5.46. Recommended Channel Alternative. Based on the results of the geomorphic analysis of the inlet, model studies, and channel stability analysis, closure of the existing channel will be necessary to assure the success of the project and accelerate the recovery of the Pointe shoreline and associated habitat. Also, with respect to the dimensions of the new channel, all six alternatives evaluated would satisfy the stability criteria, particularly with the closure of the existing channel. The only channel alternative that appeared to be marginally acceptable was the 13.5-ft NGVD x 400 ft channel, which would result in an overall inlet cross-sectional area very close to the critical area. Accordingly, in order to provide some degree of safety, the next smallest channel evaluated, i.e., the 13.5-ft NGVD x 500 ft channel was selected. This channel is deemed to be the minimum channel needed to completely satisfy the inlet stability criteria and will result in less scour than the 13.5-ft NGVD x 400 ft channel during the initial readjustment period immediately following the construction of the channel.

6.0 DESIGN OF CLOSURE DIKE FOR EXISTING CHANNEL

6.1. Introduction. The location of the dike is shown on Figure 6.1 and is in an area where the channel diverges into a predominant flood channel (east side) and ebb channel (west side). Other information shown on this figure will be discussed later. Maximum depths in the dike area are around 12 feet below NGVD and average approximately 7 feet below NGVD. The total distance across the channel, measured from the +4-foot NGVD elevation on both sides of the channel, ranges from 1,650 feet to 1,800 feet. The final crest elevation of the dike will be +4.5 feet NGVD or approximately equal to the maximum elevation of the existing sand spit. A centerline profile of the dike is shown on Figure 6.2.

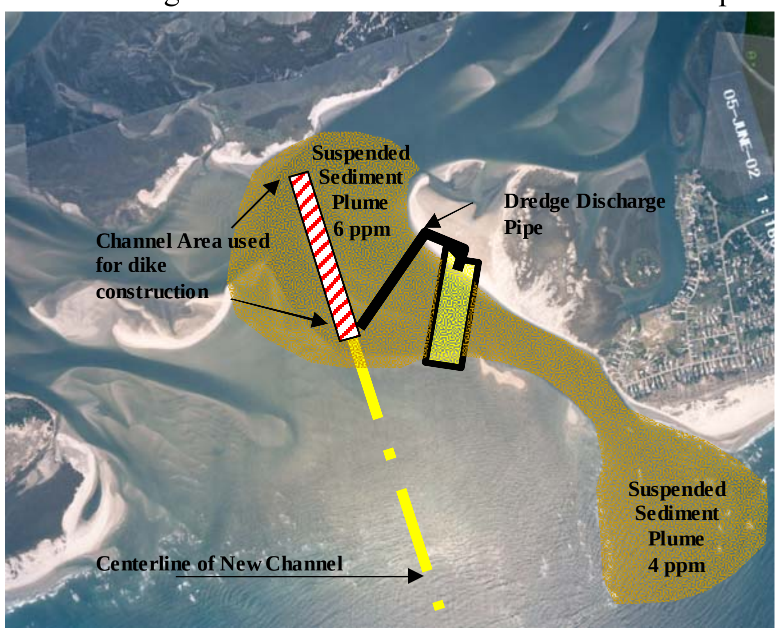
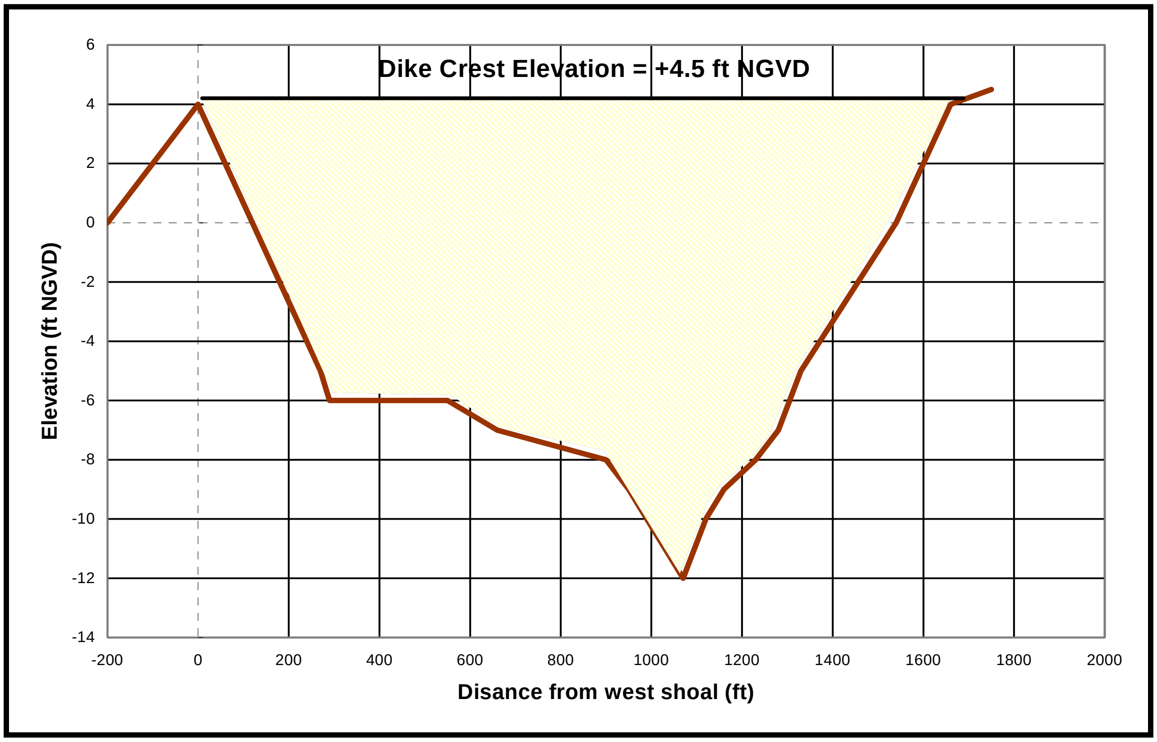


