

2019

# West Bank & Vicinity GRR Civil Engineering – Appendix A



U.S. Army Corps of Engineers,  
New Orleans District

Non-Federal Sponsor: Coastal  
Protection and Restoration Authority  
Board

11/22/2019

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## WEST BANK & VICINITY GRR

### APPENDIX A

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Enclosure 1 - GRR WBV Quantities

Enclosure 2 - GRR WBV Quantities

## EXISTING LEVEE SECTIONS APPENDIX

### 1 INTRODUCTION

#### 1.1 OVERVIEW

This appendix describes the methodology used to calculate quantities based on the projected levee lifts required to achieve the estimated design elevations for two alternatives - the 1% and 0.5% levels of risk reduction in the year 2073 for the intermediate sea level rise scenario. For the scope of this study and the size of the study area, representative reaches were chosen around the system to analyze. This appendix contains examples of representative cross sections from the representative levee reaches around the West Bank and Vicinity (WBV) project areas. The below cross sections depict the section at the time of the last levee lift. The elevation of last levee lift and the design grade for each reach is stated in the paragraphs below. All elevations are referenced to NAVD88 (2004.65), unless otherwise noted. The locations of the representative reaches discussed in this report are shown in Figure 1, highlighted in green. Explanation of why certain reaches were chosen can be found in Appendix B.

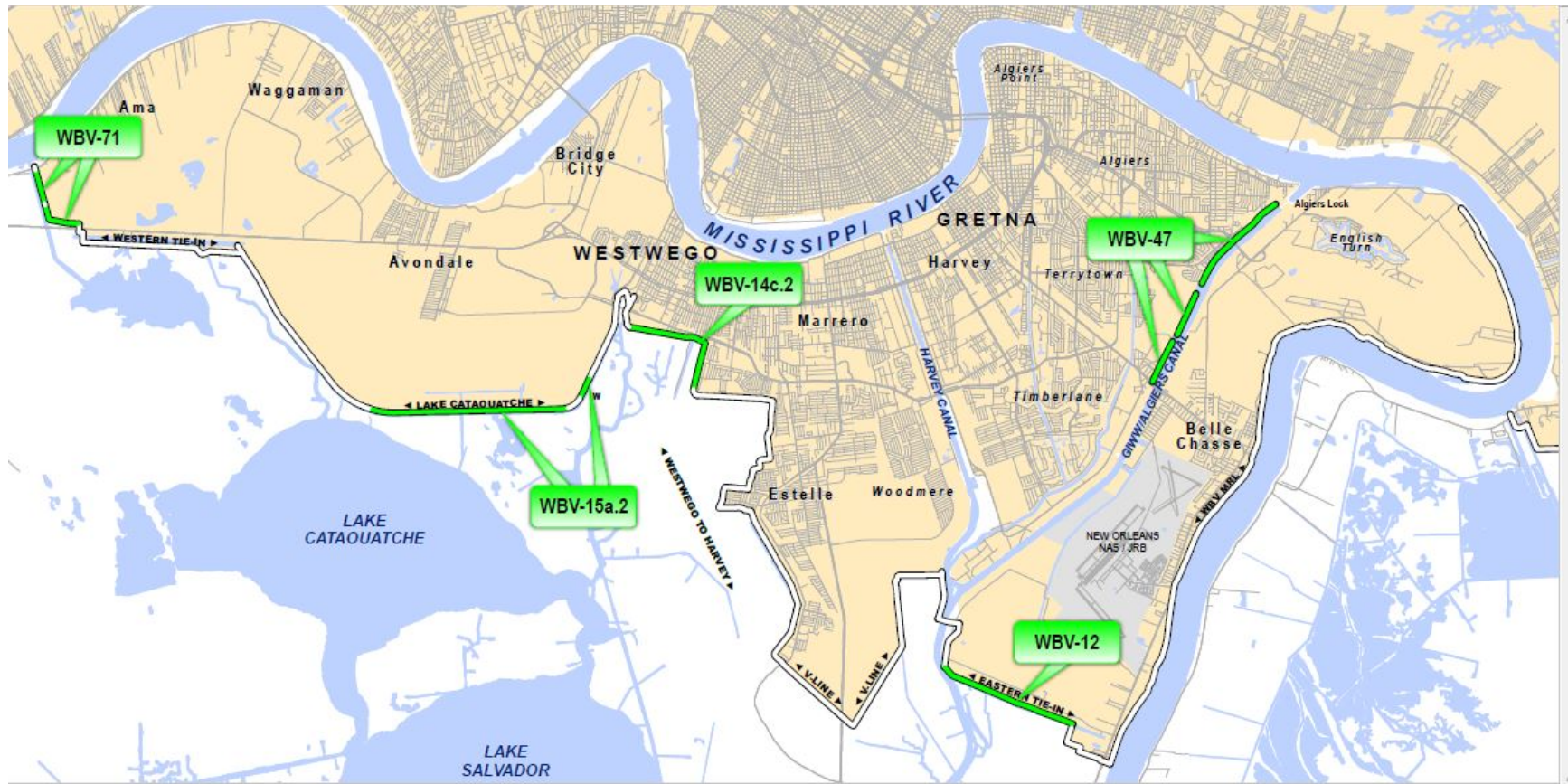


Figure 1. West Bank and Vicinity Representative Reach Locations

## 2 EXISTING LEVEE SECTIONS

### 2.1 WBV-12 HERO CANAL REACH.

#### 2.1.1 WBV-12

This levee reach was last lifted by the non-federal sponsor in 2017-2018 to an elevation of 13.0. The 2007 design grade is El. +10.5; the 2057 design grade is El. +14.0. This reach was armored with HPTRM in 2018.

The levee has a 10 foot wide crown, 1:3 landside side slope and a 1:4 flood side slope. The contract provided 2.0 feet of overbuild in anticipation of future subsidence. Landside stability berms with a reinforcing geotextile were required between STA 126+55 and STA 151+05. Landside stability berms without a reinforcing geotextile were required from STA 151+05 to STA 176+05 and from STA 191+55 to STA 244+00. Landside stability berms were not required between levee STA 124+70 and STA 126+05 and between STA 176+55 and STA 178+66.

During construction the plans were modified to install a soil-bentonite slurry cutoff trench between STA 158+00 and STA 215+00 and a sheet pile cutoff wall between STA 220+00 and STA 244+90 on the flood side of the levee.

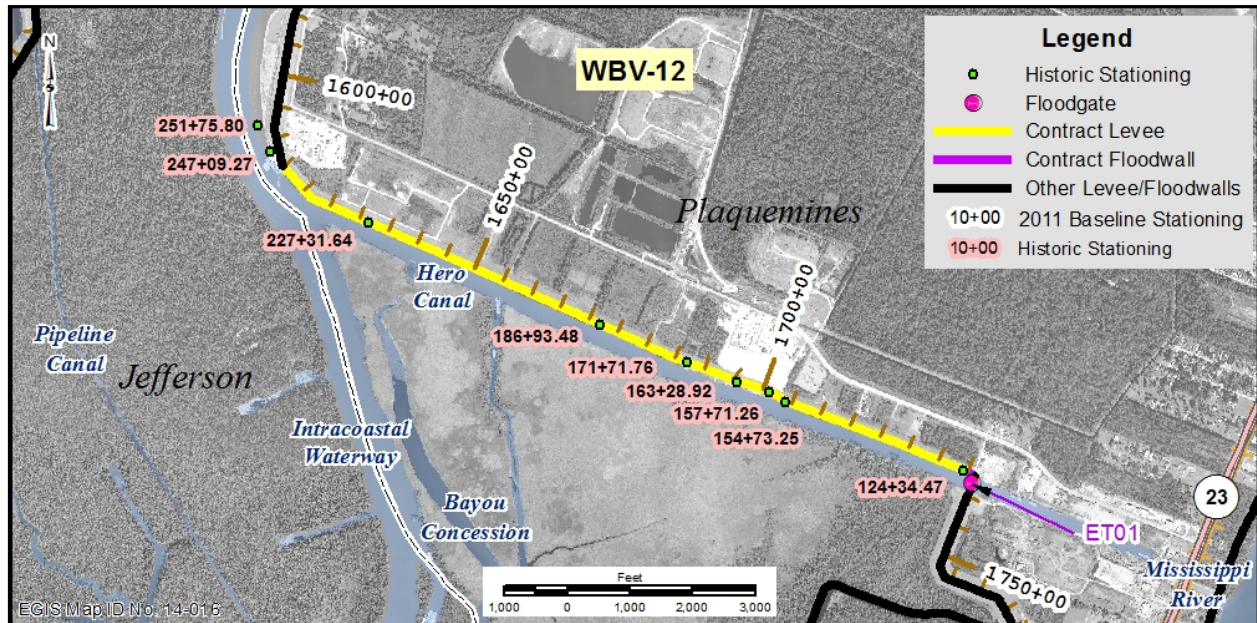
In 2014, to prevent bank erosion along the Hero Canal levee at the intersection of Hero Canal and the GIWW, a foreshore dike was constructed along the bank line of Hero Canal between centerline stations 236+6 and 244+90.

