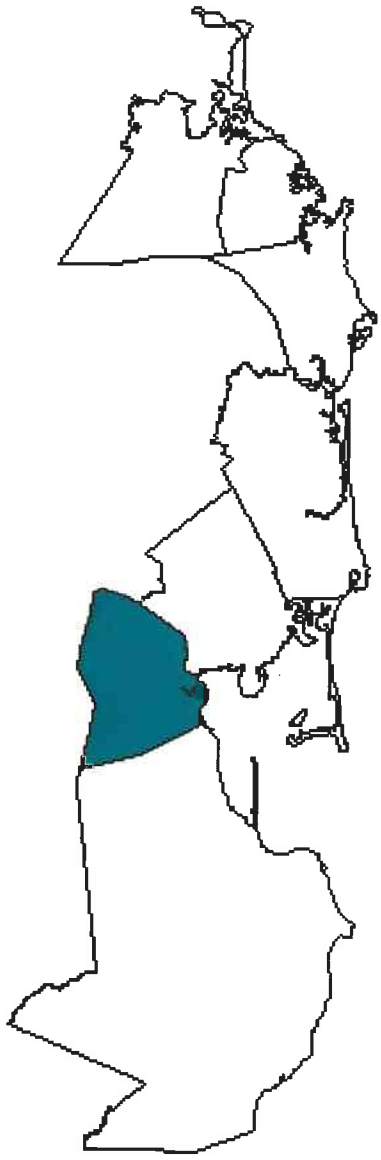
South Shore Coastal Infrastructure Inventory and Assessment Demonstration Project

Coastal Hazards Commission



Town of Kingston

Prepared for:
Office of Coastal Zone Management
Boston, MA

February 28, 2007

Presented by:

Bourne Consulting Engineering
Franklin, Massachusetts

In Association With:

Applied Coastal Research & Engineering, Inc.
Alpha Land Surveying & Engineering Associates

BCE **Bourne Consulting Engineering**
Waterfront Engineers

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Section I – 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 region included in the demonstration project was identified as the South Shore and included the eight communities of Hingham, Hull, Cohasset, Scituate, Marshfield, Duxbury, Kingston and Plymouth.

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, research and field assessments. Assisting ***BCE*** was Applied Coastal Research and Engineering, Inc. of Mashpee, MA who was responsible for field assessments and GIS data conversion. Alpha Land Surveying and Engineering of Middleboro, MA also supported the Team with field GPS survey.

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 is the performance of a demonstration project for coastal structures located on the South Shore. The demonstration project will identify existing structures, their general conditions, ability to provide coastal protection and the probable cost for repairs. The information collected and developed will be incorporated into the MassGIS system to allow use for developing a 20 Year Coastal Infrastructure Plan.

As this is a demonstration project, it will serve as the basis for development of a statewide inventory and assessment of all Commonwealth coastal structures and the needs for their maintenance and/or repair. Incorporated into this project will be the identification of issues and limitations of the investigation and

assessment to achieve the overall goals and what should be included in future investigations/assessments of coastal structures for the other regions.

Goals of Study

The goals of the South Shore Coastal Infrastructure Inventory and Assessment Project include:

- To be used as the model to go forward for assessment of coastal structures for the remainder of the coastal regions
- To identify areas of research and/or assessment that need to be modified for future phases that were not included within the demonstration project
- Complete the study with the final report by November 15, 2006 for submission to the Coastal Hazards Commission
- To identify all the coastal structures the state either owns or has responsibility to maintain for the eight communities 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.
    - Federal structures were identified but no assessment of conditions or priority was performed.
    - 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. No investigation of state archives was performed. Research at MA DEP Chp 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-PPP-BBB-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 the state.

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: Ownerships 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 were 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 is 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 is 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

Preliminary Condition Assessment		Definition Based Upon Perceived Immediacy of Action and Potential to Cause Damage if Not Corrected	Level of Action Required
A	Excellent	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	None
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
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	Moderate
D	Poor	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.	Major
F	Critical	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.	Immediate

