Massachusetts Coastal Infrastructure Inventory and Assessment Project
Massachusetts Department of Conservation and Recreation
Office of Waterways

Outer Cape Cod - North

Provincetown
Truro
Wellfleet
Eastham

July 6, 2009

Prepared for:

Massachusetts Department of Conservation and Recreation
Hingham, Massachusetts

Presented by:
Bourne Consulting Engineering
Franklin, Massachusetts

In Association With:
Applied Coastal Research & Engineering
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  o Document Table

• MA DCR – DOCUMENT LIST
  o Document Table

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  o Document Table
  o Copies of License Documents

• USACE – PERMIT DOCUMENT LIST
  o Document Table
  o Copies of Permit Documents

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Section I

Coastal Hazards Infrastructure and Assessment Program

INTRODUCTION

PURPOSE

DEVELOPMENT OF MassGIS DATABASE ATTRIBUTES

DEVELOPMENT OF REPAIR / RECONSTRUCTION COSTS
Massachusetts Coastal Infrastructure
Inventory and Assessment Project
Coastal Hazards Commission

Section 1 – Coastal Hazards Infrastructure and Assessment Program

INTRODUCTION

The Project and Client

The Commonwealth of Massachusetts has initiated a Coastal Hazards Commission (CHC) to identify the vulnerability of the state to coastal hazards. As one of five working groups working under the CHC, the 20-Yr Infrastructure Plan was to establish a prioritization for the repair of coastal structures. The focus areas of the Working Group include:

- Publicly owned infrastructure
- Infrastructure for which State is responsible
- Inventory of public hazards infrastructure
- Evaluation on conditions
- Development for a prioritization of work
- Estimation of capital and maintenance costs

The 20-Yr Infrastructure Working Group is led by Representative Frank Hynes with CZM as the lead State Agency overseeing the management of the project. The Massachusetts coastline has been broken up into 4 major regions consisting of the North Shore, Boston, South Coast, and the Cape and Islands. The South Shore (the Towns of Hull, Cohasset, Seekonk, Hingham, Plymouth, Kingston, Scituate and Duxbury) was previously evaluated by Bourne Consulting Engineering as a demonstration project in 2006.

Consultant Team

The consultant team that performed the demonstration project was led by Bourne Consulting Engineering (BCE) of Franklin, MA who was responsible for overall project management, specified areas of field assessments, and research. Assisting BCE was Applied Coastal Research and Engineering Inc. of Mashpee, MA, Childs Engineering Corporation, of Medfield, MA., and Waterfront Engineer LLC of Stratham, NH.

PURPOSE

Study Purpose

CZM seeks to identify the capacity of Massachusetts coastal structures to resist major coastal storms and prevent storm damage. In working toward this goal, CZM has initiated a program to perform an assessment of Commonwealth owned and/or maintained coastal structures. The first phase of this program was the performance of a demonstration project for coastal structures located on the South Shore. The demonstration project identified existing structures, their general conditions, ability to provide coastal protection and the probable cost for repairs. The information collected and developed has been incorporated into the MassGIS system to allow use for developing a 20 Year Coastal Infrastructure Plan.

The demonstration project served as a basis for the current statewide inventory assessment of all Commonwealth coastal structures and the needs for their maintenance and/or repair.

Outer Cape Cod - North
Goals of Study
The goals of the Massachusetts Coastal Infrastructure Inventory and Assessment Project include:
- To identify all the coastal structures the state either owns or has responsibility to maintain for the 4 regions included within the study.
- Of the structures identified, determine the structure location and characteristics, the structure condition relative to providing coastal protection and the structure importance in relation to what it is protecting.
- To the degree possible, identify the structure elevation and the FIRM mapping flood elevation and category.
- To the degree possible, identify structure owner and available documents from local, state and federal agencies.
- To establish an estimated cost to rehabilitate the coastal structures to provide the level of project established in the structure’s original design.
- Provide the information in a format compatible for incorporation into the MassGIS system.

Limit of Study
Due to the time constraints and the amount of effort necessary to collect, process and compile the information, the following are identified as limitations of the information presented:
- All property ownership was taken as presumed. No legal investigation of ownership was performed during the project. Property ownership is based on town assessor maps. Where structures were located outshore of assessor map defined property lines, it was assumed to be Town land unless other information indicated otherwise. Where structures were located outshore of Mean Low Water, property is assumed to be State owned.
- The structure ownership was based on assessor maps and research at the local, state and federal levels. Where there was indication of public work on a structure on Town land or on private property, the structure was presumed to be Town owned. Where the structure was on state property, the structure was presumed to be state owned. Where ownership of the structure was not clear but was located on private property, the structure ownership was defined as unknown.
- The study included town and state owned structures as it was assumed that most town owned structures received state funding at some level for construction and/or maintenance.
  - Structures that were determined to be private were not included.
  - Undocumented structures considered to be on private land, but having the potential to have been publicly built and/or maintained, were identified as having an “unknown ownership”.
- The prioritizing of structures was based primarily on risk to general infrastructure and density of housing. Infrastructure included was buildings. The study did not consider all infrastructure issues including:
  - No consideration on utility impacts – water, electrical, sewer, gas
  - No consideration of roadway and bridge protection
  - Evacuation routes were not considered within the investigation
  - Location of Emergency Shelters were not included in priority assessments
- Research was performed at the local, state and federal levels. The local research was limited to location and documenting available coastal structure contract drawings. Research at DCR was restricted to available historic construction plans for coastal structures at the MA-DCR Waterways office in Hingham, MA, and MA-DCR Division of Urban Parks and Recreation in...
Boston, MA. No investigation of state archives was performed. Research at MA DEP Chapter 91 and USACE was limited to recorded permits and licenses found in their files. No investigation was performed at the Registry of Deeds.

DEVELOPMENT OF MassGIS DATABASE ATTRIBUTES

The specific attributes that would be incorporated into the MassGIS system were developed based on the scope of work and the goals to be achieved. The following was established to standardize the data collection and presentation and to allow total flexibility for sorting by attributes in the final GIS database. The attributes identified below were input into a MS Access database which was used to manage the data from all eight communities within a single file.

Database Attributes

- Attribute Descriptions/Definitions

Structure Number: A unique structure number was given to each coastal structure. The number was based on existing numbering systems that include the State Department of Environmental Protection community number followed by the local community assessor’s parcel numbering system. The last three digits of the number represent the structure within the parcel. Where structures extend over several parcels, the structure is referenced to a parcel that is approximately in the center of the structure. Where Town assessor’s references include letters, those are also included within the structure number. Some communities have block numbering within their numbering system and these are included. Communities without block numbering still have the block numbering included but these are illustrated as all zeros for that specific segment.

Structures that are on Town property, which would otherwise not have a parcel number, are referenced to a parcel that is in the immediate vicinity of the coastal structure.

On this basis, the following is the general numbering convention:

**CCC-MMM-BBB-PPP-SSS**

Where:

- CCC: DEP Community Number
- MMM: Community Map Number
- BBB: Block Number (000 if no block numbering system)
- PPP: Community Parcel Number
- SSS: Structure Number

Property Ownership: All property ownership was on a “presumed” basis as no legal verification of ownership was performed. The ownership of the property was classified under four basic areas which were private ownership (Private), Town ownership (Local), Commonwealth of Massachusetts ownership (State), federal government ownership (Federal) or unknown. Property ownership was based on Town assessor’s maps. Where the location was located above Mean Low Water, and not within a defined parcel, the property ownership was presumed to be the Town unless documentation was found to indicate otherwise. Where a structure was located offshore of Mean Low Water, the property ownership was presumed to be federal.

Structure Ownership: The ownership of all structures is presumed as no verification of ownership was performed. Ownership of the structure was determined by research into historic state and federal
permits and the entity indicated on the permits as the applicant. Where no other information was found, the following was utilized:

- Structures located on private land but appearing to be significant structures were identified as owned by the Town or as “Unknown”. Unknown was used were there was a question of local or private ownership.
- Structures on Town property were assumed to be owned by the Town
- Structures that were located off-shore were presumed to be federally owned
- Structures that were identified as being privately owned were eliminated from the database

**Basis of Ownership:** The basis of structure ownership was provided to give rationale to the structure ownership and identified the research resource that identified the ownership or the methodology otherwise used. The responses utilized were limited to the following:

- DPW – DPW Employee Interview
- DCR - Contract Drawings
- DEP – Ch 91 License
- USACE – Permits
- Property Ownership
- Offshore Structure

**Structure Owner’s Name:** Ownership names reflect the presumed owner of publicly owned structures. As this was for public structures only, the ownership was restricted to the community name, the state agency or the federal agency.

**Earliest Structure Record:** The year of the oldest document located for the structure. The information is determined from the document research performed on the structure from local, state and federal agencies. If no documents could be found than this entry is denoted as ‘Unknown’. Where documentation of the structure could be found, the date from the oldest document was utilized.

**Primary Structure / Secondary Structure:** Many of the coastal structures consisted of combined structures which were rated separately. It was typically found that one structure was significantly more predominant (Ex. Bulkhead/Seawall) and was therefore identified as the Primary Structure while a smaller structure might exist in front (ex. Revetment) of it. The type, height and material of each structure are identified separately. The condition of each structure was based on the Primary Structure. Where there was no secondary structure, the fields were left blank.

**Structure Type:** The structure type was categorized into five basic coastal structure categories which were Bulkhead/Seawall, Revetment, Coastal Beach, Coastal Dune, and Jetty/Groin.

**Structure Material:** The identification of the coastal structure’s material of construction was performed and represents the primary material. Stone structures consisted of both mortared and non-mortared conditions.

**Structure Height:** Each type of structure was categorized by its visible height in feet which was broken into four specific ranges which are:

- < 5 feet
- 5 to 10 feet
- 10 to 15 feet
- >15 feet

**Structure Condition:** A preliminary assessment of the condition for each structure was performed by the field teams. This was by visual observation only and no detailed investigation was performed. The condition assessments were based on a predefined five level rating system that ranged from Rating A for Excellent Condition to Rating F for Critical Condition. A detailed listing of the conditions and their definitions can be seen in Exhibit A.
**Priority Rating:** In order to account for the need for protection at any one site, a five level priority rating system was established. This allowed for consideration of public infrastructure protection, density of residential housing for development of structure overall importance for coastal protection. The ratings range from Level 1 for no infrastructure or residence protection to Level 5 for critical inshore infrastructure protection and/or high density residential. The detailed listing and definitions for the priority categories can be seen in Exhibit B.

**Structure Repair/Reconstruction Cost:** A preliminary estimation of construction costs to maintain or repair structures was made based on the preliminary field assessment of the structures. A Repair Cost Matrix was developed based on structure type, condition, height and material and can be seen in Exhibit C. Once each structure’s type, height, and material classifications were determined, the cost per foot for the structure was determine from the Repair Cost Matrix and multiplied by the length of the structure to obtain the estimated repair/restoration cost. The cost matrix repair costs include a 20 percent construction cost contingency as well as 10 percent costs for engineering and permitting.

**Structure Length:** The length of each structure is provided and utilized in the development of the repair/reconstruction costs. The lengths are given to the nearest foot and taken as the linear distance along the structure, as determined by the GPS location, which takes into account structure angles and curvature.

**Structure Elevation:** The elevation of structures was determined in feet from existing information where available. The datum used is NAVD 88 and elevations are to the nearest foot. From a previous study much of the south shore coastal structures had elevations defined based on LIDAR mapping data. Where available structure documentation with elevations was found, in areas with no LIDAR data, the information was included within the structure information. Where there was no LIDAR information or existing documentation, the item has been left blank.

LIDAR (Light Detection and Ranging) is technology that is currently being used for high-resolution topographic mapping by mounting a LIDAR sensor, integrated with Global Positioning System (GPS) and inertial measurement unit (IMU) technology, to the bottom of aircraft and measuring the pulse return rate to determine surface elevations.

**FEMA Zone and Elevation:** For each structure the FEMA Flood Insurance Rate Maps (FIRM) were researched for their Flood Zone designation and their Base Flood Elevation from the most recent FIRM maps for the specific Town. The elevations are provided in feet on the same datum as the FIRM maps (NGVD) with no adjustments or conversions.

**Structure Comments:** The engineering team provided a brief description and comment on the structure at the time of the field assessments which is provided in support of the condition rating that was given for the structure.

**Pictures:** At the time of the field assessments, digital photographs were taken to provide a general overview of the structure. The number of pictures was limited to a maximum of six. The first photograph for each structure is shown on the Structure Assessment Form. The list of all photographs is provided on the form.

**Town Documents:** Town documents represent the structure information that could be found in the Town’s DPW/Engineering Department records. Where particular records could be found, a table of document information was developed and included within the database with limited descriptions.
MA - DCR Documents: MA-DCR documents represent the structure information that could be found within DCR – Waterways office in Hingham. Where particular records could be found, a table of document information was developed and included within the database with limited descriptions.

MA - DEP Chp. 91 Licenses: MA-DEP Chapter 91 license documents represent the structure information that could be found within MA-DEP Chp 91 records in Boston. Where particular records could be found, they were scanned as pdf files and attached to the structure through the GIS database information. In addition, a table of license document information was developed and included within the database with limited descriptions.

USACE Permits: USACE Permits represent the structure information that could be found within the Army Corp of Engineers regulatory office in Concord, MA. Where particular records could be found, they were scanned as pdf files and attached to the structure through the GIS database information. In addition, a table of license document information was developed and included within the database with limited descriptions.

DEVELOPMENT OF REPAIR / RECONSTRUCTION COSTS

A matrix to be used within the database has been developed to assess likely rehabilitation/repair costs to restore the coastal structures to their original design condition. No attempt was made to assess the level of exposure and associated level of protection that might be required to meet current design standards for these structures. These costs are only an estimation to bring these structures back to their original design intent based on 2006 construction costs.

The development of the cost matrix is based on the following:

Structure Condition Ratings. – The condition of the coastal structures was determined in the field by the survey crew which was led by an engineer with waterfront structure assessment and design experience. The definitions of the rating criteria utilized for the assessments are presented elsewhere.

The cost implications for each rating condition are as follows:

- **A Rating** Structures not requiring any maintenance, repair or rehabilitation cost and would not be expected to experience damage if subject to a major coastal storm event.
- **B Rating** Structures requiring limited or no repair and would be expected to experience only minor damage if subject to a major coastal storm event. The value of these maintenance costs is assumed to be 10 percent of the construction cost.
- **C Rating** Structures requiring moderate to significant level of repair or reconstruction and would be expected to experience significant damage if subject to a major coastal storm event. The structure is presumed to be effective under a major storm event. The value of the repair costs is assumed to be 50 percent of the construction cost.
- **D Rating** Structures requiring significant level of rehabilitation or total reconstruction and would be expected to experience significant damage or possibly fail if subject to a major coastal storm event. The value of the repair costs is assumed to be 100 percent of the construction cost.
• F Rating  Structures requiring complete reconstruction and would expect to provide little or no protection from a major coastal storm event. The value of the repair costs is assumed to be 100 percent of the construction cost plus a cost for removal/disposal of the original structure.

**Height of Structure** – Height of a structure is a major factor in the structure cost and therefore was identified as a significant factor in assessing rehabilitation/repair construction costs. The structures were broken down into four major categories which were:

- **<5’**  Structures that were less than five feet in height
- **5’-10’**  Structures five to 10 feet in height
- **10’-15’**  Structures over 10 feet to 15 feet in height
- **>15’**  Structures greater than 15 feet in height – assumed 20 feet typical

**Length of Structure** – Length is based on field GPS location with measurements rounded to the nearest foot.

**Bulkhead / Seawall Structures** – These structures are assumed to be constructed out of concrete, steel, stone or wood with each having its own criteria for establishing costs. For each structure type the following was assumed:

- **Concrete Seawalls** – These walls were assumed to be gravity structures with the volume of concrete used based on the bottom width being one-half of the structure height. Costs of construction were based on a per cubic yard estimate that varied from $350 to $630 per cubic yard depending on the structure height. Values for excavation and demolition of existing structure were also included.

- **Stone Seawalls** - These walls were treated the same as concrete seawalls and assumed to be gravity structures with the volume of the structure based on the bottom width being one-half of the structure height. Costs of construction were based on a per cubic yard estimate that varied from $350 to $630 per cubic yard depending on the structure height. Values for excavation and demolition of existing structure were also included.

- **Steel Bulkheads** – Steel bulkheads were presumed to be constructed with steel sheet piling. Tie back systems were presumed for structures 10 feet or greater in height. Shorter walls were assumed to have a cantilever design. The total depth of sheeting was presumed to be two times the exposed height. The cost for construction varied from $40 per square foot to $60 per square foot plus the cost of excavation and demolition.

- **Timber Bulkheads** – Timber bulkheads were presumed to be constructed with timber piles at eight foot on center, horizontal wales and vertical four inch sheathing. The unit costs for installed materials used were $1,500 per pile and $7.50 per bfm.

