Ocean City Projects- Plan Formulation Rationale

Continuing Authorities Program, Section 204: Regional Sediment Management Ocean City Scour Hole: Plan Formulation

Step 1: Three initial alternatives for the scour hole were formulated.

Initial Alternatives

Alternative	Description	Image
A	Fill scour hole with dredged material and cap with non- erodible layer	
В	Install training structures generally perpendicular to shoreline to mimic old bridge structures effect on tidal currents	
C	Fill scour hole with dredged material and cap with non- erodible layer and dredge shoal in southernmost Isle of Wight Bay	

Step 2: The initial alternatives were screened for further 2D modeling.

Alternative B screened out:

• Based on engineering experience, it was expected that the structure(s) would "create havoc" in the immediate area, and cause large harder to quantify effects over time from a system wide

perspective. A huge volume of water would continue to flow through the scour hole. The hole could continue to evolve and destabilize the shoreline.

- The team had concerns about incursion into adjacent boatable waters and impacts to navigation (commercial and recreational) in those areas.
- The training structures would need to cross the very deep scour hole (over 50 feet deep). The scour hole would likely need to be filled with dredged material to enable training structure function.

Alternative	Notes	Image
A	 Negligible effects from a system wide perspective and shows small differences in deposition and erosion local to the alternative location. Appears to solve the problem with minimal impacts. Local excess erosion could be prevented by expanding area of non-erodible layer 	Displacement (are new 5. Sour & 1) - 20 - 11 - 10 - 00 - 00
C	 Largest effect from a system wide perspective, as the flow distribution is the most affected by this alternative Depositional effects are seen at a larger scale with the second alternative Large impact associated with dredging shoal Large area of shoaling (blue) may negatively affect the navigation channel. Does not display additional scour hole benefits to Alternative A. 	Dedecement (m) Bot - Scoth

Step 3: The project team has used 2D modeling to evaluate hydrodynamics and sediment movement

Red = Scour due to alternative Blue = Shoaling due to alternative

Step 4: A Proposed Tentatively Selected Plan was selected: Alternative A.

Fill scour hole with approximately 50,000 cy of sediment

- Beneficial use of maintenance dredged material from navigation project
- Cap filled area with marine mattress



Figure 1. Tentatively Selected Plan, Alternative A.

Continuing Authorities Program, Section 107 Harbor and Inlet Project: Plan Formulation

Step 1: Five initial alternatives were formulated for the Sec 107 Harbor and Inlet Project along with the No-Action alternative.

Alternative	Description	Image	
A	The current channel is within the shallow part of the inlet channel therefore it's proposed to shift the entire channel in the inlet south of the existing channel.	Legend Training Danal Examples Training Dana	
В	Extending and connecting the existing breakwater off Assateague Island and tying it into Assateague Island. A training structure(s) may also be installed from the existing breakwater extending into the channel to induce scour and deflect flow. This alternative also includes realigning the inlet channel south to naturally deeper water.		
C	Extending the breakwater at the north end of Assateague Island and narrow the opening between the breakwater and the north face of Assateague Island. This alternative would make use of only extending the existing breakwater to allow for the ebb flow to travel through the opening and potentially avoid the creation of an Eddy behind the breakwaters and the island. This alternative also includes realigning the inlet channel south to naturally deeper water.		
D	Extending the breakwater to the south of Assateague Island in an "L" shape form to deflect flow away from the north side of the Island. This alternative would protect the north side of Assateague Island to train currents. This alternative also includes realigning the inlet channel south to naturally deeper water.		

E Deepening the existing channel below the authorized depth of -10ft MLLW. This alternative also includes realigning the inlet channel south to naturally deeper water.	
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Step 2: The initial alternatives were screened for further 2D modeling and it was determined that two alternatives would be carried forward for further evaluation to determine the tentatively selected plan.

Alternative D screened out:

- The National Park Service stance remains that the island should be free to migrate over time with natural processes. Additionally, this would cause loss of bayside shoreline heavily used by recreational boaters.
- This alternative was ineffective in that while it would stabilize the bayside shoreline of Assateague Island to train currents, it would not address the problem of shoaling in the inlet.

