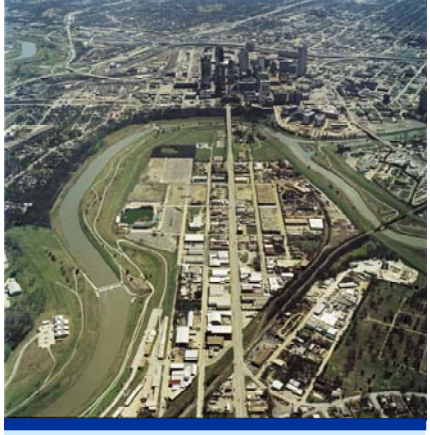
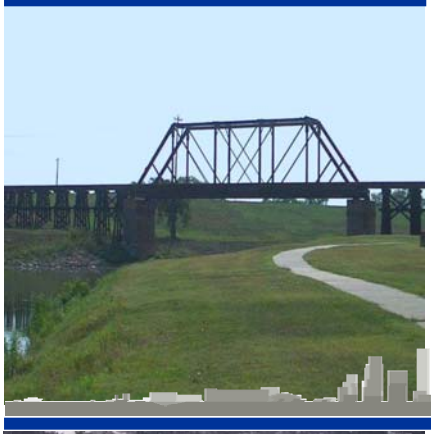
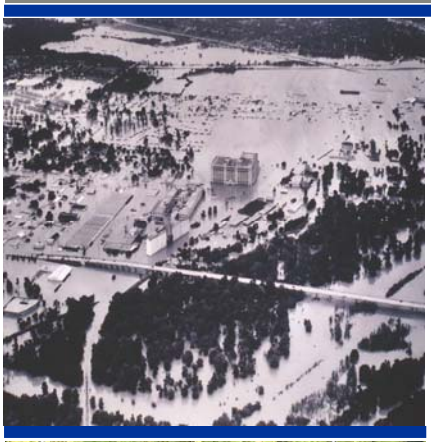
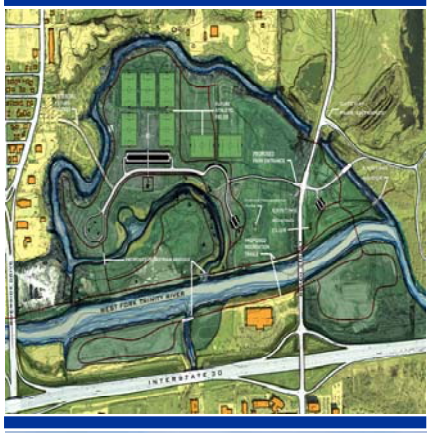
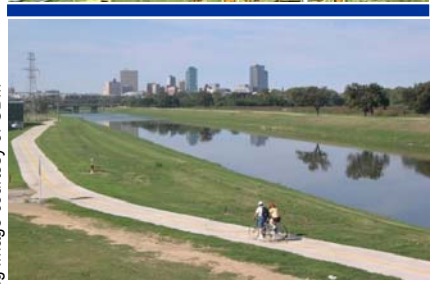










Rendering Image courtesy of CDM

Upper Trinity River Central City Fort Worth, Texas

Final Supplement No. 1 to the Final Environmental Impact Statement

Prepared by:
U.S. Army Corps of Engineers
Fort Worth District

March 2008

Final
Supplement No. 1 to the
Final Environmental Impact Statement
for the
Central City Project,
Upper Trinity River, Texas

Lead Agency:	U. S. Army Corps of Engineers, Fort Worth District
Cooperating Agencies:	N/A
Title of Proposed Action:	Project Modification
Affected Jurisdiction:	Upper Trinity River Basin, Trinity River, Texas

ABSTRACT:
The Central City Project is located within the vicinity of the downtown area of Fort Worth, Texas, along the West Fork and Clear Fork of the Trinity River and consists of a bypass channel, levee system, and associated improvements to divert flood flows around a segment of the existing floodway system. Included in the Corps of Engineers (Corps) portion of the project are hydraulic (valley storage) and related environmental and cultural resource mitigation requirements. Federal costs of the Corps portion of Central City Project are defined by PL 108-447 at $110,000,000. The non-Federal sponsor is the Tarrant Regional Water District and the City of Fort Worth is one of the local partners. These entities are also sponsors for the Riverside Oxbow Ecosystem Restoration Project, which encompasses about 1,060 acres along a 3-mile reach just downstream of the Central City Project including a portion of the old natural channel of the West Fork that was severed as a cut-off oxbow when the channel was realigned. Federal Cost for the Riverside Oxbow project is estimated (2002 price levels) at about $8,300,000. By letter dated 22 June 2006, the City of Fort Worth requested that the Corps conduct an evaluation of the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow Ecosystem Restoration project area to accommodate valley storage requirements. In response to that letter request, the Corps' initial evaluation suggested the concept merited additional study. Alternatives considered in more detailed evaluation of the proposal include the No Action Plan, which assumes that each project would proceed separately as currently approved and a Modified Central City Project alternative. This alternative has been formulated to integrate features of the Riverside Oxbow project and includes areas within the Riverside Oxbow project area for replacement valley storage. This analysis considers contingency valley storage sites that could be used in the event that hydraulic analyses conducted during more detailed design indicate that primary storage sites are not sufficient to achieve the required storage. The Modified Central City Project alternative would also involve relocation of the Samuels Avenue dam to a location slightly upstream of the approved dam site. To assure a comprehensive analysis, the total hydraulic system including the Central City and Riverside Oxbow areas and the channels upstream and downstream of these areas was evaluated. The recommended plan in this Supplement No. 1 to the Final EIS for the Central City Project is the Modified Central City alternative.