**Revetment Structures** – Revetment structures were presumed to be constructed of dry placed (no concrete) stone with a two on one slope and a horizontal toe and crown equal to the thickness layer established for each height condition. The total thickness of the revetment layers varied from six to ten feet with the cost of armor and under-layer stone assumed to be $50 per ton and the crushed stone base to be $15 per ton.
Groins and Jetties – Groins and jetties were assumed to be the same materials and construction as the revetment structures but would have two sides and therefore double the quantities.

Coastal Beaches – Costs for restoration of Coastal beaches presumed the placement of beach renourishment sands at a 1-on-20 slope over the existing beach conditions. The cost for deposition of sand assumed relatively close source of material and utilized $20 per cubic yard for the material installed.

Coastal Dunes – Restoration of coastal dunes assumed a cross section of renourished sand with a one-on-four slope on one side of a 25 foot width at the defined dune height. The cost for deposition of sand assumed relatively close source of material and utilized $20 per cubic yard for the material installed.

Contingency – A contingency of 20 percent was added to all costs to reflect the unknowns associated with this level of rehabilitation/repair estimating.

Engineering and Regulatory Approvals – A ten percent increase to the cost matrix prices was assessed to represent the engineering design and regulatory approval requirements for the restoration of these structures.
## EXHIBIT A

**Structure Condition Table – 5 Level Rating System**

<table>
<thead>
<tr>
<th>Preliminary Condition Assessment</th>
<th>Definition Based Upon Perceived Immediacy of Action and Potential to Cause Damage if Not Corrected</th>
<th>Level of Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Excellent</td>
<td>Like new condition. Structure expected to withstand major coastal storm without damage. Stable landform (beach, dune or bank). Adequate system exists to provide protection from major coastal storm</td>
<td>None</td>
</tr>
<tr>
<td>B Good</td>
<td>Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure</td>
<td>Minor</td>
</tr>
<tr>
<td>C Fair</td>
<td>Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life</td>
<td>Moderate</td>
</tr>
<tr>
<td>D Poor</td>
<td>Structure exhibits advanced levels of deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure has strong risk of significant damage and possible failure during a major coastal storm. Structure should be monitored until repairs/reconstruction can be initiated. Actions taken to reconstruct structure to regain full capacity to resist a major coastal storm. Landform eroded, stability threatened. Landform not adequate to provide protection during major coastal storm. Actions taken to recreate landform to adequate limits for full protection from a major coastal storm.</td>
<td>Major</td>
</tr>
<tr>
<td>F Critical</td>
<td>Conditions of structure/landform may warrant emergency stabilization as failure may result in potential loss of property and/or life. Landform eroded, loss of integrity Structure exhibits critical levels of deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure provides little or no protection from a major coastal storm. Actions taken to totally reconstruct structure to regain full capacity. Landform stability is severely compromised, rate of erosion/material loss may be increasing, and landform does not provide adequate protection from a major coastal storm. Actions taken to recreate landform to adequate limits for full protection from a major coastal storm.</td>
<td>Immediate</td>
</tr>
</tbody>
</table>
EXHIBIT B

Priority Rating System - 5 Level Rating System

<table>
<thead>
<tr>
<th>Preliminary Priority Level Assessment</th>
<th>Level Based Upon Perceived Immediacy of Action and Presence of Potential Risk to Inshore Structures if Not Corrected</th>
<th>Level of Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>None</td>
<td>Long Term Planning Considerations</td>
</tr>
<tr>
<td>II</td>
<td>Low Priority, Inshore Structures Present with Limited potential for Significant Infrastructure Damage</td>
<td>Future Project Consideration</td>
</tr>
<tr>
<td>III</td>
<td>Moderate Priority, Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (&lt;1 dwelling impacted / 100 feet of shoreline)</td>
<td>Consider for Active Project Improvement Listing</td>
</tr>
<tr>
<td>IV</td>
<td>High Priority, High Value Inshore Structures with Potential for Infrastructure Damage and/or Moderate Density Residential Dwellings (1-10 dwellings impacted / 100 feet of shoreline)</td>
<td>Consider for Next Project Construction Listing</td>
</tr>
<tr>
<td>V</td>
<td>Immediate / Highest Priority, Critical Inshore Structures Present with Potential for Infrastructure Damage and/or High Density Residential Dwellings Conditions of structure may warrant emergency stabilization as failure may result in potential loss of property and/or life. (&gt;10 dwellings impacted / 100 feet of shoreline)</td>
<td>Consider For Immediate Action Due to Public Safety and Welfare Issues</td>
</tr>
</tbody>
</table>
# Exhibit C

## Repair / Rehabilitation Costing Data

Cost per linear foot of structure

<table>
<thead>
<tr>
<th>Structure Type</th>
<th>Structure Materials</th>
<th>Structure Height</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>BULKHEAD/ SEAWALL</td>
<td>CONCRETE</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$64</td>
<td>$425</td>
<td>$859</td>
<td>$983</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$152</td>
<td>$759</td>
<td>$1,818</td>
<td>$1,782</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$251</td>
<td>$1,254</td>
<td>$2,528</td>
<td>$2,970</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$396</td>
<td>$1,980</td>
<td>$3,960</td>
<td>$4,752</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STEEL</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$54</td>
<td>$273</td>
<td>$548</td>
<td>$650</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$165</td>
<td>$825</td>
<td>$1,850</td>
<td>$1,848</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$251</td>
<td>$1,254</td>
<td>$2,508</td>
<td>$2,772</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$343</td>
<td>$1,716</td>
<td>$3,432</td>
<td>$3,795</td>
<td></td>
</tr>
<tr>
<td></td>
<td>STONE</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$84</td>
<td>$425</td>
<td>$850</td>
<td>$983</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$152</td>
<td>$759</td>
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<tr>
<td></td>
<td>WOOD</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$96</td>
<td>$431</td>
<td>$862</td>
<td>$964</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$127</td>
<td>$632</td>
<td>$1,265</td>
<td>$1,463</td>
<td></td>
</tr>
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<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$161</td>
<td>$804</td>
<td>$1,608</td>
<td>$1,872</td>
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<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$202</td>
<td>$1,008</td>
<td>$2,017</td>
<td>$2,360</td>
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<tr>
<td>COASTAL BEACH</td>
<td>SAND</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$26</td>
<td>$132</td>
<td>$284</td>
<td>$264</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$127</td>
<td>$634</td>
<td>$1,267</td>
<td>$1,257</td>
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<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$224</td>
<td>$1,122</td>
<td>$2,244</td>
<td>$2,244</td>
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<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$396</td>
<td>$1,980</td>
<td>$3,960</td>
<td>$3,960</td>
<td></td>
</tr>
<tr>
<td>COASTAL DUNE</td>
<td>SAND</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$18</td>
<td>$93</td>
<td>$186</td>
<td>$186</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$48</td>
<td>$238</td>
<td>$476</td>
<td>$476</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$79</td>
<td>$395</td>
<td>$790</td>
<td>$790</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$132</td>
<td>$660</td>
<td>$1,320</td>
<td>$1,320</td>
<td></td>
</tr>
<tr>
<td>REVETMENT</td>
<td>STONE</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$66</td>
<td>$333</td>
<td>$864</td>
<td>$730</td>
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<tr>
<td></td>
<td></td>
<td>5 To 10 Feet</td>
<td>$0</td>
<td>$120</td>
<td>$801</td>
<td>$1,201</td>
<td>$1,300</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$157</td>
<td>$781</td>
<td>$1,564</td>
<td>$1,696</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$247</td>
<td>$1,234</td>
<td>$2,468</td>
<td>$2,666</td>
<td></td>
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<tr>
<td>GROIN</td>
<td>STONE</td>
<td>Under 5 Feet</td>
<td>$0</td>
<td>$132</td>
<td>$664</td>
<td>$1,323</td>
<td>$1,460</td>
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<td>5 To 10 Feet</td>
<td>$0</td>
<td>$240</td>
<td>$1,201</td>
<td>$2,402</td>
<td>$2,600</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>10 To 15 Feet</td>
<td>$0</td>
<td>$314</td>
<td>$1,564</td>
<td>$3,128</td>
<td>$3,362</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Over 15 Feet</td>
<td>$0</td>
<td>$494</td>
<td>$2,468</td>
<td>$4,932</td>
<td>$5,333</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Repair / Rehabilitation Costs include 10% for engineering and regulatory approvals and 20% construction contingency.
Section II

Provincetown
STRUCTURE REPAIR / RECONSTRUCTION COST - Town of Provincetown

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>Structure Condition Rating</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulwark / Seawall</td>
<td>3</td>
<td>$66,495 $1,254,000</td>
<td>$1,320,495</td>
</tr>
<tr>
<td>Revetment</td>
<td>3</td>
<td>$54,054 $1,953,000</td>
<td>$2,007,554</td>
</tr>
<tr>
<td>Breakwater</td>
<td>2</td>
<td>$2,669,000</td>
<td>$2,669,000</td>
</tr>
<tr>
<td>Groin / Jetty</td>
<td>3</td>
<td>$116,200 $1,500,550</td>
<td>$1,616,750</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td></td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Coastal Beach</td>
<td></td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>$2,789,549 $3,323,800 $1,500,550</td>
<td>$7,013,899</td>
</tr>
</tbody>
</table>

Based on the limited research within the scope of this project research, the presumed ownership of the structures was established on an initial basis and would be subject to more intense review in future tasks. Structures identified as being owned privately were excluded from further consideration. Although ownership of the land on which the structure was located was a factor, the structure ownership was treated as a separate issue from land ownership. For the Town of Provincetown, the breakdown of structures by assumed ownership is as follows:

STRUCTURE OWNERSHIP / REPAIR COST - Town of Provincetown

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>Structure Condition Rating</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town Owned</td>
<td>10</td>
<td>$2,789,549 $3,323,800 $1,500,550</td>
<td>$7,013,899</td>
</tr>
<tr>
<td>Commonwealth of Massachusetts</td>
<td>-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Federal Government Owned</td>
<td>-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Unknown Ownership</td>
<td>1</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>$2,789,549 $3,323,800 $1,500,550</td>
<td>$7,013,899</td>
</tr>
</tbody>
</table>

The identification of presumed ownership was not based on the investigation of legal documents but relied on property ownership and from construction and regulatory documents that were found. A more detailed investigation of legal documents and agreements would be required where structure ownership is disputed. A more detailed identification of structure type, length, condition and location can be found in Section II-B which contains Structure Assessment Reports for each individual structure found.

SUMMARY

The enclosed reports and associated documents reflects the Town of Provincetown’s coastal structure information that will eventually be input into a state-wide GIS database and will be accessible through MassGIS. This data, when compiled state-wide, will be critical in the development of both short term and long term planning for maintaining and improving Massachusetts coastal protection.

This database will also provide relatively quick access to identify available documentation for these structures as well as the ability to be updated as coastal structure improvements are made.
Based on the limited research within the scope of this project research, the presumed ownership of the structures was established on an initial basis and would be subject to more intense review in future tasks. Structures identified as being owned privately were excluded from further consideration. Although ownership of the land on which the structure was located was a factor, the structure ownership was treated as a separate issue from land ownership. For the Town of Provincetown, the breakdown of structures by assumed ownership is as follows:

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**SUMMARY**

The enclosed reports and associated documents reflects the Town of Provincetown’s coastal structure information that will eventually be input into a state-wide GIS database and will be accessible through MassGIS. This data, when compiled state-wide, will be critical in the development of both short term and long term planning for maintaining and improving Massachusetts coastal protection.

This database will also provide relatively quick access to identify available documentation for these structures as well as the ability to be updated as coastal structure improvements are made.
Section II - Provincetown

Part B

Structure Assessment Reports
Property Owner: Private
Presumed Structure Owner: Local
Owner Name: Provincetown

Location: Pilgrims First Landing Park
Based On Comment: 

Earliest Structure Record: 1956
Estimated Reconstruction/Repair Cost: $976,800.00

Length: 1250 Feet
Top Elevation: 9 Feet NAVD 88
FIRM Map Zone: V4
FIRM Map Elevation: 13 Feet NGVD

Primary Type: Revetment
Primary Material: Stone
Primary Height: 10 to 15 Feet
Secondary Type: 
Secondary Material: 
Secondary Height: 

Structure Summary:
Placed stone riprap at a 1 on 2 slope. Stones are 3 feet by 2 feet by 2 feet on average. No visible scour. There has been many asphalt and concrete repairs. Behind is a hotel.

Condition Rating
C
Fair
Level of Action Description
Moderate
Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating
IV
High Priority
Action Description
Consider for Next Project Construction Listing
High Value Inshore Structures with Potential for infrastructure Damage and/or Moderate Density Residential Dwellings (1-10 dwellings impacted / 100 feet of shoreline)

Structure Images:
058-051-000-002-100-PH01A.jpg

Structure Documents:
USAGE November 1 Proposed Fill in 058-051-000-002-100-COE1A

Prepared By: Bourne Consulting Engineering
# CZM Coastal Infrastructure Inventory and Assessment

## Structure Assessment Form

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Long Point Marshes</td>
<td>10/25/2007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Presumed Structure Owner:</th>
<th>Based On Comment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner Name:</th>
<th>Earliest Structure Record:</th>
<th>Estimated Reconstruction/Repair Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincetown</td>
<td>Unknown</td>
<td>$54,054.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length:</th>
<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>450 Feet</td>
<td>6 Feet NAVD 88</td>
<td>V4</td>
<td>13 Feet NGVD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revetment</td>
<td>Stone</td>
<td>5 to 10 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
</table>

### Structure Summary:
Placed stone riprap at a little slope. Stones are 3 feet by 2 feet by 2 feet on average. No visible scour or erosion. There is a road, a few houses, and a park behind.

### Condition Rating
- **Level of Action Description**
  - Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

### Priority Rating
- **Level of Action Description**
  - Inshore Structures with potential for infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

### Structure Images:
- 058-051-000-002-200-PHO2A.jpg
- 058-051-000-002-200-PHO2B.jpg

### Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Provincetown

Location: Long Point Marshes
Based On Comment:

Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $1,884,000.00

Date: 10/25/2007

Length: Top Elevation: FIRM Map Zone: FIRM Map Elevation:
6000 5 V4 13
Feet Feet NAVD 88 Feet NGVD

Primary Type: Breakwater
Primary Material: Stone
Primary Height: 10 to 15 Feet

Secondary Type: Secondary Material: Secondary Height:

Structure Summary:
Placed stone dike with stones that are 3 feet by 2 feet by 2 feet on average. Minor stone movement and no visible scour. Provincetown Harbor is in front and there is marsh behind.

Condition Rating
B Good

Level of Action Description
Minor Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform is adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
1 None Long Term Planning Considerations No Inshore Structures or Residential Dwelling

Structure Images:
058-351-000-002-300-PHO3A.jpg
058-351-000-002-300-PHO3B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
**CZM Coastal Infrastructure Inventory and Assessment**

**Structure Assessment Form**

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
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</thead>
<tbody>
<tr>
<td>Local</td>
<td>Commercial Street</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Presumed Structure Owner:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>10/25/2007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner Name:</th>
<th>Earliest Structure Record:</th>
<th>Estimated Reconstruction/Repair Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincetown</td>
<td>1934</td>
<td>$1,062,336.00</td>
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<th>FIRM Map Elevation:</th>
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</thead>
<tbody>
<tr>
<td>800 Feet</td>
<td>Feet NAVD 88</td>
<td>V4</td>
<td>14 Feet NGVD</td>
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<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groin/ Jetty</td>
<td>Stone</td>
<td>Under 5 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Structure Summary:**
Set of dumped stone groins. The stones are coming unravelled. There are signs of stone movement and section loss. The groins are in front of houses.

**Condition Rating**
- Poor

**Level of Action Description**
Structure exhibits advanced levels of deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure has strong risk of significant damage and possible failure during a major coastal storm. Structure should be monitored until repairs/reconstruction can be initiated. Actions taken to reconstruct structure to regain full capacity to resist a major coastal storm. Landform eroded, stability threatened. Landform not adequate to provide protection during major coastal storm. Actions taken to recreate landform to adequate limits for full protection from a major coastal storm.

**Priority Rating Action Description**
- Moderate Priority
- Consider for Active Project Improvement Listing
- Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings ( <1 dwelling impacted / 100 feet of shoreline)

**Structure Images:**
- 056-062-000-013-100-PHO1A.jpg

**Structure Documents:**
- MA-DCR | May 1934 | Proposed Stone | 058-062-000-013-100-DCR1A
- MA-DCR | August 1938 | Proposed Shore | 058-062-000-013-100-DCR1B

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Provincetown
Location: Commercial Street
Based On Comment:
Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $116,200.00
Date: 10/25/2007

Length: 175 Feet
Top Elevation: 7 Feet NAVD 88
FIRM Map Zone: V4
FIRM Map Elevation: 13 Feet NGVD

Primary Type: Groin/ Jetty
Primary Material: Stone
Primary Height: Under 5 Feet
Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
Set of 3 dumped stone groins. There is moderate stone movement and section loss. The stones are on average 4 feet by 3 feet by 3 feet in size. There appears to be relics of old groins along the coast also.

