

December 16, 2015

Mr. Adam Turner
Executive Director
Martha's Vineyard Commission
33 New York Avenue
Oak Bluffs, MA 02557

Re: **DRI 659 – North Bluff Seawall**

Dear Mr. Turner:

Pursuant to public questions received at and since our MVC DRI hearing last Thursday (12/10/15), please accept this letter in response to your questions received on Tuesday (12/15/15). The responses to these questions are based on the information contained in the CLE project plans and specifications dated October 7, 2015 and recent LUPC & DRI submittals to the MVC and were prepared in collaboration with the Town of Oak Bluffs.

On behalf of the Town of Oak Bluffs and in support for the proposed replacement of an authorized seawall and revetment and the improvement of an existing shoreline path along the North Bluff beach, please see the below stated responses.

DRI 659 - North Bluff Seawall – Post Public Hearing (1) Questions 2015-12-15

1. Funding:

a. How is the funding for this project currently allocated?

The project is funded by grants from DCR Dams & Seawall of \$3.6m + Seaport Council of \$2.0m for a \$5.6m Project Budget. The combined state grants, not separately allocated in the budget, will fund the proposed project with a 5% contingency and construction management services.

b. Can the State funding deadline for substantial construction is June 30, 2016 be extended?

The deadline for project substantial completion is June 30, 2016, there is little likelihood the funding would get extended. The Town of Oak Bluffs understands the deadline has already been extended once and will not be extended again.

c. Regarding CPA funding:

- i. How much money from CPA is required for this project both initially and annually?

The current project budget is \$5,433,984.35 which is less than the \$5.6m available thru state funding. There are no CPA funds requested for this project. The CPA funding article for the Special Town Meeting (STM) this fall was pulled from the warrant and never voted on.

- ii. What specifically would the CPA funding go towards?

There are no CPA funds requested for the project.

2. **Maintenance:** At the Public Hearing the cost of annual maintenance for the proposed metal seawall was estimated to be \$5,000-\$7,500/year.

- a. Has the Town considered these costs for on-going maintenance?

Yes, the Town of Oak Bluffs is committed to on-going maintenance of the seawall project. Funding will be placed in the Highway Department budget for maintenance of the seawall.

- b. Where will the \$5,000-\$7,500 a year come from?

CLE estimates the annual seawall maintenance budget of \$6,000 assumes \$1,000 for materials and 100 man-hours of labor at \$50/hour, if performed on an annual basis.

Who will be responsible?

The Oak Bluffs Department of Public Works (DPW).

- c. What Federal and/or State Permits would be required for this maintenance of the seawall?

None, the maintenance of the seawall is an allowed permit and license condition under the Wetlands Protection Act (WPA) and the Town Wetlands Bylaw. The Order of Conditions (OOC) states that "This Order allows for the future maintenance of the seawall, boardwalk and coastal bank in the approved design".

- d. Without proper maintenance, what is the environmental impact of the corrosion of a rusting seawall?

The seawall has been designed with high-nickel content A-690 epoxy coated steel with bolted wale, cap and recurve sections to minimize corrosion and any environmental impacts. A recent 2000 ASM International paper on The Effects and Economic Impacts of Corrosion states "corrosion is a natural process that forms hydrated iron oxides (rust) similar in chemical composition

to original iron ore". Based on researched data, there is no anticipated environmental impact from rusting steel from this project. Maintenance of the epoxy coating will minimize steel corrosion.

Furthermore, the project has a contract requirement for a two (2) year warranty for visible corrosion on all exposed sheet piling and steel pile cap (Section 990-5).

3. **Repair and Replace:**

a. Was the repair of the existing wall considered as an option?

DCR Waterways declared the existing seawall & revetment failed in their letter dated August 9, 2013 following Hurricane Sandy in October 2012. The failed concrete seawall, constructed with an aggregate of beach sand and without steel reinforcement has cracked, spalled, settled, undermined and rotated and is no longer capable of providing shoreline protection for the coastal bank or Seaview Avenue Extension. The existing concrete seawall (circa 1932) repair alternative was considered during the permitting process and not selected as economically viable or in the best interest of the Town of Oak Bluffs or found to address predicted sea-level rise and increased storm intensities.