U.S. Army Corps of Engineers
Fort Worth District
ATTN: CESWF-EC-D (Mr. Saji Alummuttil)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Commercial Telephone: (817) 886-1764

Summary

Final Supplement No. 1 to the Final Environmental Impact Statement for the Central City Project, Upper Trinity River, Texas

( ) Draft (X) Final

U.S. Army Corps of Engineers
Fort Worth District
ATTN: CESWF-EC-D (Mr. Saji Alummuttil)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Type of Action: (X) Administrative
( ) Legislative

Project Description:

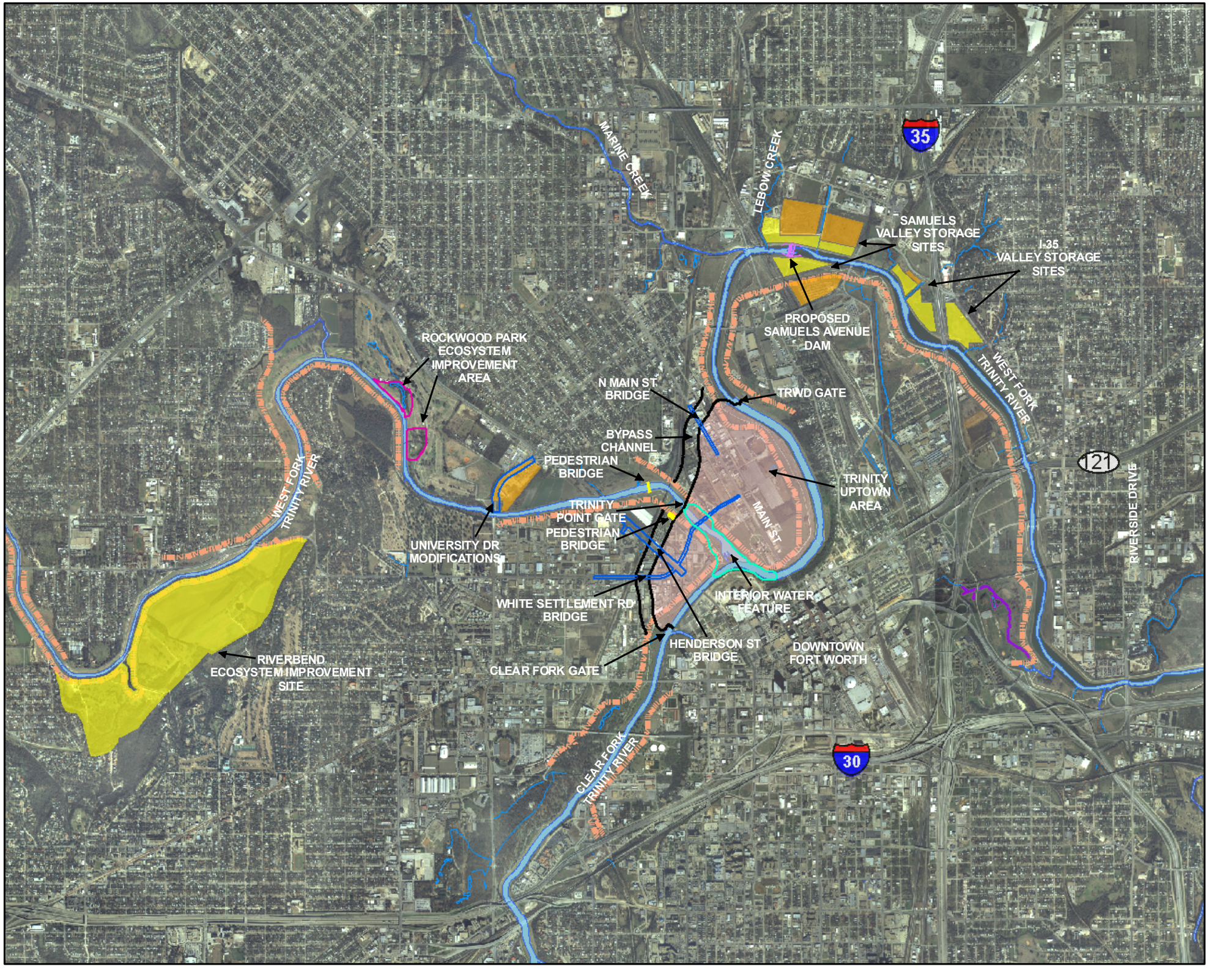
The overall public infrastructure project, termed the Central City project, is a multi-agency endeavor involving several Federal agencies and at least three non-Federal entities. The Tarrant Regional Water District is the non-Federal sponsor for the Authorized U.S. Army Corps of Engineers (Corps) component of the Central City project, with funding supplemented from the Trinity River Vision Tax Increment Financing District. As the project's name would suggest, the Central City Project is located within the immediate vicinity of the downtown area of Fort Worth, Texas, along the West Fork and Clear Fork of the Trinity River. The river is currently channelized with levees along the entire project area as part of the original Fort Worth Floodway, a Federal flood control project.

The currently approved Central City project consists of a bypass channel, levee system, and associated improvements to divert flood flows around a segment of the existing Floodway system adjacent to downtown Fort Worth. Water levels in the bypass channel and adjacent waterways would be controlled by a dam (Samuels Avenue Dam) with crest gates. The dam would be located on the West Fork of the Trinity River just east of Samuels Avenue with three isolation gates to protect the interior area east of the bypass channel from flood flows during large events. Two miles of the existing West Fork would function as a controlled, quiescent watercourse with a water feature or urban lake approximately 900-feet long in the interior area. Land acquisition and excavation would be required in the Riverbend area along the West Fork just west of downtown, and existing levees would be modified to provide hydraulic mitigation for the downtown features. Six bridges, four vehicular and two pedestrian, are proposed for the project. Pertinent features of the Central City Project are displayed in Figure 1.

The Corps component of the project, as originally defined, includes the bypass channel the isolation gates, the Samuels Avenue Dam, valley storage mitigation, and real estate, business and property owner relocations, and some engineering and design costs associated with these features. Included in the Corps project is all hydraulic mitigation (valley storage) and ecosystem mitigation, and all cultural resources mitigation excepting mitigation of impacts to buried archeological resources that may be discovered in conjunction with project features other than those included in the Corps project. The primary valley storage site for the Central City Project is the Riverbend site, which is located upstream of the primary Central City project features. Utilization of the Riverbend valley storage site would require

Central City

Figure 1
Central City Project



Legend

- BYPASS CHANNEL
- PROPOSED SAMUELS AVE DAM
- INTERIOR WATER FEATURE
- PEDESTRIAN BRIDGE
- EXISTING LEVEE
- ROAD IMPROVEMENT
- ECOSYSTEM RESTORATION AREA
- AQUATIC HABITAT MITIGATION AREA
- TRINITY UPTOWN AREA
- STREAMS

VALLEY STORAGE SITE WORK DESCRIPTION

- CUT
- FILL/SPOIL

N

0 0.25 0.5 1 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

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As of 8/24/2007

fairly substantial habitat mitigation. The Corps project also includes additional ecosystem improvement measures, some in the Riverbend site and some in the Rockwood Ecosystem Improvement Area. The Corps of Engineers component of the Central City Project was authorized for construction by Section 116 of Public Law 108-447, dated 8 December 2004. Under that authority, Corps participation is limited to $110 million with a total project cost $220 million for that portion of the infrastructure plan in which the Corps can participate. A Final Environmental Impact Statement (FEIS) was completed for the Central City Project in January 2006 and the Project Report was completed in March 2006. The Record of Decision (ROD) was signed, and the Project Report recommending the Community-Based Alternative was endorsed as being technically sound and environmentally acceptable, by the Assistant Secretary Army for Civil Works (ASA (CW) on 7 April 2006.

