Tighe&Bond
Engineers | Environmental Specialists

WEYMOUTH MUNICIPAL VULNERABILITY ACTION GRANT SUMMARY REPORT

FORT POINT COASTAL INFRASTRUCTURE IMPROVEMENTS

June 2019

SUBMITTED TO:

Weymouth Department of Public Works
Weymouth, MA

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APPENDICES

EXECUTIVE SUMMARY

To address natural hazard events and improve climate resiliency, Weymouth completed a Hazard Mitigation Plan in 2014. The Weymouth Local Hazard Mitigation Planning Team identified several mitigation measures that would serve to reduce the Town's vulnerability to natural hazard events. **The most important of these are physical infrastructure improvement projects including coastal structure elevations along Fort Point Road.**

Weymouth took part in the Executive Office of Energy and Environmental Affair's Municipal Vulnerability Preparedness Planning Program (MVP) in 2017, to continue exploring ways to make Weymouth more resilient to natural hazards including coastal flooding and the impacts of climate change. Coastal infrastructure (particularly seawalls), drainage and stormwater management were among the Town's top categories of concerns and challenges in the final MVP Planning Report. Reconstruction of the coastal infrastructure in the Fort Point Road area was, once again, identified as an immediate need.

In 2018, Weymouth pursued and was awarded an $129,557 MVP Action Grant to address the physical infrastructure in the Fort Point Road area. The Town worked together with Tighe and Bond, an engineering and environmental specialist firm, to determine the best solution to address the infrastructure and climate-related concerns at the Fort Point Road area coastline.

Work completed under the grant included identification of required access agreements for construction and long-term maintenance, an existing conditions survey, geotechnical borings, and public outreach to discuss analysis of alternatives for the seawall improvements.

The MVP Action Grant final deliverable included permit level design for the preferred restoration option for the coastal improvements, including public stairway access to the water and drainage improvements. A conceptual video rendering of the seawall alternatives was developed and landscape rendering graphics prepared for the preferred alternative for public posting.

The technical partners from Massachusetts Coastal Zone Management met with the planning team on several occasions, both in person and via conference call to provide advice and improve the project deliverables.

SUMMARY OF THE PLANNING AND DESIGN PROCESS

The MVP Action grant involved the following steps in planning, studies outreach and design. Highlights of each major task are provided below:

PRIVATE PROPERTY ACCESS AND MAINTENANCE

- While the seawall is owned by the Town, there are 25 properties what will need some type of legal access for wall repairs, improvement and maintenance. Finding and recommendations to the Town were provided.

ENGINEERING STUDIES AND SURVEY

- Existing topographic survey completed.
- Coastline conditions assessment completed.
- Three 25-40-foot deep borings drilled behind the seawall on Fort Point Road (task was supplemental to MVP grant).

ALTERNATIVES ANALYSIS AND OUTREACH

- Three alternative wall designs were presented at a public meeting on March 21, 2018. A preferred alternate was selected based on feedback from the public and technical advisors.

PERMITTING LEVEL DESIGN

- Final Deliverables: Conceptual Graphic, Permit Level Design, Opinion of Probable Construction Cost and Permitting Memo

View north along Fort Point Road showing added revetment and toe repairs behind failing seawall.

PUBLIC OUTREACH

Public outreach was accomplished through a combination of press releases, public meetings and postings on the Towns Website. The highlights of public outreach are listed below. Public Outreach deliverables are in Appendix A.

APPENDIX A:

PUBLIC MEETINGS

- Meeting Agenda and Sign-in sheet November 29, 2018
- PowerPoint presentation
- Meeting Summary
- March 21, 2019 Public Meeting Deliverables are in Appendix C

ACCESS AND MAINTENANCE AGREEMENT MEMO

- Fort Point Seawall Repair Access Memo 1.10.19

TOWN WEBSITE POSTINGS

https://www.weymouth.ma.us/engineering/pages/fort-point-road-seawall-project

ENGINEERING ASSESSMENT

COASTLINE CONDITIONS SURVEY

A complete coastline conditions survey was completed for the Fort Point Road area. The coastline conditions survey included apparent sediment movements, tides, currents, prevailing wave orientations, beach sediment and shellfish characterization, revetment and seawall assessment, and the drainage system within the project area. The assessments helped to form an engineering basis for concept development and outreach discussions.

A professional topographic survey of the coastline and inland drainage areas was completed and an existing conditions plan prepared.