Is it possible to repair the existing wall?

No, please see the response to Question 3.a., once a structure is classified in D/F condition, it is no longer structurally sound, performing its intended function and is beyond economically justified repair or rehabilitation.

b. Was a replacement seawall made of concrete considered?

Yes, the construction of a steel-reinforced concrete replacement seawall was the first option that was considered. Originally the new seawall was to remain at elevation 8.5' NGVD29. In 2010 the Town of Oak Bluffs Selectmen voted to raise the seawall to elevation 12'5 to address predicted sea-level rise and increased storm intensities. The local permits for the replacement of an authorized seawall and revetment under state and federal regulations were obtained for the concrete alternative by 2013. Once the preliminary (permit) plans were developed into final design plans it became apparent the 15.5' high wall (Top EL=12.5 w/ Bottom of Footing EL=-3.0') would require sectional construction within a dewatered steel sheet cofferdam, reinforced for coastal bank, storm events and heavy equipment surcharges. The estimated cost for the concrete seawall and boardwalk project in October 2014 was \$8,512,475. The initial post-Sandy FEMA Project Worksheet (PW) dated October 17,

2013 provided an estimated funding of \$1,960,845.00 for the replacement of the concrete seawall along with an additional \$378,805.04 for mitigation measures for a total of \$2,339,605.04. The FEMA funding brought the total of available project funds to \$7,939,605.04 with the remaining \$572,869.96 to be raised by the Town of Oak Bluffs or other sources. On August 5, 2014 the Town of Oak Bluffs met with FEMA and was informed the North Bluff PW amount had been reduced to \$113,318.00 leaving a \$2,799,157.00 project shortfall thereby making the concrete seawall option not possible. CLE met with the Town of Oak Bluffs to determine the feasibility of a \$5.6m budget and to determine what could be built to meet the project objectives within the available project budget. In the fall of 2014 CLE prepared preliminary plans and cost estimates for the steel seawall alternative project, the concept was approved by the Town of Oak Bluffs, DCR Waterways and the funding agencies (DCR Dam/Seawall & Seaport) along with amending the existing local (OOC) and state (DEP) and federal (ACOE) project notifications and the project was bid in October 2015 and awarded to Northern Construction in November 2015 with a deadline of June 30, 2016 for substantial completion. CLE performed Standard penetration tests (SPT) in March and April of 2015 for the final design of the steel sheetpile seawall and determined that the relatively weak fine grain sands along the alignment of the seawall would have provided a very weak foundation for the original concrete seawall footing and likely would have required special footings and/or driven pilings to provide adequate support for the originally proposed concrete seawall and coastal bank.

Why was this option not selected?

The concrete seawall option was not selected for the reasons stated above.

How long would a seawall made of concrete last compared to a sheet metal seawall?

If properly designed, constructed and maintained either structure would have a service life of 40 to 50 years.

c. How difficult is it to construct a replacement seawall?

The construction of the concrete seawall (2014) would have been difficult and would have required the construction of temporary reinforced steel sheet cofferdams (48' by 20') with dewatering for the entire length of the project to support excavation of the existing seawall and support the coastal bank, storm conditions and heavy equipment surcharge loads. At

the SSA Ferry Dock additional measures would have been necessary to assure the structural integrity of the SSA facility concrete wall abutting the North Bluff project and ensure continued ferry dock service during the construction of the North Bluff seawall project.

How long will it take to complete such a project?

The CLE project schedule prepared on May 23, 2014 for the concrete seawall option estimated a 24 month duration, starting in June 2014 with completion of the project by June 2016.

d. Describe the seawall replacement as it currently is proposed?

