

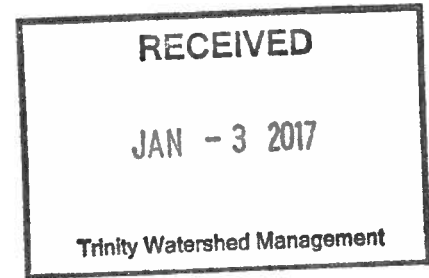


DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

December 13, 2016

Operations Division

Ms. Sarah Standifer
Director
Trinity Watershed Management Department
City of Dallas
1500 Marilla Street, Room 6BS
Dallas, Texas 75201



Dear Ms. Standifer:

The annual Operations and Maintenance inspection of the Dallas Floodway Project in the city of Dallas, Texas was conducted on October 24-25, 2016 by a team of representatives from the U.S. Army Corps of Engineers Fort Worth District, the Trinity Watershed Management Department, and Dallas Water Utilities Department. The U.S. Army Corps of Engineers was represented by Mr. Mark Sissom, Mr. Brian Brasher, and Mr. David Little. This inspection was conducted in accordance with the provisions of Title 33 of the Code of Federal Regulations, Section 208.10 pertaining to local flood protection projects constructed by the United States. A copy of the Annual Inspection Report is enclosed.

As a result of this inspection, the Fort Worth District has assigned a Minimally Acceptable rating to the East Levee, West Levee, and Central Wastewater Treatment Plant Levee of the Dallas Floodway System. These ratings are consistent with ratings from the previous annual Operations and Maintenance inspection and the Periodic Inspection conducted in April 2014. For more detailed information related to the overall ratings, please see the inspection report. Your continued investment in maintenance of the floodway is appreciated and will help ensure that the project performs as designed.

Our next inspection will be scheduled in October of 2017. If you have any questions pertaining to operation or maintenance of the Dallas Floodway, please contact Mr. Mark Sissom, P.E., (817) 886-1582. Questions concerning Public Law 84-99 eligibility and formulation of a SWIF request should be referred to Mr. Brian Brasher, (817) 886-1728.

Sincerely,

A handwritten signature in black ink that reads "Timothy L. MacAllister". The signature is written in a cursive style with a large initial 'T' and 'M'.

Timothy L. MacAllister
Chief, Operations Division

Enclosure

ANNUAL INSPECTION REPORT DALLAS FLOODWAY

1. General. The annual Operations and Maintenance inspection of the Dallas Floodway was conducted on 24-25 October 2016, in accordance with the provisions of Title 33 Code of Federal Regulations, section 208.10, as it applies to local flood protection works constructed by the United States. Mark Sissom, P.E., Brian Brasher, P.E., and David Little, P.E., represented the U.S. Army Corps of Engineers. Representatives from the city of Dallas included Dhruv Pandya, Ricky McRay, and Jose Chio. The inspection was conducted under partly cloudy skies and a temperature of 76 degrees. The inspection included the East and West Levees, the Central Wastewater Treatment Plant Levee, the pump stations, and interior drainage features. Photographs taken during the inspection and summary rating sheets are included herein.

2. East and West Levees. The East and West Levees are, in general, true to the design slopes and grades and are reasonably well maintained. Above average rainfall, mild temperatures for the year, and regular mowing have resulted in good recovery of turf grasses on the levee surfaces, although there are still some areas in poor condition from the extended drought conditions that ended last year. The skin slides on the East Levee that occurred in 2015 have been repaired and now appear to be stable. Minor damage due to feral hogs is evident on the surfaces of the East Levee, upstream of State Highway 183. Armoring of the levee surfaces with riprap beneath highway and railroad bridges has reduced or eliminated erosion in these areas and performed well during recent flooding. Damaged or disturbed surfaces of the West Levee, due to construction of the new I35 bridges, have been repaired, but still need to be seeded or solid sod applied to restore the turf. Areas within the shadow line of the bridge are supposed to be armored with concrete riprap before construction is complete.



