THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
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John Kennelly,
Chief of Planning
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly,

Thank you for the opportunity to comment on the U.S. Army Corps of Engineers (USACE) New England District study regarding the flooding and storm damage problems in the Fieldston and Brant Rock sections of Marshfield ("study area"). The Massachusetts Office of Coastal Zone Management (CZM) participated in the interagency site visit on September 27th, attended by local, state and federal officials. We also reviewed the Reconnaissance Study, dated January 5, 2006, and the Initial Feasibility Study Report, dated February 2007. We have provided extensive technical assistance to the Town of Marshfield regarding the storm damage issues in this area. Based on observations and review of available information regarding the flooding, erosion and storm damage patterns, the flooding and storm damage issues in this locale are complex. CZM believes that there needs to be a multi-faceted approach to addressing the range of flooding and storm damage issues as no one single option can mitigate all of the current issues. CZM offers the following comments and recommendations to address these issues.

As discussed at the site visit, there are significant issues with flooding and storm damage along the majority of the shoreline from the Fieldston area south through Brant Rock. One indicator of the level and extent of damage being experienced in this area are the claims submitted under the National Flood Insurance Program (NFIP). In 2005, CZM published the *South Shore Coastal Hazards Characterization Atlas*, which provides maps that illustrate shoreline variables, including properties with multiple flood insurance claims between 1978 and 2002. Attached is the map for the study areas, which depicts significant concentrations of properties with multiple flood insurance claims from Fieldston to Brant Rock. The Atlas is available online at: http://www.mass.gov/czm/hazards/ss_atlas/atlas.htm. Since this is a subset of all the claims data, CZM recommends that the USACE obtain all the NFIP claims data from Department of Conservation and Recreation (DCR) Flood Hazard Management Program (FHMP), which implements the NFIP for the state. In addition to the NFIP claim data, the Atlas also contains maps of other variables, including littoral cell boundaries, shoreline type, and beach width fronting coastal banks. The *Description of Variables Report*, also available online, contains maps of tide range, wave climate, and storm susceptibility for the entire coast of Massachusetts. This data should be helpful as the USACE proceeds with this study.

There are vertical concrete seawalls along the entire length of the shoreline from Fieldston to Brant Rock. In some sections, the seawalls are fronted by riprap revetments, constructed to help prevent further undermining of the seawalls. The state Coastal Hazards Commission initiated an inventory and assessment of all publicly owned seawalls, revetments, groins, jetties and other coastal

engineering structures in 2006. The *Massachusetts Coastal Infrastructure Inventory and Assessment Project* (CIIA) reports produced as a result of this effort include condition ratings and estimated repair or reconstruction costs for publically owned coastal engineering structures on ocean facing shorelines. The reports are available online at: http://www.mass.gov/czm/stormsmart/mitigation/infrastructure_reports.htm. As discussed at the site visit, one of the main findings of the CIIA for the majority of seawalls and other coastal engineering structures from the Fieldston area to Brant Rock is that the landforms in front of and under the structures (i.e. coastal beach and nearshore) are eroded, threatening the stability of the structures. The report also states that the landform is not adequate to provide protection during a major storm event. Past efforts by the Town and State have included repairing the walls, increasing the height of them in some cases, and placing riprap seaward of the walls to provide structural support. The result of the seaward encroachment of the riprap is that the tides and waves interact with the structures more frequently, causing more erosion of the beach and nearshore. As the erosion of the beach has increased, the riprap has been undermined and larger revetments are constructed to protect the structural integrity of the seawalls. The more the waves and tides interact with the walls and the riprap, the more water and waves come over the wall, leading to increased flooding and storm damage landward of the walls.

Although there has been some reduction in the storm damage directly behind the walls as a result of increased height, a recurved cap, or when a new revetment was placed seaward of them, this cycle of building bigger structures each time they get undermined has resulted in significant impacts to the beach and nearshore making the storm damage and flooding situation worse in the long term. In addition, the environmental impacts to the beach and nearshore have been significant; the elevation and volume of the fronting landforms has been significantly diminished, completely changing the habitat and function of these areas. The conclusion in the Initial Feasibility Study that the option of raising the existing seawall poses limited environmental impacts does not appear to take into account the significant impacts that have been occurring as a result of similar projects.