EXHIBIT B

Priority Rating System - 5 Level Rating System

Preliminary Priority Level Assessment		Level Based Upon Perceived Immediacy of Action and Presence of Potential Risk to Inshore Structures if Not Corrected	Level of Action Required
I	None	No Inshore Structures or Residential Dwelling Units Present	Long Term Planning Considerations
II	Low Priority	Inshore Structures Present with Limited potential for Significant Infrastructure Damage	Future Project Consideration
III	Moderate Priority	Inshore Structures with potential for Infrastructure Damage and/or Limited Residential Dwellings (<1 dwelling impacted / 100 feet of shoreline)	Consider for Active Project Improvement Listing
IV	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)	Consider for Next Project Construction Listing
V	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. (>10 dwellings impacted / 100 feet of shoreline)	Consider For Immediate Action Due to Public Safety and Welfare Issues

CZM SOUTH SHORE COASTAL INFRASTRUCTURE INVENTORY AND ASSESMENT PROJECT

EXHIBIT C

September 14, 2006

REPAIR / REHABILITATION COSTING DATA

Cost per linear foot of structure

STRUCTURE TYPE	STRUCTURE MATERIALS	STRUCTURE HEIGHT	STRUCTURE CONDITION RATING A	B	C	D	F
BULKHEAD/ SEAWALL	CONCRETE	Under 5 Feet	$0	$84	$425	$850	$983
		5 To 10 Feet	$0	$152	$759	$1,518	$1,782
		10 To 15 Feet	$0	$251	$1,254	$2,508	$2,970
		Over 15 Feet	$0	$396	$1,980	$3,960	$4,752
	STEEL	Under 5 Feet	$0	$54	$273	$546	$680
		5 To 10 Feet	$0	$165	$825	$1,650	$1,848
		10 To 15 Feet	$0	$251	$1,254	$2,508	$2,772
		Over 15 Feet	$0	$343	$1,716	$3,432	$3,795
	STONE	Under 5 Feet	$0	$84	$425	$850	$983
		5 To 10 Feet	$0	$152	$759	$1,518	$1,782
		10 To 15 Feet	$0	$251	$1,254	$2,508	$2,970
		Over 15 Feet	$0	$396	$1,980	$3,960	$4,752
	WOOD	Under 5 Feet	$0	$86	$431	$862	$994
		5 To 10 Feet	$0	$127	$632	$1,265	$1,463
		10 To 15 Feet	$0	$161	$804	$1,608	$1,872
		Over 15 Feet	$0	$202	$1,008	$2,017	$2,380
COASTAL BEACH	SAND	Under 5 Feet	$0	$26	$132	$264	$264
		5 To 10 Feet	$0	$127	$634	$1,267	$1,267
		10 To 15 Feet	$0	$224	$1,122	$2,244	$2,244
		Over 15 Feet	$0	$396	$1,980	$3,960	$3,960
COASTAL DUNE	SAND	Under 5 Feet	$0	$18	$93	$186	$186
		5 To 10 Feet	$0	$48	$238	$476	$476
		10 To 15 Feet	$0	$79	$395	$790	$790
		Over 15 Feet	$0	$132	$660	$1,320	$1,320
REVETMENT	STONE	Under 5 Feet	$0	$66	$333	$664	$730
		5 To 10 Feet	$0	$120	$601	$1,201	$1,300
		10 To 15 Feet	$0	$157	$781	$1,564	$1,696
		Over 15 Feet	$0	$247	$1,234	$2,468	$2,666
GROIN	STONE	Under 5 Feet	$0	$157	$664	$1,328	$1,460
		5 To 10 Feet	$0	$157	$1,201	$2,402	$2,600
		10 To 15 Feet	$0	$157	$1,564	$3,128	$3,392
		Over 15 Feet	$0	$157	$2,468	$4,937	$5,333

NOTE: Repair / Rehabilitation Costs include 10% for engineering and regulatory approvals and 20 % construction contingency.

Section II

Town of Kingston

Community Findings

Section II – Community Findings – Town of Kingston

COMMUNITY DESCRIPTION

The Town of Kingston consists of a land area of 18.5 square miles out of a total area of 20.4 square miles and had a population of 11,780 in the 2000 census. The Town is located on the South Shore of Massachusetts and its location can be seen on this report's cover. The estimated length of shoreline that is directly exposed to open ocean waves is 3.2 miles with the remaining shoreline semi-protected by offshore structures or landforms. 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 Kingston, there were 10 publicly owned structures identified which provide significant coastal protection. The location of the structures can be seen in Sheets 1 through Sheet 3 in Section III 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:

STRUCTURE TYPE AND QUANTITY - Town of Kingston

Primary Structure (1)	Total Structures	Structure Condition Rating A	B	C	D	F	Total Length (feet)
Bulkhead / Seawall	4			4			660
Revetment	4		4				1340
Groin / Jetty	2			1	1		135
Coastal Dune							
Coastal Beach							
	10		4	5	1		2135

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 Kingston's case there are a total of 10 structures which would require approximately $776,000 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 $113,000 would be required to upgrade the Town's coastal protection.