Material used to enlarge the levee was obtained from both government furnished borrow area "N" along Walker Road and a contractor-furnished borrow area and contractor furnished borrow areas.

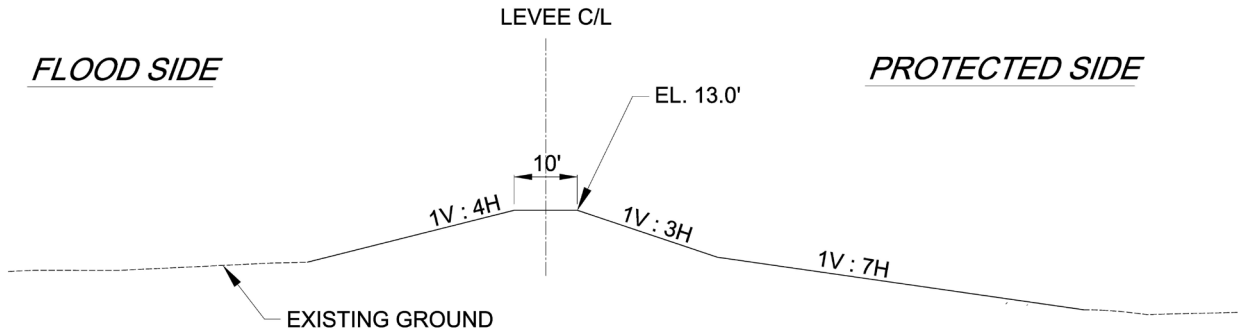
#### WBV-ARM-16 System Armoring (WBV-12)

This reach was armored in 2018 under contract WBV-ARM-16. The armoring contract consisted of placing HPTRM along the crown and protected side of the levee. Once placed, the HPTRM was covered with sod and fertilized. The HPTRM is secured with percussion driven earth anchors and 12 inch metal pins that are placed in a minimum 1 ft. by 1 ft. anchor trench.





WBV-12 Levee Reach



WBV-12 TYPICAL LEVEE DESIGN SECTION

N.T.S.

WBV-12 Typical Levee Section

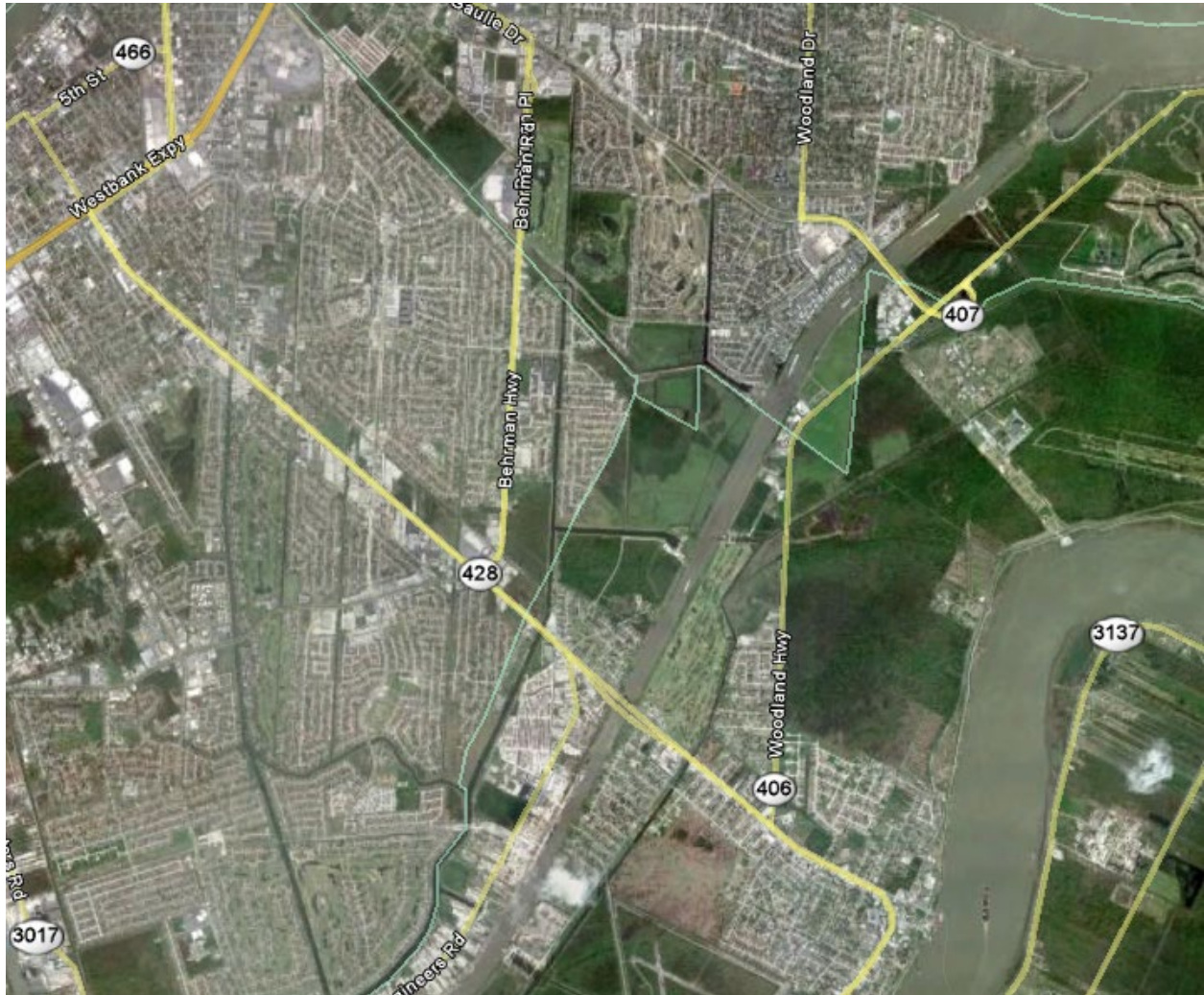
## 2.2 WBV 47.1, 47.2A ALGIERS LOCK TO BELLE CHASE HWY.

This levee reach was last lifted by USACE to 9.2 in 2011. The design grade is 8.5. This contract involved raising levees to authorized level of protection along a reach of approximately 3.7 miles along the western side of the Algiers Canal. The work consisted of clearing and grubbing, compacted levee embankment, compacted berm embankment, silt fences, truck wash-down racks, borrow pit management, construction of access roads, fertilizing, seeding, mulching, and deep soil mixing. Deep soil mixing was required at Entergy's high powered aerial crossing to eliminate the need for a landside stability berm at the tower.

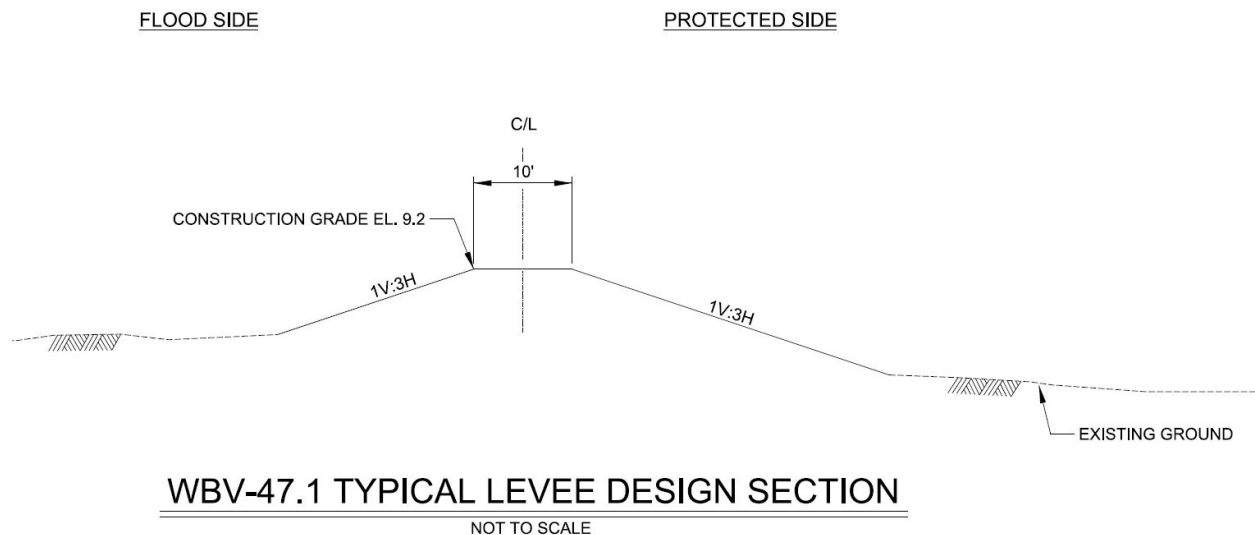
Specifically, this contract added levee crown with land side stability berms, straddle levee enlargements with land side stability berms, land side levee enlargements with stability berms, canal side levee enlargements, and land side levee enlargements on approximately 2.9 miles of earthen levee. The project extended in a southerly direction along the west side of the Algiers Canal from the Algiers Canal Lock to a point approximately 700 feet north of Planters Pump Station and included the following no work areas:

