

APPENDIX CENTRAL CITY CLEAR FORK / WEST FORK TRINITY RIVER, AND MARINE CREEK FEASIBILITY STUDY

CIVIL DESIGN

GENERAL

The purpose of this appendix is to provide feasibility level engineering information in support of project alternatives that include flood damage reduction, ecosystem restoration, and recreational facilities along the Upper Trinity River. The study area is bounded by NE 28th Street on the north, Riverside Drive on the east, Interstate 30 on the south, and Rockwood Park on the west. This includes the Clear Fork north of Interstate 30, the West Fork from Rockwood Park to Riverside Drive, and Marine Creek South of 28th Street.

EXISTING CONDITIONS

The West Fork Trinity River and the Clear Fork Trinity River are part of the Fort Worth Floodway project, which is maintained by the Tarrant County Region Water District. The river channel through this area has been improved to eliminate the meanders of the existing river and increase the flood capacity flows. The side slopes are uniformed 1V:3H, grass-lined, and properly maintained throughout this reach. The bottom width varies from 150 to 250 feet and is also maintained to remove sediment deposits on a regular basis. The river channel varies in height to the water surface due to various low water dams placed within the river channel. The improved channel is approximately 350 feet wide. As part of the flood control, various lengths of levees have been placed along both rivers. The levees consists of earthen material with grass lined slopes and crown. The side slopes are 1H:3V and the top width varies from 20 feet to 120 feet. Vegetation growth has been limited to native grasses as the routine maintenance includes mowing and surface grading to correct any erosion problems.

ROADS AND BRIDGES

The existing river channel crosses various structures within the project area. Structures in this area include 20 Vehicular Bridges, 8 Railroad Bridges, 2 Pedestrian Bridges, 7 Low water Dams and 13 Drainage Structures. A complete list of all the above structures can be found in the Structural Section Appendix, which also contains detailed descriptions and photographs from recent site visits.

UTILITIES

Water: Existing water lines are found throughout the project area, as main lines and feeder lines to various locations. The local sponsor has provided an existing utility map. This will assist in identifying potential lines that will require relocations once alternatives are conceptualized.

Sanitary Sewer: Existing sanitary sewer lines are found throughout the project area, as force main lines and gravity feed lines from various locations. The local sponsor has provided an existing utility map. This will assist in identifying potential lines that will require relocations once alternatives are conceptualized.

Storm Drains: Existing storm drain lines and drainage structures are found throughout the project area in various locations. The local sponsor has provided an existing utility map. This

will assist in identifying potential lines that will require relocations once alternatives are conceptualized.

Natural Gas: Existing gas lines are found throughout the project area in various locations. The local sponsor has provided an existing utility map. This will assist in identifying potential lines that will require relocations once alternatives are conceptualized.

Electric: A large TXU electrical transmission station and lines cross the West Fork just north of the Downtown area. In addition, aerial electric distribution lines branch out throughout the project area. The local sponsor has provided an existing utility map. This will assist to identify potential lines that will require relocations once alternatives are conceptualized.

Fiber Optic: Existing fiber optic lines are found throughout the project area. The local sponsor has provided an existing utility map. This will assist in identifying potential lines that will require relocations once alternatives are conceptualized.

Telephone: Existing telephone facilities are assumed to follow the existing roads and electrical aerial lines in this area.

Petroleum: No existing petroleum lines are known to exist in the area.

DRAWING FILES SHOWING EXISTING CONDITIONS

The Table 1 below shows the MicroStation files that have been generated from the GIS information provided by the local sponsor that indicated various existing features and utilities of the project area.