STRUCTURE REPAIR / RECONSTRUCTION COST - Town of Kingston

Primary Structure (1)	Total Structures	Structure Condition Rating A	B	C	D	F	Total Cost
Bulkhead / Seawall	4			$ 433,884			$ 433,884
Revetment	4		$195,769				$ 195,769
Groin / Jetty	2			$ 33,198	$112,873		$ 146,071
Coastal Dune							$ -
Coastal Beach							$ -
	10	$-	$195,769	$ 467,082	$112,873	$ -	$ 775,724

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 Kingston the breakdown of structures by assumed ownership is as follows:

STRUCTURE OWNERSHIP / REPAIR COST - Town of Kingston

Primary Structure (1)	Total Structures	Structure Condition Rating A	B	C	D	F	Total Cost
Town Owned	10		$195,769	$ 467,082	$112,873		$ 775,724
Commonwealth of Massachusetts							$ -
Federal Government Owned							$ -
Unknown Ownership							$ -
							$ -
	10	$-	$195,769	$ 467,082	$112,873	$ -	$ 775,724

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 which contains Structure Assessment Reports for each individual structure found.

SUMMARY

The enclosed reports and associated documents reflects the Town of Kingston'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

Town of Kingston

Structure Assessment Reports

File: X:\26600-\26637\Final Town Report Ortho Drawings\Kingston Report Drawing.dwg

COASTAL STRUCTURE LOCATION PLAN

TOWN OF KINGSTON

SOUTH SHORE COASTAL INFRASTRUCTURE INVENTORY AND ASSESSMENT DEMONSTRATION PROJECT

AUGUST 2006

0 200

SCALE: 1" = 200'

BCE Bourne Consulting Engineering

SHEET 1 OF 1

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-038-000-034-100

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	River St.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	Property Ownership

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	0	$231,990.00

Length:	Top Elevation:	FIRM Map Zone:	FIRM Map Elevation:
185 Feet	Feet NAVD 88	A2	10 Feet NGVD

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Stone block seawall (dryset) with concrete cap which forms filled town wharf. Fender piles around outshore end which apears to be helping retain stones. Many small voids in wall with signs of settling and fill loss inshore.

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:

037-038-000-034-100-PHO1A.jpg

037-038-000-034-100-PHO1B.jpg

037-038-000-034-100-PHO1C.jpg

037-038-000-034-100-PHO1D.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-038-000-034-200

Key: community-map-block-parcel-structure

Property Owner: Local

Location: River St.

Date: 9/1/2006

Presumed Structure Owner: Local

Based On Comment: Property Ownership

Owner Name: Kingston

Earliest Structure Record: 0

Estimated Reconstruction/Repair Cost: $18,018.00

Length:	Top Elevation:	FIRM Map Zone:	FIRM Map Elevation:
150 Feet	Feet NAVD 88	A2	10 Feet NGVD

Primary Type: Revetment

Primary Material: Concrete

Primary Height: 5 to 10 Feet

Secondary Type:

Secondary Material:

Secondary Height:

Structure Summary :

Bituminous concrete boat ramp beside town wharf. Moderate deterioration of pavement.

Condition Rating	B Good	*Priority Rating*	I None
Level of Action	Minor	*Action*	Long Term Planning Considerations
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.	*Description*	No Inshore Structures or Residential Dwelling Units Present

Structure Images:

037-038-000-034-200-PHO2A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-049-000-108-100

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	Rocky Nook Ave.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	DCR – Contract Drawings

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	1959	$159,436.00

Length:	Top Elevation:	FIRM Map Zone:	FIRM Map Elevation:
1015 Feet	Feet NAVD 88	V2	15 Feet NGVD

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Erosion rip rap slope (1 vertical to 2 horizontal) with 1 to 2 ton stones. Toed into sandy beach outshore (just below mean low water). Erosion evident above top of wall (stones dumped along top). Road inshore of slope.