Condition Rating
Level of Action Description
C Moderate Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating Action Description
III Moderate Priority Consider for Active Project Improvement Listing Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

Structure Images:
[058-062-000-013-200-PHO2A.jpg]

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local  
Presumed Structure Owner: Local  
Owner Name: Provincetown  
Location: Commercial Street  
Based On Comment:  
Earliest Structure Record: Unknown  
Estimated Reconstruction/Repair Cost: $438,214.00  
Date: 10/25/2007  

| Length: 330 Feet | Top Elevation: 8 Feet NAVD 88 | FIRM Map Zone: V4 | FIRM Map Elevation: 13 Feet NGVD |

Primary Type: Groin/ Jetty  
Primary Material: Stone  
Primary Height: Under 5 Feet  
Secondary Type:  
Secondary Material:  
Secondary Height:  

Structure Summary: Set of 6 dumped stone groins. Moderate to heavy stone movement and section loss. Stones are 4 feet by 3 feet by 3 feet on average. There appears to be relics of old groins along the coast.

Condition Rating Level of Action Description  
Priority Rating Action Description  

III Moderate Priority Consider for Active Project Improvement Listing  
Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

Condition Rating Level of Action Description  
Priority Rating Action Description  

Structure Images:  
[058-062-000-013-300-PHO3A.jpg]  
[058-062-000-013-300-PHO3B.jpg]  

Structure Documents:  

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Provincetown

Location: Town Boat Ramp
Based On Comment: 
Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $18,975.00

<table>
<thead>
<tr>
<th>Length: 125 Feet</th>
<th>Top Elevation: 11 Feet NAVD 88</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRM Map Zone: V4</td>
<td>FIRM Map Elevation: 11 Feet NGVD</td>
</tr>
<tr>
<td>Primary Type: Bulkhead/ Seawall</td>
<td></td>
</tr>
<tr>
<td>Secondary Type:</td>
<td></td>
</tr>
<tr>
<td>Primary Material: Concrete</td>
<td></td>
</tr>
<tr>
<td>Secondary Material:</td>
<td></td>
</tr>
<tr>
<td>Primary Height: 5 to 10 Feet</td>
<td></td>
</tr>
<tr>
<td>Secondary Height:</td>
<td></td>
</tr>
</tbody>
</table>

Structure Summary: Concrete wall with sand beach in front. Parking lot and houses behind. No visible signs of erosion.

Condition Rating Level of Action Description
B Good Minor Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
IV High Priority Consider for Next Project Construction Listing High Value inshore Structures with Potential for Infrastructure Damage and/or Moderate Density Residential Dwellings (1-10 dwellings impacted / 100 feet of shoreline)

Structure Images:
058-062-000-020-100-PHO1A.jpg
058-062-000-020-100-PHO1B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Provincetown
Location: Town Boat Ramp
Based On Comment: 
Earliest Structure Record: 1976
Estimated Reconstruction/Repair Cost: $47,520.00

<table>
<thead>
<tr>
<th>Length</th>
<th>Top Elevation</th>
<th>FIRM Map Zone</th>
<th>FIRM Map Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 Feet</td>
<td>9 Feet NAVD 88</td>
<td>V4</td>
<td>11 Feet NGVD</td>
</tr>
</tbody>
</table>

Primary Type: Bulkhead/Seawall
Secondary Type: Revetment

Primary Material: Concrete
Secondary Material: Concrete

Primary Height: 10 to 15 Feet
Secondary Height: Under 5 Feet

Structure Summary:
Concrete wall with sand beach in front. Parking lot and houses behind. No visible signs of erosion. Has ramp and riprap in front. There are concrete slabs in front of the riprap and stone. The slabs are 4 feet by 4 feet. Minor cracking on wall.

Condition Rating
Level of Action Description
Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
IV
High Priority
Consider for Next Project Construction Listing
High Value Inshore Structures with Potential for Infrastructure Damage and/or Moderate Density Residential Dwellings (1-10 dwellings impacted / 100 feet of shoreline)

Structure Images:
[058-062-000-020-200-PHO2A.jpg](058-062-000-020-200-PHO2A.jpg)
[058-062-000-020-200-PHO2B.jpg](058-062-000-020-200-PHO2B.jpg)
[058-062-000-020-200-PHO2C.jpg](058-062-000-020-200-PHO2C.jpg)

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Provincetown

Location: MacMillan Wharf
Based On Comment:

Earliest Structure Record: 1956
Estimated Reconstruction/Repair Cost: $1,254,000.00

Date: 10/25/2007

Length: 1000 Feet
Top Elevation: 10 Feet NAVD 88
FIRM Map Zone: V4
FIRM Map Elevation: 15 Feet NGVD

Primary Type: Bulkhead/Seawall
Primary Material: Steel
Primary Height: 10 to 15 Feet

Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
Sheetpile bulkhead is cased with concrete. There is moderate cracking and spalling on the concrete. Attached to the bulkhead is two piers. Behind is parking and buildings.

Condition Rating: C Fair
Level of Action Description: Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating: V Immediate / Highest Priority
Action Description: Consider For Immediate Action Due to Public Safety and Welfare Issues
Critical Inshore Structures Present with Potential for Infrastructure Damage and/or High Density Residential Dwellings Condition of structure may warrant emergency stabilization as failure may result in potential loss of property and/or life. (>10 dwellings impacted / 100 feet of shoreline)

Structure Images:
058-113-000-019-100-PH01A.jpg

Structure Documents:
USACE November 1 Proposed Fill in 058-113-000-019-100-COE1A
USACE July 1974 Proposed Bulkhead 058-113-000-019-100-COE1C
USACE December 1 Proposed Sheet 058-113-000-019-100-COEB
DEP February 19 Plan Accompanying 058-113-000-019-100-LIC1A
DEP July 1961 Plan Accompanying 058-113-000-019-100-LIC1B
DEP March 21, 20 Plan Accompanying 058-113-000-019-100-LIC1C

Prepared By: Bourne Consulting Engineering
# CZM Coastal Infrastructure Inventory and Assessment

## Structure Assessment Form

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Provincetown Harbor Breakwater</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Presumed Structure Owner:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Local</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner Name:</th>
<th>Estimated Reconstruction/Repair Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provincetown</td>
<td>$785,000.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length:</th>
<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 Feet</td>
<td>2500 Feet NAVD 88</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakwater</td>
<td>Stone</td>
<td>10 to 15 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
</table>

### Structure Summary:
Detached dumped stone breakwater located in Provincetown Harbor. Stones are 6 feet by 3 feet by 3 feet on average. Minor to moderate stone movement.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rating</th>
<th>Priority</th>
<th>Level of Action</th>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Good</td>
<td>V</td>
<td>Minor</td>
<td></td>
<td>Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.</td>
</tr>
</tbody>
</table>

### Structure Images:
- [058-113-000-019-200-PHO2A.jpg](058-113-000-019-200-PHO2A.jpg)
- [058-113-000-019-200-PHO2B.jpg](058-113-000-019-200-PHO2B.jpg)

### Structure Documents:

Prepared By: Bourne Consulting Engineering
### CZM Coastal Infrastructure Inventory and Assessment

#### Structure Assessment Form

**Property Owner:**
- Local

**Presumed Structure Owner:**
- Local

**Owner Name:**
- Provincetown

**Location:**
- Mayflower Heights

**Based On Comment:**

**Earliest Structure Record:**
- Unknown

**Estimated Reconstruction/Repair Cost:**
- $976,800.00

**Date:**
- 10/25/2007

<table>
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<tr>
<th>Length:</th>
<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
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<tbody>
<tr>
<td>1250 Feet</td>
<td>10 Feet NAVD 88</td>
<td>V2</td>
<td>13 Feet NGVD</td>
</tr>
</tbody>
</table>

**Primary Type:**
- Revetment

**Primary Material:**
- Stone

**Primary Height:**
- 10 to 15 Feet

**Secondary Type:**

**Secondary Material:**

**Secondary Height:**

**Structure Summary:**
- Dumped stone riprap. Stones are 3 feet by 2 feet by 1 foot on average. No visible scour. Moderate section loss and stone movement are visible. Behind is road into town and buildings.

**Condition Rating:**
- C
  - Fair

**Level of Action Description:**
- Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

**Priority Rating Action Description:**
- V
  - Immediate / Highest Priority
  - Consider For Immediate Action Due to Public Safety and Welfare Issues
  - Critical Inshore Structures Present with Potential for Infrastructure Damage and/or High Density Residential Dwellings Condition of structure may warrant emergency stabilization as failure may result in potential loss of property and/or life. (>10 dwellings impacted / 100 feet of shoreline)

**Structure Images:**
- 058-182-000-009-100-PHO1A.jpg
- 058-182-000-009-100-PHO1B.jpg

**Structure Documents:**

Prepared By: Bourne Consulting Engineering
Section II - Provincetown

Part C

Structure Photographs
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
<th>Description</th>
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<td>058-051-000-002-100-PH01A.jpg</td>
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<td>Structure Location</td>
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<td>058-051-000-002-200</td>
<td>058-051-000-002-200-PH02A.jpg</td>
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</tbody>
</table>
Section II - Provincetown

Part D

Structure Documents

TOWN DOCUMENT LIST

MA DCR - DOCUMENT LIST

MA DEP – Ch 91 DOCUMENT LIST

• Copies of License Documents

USACE – PERMIT DOCUMENT LIST

• Copies of Permit Documents
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
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<td>058-062-000-013-100</td>
<td>058-062-000-013-100-DCR1A</td>
<td>406</td>
<td>MA-DCR</td>
<td>Provincetown</td>
<td>May 1934</td>
<td>Proposed Stone Jetties - Bathing Beach - Province Lands - Provincetown - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>Bathing Beach</td>
<td>Stone Jetties</td>
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<td>058-062-000-013-100-DCR1E</td>
<td>543</td>
<td>MA-DCR</td>
<td>Provincetown</td>
<td>August 1938</td>
<td>Proposed Shore Protection - Provincetown - Prepared for the DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Saint Mary of the Harbor Episcopal Church Area</td>
<td>Groins</td>
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<tr>
<td>BCE Structure No</td>
<td>Document No</td>
<td>Contract/ Drawing Number</td>
<td>Entity</td>
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<td>108</td>
<td>DEP</td>
<td>Provincetown</td>
<td>April 23, 1970</td>
<td>Plan Accompanying Petition of the Town of Provincetown to Maintain as Built a Reinforced Concrete Boat Ramp with Reinforced Concrete Retaining Walls in Provincetown Harbor at Provincetown, County of Barnstable, Massachusetts</td>
<td>1</td>
<td>Provincetown Harbor</td>
<td>Retaining Walls Around Boat Ramp</td>
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<td>059-113-000-019-100</td>
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<td>4055</td>
<td>DEP</td>
<td>Provincetown</td>
<td>February 1958</td>
<td>Plan Accompanying Petition of Town of Provincetown to Drive Sheet Steel Bulkhead and Fill in Provincetown Harbor at Provincetown</td>
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<td>Town Pier</td>
<td>Fill with Bulkhead</td>
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<td>059-113-000-019-102</td>
<td>059-113-000-019-102-LIC1B</td>
<td>4460</td>
<td>DEP</td>
<td>Provincetown</td>
<td>July 1961</td>
<td>Plan Accompanying Petitions of Town of Provincetown and Monument Pier Co. Inc. to Maintain Sheet Steel Bulkhead and Fill in Provincetown Harbor</td>
<td>1</td>
<td>Town Pier</td>
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<tr>
<td>059-113-000-019-100</td>
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<td>8621</td>
<td>DEP</td>
<td>Provincetown</td>
<td>March 21, 2000</td>
<td>Plan Accompanying Petition of Town of Provincetown to License, Reconstrcut and Maintain MacMillan Pier, Dredge and Perform Beach Nourishment in Provincetown Harbor, Town of Provincetown, County of Barnstable, Massachusetts</td>
<td>22</td>
<td>Provincetown Harbor</td>
<td>Beach Nourishment</td>
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</table>
PLAN ACCOMPANYING PETITION OF THE
TOWN OF PROVINCETOWN

TO maintain as built a
REINFORCED CONCRETE BOAT RAMP
WITH REINFORCED CONCRETE
RETAINING WALLS
IN PROVINCETOWN HARBOR
AT PROVINCETOWN
COUNTY OF BARNSTABLE, MASSACHUSETTS
JUNE, 1975
PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS.

LICENSE PLAN NO. 5621
Approved by Department of Environmental Protection
Date: OCT 1 & 2000

PIER RECONSTRUCTION PLAN

MARCH 21, 2000 (REVISED)
AUGUST 27, 1999
SHEET 8 OF 9
LICENSE PLAN NO. 8621

Approved by Department of Environmental Protection
Date: OCT 16 2000

PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS
BURLINGTON, MASS.

PLAN OF RECONFIGURATION
AND CONSTRUCTION ZONE

SCALE: 1" = 200'

MARCH 21, 2000 (REVISED)
MAIN PIER PILES
146 STEEL PIPE PILES TOTAL
66 TIMBER PILES TOTAL

MAIN PIER
SECTION C-C

SCALE: 1"=20'

TEE SECTION
SECTION D-D

TEE SECTION PILES
128 STEEL PIPE PILES TOTAL
120 TIMBER PILES TOTAL
FINGER PIER EXTENSION

SCALE: 1"=10'

LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection
Date OCT 16 2000

PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS

MARCH 21, 2000 (REVISED)
PLAN - ACCESSIBLE FLOAT

NOTES:
1. 8 STEEL PIPE PILES TOTAL
2. SEE SHEET 9 FOR ELEVATIONS J-J AND K-K.

SCALE: 1"=20'

NON-SLIP URETHANE COATING WITH ALUMINUM OXIDE GRIT

FREEBOARD VARIES, 4'-'0" TO 5'-'0" AND 3'-'0" AT 16'x4C FLOAT

CONCRETE BALLAST
STEEL BALLAST

STEEL PLATE
STEEL FRAME

COAL TAR EPOXY COATING

Typical Float Section

Not to Scale

LICENSE PLAN NO. 5621
Approved by Department of Environmental Protection
Date OCT 16 2000

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS

MARCH 21, 2000 (REVISED)
ELEV +23.00

MHW : 9.1
MLW : 0.0
4'-0" FREEBOARD

EXIST. GROUND (-16.0±)

BARGE SHALL CONSIST OF A MIN. OF SIX COMPARTMENTS

24" ø x 1/2" WALL THICKNESS, CONCRETE FILLED STEEL PIPE PILE, TYP

EDGE OF PIER
EL. 17.6
EL. 16.0±

MLW : 0.0
3'-0" FREEBOARD

56' RAMPRIDER GANGLWAY

PLATFORM CAR

STEEL WEAR PLATE UNDER FULL RANGE OF ROLLER

CALL/SEND STATION (MOUNTED ON GANGWAY)

4'-0" FREEBOARD

LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection Date OCT 16 2000

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BOSTON, MA

ELEVATION J-J

SCALE: 1"=20'

ELEVATION K-K

SCALE: 1"=20'

MARCH 21, 2000 (REVISED)
LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection
Date OCT 16 2000

PLAN - COURTESY DOCK

SCALE: 1" = 20'

NOTE:
THE COURTESY FLOAT AND GANGWAY SHOWN WILL BE REVISED TO AN ACCESSIBLE FLOAT WITH A NON-MECHANICAL RAMP/GANGWAY SYSTEM.

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS.

ELEVATION A-A
SCALE: 1" = 20'

COURTESY DOCK SECTION B-B
SCALE: 1/8" = 1'-0"
DECK PLAN — FLOATING DOCKS

0  60'
SCALE: 1" = 80'

LICENSE PLAN NO.  PL21
Approved by Department of Environmental Protection
Date OCT 18 2000

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS

LEGEND
- 10.75" OD STEEL PIPE GUIDE PILE (TOTAL = 36)

COMMONWEALTH OF MASSACHUSETTS
PROFESSIONAL ENGINEER
NO. 37119
MARCH 21, 2000 (REVISED)
PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS

LICENSE PLAN NO. 8621

TYPICAL SECTION

VESSSEL GROUNDING FRAME

Approved by Department of Environmental Protection
Date: OCT 16 2000

SCALE: $\frac{1}{8}''=1'-0''$

Vessel Grounding Frame

12x12x2'-0" Block
DAP 3", TYP.

EXISTING GROUND
EL. 4.0±

TIMBER PILES (6 TOTAL)

MLW EL. 0.0

TIP EL.-6.0

EL. 18.0

EL. 12.0

MHW EL. 9.1

SCALE: $\frac{1}{8}''=1'-0''$

DAVID P. ANDERSON
CIVIL ENGINEER
No. 37116

MARCH 21, 2000 (RECEIVED)
Plan accompanying petition of Town of Provincetown to license, reconstruct and maintain MacMillan Pier, dredge and perform beach nourishment in Provincetown Harbor, Town of Provincetown Fay, Spofford & Thorndike, Inc. Engineers Burlington, Mass. March 21, 2000 (Revised)
PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS
BURLINGTON, MASS

LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection
Date: OCT 16 2000

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

ELEVATION M-M

SECTION N-N

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

MARCH 21, 2000
(AUGUST 27, 1999) (REVISED)

DAVID P.
ANDERSON
CIVIL
No. 871
DREDGING PLAN

DREDGE TO EL. -3.0 FT MLW SLOPE
DREDGE TO EL. -6.0 FT MLW
MEET EXISTING GRADE

SCALE: 1" = 300'

SECTION A-A (TYP.)

