

Supplemental to MT 2 Form 3

E. LEVEE/FLOODWALL

1. System Elements

b. Levee elements and locations are:

Levee Element	Levee Locations
Phase 1 Levee	0+00 to 25+00
Phase 2 Levee	0+00 to 9+75
Phase 2 Floodwall	7+80 to 9+00
See attachment for additional info.	

e. Attach certified drawings containing the following information

(Indicate plan set sheet numbers)		
Attach certified drawings containing the following information:	Phase 1	Phase 2
1. Plan of levee embankment and floodwall structures.	070-(1-4)	29,30
2. A profile of levee/floodwall system showing the Base Flood Elevation (BFE) levee and/or wall crest and foundation, and closure locations for the total levee system.	070-(1-4)	10,24
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure.	070-(1-4)	10, 24
4. A layout detail for the embankment protection measures.	075-(1-4)	33,34
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structure, and pump stations.	020-(1,2,9,10,13,14); 030-1; 200-(1-7)	9, 21, 42, 43, S-502, S-301

5. Embankment Protection

e. Riprap is not needed because of low velocities.

5. Embankment and Foundation Stability

c. Identify locations and describe the basis for selection of critical location for analysis:

- Overall Height: Sta.: 19+00-Phase I (Cross Section 1), height 3.5 ft.
- Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - Slope: SS = 3 (h) to 1 (v)
- Basis for selection: Typical section on the north side of Phase I.

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- Overall Height: Sta.: 15+00-Phase I (Cross Section 2), height 11.2 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - River Side Slope: SS = 4 (h) to 1 (v)
 - Land Side Slope: SS = 3 (h) to 1 (v)
 - Basis for selection: Higher levee fill placed on existing slope.
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- Overall Height: Sta.: 11+50-Phase I (Cross Section 3), height 14.4 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - River Side Slope: SS = 4 (h) to 1 (v)
 - Land Side Slope: SS = 3 (h) to 1 (v)
 - Basis for selection: Highest levee fill.
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- Overall Height: Sta.: 8+25-Phase I (Cross Section 4), height 5.1 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - River Side Slope: SS = 4 (h) to 1 (v)
 - Land Side Slope: SS = 3 (h) to 1 (v)
 - Basis for selection: Higher levee fill located at top or onto existing slope.
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- Overall Height: Sta.: 1+00-Phase I (Cross Section 5), height 10.1 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - Slope: SS = 3 (h) to 1 (v)
 - Basis for selection: Encompass proposed clubhouse.
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- Overall Height: Sta.: 3+90-Phase II (Cross Section 6), height 5.4 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - Slope: SS = 4 (h) to 1 (v)
 - Basis for selection: Highest levee fill in Phase II.
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- Overall Height: Sta.: 8+50-Phase II (Cross Section 6a), height 2.8 ft.
 - Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - Slope: SS = 4 (h) to 1 (v)
 - Basis for selection: Closest to observed slope instability.
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- Overall Height: Sta.: 9+25-Phase II (Cross Section 6b), height 2.4 ft.
- Limiting foundation soil strength:
 - Strength $\Phi=18$ degrees, $c=0$ psf
 - Slope: SS = 4 (h) to 1 (v)
- Basis for selection: Closest to observed slope instability.

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor								Criteria (Min.)
		Cross Section 1	Cross Section 2	Cross Section 3	Cross Section 4	Cross Section 5	Cross Section 6	Cross Section 6A	Cross Section 6B	
I	End of Construction	2.13	1.90	2.16	2.00	1.75	1.60	1.45	1.42	1.3
II	Sudden Drawdown	3.44	2.33	3.07	3.15	1.09	1.03	1.00	1.10	1.0
III	Steady Seepage at Flood Stage	1.79	1.96	1.51	2.23	1.77	2.07	2.25	3.43	1.4
IV	Steady Seepage Steady State NWL	3.48	3.05	3.24	3.34	2.69	1.21	1.20	1.30	1.4*
V	Earthquake (Case I)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.0

*1.2 if residual properties are used

Attach engineering analysis to support construction plans:

Reference Appendices D, E, and F from Geotechnical Evaluation Report FA-13-07985 and Addendum 1 to Geotechnical Evaluation FA-13-07985.

7. Settlement

Attach engineering analysis to support plans:

See File: "3F – Geotechnical Report"

8. Interior Drainage

a. Specify size of each interior watershed:

- Draining to pressure conduit: 350 acres See File: "3D - Phase 1 Interior Flood Control Report"
- Draining to ponding area: 1.3 acres See File: "3D - Phase 1 Interior Flood Control Report"
- Draining to ponding area: 37 acres See File: "3E - Phase 2 Interior Flood Control Report"

a. Specify the discharge capacity of the head pressure conduit:

- Phase 1 (16+22): 252.2 cfs
- Phase 1 (12+51): 8.2 cfs
- Phase 2 (6+75): 65.45 cfs

8. Other Design Criteria

a. Sediment Transportation Considerations:

Pre-Project conditions do not have sedimentation issues. The Pre-Project and Post Project HEC-RAS models show similar velocities, as shown in the table below. Since velocities are not changing, it is expected that the project will not cause an impact on sedimentation. A detailed sediment transport analysis was determined unnecessary. "3G – Operations and Maintenance Manual" Appendix H calls for periodic inspection which will identify any future potential issues with sedimentation if it occurs. Channel inspection and maintenance are considered to be sufficient for this project.

Comparison of 10 year event				
	Pre - Project	Post Project	Post - Pre	
River Station	Vel Chnl	Vel Chnl	Difference	
	(ft/s)	(ft/s)	(ft/s)	
353	1.54	1.56	0.02	
352 AB(CLAY)BD(CASS)	1.98	1.95	-0.03	
351.6	1.72	1.70	-0.02	
351.4	1.90	1.74	-0.16	
351	2.23	2.15	-0.08	
348.8	2.06	2.05	-0.01	
348	2.09	2.10	0.01	
345 AA(CLAY)BC(CASS)	1.79	1.66	-0.13	
344 Z(CLAY)BB(CASS)	1.48	1.59	0.11	
343	1.85	1.79	-0.06	
342.5 Y(CLAY)BA(CASS)	1.58	1.50	-0.08	
342 X(CLAY)AZ(CASS)	1.74	1.76	0.02	
341	1.83	1.75	-0.08	
340 W(CLAY)AY(CASS)	1.58	1.52	-0.06	
339	1.74	1.71	-0.03	
338.5 V(CLAY)AX(CASS)	1.56	1.54	-0.02	