

Engineer's Report

for the

**Trinity River Vision / Gateway Park / Panther Island
Flood Control Project**

January 2018





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January 23, 2018

Mr. Jack Stevens, President
Tarrant Regional Water District Board of Directors
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Subject: Engineer's Report for Trinity River Vision/Gateway Park/Panther Island Flood Control Program

We are pleased to present the Tarrant Regional Water District Board (TRWD) with our draft engineer's report evaluating the scope and magnitude of the proposed TRWD Trinity River Vision/Gateway Park/Panther Island Flood Control Program slated for the May 2018 election. This report provides an Executive Summary that summarizes the entire program and provides background on the Trinity River Vision and Fort Worth Central City efforts to regain lost flood protection, environmental cleanup, and additional recreational amenities along the Trinity River. Each section of the report provides the following information for each component of the proposed program:

- Purpose and Background;
- Scope;
- Methodology for Assessment of Costs; and
- Engineer's Conclusion on Validity of Costs

We hope that the Board finds this report informative and useful while discussing the Trinity River Vision/Gateway Park/Panther Island Flood Control Program.

Sincerely,

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Engineer's Report

for the Trinity River Vision / Gateway Park / Panther Island Flood Control Program

January 2018

Prepared for:



Prepared by:

**CDM
Smith**

in association with

Kimley»Horn



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Executive Summary

ES.1 Purpose and Contents of This Report

The purpose of this report is to provide an engineer's opinion on the cost for the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program for short) as proposed by the Tarrant Regional Water District (TRWD). This report meets the requirements of the State of Texas Water Code, Title 4, General Law Districts, Subchapter A, Section 49.106 regarding bond elections (State of Texas 2017a). Established by the State of Texas in 1926 as a Water Control and Improvement District under Article 16, Section 59 of State of Texas Constitution (State of Texas 2017b), TRWD is a General Law District, and this report meets the requirements of Section 51.410, Texas Water Code as amended.

The Fort Worth floodway is an authorized Federal project to improve flood control. The USACE identified in the 1980's that the Fort Worth floodway system of levees in downtown Fort Worth (which is known as the Central City portion of the Upper Trinity flood control system) lacked adequate flood protection capabilities. This was due to population growth from approximately 350,000 in the 1960's to over 850,000 currently.

Each Federal project requires one or more local governmental entities to partner on existing or potential projects. As the entity designated by the State Legislature with responsibility for the Fort Worth floodway, TRWD is considered the Local Sponsor that works with the Federal representative, the United State Army Corps of Engineers (USACE) to plan, operate, and maintain flood protection.

The Trinity River Flood Control Program comprises \$248,000,000 to support both components of what is commonly called the Trinity River Vision project located in Fort Worth, Texas (described in Section ES.2).

This report provides the results of the examination of the opinion of probable costs associated with each of the following elements included in the Trinity River Flood Control Program (shown in Figure ES-1):

- Land-Related Costs including acquisition, demolition, relocation, and environmental remediation (Section 1);
- Utility-Related Costs including relocation and modification of stormwater, sanitary sewer, water, and franchise utilities (Section 2);
- Costs related to the modification of local streets (Section 3);
- Local sponsor (TRWD) costs associated with the design and construction of the project's bypass channel (Section 4);
- Local sponsor costs associated with the design and construction of the Marine Creek Lock adjacent to the Samuel Avenue Dam (Section 5);

Executive Summary

- Local sponsor costs associated with improvements to the Gateway Oxbow site associated with the overall project (Section 6);
- Local sponsor costs associated with flood control components and other improvements associated with the project (Section 7); and
- Costs to TRWD for program management and project contingency (Section 8).

For each of these categories of the Trinity River Flood Control Program, the following has been provided in the respective sections:

- Brief statement of purpose for the costs and any relevant background information;
- Assessment of the methodologies used to develop the costs;
- The proposed costs and what constitutes those costs; and
- Engineer's conclusions on the validity of the proposed costs.

The project commonly known as the Trinity River Vision, Fort Worth Central City, and Panther Island (among others) is a complex project that was created as a community-based effort at the turn of the 21st century and has been in planning, design, and/or construction for almost two decades. It is useful to provide background on the project to understand not only the history, but also the local/Federal relationship in the project.

ES.2 Background

Through the US Army Corps of Engineers (USACE), the Federal government has invested significantly in structural works (i.e., levees, reservoirs) as well as programmatic elements (e.g. floodplain preservation) to maintain and improve the flood resiliency of the North Texas (Upper Trinity) region. In collaboration with the USACE, TRWD is responsible for the operation and maintenance of the flood conveyance capability of the Trinity River within the City of Fort Worth. As such, TRWD is the Local Sponsor of any Federal efforts associated with the flood protection, recreation, and ecosystem protection within this system.

The Fort Worth Central City Project represents portions of the Clear Fork and West Fork of the Trinity River adjacent to downtown Fort Worth, Texas identified by the US Army Corps of Engineers as an area of the Upper Trinity River in need of improved flood control. A community-based effort to identify the most beneficial means of improving flood control began in 2001. Several concepts that combined flood protection, recreation, and ecosystem restoration but also included community revitalization were considered in this community-based effort and this culminated in the Trinity Uptown Plan (TRWD 2004) which became the community-preferred plan. Figure ES-1 shows the core element of the community-preferred plan, a 1.5-mile long by-pass channel that intercepts flood flows from the Clear and West Forks of the Trinity River as they meet in downtown Fort Worth and moves them away from what is now known as Panther Island. This provides not only the badly needed flood protection improvements, but also allows for environmental cleanup and additional recreational benefits (TRVA 2014).

Executive Summary

The USACE Fort Worth District designated the Trinity Uptown Plan as the Community-Based Alternative. In 2004, the USACE was authorized to evaluate the Fort Worth Central City project in Public Law (PL) 108-447 (GPO 2004). As a result, USACE, TRWD, and other partner entities began the required environmental impact assessments required by the National Environmental Protection Act (CEQ 2017) which required the comparison of several alternative means of meeting flood control needs including the Community-Based Alternative (Trinity Uptown). This resulted in publication of a Final Environmental Impact Statement (FEIS) in January 2006 (USACE 2006) and issuance of a subsequent Record of Decision (ROD) from USACE that the community-based alternative (the Trinity Uptown Plan) was “technically sound and environmentally acceptable” in April 2006, allowing the project to proceed.

The project was modified slightly in April 2008 to combine the Central City project area with the USACE-designated Gateway Oxbow project downstream (see Figure ES-1) to provide synergy and cost savings between the two projects. This required a Supplement to the FEIS which received a ROD in May 2008 that the modified project was “technically sound and environmentally acceptable” (DOA-ASACW 2008). Since that time, the Final SEIS (FSEIS) (USACE 2008) has been the basis on which this project has proceeded with regards to design and construction of portions of the projects with joint local-Federal responsibility (flood control, recreation, environmental cleanup and ecosystem restoration).

Cost assessment associated with the joint local-Federal components of the projects have been reviewed extensively by USACE at several points during project development. These jointly reviewed costs were submitted to the Assistant Secretary of the Army for Civil Works in 2014 in response to USACE requesting proposals for inclusion in the bi-annual Water Resources Development Act (WRDA), targeted for 2016. The Assistant Secretary of the Army for Civil Works subsequently recommended the project for inclusion in WRDA 2016, which Congress did. Congress modified the title of the bill from WRDA to Water Infrastructure Improvements for the Nation (WIIN) Act. In December 2016, the US Congress passed WIIN and the President signed the bill into Public Law 114-322 (GPO 2016) which provided full authorization for the Community-Based Alternative in the FSEIS as the “Upper Trinity” project approving a project cost of \$810,000,000. Federal participation is concentrated on those portions of the project that predominantly bring flood protection back to regional standards for the Standard Project Flood.

ES.3 Summary of Trinity River Flood Control Program Costs

The Trinity River Flood Control Program is comprised of eight categories of activities and associated costs totaling \$248,000,000 to fund a portion of the local cost-share needed to support the project. Table ES-1 provides a summary of these costs by category and expected duration over which those funds would be expended.

Table ES-1: Categorical Costs for Trinity River Flood Control Program and the Anticipated Duration of Each Element

Item Number	Description	Cost	Duration
1	Land-Related Costs including acquisition, demolition, relocation, and environmental remediation	\$33,379,050	Oct 2018 – Jan 2024
2	Utility-Related Costs including relocation and modification of stormwater, sanitary sewer, water, and franchise utilities	\$114,625,153	Oct 2018 – Sep 2026
3	Costs related to the modification local streets	\$2,193,520	Oct 2018 – Jan 2024
4	Local sponsor costs associated with the joint local-Federal design and construction of the project's bypass channel	\$13,041,191	Oct 2018 – Jul 2026
5	Local sponsor costs associated with the design and construction of the Marine Creek Lock	\$10,245,376	Jan 2026 – Sep 2027
6	Local sponsor costs associated with improvements to the Gateway Park site	\$6,668,614	Apr 2023 – Jul 2024
7	Local sponsor costs associated with flood control components and with other joint local-Federal improvements associated with the project	\$19,253,288	Oct 2018 – Sep 2024
8	Local Sponsor costs for program management and project contingency	\$48,593,808	Oct 2018 – Sep 2027
Total Program Amount		\$248,000,000	May 2018 – Sep 2027

ES.4 Conclusions

In summary, we as the licensed professional engineers reviewing the costs associated with each portion of the Trinity River Flood Control Program, have found the estimated costs associated with the Program to be reasonable and their development consistent with the standard of care expected from the professional practices involved in the estimating of these costs. Our conclusion is based on the following:

- The review of land-related cost information provided to us by TRWD and TRVA;
- Interviews with TRWD and TRVA staff on the cost-estimating procedures used;
- Review of information and materials provided by outside professionals involved in planning, designing, and estimating costs for elements of the Trinity River Flood Control Program;
- Where Federal involvement in an element of the Trinity River Flood Control Program occurs, knowledge that those cost estimates were independently reviewed;
- Where involvement of the City of Fort Worth is included, that City staff worked with their consultants who developed designs and opinions of costs to independently review those designs and costs; and
- Historical costs already incurred by the program for many of these categories.

ES.5 References

CEQ 2017, *The National Environmental Policy Act*, The Council on Environmental Quality, Department of Energy, Washington, DC, <https://ceq.doe.gov/laws-regulations/laws.html>, 2017

DOA-ASACW 2008, *Record of Decision, Upper Trinity River, Central City, Fort Worth, Texas*, Department of The Army, Office of The Assistant Secretary Civil Works, Pentagon, Washington DC, May 21, 2008

GPO 2004, *Consolidated Appropriations Act of 2005, Public Law 108-447, December 8, 2004*, Government Printing Office, Washington DC, <https://www.gpo.gov/fdsys/pkg/PLAW-108publ447/pdf/PLAW-108publ447.pdf>

GPO 2016, *Water Infrastructure Improvements for the Nation Act, Public Law 114-322, December 16, 2016*, Government Printing Office, Washington, DC, <https://www.gpo.gov/fdsys/pkg/PLAW-114publ323/pdf/PLAW-114publ323.pdf>

State of Texas 2017a, *State of Texas Water Code, Chapter 49, Section 49.106 – Bond Elections (established 1995 and lasted amended 2003)*, Texas Constitution and Statutes, State of Texas Legislature, <http://www.statutes.legis.state.tx.us/Docs/WA/htm/WA.49.htm#49.106>, 2017

State of Texas 2017b, *State of Texas Constitution, Article 16 – General Provisions, Section 59 – Conservation and Development of Natural Resources; Development of Parks and Recreational Facilities; Conservation and Reclamation Districts; Indebtedness and Taxation Authorized (established 1917 and lasted amended 2003)*, Texas Constitution and Statutes, State of Texas Legislature, <http://www.statutes.legis.state.tx.us/Docs/CN/htm/CN.16.htm#16.59>, 2017

TRWD 2004, *The Trinity Uptown Plan*, produced for the Tarrant Regional Water District by Gideon Toal Inc., Bing Thom Associates Inc. and CDM Inc., 2004

TRVA 2014, *Estimated Economic Benefits of the Modified Central City Project (Trinity River Vision) in Fort Worth, Texas*, prepared for Trinity River Vision Authority by the Center for Economic Development and Research, University of North Texas, November 2014

USACE 2006, *Final Environmental Impact Statement*, US Army Corps of Engineers, Fort Worth District, <http://www.swf.usace.army.mil/Missions/Water-Sustainment/Trinity-River-Central-City/>, 2006.