- From Station 785+53.33 to Station 787+21.78 – There was a 42" sewer force main owned by the Sewerage and Water Board of New Orleans that crossed the levee in this area and was relocated under the WBV-83 project.
- From Station 805+07.98 to Station 805+82.98 – There was a 12" high pressure gas pipeline owned by Gulf South that crossed the levee in this area which was relocated in the fall of 2012 as part of the WBV-82 project.
- From Station 869+36 to Station 883+92 – There was a 30" high pressure gas pipeline owned by Chevron that crossed the levee in this area. The gas pipeline was relocated in the fall of 2012 as part of the WBV-81 project. The fronting protection of Sewerage and Water Board Drainage Pump Station 13 (WBV-08) ties into this levee between these stations.





**WBV-47.1, WBV-47.2 Levee Reach**



### WBV-47.1 Typical Levee Section

## 2.3 WBV-71 WESTERN TIE-IN LEVEES (NORTH-SOUTH).

### 2.3.1 WBV-71

This levee reach was last lifted by USACE to El. 11.5 in 2013. The 2007 1% hydraulic design elevation is 11.5. The required 2057 1% hydraulic design elevation for the WBV-71 levee was 13.0 ft. This contract was armored in 2016.

This segment of the Hurricane and Storm Damage Risk Reduction System (HSDRRS) consisted of 1.3 miles of levee, located in St. Charles Parish on the west bank of the Mississippi River, in the vicinity of the Davis Pond Freshwater Diversion Canal.

The contract began at 2011 Baseline STA. 0+00 on the west end of the WBV alignment (the Western Tie-In (WTI) in St. Charles Parish, south of LA Highway 18, south of the Union Pacific Railroad tracks and just south of the WTI WBV-77 Project T-wall tie-in) and proceeded east to 2011 Baseline STA. 75+37.6.

The WBV-71 construction contract consisted of: clearing and grubbing; constructing access ramps and a maintenance road; enlarging an existing earthen levee and berms (north-south segment); constructing a new earthen levee and berms (west-east segment); excavating a drainage ditch; installing swales; constructing a new levee ramp; access road surfacing; and turf establishment. The west-east segment included a sand base with high strength geo-textile fabric installed on top of the sand base before clay embankment was placed and compacted. It should be noted that access road surfacing occurred only in the vicinity of levee ramps.

This earthen levee, constructed by DQSI, LLC, had a 10 ft. crown width with an original design grade of El. 9.0 ft. and a construction grade of El. 11.5 ft., with 1 vertical on 4 horizontal levee side slopes. A 2012 levee lift raised the construction grade crown to El. 12.0 ft. Thus the

construction contract provided approximately 3 ft. of overbuild after completion of the 2012 levee lift. Some levee lift construction for WBV-71 was performed under the WBV-77 contract. A wave berm had a 1 vertical on 14 horizontal side slope from berm toe to a shoreline of El. 6.5 ft. There was also at least a 15 ft. wide vegetation-free zone. Also on the west-east levee segment, there was a 5-strand barb wire fence with wood posts embedded in the levee and berms crossing near a property boundary; this pre-existing fence was re-installed through USACE as part of the WBV-71 2012 levee lift. There was an earthen roadway levee ramp crossing near Coulee Road. The first lift required minor landside stability berms between stations 52+35 and 76+77.

The 2012 levee lift was constructed by two separate construction contracts: W912P8-11-C-0051 (Cajun Constructors, Inc.) and W912P8-09-D-0047 0003 DQSI, LLC.

The typical levee section for this contract included a wave berm. The elevation for the wave berm must be monitored since it was a factor for establishing the required 1% hydraulic design elevation for the levee crown.

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### 2.3.2 WBV-ARM-08 SYSTEM ARMORING (WBV-71 AND WBV-72)

This armoring contract WBV-ARM-08 included armoring a segment of the HSDRRS from 2011 baseline STA. 5+82 to STA. 241+36, consisting of 4 miles of levee. The armoring contract reach is comprised of two contract reaches (WBV-71 and WBV-72) that were constructed under the original WBV contracts.

The armoring contract consisted of placing HPTRM along the protected side of the levee. Once placed the HPTRM was covered with sod and fertilized. The HPTRM is secured with percussion driven earth anchors and 12 inch metal pins that are placed in a minimum 1 ft. by 1 ft. anchor trench.

There are several locations in the contract reach where the HPTRM abuts to a hardened surface. At some locations this abutment occurs where concrete scour protection is placed at the intersection of a levee and floodwall. In addition to abutment at scour protection, the HPTRM also abuts to hardened surfaces at concrete ramps and miscellaneous concrete pads throughout the reach. Where the HPTRM abuts to a hardened surface, an anchor trench is placed running parallel to the edge of the hardened surface. Existing crushed stone ramps located on the protected side of the levee were concrete paved during the armoring contracts by placing 6" thick concrete on top of the existing crushed stone. Concrete ramps are located at the following stations: 95+78; 204+80; 214+97; and 218+65.



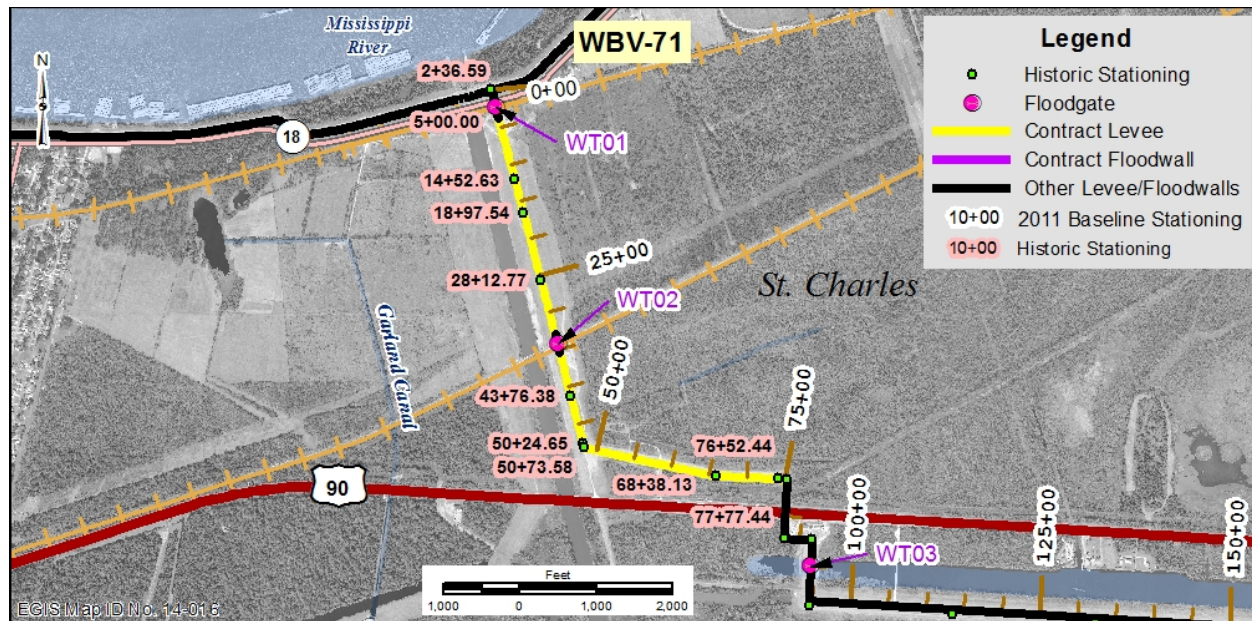
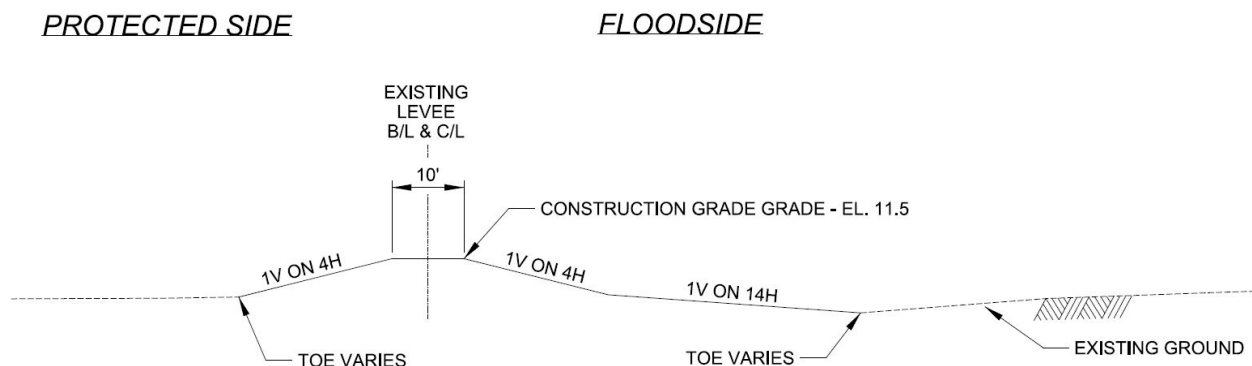