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

Structure Images:

037-049-000-108-100-PHO1A.jpg

037-049-000-108-100-PHO1B.jpg

037-049-000-108-100-PHO1C.jpg

037-049-000-108-100-PHO1D.jpg

Structure Documents:

MA DPW	SEPT 1959	PROPOSED SHORE	037-049-000-108-100-DCR1A

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-030-100

Key: community-map-block-parcel-structure

Property Owner: Local

Location: Sunset Rd.

Date: 9/1/2006

Presumed Structure Owner: Local

Based On Comment: Property Ownership

Owner Name: Kingston

Earliest Structure Record: 0

Estimated Reconstruction/Repair Cost: $15,015.00

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

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Placed rip rap slope (1 vertical to 2 horizontal) toed into sandy beach. 500 to 2000 lb. stone with chinking done well.

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

Structure Images:

037-059-000-030-100-PHO1A.jpg

037-059-000-030-100-PHO1B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-100

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	Braintree Ave.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	Property Ownership

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	0	$85,008.00

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

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Stone block seawall (dry set) with beach outshore. Snack bar building and park inshore. Many small voids and much erosion inshore.

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

Structure Images:

037-059-000-051-100-PHO1A.jpg

037-059-000-051-100-PHO1B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-200

Key: community-map-block-parcel-structure

Property Owner: Local

Location: Braintree Ave.

Date: 9/1/2006

Presumed Structure Owner: Local

Based On Comment: Property Ownership

Owner Name: Kingston

Earliest Structure Record: 0

Estimated Reconstruction/Repair Cost: $74,382.00

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

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

One 2 foot high course of stone blocks with 4 inch to 8 inch rocks dumped inshore of it. Erosion of material inshore.

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

Structure Images:

037-059-000-051-200-PHO2A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-300

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	Braintree Ave.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	Property Ownership

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	0	$42,504.00

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

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Placed rip rap slope along edge of boat ramp and residential propoerty. 500 to 1500 lb. stone. Erosion at top of slope.

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

Structure Images:

037-059-000-051-300-PHO3A.jpg

037-059-000-051-300-PHO3B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-400

Key: community-map-block-parcel-structure

Property Owner: Local

Location: Braintree Ave.

Date: 9/1/2006

Presumed Structure Owner: Local

Based On Comment: Property Ownership

Owner Name: Kingston

Earliest Structure Record: 0

Estimated Reconstruction/Repair Cost: $112,873.00

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

Primary Type: Groin/ Jetty

Primary Material: Stone

Primary Height: Under 5 Feet

Secondary Type:

Secondary Material:

Secondary Height:

Structure Summary :

500 to 2000 lb. stone placed along edge of town beach. Several gaps in structure and dislodged stones.

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

Structure Images:

037-059-000-051-400-PHO4A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-500

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	Braintree Ave.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	Property Ownership

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	0	$33,198.00

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

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

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Dumped rip rap (100 to 1000 lb. stone) along edge of public beach. Movement and jumbling of stones.

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

Structure Images:

037-059-000-051-500-PHO5A.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

CZM South Shore Coastal Infrastructure Inventory and Assessment

Structure Assessment Form

Town: Kingston

Structure ID: 037-059-000-051-600

Key: community-map-block-parcel-structure

Property Owner:	Location:	Date:
Local	Braintree Ave.	9/1/2006

Presumed Structure Owner:	Based On Comment:
Local	Property Ownership

Owner Name:	Earliest Structure Record:	Estimated Reconstruction/Repair Cost:
Kingston	0	$3,300.00

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

Primary Type:	Primary Material:	Primary Height:
Revetment	Concrete	Under 5 Feet

Secondary Type:	Secondary Material:	Secondary Height:

Structure Summary :

Bituminudious concrete emergency boat ramp with precast concrete curb around outshore end. Outshore end just above mean high water.