The North Bluff Seawall project requires the construction of a steel sheet seawall just seaward of the existing concrete seawall for a length of 500' between the OFBA Fish Pier and the harbor parking lot. The project also includes the placement of 3 to 4 ton stone revetment along the base of the seawall and the construction of beach and sidewalk access stairs, timber boardwalk with benches (4) and light posts (5), an ADA access beach ramp and expansion of the Bathhouse plaza.

e. A number of costs per linear foot a/o cubic foot for various aspects of the plan and alternatives were discussed. Can you list the price per linear/cubic/square foot for different types of seawalls/armoring projects? (Such as building a steel wall, a concrete replacement wall, repairing existing wall, beach nourishment, boardwalk, etc...)

Based on a number of recently bid waterfront projects, CLE reports the following average unit costs:

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Unit Cost</u>
Conc. Seawall & Rev.	Cofferdam 180'	LF	\$ 9,600.00
Conc. Seawall & Rev.	Cofferdam 600'	LF	\$ 6,500.00
Steel Seawall & Rev.	NB Project 500'	LF	\$ 4,868.00
Dredging & Beach Noursh.	Little Bridge – 10k	CY	\$ 60.00 (Low)
Concrete Seawall Repairs	2006 DCR App. D	LF	\$ 2,000 (C) to \$ 4,000 (D)
Timber Boardwalk & Rail	Medium 500'	SF	\$ 100 to \$ 125
Stone Revetment	4 to 10 ton	TON	\$ 75 to \$ 100

f. Are there any other alternatives to the use of metal or concrete for the seawall?

Yes, granite stone revetments are typically constructed as seawalls, groins and breakwaters and are designed based on geotechnical conditions, design criteria, permit constraints, allowable footprint, proximity of abutting

structures, project objectives and sufficient project funding. For the North Bluff Seawall the use of a stone revetment was determined not to be viable due to increased footprint, limited design life, requirement for an ADA-access beach ramp and impact on the constructability, protection and maintenance of the timber boardwalk and other project amenities.

g. If the seawall is not constructed, what is the effect on the bluff itself?

The existing concrete seawall will collapse and subsequent coastal storm events will eventually destroy the coastal bank, undermine the Seaview Avenue Extension roadway and endanger existing public infrastructure, residences and local businesses. In its present condition and elevation the existing concrete seawall is not capable of mitigating predicted sea-level rise and increased storm intensities, a new seawall is required to adequately protect the coastal bank, the road and adjacent structures.

h. How difficult will it be to replace the steel wall in the future when it needs to be replaced?

Typically another steel sheet is driven directly in front of the existing steel and the tie-back anchors are replaced. In projects where the sheets are to be removed, the new sheets are driven either in front of or behind the existing sheets, the existing sheets are pulled or cut-off and the tie-back are replaced.

i. Is completing the Beach Nourishment plan with repair of the existing wall a viable alternative.

As mentioned in my response to Question 3.a. the repair of the seawall is not a viable option. The placement of sacrificial sand nourishment will help to mitigate storm damage by absorbing wave and current action and eventually erode, but it will not adequately protect the failed seawall.

i. How much would that cost?

Based on the recently completed Little Bridge Dredging (10,000 CY) project with Beach Nourishment for Ink Well and Pay Beaches the costs were \$40/CY for dredging and \$20/CY for Beach Nourishment. The estimated cost for the placement of Sengekontacket Dredged Material on North Bluff would be about between \$900,000 and \$1,200,000 for a 15,000 CY project.

4. **Examples:**

- a. Has this type of wall been used before in the Ocean (FEMA VE Zone) in a similar circumstance in New England and/or Northeast?

<u>Year</u>	<u>Project</u>
2016	Easy Street Bulkhead, Nantucket, MA (Pending)
2015	Orient Point Bulkhead, Seawall & Revetment, Orient Point, NY
2009	QDC Bulkhead & Revetment, Kingstown, RI
2002	New Rochelle City Marina, New Rochelle, NY
1992	Mattapoisett Town Wharf, Mattapoisett, MA
1986	Marion Town Pier, Marion, MA

- 5. **Endurance:** The current concrete sea wall has been in place for an estimated 75 years (albeit not in perfect shape).