USACE 2008, *Final Supplemental Environmental Impact Statement*, US Army Corps of Engineers, Fort Worth District, <http://www.swf.usace.army.mil/Missions/Water-Sustainment/Trinity-River-Central-City/>, 2008.

**TRINITY RIVER VISION / GATEWAY PARK /
PANTHER ISLAND FLOOD CONTROL PROJECT**
WORK BREAKDOWN STRUCTURE (WBS)
OVERALL PROJECT AREA MAP



FIGURE E8-1:
TRINITY RIVER VISION /
GATEWAY PARK / PANTHER
ISLAND PROJECT AREA MAP

LEGEND
WBS NO., CONTRACT PACKAGE

- N/A 01. PED - PRELIMINARY DESIGN
- N/A 02. LAND PURCHASE
- N/A 03. RELOCATION
- N/A 04. DEMOLITION
- N/A 05. ENVIRONMENTAL
- N/A 06. STORM DRAINAGE SYSTEM
- N/A 07. SANITARY SEWER & WATER SYSTEM
- N/A 08. FRANCHISE UTILITIES
- 9. HENDERSON STREET BRIDGE
- 10. MAIN STREET BRIDGE
- 11. WHITE SETTLEMENT STREET BRIDGE
- N/A 12. PROGRAM MANAGEMENT
- 13. SAMUELS AVENUE VALLEY STORAGE
- 14. HAM BRANCH VALLEY STORAGE/ECOSYSTEM
- 15/16. RIVERSIDE PARK VALLEY STORAGE/RECREATION
- 17. ROCKWOOD PARK VALLEY STORAGE
- 18. ROCKWOOD PARK ECOSYSTEM
- 19. UNIVERSITY DRIVE VALLEY STORAGE

- 20. GATEWAY/OXBOW AREA VALLEY STORAGE
- 21. GATEWAY/OXBOW AREA ECOSYSTEM
- 22. GATEWAY/OXBOW AREA RECREATION
- 23.01. BYPASS CHANNEL SEGMENT NORTH SEGMENT A
- 23.02. BYPASS CHANNEL SEGMENT NORTH SEGMENT B
- 24.01. BYPASS CHANNEL SEGMENT SOUTH SEGMENT C
- 24.02. BYPASS CHANNEL SEGMENT SOUTH SEGMENT D
- 25. CLEAR FORK GATE
- 26. TRINITY POINT GATE
- 27/28. TRWO GATE/STORM WATER PUMP STATION
- 29. SAMUELS AVE DAM
- 30. MARINE CREEK DAM & LOCK
- 31. MARINE CREEK CHANNEL EXPANSION
- 32. TRINITY POINT PEDESTRIAN BRIDGE
- 33. MAIN STREET PEDESTRIAN BRIDGE
- 34. WEST FORK PEDESTRIAN BRIDGE
- N/A 35. LOCAL STREET MODIFICATIONS
- 36. WHITE SETTLEMENT EXTENSION
- 37. INTERIOR WATER FEATURE

2,400 ACRES OF PROPERTY
PROTECTED BECAUSE
OF PROJECT

Section 1 - Land-Related Costs (Acquisition, Demolition, Relocation, and Environmental Remediation)

1.1 Purpose and Background

As the Local Sponsor for the Fort Worth Central City Project, Tarrant Regional Water District (TRWD) is responsible for the costs related to purchase and use of land needed to complete the project. Land-related costs for the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program) include:

- Acquisition of properties within the project corridor consistent with the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (CFR Title 42);
- Demolition of structures on acquired properties in preparation for Program construction activities;
- Relocation assistance as governed by the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 for any property owners impacted by the acquisition of their property; and
- Environmental Remediation of any properties which may have been impacted by historical operations onsite.

The parcels to be acquired are identified on Figures 1-1, 1-2 and 1-3 and include thirteen parcels in the Bypass Channel Corridor, fourteen parcels in the Samuels Avenue Dam project area, and ten parcels in the Riverside Oxbow project area, respectively. Demolition parcels are shown on Figures 1-4 and 1-5 and include nineteen parcels in the Bypass Channel Corridor and one parcel in the Riverside Oxbow project area, respectively. Relocation assistance will be provided for the four parcels in the Bypass Channel Corridor shown in Figure 1-6. The parcels requiring environmental remediation are shown in Figures 1-7 and 1-8 and include twenty-three parcels in the Bypass Channel Corridor and three parcels in the Samuels Avenue Dam project area, respectively.

1.2 Methodologies for Assessment of Cost

Information on the methodologies used in developing the costs associated with the various land-related activities in this portion of the Program were provided by the Tarrant Regional Water District (TRWD) with respect to the acquisition of properties and relocation and by the Trinity River Vision Authority (TRVA) for costs associated with demolition (CDM 2018) and environmental remediation (CDM 2018) as well as the method of escalating costs depending on the timing for each of the activities. Details on these methodologies are presented in the following paragraphs.

1.2.1 Acquisition

To develop fair market cost estimates for acquisition of properties required for the construction of the Bypass Channel, TRWD retained appraisers whom TRWD deemed highly qualified and were also certified by USACE to perform Federal acquisition appraisals consistent with the Federal regulations cited above (TRWD 2018).

Section 1 - Land-related Costs (Acquisition, Demolition, Relocation, and Environmental Remediation)

1.2.2 Relocation

To develop cost estimates for relocation assistance for property owners impacted by acquisition of their property for the construction of the Bypass Channel, TRWD retained relocation specialists to perform relocation appraisals consistent with the Federal regulations cited above (TRWD 2018).

1.2.3 Demolition

Cost estimates for demolition activities were originally developed by Camp Dresser & McKee Inc. (predecessor firm to CDM Smith Inc.) using industry knowledge of de-construction techniques, estimated quantities of materials, and unit costs from industry reference guides (CDM 2018). The cost estimates were loaded into the project management database and have been escalated to their anticipated occurrence in the overall project schedule.

1.2.4 Environmental Remediation

Cost estimates for environmental remediation activities were originally developed by Camp Dresser & McKee Inc. (predecessor firm to CDM Smith Inc.) using industry knowledge of remediation techniques, estimated quantities of materials from plans and specifications for the work, and unit costs from industry reference guides (CDM 2018). The cost estimates were loaded into the project management database and have been escalated to their anticipated occurrence in the overall project schedule.

1.3 Costs

Costs for the land-related activities are summarized in Table 1-1 and are broken into four categories:

- Acquisition of the properties enumerated above that are needed for completion of the project;
- Demolition of structures on specific properties acquired or remaining to be acquired (such as buildings, fences, utility services, etc.);
- Costs associated with relocating businesses and organizations utilizing specific acquired properties; and
- Remediation of any environmental hazards on certain properties to restore the land to standards for residential development.

Table 1-1: Land-Related Costs for Trinity River Flood Control Program

Item Number	Description	Cost
1a	Acquisition of Property	\$19,614,539
1b	Demolition of Existing Structures	\$8,186,401
1c	Relocation Costs	\$576,978
1d	Environmental Remediation of Acquired Properties	\$5,001,132
Total Land-Related Cost Amount		\$33,379,050

Note: Duration of this portion of the program is expected to be October 2018 through Jan 2024

Section 1 - Land-related Costs (Acquisition, Demolition, Relocation, and Environmental Remediation)

The costs represented in Table 1-1 are inclusive of all costs associated with the activity, including but not limited to:

- Fees associated with the professional services of real estate appraisers, relocation specialists, engineers, and environmental scientists, etc.;
- Appropriate contingency costs in line with industry standards should unexpected costs arise in the execution of the land-related portions of this program; and
- Appropriate escalation of costs reflecting the point in time when each activity of the land-related program will occur.

1.4 Conclusions

We find the estimated costs associated with the land-related portion of this the Trinity River Flood Control Program to be reasonable and their development consistent with the standard of care expected from the professional practices involved in the estimating of land-related costs. Our conclusion is based on the following:

- The review of land-related cost information provided to us by TRWD and TRVA;
- Interviews with TRWD and TRVA staff on the cost-estimating procedures used;
- The nature of the quality assurance program undertaken by Camp, Dresser & McKee, Inc. for demolition and environmental remediation costs;
- All properties are reviewed and approved by the USACE Fort Worth District; and
- Historical costs already incurred by the program for each of these land-related categories.

1.5 References

CDM 2018, *Trinity River Vision/Gateway Park/Panther Island Flood Control Program – Demolition and Environmental Remediation*, Letter report prepared for Trinity River Vision Authority, CDM Smith Inc., January 2018

CFR Title 42, *Title 42 - The Public Health and Welfare, Ch. 61: Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs*, Code of Federal Regulations, Office of the Law Revision Counsel of the United States House of Representatives, <http://uscode.house.gov/view.xhtml?path=/prelim%40title42/chapter61&edition=prelim>, 2017

TRWD 2018, *Memo Citing Methodology Used for Appraisal and Relocation Costs*; Tarrant Regional Water District, Fort Worth, Texas, January 2018



LEGEND

- APPROXIMATE PARCEL BOUNDARIES
- CONSTRUCTION LIMITS (BYPASS CHANNEL ONLY)
- EASEMENT
- BYPASS CHANNEL
 - 200-FOOT OFFSET
 - STAIRS / RAMPS
 - WALLS
 - 25-FOOT OFFSET
- OVERBANK
- TOP OF LEVEE / TOE OF SLOPE
- BRIDGES
- OWNERSHIP
 - PRIVATE PROPERTIES FOR ACQUISITION

DISCLAIMER: This data is an approximation based upon the best information available at the time of printing. Information contained on this map is intended for general planning level use only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and only represents the approximate relative location of property boundaries. The Tarrant Regional Water District is not liable for misuse of this information or derivative products resulting from this map.





LEGEND


APPROXIMATE PARCEL BOUNDARIES

OWNERSHIP

PRIVATE PROPERTY

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	FORT WORTH CENTRAL CITY	
	SAMUELS AVENUE ACQUISITION PARCELS	
	FIGURE 1.2	10/2009



LEGEND

APPROXIMATE PARCEL BOUNDARIES

OWNERSHIP

PRIVATE PROPERTY

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0 400 800
SCALE IN FEET



FORT WORTH CENTRAL CITY

RIVERSIDE OXBOW -
GATEWAY PARK
ACQUISITION PARCELS

FIGURE 1.3

10/2009



LEGEND

- APPROXIMATE PARCEL BOUNDARIES
- CONSTRUCTION LIMITS (BYPASS CHANNEL ONLY)
- CONSTRUCTION LIMITS (PROPOSED)
- BYPASS CHANNEL
- 200-FOOT OFFSET
- WALLS
- 25-FOOT OFFSET
- OVERBANK
- TOP OF LEVEE / TOE OF SLOPE
- BRIDGES
- OWNERSHIP
- PRIVATE PROPERTIES FOR DEMOLITION

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LEGEND


APPROXIMATE PARCEL BOUNDARIES

OWNERSHIP

COFW PROPERTY

DISCLAIMER: This data is an approximation based upon the best information available at the time of printing. Information contained on this map is intended for general planning level use only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and only represents the approximate relative location of property boundaries. The Tarrant Regional Water District is not liable for misuse of this information or derivative products resulting from this map.



