EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
DAM, LEVEE AND SEAWALL REPAIR AND REMOVAL

ADMINISTRATIVE SUMMARY

PROJECT TITLE:	**Warrens Cove Revetment Repair**		**STATE ID #**	#057-041-000-029-100 #035-053-000-042-200	
LOCATION COORDINATES:	Latitude	42° 56’ 30”	Longitude	-70° 37’ 15”	

RESPONDING ORGANIZATION

Contact Name: David Gould, Town of Plymouth, Department of Marine & Environmental Affairs

Address: 11 Lincoln Street, Plymouth, MA 02360

Telephone: 508-747-1620 ext 134

Facsimile: 508-830-4140

Internet Address: DGould@townhall.plymouth.ma.us

PROJECT CATEGORY (CHOOSE ONE):

____ Category 1 - Dams and similar unregulated impoundments

_X_ Category 2 - Seawalls, coastal flood and/or foreshore protection

____ Category 3 - Inland flood control structures and levees, excluding dams and similar unregulated impoundments

FUNDS SOUGHT FROM PROGRAM

State Funds via EEA **$810,993**

Anticipated Matching Funds (*cash and in-kind*) **$270,307**

Sources (*Federal? State? Local?*): **Local**

AUTHORIZED APPLICATION SIGNATURE

Signature _____ Date _____

Print Name and Title David Gould, Director

EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
DAM, LEVEE AND SEAWALL REPAIR AND REMOVAL:
APPLICATION FOR FUNDING – CONSTRUCTION FINANCE

RESPONSE PROPOSAL

Introduction

This response to the Executive Office of Energy and Environmental Affairs (EOEEA), Request for Quotes (RFQ) is being submitted by the Town of Plymouth to repair and reconstruct portions of the 720 linear feet of revetment primarily fronting Bert's Cove Restaurant and the Pilgrim Sands Motel. The existing stone revetment fronts a vertical concrete seawall. The proposed revetment work will consist of dismantling the existing structure in selected locations, placement of filter fabric, and reconstruction of the structure with appropriately sized stone. The revetment will be reconstructed to the same overall dimensions (height and slope) as the existing structure. Areas where revetment reconstruction will be performed are shown on the attached plan (Attachment A).

This project provides improvements to storm damage protection to the properties landward of the seawall. Over the past several decades, northeast storm events have continued to cause significant damage to coastal infrastructure in Warren's Cove. Specifically, the low lying landform at the south end of Plymouth Beach (including the Town beach parking lot, Bert's Cove Restaurant, and Pilgrim Sands Motel) have experienced wave overtopping during severe storm events. Most recently, the series of severe northeast storms over the 2012-2013 winter season (including the influence of Hurricane Sandy) caused continued lowering of the fronting beach and moderate damage to the revetment. Although the seawall and revetment have remained intact, the repairs performed following the 1991 northeaster ("the Halloween Storm") did not return the structure to its "as-built" condition. More recent work in 2002 re-established the revetment to design conditions; however, portions of the revetment have settled over the past 10+ years as the beach continues to lower, allowing wave action to destabilize portions of the revetment. Although much of the property directly landward of the wall is private, the integrity of the concrete seawall and the stone revetment fronting this seawall is the responsibility of the Town. The seawall is owned and maintained by the Town of Plymouth, where public access along the seawall is provided from the Town parking lot immediately north of the project area (along the crest of the concrete seawall that is a continuation of the seawall in the project area). In addition, the revetment and seawall also protect Warren Avenue (Route 3A) directly landward of the restaurant and motel. This roadway serves as one of the primary evacuation routes from the Pilgrim Nuclear Generating Station.

Between 1978 and 2001, total FEMA claims paid to the two property owners protected by the existing revetment was $1,069,976, where a total of nine (9) claims were filed over this 23-year period. With on-going sea-level rise, the storm damage

costs are anticipated to escalate in the future and reconstruction of the revetment is required to (a) provide direct shore protection needs to the properties and roadway, and (b) reduce wave overtopping during significant coastal storms.