The Riverside Oxbow Project, like the Central City Project, includes the Tarrant Regional Water District as the non-Federal sponsor with the City of Fort Worth as a local partner. The Riverside Oxbow project area encompasses about 1,060 acres just east of downtown Fort Worth, Texas, on the West Fork of the Trinity River. The project area is located downstream of Riverside Drive (the downstream end of the Fort Worth Floodway) and extends to the East 1st Street bridge crossing of the West Fork. This project was recommended to Congress by the Chief of Engineers for construction authorization in 2002; however that authorization has not yet occurred. Features of the Riverside Oxbow Project are displayed on Figure 2. This 3-mile reach includes a portion of the old natural channel of the West Fork, which was severed as a cut-off oxbow when the channel was realigned, the West Fork and Sycamore Creek confluence, and a low water dam downstream of Beach Street. Generally, the project area falls between Interstate Highway (IH) 30 on the south and the 100-year floodplain boundary to the north. Corps of Engineers participation in the Riverside Oxbow Project consists of reestablishment of low flows through the old river oxbow, including replacement of the Beach Street bridge; creation of about 50 acres of emergent wetlands; riparian habitat improvement on about 180 acres of existing forest tracks including establishment of a 150-foot wide riparian buffer (native grassland) along the West Fork from Riverside Drive to East 1st Street; establishment of native grasses and forb buffer zones on 46 acres; reforestation of 66 acres using a variety of native hard and soft mast trees and shrubs; and preservation and habitat improvement to about 207 acres of native floodplain grasslands. Corps participation also includes linear recreation along 9,000 feet of concrete trail, 1,400 feet of crushed aggregate trail, 7,600 feet of wood mulch equestrian trail as well as associated access points, and parking and restroom facilities.

An Interim Feasibility Report and Integrated Environmental Assessment was completed in April 2003 for the Riverside Oxbow Project. A Finding of No Significant Impact (FONSI) was signed by the Acting Fort Worth District Commander on 22 May 2003. The Interim Feasibility Report recommends implementation of the Locally Preferred Plan (LPP), which consists of the National Ecosystem Restoration (NER) Plan along with additional local features. On 29 May 2003 the recommended Plan for the Riverside Oxbow was approved by the Chief of Engineers. An addendum, dated April 2005, was prepared that changed the extent of the various habitat types to be restored. Total cost of the project was estimated in the 2005 addendum at about $20,800,000 with a Federal cost of about $8,300,000 based on October 2002 dollars. (Those costs are $23,625,413 and $9,426,540, respectively, when updated to 2005 dollars for this SEIS). Neither construction funding nor authority for implementation of this project has been provided by Congress and it was not included in the projects authorized in the Water Resource Development Act enacted on 8 November 2007.

By letter dated 22 June 2006, the City of Fort Worth requested that the Corps of Engineers conduct an evaluation to consider the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow project. The City's request recognized that each of these projects were moving forward as individual projects and that they are located adjacent to one another. The City and the Tarrant Regional Water District, both non-Federal sponsors for these two projects, indicated their opinion that based on their adjacency, there might be merit in merging the two projects. In their letter, the City of Fort Worth identified potential benefits of combining the projects that would not be achieved if they were to continue to proceed as individual projects. In response to that letter request, the Fort Worth District Corps of Engineers performed an initial evaluation which suggested that the concept merited detailed study. The result of those detailed evaluations is presented in this Supplement No. 1 to the Final EIS for the Central City Project.

Alternatives considered in the evaluation of the proposal by the City of Fort Worth include the No Action Plan, which assumes that each project would proceed separately as currently approved and a Modified Central City alternative. Although the Riverside Oxbow project is not currently authorized or funded for construction, it or a variant of it is expected to be implemented. The modified Central City alternative was formulated to integrate features of the Riverside Oxbow project and includes areas within the Riverside Oxbow area as replacement hydraulic mitigation sites where habitat development can occur. In order to assure a comprehensive analysis, the total hydraulic system was evaluated, including the Central City and Riverside Oxbow areas and the channels upstream and downstream of these areas. The analysis also considers five contingency valley storage sites that could be used in the event analyses conducted during the detailed design phase of the project indicate that the primary storage sites are not sufficient to achieve the required valley storage or that other factors preclude their use. One or more of these sites could be used to replace any of the primary sites depending on how much valley storage is required.

Based upon detailed evaluations presented in this Supplement No.1 to the Final EIS for the Central City Project, and on public coordination under the National Environmental Policy Act, the Fort Worth District has selected the Modified Central City alternative for recommendation, pending receipt of any substantial comments that would lead to a decision to the contrary. The major difference between the Modified and original Central City Projects is in location of valley storage sites required to accommodate the increased hydraulic efficiency of the bypass channel. The Modified Central City alternative retains the major features of the original Central City Project but utilizes existing public lands and minimizes use of private lands to a greater extent to accommodate the valley storage requirement. The Modified Central City alternative also involves relocation of the Samuels Avenue Dam to a location upstream of the Marine Creek confluence for geotechnical and environmental reasons. To maintain small boat access between the Trinity River and Marine Creek, a low water dam on Marine Creek and a boat channel with lock structure will be constructed between the Trinity River impoundment and Marine Creek. Figure 3 provides an overview of the Modified Central City Project Alternative.