	FORT WORTH CENTRAL CITY	
	RIVERSIDE OXBOW - GATEWAY PARK DEMOLITION PARCELS	
	FIGURE 1.5	10/2009

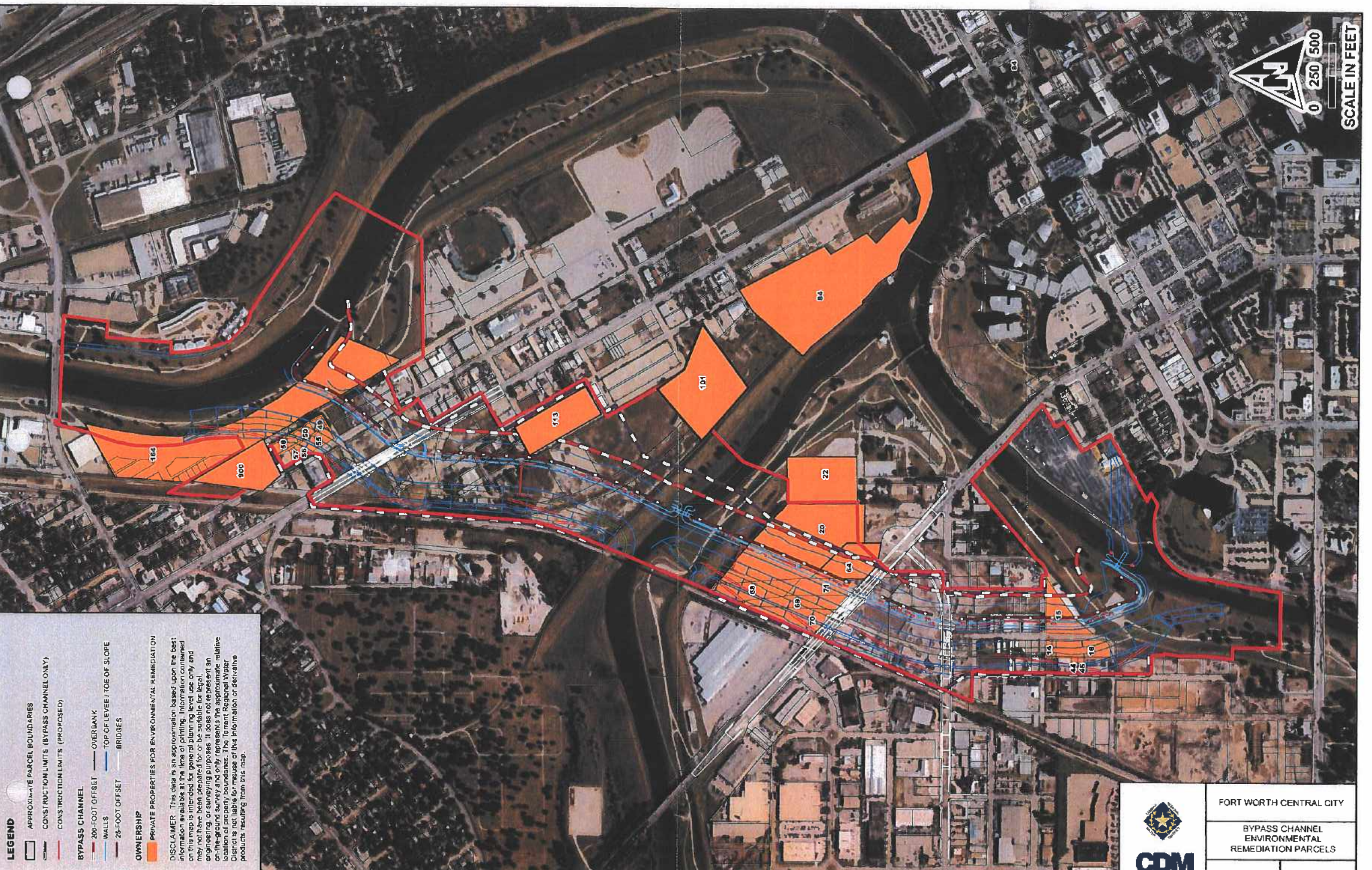


LEGEND

- APPROXIMATE PARCEL BOUNDARIES
- CONSTRUCTION LIMITS (BYPASS CHANNEL ONLY)
- CONSTRUCTION LIMITS (PROPOSED)
- BYPASS CHANNEL
- 200-FOOT OFFSET
- WALLS
- 25-FOOT OFFSET
- OVERBANK
- TOP OF LEVEE / TOE OF SLOPE
- BRIDGES
- OWNERSHIP
- PRIVATE PROPERTIES FOR RELOCATION

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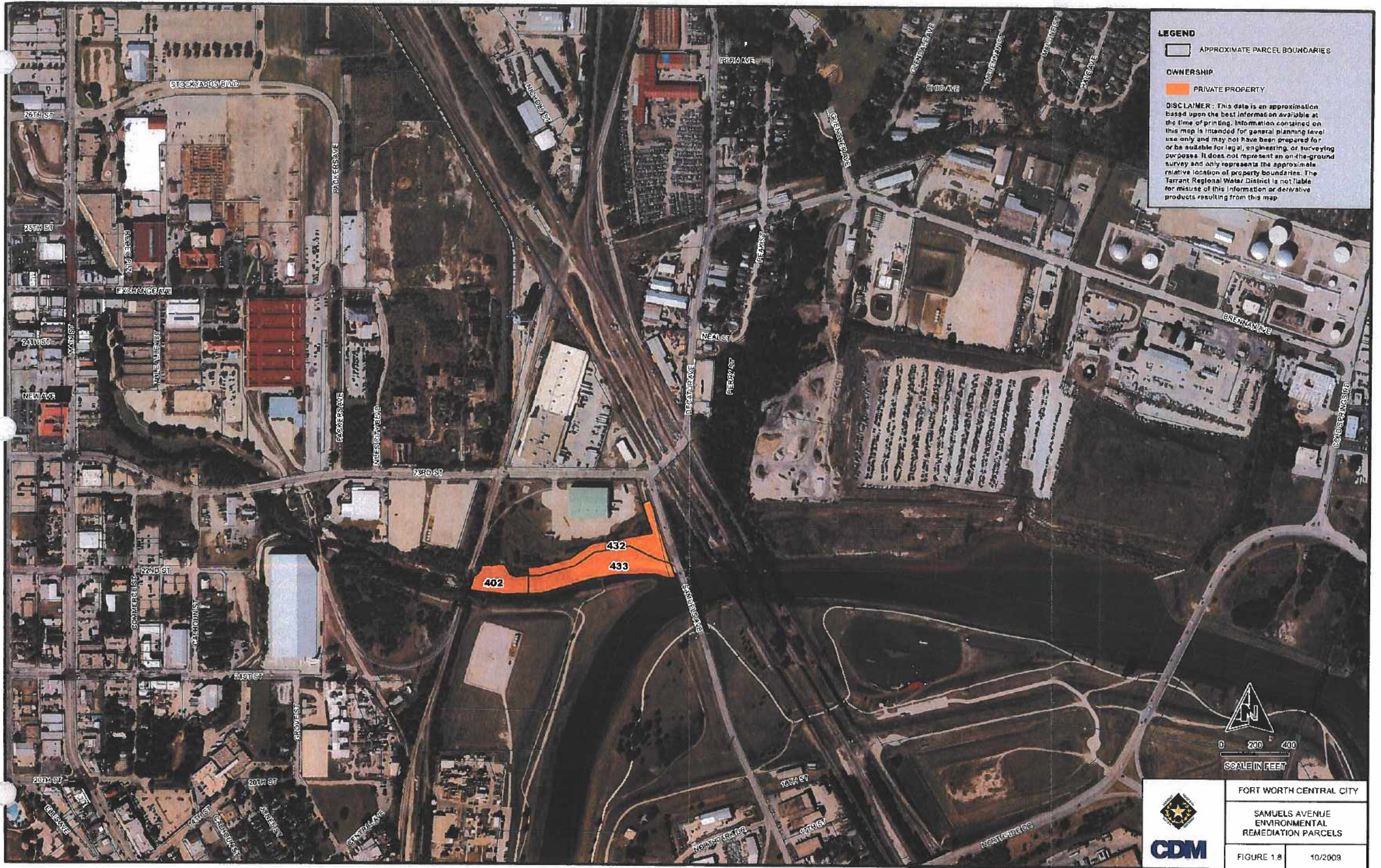


LEGEND

- APPROXIMATE PARCEL BOUNDARIES
- CONSTRUCTION LIMITS (BYPASS CHANNEL ONLY)
- CONSTRUCTION LIMITS (PROPOSED)
- BYPASS CHANNEL
- 200-FOOT OFFSET
- WALLS
- 25-FOOT OFFSET
- OVERBANK
- TOP OF LEVEE / TOE OF SLOPE
- BRIDGES
- OWNERSHIP
- PRIVATE PROPERTIES FOR ENVIRONMENTAL REMEDIATION

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LEGEND


APPROXIMATE PARCEL BOUNDARIES

OWNERSHIP

PRIVATE PROPERTY

DISCLAIMER: This data is an approximation based upon the best information available at the time of printing. Information contained on this map is intended for general planning level use only and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and only represents the approximate relative location of property boundaries. The Tarrant Regional Water District is not liable for misuse of this information or derivative products resulting from this map.



	FORT WORTH CENTRAL CITY	
	SAMUELS AVENUE ENVIRONMENTAL REMEDATION PARCELS	
	FIGURE 1.8	10/2009

Section 2 - Utility-Related Costs (Storm, Sanitary Sewer, Water, and Franchise)

2.1 Purpose and Background

Construction of the Central City Bypass Channel requires significant modifications of both public (stormwater, sanitary sewer, and water systems) and franchise (electric, natural gas, telephone, fiber optic, etc.) utility networks that cross the construction corridor. The City of Fort Worth is responsible for relocations and modifications to the public utilities while the various franchise companies will make the required relocations and modifications to their systems (KHA 2018). The following elements are included in the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program):

2.1.1 Storm Drainage System

Stormwater drainage system relocations and modifications included the Trinity River Flood Control Program are shown in Figures 2-1 and 2-2 and are summarized as follows:

- 06.05 Grand Avenue Phase 2 Part 2 Lateral North under Fort Worth and Western Railroad (FWWR) – installation of 614 feet of 6-foot by 6-foot box culvert, 780 feet of three 72-inch storm drain with 102-inch steel casing, 98 feet of 60-inch storm drain in 84-inch steel casing and 1,000 feet of 72-, 60-, 48-, 30-, and 24-inch storm drains.
- 06.05 Grand Avenue Phase 2 Part 3 – installation of 300 feet of 6-foot x 6-foot box culvert, 621 feet of 72-inch storm drain with 102-inch steel casing, and 82 feet of 24-inch storm drain and installation of 270 feet of 42-inch storm drain.
- 06.08 Viola – installation of 300 feet of 60-inch and 220 feet of 36-inch storm drains
- 06.07 New Bazaar Outfall – installation of 630 feet of 42-inch storm drain
- 06.21 New Main Street Outfall – installation of 700 feet of 7-foot by 6-foot box culvert
- University Blvd – installation of 1,000 feet of 72-inch storm drain
- Greenleaf Sump Mitigation – construction of a detention pond with 8.2 acre-feet of storage and 700 feet of 30-inch storm drain.
- Storm Laterals – installation of 1,600 feet of 7-foot by 4-foot box culvert, 870 feet of 6-foot by 4-foot box culvert, 1,000 feet of 5-foot by 4-foot box culvert, and 1,230 feet of 4-foot by 4-foot box culvert; 2,460 feet of 48-inch storm drain, 2,130 feet of 42-inch storm drain, 1,460 feet of 36-inch storm drain, 2,040 feet of 30-inch storm drain, and 9,710 feet of 24-inch storm drain.