The estimated commencement date for the Project is October, 2016 with completion in June, 2017. This is a Category 2 project as failure of the wall would likely cause loss of life and/or serious public infrastructure damage.

Part I: Project Identification and Narrative

Section A: Review of Current Conditions

The Project Area is located at the southern limit of Plymouth Long Beach in the Town of Plymouth. The Warren Cove shore protection consists of 720 linear feet of seawall and revetment structure located on the east side of the barrier beach system along Warren Avenue (Route 3A). The location of the Project is shown on the USGS topographic map shown in Figure 1 and a more detailed aerial photograph in Figure 2. The beach and seawall may be accessed by the public Town immediately north of the project area (along the crest of the concrete seawall that is a continuation of the seawall in the project area). This roadway serves as one of the primary evacuation routes from the Pilgrim Nuclear Generating Station, as well as numerous other properties in the Plymouth Beach vicinity. However, the road often becomes overwashed with sediment and debris during severe storms as a result of excessive overtopping of the seawall.

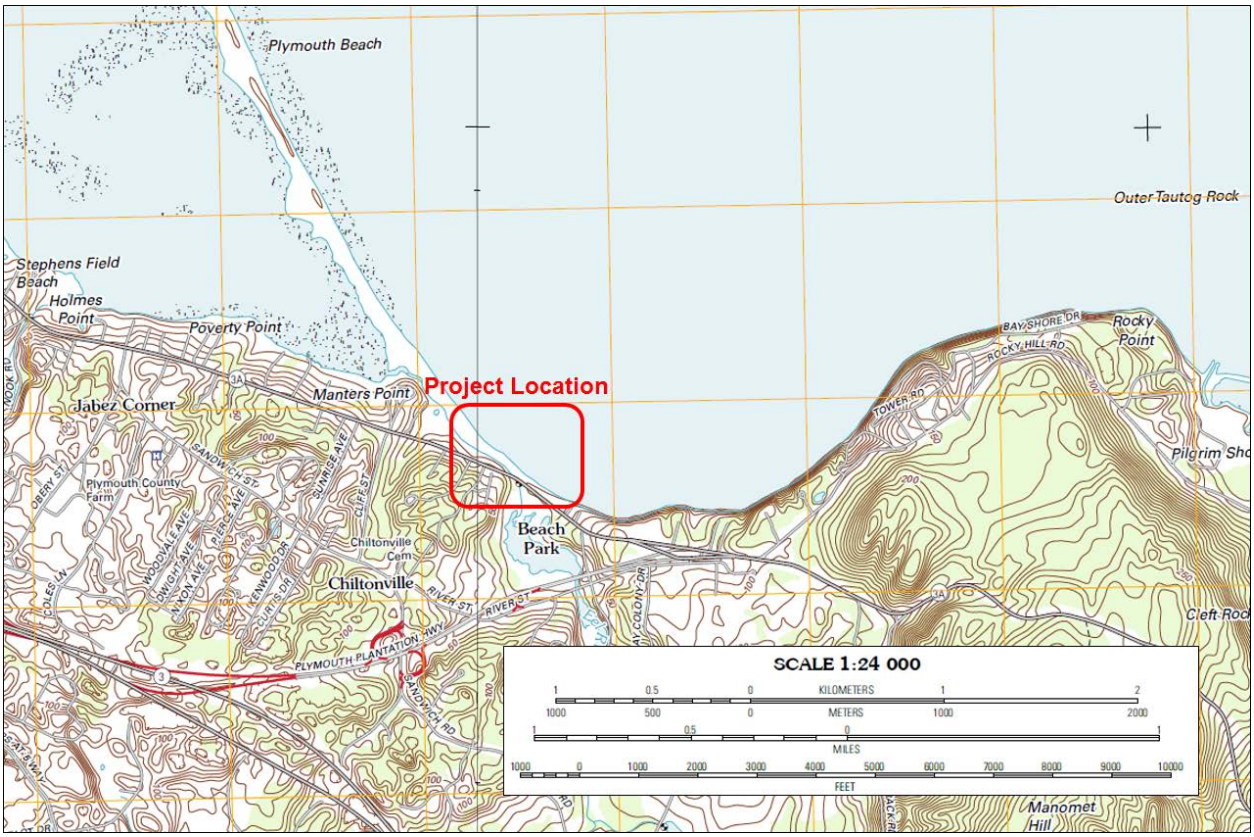

Figure 1. Project Area vicinity showing Plymouth Beach and Warren Cove (map from USGS).