Alternative E screened out:

• The Federal Interest Determination evaluated -14ft MLLW in the harbor and -16ft MLLW in the channel. However, it was determined that the vessels utilizing the channel did not require a depth below -10ft MLLW for their draft and it was decided that channel realignment was a more suitable alternative.

Additionally, five solutions were discussed, but not retained for additional alternative discussion:

- A solution was proposed to add material to the North side of Assateague Island to build up land to historic shoreline condition. The solution was not retained since it would usurp public water and bottom, and likely be unstable without a structural component.
- A solution was proposed to construct training structure(s) extending into the Inlet Channel along the south end of Fenwick Island. This would narrow the channel and promote scour in the center of the inlet rather than nearer shore potentially alleviating the dredge frequency. However, this solution was not retained since it would negatively impact navigation safety and sediment transport and flow through the inlet.
- Another solution was proposed to narrow the channel and promote scour along the south end of Fenwick Island by adding fill along the entire island to narrow the inlet (essentially extending the island further south). This solution was not retained because it was cost prohibitive and would usurp public water and bottom.
- A solution was proposed to Narrow Isle of Wight Bay with the intent to cause scouring flows in the inlet vicinity (could also contribute to scour hole management for the Section 204 study). This solution would include constructing training structures into Isle of Wight Bay (mimicking historic old road and railroad bridge locations). This solution was not retained due to the likelihood of creating a navigation hazard, high cost and difficulty to construct due to deep

water and strong flows and it would produce widespread affects over a large are in the inlet vicinity with the likelihood of creating areas of shoaling elsewhere in the project footprint.

• A solution was proposed to rehab or replace the old bulkhead by Martin Fish Co. LLC. Historically, the old bulkhead had provided some protection for boats in the harbor which are now bounced around against their mooring by the wave action. Additionally, it could provide erosion protection for properties and structures. However, there were concerns regarding the high cost of training structures, and it would likely affect large areas of the flow regime in the entrances of both bays and the inlet and channels. This solution would not reduce transportation inefficiencies or improve safe navigation within the inlet channel. This solution along with the other training structure alternatives mentioned previously was not retained.



Figure 2. Proposed bulkhead repair by Martin Fish Co. LLC.

Step 3: The project team has used 2D modeling to evaluate hydrodynamics and sediment movement. Project components of Alternatives A, B and C were combined and renamed to alternatives 2 and 3. Alternative 1 remains the No-Action alternative which is the basis for evaluating the future-without project conditions.

Alternative	Notes	Image
2	 Large effect from a system wide perspective, as the flow distribution is substantially affected by this alternative Depositional effects are seen at a larger scale, especially along the bay side of Fenwick Island. Large area of shoaling (blue) may affect the Isle of Wight navigation channel and access to private marinas. 	Breakwater 2 Closer Breakwater 3 Left Sinepuxent Channel
3	 Negligible effects from a system wide perspective and shows small differences in deposition/scour local to the alternative location. Appears to solve the problem with minimal impacts within the inlet channel. 	been a large for a

Table 2. Alternatives modeled to evaluate hydrodynamics and sediment movement.

Red = Scour due to alternative Blue = Shoaling due to alternative Step 4: A Tentatively Selected Plan was selected: Alternative 3.

Components:

1.Dredge ~4,000 CY and realign channel to deeper water

2. Connect Assateague breakwaters (with NO gap) and build spur into Sinepuxent Channel

3. Use dredged material from channel realignment as fill for construction of breakwater extension.



SCALE: 1 IN.-20 FT. 20 0 20 4

Figure 2. Alternative 3, Tentatively Selected Plan.

Although this plan does not maximize net benefits due to the higher cost of connecting the breakwater to the jetty, the team determined that there are disbenefits associated with the shoaling on the bay side of Fenwick Island and into Isle of Wight channel (based on 2D model results). This shoaling over a one-year timeframe impacts the USACE maintained Isle of Wight channel and private marinas, incurring additional operations and maintenance (O&M) costs long-term. These O&M costs are unknown since the modeling was not run for long-term projections of hydrodynamics and sediment movement. Therefore, the economic evaluation was not able to include a quantitative value for these damages. This movement of material elsewhere in the system and subsequent damages warranted another look at the solutions presented. The team along with the sponsors and working group agreed that Alternative 3 would address the increased shoaling in the inlet channel and reduce O&M over the long-term with localized shoaling and scour in the vicinity of the project.