Summary of Major Environmental Effects:

From a hydraulic standpoint, implementation of the Modified Central City alternative would accommodate the valley storage requirements of the overall Central City Project by using lands within the Riverside Oxbow restoration area rather than lands upstream of the project. Land acquisition costs would be reduced with implementation of the Modified Central City alternative due to the fact that much of the land within the Riverside Oxbow project area is already in public ownership. The Modified Central City alternative would avoid much of the initial impact to riparian woodland that would occur with the original Central City project. Upon completion of the habitat development and compensating for these impacts, the Modified Central City alternative would result in more riparian woodland habitat outputs with the development of over 147 acres of trees but less wetland habitat outputs relative to the No Action alternative. The Modified Central City alternative would have similar upland woodland impacts and outputs as the No Action alternative but would impact a greater amount of grassland habitat than the No Action alternative. Most of the grassland impacts will occur to areas dominated by non-native species and therefore no mitigation is deemed necessary. These changes in habitat outputs are primarily due to relocating the valley storage sites from the Riverbend area to the Riverside Oxbow project area and replacing grassland habitat at these sites with Bottomland Hardwood habitat.

Relocation of the Samuels Avenue dam site to upstream of the Marine Creek confluence would avoid some adverse effects to riparian and aquatic habitat along lower Marine Creek and all impacts to Lebow Creek. However, construction of a low water dam on Marine Creek and a boat channel from the Trinity River impoundment to Marine Creek would still result in inundation (albeit to a lesser extent) of riparian and aquatic habitat in Marine Creek that would still require mitigation. This aquatic habitat mitigation is proposed to occur in the Ham Branch tributary and in the remnant Sycamore Creek. Overall, implementation of the recommended Modified Central City alternative would increase flood protection,

Central City
Figure 2 - Approved Riverside Oxbow Ecosystem Restoration Project
(Plan Approved by Secretary of the Army)

Legend

- ORIGINAL STUDY AREA BOUNDARY
- STUDY AREA ZONE BOUNDARIES
- BRIDGE
- STREAMS

PLAN FEATURES

- MAINTENANCE ACCESS
- WETLAND PUMP
- TXDOT TRAIL
- EQUESTRIAN TRAIL
- EXISTING TRAIL
- EXISTING TRAIL TO BE REBUILT
- PROPOSED TRAIL
- PROPOSED TREES
- EXISTING WATER
- NEW LAKES
- PLUG/CHANNEL VEGETATION
- RIPARIAN WOODLANDS
- RIPARIAN BUFFER
- WET SOIL MANAGEMENT
- WETLAND
- NATIVE GRASSLANDS

N

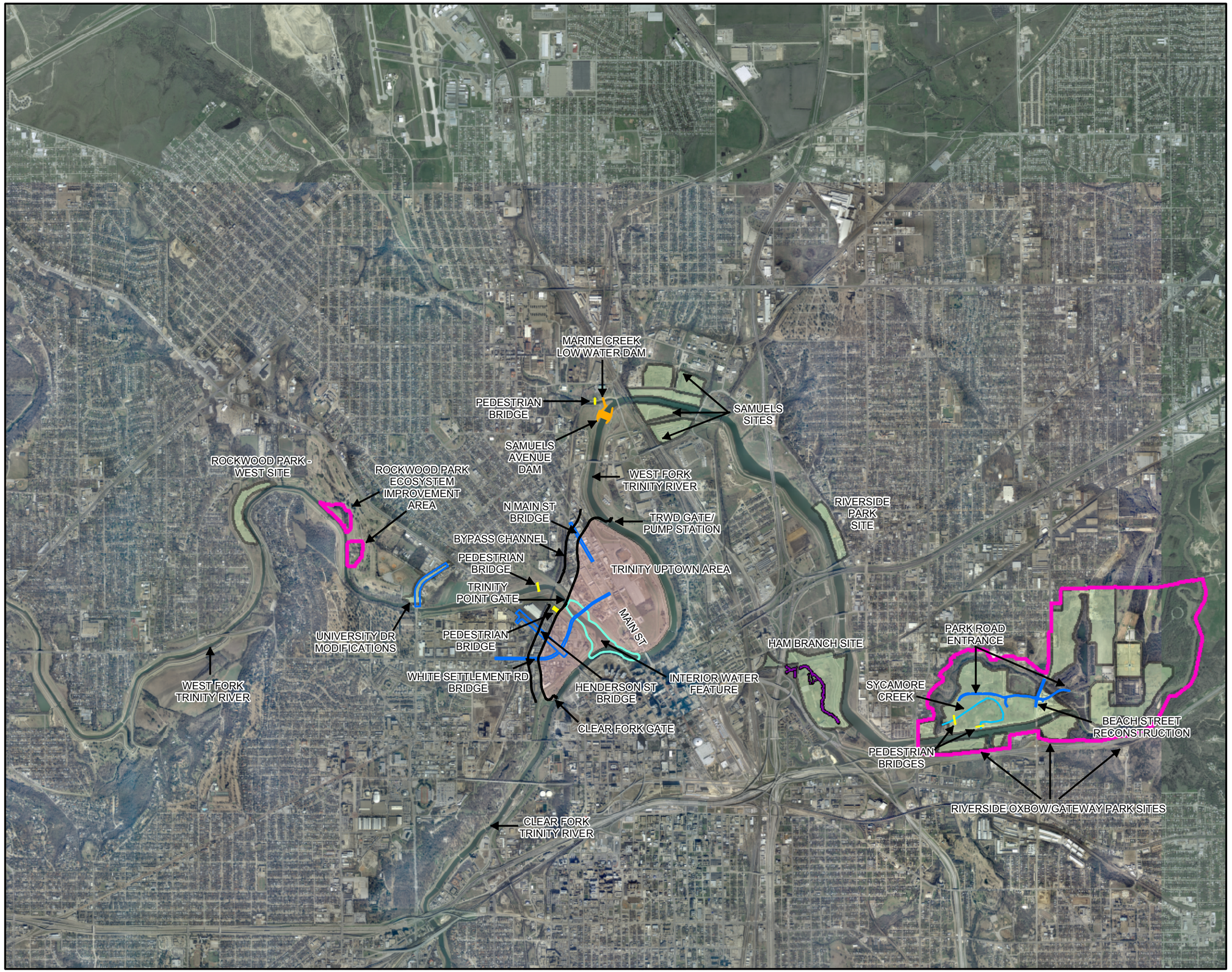
0 0.1 0.2 0.4 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

Central City

Figure 3 - Modified Central City Project Alternative



Legend

- BYPASS CHANNEL
- ROAD IMPROVEMENT
- PEDESTRIAN BRIDGE
- VALLEY STORAGE SITE
- ECOSYSTEM RESTORATION AREA
- AQUATIC HABITAT MITIGATION AREA
- TRINITY UPTOWN AREA

N

0 1,645 3,290 6,580 Feet

Aerial Photography Date: January 2005

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As of 10/1/07

habitat outputs, recreation, and local project costs, but would reduce habitat mitigation requirements and acquisition of private lands by over half relative to the No Action alternative.