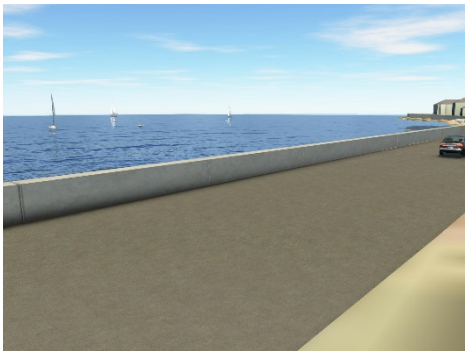
GEOTECHNICAL BORINGS

Based on the selection of the sheet pile type design for the Fort Point Seawall, additional geotechnical work is required to optimize the design for the sea wall. Three borings were installed, to a depth of 28-40 feet. The boring data was used to determine the optimal depth of the sheet pile cutoff wall, and subsurface materials which inform calculations to assure the structural integrity of the design including the existing height of the wall plus a potential future extension.

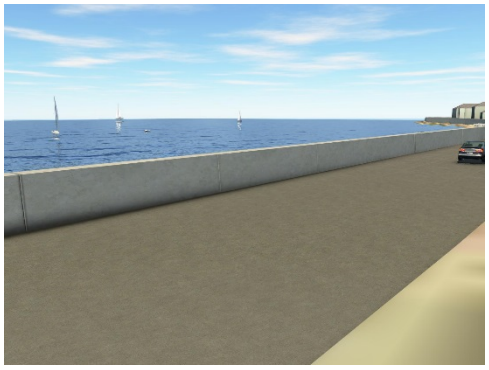
The boring logs and geotechnical summary are provided in Appendix B.

APPENDIX B:

- Boring Locations and Logs
- Field Investigations



Proposed Sheet Pile Seawall- EL 12.0 FT



Proposed Sheet Pile Seawall- EL 13.5FT

Proposed Seawall Finishes

Proposed Seawall Finishes

ALTERNATIVES ANALYSIS

Three conceptual alternatives for the Fort Point Road Seawall were examined. These alternatives included a sheet pile supported wall, an in-kind replacement with a similar precast seawall block, or a concrete gravity wall. Each of the three alternatives would be designed to be a minimum elevation of 12 feet NAVD88, with an option to raise the wall an additional 1.5 feet at some time in the future.

The benefits and constraints for the three alternatives were analyzed. Feasibility, permitting issues, construction cost, public benefit, sustainability, ecological benefits, flood mitigation, complexity, maintenance and grant funding potential were all considered.

The pros and cons of the alternatives were presented at a neighborhood meeting on March 21, 2019. The presentation used a variety of media including PowerPoint graphics and video renderings. Following the meeting, landscape perspective drawings of the preferred design were posted on the Town website.

Tighe & Bond recommended the sheet pile supported wall due to the added benefit of preventng seepage through and under the seawall and the height of the wall will provide the additional freeboard necessary for sea level rise. The alternatives analysis deliverables are provided in Appendix C except for the video graphics due to size.

APPENDIX C:

- March 21, 2019 Public Meeting Agenda and Sign in
- Public Meeting Notice
- Alternatives Meeting Power Point
- Alternatives Meeting Summary

OPTION NUMBER	PROS	CONS	APPROX COST
No Build	• No jurisdictional impacts • No cost	• Wall blocks are deteriorating • Does not provide additional freeboard for SLR	$
1A – Install concrete encased sheet pile wall – Raise wall 2’ to EL 12’	• Prevents seep through wall • Provides additional freeboard for SLR • Can be adapted for future expansion	• High cost • Must reset some revetment •	$$$$
1B – Install concrete encased sheet pile wall – Raise to EL 13.5’	• Prevents seep through wall • Wave overtopping reduced • Consider raising road	• High cost • Must reset some revetment • Loss of some views over the wall	$$$$
2A – Replace existing wall blocks in kind – Raise wall 2’ to EL 12’	• Simple solution • Provides additional freeboard for SLR • Can be adapted for future expansion	• Allows water through revetment • Large cast-in-place leveling slab	$$
2B – Replace existing wall blocks in kind – Raise wall to EL 13.5’	• Simple solution • Wave overtopping reduced • Consider raising road	• Allows water through revetment • Large cast-in-place slab • Loss of some views over the wall	$$
3A – Install concrete gravity wall – Raise wall 2’ to EL 12’	• Provides additional freeboard for SLR • Can be adapted for future expansion	• Provides additional freeboard for SLR • Can be adapted for future expansion	$$$
3B – Install concrete gravity wall – Raise wall to EL 13.5’	• Wave overtopping reduced • Consider raising road	• Wave overtopping reduced	$$$

Matrix presenting the pros and cons of the three pond restoration options.