EDGE OF NEW PIER
EL. 16.5'

39'-8"

DREDGE TO EL. -10.0 FT MLW SLOPE
MEET EXISTING GRADE

SCALE: 1" = 30'

SECTION B-B (TYP.)

DATE: OCT 16 2000

APPROVED BY DEPARTMENT OF ENVIRONMENTAL PROTECTION

LICENSE PLAN NO. S627

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORDIKE, INC. ENGINEERS
BURLINGTON, MASS.
PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS
BURLINGTON, MASS

SECTION A-A

SCALE: 1"=40'

MARCH 21, 2000

(PREVISED)
LICENSE PLAN NO. 8621

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN

FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS

MARCH 21, 2000

SCALE: 1"=1'-0"

MLW ELEV. 0.0

DAVID P. ANDERSON CIVIL No. 37119 (REVISED)

DAVID P. ANDERSON CIVIL No. 37119 (REVISED)

(058-113-000-019-100)
LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection
Date OCT 16 2000

PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS.

PLAN
SCALE: 1"=20'
MARCH 21, 2000 (REVISED)
AUGUST 27, 1999
SHEET 18 OF 21
PLAN ACCOMPANYING PETITION OF TOWN OF PROVINCETOWN TO LICENSE, RECONSTRUCT AND MAINTAIN MACMILLAN PIER, DREDGE AND PERFORM BEACH NOURISHMENT IN PROVINCETOWN HARBOR, TOWN OF PROVINCETOWN FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS BURLINGTON, MASS.

T = TOWN OF PROVINCETOWN OWNER

ABUTTERS PLAN

SCALE: 1"=300'

LICENSE PLAN NO. 9424

APPROVED BY DEPARTMENT OF ENVIRONMENTAL PROTECTION

MARCH 21, 2000

DAVID P. ANDERSON CIVIL
No. 3215

(REVISED) AUGUST 22, 1999 SHEET 10 OF 22
LIST OF ABUTTERS

1. LAZIER ROBERT T
   C/O KIT WILLIAMS
   PO BOX 1325
   VAIL, CO 81658

2. CABRAL ENTERPRISES, INC
   FISHERMEN'S WHARF
   PROVINCETOWN, MA 02657

3. DDK INC
   PO BOX 337
   PROVINCETOWN, MA 02657

4. LUCCI REALTY INC
   32 CONANT ST
   PROVINCETOWN, MA 02657

5. 321 COMMERCIAL ST REALTY TRUST
   321 COMMERCIAL ST
   PROVINCETOWN, MA 02657

6. LUCCI REALTY INC
   32 CONANT ST
   PROVINCETOWN, MA 02657

7. GRACE JOHN T ET AL
   PO BOX 658
   PROVINCETOWN, MA 02657

8. PROVINCETOWN BOARD OF TRADE
   PO BOX 1017
   PROVINCETOWN, MA 02657

9. SCHLOSBERG PHYLLIS E
   5 WEBSTER PL
   PROVINCETOWN, MA 02657

10. ROBERTS MARGARET RUTH LEAF
    ESTATE OF MARY MORAN
    7034 COPPERWOOD WAY
    COLUMBIA, MD 21046

11. JANOUSIS MICHAEL J JR
    6 BROWNE ST
    PROVINCETOWN, MA 02657

12. BROTHIE MARY M.
    1001 NW 2ND AVE
    BOCA RATON, FL 33432

13. INVESTOR BANK OF AMERICA, INC
    178 BRADFORD ST
    PROVINCETOWN, MA 02657

14. SMALLS COURT REALTY TRUST
    PO BOX 384
    OSERVILLE, MA 02655

15. LEWIS ALAN I. ET AL
    50 CONGRESS ST #50
    PROVINCETOWN, MA 02657

16. MURIEL COILL REVOCABLE
    TRUST/MURIEL COILL TTEE
    50 CONGRESS ST SUITE 615
    BOSTON, MA 02109

17. GOV WILLIAM BRADFORD
    REALTY TRUST
    314 COMMERCIAL ST
    PROVINCETOWN, MA 02657

18. GOV WILLIAM BRADFORD
    REALTY TRUST
    314 COMMERCIAL ST
    PROVINCETOWN, MA 02657

LICENSE PLAN NO. 8621
Approved by Department of Environmental Protection
Date OCT 16 2000

PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS
BURLINGTON, MASS.

MARCH 21, 2000 (REVISED)
AUGUST 27, 1999
LIST OF ABUTTERS

18 LISA, ROSE, FABIEN LUSTIGMAN
   8 SUNNYFIELD
   LONDON NW7 4RG ENGLAND

19 LISA, ROSE, FABIEN LUSTIGMAN
   8 SUNNYFIELD
   LONDON NW7 4RG ENGLAND

20 CHARLES S. MCKENZIE, ET AL
   RIPLEY FAMILY TRUST
   64288 E GOLDEN SPUR CT.
   TUCSON AZ 85739

21 SUSAN SWEENEY ET AL
   915 LAWTON ST.
   MCLEAN, VA 22101

22 ELIZABETH SCHWARZ
   676 COMMERCIAL ST
   PROVINCETOWN, MA 02657

23 ROGER S. LOCKE
   682 COMMERCIAL ST.
   PROVINCETOWN, MA 02657

24 ROGER S. LOCKE ET AL TTEES
   682 COMMERCIAL ST.
   PROVINCETOWN, MA 02657

25 OWNER'S UNKNOWN
   686 COMMERCIAL ST.
   PROVINCETOWN, MA 02657

26 THOMAS VASILOS ET UX
   STEPHANIE VASILOS
   72 COTTAGE PARK ROAD
   WINTHROP, MA 02152

27 BEACH POINT REALTY TRUST
   FRED E. SATERIALE TTEE
   P.O. BOX 392
   PROVINCETOWN, MA 02657

28 BEACH POINT REALTY TRUST
   FRED E. SATERIALE TTEE
   P.O. BOX 392
   PROVINCETOWN, MA 02657

29 TIMPAM REALTY TRUST
   TIMOTHY F. MCNULTY TTEE
   742 COMMERCIAL ST
   PROVINCETOWN, MA 02657

30 HEIDI J. SCHMIDT
   730 COMMERCIAL ST
   PROVINCETOWN, MA 02657

31 DONALD J. SLATER ET UX
   VALERIE P. SLATER
   6916 HICKORY CREEK
   PLANO, TX 75023

32 KATHERINE E. BACHMAN ET AL
   KATHERINE F. THURMOND
   12 THORNDIKE ST.
   BROOKLINE, MA 02146

33 LEONARD H. ALBERTS MD
   P.O. BOX 276
   PROVINCETOWN, MA 02657

34 HALCYONE HTASHA
   P.O. BOX 993
   PROVINCETOWN, MA 02657

LICENSE PLAN NO. 8021

PLAN ACCOMPANYING PETITION OF
TOWN OF PROVINCETOWN TO LICENSE,
RECONSTRUCT AND MAINTAIN
MACMILLAN PIER, DREDGE AND PERFORM
BEACH NOURISHMENT IN PROVINCETOWN
HARBOR, TOWN OF PROVINCETOWN
FAY, SPOFFORD & THORNDIKE, INC. ENGINEERS
BURLINGTON, MASS.

DAVID P. ANDERSON
CIVIL
No. 37119
REGISTERED ENGINEER

MARCH 21, 2000 (REVISED)
AUGUST 27, 1999 SHEET 22 OF
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Shots</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>058-051-000-002-100</td>
<td>058-051-000-002-100-CDE1A</td>
<td>61-223</td>
<td>USACE</td>
<td>Provincetown</td>
<td>November 1966</td>
<td>Proposed Fill in Provincetown Harbor at Provincetown, Massachusetts, County of Barnstable</td>
<td>4</td>
<td>Commercial Street</td>
<td>Fill with Bulkhead Adjacent to Breakwater</td>
</tr>
<tr>
<td>058-113-000-019-100</td>
<td>058-113-000-019-100-CDE1A</td>
<td>59-147</td>
<td>USACE</td>
<td>Provincetown</td>
<td>December 1967</td>
<td>Proposed Sheet Steel Bulkhead and Fill in Provincetown Harbor - Provincetown, Mass. - Application by Town of Provincetown</td>
<td>1</td>
<td>Town Pier</td>
<td>Fill with Bulkhead</td>
</tr>
<tr>
<td>058-113-000-019-100</td>
<td>058-113-000-019-100-CDE1B</td>
<td>61-223</td>
<td>USACE</td>
<td>Provincetown</td>
<td>November 1966</td>
<td>Proposed Fill in Provincetown Harbor at Provincetown, Massachusetts, County of Barnstable</td>
<td>4</td>
<td>Town Pier</td>
<td>Fill with Bulkhead</td>
</tr>
<tr>
<td>058-113-000-015-100</td>
<td>058-113-000-019-100-COE1C</td>
<td>75-90</td>
<td>USACE</td>
<td>Provincetown</td>
<td>July 1974</td>
<td>Proposed Bulkhead Modification in Provincetown Harbor at Provincetown, County of Barnstable, Massachusetts</td>
<td>3</td>
<td>Town Pier</td>
<td>Fill with Bulkhead</td>
</tr>
</tbody>
</table>
Elevations based on mean higher water level survey station SP elev. 10.54
Note: Elevations are in feet and heights above mean lower low water
Elevations below mean low water

SECTION AT BB

PLAN

PROFILE AT AA (Typical Section)

Application by Provencetown...
PLAN ACCOMPANYING PETITIONS OF TOWN OF PROVINCETOWN

MONUMENT FISH CO. INC.
To Maintain Sheet Steel Bulkhead & Fill
PROVINCETOWN HARBOR
PROVINCETOWN, MASS.

FRANCIS J. ALVES

COMMONWEALTH OF MASSACHUSETTS
REGISTERED ENGINEER
PLAN ACCOMPANYING PETITIONS OF TOWN OF PROVINCETOWN
MONUMENT FISH CO. INC.
To Maintain Sheet Steel Bulwark & Fill
PROVINCETOWN HARBOR
PROPOSED SHEET STEEL BULKHEAD & FILL IN PROVINCETOWN HARBOR, PROVINCETOWN MASS. APPLICATION BY TOWN OF PROVINCETOWN DECEMBER 1957
PLAN ACCOMPANYING PETITIONS OF TOWN OF PROVINCETOWN
MONUMENT FISH CO. INC.
To Maintain Sheet Steel Bulkhead & Fill
PROVINCETOWN HARBOR
PROVINCETOWN, MASS.

FRANCIS J. ALVES
PROPRIETOR
REGISTRY OF DEEDS PROFESSIONAL
PLAN ACCOMPANYING PETITIONS OF TOWN OF PROVINCETOWN
MONUMENT FISH CO. INC.
To Maintain Sheet Steel Bulwark & Fill
PROVINCETOWN HARBOR

Elevations are in feet and tenths above the plane of Mean Low Water.
PROPOSED BULKHEAD MODIFICATION
IN PROVINCE TOWN HARBOR
AT PROVINCE TOWN
COUNTY OF BARNSTABLE, MASSACHUSETTS
APPLICATION BY TOWN OF PROVINCE TOWN
JULY, 1974
3 SHEETS
TRANSITION FOOTING BETWEEN SECTIONS C-C & D-D

FRONT ELEVATION

NOTE: Locate construction joints at least 2 feet on center of expansion joints. Footing expansion joints as specified by the Engineer.

- Fender piles 10'-0" o.c.
- Approximate grade existing ground

Profile

SECTION A-A

- Approx. existing ground

- N.W.W. ELEV. 3.10'
- N.L.W. ELEV. 0.00'

Scale of Feet: 20', 15', 10', 5', 2', 1/2', 1/2'

Profile Scale: 10', 5', 2', 1', 1/2', 1/2'

SHEET 3 OF 3 SHEETS

NOTE: Transition footing shall extend 5'-0" from the west corner of the foundation. 5'-0" is the west corner of the front face of the foundation.
Section III

Truro
Section III – Community Findings – Town of Truro

COMMUNITY DESCRIPTION

The Town of Truro consists of a land area of 21.06 square miles out of a total area of 26.32 square miles and had a population of 2,087 in the 2000 census. The Town is located in Cape Cod of Massachusetts and its location can be seen on this report’s cover. The estimated length of shoreline is 26 miles that are directly exposed to open ocean. The Town is protected from major coastal storms by both natural and man-made shoreline structures that require maintenance to insure the long term protection of its coastline. The man-made and publicly owned structures that protect the Town were investigated for their ability to provide adequate protection from major coastal storms. Structures have been identified as publicly owned, including coastal dunes and beaches, based on evidence of investment of public funds made to create/enhance/maintain these structures. The assessment did not include floating or pile supported structures as they are assumed not to provide any significant coastal protection from major storm events.

STRUCTURE INVENTORY

Within the Town of Truro, there were 5 structures which had public or unknown ownership which provide significant coastal protection. The location of the structures can be seen in Sheets 1 through Sheet 3 in Section III-B of this report. The structures were categorized by their type and by their structural condition based on a preliminary field assessment. The distribution of structures by type and condition can be seen in the following table:

<table>
<thead>
<tr>
<th>STRUCTURE TYPE AND QUANTITY - Town of Truro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Structure</td>
</tr>
<tr>
<td>Bulkhead / Seawall</td>
</tr>
<tr>
<td>Revetment</td>
</tr>
<tr>
<td>Breakwater</td>
</tr>
<tr>
<td>Groin / Jetty</td>
</tr>
</tbody>
</table>

Within the above table, the total length of each type of structure is also provided. The structures are listed by the type which is providing the primary coastal protection. Many sites have multiple structure types at the same location (i.e. revetment in front of seawall). These secondary structures, although not identified within these tables, are included in the development of repair/rehabilitation costs.

The development of repair costs has been included by structure type and by condition. In the Town of Truro’s case there are a total of 5 structures which would require approximately $2.7 million to bring all the coastal structures to “A” Rating. Most critical will be the structures in the “D” and “F” classifications as those are assumed to undergo some level of damage or failure during the next major coastal storm event. To reconstruct these structures, identified in the preliminary survey as being in poor condition, an estimated $720,000 would be required to upgrade the Town’s coastal protection.
STRUCTURE REPAIR / RECONSTRUCTION COST - Town of Truro

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead / Seawall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Revetment</td>
<td>2</td>
<td></td>
<td>$ 675,840</td>
<td>$</td>
<td></td>
<td>$</td>
<td>675,840</td>
</tr>
<tr>
<td>Breakwater</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Groin / Jetty</td>
<td>3</td>
<td></td>
<td>$1,283,005</td>
<td>$720,720</td>
<td>$</td>
<td>$</td>
<td>2,003,725</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Coastal Beach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td></td>
<td><strong>$1,958,845</strong></td>
<td><strong>$720,720</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>2,679,565</strong></td>
</tr>
</tbody>
</table>

Based on the limited research within the scope of this project research, the presumed ownership of the structures was established on an initial basis and would be subject to more intense review in future tasks. Structures identified as being owned privately were excluded from further consideration. Although ownership of the land on which the structure was located was a factor, the structure ownership was treated as a separate issue from land ownership. For the Town of Truro, the breakdown of structures by assumed ownership is as follows:

STRUCTURE OWNERSHIP / REPAIR COST - Town of Truro

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town Owned</td>
<td>5</td>
<td></td>
<td>$1,958,845</td>
<td>$720,720</td>
<td>$</td>
<td>$</td>
<td>2,679,565</td>
</tr>
<tr>
<td>Commonwealth of Massachusetts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Federal Government Owned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Unknown Ownership</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td></td>
<td><strong>$1,958,845</strong></td>
<td><strong>$720,720</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>2,679,565</strong></td>
</tr>
</tbody>
</table>

The identification of presumed ownership was not based on the investigation of legal documents but relied on property ownership and from construction and regulatory documents that were found. A more detailed investigation of legal documents and agreements would be required where structure ownership is disputed. A more detailed identification of structure type, length, condition and location can be found in Section III-B which contains Structure Assessment Reports for each individual structure found.

SUMMARY

The enclosed reports and associated documents reflects the Town of Truro’s coastal structure information that will eventually be input into a state-wide GIS database and will be accessible through MassGIS. This data, when compiled state-wide, will be critical in the development of both short term and long term planning for maintaining and improving Massachusetts coastal protection.