3. Floodway and Main Channel. The overbank areas between the levees are generally clear of trees and woody vegetation, and provide good hydraulic conveyance. Frequent mowing of these areas controls unwanted vegetation and helps present a well-maintained appearance. Some damage was noted along both banks of the main channel, due to sloughing or erosion from recent flood events and sustained release of flood water from upstream reservoirs. Significant scour was noted beneath the piers of

the main span of the Continental Bridge, which is now a city park and closed to vehicular traffic.

4. Central Wastewater Treatment Plant (CWWTP) Levee. The levee around the CWWTP is maintained by the Dallas Water Utilities Department, and received a detailed evaluation during the Periodic Inspection in 2014. In general, the levee is true to design alignment and grades, has adequate turf on the slopes, is mowed regularly, and appears to be in good condition. Desiccation cracking noted in previous inspections, including the Periodic Inspection, has self-healed to some degree due to above average rainfall this year, and no slides or signs of slope instability were noted. Numerous utilities (water, sewer, storm drain) cross this levee, many of which have not been accurately accounted for with respect to their actual size, location, age, current condition, or approximate date and method of abandonment, where applicable.



5. Pump Stations and Sluice Structures.

Although a detailed review of each facility was not accomplished during this inspection, Old Baker, the new Baker III, Delta, New Pavaho and Charlie stations were entered and given a cursory review. All the pump stations appear to be in good condition, are fully functional, and reasonably well maintained. Construction of the new Able pump station is well underway and was briefly viewed for conformance to the approved plans. In general, intake areas in the sumps appeared to be free of trash and debris, and discharge channels for the pump stations and gravity sluice structures also appeared to be clear and functional. Several of the discharge channels have been re-shaped and concrete slope protection added where the channel slopes wrap around to a headwall or sluice gate control structure. Erosion damage along the banks of the drainage channel parallel to Topeka Avenue and leading directly to Pavaho pump station was recently repaired and the area covered with erosion control fabric. Just prior to this inspection, the service bridge for Able Pump Station gravity sluice control structure was inadvertently knocked down, for the second time, by the I30/I35 Dallas Horseshoe contractor, leaving the structure temporarily inaccessible



except by bucket truck. The sluice gates, which are remotely operated, were quickly restored to service and TWM personnel are now working with the Horseshoe contractor to replace the bridge.

6. Sump Areas and Pressure Sewers.

The sump areas are mowed on a regular basis, are in good condition and reasonably well maintained. Many of the problem areas related to surface drainage features and noted in previous inspections have been addressed, either by construction of new headwalls for storm drain outfalls, placement of riprap slope protection, or re-grading of slopes. The reinforced concrete sump lining at Baker III and Pavaho pump stations appears to be performing adequately. The gate control structures for the pressure sewers were given a cursory visual inspection, and the Coombs Creek intake feature was entered; however, the other sewers were not entered.



7. Conclusion and Recommendations. Based on the results of this inspection, the Dallas Floodway is performing in accordance with the original design assumptions and is reasonably well maintained. The East Levee, West Levee and Central Wastewater Treatment Plant Levee retain the previously assigned rating of Minimally Acceptable. A copy of the overall ratings for each component is included herein. Recommendations to the sponsor are as follows:

- a. Continue with the current mowing schedule and general Operations and Maintenance program.
- b. Perform a utility survey to properly account for all the levee penetrations and crossings, including abandoned pipelines, at the Central Wastewater Treatment Plant levee.
- c. Ensure that all pipes crossing under or over the levees receive adequate inspection every 5 years, and document the inspections.
- d. Update the levee crest survey for all levees, and bring low spots up to design elevation.


MARK A. SISSOM, P.E.
Civil Engineer

DALLAS FLOODWAY – ANNUAL INSPECTION

Table 1: Ratings for Levee Embankments, October 2016

Levee System	Approx Length (miles)	Unwanted Vegetation	Sod Cover	Encroachments	Closure Structure	Slope Stability	Erosion	Settlement	Depression/Rutting	Cracking*	Animal Control	Culverts/Pipes (See Interior Drainage)	Riprap Revestment	Other Revestment	Wells /Drainage	Seepage	Overall Rating
West Levee	10.8	A	M	A	NA	A	A	M	M	M	A	NA	A	NA	NA	A	M
East Levee	11.3	A	M	A	See Floodwalls	A	A	M	M	M	A	NA	A	NA	NA	A	M
CWWTP Levee	2.7	A	A	A	NA	A	M	A	M	M	A	NA	NA	NA	NA	A	M

