CCF Predation Reduction Alternative: Rock Levee Salvage Corridor from the CCF Gates to the Skinner Fish Facility

Conceptual Description of the Structure

A 2.25–mile-long (12,000-foot-long) rock-wall levee could be constructed along the southern portion of CCF to directly connect the intake gates to the salvage facility with a salvage corridor. The salvage corridor should have a cross section of about 2,500 square feet with a top width of about 200 feet and an average depth of 12.5 feet (at -2.5 feet NAVD) to allow the maximum pumping flow of about 10,000 cfs to flow directly from the intake gates to the Skinner fish facility trash rack and louvers. A maximum velocity of about 4 ft/sec (with full pumping) would transport delta smelt and Chinook salmon (and all other fish) to the salvage facility in less than an hour. The transport time during pumping of 5,000 cfs would remain less than 2 hours. This would greatly minimize the exposure of smaller fish to predation by striped bass, white catfish and other predators. The average travel time through CCF with pumping of 5,000 cfs is about 2.5 days. The predation loss during a 2-hour period in the salvage corridor will likely be less than 10% of the existing predation loss during a 2-3 day period inn CCF. The actual predation reduction benefits can be directly measured with this alternative.

The rock-wall levee construction will allow water to move into and out of storage in the remainder of CCF (needed for tidal inflows and night-time pumping to minimize energy costs). A rock size of 4 to 6 inches will provide sufficient pore space to maintain the storage within an inch of the water level in the salvage corridor. Only the top portion of the levee wall needs to be constructed of rock; the bottom portion of the levee wall could be constructed from a sand and clay mixture to provide a foundation for the rock-wall top portion of the salvage corridor. The basic design might be a sediment levee foundation with a top width of 50 feet at elevation –5 feet NAVD. The sediment for these foundation levees might be dredged from the 200-foot-wide corridor along the south shore, with a bottom at -15 feet NAVD. The dredging of the 200-feet wide corridor (assumed depth of 5 feet) would require about 500,000 cubic yards. A 25-foot-wide-by-12.5-foot-high 1:1 slope rock pyramid would be placed on top of the sediment foundation, extending to +7.5 feet NAVD (Diagram 1). The size of the rock could be investigated during the final design to ensure that the rock levee excludes most fish from moving through the rock barrier. About 70,000 cubic yards of rocks would be needed to construct this “salvage corridor” rock levee to reduce predation losses. Additional rock (5,000 cubic yards) might be placed over fill to eliminate the scour hole near the CCF gates.

The rock portion of the levee could be just 5 feet deep (at minimum CCF elevation) to maintain the CCF elevation within an inch of the water level in the salvage corridor (during periods when the CCF gates are closed with maximum pumping (10,000 cfs). The rock levee should begin at about –5 feet NAVD and extend upward to 7.5 feet NAVD to extent slightly above the maximum water surface elevation that is about 5 feet NAVD.

Optional Predator Reduction in the Salvage Corridor

Once constructed (after the testing and demonstration period), there are no operations of the facility (no moving parts). The testing and fish measurements (predator tracking) may indicate that a predator removal program should be included. A regular (weekly) trawling of the salvage