Condition Rating	B Good
Level of Action	Minor
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	I None
Action	Long Term Planning Considerations
Description	No Inshore Structures or Residential Dwelling Units Present

Structure Images:

037-059-000-051-600-PHO6A.jpg

037-059-000-051-600-PHO6B.jpg

Structure Documents:

Prepared By: Bourne Consulting Engineering

Section IV

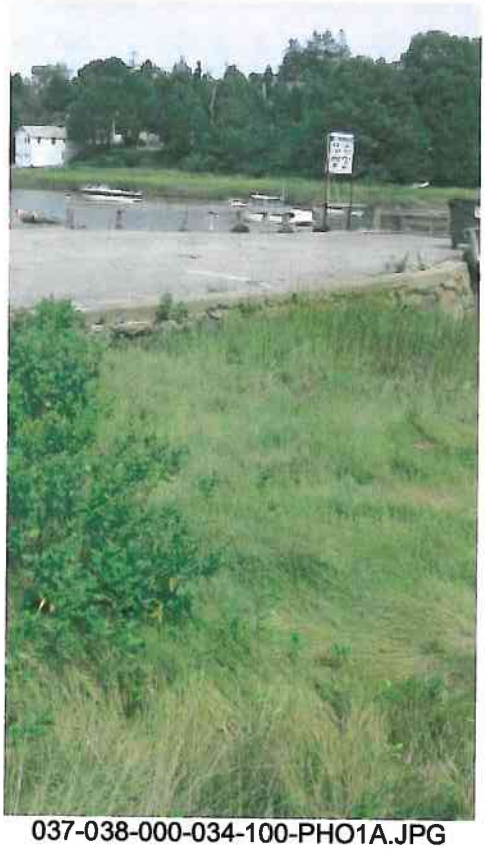
Town of Kingston

Structure Photographs

TOWN: KINGSTON
SOURCE: BCE - FIELD PHOTOGRAPHS
LOCATION: Bourne Consulting Engineering
DATE OF RESEARCH: AUGUST 2006

BCE Structure No	Document No	Contract/ Drawing Number	Entity	Municipality	Date	Title	Sheets	Location	Description
037-038-000-034-100	037-038-000-034-100-PHO1A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-038-000-034-100	037-038-000-034-100-PHO1B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-038-000-034-100	037-038-000-034-100-PHO1C.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-038-000-034-100	037-038-000-034-100-PHO1D.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-038-000-034-200	037-038-000-034-200-PHO2A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-049-000-108-100	037-049-000-108-100-PHO1A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-049-000-108-100	037-049-000-108-100-PHO1B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-049-000-108-100	037-049-000-108-100-PHO1C.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-049-000-108-100	037-049-000-108-100-PHO1D.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-030-100	037-059-000-030-100-PHO1A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-030-100	037-059-000-030-100-PHO1B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-100	037-059-000-051-100-PHO1A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-100	037-059-000-051-100-PHO1B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-200	037-059-000-051-200-PHO2A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-300	037-059-000-051-300-PHO3A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-300	037-059-000-051-300-PHO3B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-400	037-059-000-051-400-PHO4A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-500	037-059-000-051-500-PHO5A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-600	037-059-000-051-600-PHO6A.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey
037-059-000-051-600	037-059-000-051-600-PHO6B.jpg		Bourne Consultting Engineering	KINSTON	August 2006	DIGITAL IMAGE	1	Structure Location	Structure Condtion Photo at Time of Survey

South Shore Coastal Infrastructure and Assessment



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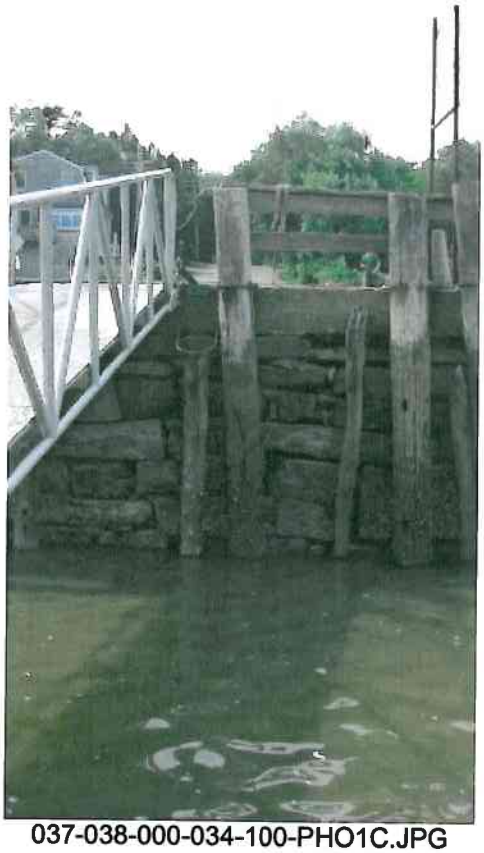