USACE Inspection Rated Items	Description of Rated Items
1. Unwanted Vegetation Growth	Unwanted vegetation includes overgrown grass and weeds that limit or prohibit proper inspection. This also includes woody growth along the system that may negatively impact the integrity of the system. Establishment of a 15-foot Vegetation Free Zone (VFZ) is required as defined in ETL 1110-2-571.
2. Sod Cover	Grass or sod cover is one of the most effective and economical means of protecting flood control levees and drainage swales against erosion caused by rain runoff, channel flows, and wave wash. Failure to properly maintain the grass cover can result in unnecessary erosion and possible embankment failure.
3. Encroachments	Encroachments include obstructions or inappropriate activities being conducted within the system's ROW and easement. Lack of appropriate easement to minimize impacts of adjacent activities on performance of the system, will also be considered. Encroachments shall reviewed by USACE in accordance with 33 USC § 408 and 33 CFR § 208.10 to determine the effect on the system.
4. Closure Structures (Stop Log, ECS)	Closure structures should be in proper condition with all required materials and equipment readily available. Installation instructions should be available and trial closures shall be conducted per the requirements of the O&M Manual. Records should be provided for the inspection.
5. Slope Stability	The stability of the levee embankment is critical with respect to the systems integrity during a flood event. Steep levee slopes are difficult to maintain and are susceptible to sloughs and slides.
6. Erosion/ Bank Caving	Erosion of Levee Embankments, Interior Drainage Features, Structures, and Channels should be monitored. Revetments and other improvements shall be made as necessary.
7. Settlement	The settlement of the system should be measured using a topographic crest survey, with datum per the requirements of EC 1110-2-6065.
8. Depressions/ Rutting	Ruts and depressions allow water to pond on the levee embankment, which can lead to seepage and stability problems for the system.
9. Cracking	Cracking due to desiccation and differential settlement should be kept minimal with no vertical movement.
10. Animal Control	Burrows created by animals (and insects) can lead to rapid levee failures during floods. For this reason, an active abatement program needs to be implemented to remove rodents and insect.
11. Culverts/ Discharge Pipes	All pipes and culverts within the levee template shall be inspected on an Annual basis to establish the condition of the utility. Reports of these inspections shall be made available to USACE for review.
12. Riprap Revetments/Bank Protection	Riprap revetments should be in proper condition with minimal displacement, degradation, or unwanted vegetation.
13. Revetments other than Riprap	Other revetments, such as blankets and blocks, should be in proper condition with minimal displacement, degradation, or unwanted vegetation.
14. Underseepage Relief Wells/ Toe Drainage Systems	Relief wells and toe drains are used to relieve hydrostatic pressures in the foundation of a levee, caused by fluctuation in the water table or seepage under a levee or flood control structure during a flood. Maintenance of these features should be conducted per the requirements of the O&M Manual and records should be provided for the inspection.
15. Seepage	Seepage problems are critical with respect to the system's integrity during a flood event. Continuously saturated soils (not caused by ponded water or poor drainage) are an indication of seepage areas of concern. This is a rating of the history and/or evidence of seepage.

Notes: * Desiccation crack ratings are based on field inspection observations and findings from the 2012 Trinity River Corridor Dallas Floodway Risk Assessment.

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Table 2: Ratings for Interior Drainage Systems, October 2016