Figure 2. WBV-71 Baseline Stationing



## WBV-71 TYPICAL LEVEE DESIGN SECTION

NOT TO SCALE

### WBV-71 Typical Levee Section

#### 2.4 WBV-14C.2 NEW WESTWEGO PS TO ORLEANS VILLAGE.

This segment of the HSDRRS WBV consisted of raising approximately 3.5 miles of existing earthen levee to the 100-year level of protection. This reach is located on the west bank of the Mississippi River in the Westwego area in Jefferson Parish, Louisiana. This levee reach is currently being constructed by the non-federal sponsor to El. 14. The design grade is 10.5. The

last lift was to elevation 13.5 in 2011. This reach is scheduled to be armored with HPTRM in 2019-2020.

The last contract in 2011 consisted of the following:

The floodwalls extend from the Westminster pump station, to the levee sections of WBV-14c.2. At the south end of the Westminster pump station, two T-wall monoliths and an I-wall were needed to connect the levee sections. At the north end of the Westminster pump station, six monoliths and an I-wall were required to connect to the levee section. Anti-erosion concrete slope paving was provided at the levee and I-wall interface. The same cross section was used for all eight proposed monoliths, consisting of a four-ft.-thick base slab and a two-ft. stem. A similar cross section was included in the drawings for the WBV-30 T-Walls.

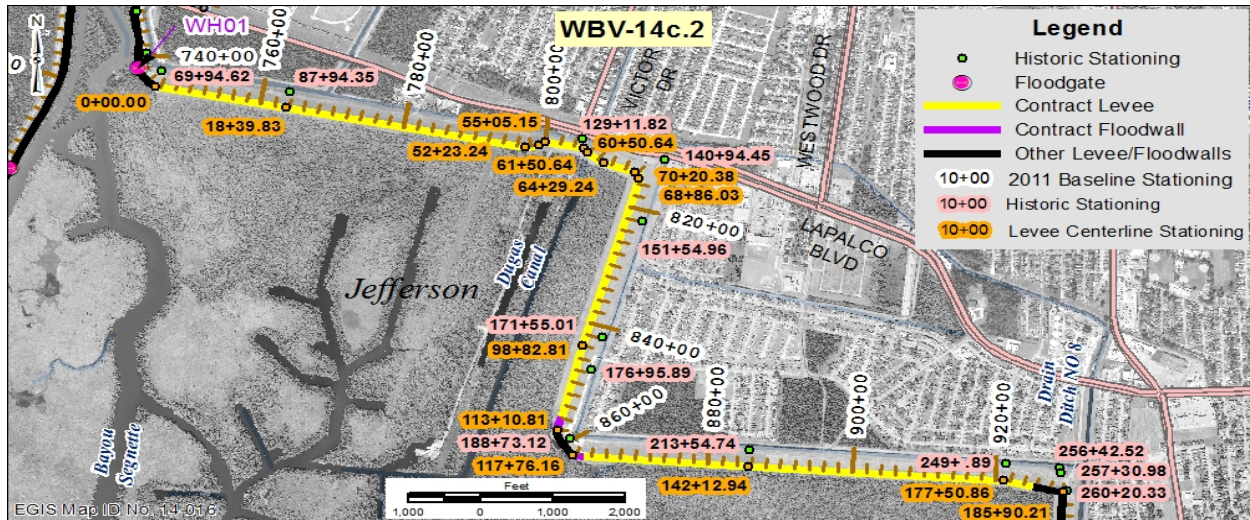
Existing soil mixing occurs north and south of the Westminster pump station, and the two monoliths on the south end were placed directly in front of soil mix columns. The soil mixing on the north side ends at the location of the constructed walls. The piles in the south monoliths were battered at a steeper angle to avoid below-grade pile conflicts with the soil mixing.

The contract began at 2011 Baseline STA. 745+05 and proceeded to a no-work area from STA. 854+75 to STA. 862+68 constructed under the contract Fronting Protection Westminster Pumping Station (WBV-30). The levee work continued from STA. 862+68 and concluded at Option Area A (STA. 925+31), which is the Gulf South pipeline relocation. Option Area A was not exercised under this contract; the Gulf South pipeline relocation was accomplished under the contract Westwego to Harvey Utility Crossings and Miscellaneous Sector Gate Retrofits (WBV-14j).

The required 1% hydraulic design elevation for the levee is 10.5 ft. in 2007 and 14 ft. in 2057. This contract provided 3.0 ft. of overbuild achieving a construction grade of approximate El. 13.5 ft. During construction, the existing levee was degraded and the center line of the new levee was shifted toward the flood side. The required 1% hydraulic design elevation for the floodwalls is 14 ft. in 2057. The top of the T-walls is thus El. 14 ft. while the top of the I-walls is El. 14.5 ft. (the 0.5 ft. difference represents overbuild in accordance with HSDRRS Design Guidelines, Section 5.1.3).

A ramp crosses the levee near 2011 Baseline STA. 801+00. The ramp provides access to Lapalco Blvd. (on the protected side) and Westwego Seaplane Airport (on the flood side). Although it is not essential to the function of the system it is maintained in accordance with this manual.

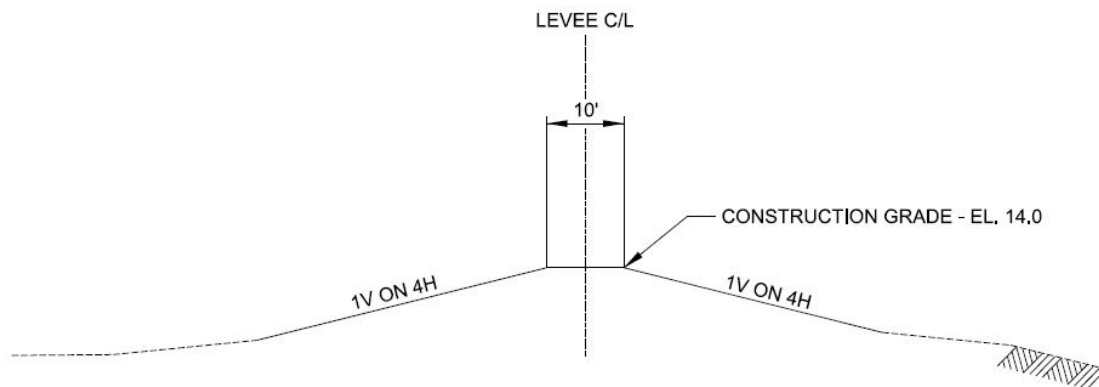




**WBV-14c.2 Levee Reach**

*PROTECTED SIDE*

*FLOODSIDE*



**WBV-14C.2 TYPICAL LEVEE DESIGN SECTION**

NOT TO SCALE

**WBV-14c.2 Typical Levee Section**

## 2.5 WBV-15A.2 LAKE CATAOUCHE PS#1 TO SEGNETTE STATE PARK.

### 2.5.1 WBV-15A.2

This segment of the HSDRRS consists of approximately 3.75 linear miles of levee located within the Lake Cataouatche Reach of the West Bank and Vicinity portion of the Greater New Orleans HSDRRS in Jefferson Parish, Louisiana. This contract is currently being armored with HPTRM.