This database will also provide relatively quick access to identify available documentation for these structures as well as the ability to be updated as coastal structure improvements are made.
Section III - Truro

Part B

Structure Assessment Reports
## CZM Coastal Infrastructure Inventory and Assessment

### Structure Assessment Form

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Beach Point</td>
<td>10/25/2007</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Presumed Structure Owner:</th>
<th>Based On Comment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner Name:</th>
<th>Earliest Structure Record:</th>
<th>Estimated Reconstruction/Repair Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truro</td>
<td>1936</td>
<td>$700,520.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length:</th>
<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1055</td>
<td>5</td>
<td>V2</td>
<td>19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Feet</th>
<th>Feet NAVD 88</th>
<th>Feet NGVD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groin/ Jetty</td>
<td>Stone</td>
<td>Under 5 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Structure Summary:**
Set of 7 dumped stone groins. Stones are 3 feet by 2 feet by 2 feet on average. Stones have moderate stone movement and section loss. Behind there are many houses and a beach.

<table>
<thead>
<tr>
<th>Condition Rating</th>
<th>Priority Rating</th>
<th>Priority Action</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>III</td>
<td>Moderate Priority</td>
<td>Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (&lt;1 dwelling impacted / 100 feet of shoreline)</td>
</tr>
<tr>
<td>Fair</td>
<td>Consider for Active Project Improvement Listing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Level of Action Description:** Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

**Structure Images:**
- 075-008-000-026-100-PHO1A.jpg
- 075-008-000-026-100-PHO1B.jpg

**Structure Documents:**
- MA-DCR | August 1936 | Proposed Stone | 075-008-000-026-100-DCR1A
- MA-DCR | July 1937 | Proposed Stone | 075-008-000-026-100-DCR1B
- MA-DCR | August 1938 | Proposed Shore | 075-008-000-026-100-DCR1C
- MA-DCR | July 1974 | Proposed Shore | 075-008-000-026-100-DCR1D

Prepared By: Bourne Consulting Engineering
**CZM Coastal Infrastructure Inventory and Assessment**

**Structure Assessment Form**

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presumed Structure Owner:</td>
<td>Based On Comment:</td>
<td></td>
</tr>
<tr>
<td>Local</td>
<td>Estimated Reconstruction/Repair Cost:</td>
<td>$720,720.00</td>
</tr>
<tr>
<td>Owner Name:</td>
<td>Earliest Structure Record:</td>
<td>1950</td>
</tr>
<tr>
<td>Truro</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length:</th>
<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 Feet</td>
<td>Feet NAVD 88</td>
<td>V4</td>
<td>17 Feet NGVD</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groin/ Jetty</td>
<td>Stone</td>
<td>5 to 10 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
</table>

**Structure Summary:**

Placed stone jetty at the inlet of Pamet Harbor. Structure is heavily deteriorated. There is visible stone movement and section loss. Stones are 3 feet by 2 feet by 2 feet on average.

**Condition**

- Rating: Poor
- Level of Action: Major
- Description: Structure exhibits advanced levels of deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure has strong risk of significant damage and possible failure during a major coastal storm. Structure should be monitored until repairs/reconstruction can be initiated. Actions taken to reconstruct structure to regain full capacity to resist a major coastal storm. Landform eroded, stability threatened. Landform not adequate to provide protection during major coastal storm. Actions taken to recreate landform to adequate limits for full protection from a major coastal storm.

**Priority**

- Rating: None
- Action: Long Term Planning Considerations
- Description: No Inshore Structures or Residential Dwelling Units Present

**Structure Images:**

- 075-049-000-016-100-PHO1A.jpg
- 075-049-000-016-100-PHO1B.jpg

**Structure Documents:**

<table>
<thead>
<tr>
<th>Usage</th>
<th>Date</th>
<th>Type</th>
<th>ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>USAGE</td>
<td>November 1</td>
<td>Proposed Stone Jetty</td>
<td>075-049-000-016-100-COE1A</td>
</tr>
<tr>
<td>MA-DCR</td>
<td>October 195</td>
<td>Proposed Stone</td>
<td>075-049-000-016-100-DCR1A</td>
</tr>
<tr>
<td>MA-DCR</td>
<td>November 1</td>
<td>Proposed Stone</td>
<td>075-049-000-016-100-DCR1B</td>
</tr>
</tbody>
</table>

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Truro

Location: Parnet Harbor - South Jetty
Based On Comment:

Earliest Structure Record: 1950
Estimated Reconstruction/Repair Cost: $582,485.00

Date: 10/25/2007

Length: 485 Feet
Top Elevation: Feet NAVD 88
FIRM Map Zone: V4
FIRM Map Elevation: 17 Feet NGVD

Primary Type: Groin/ Jetty
Primary Material: Stone
Primary Height: 5 to 10 Feet

Secondary Type:
Secondary Material:
Secondary Height:

Structure Summary:
Placed stone jetty at the inlet of Pamet Harbor. Stones are 3 feet by 2 feet by 2 feet on average. There is moderate stone movement and section loss.

Condition Rating: C
Level of Action: Moderate
Description: Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating: 1
Action Description: None

Structure Images:
075-049-000-019-100-PHO1A.jpg
075-049-000-019-100-PHO1B.jpg

Structure Documents:
USACE November 1 Proposed Stone Jetty 075-049-000-019-100-COE1A
MA-DCR October 195 Proposed Stone 075-049-000-019-100-DCR1A
MA-DCR November 1 Proposed Stone 075-049-000-019-100-DCR1B

Prepared By: Bourne Consulting Engineering
Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Truro
Location: Pamet Harbor
Date: 10/25/2007

Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $195,360.00

<table>
<thead>
<tr>
<th>Length: 250 Feet</th>
<th>Top Elevation: Feet NAVD 88</th>
<th>FIRM Map Zone: A4</th>
<th>FIRM Map Elevation: Feet NGVD 12</th>
</tr>
</thead>
</table>

Primary Type: Revetment
Primary Material: Stone
Primary Height: 10 to 15 Feet

Secondary Type: Secondary Material: Secondary Height:

Structure Summary:
Dumped stone riprap at water line of old train tracks. Stones are 3 feet by 2 feet by 2 feet on average. Moderate stone movement.

Condition Rating Level of Action Description
C Fair Moderate Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

Priority Rating Action Description
I None Long Term Planning Considerations No Inshore Structures or Residential Dwelling Units Present

Structure Images: ![075-049-000-032-100-PHO1A.jpg]  
Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Truro

Location: Parnet Harbor Boat Ramp
Based On Comment: 
Earliest Structure Record: 1968
Estimated Reconstruction/Repair Cost: $480,480.00

Date: 10/25/2007

Length: 800 Feet
Top Elevation: 11 Feet NGVD
FIRM Map Zone: A2
FIRM Map Elevation: 

Primary Type: Revetment
Primary Material: Stone
Primary Height: 5 to 10 Feet

Secondary Type: 
Secondary Material: 
Secondary Height: 

Structure Summary:
Placed stone riprap. Stones are 2 feet by 2 feet by 2 feet. There are many areas of concrete and asphalt repair. There are signs of stone movement, undermining and minor scour. There is a boat ramp in the middle of the structure.

Condition Rating
Level of Action Description
C Fair Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating Action Description
III Moderate Priority Consider for Active Project Improvement Listing Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

Structure Images:
075-050-000-018-100-PHO1A.JPG
075-050-000-018-100-PHO1B.JPG

Structure Documents:
D.E.P. May 1968 Plans Accompanying 075-050-000-018-100-LIC1A

Prepared By: Bourne Consulting Engineering
Section III - Truro

Part C

Structure Photographs
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>075-008-000-025-100</td>
<td>075-008-000-025-100-PH01A.jpg</td>
<td>Bourne Consulting Engineering</td>
<td>October 2007</td>
<td>DIGITAL IMAGE</td>
<td>1</td>
<td>Structure Location</td>
<td>Structure Condition Photo at Time of Survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>075-008-000-025-100</td>
<td>075-008-000-025-100-PH01B.jpg</td>
<td>Bourne Consulting Engineering</td>
<td>October 2007</td>
<td>DIGITAL IMAGE</td>
<td>1</td>
<td>Structure Location</td>
<td>Structure Condition Photo at Time of Survey</td>
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<td>October 2007</td>
<td>DIGITAL IMAGE</td>
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<td>Structure Location</td>
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<td>075-049-000-032-100</td>
<td>075-049-000-032-100-PH01A.jpg</td>
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<td>Structure Location</td>
<td>Structure Condition Photo at Time of Survey</td>
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</table>
Section III - Truro

Part D

Structure Documents

TOWN DOCUMENT LIST

MA DCR - DOCUMENT LIST

MA DEP – Ch 91 DOCUMENT LIST
  - Copies of License Documents

USACE – PERMIT DOCUMENT LIST
  - Copies of Permit Documents
<table>
<thead>
<tr>
<th>BOE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>T/Eo</th>
<th>Sheets</th>
<th>Location</th>
<th>Description</th>
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No Town Documents for the Town of Truro
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<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
<th>Description</th>
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<tbody>
<tr>
<td>075-008-000-028-100</td>
<td>075-008-000-028-100-DCR1A</td>
<td>473</td>
<td>MA-DCR</td>
<td>Truro</td>
<td>August 1936</td>
<td>Proposed Stone Jetties - Pilgrim Beach - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Pilgrim Beach</td>
<td>Groins</td>
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<tr>
<td>075-008-000-028-100</td>
<td>075-008-000-028-100-DCR1B</td>
<td>503</td>
<td>MA-DCR</td>
<td>Truro</td>
<td>July 1937</td>
<td>Proposed Stone Jetties - Pilgrim Beach - Truro, Massachusetts - Prepared for the DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Pilgrim Beach</td>
<td>Stone Groins</td>
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<td>075-008-000-028-100</td>
<td>075-008-000-028-100-DCR1C</td>
<td>543</td>
<td>MA-DCR</td>
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<td>August 1938</td>
<td>Proposed Shore Protection - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>Pilgrim Lake</td>
<td>Groins</td>
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<td>075-008-000-028-100</td>
<td>075-008-000-028-100-DCR1D</td>
<td>2797</td>
<td>MA-DCR</td>
<td>Truro</td>
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<td>Proposed Shore Protection Stone Groins - Pilgrim Beach - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>Groins</td>
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<td>1154</td>
<td>MA-DCR</td>
<td>Truro</td>
<td>October 1950</td>
<td>Proposed Stone Jetty - Pamet Harbor - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>Jetty</td>
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<tr>
<td>075-049-000-016-100</td>
<td>075-049-000-016-100-DCR1B</td>
<td>1120</td>
<td>MA-ULK</td>
<td>Truro</td>
<td>November 1950</td>
<td>Proposed Stone Jetty - Pamet River - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>MA-DCR</td>
<td>Truro</td>
<td>October 1950</td>
<td>Proposed Stone Jetty - Pamet Harbor - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>MA-DCR</td>
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<td>Proposed Stone Jetty - Pamet River - Truro - Prepared for the DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Pamet River</td>
<td>Jetty</td>
</tr>
<tr>
<td>BCE Structure No</td>
<td>Document No</td>
<td>Contract/ Drawing Number</td>
<td>Entity</td>
<td>Municipality</td>
<td>Date</td>
<td>Title</td>
<td>Sheets</td>
<td>Location</td>
<td>Description</td>
</tr>
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</tr>
</tbody>
</table>
PROPOSED 40' x 212' CONCRETE BOAT RAMP

EXISTING 15' x 120' CONCRETE BOAT RAMP TO BE REMOVED PURPLET HARBOR

PLANS ACCOMPANYING PETITION OF:
PUBLIC ACCESS BOARD
MASS. DEPT. OF FISHERIES, WILDLIFE
AND ENVIRONMENTAL LAW ENFORCEMENT
FOR RECONSTRUCTION OF:
CONCRETE BOAT RAMP
PAMET RIVER PUBLIC ACCESS FACILITY
TRURO, MASS.

COASTAL ENGINEERING CO., ORLEANS, MASS.

LICENSE PLAN NO. 1797
Approved by Department of Environmental Quality Engineering
of Massachusetts

87W = 177
PROPOSED BOAT RAMP

PROPOSED CONTOUR

EXISTING CONTOUR

PRECAST CONCRETE PLANKS

LOCATION MAP
SCALE 1:25000

EXISTING ASPHALT BEACH ACCESS RAMP TO BE REMOVED

CONSTRUCT NEW 8'x20' TIMBER ACCESS RAMP

RELOCATE HARBORMASTER HOUSE AS REQUIRED

RIP-RAP STONES 500 TO 1000 LBS. EACH

TURF CURB

PROVIDE 2'-0" FOOTING AT TOE OF RAMP

PROPOSED RAMP EDGE TO BE LOCATED ALONG EXISTING RAMP EDGE AS SHOWN

OUTLINE OF EXISTING 15'x120' BOAT RAMP TO BE REMOVED

SAW CUT EXISTING PAVEMENT

SCALE: 1" = 40'

COASTAL ENGINEERING CO., ORLEANS, MA

LICENSE PLAN NO. 1797

APPROVED BY DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEER

MAY 9, 1986

PLANS ACCOMPANYING PETITION OF:
PUBLIC ACCESS BOARD
MASS. DEPT. OF FISHERIES, WILDLIFE
AND ENVIRONMENTAL LAWS ENFORCEMENT
FOR RECONSTRUCTION OF:
CONCRETE BOAT RAMP
PAMEL RIVER PUBLIC ACCESS FACILITY
TRURO, MASS.
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
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<tr>
<td>075-049-000-016-100</td>
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<td>J1-205</td>
<td>USACE</td>
<td>Truro</td>
<td>November 1991</td>
<td>Proposed Stone Jetty at Pamet Harbor - Truro, Massachusetts - Application by DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Pamet Harbor</td>
<td>North Jetty</td>
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<tr>
<td>075-049-000-019-100</td>
<td>075-049-000-019-100-CDE1A</td>
<td>J0-225</td>
<td>USACE</td>
<td>Truro</td>
<td>November 1990</td>
<td>Proposed Stone Jetty at Pamet Harbor Truro, Mass - Application by DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Pamet Harbor</td>
<td>South Jetty</td>
</tr>
</tbody>
</table>
Section IV

Wellfleet
Section IV – Community Findings – Town of Wellfleet

COMMUNITY DESCRIPTION

The Town of Wellfleet consists of a land area of 19.84 square miles out of a total area of 35.36 square miles and had a population of 2,749 in the 2000 census. The Town is located on Cape Cod of Massachusetts and its location can be seen on this report’s cover. The estimated length of shoreline is 15 miles that are directly exposed to open ocean. The Town is protected from major coastal storms by both natural and man-made shoreline structures that require maintenance to insure the long term protection of its coastline. The man-made and publicly owned structures that protect the Town were investigated for their ability to provide adequate protection from major coastal storms. Structures have been identified as publicly owned, including coastal dunes and beaches, based on evidence of investment of public funds made to create/enhance/maintain these structures. The assessment did not include floating or pile supported structures as they are assumed not to provide any significant coastal protection from major storm events.

STRUCTURE INVENTORY

Within the Town of Wellfleet, there were 12 structures which had public or unknown ownership which provide significant coastal protection. The location of the structures can be seen in Sheets 1 through Sheet 4 in Section IV-B of this report. The structures were categorized by their type and by their structural condition based on a preliminary field assessment. The distribution of structures by type and condition can be seen in the following table:

<table>
<thead>
<tr>
<th>Primary Structure</th>
<th>Total Structures</th>
<th>Structure Condition Rating</th>
<th>Total Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>Bulkhead / Seawall</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Revetment</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Breakwater</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grin / Jetty</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal Beach</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

Within the above table, the total length of each type of structure is also provided. The structures are listed by the type which is providing the primary coastal protection. Many sites have multiple structure types at the same location (i.e. revetment in front of seawall). These secondary structures, although not identified within these tables, are included in the development of repair/rehabilitation costs.

The development of repair costs has been included by structure type and by condition. In the Town of Wellfleet’s case there are a total of 11 structures which would require approximately $3.3 million to bring all the coastal structures to “A” Rating. Most critical will be the structures in the “D” and “F” classifications as those are assumed to undergo some level of damage or failure during the next major coastal storm event of which Wellfleet has none.
STRUCTURE REPAIR / RECONSTRUCTION COST - Town of Wellfleet

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead / Seawall</td>
<td>4</td>
<td>$ 59,350</td>
<td>$ 383,990</td>
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<td>$ 423,340</td>
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<tr>
<td>Revetment</td>
<td>2</td>
<td>$ 413,457</td>
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<td>$ 413,457</td>
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<td>Breakwater</td>
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<td>$ 213,600</td>
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<td></td>
<td></td>
<td></td>
<td>$ 213,600</td>
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<tr>
<td>Groin / Jetty</td>
<td>2</td>
<td>$ 40,920</td>
<td>$ 66,400</td>
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<td></td>
<td></td>
<td>$ 107,320</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Coastal Beach</td>
<td>3</td>
<td>$ 39,917</td>
<td>$ 2,158,200</td>
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<td>$ 2,198,117</td>
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<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>$ 353,787</strong></td>
<td><strong>$ 3,002,047</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>$ 3,355,834</strong></td>
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</table>

Based on the limited research within the scope of this project research, the presumed ownership of the structures was established on an initial basis and would be subject to more intense review in future tasks. Structures identified as being owned privately were excluded from further consideration. Although ownership of the land on which the structure was located was a factor, the structure ownership was treated as a separate issue from land ownership. For the Town of Wellfleet, the breakdown of structures by assumed ownership is as follows:

STRUCTURE OWNERSHIP / REPAIR COST - Town of Wellfleet

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Total Cost</th>
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<tbody>
<tr>
<td>Town Owned</td>
<td>12</td>
<td>$ 353,787</td>
<td>$ 3,002,047</td>
<td></td>
<td></td>
<td></td>
<td>$ 3,355,834</td>
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<tr>
<td>Commonwealth of Massachusetts</td>
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<tr>
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<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>$ 353,787</strong></td>
<td><strong>$ 3,002,047</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>$</strong></td>
<td><strong>$ 3,355,834</strong></td>
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</table>

The identification of presumed ownership was not based on the investigation of legal documents but relied on property ownership and from construction and regulatory documents that were found. A more detailed investigation of legal documents and agreements would be required where structure ownership is disputed. A more detailed identification of structure type, length, condition and location can be found in Section IV-B which contains Structure Assessment Reports for each individual structure found.

