West Bank and Vicinity, Louisiana, Gulf Intracoastal Waterway West Closure Complex, Water Control Plan

Purpose

The purpose of this document and the scheduled public meeting is to solicit input for the development of the water control plan for hurricane and storm damage risk reduction structures along the Gulf Intracoastal Waterway (GIWW) on the West Bank of the Mississippi River in the Greater New Orleans Metropolitan Area.

Introduction

The addition of the West Closure Complex (WCC) to the West Bank and Vicinity, LA Hurricane and Storm Damage Risk Reduction System (HSDRRS) project will significantly change the course and operation of the perimeter defense. The WCC will provide a barrier to defend against the 100-yr storm surge up the Algiers and Harvey Canals, and thus remove 25 miles of levees, floodwalls and floodgates from the primary line of hurricane defense. The project features along the Algiers and Harvey Canals, bounded by the WCC gates on the south end and the Harvey Canal Sector Gate and Algiers Lock on the north end, serve to provide as a secondary line of risk reduction during a storm event and form a detention basin which is pumped out by the WCC pump station when the WCC gates are closed.

The West Bank and Vicinity, LA West Closure Complex System Water Control Plan will contain the instructions and supporting information for when and why to operate the project features of the WCC and the Harvey Canal Sector Gate to reduce the risk of hurricane and storm surge damage in the communities of Gretna, Marrero, Harvey, Belle Chasse and Algiers.

Figure 1: GIWW, West Bank & Vicinity

Schedule

The West Bank and Vicinity LA, West Closure Complex System Water Control Plan will be implemented when the Corps of Engineers submits the notice of substantial completion to the Coastal Protection and Restoration Authority of Louisiana (CPRA), the Non-Federal Sponsor. This notification is currently scheduled to occur in calendar year 2012. For the 2011 Hurricane Season, the WCC will be able to defend against a 100-yr storm surge with reduced pumping capacity in place, but will still be under construction. The WCC will operate in accordance with the WCC Interim Water Control Plan beginning June 1, 2011 until construction is complete.

System Features

The WCC, located just below the confluence of the Algiers and Harvey Canals, includes levees, floodwalls, gate structures and a pump station, as illustrated in Figure 2. The key operable features include gates that close to provide a surge barrier and a pump station that is designed to discharge the stormwater from the nine interior drainage pump stations along the Harvey and Algiers Canals when the gate structures are closed. The gate structures include a 225-foot wide navigable sector gate, five 16-foot square sluice gates across the GIWW channel, and two 8-foot square sluice gates at the water control structure across the Estelle Drainage Canal. The WCC pump station contains eleven 1,740 cubic feet per second (cfs) pumps to produce a combined peak discharge of 19,140 cfs (8,590,000 gallons per minute). The WCC pump station, along with the interior detention basin system, has been designed to accommodate the interior pump stations' discharge for the 10% chance exceedance, 24-hour rainfall event.