Table 1 MicroStation file format

Filename	Ext	Description	Logical Name
altA	dgn	No Elements	
cclvsta	dgn	River and Levee stations	
cc_bggen	dgn	Lvls 4-Bldgs, 5-Names	buildings
cc_flhab	dgn	Lvls 21-Cluster Outline	trees
cc_gdsrv	dgn	Lvls 27- Grd Survey points	
cc_hysur fill	dgn	Lvls 1, 19-Water edge, 20-river names	
cc_hysur	dgn	Lvls 19-Water edge, 20-river names	hydro
cc_imfdc	dgn	Lvls 53-Levee Outline, 60-Centerlines	levee
cc_imgen	dgn	Lvls 14-misc drainage, ruins, tanks	general
cc_imrec v8	dgn	Lvls 58-Park features, 1,2-misc	
cc_imrec	dgn	Lvls 58-Park features, 1,2-misc	parks
cc_lfhyp	dgn	Lvls 30-spots, 31-maj, 33-min, 32-lbl	topo
cc_lvsta	dgn	Levee Sta Lvls 6-cl,7-ticks, 8-sta, 9-lbl	
cc_trail	dgn	Lvls 1-Park Trails	
cc_trveh	dgn	Lvls 7-st names, 8-strrt, 54 Bridges	roads
cc_trvehcl	dgn	Lvls 6-road centerlines	
cc_utele	dgn	Lvls 43 Power Lines and Poles	electrical
cc_utsto	dgn	Lvls 16-culv, 37-mh, 54-strmdrains	storm sewer
cfxsext	dgn	Clear Fork H&H xsects	
concepts 1	dgn	See AltA	
existing rec	dgn	See cc_trail	
wfclext	dgn	West Fork Trinity River CL	
wfxsext	Dgn	West Fork H&H xsects	
worstfp	Dgn	Watershed Outline	
utindex3d	Dgn		index
ccclp	Dgn	River CL-1, Rvr Sta-30,	
cccxs	Dgn	Exst Gr-50, EI-51, Cell-63	
ccexortho	Emf	Arcview	
ccexortho	Bmp	Paint	
ccexortho	Aep	ArcExplorer ortho photo layout	
ccextutilities	Aep	ArcExplorer utility shape file layout	

PROPOSED FLOOD CONTROL IMPROVEMENTS TO LEVEES

In order to meet the new design levels of flood control along the existing levees of the West Fork and the Clear Fork Trinity Rivers, certain portions of the levees will have to be raised. In addition to some levee raises, a flood wall that is located under the Main Street Bridge adjacent to an existing TXU plant and substation will have to be modified in order to meet the new design flood protection criteria. The two levels of protection which have been reviewed will require improvements to match a levee design of SPF + 0 ft, SPF + 1 ft, SPF + 2 ft, and SPF + 4. The following descriptions are of the proposed improvements.

SPF + 0

The existing Floodwall under the Main Street Bridge along the Left Bank of the West Fork Trinity River will have to be raised. In order to minimize cost and provide an effective solution, this wall shall be removed and replaced with an earthen levee. The fill material shall be obtained from an off-site commercial borrow source and hauled to the project site. The new levee shall consist of the following dimensions:

Top width crest - 15'
 Base width – 75'
 Crest Elevation 546.7'
 Length – 700'
 Cubic Yards of Fill – 7,200

The Tarantula Railroad has a bridge crossing the West Fork Trinity River approximately 2880 feet upstream of the confluence of the West Fork and the Clear Fork Trinity Rivers. Since the breach of the current level of protection is so minor, the final model elevations would have to be field verified. Therefore, the use of sand bags would be proposed across this bridge crossing for developing a plan of action and cost comparison.

The levee along the Right Bank of the West Fork Trinity River just upstream of the Tarantula Railroad crossing will require some improvements in order to meet the new design levels of protection for the SPF event. Based on existing survey information an area of the levee that is approximately 200 feet upstream of the railroad and levee crossing will require minimal backfill on the crest of the levee which will total to 133 cubic yards of new material. The existing ground will need to be prepared and then returfed for erosion protection.