Figure 2. Project Area close-up aerial photograph, where red box indicates specific project area (photo from Google Earth).

The low lying landform at the south end of Plymouth Beach (including the Town beach parking lot, Bert's Cove Restaurant, and Pilgrim Sands Motel) have experienced wave overtopping during severe storm events. Most recently, the series of severe northeast storms over the 2012-2013 winter season (including the influence of Hurricane Sandy) caused continued lowering of the fronting beach and moderate damage to the revetment. Although the seawall and revetment have remained intact, the repairs performed following the 1991 northeaster ("the Halloween Storm") did not return the structure to its "as-built" condition. More recent work in 2002 re-established the revetment to design conditions; however, portions of the revetment have settled over the past decade, allowing wave action to destabilize portions of the revetment. Although much of the property landward of the wall is private, the integrity of the concrete seawall and the stone revetment fronting this seawall is the responsibility of the Town. As stated in a 1977 Memorandum from the Engineering Division, "upon completion of the construction this [the seawall/revetment] was turned over to the Town of Plymouth to maintain." Based on this understanding, the Town of Plymouth requested Applied Coastal Research and Engineering, Inc. (Applied Coastal) to review the existing condition of the revetment and recommend areas that required reconstruction. This analysis was completed in April 2014 (see report in Attachment B).

The 2007 “South Shore Coastal Infrastructure Inventory and Assessment Demonstration Project” by Bourne Consulting Engineers identified the wall as #057-041-000-029-100 and #035-053-000-042-200 and gave it a Condition C (Fair) rating. The report assigned a Priority IV (High) rating stating “(l)andform may not be sufficient to fully protect shoreline during a major coastal storm”. An excerpt from the report is included as Attachment C.

The Project Area has a long history of storm damage. Repair plans dating back to 1946 state that seawall and revetment have been replaced and/or reinforced several times. The most recent plans from 2001 called for extensive reconstruction of the revetment fronting the seawall. Figure 3 illustrates typical storm-induced wave overtopping that leads to long-term degradation of the structure.

Figure 3. Splash-over and wave overtopping at Warrens Cove during Hurricane Sandy (photo from Terence O’Neill).

Section B: Environmental Concerns

As mentioned, primary evacuation routes from the Pilgrim Nuclear Generating Station. In addition, emergency response time to the Plymouth homes south of this overwash area is substantially increased when the road is impassable due to flooding. The storm wave overtopping is also directly responsible for the significant repetitive loss FEMA claims for the Project Area. Both properties in the Project Area have received flood reimbursements from FEMA and are severe repetitive loss properties.

Approximately $1.1 million in federal claims have been paid out between 1978 and 2001, with an average of $119,000 per claim.

Section C: Project Plan

In 2013, the Town of Plymouth funded a condition survey and engineering design for repairs to the shore protection infrastructure along this stretch of the Warren Cove seawall/revetment. A Notice of Intent (NOI) was prepared and an Order of Conditions was received in 2014. Available funding from the Town is $220,307, with a private match of $50,000, totaling $270,307.

The design conditions for the seawall and revetment were based on the 100-year storm. The proposed design calls for repair and reconstruction of damaged portions of the 720 linear feet of revetment primarily fronting Bert's Cove Restaurant and the Pilgrim Sands Motel. The existing stone revetment fronts a vertical concrete seawall. The proposed revetment work will consist of dismantling the existing structure in selected locations, placement of filter fabric, and reconstruction of the structure with appropriately sized stone. The revetment will be reconstructed to the same overall dimensions (height and slope) as the existing structure. Areas where revetment reconstruction will be performed are shown on the attached plan (Attachment A).

