

ASBPA Position Paper – April 2008

Terminal Groins at Coastal Inlets

Prepared by the ASBPA Science & Technology Committee

“Groins are shore-perpendicular structures emplaced for the purpose of either (1) maintaining the beach behind them, or (2) controlling the amount of sand moving alongshore” (Kraus, Hanson, and Blomgren, 1994). A **terminal** groin is the most downcoast structure in a field of groins or a single structure positioned near the end of a littoral cell. This paper addresses only the use of terminal groins at inlets.

Terminal groins are often placed near inlets and sometimes are confused with jetties. The principal purpose of a terminal groin at an inlet is to retain sand on the beach directly updrift of the inlet, whereas the purpose of a jetty is to help maintain navigation channel depth and location by reducing sand movement into the channel. A terminal groin, once filled to capacity, will allow sand moving in the littoral zone to flow past the structure although the terminal groin will still cause some reduction in the net movement of sand at its location.

ASBPA supports the National Academy of Science position on the appropriate use of terminal groins:

*Agencies with proscriptive laws, regulations, and management plans for the shore should modify them to allow the use of fixed structures in conjunction with beach nourishment projects where project performance can be significantly improved, out-of-project negative effects are acceptably small or can be mitigated as necessary, and beach access or use is not impaired, all with due considerations for costs and environmental impacts. **Each fixed structure used in conjunction with a beach nourishment project should be filled to the upper limit of its holding capacity if its function is to retain sand.** When a beach nourishment project is not maintained, the adverse effects of any structures should be mitigated or the structures removed.*
[NRC 1995, pp. 11-12 emphasis added]

Beaches adjacent to tidal inlets are often subject to accelerated erosion and much larger scale fluctuations in the shoreline compared with beaches away from inlets. Terminal groins placed at inlets can limit the loss of sand into the inlet and moderate large-scale fluctuations of the shoreline near the inlet. Many coastal inlets have shoal systems that can hold significant quantities of sand, sometimes in the millions of cubic yards. When the channel (thalweg) migrates, the location of the ebb-tidal shoal also changes causing wave patterns around the inlet to change and often significant movement of the ocean shoreline position. Homes, roads and infrastructure can be damaged or destroyed if the result of this process is severe erosion. Terminal groins can control the position of the shoreline in these cases, thereby avoiding or considerably reducing damages caused by these processes.

It is recognized that inlet delta systems are natural conduits for bypassing sand from updrift to downdrift shores and that a terminal groin will reduce the amount of sand entering the inlet by reducing transport from the updrift shore. At locations where such sand reduction results in measurable erosion of downdrift shores, mitigation in the form of sand placement may be needed to protect structures on the downdrift beach. However, in most cases the size and the trapping capacity of the inlet shoals are orders of magnitude larger than the trapping capacity of properly designed terminal groins, making the effects of sand reduction caused by the groin undetectable.

Terminal groins should be designed to be the smallest possible length and elevation that will hold the updrift beach profile in place considering the range of littoral drift reversals that are possible at the inlet. The terminal groin should be long enough to maintain enough sand up-drift of the groin to establish the desired storm protective beach profile and in addition be able to hold an extra amount of sand in anticipation of drift reversals that would otherwise temporarily expose homes and infrastructure to storm damage.

Sand should be placed along the beaches updrift of the terminal groin to reduce or eliminate the amount of sand captured by the groin. Ideally the amount of sand placed should equal the amount of updrift beach accretion that otherwise would be expected to be caused by the groin.

At locations where the inlet shoreline position may be eroded by the loss of sand, as a result of installing a terminal groin, consideration should be given to making the groin permeable and/or of low-enough profile to allow for movement of sand to the interior shoreline.

The ASBPA concludes that terminal groins can be beneficial to control erosion on nourished and unnourished beaches and reduce losses of sand to coastal inlets. Terminal groins can control large-scale fluctuations of the shoreline and protect homes and infrastructure. Although downdrift and inlet shorelines can be adversely altered by the reduction in sand movement caused by a terminal groin, the overall positive effects of these structures typically outweigh negative effects that can be mitigated by other actions.

ASBPA recognizes there are uncertainties with the installation of any beach stabilization structure. Designs for terminal groins should seek to create a profile tailored to the site of interest that replicates the natural beach (ASCE, 1994). The impact of the structure on downcoast areas should be monitored by means of beach and inlet surveys, and sediment budgets periodically updated for the updrift beach, downdrift beach, and inlet.

References

- ASCE. 1994. Coastal Groins and Nearshore Breakwaters. Technical Engineering and Design Guides as Adapted from the US Army Corps of Engineers, No 6, American Society of Civil Engineers, New York, NY, 87 pp.
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About the ASBPA

Founded in 1926, the American Shore and Beach Preservation Association represents the scientific, technical and political interests along the coast in an effort to shape national research and policy concerning shore and beach management and restoration. The group strives to engage a factual debate on coastal issues and economics that will foster sound, far-sighted and economical development and preservation of our beaches; thereby aiding in placing their benefits within the reach of the largest possible number of people in accordance with the ideals of a democratic nation.

The ASBPA recognizes that the shores, beaches and other coastal resources of America provide important quality-of-life assets within the reach of the largest possible number of people in accordance with the ideals of a democratic nation. We pursue this mission by means of:

- Protecting and improving healthy and diverse recreational opportunities.
- Managing, protecting and enhancing environmental resources.
- Encouraging responsible and sustainable economic development.
- Preserving aesthetic values.
- Reducing damage from natural hazards and human activities.
- Mitigating human impacts to natural processes.

This association is dedicated to preserving, protecting and enhancing the beaches, shores and other coastal resources of America.