SPF + 1

The existing Floodwall under the Main Street Bridge will have to be raised as well. Likewise to minimize cost and provide an effective solution, this wall shall be removed and replaced with an earthen levee. The fill material shall be obtained from an off-site commercial borrow source and hauled to the project site. The new levee shall consist of the following dimensions:

Top width crest - 15'
 Base width – 85'
 Crest Elevation 547.7'
 Length – 700'
 Cubic Yards of Fill – 8,650

The Tarantula Railroad Bridge will also have a breach of the current level of protection. Based on the current survey information and hydraulic models evaluated, this breach is less than 1 foot. In order to correct this deficiency the final model elevations would have to be field verified. Due to the cost of putting a permanent structure across the existing railroad tracks, the use of sand bags would be proposed across this bridge crossing for developing a plan of action and cost comparison. If the final field surveys during the engineering and design phase of the project

determines that the breach exceeds more than 1.5 feet, then a permanent structure maybe looked at as a final solution.

The levee loop that provides protection along the Right Bank of the West Fork Trinity River and the Left bank of the Clear Fork Trinity River, will require improvement at three locations. The improvements shall consist of raising three sections of the levee with earthen material hauled in from a commercial borrow site. The total amount of fill required for this construction is 17,625 cubic yards. Figure 1 shows the typical cross section for the improvements. The improvements to the three locations shall consist of the following dimensions:

First Section

Located 525' upstream (US) from the US face of the Henderson Street Bridge along the West Fork Trinity River Right Bank
Top width crest - 15'
Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 5 feet.
Crest Elevation varies from 553.7' to 552.9'
Length – 1300'
Cubic Yards of Fill – 7,400

Second Section

Located 230' downstream (DS) from the DS face of the Henderson Street Bridge along the West Fork Trinity River Right Bank
Top width crest - 15'
Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 3 feet.
Crest Elevation varies from 552.8' to 552.4'
Length – 1300'
Cubic Yards of Fill – 5,290

Third Section

Located 100' upstream (US) from the US face of the Henderson Street Bridge along the Clear Fork Trinity River Left Bank
Top width crest - 15'
Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 5 feet.
Crest Elevation varies from 552.2' to 553.0'
Length – 1000'
Cubic Yards of Fill – 4,935

Due to raising segments of the levee loop in the areas mentioned above the new fill material is placed on the riverside of the levee in order to stay within the current right-of-way limits and not disturb sump areas and private property. In order to mitigate for hydraulic losses caused by the additional fill material within the flood way, an area located on the left bank of the West Fork Trinity River approximately 1000 feet upstream of the Tarantula Railroad Bridge shall be excavated out. The area designated for hydraulic mitigation covers approximately 1 acre with and average depth of 6 feet and 1V:3H side slopes.

SPF + 2

The existing Floodwall under the Main Street Bridge will have to be raised as well. Likewise to minimize cost and provide an effective solution, this wall shall be removed and

replaced with an earthen levee. The fill material shall be obtained from an off-site commercial borrow source and hauled to the project site. The new levee shall consist of the following dimensions:

Top width crest - 15'
 Base width – 90'
 Crest Elevation 548.7'
 Length – 700'
 Cubic Yards of Fill – 10,375

The Tarantula Railroad Bridge will also have a breach of the current level of protection. Based on the current survey information and hydraulic models evaluated, this breach is less than 3 feet. In order to correct this deficiency the final model elevations would have to be field verified. In order to provide adequate protection in a rapid response situation, a permanent structure shall be installed along the centerline of the levee where the levee and railroad bridge cross at approximately 1920 feet downstream of Henderson Street. The structure shall consist of a three foot high hinged gate that can be closed during peak flows by a winch. Detail descriptions of this structure can be found in the Structural Design write-up.