CZM recommends that the USACE and the Town revise the study area and explore a larger nourishment project to address the flooding, storm damage and erosion problems along the Fieldston to Brant Rock area. Based on our observations of flooding and storm damage as well as review of available information, CZM believes that the study area should extend from Fieldston all the way to Brant Rock, rather than just two relatively short sections of the shoreline. CZM strongly urges the USACE to consider the need to address the erosion of the beach and nearshore as part of the shore protection system in this area. Nourishment would be much more effective in reducing the overtopping of the seawalls than increasing the height of the walls and/or increasing the footprint of the revetments fronting the walls. This option could involve regular beach nourishment to maintain a range of beach widths to reduce overtopping of the wall and erosion of the beach and nearshore. Since there are several groins along the shoreline, sections of this area function as pocket beaches, which would reduce end losses from a nourishment project and provide increased stability of the fill placed in this area. CZM believes nourishment with relatively coarse grained sediments (i.e. a mix of sand, gravel and cobble sized sediments), with similar to slightly coarser grain size distribution to the existing beach, could be an effective method reducing the overtopping of the seawalls and restoring the beach and nearshore system. This is particularly effective if the project scope is expanded to address the flooding and storm damage issues along the entire stretch of shoreline.

Another data source to consider as part of the study is the Massachusetts Shoreline Change Project, which has five to nine high water shorelines from the mid-1800's to 2009, with change rates calculated at 40-meter intervals along the ocean-facing shoreline. The current data available on CZM's website includes shorelines up to 1994. CZM is updating this data to include three new shorelines (2000, 2001 and 2008). As example, the Historic Shoreline Change Project and the South Shore Coastal Hazards Characterization Atlas Historic Shoreline Change Rate data layer both indicate, for the most recent reporting periods, the shoreline in the Fieldston vicinity is eroding at a rate of approximately 1.5 to 2 feet per year. The most recent shoreline available, from 2008, indicates that for the majority of the project site the high tide line is at the base of the seawall. Therefore, as shoreline erosion continues the high tide line will not be able to migrate landward but will instead continue to lower the elevation of the beach fronting the seawall, potentially at an increased rate, exposing and eventually undermining the lower portions of the seawall and the proposed revetment. Please contact us to get the updated data layers for use in your study.

There are multiple options that should be considered for reducing the flooding and damage caused by the water that comes over the seawalls. Buildings, patios and decks can be elevated on open pilings to allow the water to flow unimpeded across a wider area, slowing down the water and reducing damage and flooding to landward areas. In addition, driveways and parking areas can be minimized to reduce impervious surfaces. Erosion control vegetation, such as beach grass, coastal panic grass, beach pea, and seaside goldenrod which have extensive root systems, can be planted to help hold soils in place. Additional information regarding coastal landscaping for erosion control and storm damage protection is available on CZM's website: http://www.mass.gov/czm/coastal_landscaping/index.htm. CZM also recommends that the Town consider applying for FEMA Hazard Mitigation Grants through the Massachusetts Emergency Management Agency and the DCR FHMP to help defray the cost to elevate at-risk buildings and structures. CZM encourages the Town to work with the residents in this area to identify the problems, their causes, and provide information regarding some options for each property owner to address these flooding and storm damage issues.

Both the 2007 Initial Feasibility Study and the 2006 Section 103 Reconnaissance Study Coastal Engineering Analysis reference a drainage ditch and undersized and deteriorated road culverts as contributors to flooding of the low lying area in the Fieldston section. It should be noted that since these reports were developed the Town of Marshfield, with financial assistance from FEMA/MEMA, has widened and deepened this drainage ditch and replaced and enlarged the associated culverts. In addition, Bass Creek is scheduled to be dredged as part of the mitigation requirements for the Marshfield Airport redevelopment project. These projects have the potential to significantly reduce the degree and duration of flooding in the Fieldston area by more efficiently evacuating floodwater from the this low lying are and should be considered as part of this study.

CZM is available to provide technical assistance to the USACE, the Town and the other agencies as this study moves forward. CZM encourages the USACE to provide regular updates and opportunities for input to make the study process as efficient as possible.

If you have any questions regarding CZM's comments, please contact CZM's South Shore Regional Coordinator, Jason Burtner, at 781 545-8026 x209.

Sincerely,

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