Levee System	Drainage Structures*	Vegetation /Obstruct	Encroachments	Ponding Areas	Fencing /Gates	Concrete Surfaces	Sliding /Settling	Foundations	Monolith Joints	Culverts /Pipes	Sluice Gates	Flap Gates /Valves	Trash Racks	Other Metallic	Riprap Revtment	Other Revtment	Overall Rating
West Levee	4	M	A	NA	A	M	A	A	NA	M	A	A	A	M	A	A	M
East Levee	4	M	A	NA	A	M	NA	A	NA	M	A	A	A	M	A	A	M
USACE Inspection Rated Items																	
		Description of Rated Items															
1. Vegetation and Obstructions		The Interior Drainage System should be cleared of unwanted vegetation, debris and other obstructions to maintain the flow capacity of the system. Concrete joints and weepholes should be free of grass, weeds, and woody vegetation.															
2. Encroachments		Encroachments include obstructions or inappropriate activities being conducted within the system's ROW and easement. Lack of appropriate easement to minimize impacts of adjacent activities on performance of the system, will also be considered. Encroachments shall reviewed by USACE in accordance with 33 USC § 408 and 33 CFR § 208.10 to determine the effect on the system.															
3. Ponding Areas		Drainage areas should be graded to drain with minimal obstructions in the flowline of the sump, channel, or drainage structure.															
4. Fencing and Gates		Fencing should be in good condition, capable of protection from falling or unauthorized access. Gates should be operable, with working locks, and with minimal corrosion.															
5. Concrete Surfaces**		Concrete surfaces should be in proper condition with negligible spalling, scaling, or cracking that should have minimal affect on the function of the structure. Any noted deficiency should be repaired.															
6. Tilting, Sliding or Settlement of Concrete and Sheet Pile Structures**		There should be no significant tilting, sliding and/or settlement of, or, around structures. Maximum allowable offset should be less than 2-inches, unless it has been determined that movement is no longer active. Any movement that results of failure of a watertop is <i>Unacceptable</i> .															
7. Foundation of Concrete Structures**		There should not be any active erosion, scouring, or bank caving that might affect the structures integrity.															
8. Monolith Joints		The joint material should be in good condition with minimal cracking. Joint filler and/or watertop should not be visible at any point.															
9. Culverts/ Discharge Pipes		All pipes and culverts should be in good condition with no breaks, holes, or cracks that would result in leakage with soil tight joints. They should be inspected on a Annual basis (no more than every 5 years) to establish the condition of the utility. Reports of these inspections shall be made available to USACE for review.															
10. Sluice / Slide Gates		Gates should be operable and in good condition, properly maintained with minimal corrosion. Documentation or a demonstration of operation must be provided at the time of the inspection. Silts should be free of sediment and other obstructions.															
11. Flap Gates/Flap Valves/Pinch Valves		Gates/Valves should be operable and in good condition, properly maintained with minimal corrosion. Demonstration of operation must be provided at the time of the inspection.															
12. Trash Racks (non-mechanical)		Trash racks should be fastened in place and in good condition, properly maintained with minimal corrosion.															
13. Other Metallic Items		All metal parts should be protected from corrosion with minimal rust, damage, or corrosion.															
14. Riprap Revetments of Inlet/Discharge Areas		Riprap revetments should be in proper condition with minimal displacement, degradation, or unwanted vegetation.															
15. Revetments other than Riprap		Other revetments, such as blankets and blocks, should be in proper condition with minimal displacement, degradation, or unwanted vegetation.															

Notes: *

The structures rated under this item are the Eagle Ford Sluice and 7 Pressure Sewers: Lake Cliff, Big Coombs, Little Coombs, Bellevue, Dallas Branch, Woodall Rodgers, and Turtle Creek. This item includes culverts, inlet/discharge structures, outfalls, or gatewells (and all other components required for system performance).

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Table 3: Ratings for Pump Stations, October 2016