Figure 6. 1 Dike Location

6.2. Construction of the dike would be accomplished by pumping material directly into the existing channel from the landward end of the new channel as shown on Figure 6.1. The pipeline from the dredge to the discharge point would be routed along the existing sand spit with disposal beginning on the east side of the channel and proceeding west across the channel (Figure 6.1). The discharge point of the pipe would be initially placed at an elevation close to mean high water (+2.2 feet NGVD) in order to prevent material from washing back across the sand spit.



6.3. The volume of material required to construct the dike was based on a model

Figure 6.2 Centerline Profile of Dike

developed by Creed and Olsen (Creed and Olsen 1999) for a similar channel relocation project located in Port Royal Sound, which borders the northeast shoreline of Hilton Head Island, South Carolina. In that particular case, a channel meander had developed to the southwest of the main channel and was causing severe erosion along the northeast section of Hilton Head Island. The project involved the opening of a pilot channel to divert flow away from Hilton Head and closure of the channel meander with dredged material. The simplistic model developed by Creed and Olsen predicted that the dredge would have to pump 160,000 cubic yards into the channel over a period of 3.5 days to close the channel. Peak flow velocities in the channel were comparable to the velocities in the existing Bogue Inlet channel and ranged from around 2 feet/second (fps) during neap tide conditions to 3.3 fps during spring tide conditions. Closure of the channel actually required 4 days and about 210,000 cubic yards or about 31% more than predicted. Based on the predicted and actual results of the channel closure off Hilton Head, the Creed and Olsen model appears to provide realistic results.

6.4. <u>Dike Construction Estimate</u>. The Creed and Olsen model is based on the production rate of the dredge, fall velocities of the sediment through the water column, tidal velocities in the channel, and the time-varying water depth due to varying tide levels and