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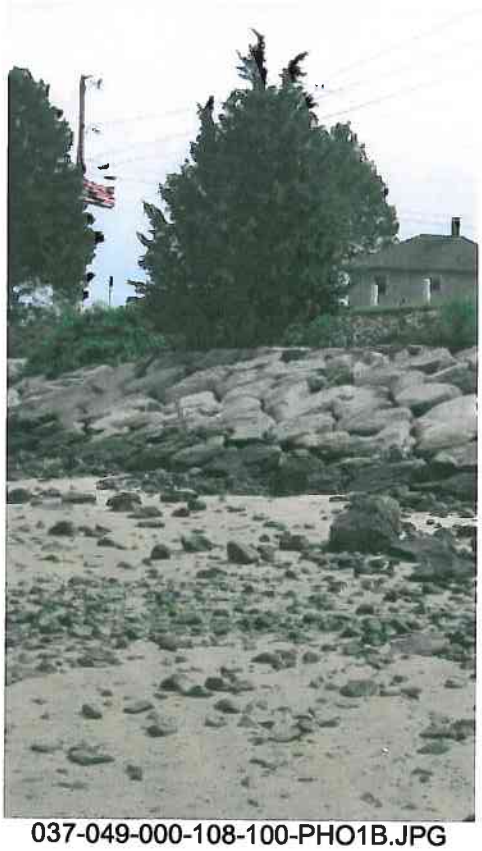
037-038-000-034-100-PHO1D.JPG

037-038-000-034-200-PHO2A.JPG

037-049-000-108-100-PHO1A.JPG



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037-049-000-108-100-PHO1C.JPG

037-049-000-108-100-PHO1D.JPG

037-059-000-030-100-PHO1A.JPG

037-059-000-030-100-PHO1B.JPG

037-059-000-051-100-PHO1A.JPG

037-059-000-051-100-PHO1B.JPG

037-059-000-051-200-PHO2A.JPG

037-059-000-051-300-PHO3A.JPG

037-059-000-051-300-PHO3B.JPG

037-059-000-051-400-PHO4A.JPG

037-059-000-051-500-PHO5A.JPG

037-059-000-051-600-PHO6A.JPG

037-059-000-051-600-PHO6B.JPG

Section V

Town of Kingston

Structure Research

TOWN DOCUMENT LIST

MA DCR - DOCUMENT LIST

MA DEP – Chp 91 DOCUMENT LIST

- Copies of License Documents

USACE – PERMIT DOCUMENT LIST

- Copies of Permit Documents

TOWN: KINGSTON
SOURCE: TOWN OF KINGSTON
LOCATION: KINGSTON MA
DATE OF RESEARCH: AUGUST 2006

NO DRAWINGS AVAILABLE AT THE TOWN

BCE Structure No	Document No	Contract/ Drawing Number	Entity	Municipality	Date	Title	Sheets	Location	Description

TOWN: KINGSTON
SOURCE: MA-DCR - OFFICE OF WATERWAYS
LOCATION: MA-DCR - OFFICE OF WATERWAYS, HINGHAM, MA
DATE OF RESEARCH: AUGUST 2006

BCE Structure No	Document No	Contract/ Drawing Number	Entity	Municipality	Date	Title	Sheets	Location	Description
037-049-000-108-100	037-049-000-108-100-DCR1A	2057	MA DPW	KINGSTON	SEPT 1959	PROPOSED SHORE PROTECTION, STONE MOUND, ROCK NECK	1	COLE STREET, SOUTH 1000 FEET	STONE MOUND AND BOAT RAMP

TOWN: KINGSTON
SOURCE: MA-DEP CHAPTER 91 LICENSE
LOCATION: MA-DEP MAIN OFFICE, BOSTON, MA
DATE OF RESEARCH: AUGUST 2006

NO DRAWINGS AVAILABLE AT DEP

BCE Structure No	Document No	Contract/ Drawing Number	Entity	Municipality	Date	Title	Sheets	Location	Description

TOWN: KINGSTON

NO DRAWINGS AVAILABLE AT USACE

SOURCE: U.S. - ARMY CORPS OF ENGINEERS

LOCATION: U.S.A.C.E. - NEW ENGLAND DISTRICT, CONCORD, MA

DATE OF RESEARCH: AUGUST 2006

BCE Structure No	Document No	Contract/ Drawing Number	Entity	Municipality	Date	Title	Sheets	Location	Description