SUMMARY

The enclosed reports and associated documents reflects the Town of Wellfleet’s coastal structure information that will eventually be input into a state-wide GIS database and will be accessible through MassGIS. This data, when compiled state-wide, will be critical in the development of both short term and long term planning for maintaining and improving Massachusetts coastal protection.

This database will also provide relatively quick access to identify available documentation for these structures as well as the ability to be updated as coastal structure improvements are made.
Section IV - Wellfleet

Part B

Structure Assessment Reports
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner:
Local

Presumed Structure Owner:
Local

Owner Name:
Wellfleet

Location:
Town: Wellfleet

Based On Comment:

Earliest Structure Record:
1952

Estimated Reconstruction/Repair Cost:
$52,510.00

Date:
10/29/2007

Length: 260 Feet
Top Elevation: Feet NAVD 88
FIRM Map Zone: A3
FIRM Map Elevation: Feet NGVD 12

Primary Type: Bulkhead/Seawall
Primary Material: Wood
Primary Height: Over 15 Feet

Secondary Type: Secondary Material: Secondary Height:

Structure Summary:
The timber bulkhead is in good condition. There is no visible deterioration. The timber piles and overlapping wales are in front to support the bulkhead. Gangways extend off the timber cap. A rail is along the cap. A parking lot with gas pump and storage for the boats is behind the structure.

Condition Rating
B Good

Level of Action Description
Minor

Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
1 None No Inshore Structures or Residential Dwelling Units Present

Structure Images:
077-020-000-004-100-PHO1A.JPG
077-020-000-004-100-PHO1B.JPG
077-020-000-004-100-PHO1C.JPG

Structure Documents:
USACE June 1953 Proposed Retaining 077-020-000-004-100-COE1A

MA-DCR February 19 Proposed Timber 077-020-000-004-100-DCR1A

MA-DCR March 1955 Proposed Harbor 077-020-000-004-100-DCR1B

MA-DCR January 1955 Proposed Harbor 077-020-000-004-100-DCR1C

MA-DCR June 1985 Proposed Harbor 077-020-000-004-100-DCR1D

Prepared By: Bourne Consulting Engineering
### CZM Coastal Infrastructure Inventory and Assessment

#### Structure Assessment Form

**Property Owner:**
- Local

**Presumed Structure Owner:**
- Local

**Owner Name:**
- Wellfleet

**Location:**
- Town: Wellfleet
- Town Pier

**Date:**
- 10/29/2007

**Based On Comment:**
- [ ]

**Earliest Structure Record:**
- 1953

**Estimated Reconstruction/Repair Cost:**
- $0.00

---

**Length:** 2400 Feet
**Top Elevation:** 88 Feet NAVD 88
**FIRM Map Zone:** A3
**FIRM Map Elevation:** 12 Feet NGVD

**Primary Type:** Revetment
**Primary Material:** Stone
**Primary Height:** Over 15 Feet

**Secondary Type:**
**Secondary Material:**
**Secondary Height:**

**Structure Summary:**
The placed stones are well placed. The slope is 1 on 4. It is currently being constructed to continue around the entire pier and replace structure 077-021-000-106-100. The Harbor Master's office and parking are located above it. The stones are on average 1 foot by 2 feet by 3 feet.

**Condition Rating**
- **Condition:** A
- **Rating:** Excellent

**Level of Action Description**
- **Level of Action:** None
- **Description:** Like new condition. Structure expected to withstand major coastal storm without damage. Stable landform (beach, dune or bank). Adequate system exists to provide protection from major coastal storm.

**Priority Rating Action Description**
- **Priority:** I
- **Rating:** None
- **Action:** Long Term Planning Considerations
- **Description:** No Inshore Structures or Residential Dwelling Units Present

---

#### Structure Images:

- 077-020-000-004-200-PHO2A.JPG
- 077-020-000-004-200-PHO2B.JPG

#### Structure Documents:

- **USACE**
  - June 1953
  - Proposed Retaining: 077-020-000-004-200-COE2A
- **USACE**
  - November 1
  - Proposed Mooring: 077-020-000-004-200-COE2B
- **MA-DCR**
  - April 1956
  - Proposed Harbor: 077-020-000-004-200-DCR2A
- **DEP**
  - November 1
  - Plan Accompanying: 077-020-000-004-200-LIC2A
- **DEP**
  - December 1
  - Plans Accompanying: 077-020-000-004-200-LIC2B

---

**Prepared By:** Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local

Presumed Structure Owner: Local

Owner Name: Wellfleet

Location: Kendrick Avenue and Commercial Street

Date: 10/29/2007

Based On Comment:

Earliest Structure Record: 1952

Estimated Reconstruction/Repair Cost: $326,040.00

Length: 190 Feet NAVD 88

Top Elevation: 12 Feet NGVD

FIRM Map Zone: A3

FIRM Map Elevation:

Primary Type: Bulkhead/Seawall

Primary Material: Steel

Primary Height: Over 15 Feet

Secondary Type:

Secondary Material:

Secondary Height:

Structure Summary:
The steel bulkhead is stabilized by timber piles and wales in front of it. There is growth along the tidal zone. The steel is corroding along the top of the bulkhead. A gangway extends to the floats from the top of the cap. There is erosion behind the bulkhead in the parking lot. The timber cap is 1 foot by 1 foot.

Condition Rating
Moderate

Level of Action Description
Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

Priority Rating
I

Action Description
None

Long Term Planning Considerations
No Inshore Structures or Residential Dwelling Units Present

Structure Images:
077-020-000-005-100-PHO1A.JPG
077-020-000-005-100-PHO1B.JPG

Structure Documents:

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<thead>
<tr>
<th>Agency</th>
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<th>Action Type</th>
<th>Document ID</th>
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<tr>
<td>USACE</td>
<td>March 1952</td>
<td>Proposed Approach</td>
<td>077-020-000-005-100-COE1A</td>
</tr>
<tr>
<td>USACE</td>
<td>June 1953</td>
<td>Proposed Retaining</td>
<td>077-020-000-005-100-COE1B</td>
</tr>
<tr>
<td>USACE</td>
<td>December 1</td>
<td>To Construct a Steel</td>
<td>077-020-000-005-100-COE1C</td>
</tr>
<tr>
<td>MA-DCR</td>
<td>June 1985</td>
<td>Proposed Harbor</td>
<td>077-020-000-005-100-DCR1A</td>
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<tr>
<td>DEP</td>
<td>June 24, 198</td>
<td>Plan Accompanying</td>
<td>077-020-000-005-100-LIC1A</td>
</tr>
</tbody>
</table>

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

**Structure Assessment Form**

**Property Owner:**
Local

**Presumed Structure Owner:**
Local

**Owner Name:**
Wellfleet

**Location:**
Kendrick Beach

**Based On Comment:**

**Earliest Structure Record:**
Unknown

**Estimated Reconstruction/Repair Cost:**
$2,158,200.00

**Date:**
10/29/2007

<table>
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<tr>
<th>Length (Feet)</th>
<th>Top Elevation (Feet NAVD 88)</th>
<th>FIRM Map Zone</th>
<th>FIRM Map Elevation (Feet NGVD)</th>
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<tbody>
<tr>
<td>1090</td>
<td>11</td>
<td>AE</td>
<td>11</td>
</tr>
</tbody>
</table>

**Primary Type:**
Coastal Beach

**Primary Material:**
Sand

**Primary Height:**
Over 15 Feet

**Secondary Type:**

**Secondary Material:**

**Secondary Height:**

**Structure Summary:**
The beach is at a 1 on 5 slope out to mean high water where it slowly becomes a 1 on 20 grade. There are seashells and grass scattered throughout the beach. A parking lot and restaurant are inshore of the beach. Adjacent to the beach is the town pier.

**Condition Rating**
- C: Fair

**Level of Action Description**
Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

**Priority Rating Action Description**
- II: Low Priority
  - Future Project Consideration
  - Inshore Structures Present with Limited potential for Significant Infrastructure Damage

**Structure Images:**
- 077-020-000-006-100-PHO1A.JPG
- 077-020-000-006-100-PHO1B.JPG
- 077-020-000-006-100-PHO1C.jpg

**Structure Documents:**

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Wellfleet
Structure ID: 077-020-000-006-200
Key: community-map-block-parcel-structure

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet

Location: Kendrick Beach
Based On Comment:
Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $66,400.00

Date: 10/29/2007

Length: 100 Feet
FIRM Map Zone: A3
FIRM Map Elevation: 11 Feet NGVD

Top Elevation: Feet NAVD 88

Primary Type: Groin/ Jetty
Primary Material: Stone
Primary Height: Under 5 Feet

Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
The single stone jetty is comprised of placed stones. The stones are on average 1 foot by 1 foot by 3 feet. The jetty extends from mean high water to mean low water. The stones are buried halfway by the sand on either side of the jetty.

Condition Rating: C
Level of Action Description: Moderate
Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority Rating: II
Action Description: Low Priority
Future Project Consideration: Inshore Structures Present with Limited potential for Significant Infrastructure Damage

Structure Images: 077-020-000-006-200-PHO2A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet

Location: Mayo Beach

Date: 10/29/2007

Based On Comment: 

Earliest Structure Record: Unknown

Estimated Reconstruction/Repair Cost: $39,917.00

Length: 315 Feet
Top Elevation: 11 Feet NGVD
FIRM Map Zone: A3
FIRM Map Elevation: 11 Feet NGVD

Primary Type: Coastal Beach
Primary Material: Sand

Secondary Type: Secondary Material:

Primary Height: 5 to 10 Feet
Secondary Height: 

Structure Summary:
The well graded beach has fine brown sand. Sand dunes with debris are inshore. There is a road and houses located inshore also.

Condition Rating
Level of Action Description
B Good Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
IV High Priority Consider for Next Project Construction Listing
High Value Inshore Structures with Potential for Infrastructure Damage and/or Moderate Density Residential Dwellings (1-10 dwellings impacted / 100 feet of shoreline)

Structure Images:
077-020-000-022-100-PHO1A.jpg
077-020-000-022-100-PHO1B.jpg
077-020-000-022-100-PHO1C.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet

Location: Mayo Beach
Based On Comment: 
Earliest Structure Record: Unknown

Date: 10/29/2007
Estimated Reconstruction/Repair Cost: $40,920.00

Length: 310 Feet NAVD 88
Top Elevation: 11 Feet NGVD
FIRM Map Zone: A3
FIRM Map Elevation: 11

Primary Type: Groin/ Jetty
Primary Material: Stone
Primary Height: Under 5 Feet
Secondary Type: Secondary Material: 
Secondary Height: 

Structure Summary:
The stone groins extend from the inshore edge of the beach out to mean low water. The stones have been dumped into place. The average stone size is 1 foot by 1 foot by 3 feet.

Condition Rating
Level of Action Description
Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
Low Priority Future Project Consideration Inshore Structures Present with Limited potential for Significant Infrastructure Damage

Structure Images: 077-020-000-022-200-PHO2A.JPG
Structure Documents: 

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet

Location: Commercial Street

Earliest Structure Record: 1958
Estimated Reconstruction/Repair Cost: $413,457.00

Date: 10/29/2007

Length: 335 Feet NAVD 88
Top Elevation: 12 Feet NGVD
FIRM Map Zone: A3
FIRM Map Elevation: 12

Primary Type: Revetment
Primary Material: Stone
Primary Height: Over 15 Feet

Secondary Type: Secondary Material: Secondary Height:

Structure Summary:
The dumped stone revetment has minor stone movement. The road located behind the revetment is paved into the top stones. There is a guardrail along the top. There are multiple drain pipes coming out of the stones. A restaurant is located across the road.

Condition Rating
Level of Action Description
C Fair Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

Priority Rating Action Description
III Moderate Priority Consider for Active Project Improvement Listing Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

Structure Images:
077-021-000-106-100-PHO1A.JPG
077-021-000-106-100-PHO1B.JPG
077-021-000-106-100-PHO1C.JPG

Structure Documents:
MA-DCR November 1 Proposed Harbor 077-021-000-106-100-DCR1A

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet
Location: Nauset Road
Based On Comment: 
Earliest Structure Record: 1957

Length: 890 Feet
Top Elevation: 88 Feet NAVD 88
FIRM Map Zone: V4
FIRM Map Elevation: 14 Feet NGVD

Primary Type: Breakwater
Primary Material: Stone
Primary Height: 5 to 10 Feet
Secondary Type: 
Secondary Material: 
Secondary Height: 

Structure Summary:
The breakwater consists of armor stones that vary from 4 to 8 tons. The structure is in good condition. There is no visible scour. There is sand build up against the armor, except at the head. Crest elevation is level.

Condition Rating Level of Action Description
B Good Minor Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
II Low Priority Future Project Consideration Inshore Structures Present with Limited potential for Significant Infrastructure Damage

Structure Images:
077-022-000-023-100-PHO1A.JPG
077-022-000-023-100-PHO1B.JPG
077-022-000-023-100-PHO1C.JPG
077-022-000-023-100-PHO1D.JPG

Structure Documents:
MA-DCR June 1957 Proposed Harbor 077-022-000-023-100-DCR1A

Prepared By: Bourne Consulting Engineering
## CZM Coastal Infrastructure Inventory and Assessment

### Structure Assessment Form

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<td>Pleasant Point Landing</td>
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<td>50 Feet</td>
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<td>V4</td>
<td>15 Feet NGVD</td>
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<tr>
<th>Primary Type:</th>
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<tr>
<td>Bulkhead/ Seawall</td>
<td>Concrete</td>
<td>5 to 10 Feet</td>
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</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
</table>

### Structure Summary:

The cast in place wall has minor cracking throughout. There is a good amount of deterioration at places of rebar. Multiple PVC drains located at top of wall. A fence is on top of the wall with a staircase to the marsh outshore. The wall is located at the very end of the road. The adjacent houses have private bulkheads in front of them. The sand has drifted to one side of the wall, leaving the corner of the wall more exposed.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Rating</th>
<th>Level of Action</th>
<th>Description</th>
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<tbody>
<tr>
<td>C</td>
<td>Fair</td>
<td>Moderate</td>
<td>Structure is sound but may exhibit minor deterioration, section loss cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.</td>
</tr>
<tr>
<td>III</td>
<td>Moderate Priority</td>
<td>Consider for Active Project Improvement Listing</td>
<td>Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (&lt;1 dwelling impacted / 100 feet of shoreline)</td>
</tr>
</tbody>
</table>

### Structure Images:

- 077-035-000-097-100-PHO1A.JPG
- 077-035-000-097-100-PHO1B.JPG

### Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Wellfleet
Structure ID: 077-041-000-185-100
Key: community-map-block-parcel-structure

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Wellfleet
Location: D Street Bridge
Based On Comment: 
Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $6,840.00
Date: 10/29/2007

Length: 45 Feet NAVD 88
Top Elevation: A3
FIRM Map Zone:
FIRM Map Elevation: 12 Feet NGVD

Primary Type: Bulkhead/Seawall
Primary Material: Wood
Primary Height: Under 5 Feet

Secondary Type: Revetment
Secondary Material: Stone
Secondary Height: Under 5 Feet

Structure Summary:
The timber bulkhead is in good condition. There is no visible scour. The riprap is 6 inches in diameter. The stones have been dumped under the timber bridge to stabilize the embankment. There is minor stone movement. The bridge is the only access road from the island to mainland.

Condition Rating
Level of Action Description
B Good Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.
Minor

Priority Rating Action Description
V Immediate / Highest Priority Consider For Immediate Action Due to Public Safety and Welfare Issues Critical Inshore Structures Present with Potential for Infrastructure Damage and/or High Density Residential Dwellings Condition of structure may warrant emergency stabilization as failure may result in potential loss of property and/or life (10+ dwellings impacted / 100 feet of shoreline)

Structure Images:
077-041-000-185-100-PHO1A.jpg
077-041-000-185-100-PHO1B.jpg
077-041-000-185-100-PHO1C.jpg
077-041-000-185-100-PHO1D.jpg
077-041-000-185-100-PHO1E.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

**Structure Assessment Form**

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<th>Property Owner:</th>
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<tbody>
<tr>
<td>Local</td>
<td>D Street Causeway</td>
<td>10/29/2007</td>
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<th>Presumed Structure Owner:</th>
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<th>Primary Height:</th>
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<tbody>
<tr>
<td>Coastal Beach</td>
<td>Sand</td>
<td>Under 5 Feet</td>
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<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
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**Structure Summary:**
The causeway is the only access/egress on Lieutenant Island. The causeway is covered at high tide. The edges of the causeway have no slope to them.