Areas of Controversy:

Prior to publication of the Notice of Intent to prepare this Supplement No. 1 to the Final EIS for the Central City Project, and prior to release of the Draft Supplement for public review, areas of concern were derived through the National Environmental Policy Act compliance process. No areas of concern were raised by the public in regard to the Riverside Oxbow project during preparation or review of that Environmental Assessment. A number of issues have been identified through the review process associated with the Central City Project. Neighborhood groups raised concerns about maintaining the historical integrity of their neighborhoods, and to accessibility to project amenities from neighborhoods such as Oakhurst and Riverside, as well as those neighborhoods with limited amounts of park space. Additional concerns addressed the availability of mass transit to relieve anticipated traffic congestion, and the potential acquisition and relocation of businesses. Discussions with the Hispanic community included construction and bidding opportunities for Hispanic businesses and public outreach to the community through Spanish language television and radio. Overall, some public opposition was expressed over the public expenditure in general, by either the Federal Government or the project sponsors (or both) and over the potential use of eminent domain to acquire needed real estate. Project costs and acquisition of private lands are, therefore, considered to be areas of concern to be addressed in this Supplement. Very few concerns relative to environmental or technical issues were received.

Public Involvement:

A Notice of Intent (NOI) to prepare a draft Supplement No. 1 to the Final EIS for the Central City Project was published in the Federal Register on February 14, 2007. The NOI provided background information and rationale for preparing the Supplement to the Final EIS. Although no formal public Scoping meeting was held, a Public Notice was mailed to the known interested public with more than 2,000 notices being mailed concurrently with publication of the NOI in the Federal Register. A total of 11 telephone contacts or visits to Corps offices and five letters were received in response to the NOI and Public Notice. Two of the phone calls were from the local media seeking interviews with the Corps' Project Manager regarding the proposed study of modification of the Central City Project. Three calls or visits were by individuals seeking to determine whether their property would be affected. Four calls were to either correct mailing addresses or to obtain digital copies of the Public Notice. One call was from a State Representative's office to clarify that the local cost of the proposal was not from State general funds, but from the Tarrant Regional Water District's flood operation funding. The three additional telephone contacts were to inquire about status of the study and Supplemental EIS.

Of the five letters received, three were from land owners or attorneys representing land owners in the project study area. One individual, although in support of re-opening the oxbow to flows, was not in favor of integrating features of the Riverside Oxbow project because funding has not been authorized for the Riverside Oxbow project, and he was opposed to restoring riparian woodlands on his property. Another individual expressed concern regarding the taking of private lands for public purposes, health hazards, increased flooding in the Riverside Oxbow area for political expediency, project costs, and questioned whether the Corps could participate in small canals that are "essential for a water theme". An attorney representing two land owners suggested that the Supplement No. 1 to the EIS offered an opportunity to correct any alleged flaws in the Final EIS for Central City and to address additional hydraulic storage alternatives, including possible additional valley storage that could be achieved with design of the Samuels Avenue dam site. A scoping letter was received from the U.S. Fish and Wildlife Service, which indicated that changes have occurred within the study areas of the two projects that warrant additional field verification, and that opportunities exist to avoid adverse impacts that would occur with the original Central City Project. The League of Women Voters expressed support for the study as an opportunity to improve Gateway Park and to preserve riverbank trees and restore previously damaged or destroyed forest areas. The League suggested maximizing reforestation in the Oxbow area as a fair balance to the dense urban development expected in the main Trinity Uptown area.

The draft Supplement No. 1 to the Final EIS for the Central City project was filed with EPA and a Notice of Availability was published in the Federal Register on January 4, 2008. Approximately 3000 Notices of Availability were mailed to interested citizens and the document was made available on the Corps' Fort Worth District website, at local libraries, and on CD's available upon request. A Public Meeting was held on January 24, 2008 during the 45-day public comment period which ended on February 19, 2008.

The majority of comments received during the public comment period were in support of the Modified Central City project, specifically supporting the recreational and habitat improvements in the Riverside Oxbow and Gateway Park areas. Some comments were received that expressed concern regarding the effects of the valley storage mitigation sites on existing recreation facilities, neighborhood roads, and public use in the Riverside Oxbow and Gateway Park areas. Comments from agencies such as the Department of Interior Texas Council on Environmental Quality, and Texas Parks and Wildlife were primarily concerned with avoiding impacts to important ecological resources during detailed design and provided specific recommendations regarding habitat development and mitigation design.

Supplement No. 1 to the
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for the
Central City Project,
Upper Trinity River, Texas

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Supplement No. 1 to the Final Environmental Impact Statement for the Central City Project, Upper Trinity River, Texas

Chapter 1 - Authority and Purpose

Study Authority

The initial study effort leading to the Central City and Riverside Oxbow Project Reports was an Interim Feasibility study of the Clear Fork and West Fork of the Upper Trinity River Basin, Fort Worth, Texas. This Interim Feasibility study was conducted in response to the authority contained in the following United States Senate Committee on Environment and Public Works Resolution dated April 22, 1988, as quoted below:

> "Resolved by the Committee on Environment and Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors is hereby requested to review the report of the Chief of Engineers on the Trinity River and Tributaries, Texas, House Document No. 276, Eighty-Ninth Congress, and other pertinent reports, with a view to determining the advisability of modifying the proposal for further studies contained therein, with particular reference to providing improvements in the interest of flood protection, environmental enhancement, water quality, recreation, and other allied purposes in the Upper Trinity River Basin with specific attention on the Dallas-Fort Worth Metroplex.