The contract begins at the Lake Cataouatche Pump Station (2011 Baseline Station 428+14.57) and extends generally west to east to the WBV-24 Segnette State Park Floodwall (2011 Baseline Station 625+34.52). This contract is bounded by the Lake Cataouatche Outer Canal immediately to the south and the Cataouatche Inner Canal immediately to the north.

The required 1% hydraulic design elevation for the WBV-15a.2 levee is 11.5 feet in 2007 and 15.5 feet in 2057 (NAVD88 (2004.65)). The levee relies on stability berms constructed on both the protected and flood sides to function under storm conditions. Foreshore protection was constructed under contract WBV-15a.2a on the floodside to provide erosion protection from daily wave action. Rip rap on the floodside berm provides protection during storm events. The levee was constructed with approximately 2 feet of overbuild to elevation 13.5 feet (NAVD88 (2004.65)) to extend the period of effective risk reduction. The typical levee section for this contract includes a wave berm. The elevation for the wave berm must be monitored since it is a factor for establishing the required 1% hydraulic design elevation for the levee crown.

Also included in the contract design and construction were swales in vicinity of reported High Moisture Areas (HMA).

There is a 24-inch diameter gas pipeline that crosses the levee right-of-way near 2011 Baseline Station 587+18.55. An Entergy overhead power line follows the contract along the south side of Lake Cataouatche Outer Canal and then crosses the canal and levee right-of-way near 2011 Baseline Station 621+56. Two Entergy power line towers are outside the WBV-15a.2 right of way (ROW) near 2011 Baseline Station 621+56.

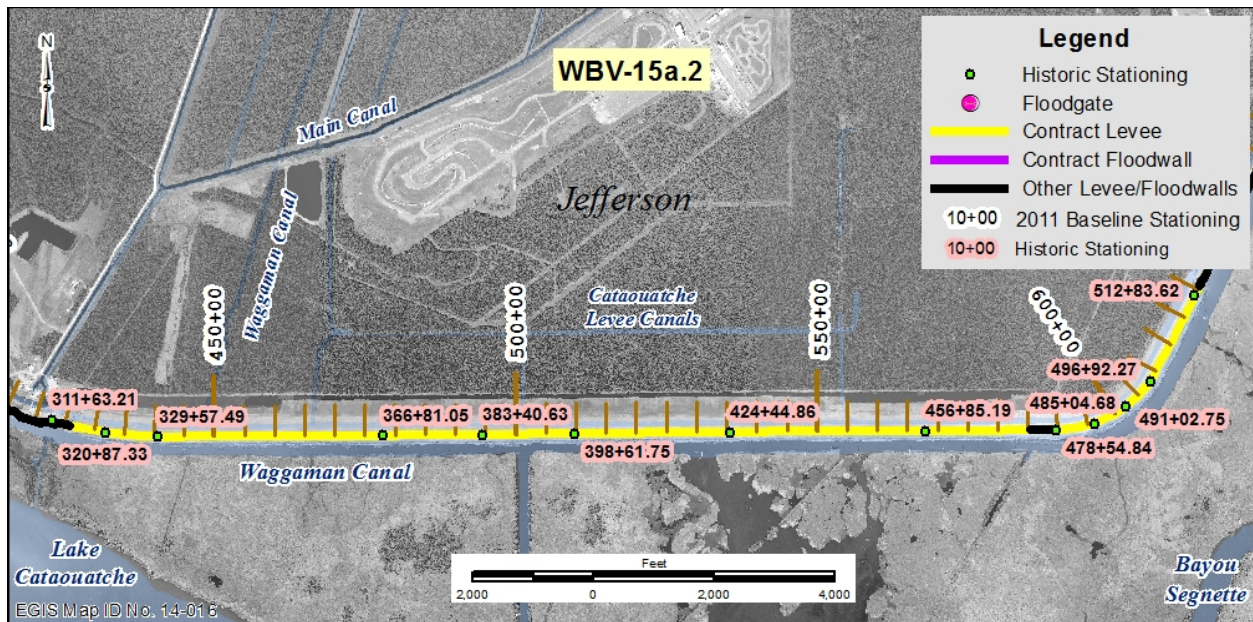
### 2.5.2 WBV-15A.2A

WBV-15a.2a included the relocation of the 24-inch diameter Chevron Gas Pipeline utility which crosses the contract right-of-way at about 2011 Baseline Station 587+18.55 and included related embankment work within 2011 Baseline Stations 582+00.55 to 594+89.55. WBV-15a.2a also included hard armor placement near the Outer Cataouatche Canal bank from about 2011 Baseline Stations 428+14.67 to 627+29.26.

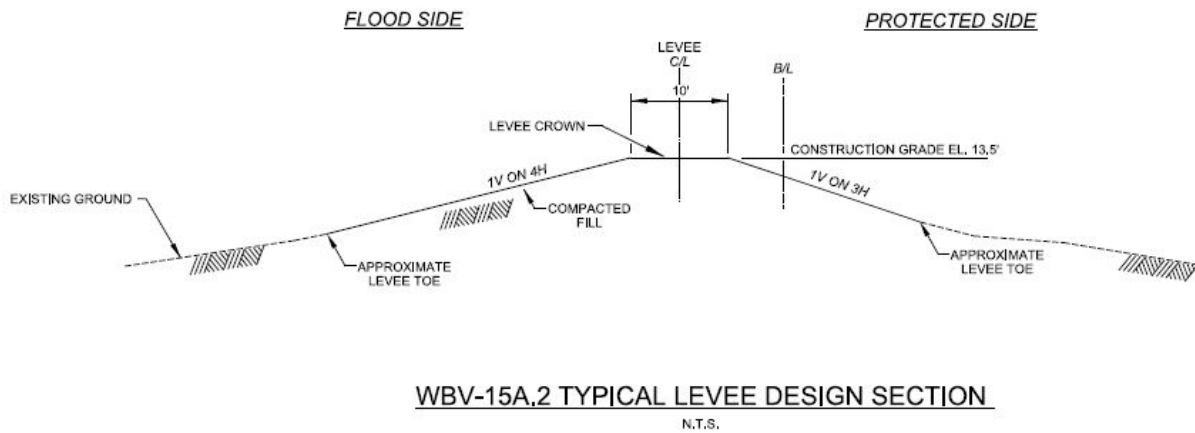
The required 1% hydraulic design elevation for the WBV-15a.2a levee is 11.5 feet in 2007 and 15.5 feet in 2057 (NAVD88 (2004.65)).

### 2.5.3 WBV-ARM-05 SYSTEM ARMORING (WBV-15A.2)

This reach is currently being armored in 2019 with HPTRM. The armoring contract will consist of placing HPTRM along the crown and protected side of the levee. Once placed, the HPTRM was covered with sod and fertilized. The HPTRM is secured with percussion driven earth anchors and 12 inch metal pins that are placed in a minimum 1 ft. by 1 ft. anchor trench.



WBV-15a.2



WBV-15a.2 Typical Levee Section



## 2.6 WBV-MRL-7.1 REACH, WEST CROSSOVER POINT TO PARISH LINE.

### 2.6.1 WBV-MRL-7.1

This segment of the HSDRRS consists of 3.6 miles of levee along the Mississippi River Levee (MRL) in Orleans Parish. The contract begins at 2004 Orleans West Levee District baseline STA. 552+10 (river mile 85.5) and ends at STA. 745+25 (river mile 81). At STA. 745+25 WBV-MRL 7.1 ties into the start of WBV-MRL 6.1.

This contract is a part of HSDRRS/MRL co-located area. The HSDRRS/MRL co-located project area is defined as the area in which the HSDRRS design elevations are higher than the MR&T design elevations. However since the MR&T was established and maintained by previous authority that is not superseded by the HSDRRS authority, the projects are said to co-exist or coincide, meaning they serve a dual purpose of providing risk reduction from both riverine flooding and hurricane surge flooding. Therefore the contract used a combination of Mississippi River and Tributaries (MR&T) and HSDRRS funding.