Pump Stations	O&M Training Records	O&M Manuals	Safety	Comm	Plant Bldg	Fencing /Gates	Pumps	Motors Engines Gears	Sumps	Mech Trash Rakes	Non-Mech Trash Racks	Fuel System	Power Source	Elec System	Megger Testing	Encl Panels Conduits	Intake /Discharge Pipelines	Sluice Gates	Flap Gates	Cranes	Other Metallic Items	Overall Rating	
10 Pump Stations	A	A	A	A	A	A	A	A	A	A	N/A	N/A	A	A	A	A	A	A	A	A	A	M	A
USACE Inspection Rated Items																							
1. Pump Station O&M, Training, and Inspection Records																							
Operations, maintenance, and inspection records should be present, utilized, and updated. All personnel should be trained in pump station operations.																							
2. Pump Station O&M Equipment Manuals																							
Operation and Maintenance Equipment Manuals and/or posted operating instructions should be present and updated as required, and adequately cover all pertinent pump station features. O&M manuals include points of contact for manufacturers and suppliers of major equipment used in the facility.																							
3. Safety Compliance																							
Safety compliance inspection reports by applicable local, state, or federal agencies available for review.																							
4. Communications																							
A telephone, cellular phone, two-way radio, or similar device is available to pump station operator and maintenance personnel.																							
6. Plant Building																							
The building is in good structural condition with no major foundation settlement problems. The roof is not leaking, intake and exhaust louvers are clear of debris, fans are operational, etc.																							
6. Fencing Gates																							
Fencing is in good condition and provides protection against falling or unauthorized access. Gates open and close freely, locks are in place, and there is little corrosion on metal parts.																							
7. Pumps																							
All pumps are properly maintained and lubricated. Systems are Annually tested and documented for review. No vibration, cavitation noises or unusual sounds are noted when the pump is operated. Bearing temperature sensor records don't indicate any problems.																							
8. Motors, Engines, Gear Reducers, Beck Stop																							
All items are operational. Preventative maintenance and lubrication is being performed and the system is annually subjected to performance testing. Instrumentation, alarms, bearing sensors and auto shutdowns are operational.																							
9. Sumps/Wet Well																							
Clear of debris, sediment, or other obstructions. Procedures are in place to remove debris accumulation during operation.																							
10. Mechanical Operating Trash Rakes																							
Drive chain, bearing, gear reducers, and other components are in good operating condition and are being properly maintained.																							
11. Non-Mechanical Trash Rakes																							
Trash racks are fastened in place and properly maintained.																							
12. Fuel System for Pump Engines																							
Fuel system is operational, day tank present and operational, fuel fresh and rotated regularly.																							
13. Power Source																							
The normal power source and backup generators, if installed, are operational, properly exercised and well maintained. Surge protection, grounding, lightning protection, transformers, and automatic/manual transfer of main power to backup system is working.																							
14. Electrical Systems																							
Operational and maintained free of damage, corrosion, and debris. Preventative maintenance and system testing is being performed annually.																							
16. Megger Testing on Pump Motors and Critical Power Cables																							
Results of Megger tests on pump motors or critical power cables show that the insulation meets manufacturer's or industry standards. Tested within the last year.																							
16. Enclosures Panels, Conduit, and Ducts																							
All enclosures, panels, conduits, and ducts are protected from corrosion damage and show no rust, damage, or deterioration that would cause a safety concern.																							
17. Intake and Discharge Pipelines																							
Intake and discharge pipelines have no corrosion and paint is intact, except for minor touch up required. Pipe couplings and anchors have no leakage or corrosion.																							
18. Sluice/Slide Gates																							
Gates open and close freely to a tight seal or minor leakage. Gate operators are in good working condition and are properly maintained. Sill is free of sediment and other obstructions. Gates and lifters have been maintained and are free of corrosion. Documentation provided during the inspection.																							
19. Flap Gates/Flap Valves/Pinch Valves																							
Gates/ valves open and close easily with minimal leakage, have no corrosion damage, and have been exercised and lubricated as required.																							
20. Cranes																							
Cranes operational and have been inspected and load tested in accordance with applicable standards within the last year. Documentation is on hand.																							
21. Other Metallic Items																							
All metal parts are protected from corrosion damage and show no rust, damage, or deterioration that would cause a safety concern.																							

DALLAS FLOODWAY – ANNUAL INSPECTION

Table 4: Ratings for Floodwalls, October 2016

Levee System	Approx Length (ft)	Unwanted Vegetation	Encroachments	Closure Structures	Concrete Surfaces	Sliding /Settling	Foundations	Monolith Joints	Wells /Drainage	Seepage	Overall Rating
East Levee	775	A	A	A	A	A	A	A	NA	A	A