The study area for that broader investigation generally includes the Standard Project Flood (SPF) floodplain of the Clear Fork and West Fork of the Trinity River from Interstate Highway (IH) 820 in east Fort Worth to the Lake Worth Dam on the West Fork and the Benbrook Dam on the Clear Fork. Site reconnaissance and documentation of existing conditions were completed for the overall study area in the fall of 2001. The Central City Channel Realignment Feasibility Study was completed by TRWD in April 2003 in association with the Texas Water Development Board (TWDB). This study concluded that various configurations of a bypass channel to divert flood flows around the Central City were feasible, and paved the way for furthering the bypass channel concept. During the study process of the Central City project area, the Corps' study authority was modified by Public Law 108-447, dated 8 December 2004, which authorized Corps of Engineers' participation for construction as follows:

> "Sec. 116. CENTRAL CITY, FORT WORTH, TEXAS. The project for flood control and other purposes on the Trinity River and Tributaries, Texas, authorized by the River and Harbor Act of 1965 (Public Law 89-298), as modified, is further modified (Public Law 108-447, Section 116) to authorize the Secretary to undertake the Central City River Project, as generally described in the Trinity River Vision Master Plan, dated April 2003, as amended, at a total cost not to exceed $220,000,000, at a Federal cost of $110,000,000, and a non-Federal cost of $110,000,000, if the Secretary determines the work is technically sound and environmentally acceptable. The cost of the work undertaken by the non-Federal interests before the date of execution of a project cooperation agreement shall be credited against the non-Federal share of the project costs if the Secretary determines that the work is integral to the project."

The Trinity River Vision Master Plan explicitly describes ultimate removal of a portion of the existing levee system as a component of the Vision, and the authorization, being based on the Vision document, provides for said modification to the existing floodway system.

Earlier during investigations under the Interim Feasibility study of the Clear Fork and West Fork of the Upper Trinity River Basin, the Tarrant Regional Water District (TRWD) and the City of Fort Worth (project sponsors), expressed an interest in moving into plan formulation for the Riverside Oxbow area. An Interim Feasibility Report with an Integrated Environmental Assessment was completed for the Riverside Oxbow Project in April 2003. A Finding of No Significant Impact (FONSI) was signed by the Acting Fort Worth District Commander on 22 May 2003. The Interim Feasibility Report recommends implementation of the Locally Preferred Plan (LPP), which consists of the National Ecosystem Restoration (NER) Plan along with additional local features. On 29 May 2003 the recommended Plan for the Riverside Oxbow was approved by the Chief of Engineers. An Addendum to the Riverside Oxbow Interim Feasibility Report was completed in April 2005 that further refines certain features of the Riverside Oxbow Project and changed the extent of the various habitat types to be restored. To date, neither construction funding nor authority for implementation of the Riverside Oxbow Project has been provided by Congress.

Purpose and Need

In 1999, Streams and Valleys of Fort Worth, a citizen organization that works with government and community agencies to improve the Trinity River, published the Streams and Valleys Trinity River Master Plan (SVTRMP). This Master Plan was the result of a broad scale community-based effort to develop a plan for 88 miles of the West and Clear Forks of the Trinity River including Marine Creek, Mary's Creek, and Sycamore Creek. The primary objective of the plan was to preserve the environmental quality of the river while enhancing the quality of life in the surrounding community. Modifications to the floodway levees to provide enhanced public access were another objective of this plan. Study of the Riverside Oxbow Project on the West Fork was initiated at the request of the TRWD at a meeting of the Upper Trinity River Feasibility Study Flood Management Task Force on 20 September 1999, and with approval for modification of the Upper Trinity River Feasibility Cost Sharing Agreement (FCSA) during a meeting of the Upper Trinity River Feasibility Study Flood Management Executive Committee on 24 September 1999. In August 2000, Tarrant Regional Water District (TRWD), in association with Streams and Valleys, the City of Fort Worth, the Corps, and Tarrant County, with assistance from the architecture/planning firm of Gideon Toal initiated development of the Trinity River Vision (TRV) Master Plan under the auspices of the Interim Feasibility Study for the Clear Fork and West Fork of the Trinity River. An important goal of the TRV Master Plan focused on the preservation and enhancement of the river and its corridors so that they remain essential greenways for open space, trails, neighborhoods, wildlife, and special recreation. The TRV Master Plan addressed eight segments of the Trinity River and its tributaries: Central City, Clear Fork (North), Clear Fork (South), Marine Creek, Mary's Creek, Sycamore Creek, West Fork (East), and West Fork (West). The City of Fort Worth approved the TRV Master Plan in May 2003 as a guide for future development along the Trinity River and its tributaries. The City Council also amended the City of Fort Worth Comprehensive Plan and the Park, Recreation, and Open Space Master Plan to incorporate the TRV Master Plan and authorized the Mayor to appoint representatives to the TRV Leadership Council.

The Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow Project, also completed in April 2003, was approved by the Chief of Engineers on 29 May 2003. An addendum, dated April 2005, was completed that changed the extent of the various habitat types to be restored. As has been stated, Public Law 108-447, dated 8 December 2004, authorizes the Secretary to undertake the Central City Project "as generally described in the Trinity River Master Plan, dated April 2003." The Corps' Central City Project Report recommending the Community-Based Alternative was endorsed as being technically sound and environmentally acceptable by the Assistant Secretary Army for Civil Works ASA (CW) on 7 April 2006. Many components of the Community Based Alternative described in the Central City Project Report were developed from the goals presented in Trinity River Vision Master Plan. This Supplement No. 1 to the Final EIS for the Central City Project has been prepared in response to the City of Fort Worth's 22 June 2006 request for the Corps to consider the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow project.

National Environmental Policy Act Requirements

This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and guidance contained in pertinent implementing regulations. NEPA is the primary legislation that sets forth regulations for the consideration of environmental consequences, both beneficial and adverse, in the decision-making process of proposed major Federal actions. Title II of this act created the Council on Environmental Quality (CEQ) and in 1978 the CEQ issued regulations (40 CFR Parts 1500-1508) which established statutes for implementing the provisions of NEPA. This Supplement No. 1 to the Final EIS for the Central City Project (SEIS) serves to fulfill the requirements of NEPA and pertinent USACE regulatory guidance for implementing the procedural provisions of NEPA found in Engineer Regulation (ER) 200-2-2.

Due to the fact that documentation of effects under NEPA on both projects was completed very recently, much of the information regarding environmental setting and problems and opportunities is not repeated within this document. Rather, that background information relative to evaluations contained in this report is incorporated by reference to those recent reports. Detailed documentation of this background information is contained in the Final EIS for the Central City Project dated January 2006, and the Interim Feasibility Report with Integrated Environmental Assessment for the Riverside Oxbow Project dated April 2003 with Addendum dated April 2005. Additional background information is contained, and may be referenced, in the Record of Decision (ROD) for the Central City Project and endorsement of the Central City Project Report, both by the ASA (CW) dated 7 April 2006. Also available for reference are the Finding of No Significant Impact (FONSI) for the Riverside Oxbow Project signed on 22 May 2003 and the Chief of Engineers Report on the Riverside Oxbow dated 29 May 2003.