**Condition Rating**
- B: Good

**Level of Action Description**
Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

**Priority Rating Action Description**
- V: Immediate / Highest Priority
  - Consider For Immediate Action Due to Public Safety and Welfare Issues
  - Critical Inshore Structures Present with Potential for Infrastructure Damage and/or High Density Residential Dwellings Condition of structure may warrant emergency stabilization as failure may result in potential loss of property and/or life. (>10 dwellings impacted / 100 feet of shoreline)

**Structure Images:**
077-041-000-185-200-PHO2A.jpg

**Structure Documents:**

Prepared By: Bourne Consulting Engineering
Section IV - Wellfleet

Part C

Structure Photographs
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
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Section IV - Wellfleet

Part D

Structure Documents

TOWN DOCUMENT LIST

MA DCR - DOCUMENT LIST

MA DEP – Ch 91 DOCUMENT LIST
  • Copies of License Documents

USACE – PERMIT DOCUMENT LIST
  • Copies of Permit Documents
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<td>Plan Accompanying Petition of Town of Wellfleet - To Construct a Boat Ramp and Maintain Timber Walkways, Finger Piers and Pile - Wellfleet Harbor - Wellfleet, Mass.</td>
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<td>Plan Accompanying Petition of Department of Environmental Management Division of Waterways to Construct a Steel Bulkhead Dredge and Dispose of Dredge Material in Wellfleet Harbor, Wellfleet, MA</td>
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NOTES:

300 PILES REQUIRED TO REPLACE EXIST. FLOAT PILES AND FLOAT PILES W/ BATTER PILES. EXISTING SPACING TO REMAIN UNCHANGED.

ELEVATIONS ARE IN FEET AND TENTHS AND ARE BASED ON THE PLANE OF MEAN LOW WATER. MINUS FIGURES REPRESENT DEPTHS BELOW THAT SAME PLANE.

IT IS PROPOSED TO REPLACE 15 LIGHT POLES. LOCATION TO BE DETERMINED IN THE FIELD.

ALL TIMBERS TO BE CCA TREATED @ 1.0 lb. ALL TIMBER PILES TO BE CCA TREATED @ 2.5 lb.
LEGEND:
- W  WATER LINE
- T  BURIED TELEPHONE LINE
- E  ELECTRICAL LINE
- UE BURIED ELECTRICAL LINE
- A  BURIED FUEL ALARM CABLE

PLANS ACCOMPANYING PETITION OF THE TOWN OF WELLFLEET TO RECONSTRUCT THE EXISTING BOAT RAMP LICENSE # (DPW CONTRACT 1606) AND PROVIDE PILE MOUNTED BOARDING FLOATS. LOCATED WITHIN WELLFLEET HARBOR, BARNSTABLE COUNTY, WELLFLEET, MA.

LICENSE PLAN NO. 9497
Approved by Department of Environmental Protection of Massachusetts

DEC 16 2002
NOTES:

1. TOPOGRAPHIC DATA SHOWN HEREIN WAS COMPLETE ON AUGUST 22, 2002, BY BOUNDARY CONSULTING ENGINEERING AND CAN ONLY REFLECT CONDITIONS AS THEY EXISTED DURING THE TIME OF THE SURVEY.

2. COORDINATES ARE BASED ON MASSACHUSETTS STATE PLANE COORDINATE SYSTEM AND ARE EXPRESSSED IN FEET.

3. SOUNDINGS AND ELEVATIONS ARE SHOWN IN FEET AND TENTHS BASED ON A MEAN LOW WATER DATUM.

4. BENCH MARK: 8" SPIKE SET IN UTILITY POLE ELEV. 15.83 MLW.

PROPOSED CONDITIONS
EXISTING AND PROPOSED BOATRAMP @ STA. 1+75

CROSS SECTION FOR PROPOSED BOATRAMP

SCALE: 1/8" = 1'-0"

LICENSE PLAN NO. 9447
Approved by Department of Environmental Protection
DEC 19 2002
SCALE: 1/8" = 1'-0"
Notes:
1. Elevations are in feet and tenths above the plane of Mean Low Water. Minus figures represent depths below that same plane.
2. All timbers to be CCA treated at 25% CCA.
3. 2500 cu yd to be dredged. 350 cu yd of clean sandy material to be placed behind prop bulkhead; where required, 400 cu yd of clean sandy material to be placed at prop disposal site on Noyo Beach. Dredge material not suitable for beach disposal is to be trucked and dumped at the town disposal site located on Colas Neck Road. Approx. 1380 cu yd.

PLAN ACCOMPANYING PETITION OF DEPARTMENT OF ENVIRONMENTAL MANAGEMENT DIVISION OF WATERWAYS TO CONSTRUCT A STEEL BULKHEAD DREDGE & DISPOSE OF DREDGE MATERIAL WELLFLEET HARBOR WELLFLEET, MA.

DEC. 19, 1984 SHEET 1 OF 4

BRAMAN ENGINEERING COMPANY CIVIL ENGINEERS & SURVEYORS

Robert A. Braman
No. 10905
Professional Engineer

License Plan No. 1243
Approved by Department of Environmental Quality Engineering of Massachusetts June 24, 1985

John Zajac, Jr. CHIEF ENGINEER
Abutters:
Town of Wellfleet
P.O. Box A
Wellfleet, Ma., 02667
Lot 34 George F. & Mary Williams
Baker Ave.
Wellfleet, Ma., 02667
Lot 35 Albert & Bertha Larsen
West Main Street
Wellfleet, Ma., 02667

LICENSE PLAN NO. 1263  85N-017

Approved by Department of Environmental Quality Engineering
JUNE 24, 1985
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
<table>
<thead>
<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>077-020-000-004-100</td>
<td>077-020-000-004-100-CDE1A</td>
<td>53-144</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>JUN 1953</td>
<td>Proposed Retaining Wall - Wellfleet Harbor, Wellfleet, MA - DPW of Massachusetts - Division of Waterways</td>
<td>2</td>
<td>Town Pier</td>
<td>Wood Bulkhead</td>
</tr>
<tr>
<td>077-020-000-004-200</td>
<td>077-020-000-004-200-CDE2A</td>
<td>53-144</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>JUN 1953</td>
<td>Proposed Retaining Wall - Wellfleet Harbor, Wellfleet, MA - DPW of Massachusetts - Division of Waterways</td>
<td>2</td>
<td>Town Pier</td>
<td>Wood Bulkhead</td>
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<tr>
<td>077-020-000-004-200</td>
<td>077-020-000-004-200-CDE2B</td>
<td>59-4</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>NOV 1956</td>
<td>Proposed Mooring Pile, Revetment, Marina, Dredging - Wellfleet Harbor, Wellfleet MA - DPW of Massachusetts - Division of Waterways</td>
<td>2</td>
<td>Town Pier</td>
<td>Proposed Revetment Slope</td>
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<tr>
<td>077-020-000-005-100</td>
<td>077-020-000-005-100-CDE1A</td>
<td>52-78</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>MAR 1952</td>
<td>Proposed Approach Road, Timber Pier and Bulkhead - Wellfleet Harbor, Wellfleet</td>
<td>2</td>
<td>Adjacent to Town Pier</td>
<td>Bulkhead</td>
</tr>
<tr>
<td>077-020-000-005-100</td>
<td>077-020-000-005-100-CDE1B</td>
<td>53-144</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>JUN 1953</td>
<td>Proposed Retaining Wall - Wellfleet Harbor, Wellfleet, MA - DPW of Massachusetts - Division of Waterways</td>
<td>2</td>
<td>Town Pier</td>
<td>Wood Bulkhead</td>
</tr>
<tr>
<td>077-020-000-005-100</td>
<td>077-020-000-005-100-CDE1C</td>
<td>85-133</td>
<td>USACE</td>
<td>WELLFLEET</td>
<td>DEC 1984</td>
<td>To Construct a Steel Bulkhead, Dredge and Dispose of Dredge Material - Wellfleet Harbor - Wellfleet, Barnstable Co., MA</td>
<td>5</td>
<td>Adjacent to Town Pier</td>
<td>Steel Bulkhead</td>
</tr>
</tbody>
</table>
NOTE
SOUNDINGS ARE IN FEET AND TENTHS AND SHOW DEPTHS BELOW THE PLANE OF MEAN LOW WATER. MINUS FIGURES SHOW ELEVATIONS ABOVE THE SAME PLANE.
MATERIAL TO BE EXCAVATED APPROXIMATELY 17,500 CUBIC YARDS, FROM AREA SHOWN CROSS HATCHED IN RED. MATERIAL TO BE DISPOSED OF IN FILL AREA, SHOWN HATCHED IN RED.

PROPOSED RETAINING WALL WELLFLEET HARBOR
WELLFLEET, MASS.
APPLICATION BY DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS DIVISION OF WATERWAYS JUNE 1953
SCALES SHOWN

ACCD.03115-D
PLAN
SCALE - FEET
0.1 = 100'

NOTE

SOUNDINGS ARE IN FEET AND TENTHS AND SHOW DEPTHS BELOW THE PLANE OF MEAN LOW WATER. MINUS FIGURES SHOW ELEVATIONS ABOVE THE SAME PLANE.

MATERIAL TO BE EXCAVATED APPROXIMATELY 12,500 CUBIC YARDS, FROM AREA SHOWN CROSS HATCHED IN RED. MATERIAL TO BE DISPOSED OF IN FILL AREA, SHOWN HATCHED IN RED.

PROPOSED RETAINING WALL
WELLFLEET HARBOR
WELLFLEET, MASS.
APPLICATION BY
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS
JUNE 1953
SCALES SHOWN
PROPOSED RETAINING WALL
WELLFLEET HARBOR
WELLFLEET, MASS.
APPLICATION BY
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS
JUNE 1953
SCALES SHOWN

John D. Bradford
NOTE: FOR LARGER SCALE PLAN WITH DIMENSIONS SEE SHEET 2.

PROPOSED MOORING PILES, REVESTMENT - MARINA - DREDGING
WELLFLEET HARBOR
WELLFLEET - MASS.

APPLICATION BY
DEPARTMENT OF PUBLIC WORKS, MASSACHUSETTS
DIVISION OF WATERWAYS
NOVEMBER 1958

Robert B. [Signature]
Enlarged Plan

Scale - Feet
1" = 40'

Note - See Sheet No. 2 for sections

120'

19 Bents - 10' O.C.

Wellfleet

Plan

Scale - Feet
1" = 200'

Note
Proposed work shown in red. Elevations are in feet and tenths above the plane of mean low water. Minus figures show elevations below the same plane.

Proposed Approach Road, Timber Pier & Bulkhead
Wellfleet Harbor
Wellfleet

Attachment
Department of Public Works of Massachusetts
Division of Waterways
March 1952

Hastings
District Waterways Engineer

ACC. NO. O29444A
Typical Section

Scale: 1/4" = 1'

Elevation

Proposed Retaining Wall
Wellfleet Harbor
Wellfleet, Mass.
Application by Department of Public Works of Massachusetts Division of Waterways
June 1953
Scales Shown

John D. Bradford
Notes:
1. Elevations are in feet and tenths above the plane of Mean Low Water. Minus figures represent depths below that same plane.
2. All timber to be GC&A Treated @ 2.5% / cu. yd.
3. 2500 cu. yd. to be dredged. 350 cu. yd. of clean sandy material to be placed behind prop. bulkhead, where required. 1450 cu. yd. of clean sandy material to be placed at prop. disposal site on Mayo Beach. Dredge material not suitable for beach disposal is to be trucked and dumped at the town disposal area, located on Cole's Neck Road. Approx. 750 cu. yd. 4.0% - denotes sample number one.

PLAN

SCALE: 1"=50'

Previous D.E.E. Piv. of Waterways
Dredge Limit
Prop. Dredge Limit

Existing Bulkhead to remain

Bouw. Pier & Floats

Dredge to - O.M.L.W.
2550 cu. yd.

Prop. Steel Bulkhead
Top. El. 15.6

Disposal of 350 cu. yd.

Prop. Dredge Limit

Exist. Timber Pier

Found. Holes
Prop. Deadman W Tie Rods (Typical)

BASE of pavement

BENCH MARK: Chisel Square set in corner of exist. 4x6' concrete box well. Elevation 16.35 MSL

64'

80'

74'

ABUTTERS

Town of Wellfleet
P.O. Box A
Wellfleet, MA. 02667
Lot 34 George F. & Mary Williams
Baker Ave.
Wellfleet, MA. 02667
Lot 35 Albert S. & Bertha Larsen
West Main St.
Wellfleet, MA. 02667

To Construct a Steel Bulkhead
Dredge & Disposal of Dredge Material
WELLFLEET HARBOR
Wellfleet, Barnstable Co., MA.
Application By
DEPARTMENT of ENVIRONMENTAL Mgmt.
DIVISION of WATERWAYS
December 14, 1984

Branan Engineering Company
Civil Engineers & Surveyors
255 Main St., Buzzards Bay, MA.
Bulkhead Detail

Scale: 1' = 5'

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

DEC. 14, 1984

3 OF 5
Section V

Eastham
Section V – Community Findings – Town of Eastham

COMMUNITY DESCRIPTION

The Town of Eastham consists of a land area of 13.99 square miles out of a total area of 27.26 square miles and had a population of 5,453 in the 2000 census. The Town is located on Cape Cod of Massachusetts and its location can be seen on this report’s cover. The estimated length of shoreline is 13 miles that are directly exposed to open ocean. The Town is protected from major coastal storms by both natural and man-made shoreline structures that require maintenance to insure the long term protection of its coastline. The man-made and publicly owned structures that protect the Town were investigated for their ability to provide adequate protection from major coastal storms. Structures have been identified as publicly owned, including coastal dunes and beaches, based on evidence of investment of public funds made to create/enhance/maintain these structures. The assessment did not include floating or pile supported structures as they are assumed not to provide any significant coastal protection from major storm events.

STRUCTURE INVENTORY

Within the Town of Eastham, there were 8 structures which had public or unknown ownership which provide significant coastal protection. The location of the structures can be seen in Sheets 1 through Sheet 4 in Section V-B of this report. The structures were categorized by their type and by their structural condition based on a preliminary field assessment. The distribution of structures by type and condition can be seen in the following table:

<table>
<thead>
<tr>
<th>Primary Structure Type</th>
<th>Total Structures</th>
<th>Structure Condition Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Bulkhead / Seawall</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Revetment</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Breakwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gravel / Jetty</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Coastal Beach</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Within the above table, the total length of each type of structure is also provided. The structures are listed by the type which is providing the primary coastal protection. Many sites have multiple structure types at the same location (i.e. revetment in front of seawall). These secondary structures, although not identified within these tables, are included in the development of repair/rehabilitation costs.

The development of repair costs has been included by structure type and by condition. In the Town of Eastham’s case there are a total of 7 structures which would require approximately $542,000 to bring all the coastal structures to “A” Rating. Most critical will be the structures in the “D” and “F” classifications as those are assumed to undergo some level of damage or failure during the next major coastal storm event. To reconstruct these structures, identified in the preliminary survey as being in poor condition, an estimated $212,500 would be required to upgrade the Town’s coastal protection.
STRUCTURE REPAIR / RECONSTRUCTION COST - Town of Eastham

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>A</th>
<th>B</th>
<th>Structure Condition Rating</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead / Seawall</td>
<td>1</td>
<td></td>
<td></td>
<td>$63,756</td>
<td></td>
<td></td>
<td></td>
<td>$63,756</td>
</tr>
<tr>
<td>Revetment</td>
<td>3</td>
<td></td>
<td></td>
<td>$73,339</td>
<td></td>
<td></td>
<td></td>
<td>$73,339</td>
</tr>
<tr>
<td>Breakwater</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
</tr>
<tr>
<td>Groin / Jetty</td>
<td>3</td>
<td></td>
<td></td>
<td>$62,800</td>
<td>$106,240</td>
<td>$212,467</td>
<td>$-</td>
<td>$381,507</td>
</tr>
<tr>
<td>Coastal Dune</td>
<td>1</td>
<td></td>
<td></td>
<td>$23,800</td>
<td></td>
<td></td>
<td></td>
<td>$23,800</td>
</tr>
<tr>
<td>Coastal Beach</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td></td>
<td><strong>62,800</strong></td>
<td><strong>$267,135</strong></td>
<td><strong>$212,467</strong></td>
<td><strong>$-</strong></td>
<td><strong>$-</strong></td>
<td><strong>$542,402</strong></td>
</tr>
</tbody>
</table>

Based on the limited research within the scope of this project research, the presumed ownership of the structures was established on an initial basis and would be subject to more intense review in future tasks. Structures identified as being owned privately were excluded from further consideration. Although ownership of the land on which the structure was located was a factor, the structure ownership was treated as a separate issue from land ownership. For the Town of Eastham, the breakdown of structures by assumed ownership is as follows:

STRUCTURE OWNERSHIP / REPAIR COST - Town of Eastham

<table>
<thead>
<tr>
<th>Primary Structure (1)</th>
<th>Total Structures</th>
<th>A</th>
<th>B</th>
<th>Structure Condition Rating</th>
<th>C</th>
<th>D</th>
<th>F</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Town Owned</td>
<td>7</td>
<td></td>
<td></td>
<td>$62,800</td>
<td>$110,999</td>
<td>$212,467</td>
<td>$-</td>
<td>$386,266</td>
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<tr>
<td>Commonwealth of Massachusetts</td>
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<td></td>
<td></td>
<td>$49,896</td>
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<td>$49,896</td>
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<tr>
<td>Federal Government Owned</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
<td></td>
<td></td>
<td></td>
<td>$-</td>
</tr>
<tr>
<td>Unknown Ownership</td>
<td>1</td>
<td></td>
<td></td>
<td>$106,240</td>
<td></td>
<td></td>
<td></td>
<td>$106,240</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
<td></td>
<td><strong>62,800</strong></td>
<td><strong>$267,135</strong></td>
<td><strong>$212,467</strong></td>
<td><strong>$-</strong></td>
<td><strong>$-</strong></td>
<td><strong>$542,402</strong></td>
</tr>
</tbody>
</table>

The identification of presumed ownership was not based on the investigation of legal documents but relied on property ownership and from construction and regulatory documents that were found. A more detailed investigation of legal documents and agreements would be required where structure ownership is disputed. A more detailed identification of structure type, length, condition and location can be found in Section V-B which contains Structure Assessment Reports for each individual structure found.