- a. How long will this type of proposed stone armoring last?

If properly designed, constructed and maintained a stone revetment is typically designed for a 20 to 30 year service life.

- b. How does that compare with the existing concrete wall that has been in place?

The current concrete seawall (circa 1932) has been repaired and the northern parking lot sections was replaced over the years. The existing concrete seawall was not designed for predicted impacts of climate change, including sea level rise, stronger storms and higher storm surges. The available historic records indicated the following projects at the North Bluff beach:

<u>Agency</u>	<u>Contract No.</u>	<u>Date</u>	<u>Scope of Work</u>
MA DPW	343	Nov. 1932	Construct Concrete Seawall
MA DPW	374	Aug. 1933	Repair Concrete Footing (143')
MA DPW	646	March 1940	Replace Concrete Seawall (105')
MA DPW	870	Dec. 1945	Construct Stone Revetment

- c. Are there any complications associated with replacing sheet metal pile driven seawall?

The geotechnical conditions at the site are conducive to the driving of steel sheet piles and test pits dug along the face of the existing seawall did not encounter obstructions below the stone revetment at the noted locations shown on the CLE plans dated October 7, 2015. The steel pipe piles driven for the OFBA Fish Pier in 2013 were readily driven and met the project specifications.

6. Beach Nourishment:

- a. Permitting for the Beach Nourishment 2 plan began in 2011. Why has it taken so long to complete?

The permitting and licensing for intertidal beach nourishment and reconstruction of the six (6) timber groins below mean high water (MHW) is complex process and requires local, state and federal permits. The Beach Nourishment (BN) II project has been delayed by DEP permit requests for additional studies and the aftermath of FEMA related work following Hurricane Sandy in 2012. First, the town had to complete a beach sediment transport study. Then Hurricane Sandy struck in 2012 and BN II was put on hold while CLE/Town worked with FEMA to get funding for storm damages to Little Bridge Inlet filling, East Chop Bluff, East Chop Bulkhead, Pay and Inkwel Beach loss, and North Bluff seawall failure. Also, work was proposed by the Oak Bluffs Harbor Committee to study the optimization of the harbor jetties as part of the process – this has been put on hold to expedite the BN II permitting.

- b. Does the project as currently propose negatively impact the beach as it currently exists?

The current project has the same footprint as the 2010 concrete seawall project and extends landward of the annual high tide line (AHTL) and does not impact the intertidal beach down to the mean low water line (MLW) as shown on the CLE plans dated October 7, 2015. The profile, height and slope of the North Bluff beach varies on a seasonal basis and is subject to attack by sea level rise and coastal erosion caused by storms events. The natural littoral process identified in the 2010 Applied Coastal study, which historically nourished and maintained the North Bluff beach has been severely diminished by the armoring of the East Chop bluff and the construction of the Harbor Inlet Jetties.

- c. What is the precise plan to accomplish beach nourishment on the North Bluff beach and what timeframes are reasonably used to see it accomplished?

The North Bluff beach nourishment is proposed by dredging sand under the current 10-Year Permit from Sengekontacket and either trucking it to the site and placing using a conveyor system, or barging it to the site and placing the sand in the near-shore zone. The proposed reconstruction of the six (6) timber groins will help to stabilize the beach and maximize the retention of the beach profiles following beach maintenance events.

The permit process is ongoing and expected to be completed in 2016 with funding for the work from either the Town and/or Coastal Zone Management (CZM) grants under their coastal resiliency program.

d. What permits are required?

The status of the permit process is as follows:

<u>Agency</u>	<u>Filing</u>	<u>Date</u>	<u>Status</u>
MEPA	ENF	11/23/11	Certificate Issues, No ENF Req.
OB Con Com	OOC	11/1/11	Order of Conditions Issued
DEP WQC	WQC	11/21/11	Pending
DEP Chap. 91	License	11/1/11	Pending
CZM	Consist. Rev.	11/7/11	Pending
MA Historical	Proj. Notific.	11/1/11	Pending
ACOE	Ind. Permit	11/1/11	Pending

e. How often will the beach nourishment process need to occur?

