

## APPLIED COASTAL

RESEARCH AND ENGINEERING, INC.



766 Falmouth Road, Suite A-1  
Mashpee, MA 02649  
<http://www.appliedcoastal.com>

**Project:** Relocation of Ellisville Inlet;  
Plymouth, Massachusetts

**Contact:** Vlad Hruby  
486 Quinobequin Road  
Waban, Massachusetts 02468



The purpose of this project was to address the on-going severe coastal bank erosion along the west side of the Ellisville Harbor entrance channel. This episodic coastal erosion has been occurring at an average rate of between 19 and 29 feet per year. Since April 2000, the inlet channel has continued migrating landward and the remains of the coastal dune system have disappeared. Based on observations made during October 2002, at least 10-to-20 feet of the coastal bank has eroded over the past year, causing the loss of several cedar trees estimated to be more than 100 years old.

During April 2000, the configuration of the Inlet was causing erosion of the beach and dune at the shoreline along Lookout Point Road. Following the Summer of 2000, the curvature of the inlet channel began eroding the coastal bank materials (i.e. the erosion extended beyond the unconsolidated dune deposit and into the consolidated glacial deposit of the coastal bank). This erosion is confined to a stretch of shoreline between the termination of Salt Marsh Road and the first groin south of the inlet. The groin defines the southern edge of the Inlet entrance, and prevents the inlet from migrating further south. Growth of the barrier spit has lengthened the tidal inlet, and forced it to run alongshore approximately 1400 feet. In addition to the southward migration of the inlet entrance, the inlet channel is slowly migrating landward. Periodic over-washing from surge and waves during storms causes the landward migration of the barrier spit and the associated movement of the inlet channel. As of April 2000, tidal currents in the inlet channel had cut away at the beach/dune system, resulting in a substantial dune scarp (~10 feet from dune crest to base) along this part of beach. By 2002, the coastal dune had been completely eroded and the channel was undermining the coastal bank fronting two residences. Immediately prior to the inlet relocation, the top of the coastal bank was within 50 feet of the nearest dwelling.

In November 2003, the inlet was relocated to its pre-1991 position. Although a major coastal storm in December 2003 threatened to cause rapid migration of the inlet, construction activities required to bolster the inlet "plug" in the relict inlet were successful in holding the inlet near its excavated position. Breaching of the inlet at the pre-1991 location provided the most appropriate erosion protection solution, without adversely affecting the environmental resources. This was a critical consideration of this project because of the Area of Critical Environmental Concern (ACEC) regulations governing Ellisville Harbor. Since relocation of the inlet channel returned the system to the condition described in the late 1980's, it has been anticipated that the barrier will gradually elongate to the south of the jetty structure. This process continues be monitored on an annual basis to determine future project needs. The channel excavation required a trench approximately 210 feet in length through the barrier beach. Excavation and "plug" construction required approximately two days with an excavator and a front-end loader.

An added benefit of the inlet relocation project is the improved tide range and estuarine circulation within the Harbor. Tide gages deployed through the inlet relocation effort indicated an increase in tide range of approximately 1 ft. Photographs of the marsh plain indicate that historic *Spartina alterniflora* stands had been "drowned" by the inefficient inlet system. The Massachusetts Estuaries Project is monitoring this recovery of the marsh system following inlet relocation.