2.1.2 Sanitary Sewer and Water Systems

Water and sanitary sewer system relocations and modifications included the Trinity River Flood Control Program are shown in Figures 2-3 (all water and sanitary sewer improvements) and 2-4 (wastewater master plan) and are summarized as follows:

Section 2 - Utility-Related Costs (Storm, Sanitary Sewer, Water, and Franchise)

- Clear Fork – Installation of 1,000 feet of 20-inch water line and 1,200 feet of 48-inch sanitary sewer line
- Oxbow A – Beach Street – Part 5 – Installation of 500 feet of 54-inch water main and 200 feet of 54-inch water main in 72-inch steel casing
- Bypass Channel Segment C – Part 14 – Installation of 1,780 feet of 66-inch sanitary sewer, 50 feet of 54-inch sanitary sewer, 90 feet of 48-inch sanitary sewer, 145 feet of 42-inch sanitary sewer, 60 feet of 36-inch sanitary sewer, and 1,600 feet of 24-inch sanitary sewer, as well as 730 feet of 84-inch steel casing and 2,045 feet of 60-inch steel casing.
- Bypass Channel Segment D – Part 13 – Installation of 1,900 feet of 60-inch sanitary sewer, 85 feet of 54-inch sanitary sewer, 84 feet of 42-inch sanitary sewer, 20-feet of 36-inch sanitary sewer, and 180 feet of 30-inch sanitary sewer with 1,150 feet of 84-inch steel casing and 675 feet of 54-inch steel casing.
- Bypass Channel Segment D – Part 23 – Abandonment of multiple distribution sanitary sewer lines within the location of the future Bypass Channel.
- University Drive – Part 24 – Installation of 1,650 feet of 12-inch sanitary sewer, 200 feet of 12-inch sanitary sewer in 20-inch casing and 270 feet of 66-inch sanitary sewer in 96-inch casing along with installation of 1,500 feet of 8-inch water line and 2,160 feet of 24-inch water line including 550 feet of 16-inch steel casing and 210 feet of 36-inch steel casing.
- Lower Utility Canal – Canal B – Installation of 4 utility lowerings of various sizes of approximately 100-feet each
- Lower Utility Canal – Canal C– Installation of 3 utility lowerings of various sizes of approximately 100-feet each
- Lower Utility Canal – Canal D– Installation of 6 utility lowerings of various sizes of approximately 100-feet each
- Lower Utility Canal – Canal A and Tie-ins at Levee – Installation of 4 utility lowerings of various sizes of approximately 100-feet each
- East Island Lift Station & Trunk Lines Canals – Installation of 1,010 feet of 12-inch sanitary sewer, 775 feet of 18-inch sanitary sewer, and 2,340 feet of 24-inch sanitary sewer, an 8 million gallon per day (MGD) lift station and 730 feet of 20-inch sanitary sewer force main.
- West Island Trunk Line Canals -Installation of 1,530 feet of 8-inch sanitary sewer, 2,650 feet of 15-inch sanitary sewer, and 520 feet of 66-inch sanitary sewer.

2.1.3 Franchise Utilities

Franchise utility relocations and modifications included the Trinity River Flood Control Program are shown in Figure 2-5 and are summarized as follows:

- 08.04 White Settlement – installation of 2,000 feet of AT&T conduit on Harold, Kansas, and Commercial

Section 2 - Utility-Related Costs (Storm, Sanitary Sewer, Water, and Franchise)

- 21.01 Beach Street – installation of 1,000 feet of Oncor overhead electric distribution lines and AT&T
- 23.02 Segment B – installation of 1,500 feet of Oncor overhead and underground electric distribution lines on Henderson and part of White Settlement
- 24.02 Segment D – installation of 1,000 feet of Oncor overhead and underground electric distribution lines on Kansas
- University – installation of 2,100 feet of Oncor overhead electric distribution lines, AT&T conduit, and Atmos gas lines
- Interior Water Feature – installation of 5,300 feet Oncor transmission mains along White Settlement Extension and the Panther Island Circulator.
- White Settlement Extension – installation 1,100 feet of Oncor overhead electric distribution lines on White
- Marine Creek – installation of Oncor overhead electric distribution lines, AT&T conduit and Atmos gas lines.
- Energy Transfer – installation of 800 feet of 20-inch gas line as shown in the Future Conditions Site E Exhibit A

2.2 Methodologies for Assessment of Cost

Information on the methodologies used in developing costs associated with the various utility relocations and modifications in this portion of the program were compiled by Kimley-Horn and Associates (KHA 2018). Details on these methodologies are presented in the following paragraphs.

Storm Drain System costs were developed by TranSystems Corporation and Freese and Nichols, Inc. in coordination with the City of Fort Worth. Opinions of Probable Construction Cost (OPCC) along with other related costs were prepared based on City standards. Costs were escalated through the TRVA program management system to the anticipated date of occurrence (KHA 2018).

Sanitary Sewer and Water System costs were developed by Kimley-Horn and Associates, Inc. They have prepared plans and specifications and OPCC for the remaining sanitary sewer and water system improvements based on the City's and TRVA's standards. Costs were escalated through the TRVA program management system to the anticipated date of occurrence.

Franchise Utility costs were developed by TranSystems Corporation and The Rios Group in coordination with the franchise utility companies (Oncor (electric), Atmos (natural gas), AT&T (telephone/fiber) and the City of Fort Worth. OPCCs along with other related costs were prepared based on the franchise utilities standards and the City's franchise utility agreements. Costs were escalated through the TRVA program management system to the anticipated date of occurrence.

OPCC costs for Energy Transfer were developed by TRVA in coordination with Energy Transfer. Costs were escalated through the TRVA program management system to the anticipated date of occurrence.

Section 2 - Utility-Related Costs (Storm, Sanitary Sewer, Water, and Franchise)

2.3 Costs

The Program costs for the utility-related activities described above are summarized in Table 2-1.

Table 2-1: Trinity River Flood Control Program Costs for Local Sponsor Cost Matching for Utility-Related Components (Storm Drainage, Water, Sewer, and Franchise Utilities)

Item Number	Description	Cost
2a	Costs associated with storm drainage relocations and modifications	\$32,683,739
2b	Costs associated with sanitary sewer and water system relocations and modifications	\$72,852,356
2c	Costs associated with franchise utility relocations and modifications	\$9,089,058
Total Utility-Related Program Amount		\$114,625,153

Note: Duration of this portion of the program is expected to be Oct 2018 through Sep 2026

2.4 Conclusions

We find the estimated costs associated with the utility-related components included this portion of the Trinity River Flood Control Program to be reasonable and their development consistent with standard of care expected from the professional practices involved in the design and estimation probable costs associated with each of these elements. Our conclusion is based on the following:

- Costs were developed under the responsible charge of a licensed professional engineer in the State of Texas;
- Costs were developed consistent with practices applied by TRVA;
- The level of independent technical review provided by the City of Fort Worth and utility engineers associated with the various franchise utilities; and
- Independent review by the TRVA and TRWD staff.

2.5 References

KHA 2018, *Trinity River Vision/Gateway Park/Panther Island Flood Control Program – Utilities (Storm Drain, Sanitary Sewer and Water, and Franchise)*, Letter report prepared for Trinity River Vision Authority, Kimley-Horn and Associates, January 2018

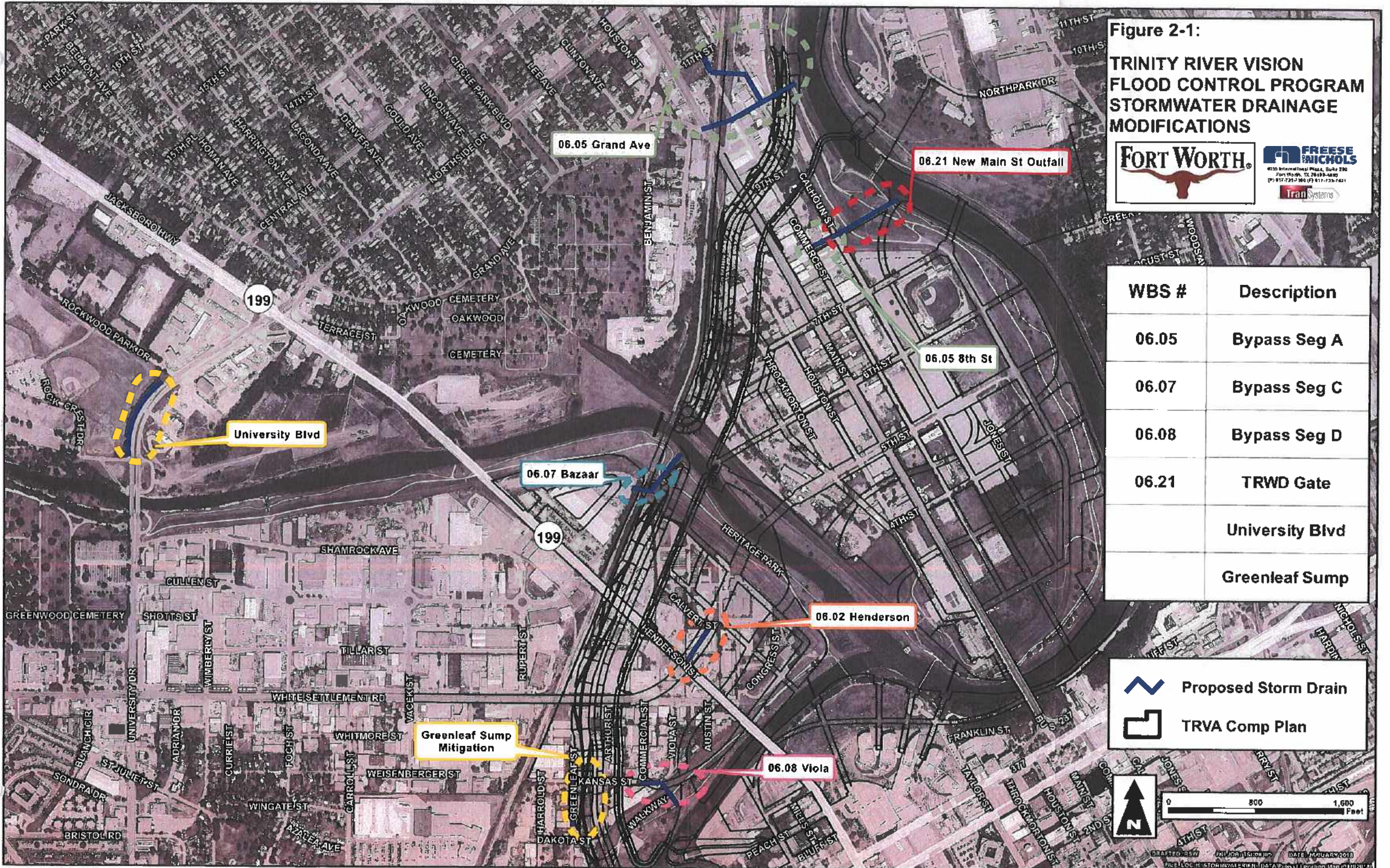


Figure 2-1:
TRINITY RIVER VISION
FLOOD CONTROL PROGRAM
STORMWATER DRAINAGE
MODIFICATIONS



WBS #	Description
06.05	Bypass Seg A
06.07	Bypass Seg C
06.08	Bypass Seg D
06.21	TRWD Gate
	University Blvd
	Greenleaf Sump

Proposed Storm Drain

TRVA Comp Plan

FIGURE 2-2

TRINITY RIVER VISION FLOOD
CONTROL PROGRAM
STORMWATER DRAINAGE AREAS

CITY OF FORT WORTH
TRV STORM DRAIN MASTER PLAN
CONTRIBUTING DRAINAGE AREAS
TRADITIONAL DESIGN



This exhibit represents preliminary conceptual alignments for the stormwater masterplan based on the KHA Grading Plan received March 8, 2013.