At STA.552+10, the MR&T authorized grade is 20.0 ft. At STA. 745+25 the MR&T authorized grade is 19.5 ft. The MR&T authorized elevation is a linear transition between the elevations. Under the co-located work, the levee was first designed to meet the MR&T authorized grade. Additional embankment was placed on top of the MR&T levee to meet the required WBV HSDRRS 1% hydraulic design elevation. From STA. 552+10 to 745+25, the WBV HSDRRS 1% hydraulic design elevation is 20.0 ft. in 2007 and 24.0 ft. in 2057. The levee was constructed to an elevation of 21.0 ft. to provide overbuild to the required WBV HSDRRS 1% hydraulic elevation.

The levee enlargement was constructed by offsetting the centerline of the levee towards the protected side. The embankment material tied into the top of the existing flood side slope pavement. A 9 inch crushed stone wearing surface was placed on the crown of the levee.

From STA. 606+00 to STA. 630+00, grouted rip rap was placed along the toe of the protected side of the levee. The grouted rip rap was placed to keep the toe of the levee on the back side of the drainage running parallel with the highway while trying to maintain a 3:1 slope. The required 1% hydraulic design elevation for the levee is 24.0 ft. in 2057.

### 2.6.2 WBV-ARM-09 SYSTEM ARMORING (WBV-MRL-7.1)

This reach was armored with HPTRM and Articulated Concrete Blocks (ACBs). The armoring contract consisted of placing High Performance Turf Reinforcement Mat HPTRM along the protected side of the levee. Once placed, the HPTRM was covered with sod and fertilized. The HPTRM is secured with percussion driven earth anchors and 12 inch metal pins that are placed only on the protected side of the levee. On the protected side slope near the crown, the HPTRM is pinned to the slope surface, after the placement of crushed stone at the crown slope to maintain a 1V:3H slope. HPTRM is then further anchored by the placement of ACBs on top as further described below. HPTRM should not be driven on for a minimum of two days following heavy rain.

In areas where the protected side slopes of the levee were built steeper than 1V on 3H, caution is advised for cutting grass.

In this contract reach, in addition to placing HPTRM, ACBs were placed on the crown of the levee, extending down the protected and flood side levee slopes for a distance of approximately 7 feet. On the flood side, the ACBs terminate in an anchor trench. On the protected side, the ACBs and filter fabric are placed on top of the HPTRM and anchored between the second and third to last ACBs. The rope on the last block was then cut and crimped. To cover the crimp, a clay wedge was then placed from the last block to the slope surface to create a smooth transition. Prior to placing the ACBs crushed stone was graded on the crown and added to the slopes of the levee as ACB sub base. The spaces between ACBs were backfilled with sand. The layer of crushed stone in addition to the ACB mat brings the final elevation of the levee crown to El 22 ft.

There are several locations in the contract reach where the HPTRM and ACBs abut to a hardened surface. The HPTRM abuts to hardened surfaces at concrete ramps, miscellaneous concrete pads, and/or turn around pads throughout the reach. Where the HPTRM abuts to a hardened surface, an anchor trench is placed running parallel to the edge of the hardened surface. Existing crushed stone ramps located on the protected side of the levee were concrete paved during the armoring contracts by placing 6" thick concrete on top of the existing crushed stone. Concrete ramps are located at stations 610+68 and 646+60. At Station 558+11 there was an existing concrete ramp. Concrete was placed on the levee crown at each side of the ramp for a smooth tie-in between the existing ramp and the ACBs. At station 615+74, an existing crushed stone parking area was removed at the levee toe and replaced with concrete pad. At Station 590+40, new slope paving was placed around existing piezometers and bollards at the toe of the levee. Concrete access pads were constructed at the following locations: 727+17 (80' long), 556+39 (50' long), and 559+57 (50' long). At Station 640+32, concrete paving was placed at the crown of the levee at an existing walkway. The walkway had a 12' long portable steel walkway was removed and then replaced by the contractor, for the placement of the pavement. Also at this station, existing crushed stone on the levee slope near the levee toe had to be removed and backfilled with compacted clay to allow for the placement of HPTRM. At Station 651+47 an existing fence crosses the levee. At the base of the fence, a new 2' wide concrete paving was placed.

## 2.7 WBV-MRL-09, WBV-MRL-10, AND WBV-MRL-11

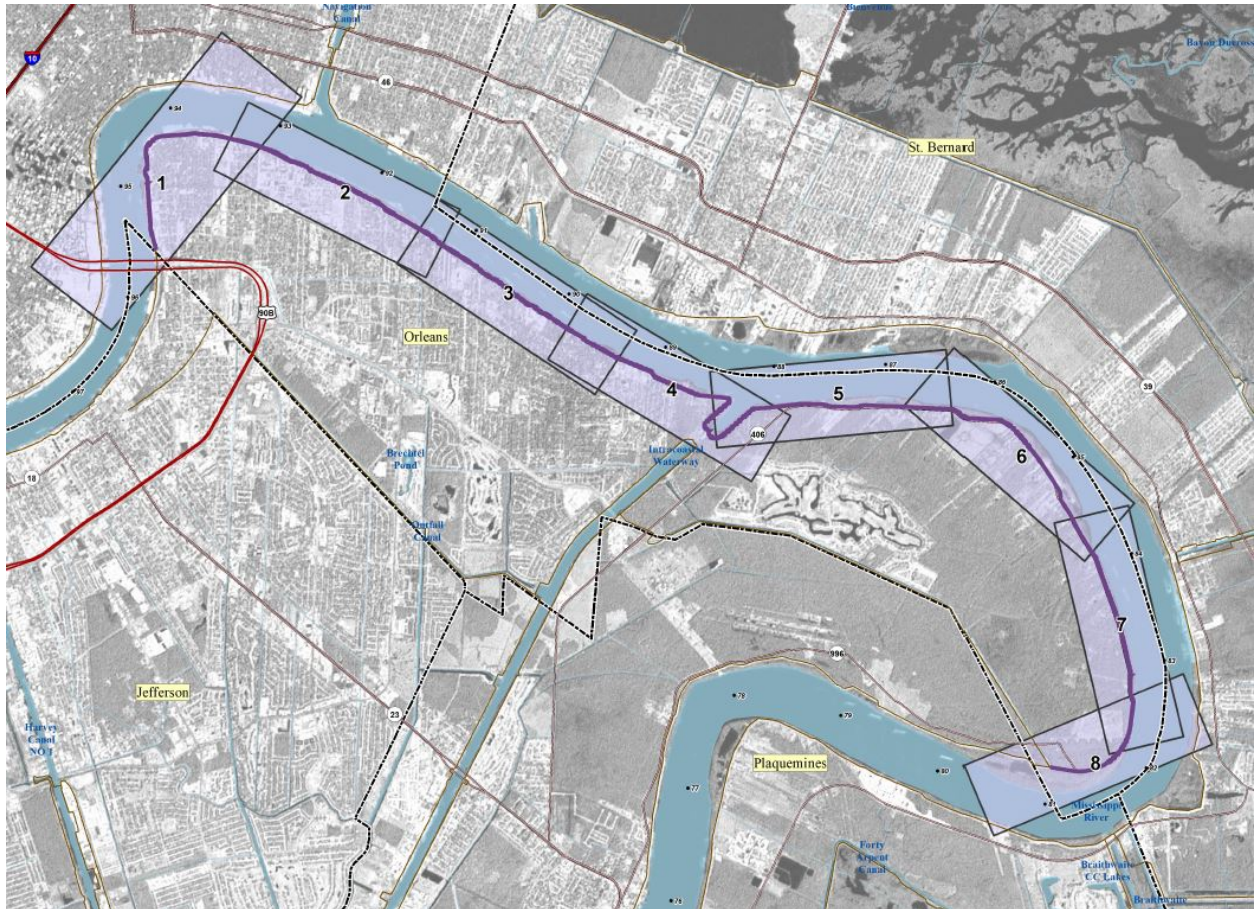
These levee reaches were not part of the WBV system as they were north of the west bank 2011 1% HSDRRS cross over point at river mile 85.5. The new 2073 cross over point, however, is at river mile 95.5 for the intermediate condition. For explanation on adjusted crossover points see the H&H appendix. The WBV-MRL-09 reach is from the Plaquemines Parish line to the east side Algiers Lock. The WBV-MRL-10 reach consists of the Algiers Lock Forebay levees. WBV-MRL-11 extends from east of the west of the Algiers Lock Forebay to the Greater New Orleans Bridge. The MR&T design grade or MRL 1973 project grade for the reach varies from 23 EL to 19.5. The 1% 2011 HSDRRS design grade is EL 20. The MRL levees have a crushed stone surfacing crown and concrete slope paving (CSP) on the flood side slope.