The levee loop that provides protection along the Right Bank of the West Fork Trinity River and the Left bank of the Clear Fork Trinity River, will require improvement at three locations. The improvements shall consist of raising three sections of the levee with earthen material hauled in from a commercial borrow site. The total amount of fill required for this construction is 100,265 cubic yards. Figure 1 shows the typical cross section for the levee raise improvements. The improvements to the three locations shall consist of the following dimensions:

First Section

Begins just downstream (DS) from University Street Bridge along the West Fork Trinity River Right Bank
 Top width crest - 15'
 Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 10 feet.
 Crest Elevation varies from 554.9' to 553.4'
 Length – 4900'
 Cubic Yards of Fill – 50,140

Second Section

Starts where the West Fork Trinity River Right Bank merges with the Clear Fork Trinity River Left Bank levees
 Top width crest - 15'
 Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 8 feet.
 Crest Elevation varies from 552.4' to 553.2'
 Length – 1200'
 Cubic Yards of Fill – 20,050

Third Section

Located 800' upstream (US) from the US face of the Henderson Street Bridge along the Clear Fork Trinity River Left Bank
 Top width crest - 15'
 Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 10 feet.

Crest Elevation varies from 553.4' to 554.2'
 Length – 2000'
 Cubic Yards of Fill – 30,075

Due to raising segments of the levee loop in the areas mentioned above the new fill material is placed on the riverside of the levee in order to stay within the current right-of-way limits and not disturb sump areas and private property. In order to mitigate for hydraulic losses caused by the additional fill material within the flood way, an area located on the left bank of the West Fork Trinity River approximately 1000 feet upstream of the Tarantula Railroad Bridge shall be excavated out. The area designated for hydraulic mitigation covers approximately 3.5 acres with an average depth of 8 feet and 1V:3H side slopes.

SPF + 4

The existing Floodwall under the Main Street Bridge will have to be raised as well. Likewise to minimize cost and provide an effective solution, this wall shall be removed and replaced with an earthen levee. The fill material shall be obtained from an off-site commercial borrow source and hauled to the project site. The new levee shall consist of the following dimensions:

Top width crest - 15'
 Base width – 110'
 Crest Elevation 550.7'
 Length – 700'
 Cubic Yards of Fill – 14,490

There will also be a breach of the current level of protection in three areas along the railroad and streets crossing over the levees. Based on the current survey information and hydraulic models evaluated, the breach areas will vary in heights from 2 to 5 feet. In order to correct these deficiencies, the final model elevations would have to be field verified. In order to provide adequate protection in a rapid response situation, permanent structures shall be installed along the centerline of the levee and where the Tarantula Railroad Bridge, Henderson Street, and Seventh Street cross the levee. The first structure located approximately 1920 feet downstream of Henderson Street shall consist of a five foot high hinged gate that can be closed during peak flows with a winch. Henderson Street crosses the levee loop in two locations. Along the Right Bank of the West Fork Trinity River, the road profile is higher than the current SPF flood elevations. Along Left bank of the Clear Fork Trinity River the road profile for Henderson Street does not meet the flood criteria elevations. In order to correct this breach, a gated structure is required that consists of double swing gates which can be closed by a winch. The third structure required to meet the SPF flood control levels shall be along 7th Street on the Left bank of the Clear Fork Trinity River. The structure shall be similar to the Henderson Street gated structure. Both structures shall be two feet in height. Detail descriptions of all three structures can be found in the Structural Design write-up.

The levee loop that provides protection along the Right Bank of the West Fork Trinity River and the Left bank of the Clear Fork Trinity River would have to be raised in order to maintain the new SPF + 4 criteria. The improvements shall consist of raising the levee along two continuous sections with earthen material hauled in from a commercial borrow site or mitigation borrow sites along the left bank of the West Fork. The total amount of fill required for this construction is 180,700 cubic yards. Figure 1 shows the typical cross section for the improvements. The improvements to the two sections shall consist of raising the levee an average of three feet. The base and toe of the levee shall be extended on the riverside in order to minimize the impacts to the sump areas and existing structures that are on the edge of the right of way limits on the landside of the levee. The levee improvements are described as with the following dimensions:

First Section (SEE FIGURE 2)

Begins just downstream (DS) from University Street Bridge along the West Fork Trinity River Right Bank

Top width crest - 15'

Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 20 feet.