PERMIT LEVEL DESIGN PLANS

The Town of Weymouth is proposing to redesign the seawall in the Fort Point Road area to provide a resilient, holistic system capable of properly functioning over the 50-year life of the new infrastructure. This holistic and resilient design approach considers projected climate change impacts, including sea level rise and increased frequency and severity of coastal storms.

Seawall Redesign and Reconstruction: The existing concrete wall is anticipated to be reconstructed as a concrete encased sheet pile wall and will be raised approximately one and one-half to two feet from the current elevation to an elevation of 12' NAVD88. The sheet pile will be driven to a depth of approximately 12 feet below Mean Sea Level (MSL), thereby improving sliding resistance, reducing wave wash-through, and minimizing potential for loss of backfill in the rocks that support the wall. The new height or top-of-wall elevation was established through public outreach and meetings to balance the risks for overtopping with the impacts of a higher wall on viewsheds and access to the beach. The new wall and its foundation will also be designed with appropriate load-bearing capacity to accommodate future modifications in height and size. This will allow the Town to more easily retrofit the infrastructure in future to better respond to climate change impacts.

The proposed project also includes public access stairways in three locations. The design of the concrete and timber stairways wraps around the top of the seawall and drops down over the revetment with helical anchor pilings to support the foot of the open timber stairway. The suggested locations for stairs include a stairway at the end of Sawtelle Road, Bacon Road, and the north end of Caldwell Street. The walls and the stairway have been designed to stay within the footprint of the existing infrastructure to minimize impacts on sensitive coastal resources.

Drainage Redesign and Reconstruction: Drainage in the Project Area will be redesigned and reconstructed to better respond to projected climate change impacts as a coherent, holistic system for storm and flood water management, not a patchwork of independent structures. This new system will rapidly drain flood waters post storm while also having the capacity to keep water out – i.e., to eliminate both surcharging and the infiltration of tidally-influenced ground water as it currently occurs.

The permit level stormwater design includes a water-tight, easy-to-maintain system including new generation elastomeric check valves to control backflow. All drain outfalls were designed for durability, ease of maintenance, and resistance to beach sedimentation and blockage and meet Massachusetts stormwater management standards for redevelopment projects. Existing catch basins will be evaluated and replaced with new structures where appropriate. All catch basins will also be hooded to remove gross solids or hydrocarbons from runoff prior to discharge.

As the project moves forward the Town plans to pursue additional MVP Action Grant funding to finalize design plans and obtain the necessary federal, state and local permits. The final design and permit phase will take at least one year. It is anticipated that construction on the seawall repairs and infrastructure improvements would take place no earlier than 2021.

Appendix D includes the permitting level design deliverables.

APPENDIX D:

- Permit Level Design Plans
- Permit Level Opinion of Probable Construction Costs
- Identification and Assessment of Permits Needed for the Fort Point Coastal Infrastructure Improvements

TECHNICAL SUPPORT PROVIDED BY PROJECT PARTNERS

The project team is especially grateful to the guidance provided by Rebecca Haney and Erikk Hokenson, from the Massachusetts Office of Coastal Zone Management. Rebecca and Erikk provided ongoing advice, attended the project meetings and provided critical input to improve the project deliverables.

Town staff supporting the project included leadership from Chip Fontaine, PE, Town Engineer and Jim McGrath, PLS, Assistant Town Engineer. The Weymouth project team included Harbormaster Paul Milone, Conservation Agent Mary Ellen Schloss, Emergency Management Director John Mulveyhill, and Weymouth Grants and Procurement Specialist Christine Howe. The Town team were involved in the grant every step of the way, providing support to coordinate grant administration, easement and access agreement discussions with key abutters, providing meeting logistics, public outreach and field support during survey and boring work, and reviewing and providing valuable comments on all deliverables.

As the project moves forward, the continued support of both state and local partners will be vitally important.

Existing view north along Fort Point Road

Conceptual view north along Fort Point Road - stamped block with stain

Existing view north east along Fort Point Road

Conceptual view north east along Fort Point Road- stamped block with stain