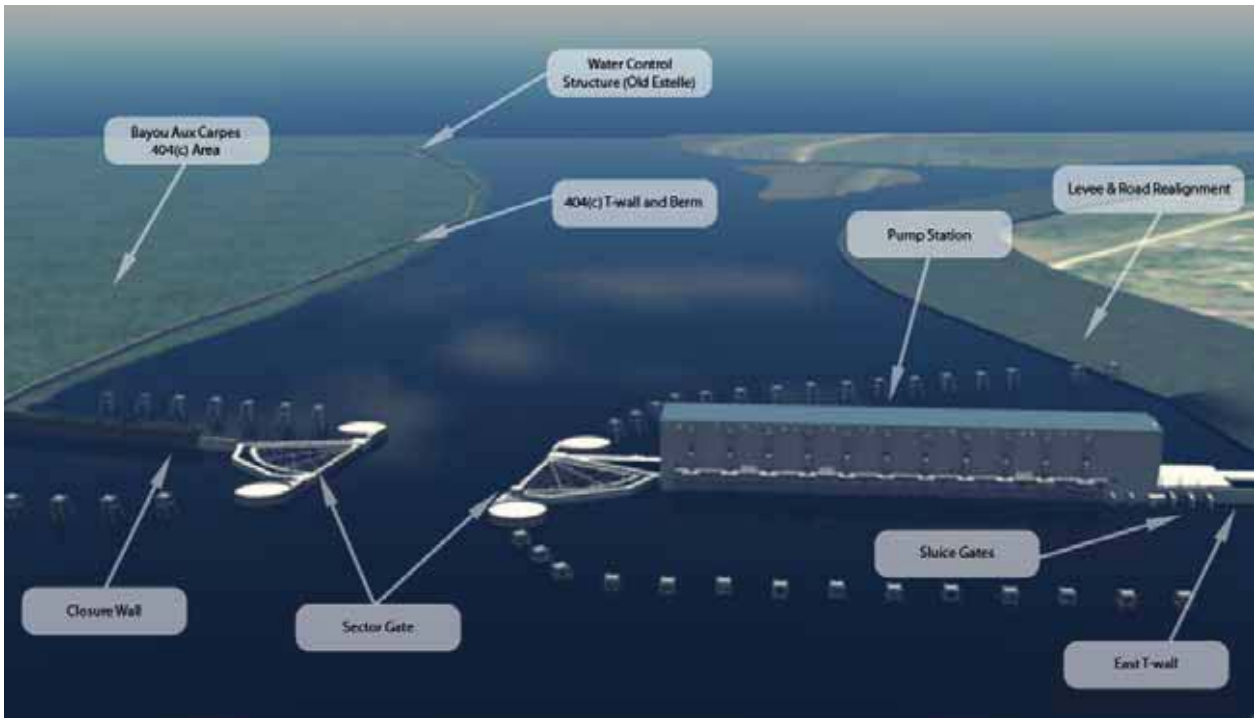

Figure 2: West Closure Complex

There are ten pump stations north of the WCC on the West Bank that discharge into the Harvey and Algiers Canals. : Cousins, Hero, Estelle, Old Estelle, SWBNO PS #11, SWBNO PS #13, Planters, Whitney-Barataria, Belle Chasse 1, and Belle Chasse 2. Closure of the water control structure across the Estelle Canal prevents storm surge and discharge from the Old Estelle Pump Station from entering the GIWW from the west when the gates are closed. The water control structure allows for drainage and circulation between the GIWW and the Estelle Canal when the gates are open.

The purpose of the Harvey Canal Sector Gate at Lapalco Blvd. is to prevent high water on the south side of the gates, where levees, floodwalls and gate structures exist, from reaching the north side, where there is no protection from high water.

The design water surface elevation for the Algiers Canal is El. 5.8-ft[1] where the detention basin levees will be maintained at El. 8.2, therefore providing allowances for uncertainty, wind set up and waves. The design water surface elevation on the Harvey Canal is El. 3.9-ft. Some businesses on the flood side of the Harvey Canal floodwalls outside of the HSDRRS may be inundated if the water level reaches El. 4.0. With the WCC project in place, the overall risk to these businesses will be lower by reducing the storm surge in the canals during a storm event.

The floodgates in Figure 1 refer to steel gate road closures that provide ingress and egress through the floodwalls and levees. They are simple structures that will be the responsibility of the appropriate authority and will not be addressed in the System Water Control Plan.

The Harvey and Algiers Locks are navigation structures. The Harvey Lock has mitre gates that cannot be operated under differential head conditions when the water level on one side of the gate is different than the water level on the other side. But, the lock does have a valve system that allows for filling and emptying of the lock. The Algiers Lock has sector gates, which can be operated under differential head conditions. Both the Harvey and Algiers Locks could be used for managing the water levels within the detention basin should the river stage elevations be low enough for the locks to be effective as a water control device during a storm event.

Water Control Plan Formulation

Under non-tropical event conditions, the WCC gates remain open and the WCC pump station does not need to operate. The gates will only be closed, except for exercising, when a storm in the Gulf of Mexico creates a surge in water level that threatens the West Bank and Vicinity. If there is rainfall over the West Bank at the time the WCC gates are closed, the WCC pump station will convey the stormwater in the canals to the outside of the line of protection.

Preliminary activities necessary to assure effective operation of the complex will commence when the New Orleans area is included within the National Weather Service 5 Day Cone. At least two days prior to a tropical storm event making landfall, the hurricane response team will gather to make preparations and respond to changing conditions. The team will include a dive crew in case there is an unplanned need for underwater procedures. The closure system includes robust and redundant mechanisms. For example, if the hydraulic system fails, a cable and winch system can be used to close the gates. In view of the fact that backup systems will require workers to be outside, some precautions will be needed to ensure the gates are closed before wind speeds exceed safe conditions.