SUMMARY

The enclosed reports and associated documents reflects the Town of Eastham’s coastal structure information that will eventually be input into a state-wide GIS database and will be accessible through MassGIS. This data, when compiled state-wide, will be critical in the development of both short term and long term planning for maintaining and improving Massachusetts coastal protection.

This database will also provide relatively quick access to identify available documentation for these structures as well as the ability to be updated as coastal structure improvements are made.
Section V - Eastham

Part B

Structure Assessment Reports
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Eastham

Location: Sunken Meadow Beach

Based On Comment:

Earliest Structure Record: 1978
Estimated Reconstruction/Repair Cost: $23,800.00

Length: 100 Feet
Top Elevation: 17 Feet NGVD
FIRM Map Zone: V4

Primary Type: Coastal Dune
Primary Material: Sand
Primary Height: 5 to 10 Feet

Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
Coastal dune with retention fences in front of it. The dune is uniform and has minor erosion. There is dune grass on top and houses behind it.

Condition Rating
C Fair

Level of Action Description
Moderate Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

Priority Rating Action Description
III Moderate Priority
Consider for Active Project Improvement Listing
Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)

Structure Images:
019-001-000-097-100-PH01A.jpg
019-001-000-097-100-PH01B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
### CZM Coastal Infrastructure Inventory and Assessment

#### Structure Assessment Form

<table>
<thead>
<tr>
<th>Property Owner:</th>
<th>Location:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td>Harmes Way</td>
<td>10/25/2007</td>
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<table>
<thead>
<tr>
<th>Presumed Structure Owner:</th>
<th>Based On Comment:</th>
<th>Earliest Structure Record:</th>
<th>Estimated Reconstruction/Repair Cost:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unknown</td>
<td></td>
<td>1967</td>
<td>$106,240.00</td>
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<tr>
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<th>Top Elevation:</th>
<th>FIRM Map Zone:</th>
<th>FIRM Map Elevation:</th>
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</thead>
<tbody>
<tr>
<td>160 Feet</td>
<td>Feet NAVD 88</td>
<td>V4</td>
<td>17 Feet NGVD</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Type:</th>
<th>Primary Material:</th>
<th>Primary Height:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groin/ Jetty</td>
<td>Stone</td>
<td>Under 5 Feet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Type:</th>
<th>Secondary Material:</th>
<th>Secondary Height:</th>
</tr>
</thead>
</table>

#### Structure Summary:

Set of three dumped stone groins. Stones are two feet by two feet by two feet on average.

- **Condition Rating**: C
- **Level of Action Description**: Moderate
  Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

- **Priority Rating**: None
- **Action Description**: Long Term Planning Considerations
  No Inshore Structures or Residential Dwelling Units Present

#### Structure Images:

- [019-001-000-101-100-PHO1A.jpg](#)
- [019-001-000-101-100-PHO1B.jpg](#)

#### Structure Documents:

<table>
<thead>
<tr>
<th>Usage</th>
<th>Date</th>
<th>Proposed Groin</th>
<th>Proposed Shore</th>
</tr>
</thead>
<tbody>
<tr>
<td>USAGE</td>
<td>August 1967</td>
<td>019-001-000-101-100-COE1A</td>
<td>019-001-000-101-100-COE1B</td>
</tr>
<tr>
<td>MA-DCR</td>
<td>August 1967</td>
<td>019-001-000-101-100-DCR1A</td>
<td>019-001-000-101-100-DCR1B</td>
</tr>
<tr>
<td>MA-DCR</td>
<td>November 1</td>
<td>019-001-000-101-100-DCR1C</td>
<td>019-001-000-101-100-DCR1D</td>
</tr>
</tbody>
</table>

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Eastham
Structure ID: 019-007-000-321-100
Key: community-map-block-parcel-structure

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Eastham

Location: Campground Road
Based On Comment:

Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $0.00

Length: 40 Feet
Top Elevation: 17 Feet NGVD
FIRM Map Zone: V4
FIRM Map Elevation:

Primary Type: Retention Wall
Primary Material: Stone
Primary Height: 10 to 15 Feet

Secondary Type: Retention Wall
Secondary Material: 
Secondary Height: 

Structure Summary:
Dumped stone revetment at the end of a road. Stones are 3 feet by 2 feet by 1 foot on average. There are a few houses behind the structure and a sand beach in front.

Condition Rating
Excellent
None

Priority Rating
III
Consider for Active Project Improvement Listing

Level of Action Description
Like new condition. Structure expected to withstand major coastal storm without damage. Stable landform (beach, dune or bank). Adequate system exists to provide protection from major coastal storm.

Structure Images:
[019-007-000-321-100-PHO1A.jpg]
[019-007-000-321-100-PHO1B.jpg]

Structure Documents:

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Eastham

Location: Bay Road
Based On Comment:

Date: 10/25/2007

Earliest Structure Record: Unknown
Estimated Reconstruction/Repair Cost: $23,443.00

Length: 30 Feet
Top Elevation: Feet NAVD 88
FIRM Map Zone: V3
FIRM Map Elevation: 20 Feet NGVD

Primary Type: Revetment
Primary Material: Stone
Primary Height: 10 to 15 Feet

Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
Dumped riprap. Stones are 3 feet by 2 feet by 2 feet on average. Structure has moderate to heavy undermining and erosion. There are voids in the stones in some sections.

Condition Rating Priority
C Fair Low Priority
Level of Action Rating Action
Moderate Future Project Consideration
Description Description
Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.

Structure Images: 019-007-000-521-100-P101A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering
**Structure Assessment Form**

**Property Owner:**
Local

**Presumed Structure Owner:**
Local

**Owner Name:**
Eastham

**Location:**
Bay Road

**Based On Comment:**

**Date:**
10/25/2007

**Earliest Structure Record:**
Unknown

**Estimated Reconstruction/Repair Cost:**
$212,467.00

<table>
<thead>
<tr>
<th>Length</th>
<th>Top Elevation</th>
<th>FIRM Map Zone</th>
<th>FIRM Map Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 Feet</td>
<td>Feet NAVD 88</td>
<td>V3</td>
<td>20 Feet NGVD</td>
</tr>
</tbody>
</table>

**Primary Type:** Groin/Jetty

**Primary Material:** Stone

**Primary Height:** Under 5 Feet

**Secondary Type:**

**Secondary Material:**

**Secondary Height:**

**Structure Summary:**
Set of dumped stone groins. Stones are 12 inches to 24 inches in diameter. Stones are scattered and show signs of heavy stone movement.

**Condition**
D

**Rating**
Poor

**Level of Action**
Major

**Description**
Structure exhibits advanced levels of deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure has strong risk of significant damage and possible failure during a major coastal storm. Structure should be monitored until repairs/reconstruction can be initiated. Actions taken to reconstruct structure to regain full capacity to resist a major coastal storm. Landform eroded, stability threatened. Landform not adequate to provide protection during major coastal storm. Actions taken to recreate landform to adequate limits for full protection from a major coastal storm.

**Priority**
I

**Rating**
None

**Action**
Long Term Planning Considerations

**Description**
No Inshore Structures or Residential Dwelling Units Present

**Structure Images:**
- [019-007-000-521-200-PHO2A.jpg](#)
- [019-007-000-521-200-PHO2B.jpg](#)
- [019-007-000-521-200-PHO2C.jpg](#)

**Structure Documents:**

**Prepared By:** Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: State
Presumed Structure Owner: State
Owner Name: State Public Access Board

Location: Rock Harbor
Based On Comment: Enacted on November 7, 1995
Earliest Structure Record: 1966
Estimated Reconstruction/Repair Cost: $49,896.00

Date: 10/25/2007

Length: 150 Feet
Top Elevation: 12 Feet NGVD
FIRM Map Zone: A4
FIRM Map Elevation: 12 Feet NGVD

Primary Type: Revetment
Primary Material: Stone
Primary Height: Under 5 Feet
Secondary Type: Secondary Material:
Secondary Height:

Structure Summary:
Dumped stone along the edge of a boat ramp. Stones had scattered. Stone size is 12 inches to 24 inches.

Condition: C
Rating: Fair
Level of Action: Moderate
Description: Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide addition material for full protection and extended life.

Priority: I
Rating: None
Action: Long Term Planning Considerations
Description: No Inshore Structures or Residential Dwelling Units Present

Structure Images:
019-019-000-120-100-PHO1A.jpg
019-019-000-120-100-PHO1B.jpg

Structure Documents:
USACE July 1966
MA-DCR October 1977

Proposed Access
Proposed Shore
019-019-000-120-100-COE1A
019-019-000-120-100-DCR1A

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Property Owner: Local
Presumed Structure Owner: Local
Owner Name: Eastham/State of Massachusetts

Location: Rock Harbor Inlet
Based On Comment:

Earliest Structure Record: 1972
Estimated Reconstruction/Repair Cost: $62,800.00

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<th>Length:</th>
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<td>200 Feet</td>
<td>Feet NAVD 88</td>
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FIRM Map Zone: A4
FIRM Map Elevation: 12 Feet NGVD

Primary Type: Groin/Jetty
Primary Material: Stone
Primary Height: 10 to 15 Feet

Secondary Type:
Secondary Material:
Secondary Height:

Structure Summary:
Placed stone mound jetty. Stones are 6 feet by 4 feet by 3 feet on average. Crest is one stone wide. No visible sign of stone movement.

Condition Rating
Level of Action Description
Week B Structure observed to exhibit very minor problems, superficial in nature. Minor erosion to landform is present. Structure / landform adequate to provide protection from a major coastal storm with no damage. Actions taken to prevent / limit future deterioration and extend life of structure.

Priority Rating Action Description
Minor None No Inshore Structures or Residential Dwelling Units Present

Structure Images:
019-019-000-120-200-PHO2A.jpg

Structure Documents:
USACE August 1972 Proposed Shore 019-019-000-120-200-COE2A

Prepared By: Bourne Consulting Engineering
CZM Coastal Infrastructure Inventory and Assessment

**Structure Assessment Form**

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<td>A8 Feet NGVD</td>
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<th>Condition Rating Level of Action Description</th>
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<td>C Fair Moderate Structure is sound but may exhibit minor deterioration, section loss, cracking, spalling, undermining, and/or scour. Structure adequate to withstand major coastal storm with little to moderate damage. Actions taken to reinforce structure to provide full protection from major coastal storm and for extending life of structure. Moderate wind or wave damage to landform exists. Landform may not be sufficient to fully protect shoreline during a major coastal storm. Actions taken to provide additional material for full protection and extended life.</td>
<td>I None Long Term Planning Considerations No Inshore Structures or Residential Dwelling Units Present</td>
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**Structure Images:**
- [019-020-000-113-100-PH01A.jpg](#)
- [019-020-000-113-100-PH01B.jpg](#)

**Structure Documents:**

Prepared By: Bourne Consulting Engineering
Section V - Eastham

Part C

Structure Photographs
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<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract Drawing Number</th>
<th>Agency</th>
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Section V - Eastham

Part D

Structure Documents

TOWN DOCUMENT LIST

MA DCR - DOCUMENT LIST

MA DEP – Ch 91 DOCUMENT LIST
  • Copies of License Documents

USACE – PERMIT DOCUMENT LIST
  • Copies of Permit Documents
<table>
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<tr>
<th>BCE Structure No</th>
<th>Document No</th>
<th>Contract/ Drawing Number</th>
<th>Entity</th>
<th>Municipality</th>
<th>Date</th>
<th>Title</th>
<th>Sheets</th>
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No Town Documents for the Town of Eastham
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<th>BCE Structure No</th>
<th>Document No</th>
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<th>Entity</th>
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<td>2609</td>
<td>MA-DCR</td>
<td>Eastham</td>
<td>August 1967</td>
<td>Proposed Shore Protection, Stone Groin Construction, Sunken Meadow Beach - Prepared for the DPW of Massachusetts - Division of Waterways</td>
<td>1</td>
<td>Sunken Meadow</td>
<td>Groins</td>
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<td>MA-DCR</td>
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<td>November 1969</td>
<td>Proposed Shore Protection, Stone Mound Construction - Sunken Meadow Beach - Prepared for the DPW of Massachusetts - Division of Waterways</td>
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<td>Groins</td>
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<td>79-226</td>
<td>USACE</td>
<td>Eastham</td>
<td>June 1978</td>
<td>Proposed Perched Beach Sunken Meadow Beach, Eastham</td>
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<td>USACE</td>
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<td>Proposed Groin Construction - Sunken Meadow Beach - Cape Cod Bay - Eastham, Mass. - Application by the DPW of Massachusetts - Division of Waterways</td>
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<td>USACE</td>
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<td>January 1972</td>
<td>Proposed Shore Protection - Stone Groin - Sunken Meadow Beach - Eastham, Mass. - Application by the DPW of Massachusetts - Division of Waterways</td>
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<td>66-218</td>
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<td>July 1966</td>
<td>Proposed Access Ramp and Facilities - Rock Harbor, Eastham, Massachusetts - Application by the DPW of Massachusetts - Division of Waterways</td>
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<td>Jetty</td>
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* SILL BAG DIMENSIONS:
  H: ~2'
  L: ~12'
  W: ~5'

PROPOSED SUNKEN MEADOW USA
PROPOSAL TO BEACH
EASTHAM, MA
APPLICATION BY TOWN OF EASTHAM
SHEET 1 OF 1  6/29/76
NOTE:
ELEVATIONS ARE IN FEET AND TENTHS AND REFER TO THE PLANE OF MEAN LOW WATER.
LOCATION OF PROPOSED WORK SHOWN IN RED.

PROPOSED GROIN CONSTRUCTION
SUNKEN MEADOW BEACH
CAPE COD BAY
EASTHAM, MASS.
APPLICATION BY
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS
AUGUST 1967
PROPOSED GROIN CONSTRUCTION
SUNKEN MEADOW BEACH
CAPE COD BAY
EASTHAM, MASS
APPLICATION BY
DEPARTMENT OF PUBLIC WORKS OF MASSACHUSETTS
DIVISION OF WATERWAYS
AUGUST 1967

SIGNATURE: [Signature]
REVIEW: [Signature]
This permit could not be copied due to the quality of the original document.

#72-73

Proposed Shore Protection
Stone Groin
Sunken Meadow Beach
Eastham, Mass
Application by the DPW of Massachusetts
Division of Waterways

January 1972
NOTE:
ELEVATIONS ARE IN FEET AND TENTHS ABOVE THE PLANE OF MEAN LOW WATER
MINUS FIGURES SHOW DEPTHS BELOW THAT SAME PLANE.
LOCATION OF PROPOSED WORK SHOWN IN RED.

PROPOSED ACCESS RAMP AND FACILITIES
ROCK HARBOR
EASTHAM MASS.
Application By
DEPARTMENT OF PUBLIC WORKS
OF MASSACHUSETTS
DIVISION OF WATERWAYS
JULY 1986

Deputy Chief Engineer-Waterways
NOTE:

Elevations are in feet and tenths and refer to the plane of mean low water. Minus figures indicate depths below that plane.

Date of Survey: March, 1971
Contract No. 2747
Locations of proposed work shown in red

PROPOSED SHORE PROTECTION
STONE JETTY
ROCK HARBOR
EASTHAM - ORLEANS
Application By
Department of Public Works of Mass.
Division of Waterways
AUGUST, 1972

Fred C. Schwehm
DEPUTY CHIEF ENGINEER - WATERWAYS

ACC. NO. 04955