No prior lift schedules were available for settlement for these reaches. From visual approximation of the survey profile, levee crest is EL 18 to El 21. Minimal settlement is expected

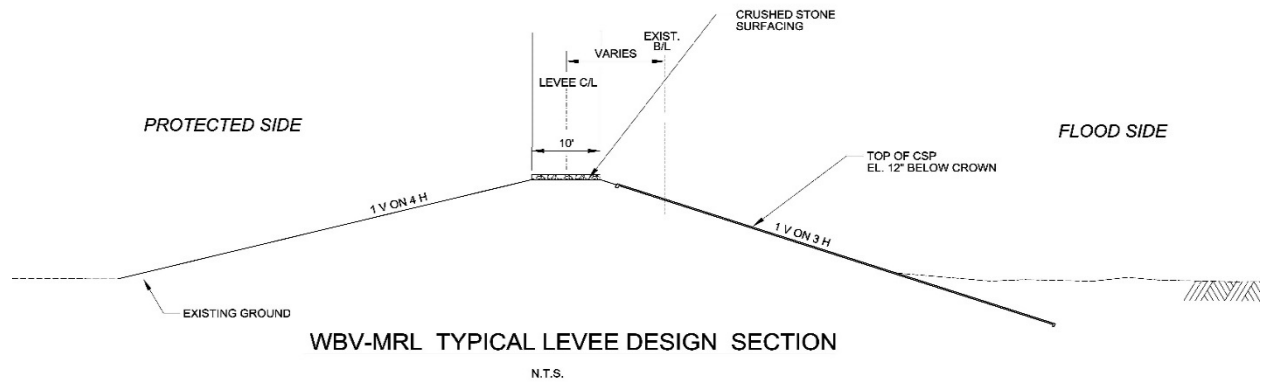


## West Bank & Vicinity General Re-Evaluation Report DRAFT

(approximately 6 inches of settlement from 2023 to 2073). It was conservatively assumed that there would be three lifts of three feet each for the 1% alternative.



**WBV-MRL Levee Reaches**



**WBV-MRL Typical Levee Section**

### 3 TSP QUANTITY CALCULATION – INTERMEDIATE 1% DESIGN

Due to the enormity of the entire system, representative reaches were chosen and lift schedules were developed for some reaches and applied to representative reaches. For explanation on development of lift schedules refer to the Geotechnical Appendix. The following table presents the results of the geotechnical analysis and lift schedules for each reach.

Contract ID	Contract	1st Lift			2nd Lift			3rd Lift			4th Lift		
		Year	Lift Elevation	Height (FT)	Year	Lift Elevation	Height (FT)	Year	Lift Elevation	Height (FT)	Year	Lift Elevation	Height (FT)
WBV-06a.2 & 3b	Belle Chasse Hwy to Hero Cutoff (West)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-09a	Hero Canal to Oakville - Hero Canal to PS	2024	15	3.0	2043	16	3	2060	17	2.5	N/A	N/A	N/A
WBV-12	Hero Canal Reach 1	2024	15	3.0	2043	16	3	2060	17	2.5	N/A	N/A	N/A
WBV-14a.2& g.2	Harvey Canal West Bank Levees	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-14b.2	Orleans Village to Hwy 45 Levee	2040	15	2.5	2058	15.5	2	N/A	N/A	N/A	N/A	N/A	N/A
WBV-14c.2	New Westwego PS to Orleans Village	2046	15.5	3.0	2070	14.5	1	N/A	N/A	N/A	N/A	N/A	N/A
WBV-16.2	Bayou Segenette Complex levee portion	2046	15.5	3.0	2070	14.5	1	N/A	N/A	N/A	N/A	N/A	N/A
WBV-14e.2	V-line Levee, east of Vertex	2040	15	2.5	2058	15.5	2	N/A	N/A	N/A	N/A	N/A	N/A
WBV-14f.2	Hwy 45 Levee	2040	15	2.5	2058	15.5	2	N/A	N/A	N/A	N/A	N/A	N/A
WBV-15a.2	Lake Cataouatche PS to Segnette State Park	2026	15	2.5	2039	16	2.5	2051	17	2.5	2064	17.5	2
WBV-17b.2	Station 160+00 to Hwy 90	2054	13	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-18.2	Hwy 90 to Lake Cataouatche PS	2054	13	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-47.1	Algiers Lock to Belle Chasse Hwy (West)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-48.2	Belle Chasse to Algiers Lock (East)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-49.1	Hero Levee to Belle Chasse Hwy (East)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-71	Western Tie-In Levees - (North-South)	2054	13	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-72	Western Tie-In Levees - (East-West)	2054	13	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-90	GIWW-West Closure Complex	2024	15	3.0	2043	16	3	2060	17	2.5	N/A	N/A	N/A
WBV-MRL 1.2b	Augusta to Oakville	2037	24.5	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL 3.2	Belle Chasse to Oak Poin	2037	24.5	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL 5.2	English Turn Bend	2030	23.5	2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL 6.1	Parish Line to English Turn Bend	2030	23.5	2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL 7.1	West Crossover Point to Parish Line	2030	23.5	2.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL-9	Algiers Lock To West Crossover Point	2050	23	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL-10	Algiers Lock Forebay Levees	2040	23.5	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WBV-MRL-11	GNO Bridge to Algiers Lock	2065	23.5	1.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

#### Intermediate 1%Design Lift Schedule

### 3.1 LEVEE LIFT QUANTITY CALUCATION ASSUMPTIONS

Quantities for each lift were calculated based on cross sectional area. It was assumed that all lifts are straddle lifts and no berms are affected. The only site investigations that were done is a profile survey of the levee crown elevations.

Some levee reaches have concrete paved transitions from levee to floodwall. It is assumed that with each lift, the slope paving would need to be removed, lifted, and replaced to match the required design elevation.

Silt fence quantities were calculated by doubling the reach length and adding 25% contingency for staging areas.

Embankment quantities were calculated using cross sectional areas. Clearing, grubbing, seeding, and mulching quantities are assumed to be the same, in acres per lift.

Quantities calculated for each reach are located in Enclosure 1 at the end of this appendix.

### 3.2 ARMORING

It is assumed that all previously placed armoring for each reach would need to be removed before each lift and then replaced after construction of each lift. Armoring consists of HPTRM or ACB. As previously done, because MRL levees have all-weather access roads on the crown, so ACBs were placed on these reaches as the method of armoring. All other reaches have HPTRM.

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### 3.2.1 WBV-MRL LEVEES

The HPTRM will be placed on the landside of the levee and generally extend a distance of 15-ft. past the land side levee toe and terminate in an anchor trench. After the initial placement of the HPTRM on the land side, the HPTRM is anchored using percussion driven earth anchors in a specific pattern so that the HPTRM maintains contact with the levee surface. Additional steel pins are used in between the percussion driven earth anchors to further anchor the HPTRM.

ACBs are placed on the crown of the levee, extending down the land and flood side levee slopes for a distance of approximately 7 feet. On the flood side, the ACBs terminate in an anchor trench. On the land side, the ACBs and filter fabric are placed on top of the HPTRM and anchored. As part of the installation of the ACBs, crushed stone was added and graded on the levee crown and side slopes.

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### 3.2.2 ALL OTHER WBV REACHES

HPTRM armoring is placed from a distance of 4 feet down the flood side slope from the levee crown and extends across the levee crown, down the land side slope, and then extends an additional 15 feet past the landside toe. The HPTRM is secured with percussion driven earth anchors and 12 inch metal pins that are placed in a minimum 1 foot by 1 foot anchor trench. Once placed the HPTRM was covered with Bermuda sod and fertilized.

## 3.3 MRL SLOPE PAVING

All MRL levees have concrete slope paving on the flood side slope. It is assumed for this alternative that the slope paving will need to be removed and replaced with expansion of the levee footprint. The quantities are included in enclosure 1.

## 3.4 FORESHORE FRONTING PROTECTION RIPRAP

For some reaches, foreshore protection was added per HSDRRS guidelines to prevent foreshore shore erosion along the lakefront. It is assumed that to maintain the 1% level of protection additional foreshore riprap would need to be replaced. It is assumed that an additional 15 foot width of riprap would need to be replaced. Quantities are calculated in enclosure 1 at the end of this appendix.