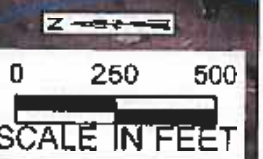


FIGURE 2-3:
TRINITY RIVER VISION
FLOOD CONTROL PROGRAM
SANITARY SEWER AND
WATER SYSTEMS PROJECTS

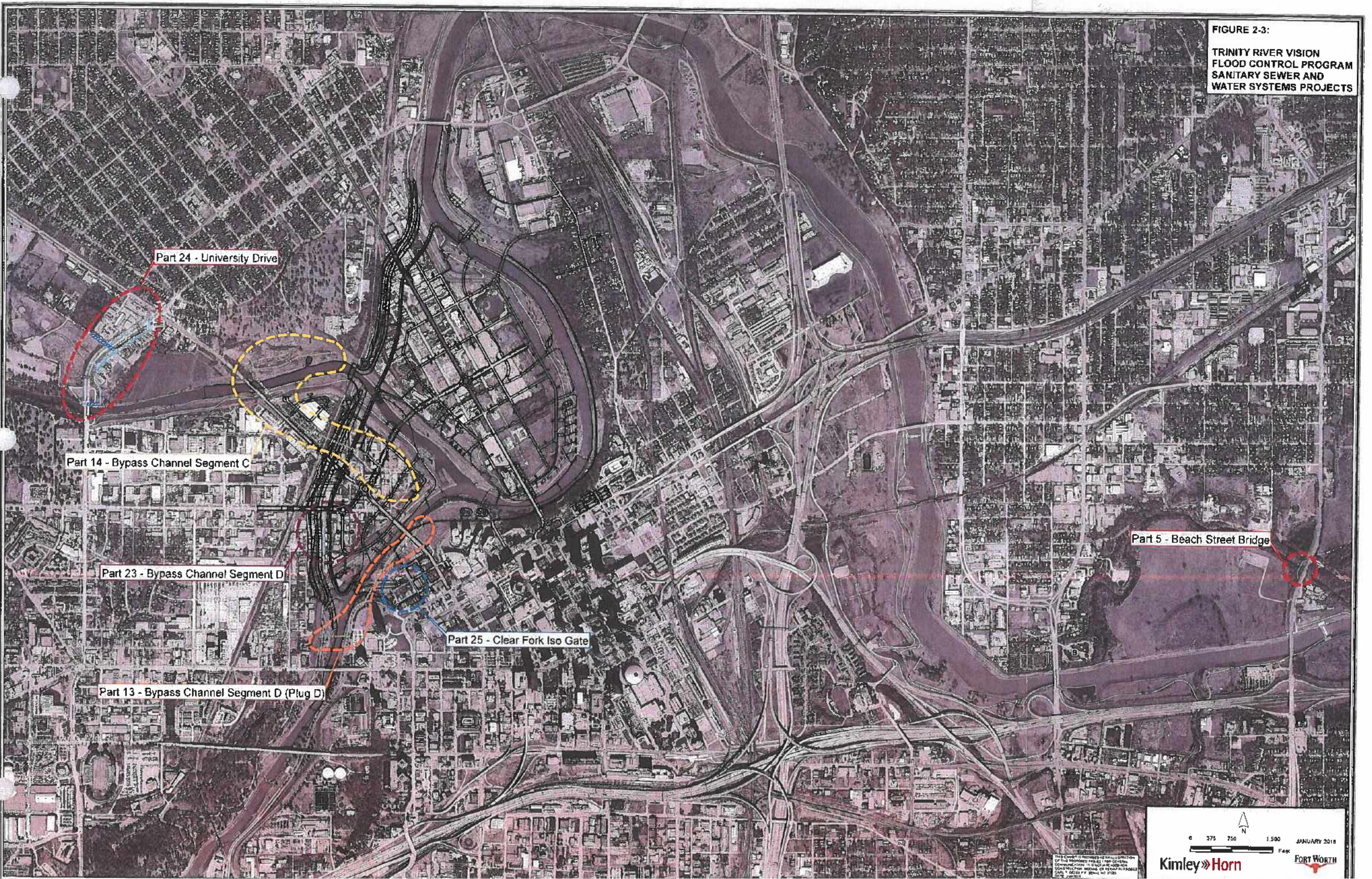


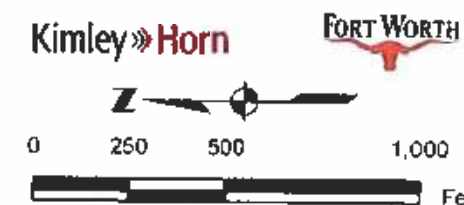
FIGURE 2-4:
TRINITY RIVER VISION
FLOOD CONTROL PROGRAM
WASTEWATER MASTER PLAN

Legend

Sanitary Sewer Basins

Sub-Basin A1	Sub-Basin A5
Sub-Basin A2	Sub-Basin A6
Sub-Basin A3	Sub-Basin A7
Sub-Basin A4	Sub-Basin A8
	Sub-Basin A9

- Existing Sanitary Sewer Collector Mains ≥ 54"
- Future Sanitary Sewer Collector Mains
- Future Sanitary Sewer Force Main
- Future Sanitary Sewer Lift Station (LS)
- Future Roadway Alignments
- Abandoned
- Future Abandonment



THIS EXHIBIT IS PROVIDED AS AN ILLUSTRATION OF THE PROPOSED PROJECT FOR GENERAL COMMUNICATION. IT IS NOT INTENDED FOR CONSTRUCTION, BIDDING, OR PERMIT PURPOSES. CARL T. DESEE P.E. SERIAL NO. 87885 DATE JAN 2018

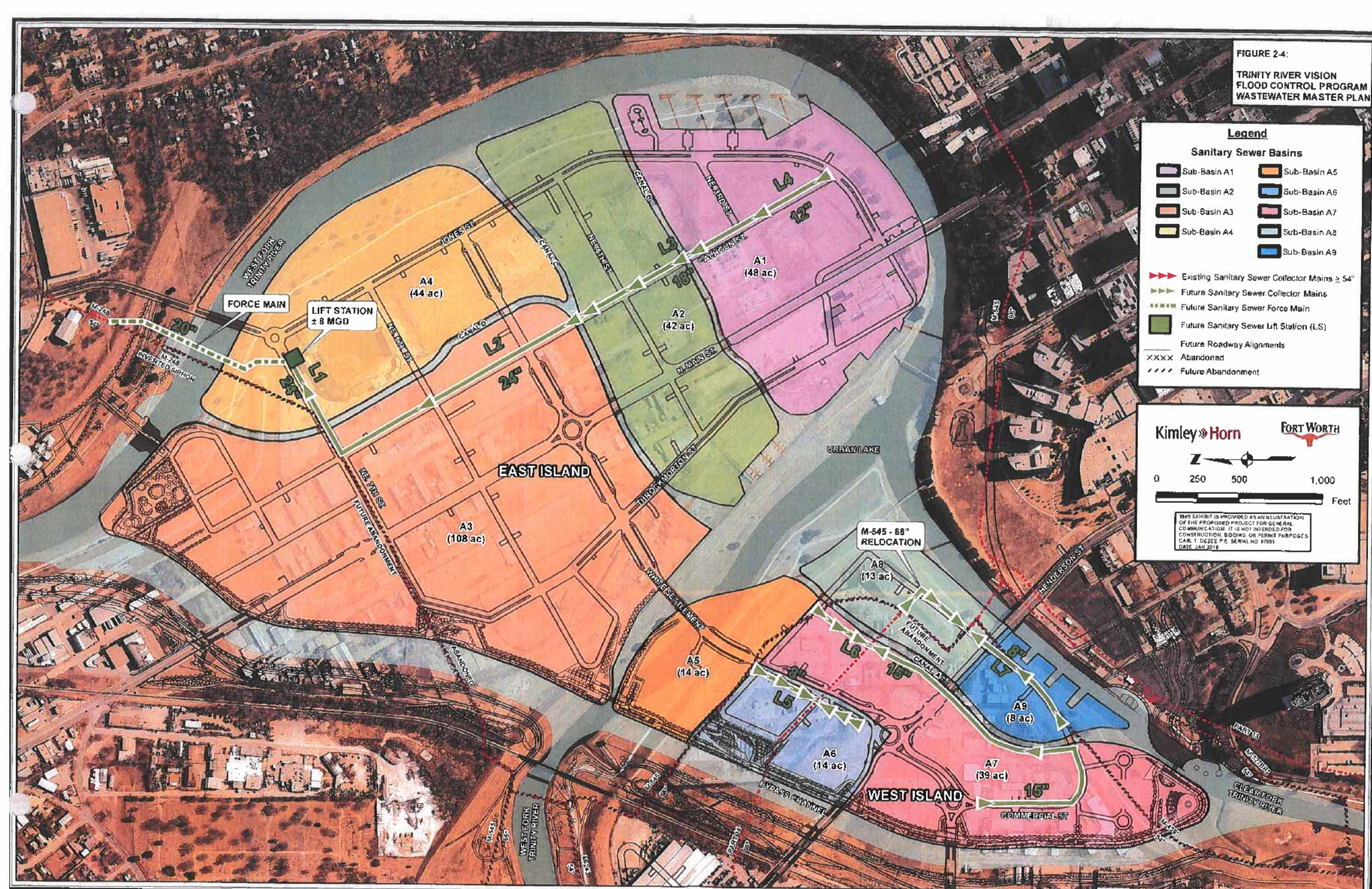
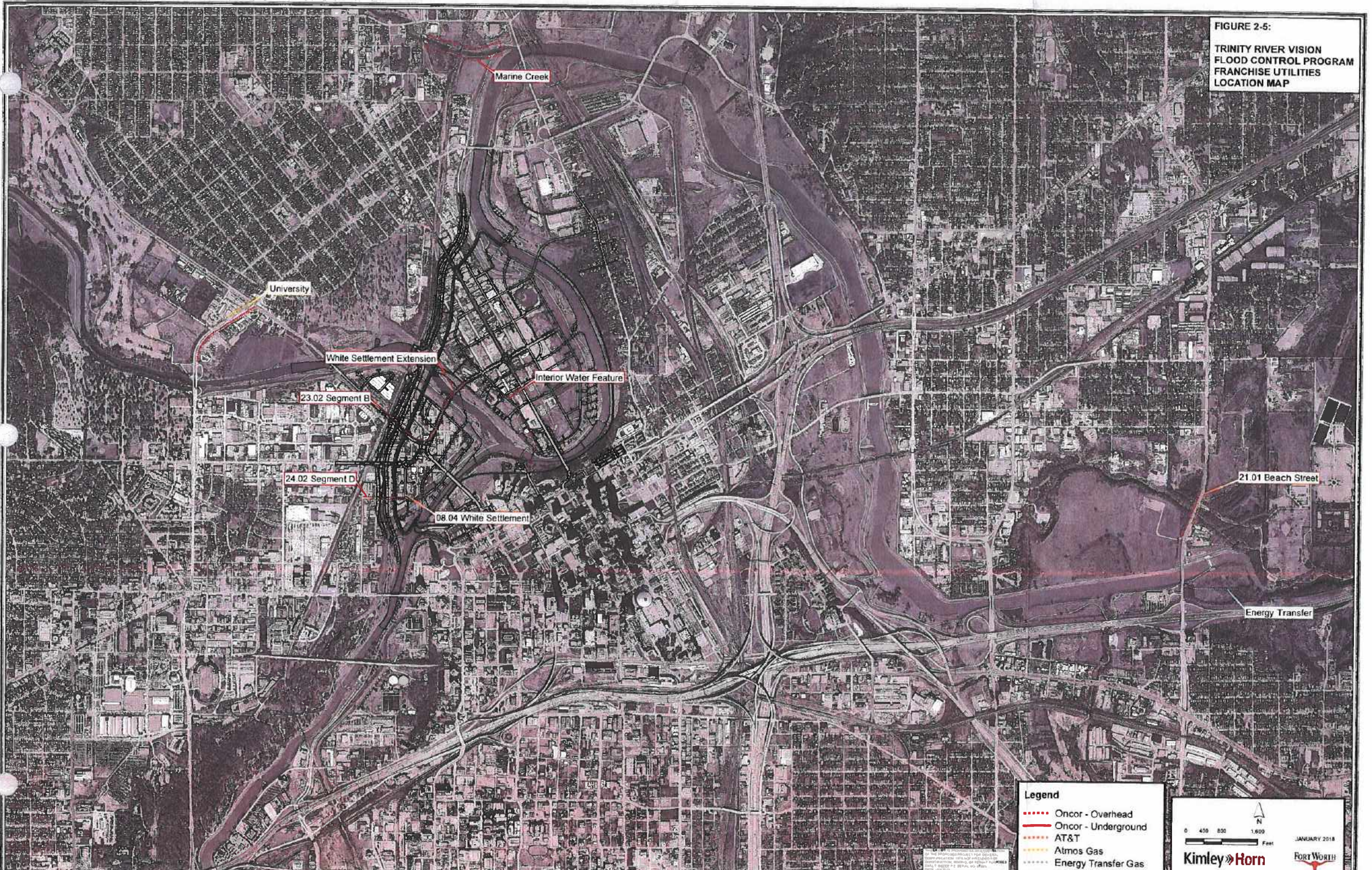