USACE Inspection Rated Items	Description of Rated Items
1. Vegetation and Obstructions	Unwanted vegetation includes overgrown grass and weeds that limit or prohibit proper inspection. This also includes woody growth along the system that may negatively impact the integrity of the system. Establishment of a 15 foot Vegetation Free Zone (VFZ) is required per ETL 1110-2-571.
2. Encroachments	Encroachments include obstructions or inappropriate activities being conducted within the system's ROW and easement. Encroachments shall reviewed by USACE in accordance with 33 USC § 408 and 33 CFR § 208.10 to determine the effect on the system.
3. Closure Structures	Closure structures should be in proper condition with all required material readily available. Installation instructions should be available and trial closures shall be conducted regularly
4. Concrete Surfaces	There should not be any obvious head cutting, bank erosion or horizontal deviation of the channel banks.
5. Tilting, Sliding or Settlement of Concrete Structures**	There should be no significant tilting, sliding and/or settlement of, or, around structures. Maximum allowable offset should be less than 2-inches; unless it has been determined that movement is no longer active. Any movement that results in failure of waterstop is Unacceptable
6. Foundation of Concrete Structures	There should not be any active erosion, scouring or bank caving that might affect the structures integrity.
7. Monolith Joints	The joint material should be in good condition with minimal cracking. Joint filler and/or waterstop should not be visible at any point.
8. Underseepage Relief Wells/ Toe Drainage Systems	Relief wells and toe drains are used to relieve hydrostatic pressures in the foundation of a levee, caused by fluctuation in the water table or seepage under a levee or flood control structure during a flood. Maintenance of these features should be conducted per the requirements of the O&M Manual and records should be provided for the inspection.
9. Seepage	Seepage problems are critical with respect to the systems integrity during a flood event. Continually saturated soils (not caused by ponded water or poor drainage) are an indication of seepage areas of concern. This is a rating of the history and/or evidence of seepage and does not fully evaluate potential seepage concerns.

DALLAS FLOODWAY – ANNUAL INSPECTION

Table 5: Ratings for Channel, October 2016

FRM Channel Segment	Approx Length (miles)	Vegetation /Obstruct	Shoaling	Encroachments	Erosion	Concrete Surfaces	Sliding /Settling	Foundations	Monolith Joints	Flap Gates /Valves	Riprap Revetment	Other Revetment	Overall Rating
Trinity River	8.1	M	A	A	A	A	NA	NA	NA	NA	NA	M	M
West Fork	3.3	M	A	A	A	NA	NA	NA	NA	NA	NA	NA	M
Eim Fork	3.7	M	A	A	A	NA	NA	NA	NA	NA	NA	NA	M

USACE Inspection Rated Items	Description of Rated Items
1. Vegetation and Obstructions	The FRM Channel Segments should be cleared of unwanted vegetation, debris and other obstructions to maintain the flow capacity of the channel.
2. Shoaling (sediment deposition)	There should not be any vegetative shoaling, and any non-vegetative shoaling should be minimal to reduce impacts to the channels flow capacity.
3. Encroachments	Encroachments include obstructions or inappropriate activities being conducted within the system's ROW and easement. Encroachments shall reviewed by USACE in accordance with 33 USC § 404 CFR and § 208.10 to determine the effect on the system.
4. Erosion	There should not be any obvious head cutting, bank erosion or horizontal deviation of the channel banks.
5. Concrete Surfaces	Concrete surfaces should be in proper condition with negligible spalling, scaling, or cracking that should have minimal affect on the function of the structure. Any noted deficiency should be repaired.
6. Tilting, Sliding or Settlement of Concrete Structures	There should be no significant tilting, sliding and/or settlement of, or around structures. Maximum allowable offset should be less than 2-inches, unless it has been determined that movement is no longer active. Any movement that results of failure of a waterstop is <i>Unacceptable</i> .
7. Foundation of Concrete Structures	There should not be any active erosion, scouring, or bank caving that might affect the structures integrity.
8. Slab and Monolith Joints	The joint material should be in good condition with minimal cracking. Joint filler and/or waterstop should not be visible at any point.
9. Flap Gates/ Flap Valves/ Pinch Valves	Gates/valves should be operable and in good condition, properly maintained with minimal corrosion. Demonstration of operation must be provided at the time of the inspection.
10. Riprap Revetments and Banks	Riprap revetments should be in proper condition with minimal displacement, degradation, or unwanted vegetation.
11. Revetments other than Riprap	Other revetments, such as blankets and blocks, should be in proper condition with minimal displacement, degradation, or unwanted vegetation.