The proposed seawall and revetment is designed to structurally withstand the 100-year storm wave condition. In addition, the rough-faced configuration of the proposed revetment repairs will reduce wave overtopping volumes. Wave overtopping runoff and debris that flows onto Warren Avenue is expected to be modestly reduced by proposed design.

It was not possible to incorporate sea level rise projections into the proposed design, as extensive structure enlargement (higher seawall, higher revetment crest, larger footprint, etc.) would be required to further mitigate storm damage. This larger structure would have substantially higher construction costs, as well as significantly greater environmental impacts to adjacent Land Under the Ocean resources. In addition, the surrounding landform (i.e. the remainder of the barrier beach fronting Eel River on Plymouth Beach) would also need to be raised to mitigate storm damage to the roadway. In the future, the seawall and revetment may require additional armoring and/or other shore protection solutions to reduce overtopping to acceptable volumes depending on the magnitude of sea level rise; however, it does not appear that the substantial costs and expanded environmental impacts are warranted at this time.

All environmental regulatory permits are in place for the proposed revetment repairs and reconstruction effort. In addition, a bid package has been developed by the Town.

Chapter 91 public access is provided along the crest of this publically maintained seawall.

Part II: Proponent Qualifications

The project proponent is the Town of Plymouth, in Plymouth County, Massachusetts. The Town was officially incorporated in 1620.

The primary contact for the project will be David Gould, Director, Department of Marine and Environmental Affairs. The secondary contact will be Kerin McCall, Environmental Technician. Copies of the resumes for these key personnel are attached.

Engineering and design of this project was done by Applied Coastal Research and Engineering, Inc. (Applied Coastal) in association with Sullivan Engineering. Additional engineering services for this project will be contracted with Applied Coastal. Resumes for the primary Applied Coastal engineers (John Ramsey and Hugh “Trey” Ruthven) are attached.

Part III: Project Schedule and Cost Estimates

The estimated commencement date for the Project is October 2016 with completion in June, 2017. The total requested EOEEA Grant Funding is $810,993, with Town Match totaling an additional $270,307 (25% of the total project coast). A detailed cost estimate is provided in Attachment D.

Part IV: Ongoing Operations and Maintenance Plans

Because the coastal structure in the Project Area plays such an important role by protecting both upland property and critical infrastructure, the Town of Plymouth is committed to ongoing care and maintenance of the Warren Cove revetment/seawall. The Town has been proactively maintaining this structure since 1991.

As part of the project, the Town and Applied Coastal will develop an operations and maintenance plan for the structure that will include a routine inspection component. The engineering inspection process will utilize a methodology consistent with the state South Shore Coastal Infrastructure Inventory and Assessment Demonstration Project, as Applied Coastal was one of the collaborators with Bourne Consulting Engineers on this project.

LIST OF ATTACHMENTS

Attachment A: Project Design Plans

See attached permitting plans by Applied Coastal and Sullivan Engineering.

Attachment B: Planning Report(s) used as project basis: Applied Coastal 2014 Analysis

See attached excerpts from Applied Coastal.

Attachment C: Planning Report(s) used as project basis

See attached excerpts from Bourne Engineering.

Attachment D: Detailed Cost Estimate

See attached cost estimate.

Attachment E: Resumes

Resume of David Gould, Kerin McCAll, John Ramsey, and Hugh Ruthven

Warren Cove Seawall Removal and Reconstruction
Cost Estimate

Item No.	Item	Quantity	Unit	Cost/Unit	Total
1	Mobilization/Demobilization	1	lump sum	$80,000	$80,000
2	Site Work/Demo/removal	1	lump sum	$50,000	$30,000
4	Sewall Construction	200	linear feet	$3,000	$600,000
5	Revetment Reconstruction	200	linear feet	$500	$100,000
					$810,000

Total Construction Cost	**$810,000**
Contingency (20%)	**$162,000**
Total with Contingency	**$972,000**