FIGURE 2-5:
TRINITY RIVER VISION
FLOOD CONTROL PROGRAM
FRANCHISE UTILITIES
LOCATION MAP



Legend
..... Oncor - Overhead
———— Oncor - Underground
..... AT&T
..... Atmos Gas
..... Energy Transfer Gas

Section 3 – Costs Related to Modification of Local Streets

3.1 Purpose and Background

Construction of the Bypass Channel results in the need for the City of Fort Worth to modify its existing street network within the Central City project area. In addition to the construction of three bridges which cross the Bypass Channel and the White Settlement Extension which crosses the interior water feature (these are paid for through separate funding mechanisms), numerous street rights-of-way within the Bypass Channel footprint must be vacated and removed along with improvements to adjacent remaining roads to meet City standards. Figure 3-1 provides an overall summary of the local street modification work to be completed.

The Local Street Modification costs in the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Program) include the following:

- Henderson Detour – associated with the Henderson and Main bridges to maintain the detour crossings of the Fort Worth and Western Railroad during bridge construction;
- Bypass Channel Segment A - includes vacations of portions of Calhoun, Commerce, 8th, 9th and Refinery Streets along with 690 feet of roadway and drainage improvements to ensure continued access by property owners;
- Bypass Channel Segment B - includes vacations of portions of Houston, Throckmorton, 7th, and 8th Streets as well as 270 feet of roadway and drainage improvements; and
- Bypass Channel Segment D - includes vacations of Arthur Street and portions of Kansas and Dakota Streets along with 400 feet of roadway and drainage improvements to ensure continued access by property owners.

3.2 Methodologies for Assessment of Cost

Kimley-Horn and Associates, Inc. in coordination with the City of Fort Worth have developed the local street modifications work on the Central City project (KHA 2018). They have prepared conceptual plans and Opinions of Probable Construction Cost (OPCC) along with other related costs based on City standards. Costs were escalated through the TRVA program management system to the anticipated date of occurrence.

3.3 Costs

Costs for the Local Street Modifications activities are summarized in Table 3-1 on the following page.

Section 3 – Costs Related to Modification of Local Streets

Table 3-1: Trinity River Flood Control Program Costs for Local Sponsor Cost Matching for Local Street Modifications

Item Number	Description	Cost
3	Costs associated with local street modifications	\$2,193,520
Total Program Amount		\$2,193,520

Note: Duration of this portion of the program is expected to be Oct 2018 through Jan 2024

3.4 Conclusions

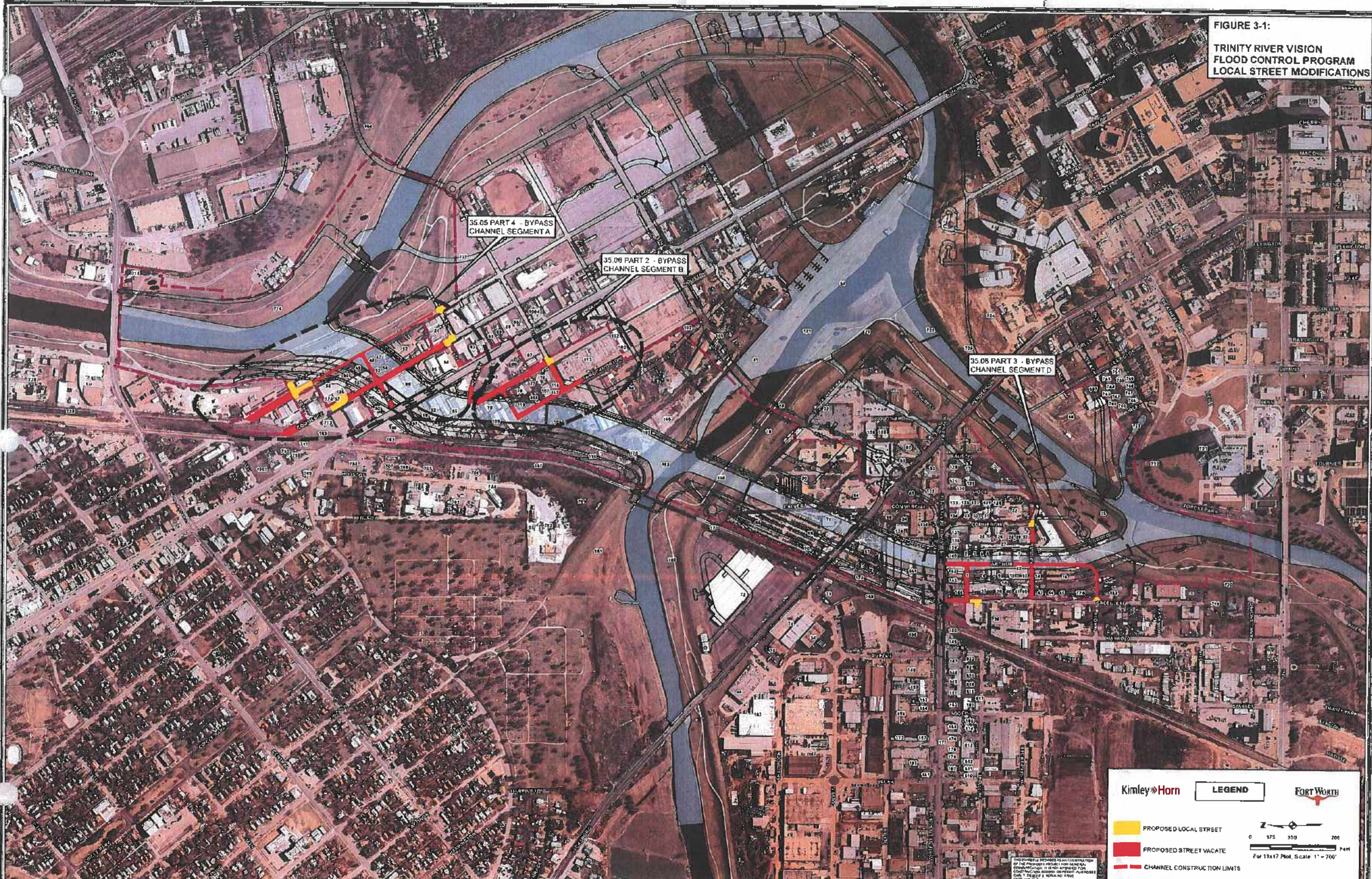
We find the estimated costs associated with the local street modification components included in this Program to be reasonable and their development consistent with standard of care expected from the professional practices involved in the design and estimation probable costs associated with each of these elements. Our conclusion is based on the following:

- Costs were developed under the responsible charge of a licensed professional engineer in the State of Texas;
- Costs were developed consistent with practices used by TRVA;
- The level of independent technical review provided by the City of Fort Worth; and
- Independent review by the TRVA and TRWD staff.

3.5 References

KHA 2018, *Trinity River Vision/Gateway Park/Panther Island Flood Control Program - Local Street Modifications*, Letter report prepared for Trinity River Vision Authority, Kimley-Horn and Associates, January 2018

FIGURE 3-1:
TRINITY RIVER VISION
FLOOD CONTROL PROGRAM
LOCAL STREET MODIFICATIONS



Section 4 - Local Sponsor Costs Related to Federally Authorized Bypass Channel

4.1 Purpose and Background

The purpose of this section is to outline certain portions of the Bypass Channel whose costs would be covered by this Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program). Public Law 114-322 (see Executive Summary) authorized USACE to participate in the Fort Worth Central City project approving a joint local-Federal cost of \$810,000,000. The authorization also stipulated that a maximum of \$5,500,000 dollars of the Federal share could be spent on elements that were predominantly recreational.

The Trinity River Flood Control Program funds target the following recreational components of the Bypass Channel:

- Promenade Parks Improvements;
- Soft Side of the Bypass Channel Improvements; and
- Hard Edge Side of the Bypass Channel Improvements.

4.2 Methodologies for Assessment of Cost

Costs for the flood control components were initially developed as part of the documentation for the USACE's Final Environmental Impact Statement and Project Report which were endorsed as being technically sound and environmentally acceptable by the Assistant Secretary of the Army for Civil Works in April 2006 (see Executive Summary). The project estimated cost was initially prepared using the USACE's cost estimating system MCACES and data bases.

The Federally-approved modification of the Project in 2008 under NEPA (see Executive Summary) resulted in an updating of the cost estimates. As part of this process, independent reviews were conducted by the USACE. In addition to the USACE Fort Worth District technical review that certified the project was technically and legally sufficient (USACE 2008a), Independent Technical Reviews (ITRs) of the project and costs were conducted by the USACE Tulsa District (USACE 2007) which certified the adequacy of the design. In addition, the USACE Walla Walla District provided an independent review of the project scope, cost estimates, escalation, risk analysis, and contingencies and certified them as adequate (USACE 2008 b, c).

In 2013, TRVA contracted with an architecturally-led design team (Hargreaves Associates and Randall Stout Associates) to assess increasing both the accessibility and usability of the bypass channel and adjacent areas during non-flood conditions. This resulted in several recommendations which were accepted by the Local Sponsor and which have changed costs associated with the bypass channel (reducing costs in some instances through improved design and increasing costs in other instances to increase the availability of parks and open spaces and improved pedestrian mobility). This design effort, currently at approximately sixty-percent complete, has provided opinions of probable cost for these improved amenities. These, in turn, were provided to USACE for independent estimation and review.

Section 4 - Local Sponsor Costs Related to Federally Authorized Bypass Channel

Cost estimates from the Local Sponsor have been reviewed by USACE. Through these processes, costs have then been updated based upon the developed engineering and architectural plans using the latest USACE cost estimating software, MII (which replaced MCACES), Civil Works Costs Indexing System, and data bases. As with all parts of the project, TRVA, as program manager for the project, has input these costs into their program management system for the project. TRVA's system escalates costs to the endpoint of construction consistent with standard industry practices.

4.3 Costs

Table 4-1 lists the cost in the Program that represent the improvements to the public use areas of the Bypass Channel and adjacent areas.

Table 4-1: Local Sponsor Costs Associated with the Trinity River Flood Control Program Related to Participation in the Federally Authorized Bypass Channel

Item Number	Description	Cost
4	Local sponsor (TRWD) costs associated with the design and construction of the project's bypass channel	\$13,041,191
Total Bypass Channel Program Costs		\$13,041,191

Note: Duration of this portion of the program is expected to be Oct 2018 through Jul 2026

4.4 Conclusions

We find the estimated costs associated with the portion of the Bypass Channel for which the Local Sponsor (TRWD) has included funds in the Trinity River Flood Control Program to be reasonable and their development consistent with standard of care expected from the professional practices involved in estimating the costs associated with these elements. Our conclusion is based on the following:

- The consistent application of cost estimating and tracking procedures coordinated between USACE and its contractors and reviewers and coordinated with the Local Sponsor program manager, TRVA;
- The level of independent technical review provided by USACE;
- Focused independent review by the Walla Walla District of USACE on the cost and risk elements associated with the project;
- USACE Fort Worth District review of design and cost estimates provided by architectural consultants hired by TRVA;
- Cost and schedule updates provided by TRVA through their program management system coordinated with the USACE Fort Worth District; and
- Historical costs already incurred by the program.