The Corps of Engineers Water Control Manager in the New Orleans District, in coordination with the United States Coast Guard and local authorities, has decision support tools to aid in determining if and when to close and operate structures when a tropical event threatens the metropolitan area. These tools utilize computer models and records from past storms to analyze National Hurricane Center storm tracking data. A storm surge atlas has been developed from more than 300 storm tracks to provide an immediate estimate of surge depth. (see details at http://www.haskoninginc.com/en-gb/Projects/Pages/HurricaneSurgeAtlas.aspx).

The current conceptual plan is to close the gates at the WCC twenty four (24) hours before the storm surge is predicted to exceed El. 4.0-ft at the site. This conceptual plan provides 24-hours for alternative closure methods, if required, to ensure closure of the surge barrier project features. The divers, mechanics and operators would already be on hand to begin the backup measures.

[1] All elevations in this document have units of feet NAVD88, 2004.65 Epoch.

As soon as the gate structures are closed, the pumps within the pump station will be activated to draw down the water levels within the detention basin to EL. 0.0-ft to provide the maximum possible stormwater storage. The pump station will continue to operate as necessary while the gates are closed to maintain water levels in the Harvey and Algiers Canal as close to El. 0.0-ft as possible. Data from upstream pumping stations obtained by the SCADA system will assist the hurricane response team in planning pump operations.

The WCC gates will be re-opened as soon as conditions permit. Gate opening conditions include: (1) the threat of increasing storm surge has passed, (2) flood side water levels outside of the surge barrier are less than water levels within the detention basin and falling (if the interior water levels are lower than the flood side water levels, sluice gates may be opened to achieve equilibrium before opening sector gates), and (3) water level difference between flood side and protected side is small enough to prevent scour. The pump station will not need to be operated when the gates are open, or during non-tropical storm events (except for exercising the pumps in accordance with the operation and maintenance requirements).

The Estelle Canal Water Control Structure should be closed well before a storm surge is expected to reach the WCC due to its remote location and can be opened after the storm passes. A regulation plan for freshwater management during normal conditions is currently under discussion with the Environmental Protection Agency (EPA) and the National Park Service (NPS), the administrative agencies overseeing any actions or activities within the Bayou aux Carpes 404(c) site.

The conceptual plan for the Harvey Canal Sector Gate is that the gate will close when the water surface elevation at the gate reaches El. 2.0-ft and rising, and it will open when the water surface elevation drops to El. 2.0-ft and falling. The gate can be closed even if storm surge is not causing water levels to rise.

The Algiers Lock may be used for controlling water levels within the detention basin, if necessary, should storm surge caused the WCC gates to close. If the water level of the Mississippi River is lower than the water level of the Algiers Canal, and the water levels within the detention basin need to be lowered more quickly than opening the WCC gate structures can accomplish, then the gates at Algiers Lock could be opened simultaneously to lower the canal water levels into the river.

Interim Water Control Plan

The interim water control plan will cover the period from the time the WCC becomes operational to the time construction is complete for all project features. The interim plan will be different than the plan for the permanent condition in two significant aspects:

1) The surge barrier will have reduced pumping capacity in place with eight of the eleven pumps operational by the start of the 2011 hurricane season, and

2) The height of a portion of the surge barrier (the 270-linear ft of closure wall extending from the sector gate to the 404(c) floodwall will be at El. 11.0-ft for the 2011 hurricane season. Elevation 11.0-ft is the design elevation required to ensure that overtopping from the surge and associated waves meets the HSDRRS design criteria for overtopping. The additional height to complete the closure wall to El. 16.0-ft for the permanent floodwall is to compensate for subsidence and sea level rise (due to global warming) and to incorporate 2-ft for structural superiority. Structural superiority is included in the design elevation for those structures that would be very difficult to rebuild, if damaged, due to disruption of service and to possibly prevent overtopping to ensure survivability of the structures.

Contents of the West Bank and Vicinity, LA, West Closure Complex System Water Control Plan

The WCC System Water Control Plan will be a chapter in the West Bank and Vicinity, LA, West Closure Complex System Master Water Control Manual. The contents of a Water Control Manual are prescribed by USACE Engineering Regulation **ER 1110-2-8156, Preparation of Water Control Manuals**, 31 August 1995. The Table of Contents is shown below. As the Table of Contents makes apparent, much of the information in the Manual is background information about the location, purpose, authorization, and cooperative agreements for the projects; as well as hydrologic, hydraulic, industrial, environmental and cultural conditions for the area served by the project. Most of this background information has been presented in the planning and design documents that preceded authorization and construction. This document is intended to illustrate the current concept for some of the key items noted in the Master Water Control Manual Table of Contents, but which have not yet been written.

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