Crest Elevation varies from 556.9' to 555.4'

Length - 4900'

Cubic Yards of Fill - 114,700

Second Section (SEE FIGURE 3)

Starts where the West Fork Trinity River Right Bank merges with the Clear Fork Trinity River Left Bank levees

Top width crest - 15'

Base improvements will extend beyond the existing toe of the levee on the Riverside on the average of 20 feet.

Crest Elevation varies from 558.4' to 557.2'

Length - 5860'

Cubic Yards of Fill - 65,900

Due to raising segments of the levee loop in the areas mentioned above the new fill material is placed on the riverside of the levee in order to stay within the current right-of-way limits and not disturb sump areas and private property. In order to mitigate for hydraulic losses caused by the additional fill material within the flood way, an area located on the left bank of the West Fork Trinity River shall be excavated out. This area is located upstream and downstream of Henderson Street extending out approximately 1200 feet in each direction. The area designated for hydraulic mitigation covers approximately 18 acres with an average depth of 6 feet and 1V:3H side slopes.

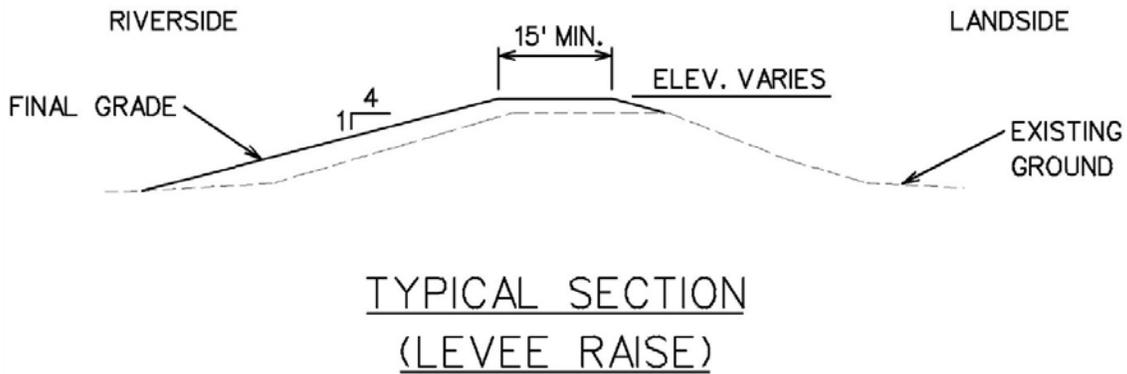


FIGURE 1

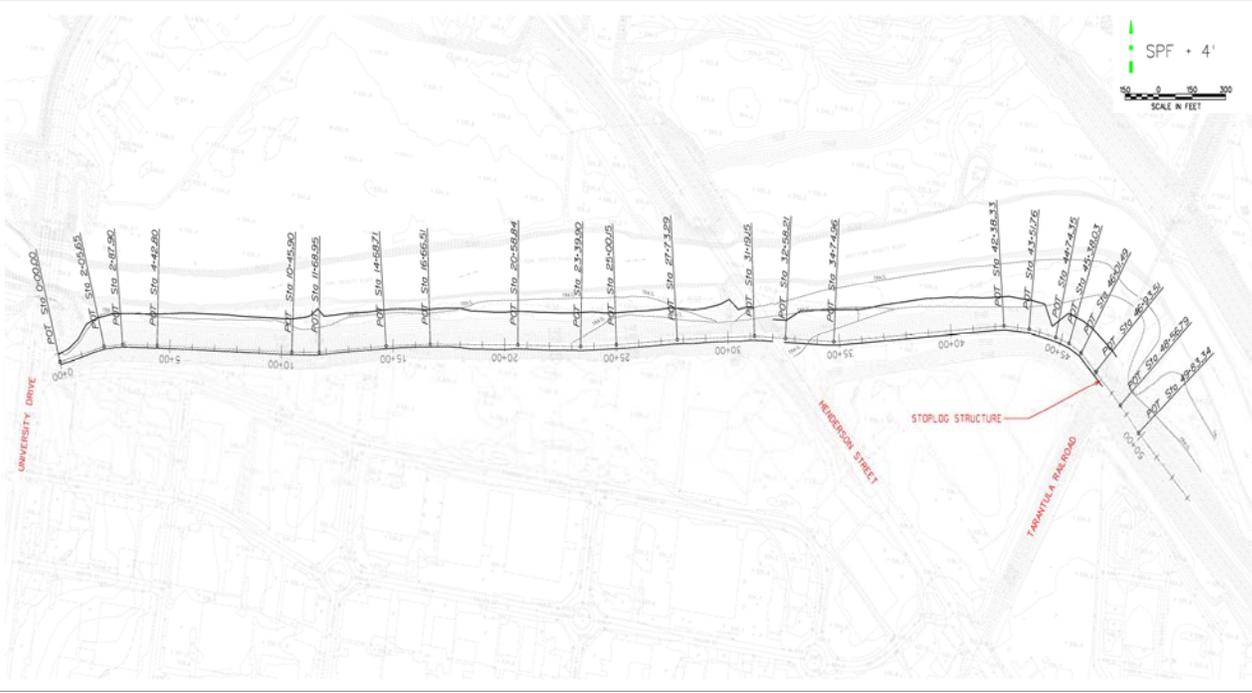


FIGURE 2

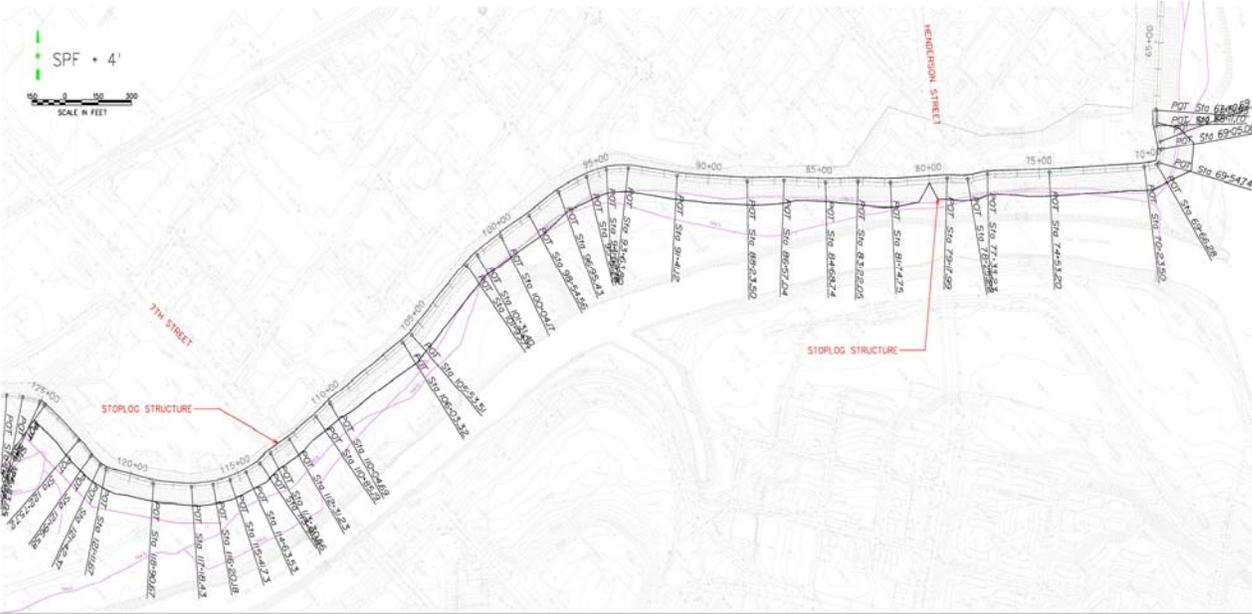


FIGURE 3