4.5 References

USACE 2007, *Memorandum – Independent Technical Review Certification – Fort Worth Central City Preliminary Design, Supplement No. 1 to the FEIS Appendices*, US Army Corps of Engineers, Tulsa District, November 2007

USACE 2008a, *Trinity River - Central City, Ft Worth, Texas - Project Report, Certification of Technical Review and Legal Sufficiency*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008b, *Upper Trinity River, Central City, Fort Worth, Texas – Cost and Schedule Risk Analysis Report*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008c, *Upper Trinity River, Central City, Fort Worth, Texas - Cost and Schedule Baseline Certification*, US Army Corps of Engineers, Walla Walla District, April 2008

Section 5 - Local Sponsor Costs Related to Marine Creek Lock

5.1 Purpose and Background

The purpose of this section is to outline the Local Sponsor responsibilities associated with costs for the Marine Creek Lock adjacent to the Samuel Avenue Dam which would be covered by the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program).

The Fort Worth Central City Project was modified in 2008 to include Ecological and Recreational components of the USACE Riverside Oxbow Project and incorporate the relocation of the proposed Bypass Channel Control Dam Structure (Samuels Avenue Dam) (TRWD 2004). The relocation of the Samuels Avenue Dam was based on geotechnical considerations and the opportunity to mitigate adverse impacts to Marine Creek and Lebow Creek. The relocation of the structure improves the flood flow conveyance capacity of Marine Creek, however it also resulted in the severance of the linkage of Marine Creek with the West Fork of the Trinity River. This was due to a difference in normal water surface elevations.

Navigability throughout the Central City Project was a key element of the Project as documented and reviewed in the original EIS and the ability to connect the Stockyards to other Districts is an important project output. To meet this objective, a lock structure is required to accommodate boat travel between the different water surface elevations. The Marine Creek Lock is required to maintain the water linkage and allow for small boat traffic between the Stockyard area and the West Fork of the Trinity River. A concept rendering of the lock is shown in Figure 5-1.

The Marine Creek Lock is integrated with the Samuel Avenue Dam and, as such, the costs in this component of the Trinity River Flood Control Program are concentrated on those components of the joint dam/lock structure that are exclusive to providing connectivity to Marine Creek and the Stockyards.

5.2 Methodologies for Assessment of Cost

The Federally-approved modification of the Project in 2008 under NEPA (see Executive Summary) resulted in an updating of the cost estimates. The Fort Worth District provided a technical review and certified the Project in April 2008 (USACE 2008a). The USACE Tulsa District provided an independent technical review of documents, certifying technical validity of the design (USACE 2007). The USACE Walla Walla District provided an independent review of project scope, cost estimates, escalation, risk analysis, and contingencies which they certified as appropriate (USACE 2008b, c).

Throughout these processes, costs have been updated based upon the developed engineering and architectural plans and anticipated schedule using the latest USACE cost estimating software, MII, Civil Works Costs Indexing System, and data bases. As with all parts of the project, TRVA, as program manager for the project, has input these costs into their program management system for the project. TRVA's system brings costs forward based upon escalation to the endpoint of construction consistent with standard industry practices.

5.3 Costs

Table 5-1 lists the cost associated with this Program as it relates the costs to be borne by the Local Sponsor associated with the Marine Creek Lock.

Table 5-1: Costs Associated with the Trinity River Flood Control Program Related to the Marine Creek Lock

Item Number	Description	Cost
5	Costs associated with the design and construction of the Marine Creek Lock	\$10,245,376
Total Marine Creek Program Amount		\$10,245,376

Note: Duration of this portion of the program is expected to be Jan 2026 through Sep 2027

5.4 Conclusions

We find the estimated costs associated with the Marine Creek Lock that have been included in the Trinity River Flood Control Program to be reasonable and their development consistent with the standard of care expected from the professional practices involved in the estimating the costs associated with these elements. Our conclusion is based on the following:

- The consistent application of cost estimating with the USACE MII cost estimating system and tracking procedures coordinated between USACE, its contractors, reviewers and the Local Sponsor program manager, TRVA;
- The level of independent technical review provided by USACE;
- Independent review by the Walla Walla District of USACE focusing on the Project cost estimates; and
- Cost and schedule updates provided by TRVA through their program management system.

5.5 References

TRWD 2004, *The Trinity Uptown Plan*, produced for the Tarrant Regional Water District by Gideon Toal Inc., Bing Thom Associates Inc. and CDM Inc., 2004

USACE 2007, *Memorandum – Independent Technical Review Certification – Fort Worth Central City Preliminary Design, Supplement No. 1 to the FEIS Appendices*, US Army Corps of Engineers, Tulsa District, November 2007

USACE 2008a, *Trinity River - Central City, Ft Worth, Texas - Project Report, Certification of Technical Review and Legal Sufficiency*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008b, *Upper Trinity River, Central City, Fort Worth, Texas – Cost and Schedule Risk Analysis Report*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008c, *Upper Trinity River, Central City, Fort Worth, Texas - Cost and Schedule Baseline Certification*, US Army Corps of Engineers, Walla Walla District, April 2008

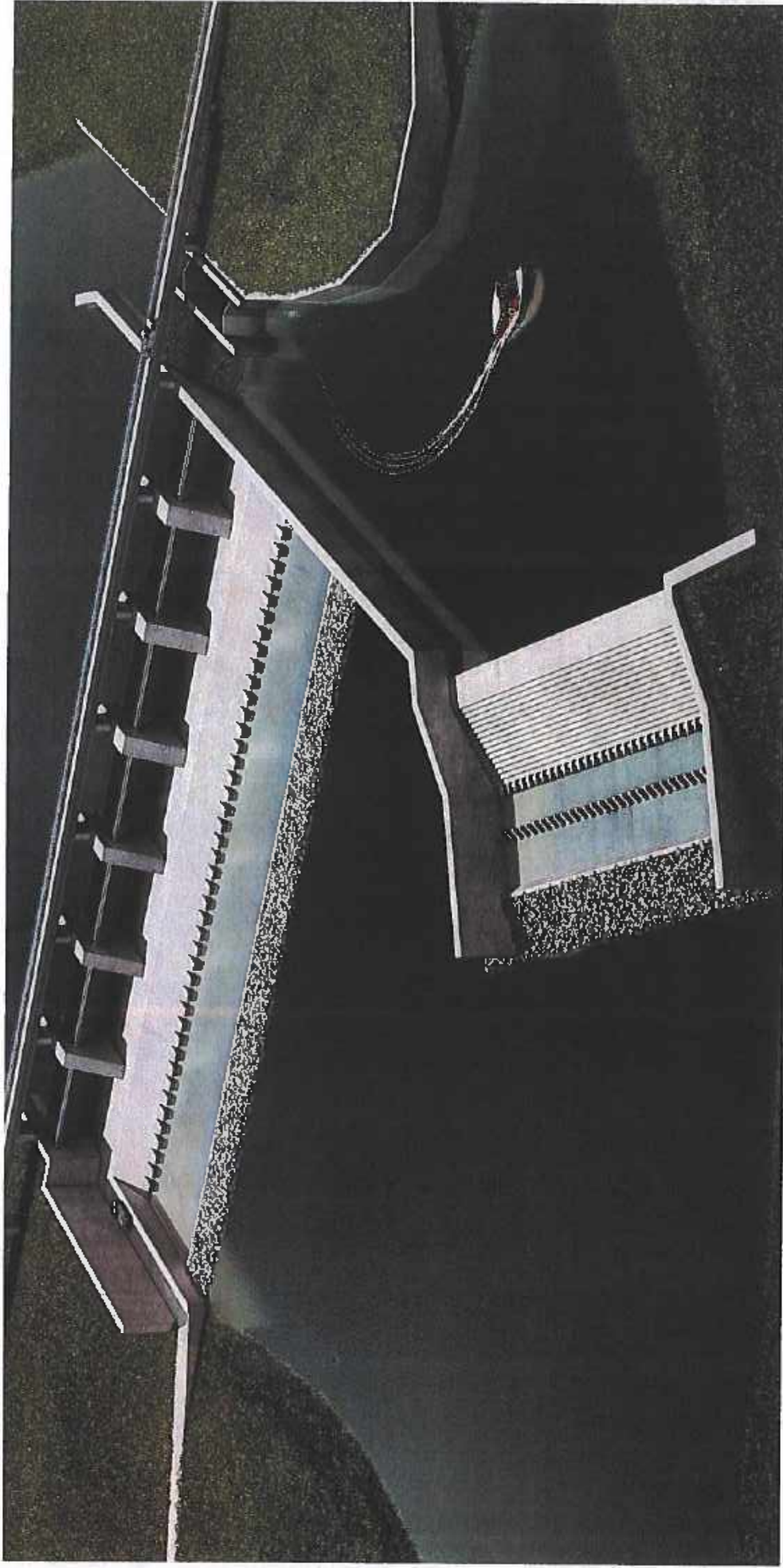


Figure 5-1
Conceptual Configuration of Samuel Avenue Dam and the Marine Creek Lock (source: TRVA)

Section 6 - Local Sponsor Costs Related to Federally Authorized Gateway Park

6.1 Purpose and Background

The purpose of this section is to outline certain portions of improvements to Gateway Park whose costs would be covered by the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program). These components are associated with those parts of the Project identified in the FSEIS to achieve the overall flood control benefits of the project by preserving the floodplain storage capacity in the project area. The floodplain or "valley" storage areas are being coordinated with the City of Fort Worth's Master Plan for Gateway Park (TRVA 2017) so that these facilities are complementary to the overall improvements to Gateway Park.

This portion of the Program would constitute the local cost share associated with the following Gateway Park valley storage components to bring these flood control elements into alignment with the Master Plan for Gateway Park. Figure 6-1 illustrates the overall valley storage elements of the Fort Worth Central City project and highlights the components associated with Gateway Park:

- Valley storage areas A and C representing 1,273 acre-feet of valley storage combined;
- Valley storage area E representing 143 acre-feet of valley storage combined; and
- Valley storage area H representing 114 acre-feet of valley storage.

6.2 Methodologies for Assessment of Cost

As indicated in the Executive Summary, an evaluation of the merits of incorporating some of the components of the USACE Riverside Oxbow Project (previously approved by Chief of Engineers) into the Central City Project was conducted based on a request by the City of Fort Worth who saw synergy between the projects and their efforts to improve Gateway Park. This evaluation resulted in a modification of the Project in 2008 and was approved in a Record of Decision on May 21, 2008. Key to this determination was that the modified project provides ecosystem restoration and compatible recreational development consistent with the City's Gateway Park Master Plan.

These Park improvements were incorporated into the Valley Storage, Hydrologic and Ecological plans as integral components. The Federally approved modification of the Project in 2008 under NEPA (see Executive Summary) resulted in an updating of the cost estimates. As part of this process, independent reviews were conducted by the USACE. The USACE Fort Worth District certified the technical and legal sufficiency of the documents (USACE 2008a). Independent Technical Reviews (ITRs) were conducted by the Tulsa and Walla Walla Districts. The Tulsa District provided an independent technical review of documents and certified that all review comments were addressed adequately (USACE 2007). The USACE Walla Walla District participated in a working session with USACE and local project staff on cost estimation and risk assessment (USACE 2008b). The Walla Walla District subsequently provided an independent certification that project scope, cost estimates, escalation, risk analysis, and contingencies were adequate (USACE 2008c) based on these results.

Section 6 - Local Sponsor Costs Related to Federally Authorized Gateway Park

Additional design modifications and improvements and their associated cost estimates have continued to be reviewed by USACE. Through these processes, costs have then been updated based upon the developed engineering plans using the latest USACE cost estimating software (MII), Civil Works Costs Indexing System, and data bases. As with all parts of the project, TRVA, as program manager for the project, has input these costs into their project management system for the project which brings costs forward based and escalates them to the endpoint of construction consistent with standard industry practices.