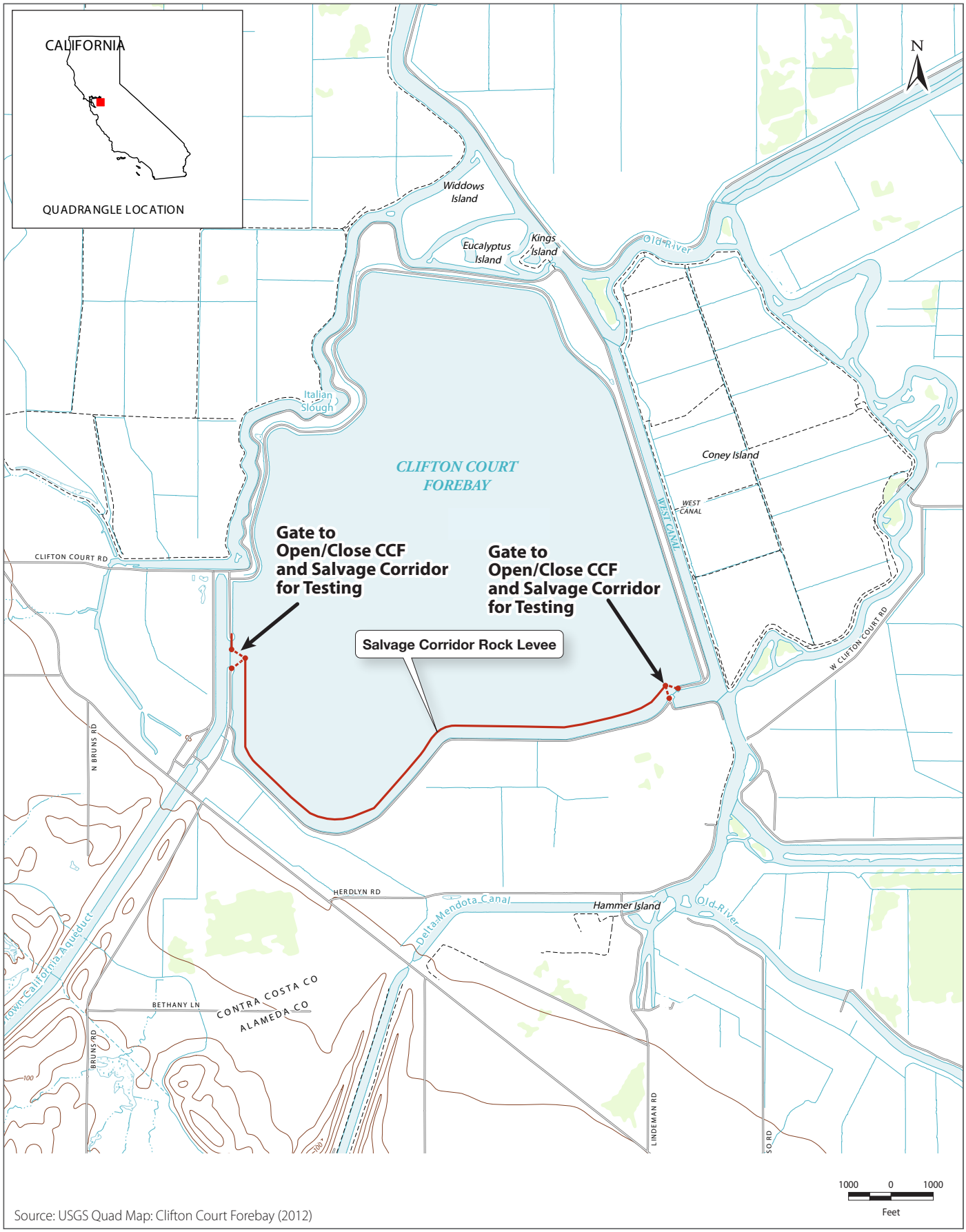
corridor with a commercial fishing boat (barge) and appropriate nets might maintain a relatively low abundance of large predators within the 2.25 mile long salvage corridor. This 55-acre habitat will have a steady supply of fish from the south Delta, but the fish abundance (fish/taf) within the corridor should be no different than the fish abundance in the south Delta channels. If a relatively high abundance of large predators enter the salvage corridor, some removal of the predators with large nets or trawling booms may further reduce the predation losses. Predators growing within CCF (outside the salvage corridor) may enter as small fish (through rock levee) and feed (grow) on smaller fish living within the Forebay (residents). But these predators will not have access to the salvage corridor.

Optional Predation Monitoring in the Salvage Corridor

The salvage corridor will be designed to allow the predation reduction benefits to be directly measured. The Salvage corridor levee will have a gate that can be closed at the CCF gates and another gate that can be closed at the intake channel to the Skinner Fish Facility. The gates can be relatively simple swing gates on pilings at either side of the salvage corridor. (Diagram 2).The suggested experimental design would be to open the salvage corridor for a 3-5 day period and measure salvage with the normal 20 minutes per hour sampling (expansion of 3x). The salvage corridor would then be closed for a 3-5 day period so that the diversions to CCF and pumping from CCF and salvage would be existing conditions. The salvage would continue to be measured with the 20 minutes per hour sampling. The predation reduction benefits would be evaluated from the salvage ratio for each fish species during these alternating periods (treatment and control). The alternating measurement periods (salvage corridor open and closed) is needed because the fish abundance (i.e., fish concentration [fish/taf]) varies dramatically in the south Delta with migration events, spawning events, and seasonal habitat conditions (i.e., SJR inflow, temperature and salinity). This is the same measurement strategy used to test and evaluate the Stockton DWSC Dissolved Oxygen Aeration Facility in 2009 and 2010.