The Town of Oak Bluffs is proposing a 5 to 10 year beach nourishment cycle. Historically it is reported that dredging of Little Bridge occurred every year, for a period of time and the sand was used for beach nourishment.

f. Will the groins require regular maintenance?

The timber groins will need to be inspected on minimum of five (5) year cycles and maintained and repaired as necessary.

7. Boardwalk:

a. How did this concept originate?

The timber boardwalk concept was created in collaboration with DCR Waterways, the Town of Oak Bluffs and the project funding agencies. It is was presented and shown on the 2010 MVC DRI submission for the OFBA Fish Pier in Oak Bluffs. The proposed boardwalk provides a scenic and safe ADA accessible pedestrian access along a heavily traveled road. The boardwalk, as well as a harbor walk designed as part of the Town's Streetscape project will direct pedestrians and visitors safely along the waterfront into the center of town.

b. Is this consistent with the Towns development plans

The timber boardwalk is shown on the Town of Oak Bluffs Streetscape Master Plan dated July 2015. The Master Plan includes the North Bluff boardwalk as well as a harbor walk.

The Town's 2015 Open Space and Recreation (OSR) Plan sites Climate Change Adaptation as one of its three (3) main goals. Priority goals include:

- Prioritize and repair failing seawall, revetments
- Seek sand sources for beach nourishment
- Develop long-term beach management plans

The North Bluff seawall project is not stated as a goal in the 2015 OSR plan since at that time the permitting and planning was completed and the project was considered shovel ready by the state funding agencies.

8. Aesthetics:

- a. The appearance of the seawall is an issue discussed by many at the hearing. What is your response to those who question a steel wall appropriateness at the north bluff?

The primary function of the steel sheet seawall is to provide a stable and efficient structure to protect the coastal bank, support the timber boardwalk, protect Seaview Avenue Extension and its infrastructure, local businesses and residences from coastal storm events and predicted sea-level rise and increased storm intensities. The use of coated (haze grey) steel sheeting is a common practice for public and commercial waterfront facilities, the noted heightened visibility of the steel seawall structure with a 5.5' reveal will require regular maintenance to retain aesthetic qualities.

The stone revetment and the steel bulkhead will both be gray in color and blend into the new shoreline. The town believes the gray sheetpile bulkhead will be unobtrusive and more aesthetically pleasing than the existing, crumbling concrete seawall and eroded coastal bank.

- b. Lampposts are shown on the plan but not in Sections and not at a scale that anyone can see in the perspective. Do you have a section and detail of what the lampposts would look like?

The lampposts are specified in the CLE plans (Pages 15, 16 & 17) and Specifications (Section 800) dated October 7, 2015. The lighting plan call for two (2) 20' tall light posts near the harbor parking lot and three (3) 16' tall light posts along the boardwalk to provide safe night-time pedestrian access. CLE met with DCR, the Town of Oak Bluffs and their Lighting Consultant on April 8, 2014 to review the proposed lighting fixtures and benches and assigned the Town as responsible party for reviewing and accepting the contractor (Northern) supplied lampposts, benches and Bathhouse plaza lighting. The light posts review and acceptance is pending town approval.

Additionally, CLE specified benches to match the Department of Fish and Game (OFBA) timber and galvanized steel benches that are currently installed on the Fish Pier and the new 52' section of ADA-access Boardwalk, thereby creating consistency with benches along the proposed timber boardwalk.

The lighting fixtures with aluminum tapered pole were selected to match the lighting fixtures associated with the SSA Ferry Facility and the sidewalk along Seaview Avenue Extension and match the current aesthetics of the area. The Town of Oak Bluffs believes there are a number of different types of fixtures used in the area around the North Bluff and adding another to the mix does not seem like it would be aesthetically pleasing.

9. Technical Information:

- a. Some of the testing that was done is difficult to understand. For example, a Standard Penetration Testing is measured in Blow Counts. Can you explain that as briefly as possible in writing for the laymen?