In addition to the NEPA documentation for the Central City Project and the Riverside Oxbow Project, two other NEPA documents of relevance are also hereby incorporated by reference. Those documents are the Trinity River and Tributaries Environmental Impact Statement (TREIS) and the Programmatic EIS for the Upper Trinity River Basin (PEIS) dated June 2000.

The TREIS was prepared by the Corps in the mid-1980s to address the increase in floodplain development that was occurring in the upper Trinity River basin. The TREIS focused on actions requiring Corps permits under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (CWA) of 1972, as amended, with emphasis on addressing cumulative impacts of granting multiple permits. Two conclusions of this planning effort were that existing regional floodplain management policies were inadequate to maintain existing levels of flood protection within the region's major urban areas and that additional, more stringent, floodplain management criterion were needed. In particular, this effort identified the system's valley storage as a critical element requiring protection through the permitting process. The Record of Decision (ROD) for the TREIS was signed in 1988. The TREIS ROD included hydrologic and hydraulic criteria for actions that require Corps permits, such as the 100-year flood and Standard Project Flood (SPF) water surface elevations along the Clear Fork, Elm Fork, and West Fork of the Trinity River, as well as tributaries that have drainage areas in excess of 100 square miles. The ROD also included criteria for projects in the floodplains of other tributaries of the Trinity River and established guidelines for mitigation of habitat losses resulting from projects in floodplain areas covered by the TREIS.

The Programmatic EIS for the Upper Trinity River Basin focuses on various potential Corps projects that were being investigated or considered at the time. Reasonably foreseeable projects being pursued by other entities within the study area were also identified and potential direct and cumulative impacts resulting from implementation of the entire suite of projects on the human and natural environment were assessed. The document provides a general description of the environmental setting of the Upper Trinity River Basin. The Programmatic EIS for the Upper Trinity River Basin identifies the Clear Fork and West Fork watersheds, inclusive of the Central City and Riverside Oxbow segments, as actively under study at that time for flood damage reduction, ecosystem restoration, and recreation purposes. The previous NEPA documents for the Central City Project and the Riverside Oxbow Project, as well as this Supplement No. 1 to the Final EIS for the Central City Project are "tiered" to the Programmatic EIS.

Public Concerns

Two primary areas of public concern were identified during coordination of the Draft and Final EIS for the Central City Project. These concerns are the public expenditure of funds in general and the potential use of eminent domain to acquire needed real estate. Project costs and acquisition of private lands therefore are considered to be primary areas of public concern to be addressed in this Supplement. Public and agency support was expressed for and compatible recreational access during the planning and coordination of the Riverside Oxbow Project but no major areas of public concern were identified in association with that project.

Study Objectives

Initial evaluation of the Central City Project identified four general categories of problems and opportunities as Flood Protection, Ecosystem Improvement, Urban Revitalization, and Recreation. The objective identified during planning of the Riverside Oxbow Project is Ecosystem Restoration with a secondary goal of Recreation. Corps participation in the development of water resource related opportunities is limited to the primary Federal purposes of Flood Protection and Ecosystem Restoration, with compatible Recreation as a secondary Federal purpose. Any development not considered to be a Federal purpose may be incorporated into the project proposal as the responsibility of the non-Federal or non-Corps project sponsors and/or participants. Those goals and objectives identified during initial formulation remain valid in this current evaluation.

The goals and objectives established for Flood Protection were (and remain) to restore the design level of protection (SPF+4 feet) where it exists throughout the system and to maintain or improve flood protection associated with interior drainage to the floodway system. The objectives for Ecosystem Improvement are to restore, improve, and diversify aquatic habitat associated with the Clear and West Forks of the Trinity River for native aquatic organisms, to improve and increase quantity of emergent wetland habitat for migratory birds of ecological importance, to establish continuity and connectivity within and between regionally and nationally significant ecosystems, and to protect and improve existing pockets of high quality bottomland hardwoods adjacent to the river system.

Urban Revitalization objectives of the project sponsors are to provide aesthetic and recreational focal points for the Central City, encourage a higher density of people living, working, playing, and learning in the Central City, orient mixed use development directed toward the river, create an interior water feature or focal point, provide a higher normal water level, eliminate or modify levees where feasible while maintaining the design level of flood protection, create new and enhance existing linkages to neighborhoods and districts, and to enhance redevelopment potential of Central City lands. Recreation objectives are to provide extensive and direct public access to the river and waterfront, facilitate a water-based system of linkages between Downtown, the Stockyards, and the Cultural District, provide recreational and open space amenities, provide a continuity of urban trails through Downtown consistent with the Trinity Trails system, and to create additional trail linkages with neighborhoods and cultural amenities.

While the original study objectives remain in effect, this supplement is being prepared to analyze the potential effects of modifying the Central City project to incorporate features of the Riverside Oxbow Ecosystem Restoration project and to consider areas within Riverside Oxbow as replacement hydraulic mitigation sites. A further objective of this current analysis is to avoid or at least minimize adverse environmental effects of the approved Samuels Avenue dam site by identifying a potential alternate site.

Chapter 2 - Affected Environment

This chapter describes the area of the affected environment (as displayed in Figure 4) within the Upper Trinity River Basin and outlines its major features and existing conditions with respect to various categories pertinent to this study. A forecast of environmental conditions over a 50-year period of analysis was used as a basis for assessing impacts of the alternatives in Chapter 4. The categories include climatology, geology, physiography, soils, hydrology and hydraulics, vegetative cover, terrestrial resources, aquatic resources, water quality, air quality, cultural resources, socioeconomics environmental justice, and recreation and open space. Comprehensive scientific lists by category have been included in the Final EIS for the Central City Project, the Riverside Oxbow Interim Feasibility Report with Integrated Environmental Assessment, and the Programmatic EIS for the Upper Trinity River Basin. In order to reduce redundant paperwork, consistent with the provisions of the National Environmental Policy Act, those comprehensive lists are not repeated here but are incorporated by reference. The following paragraphs, therefore, are presented to provide brief overview or summary of the affected environment.