6.3 Costs

Table 6-1 lists the cost associated with this portion of the Program as it relates to the costs borne by the Local Sponsor associated with the Gateway Park Improvements which are an integral part of the approved Project.

Table 6-1: Local Sponsor Costs Associated with the Trinity River Flood Control Program Related to Participation in the Flood Control Components at Gateway Park

Item Number	Description	Cost
6	Local sponsor (TRWD) costs for park improvements to Gateway Park associated with Central City flood control features	\$5,668,614
	Total Gateway-Related Cost Amount	\$5,668,614

Note: Duration of this portion of the program is expected to be April 2023 through July 2024

6.4 Conclusions

We find the estimated costs associated with the Gateway Park Improvements that have been included this portion of the Trinity River Flood Control Program to be reasonable and their development consistent with the standard of care expected from the professional practices involved in the estimating the costs associated with these elements. Our conclusion is based on the following:

- The consistent application of cost estimating and tracking procedures using the USACE MII cost estimating system, coordinated between USACE and its contractors, reviewers and with the Local Sponsor program manager, TRVA;
- The level of independent technical review provided by USACE;
- Independent review by the Walla Walla District of USACE focusing on the cost estimates associated with the project;
- Historical costs already incurred at Gateway Park;
- Cost and schedule updates provided by TRVA through their program management system.

6.5 References

TRVA 2017, *Gateway Park Master Plan*, Trinity River Vision Authority, Fort Worth Texas, <http://trinityrivervision.org/projects/gateway-park-master-plan>, 2017

USACE 2007, *Memorandum – Independent Technical Review Certification – Fort Worth Central City Preliminary Design, Supplement No. 1 to the FEIS Appendices*, US Army Corps of Engineers, Tulsa District, November 2007

USACE 2008a, *Trinity River - Central City, Ft Worth, Texas - Project Report, Certification of Technical Review and Legal Sufficiency*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008b, *Upper Trinity River, Central City, Fort Worth, Texas – Cost and Schedule Risk Analysis Report*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008c, *Upper Trinity River, Central City, Fort Worth, Texas - Cost and Schedule Baseline Certification*, US Army Corps of Engineers, Walla Walla District, April 2008

Figure 6-1:

Conceptual Recreation and Infrastructure Plan for Gateway Park

Legend

-  EXISTING TRAILS
-  EXISTING TRAIL TO BE REBUILT (CONCRETE)
-  TRAIL (CONCRETE)
-  TRAIL (SOFT PAVED)
-  EQUESTRIAN TRAIL
-  BEACH ST RECONSTRUCTION
-  ROADWAY AND PARKING
-  BOAT LAUNCH
-  ROCK CLUSTER CONTROL STRUCTURE (WEIR)



0 430 860 1,720 Feet

Aerial Photography Date: January 2005



US Army Corps
of Engineers
Fort Worth District

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Section 7 - Local Sponsor Costs Related to Cost-Share of Federally Authorized Flood Control and Other Improvements

7.1 Purpose and Background

The purpose of this portion of the Trinity River Vision/Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program) is to account for direct costs (in cash) that the Local Sponsor (TRWD) must provide to the USACE for the execution of the Project based on the requirements of Federal Law. These laws apply equally to all local sponsors for civil works projects undertaken with USACE across the country.

7.2 Methodologies for Assessment of Cost

The majority of civil works projects (such as the Fort Worth Central City Project) are governed principally by what has been commonly known as the Water Resources Development Act (WRDA) which is amended and passed by the US Congress on a periodic basis (and signed into public law).

7.2.1 Local Sponsor Cost Share Relating to Flood Control Components

Each WRDA bill that becomes law includes amendments and revisions to earlier versions of WRDA and some of these revisions relate to how USACE and local sponsors interact, including cost-sharing. WRDA 1986, which became Public Law 99-662 (GPO 1986) included a revision that has carried forward to this date that stipulates in Section 103 of the bill/law:

SEC. 103. FLOOD CONTROL AND OTHER PURPOSES.

(a) FLOOD CONTROL.—

(1) GENERAL RULE.—*The non-Federal interests for a project with costs assigned to flood control (other than a non-structural project) shall—*

(A) pay 5 percent of the cost of the project assigned to flood control during construction of the project;

Table 7-1 outlines the anticipated cost of this cost-sharing requirement for TRWD as the Local Sponsor based on the estimated cost of the flood control portion of the project.

7.2.2 Local Sponsor Cost Share Relating to Other Federally Authorized Components

Congress can provide Federal funding through USACE for participation in authorized local/Federal civil works projects so long as that funding provides one or more of three benefits: 1) flood control, 2) recreation, and 3) ecosystem restoration. As indicated in the Executive Summary, the Upper Trinity/Fort Worth Central City project was authorized in WRDA/WIIN 2016 which became PL 114-322 (GPO 2016). Part of the authorization places a limit of \$5,500,000 of Federal funds to be spent on components of the project that serve a recreational purpose only.

7.3 Costs

Table 7-1 outlines the anticipated cost of this cost-sharing requirement for TRWD as the non-Federal interest/Local Sponsor based on the estimated cost of the flood control portion of the project.

Section 7 - Local Sponsor Costs Related to Cost-Share of Federally Authorized Flood Control and Other Improvements

Table 7-1: Trinity River Flood Control Program Costs for Local Sponsor Cost Matching for Flood Control and Recreation-Specific Components

Item Number	Description	Cost
7a	Local sponsor share of flood control costs as defined by Public Law 99-662	\$13,753,288
7b	Local sponsor match of recreation-specific components of the project as defined in Public Law 114-322	\$5,500,000
Total Cost-Share Program Amount		\$19,253,288

Note: Duration of this portion of the program is expected to be Oct 2018 through Sep 2024

7.4 Conclusions

We find the estimated costs associated with the portion of the Trinity River Flood Control Program for flood control and recreational components for which the Local Sponsor (TRWD) is solely responsible to be appropriate. First, as mentioned in previous sections, costs associated with the project overall are reasonable and their development consistent with the standard of care expected from the professional practices involved in the estimating those costs.

The costs associated with this portion of the Trinity River Flood Control Program are appropriate because they are defined by Federal law as described earlier and referred to in Section 7.5.

7.5 References

GPO 1986, *Water Resources Development Act, Public Law 99-662, November 17, 1986*, Government Printing Office, Washington, DC, <https://www.govinfo.gov/content/pkg/STATUTE-100/pdf/STATUTE-100-Pg4082.pdf>

GPO 2016, *Water Infrastructure Improvements for the Nation Act, Public Law 114-322, December 16, 2016*, Government Printing Office, Washington, DC, <https://www.gpo.gov/fdsys/pkg/PLAW-114publ323/pdf/PLAW-114publ323.pdf>

Section 8 - Costs Associated with Local Sponsor Program Management and Contingency

8.1 Purpose and Background

The purpose of this portion of the Trinity River Vision /Gateway Park/Panther Island Flood Control Program (Trinity River Flood Control Program) is to account for costs associated with the management of the Fort Worth Central City project, referred to as program management which is a joint effort between the Local Sponsor (TRWD/TRVA) and the USACE Fort Worth District. This portion of the Trinity River Flood Control Program also accounts for costs associated with having funds available for contingency.

8.2 Methodologies for Assessment of Cost

How the costs were developed for each of these components is discussed in the subsections below.

8.2.1 Program Management

Large programs, such as the Central City project, require a management structure capable of ensuring adequate resources are directed towards the project to complete tasks on schedule and monitoring costs. Program managers also continuously plan for and incorporate any changes to the project that might occur, ensure the technical soundness of design elements, and procure contractors to do the work in a manner that meets regulatory requirements (particularly Federal contracting requirements) and provides the best value (adequate qualifications to do the work and lowest price).

These functions are jointly provided by the Local Sponsor and the USACE Fort Worth District where Federal dollars are involved. For portions of the Central City project that are solely a local responsibility to fund and build, TRVA provides the program management functions for those elements. The cost estimate for program management was developed using several inputs:

- Guidance provided to TRVA by USACE Fort Worth District on their typical percentages of project cost utilized on large civil works projects based on the types of staff needed and their roles and responsibilities (TRVA 2017);
- TRVA historical experience with program management costs associated with the Central City project since 2006; and
- Independent evaluation of the costs associated with the Central City project by the USACE Walla Walla District (USACE 2008 a, b, c).

8.2.2 Contingency

All public works projects carry an amount of funding held in reserve in order to be able to adapt to unforeseen changes in the project. Standard industry practice, borne out by decades of experience, is that the amount of contingency is larger at the beginning of the project when design is considered conceptual (usually considered ten percent complete) and smaller when design is complete. Though design may be complete and the amount (by percentage of estimated constructed project cost) of contingency smaller, some contingency is needed during the construction phase for unforeseen circumstances that may require additional funding to address (such as undocumented

Section 8 - Costs Associated with Local Sponsor Program Management and Contingency

environmental contamination, undocumented underground infrastructure, abnormal weather delays, etc.). The Central City Project is a collection of many smaller projects (bypass channel, park improvements, floodplain storage preservation, ecosystem restoration, bridges, etc.) and these projects are in various stages of completion. As such, contingency costs included in the Program are representative of what stage a project associated with the Trinity River Flood Control Program is in and the complexity and/or risk expected with that project.

The contingency represented in this portion of the Trinity River Flood Control Program is that associated with those projects in the Trinity River Flood Control Program that have not yet had contingency built into their cost estimates. For instance, the cost estimates for utilities and street modifications (Sections 2 and 3) all include contingency built into them by the City of Fort Worth.

8.3 Costs

Table 8-1 presents the Program costs associated with program management and available funds for contingency purposes.

Table 8-1: Trinity River Flood Control Program Local Sponsor Costs for Program Management and Contingency

Item Number	Description	Cost
8a	Program management costs	\$12,184,898
8b	Contingency funds	\$36,408,910
Total Program Management and Contingency Cost Amount		\$48,593,808

Note: Duration of this portion of the program is expected to be Oct 2018 through Sep 2027

8.4 Conclusions

We find the estimated costs associated with program management and contingency in this portion of the Trinity River Flood Control Program to be reasonable and their development consistent with the standard of care expected from the professional practices involved in estimating the costs associated with these elements. Our conclusion is based on the following:

- The consistent application of cost estimating and tracking procedures coordinated between USACE and its contractors and reviewers and coordinated with the Local Sponsor program manager, TRVA;
- The level of independent technical review provided by USACE (USACE 2007 and 2008a);
- Focused independent review by the Walla Walla District of USACE on the cost and risk elements associated with the project (USACE 2008 b, c);
- USACE Fort Worth District review of design and cost estimates provided by architectural consultants hired by TRVA;
- Cost and schedule updates provided by TRVA through their program management system coordinated with the USACE Fort Worth District; and
- Historical costs already incurred by the program.

8.5 References

TRVA 2017, *Email exchange between Woody Frossard of (TRVA Project Manager) and Gail Hicks (USACE Fort Worth District Project Manager) on USACE program management cost components and estimate of percent of project cost*, Trinity River Vision Authority, December 2017

USACE 2008a, *Trinity River - Central City, Ft Worth, Texas - Project Report, Certification of Technical Review and Legal Sufficiency*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008b, *Upper Trinity River, Central City, Fort Worth, Texas - Cost and Schedule Risk Analysis Report*, US Army Corps of Engineers, Fort Worth District, April 2008

USACE 2008c, *Upper Trinity River, Central City, Fort Worth, Texas - Cost and Schedule Baseline Certification*, US Army Corps of Engineers, Walla Walla District, April 2008

USACE 2007, *Memorandum - Independent Technical Review Certification - Fort Worth Central City Preliminary Design, Supplement No. 1 to the FEIS Appendices*, US Army Corps of Engineers, Tulsa District, November 2007