Costs of Rock Levee Salvage Corridor

The cost of this salvage corridor has not been accurately calculated, but it is likely to cost less than $50 million ($50/CY for dredging, $150/CY for rock levee placement, $10 million for closure gates) and have a substantial fish protection benefit compared to recent expenditures for fish protection of a similar magnitude (e.g., EWA in 2000-2005 and VAMP in 2000-2011).



Source: USGS Quad Map: Clifton Court Forebay (2012)

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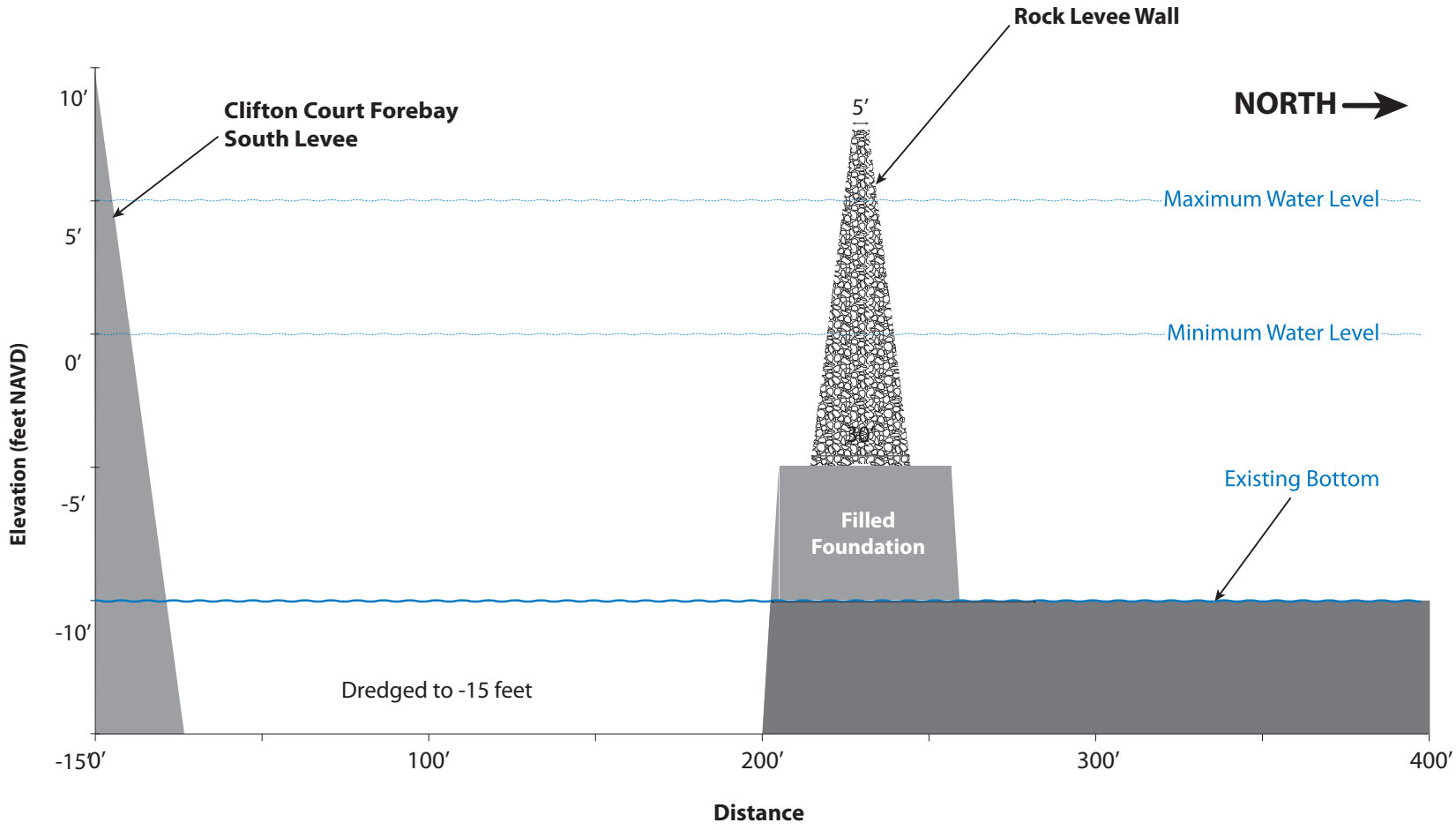
Map of Clifton Court Forebay and Salvage Corridor