A standard penetration test (SPT) is an investigation of geotechnical site conditions and evaluation of the sediment characteristics and their ability of underlying soils to adequately support a structure with noted factors of safety (FS) for specific design criteria. Typically the SPT are performed by boring a 4" hole into the ground with samples taken at five (5') foot intervals and recording the number of blows per foot of a 140 pound hammer dropping 30" to penetrate a foot of sediment. Generally, the higher blow counts are indicative of greater capacity of the underlying soils up to a refusal limit, defined as 100 blows per foot. At refusal a rock coring is usually extended 5' to 10' into the material to confirm the existence of ledge, rock or glacial till.

- b. Claims were made that the existing seawall has "failed". Is there a technical definition for what that means in this case?

DCR Waterways declared the existing seawall & revetment failed in their letter dated August 9, 2013 following Hurricane Sandy in October 2012. The failed concrete seawall, constructed with an aggregate of beach sand and without steel reinforcement has cracked, spalled, settled, undermined and rotated and is no longer capable of providing shoreline protection for the coastal bank or Seaview Avenue Extension.

Has there been an official test with documentation that the North Bluff seawall had officially "failed"? If so what was the standard/criteria for failure?

DCR Waterways declared the existing seawall & revetment failed in their letter dated August 9, 2013 following Hurricane Sandy in October 2012. The definition and criteria for failure is defined in the Massachusetts Coastal

Infrastructure Inventory and Assessment (MCIIA) Project Report published by DCR Waterways dated October 2009.

- c. The soils under the parking lot, where the bulkhead was replaced a few years ago, appear to be different than along the site of the currently proposed metal seawall. Can you briefly explain the results of that testing and where it occurred, and describe the implications of this finding?

As part of our final seawall design process for the steel seawall, CLE performed additional SPT along the proposed seawall alignment and top of coastal bank in March 2015 to augment the original geotechnical investigation performed in September 2009. During the 2009 (B-1-09) and 2015 (B-1-15) borings confirm the existence of fill materials for the parking lot and blow counts averaging 20 blows per foot for the underlying material in the 9' to 16' depth range and the stated transition to weaker sediments averaging 6 blows per foot along the proposed seawall alignment at similar depths

10. Consequences:

- a. What are the economic risks if the town does nothing to the North Bluff Sea Wall?

The Town of Oak Bluffs will face economic hardship from the loss of the existing concrete seawall. The subsequent damage caused by coastal storms and sea level rise to the North Bluff area's then unprotected coastal bank, public roadway and infrastructure will negatively impact local businesses, lower property values and disrupt tourism and seasonal ferry service to Oak Bluffs.

11. Lawsuits:

- a. The Town is appealing the decision by FEMA to withdraw funding. If the Town is successful in its appeal and receives the FEMA funding what would the funding be used for?

The FEMA funds could either be used to reduce the required funding from the state grants or for the completion of the entire length of seawall and boardwalk from the Fish Pier to the SSA Ferry Dock.

- b. There were several appeals relative to the bidding process. Can you briefly describe the status of those and how that might affect project timing?

The Town of Oak Bluffs initially bid the North Bluff Seawall project in September 2015 and the Town after reviewing the bids elected to rebid the project due to insufficient project funding. The Town removed a project requirement and re-bid the project in October 2015. Following the opening of bids one of the bidders (MIG) filed a preliminary injunction against the project, the Court denied the request for preliminary relief by MIG. MIG has not taken any further action in this matter.

Subsequent to the second (2nd) bid in October 2015, the North Bluff project was awarded to Northern Construction in November 2015 and is proceeding with a schedule substantial completion date of June 30, 2016.

Please contact me directly (508-801-4506) if you have any questions.

Respectfully submitted,
CLE Engineering, Inc.



Carlos G. Peña, P.E.
Vice President

Cc: Michael Santoro (Town of Oak Bluffs)
Robert Whritenour (Town of Oak Bluffs)
Elizabeth Durkee (Town of Oak Bluffs)
David Lager (NATCO)