## 4 QUANTITY CALCULATION – INTERMEDIATE 0.5% DESIGN STORM

Hydraulic design elevations were calculated for the 0.5% intermediate design or 200 year storm. For explanation on these calculations see the H&H appendix. Due to time constraints, lift schedules and curves were not developed for this option. Design elevations for the 200 year storm were interpolated from the 100 and 500 year intermediate design storm elevation to come up with an estimation of lifts. The increase in lift from the 100 year elevation was either added to

the last 100 year lift or an additional lift was added in keeping with the previous maximum lift of 3 feet. See enclosure 2 for lift schedules and estimates quantities. The same assumptions from the 1% design quantity calculations apply.

## 5 GENERAL ASSUMPTIONS

### 5.1 UTILITY RELOCATIONS

Because all lifts would generally straddle the footprint of a previous lift, it is assumed that no utility relocations would be required.

### 5.2 RIGHT OF WAY

For the intermediate 1% and 0.5% design storm, the new footprint was compared to the existing right of way limits for the last levee lift for the representative reaches to determine if any new right of way would be required. For most of the WBV reaches, for the intermediate design condition slight land side of flood side shifts would eliminate the need for additional easement.

## 6 REFERENCES

HSDRRS West Bank and Vicinity, WBV-14c.2, New Westwego Pump Station to Orleans Village Phase 2, Volume 3 OMRR&R manual, April 2016

HSDRRS West Bank and Vicinity WBV-47.1 Algiers Canal – West Bank Station 770+00 to Station 921+50 Algiers Lock to Belle Chase Hwy, Phase 1, Volume 3 OMRR&R Manual, March 2013

HSDRRS West Bank and Vicinity WBV-Jefferson, WBV-90 Revision 1, Volume 3 OMRR&R Manual, Jefferson Parish, January 2019

HSDRRS West Bank and Vicinity, WBV-15a.2 and WBV-15a.2a, Lake Cataouche Levee Enlargement, Phase 2, Lake Cataouche Pump Station to Segnette State Park Volume 3 OMRR&R Manual, September 2015

HSDRRS WBV-7.1 West Crossover Point to Parish Line, Volume 3 West Bank and Vicinity OMRR&R Manual, March 2019



### **West Bank and Vicinity**

Contract ID	Contract	Representative Reach	Length (FT)	X-Section Distance(FT)	transitions	Toe to toe	Silt Fence (LF/Lift)	S&M , C&G (Ac/Lift)	1st Lift		2nd Lift		3rd Lift		4th Lift		ARMORING CONTRACT	FORESHORE PROTECTION (CY)	FORESHORE PROTECTION (SF)	Slope Paving (SQ)			
									Height (FT)	Fill (CY)	Height (FT)	Fill (CY)	Height (FT)	Fill (CY)	Height (FT)	Fill (CY)							
WBV-06a.2 & 3b	Belle Chasse Hwy to Hero Cutoff (West)	WBV-47.1	SEE INTERIOR LEVEES TABLE				N/A	N/A	N/A	N/A	N/A	N/A			N/A	N/A		N/A	N/A	N/A			
WBV-09a	Hero Canal to Oakville - Hero Canal to PS	WBV-12	4983.84	350	4	100	12,460	50.1	3.000	55,376	3	55,376	2.5	46,147	N/A	N/A	ARM-05	N/A	N/A	N/A			
WBV-12	Hero Canal Reach 1		12100	170	3	106	30,250	59	3.000	142,511	3	142,511	2.5	118,759	N/A	N/A	ARM-16	2667	18000	N/A			
WBV-14a.2& g.2 (piece)	Harvey Canal West Bank Levees	WBV14a.2	SEE INTERIOR LEVEES TABLE				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
WBV-14b.2	Orleans Village to Hwy 45 Levee	WBV-14c.2	15100	130	5	100	37,750	56.3	2.500	139,815	2	111,852	N/A	N/A	N/A	N/A	ARM-07	N/A	N/A	N/A			
WBV-14c.2	New Westwego PS to Orleans Village		17250	300	4	115	43,125	148.5	3.000	220,417	1	73,472	N/A	N/A	N/A	N/A	ARM-17	N/A	N/A	N/A			
WBV-16.2	Bayou Segenette Complex levee portion		800	300	4	115	2,000	6.9	3.000	10,222	1	3,407	N/A	N/A	N/A	N/A	ARM-14			N/A			
WBV-14e.2	V-line Levee, east of Vertex		15200	135	1	100	38,000	58.9	2.500	140,741	2	112,593	N/A	N/A	N/A	N/A	ARM-06	N/A	N/A	N/A			
WBV-14f.2	Hwy 45 Levee		14900	135	5	100	37,250	57.7	2.500	137,963	2	110,370	N/A	N/A	N/A	N/A	ARM-02	N/A	N/A	N/A			
WBV-14i.2	V-line Levee, LA 3134 Highway Crossing		2210	450	N/A	100	5,525	28.5	2.500	20,463	2	16,370	N/A	N/A	N/A	N/A		N/A	N/A	N/A			
WBV-15a.2	Lake Cataouatche PS to Segnette State Park	WBV-15a.2	19800	130	2	100	49,500	73.9	2.500	183,333	2.5	183,333	2.5	183,333	2	146,667	ARM15	N/A	N/A	N/A			
WBV-17b.2	Station 160+00 to Hwy 90	WBV 71	3500	130	N/A	100	8,750	13.1	1.500	19,444	N/A	N/A	N/A	N/A	N/A	N/A	ARM-04	N/A	N/A	N/A			
WBV-18.2	Hwy 90 to Lake Cataouatche PS		14300	300	1	80	35,750	123.1	1.500	63,556	N/A	N/A	N/A	N/A	N/A	N/A	ARM-12	N/A	N/A	N/A			
WBV-47.1	Algiers Lock to Belle Chasse Hwy (West)	WBV-47.1	SEE INTERIOR LEVEES TABLE				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			
WBV-48.2	Belle Chasse to Algiers Lock (East)	WBV-48.2					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
WBV-49.1	Hero Levee to Belle Chasse Hwy (East)	N/A					N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
WBV-71	Western Tie-In Levees - (North-South)	WBV 71	7500	250	3	100	18,750	53.8	1.500	41,667	N/A	N/A	N/A	N/A	N/A	N/A	ARM-08	N/A	N/A	N/A			
WBV-72	Western Tie-In Levees - (East-West)		14000	200	3	70	35,000	80.3	1.500	54,444	N/A	N/A	N/A	N/A	N/A	N/A		N/A	33481	226000	N/A		
WBV-90	GIWW-West Closure Complex	WBV-12	4400	250	N/A	109	11,000	31.6	3.000	53,289	3.0	53,289	2.5	44,407	N/A	N/A	ARM-01	N/A	N/A	N/A			
WBV-MRL 1.2b	Augusta to Oakville 505+00 to 585+00	WBV-MRL-1.2b	8000	150	4	100	20,000	34.4	2	59,259	N/A	N/A	N/A	N/A	N/A	N/A	ARM-03	N/A	N/A	N/A			
WBV-MRL 3.2	Belle Chasse to Oak Point 310+00 to 443+00		13300	150	2	100	33,250	57.2	2	98,519	N/A	N/A	N/A	N/A	N/A	N/A	ARM-10	N/A	N/A	N/A			
WBV-MRL 5.2	English Turn Bend (174+00 to 259+00)	WBV-MRL-6.1	12100	150	2	100	30,250	52.1	2.5	112,037	N/A	N/A	N/A	N/A	N/A	N/A	ARM-11	N/A	N/A	5203			
WBV-MRL 6.1	Parish Line to English Turn Bend 0+00 to 138+00		13800	150	N/A	100	34,500	59.4	2.5	127,778	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	5934			
WBV-MRL 7.1	West Crossover Point to Parish Line	WBV-MRL-7.1	19525	150	N/A	97	48,813	84	2.5	175,363	N/A	N/A	N/A	N/A	N/A	N/A	ARM-09	N/A	N/A	8396			
WBV-MRL-9	Algiers Lock Forebay to West Crossover Point	WBV-MRL-9	36000	160	N/A	120	90,000	165.3	1.5	240,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18000				
WBV-MRL-10	Algiers Lock Forebay Levees	WBV-MRL-10	5500	160	2	120	13,750	25.3	2.5	61,111	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2750				
WBV-MRL-11	GNO Sidgeon to Algiers Lock	WBV-MRL-11	16500	160	2	120	41,250	75.8	1	73,333	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9800				

## West Bank and Vicinity