Exaggerated Scale:
Horizontal Scale: 1 mm = 2 ft
Vertical Scale: 20 mm = 5 ft

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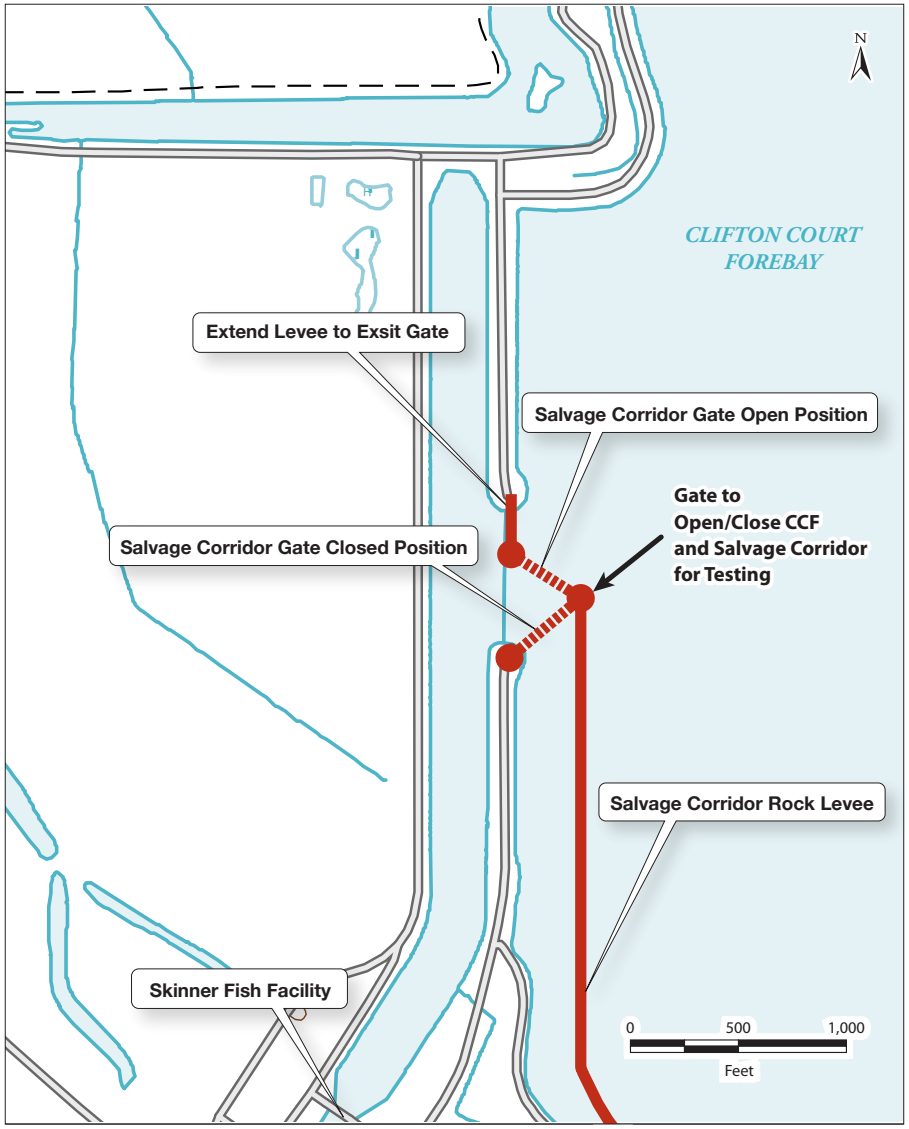
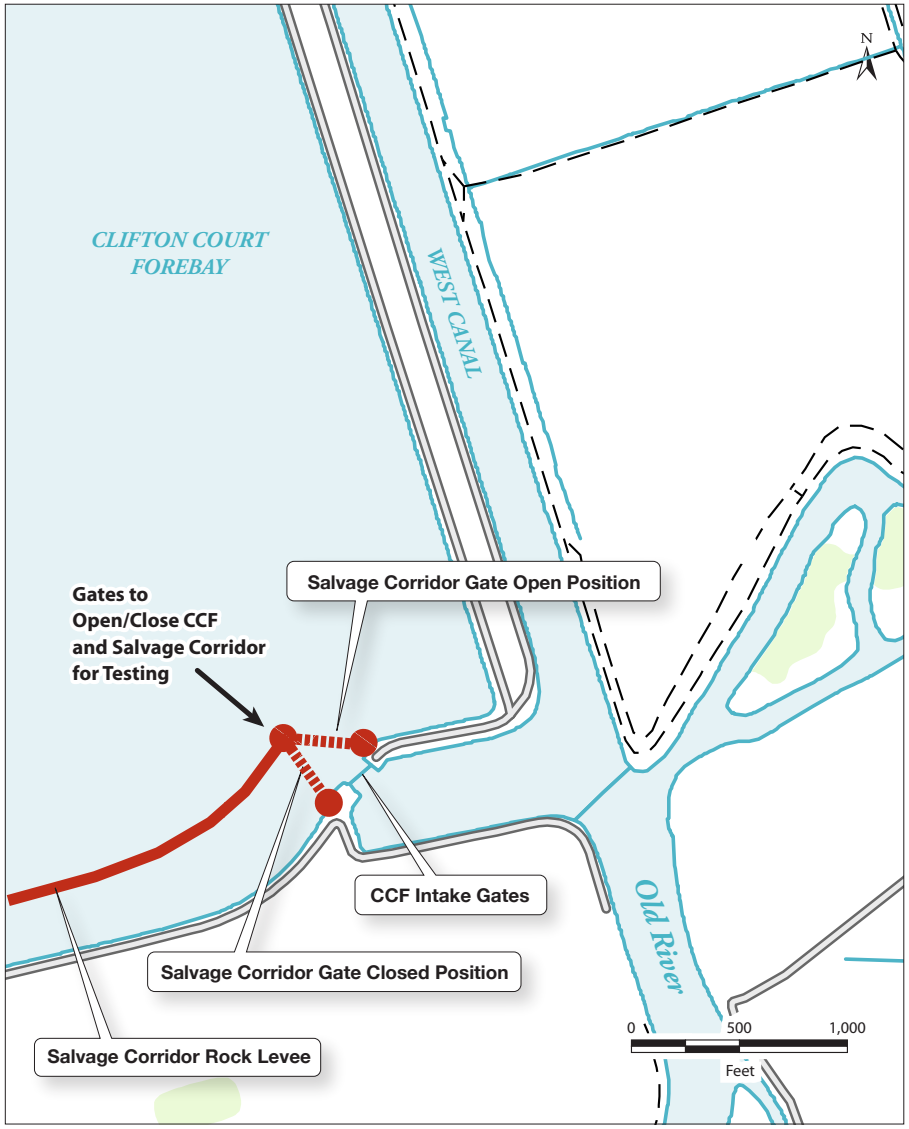
Diagram 1
Cross-Section of Salvage Corridor Dredging and Rock Levee Wall along Southern Shore of Clifton Court Forebay



A. Salvage Corridor Exit Gate



B. Salvage Corridor Entrance Gate

Source: USGS Quad Map: Clifton Court Forebay (2012)

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Diagram 2
Clifton Court Forebay
Salvage Corridor Diagram