Climatology

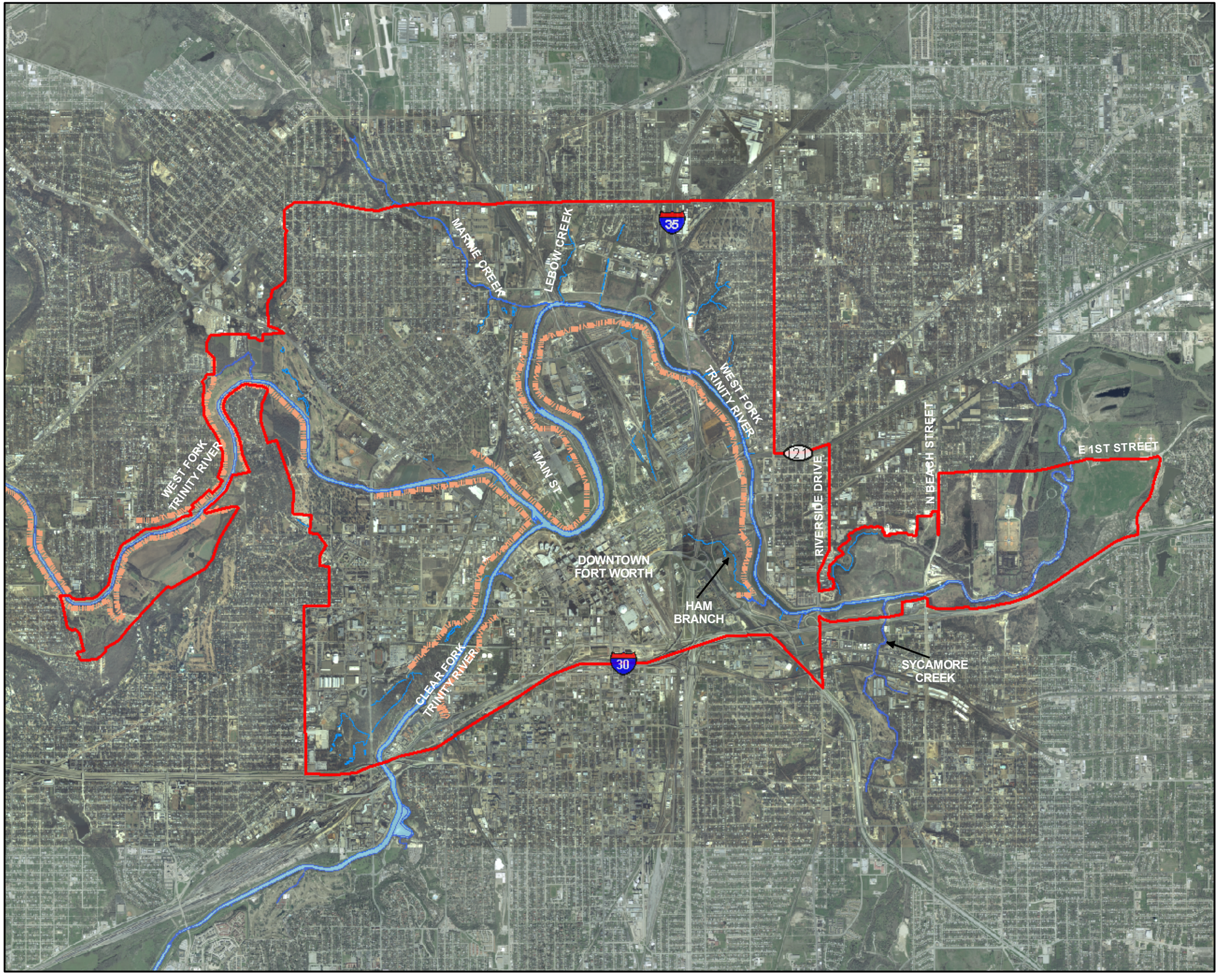
The climate in the Upper Trinity watershed and the study area is humid subtropical with hot summers and mild winters. Snowfall and sub-freezing temperatures are experienced occasionally during the winter season. Generally, the winter temperatures are mild with occasional cold periods of short duration resulting from the rapid movement of cold pressure air masses from the Northwestern polar regions and the continental western highlands. Recorded temperatures at the Dallas - Fort Worth (DFW) International Airport have ranged from a high of 113^0 F in June 1980 to a low of -1^0 F in December 1989. The average annual temperature over the watershed varies from 64^0 F at Bridgeport in the northwestern extremity of the watershed to 66^0 F at DFW International Airport. The mean annual relative humidity for the DFW Metroplex is about 65 percent. The average annual precipitation over the watershed varies from about 30 inches at Jacksboro, in the northwestern extremity of the watershed, to about 32 inches in the DFW Metroplex. The extreme annual precipitation amounts since 1887 include a maximum of 53.54 inches in 1991 at the DFW International Airport and a minimum of 17.91 inches in 1921 at Fort Worth. The maximum recorded precipitation in a 24 hour period was 9.57 inches, at Fort Worth on the 4th and 5th of September 1932. A large part of the annual precipitation results from thunderstorm activity, with occasional very heavy rainfall over brief periods of time. Thunderstorms occur throughout the year, but are more frequent in the late spring and early summer. The average annual evaporation rate is estimated to be approximately 60 inches per year.

Geology

The regional geology of the Upper Trinity River Basin reflects the various depositional phases and environments that took place during Pennsylvanian, Cretaceous, and Quaternary geologic times. The oldest strata, which are exposed in the northwestern reaches of the basin, are Pennsylvanian in age and consist of marine and near shore sand, shale, and limestone strata. Cretaceous strata, consisting of near shore sand and marine shale and limestone are exposed at the surface over most of the Upper basin. The Cretaceous sediments, which dip gently toward the east and southeast, were deposited unconformably over the northwest dipping Pennsylvanian strata after a period of lifting and erosion. The sediments found in the study area as a result of the processes of weathering and erosion of the older rocks during the Quaternary Period are composed of unconsolidated sand, gravel, silt, and clay which comprise the alluvial deposits which occur in the Trinity River floodplain and its major tributaries. The highest terraces located at the outer edge of the floodplain represent the oldest remnant floodplain. Cycles of successive down-cutting produced terraces of lower and younger floodplain levels. Within the study area, three separate terrace levels are recognized. The present floodplain is approximately 20 feet above the river with successively older terraces lying about 50, 70, and 90+ feet above the river level. All three of the terraces correlate with periodic advances and retreat of continental glaciations with resulted in periods of heavy rainfall and low sea levels.

Central City

Figure 4 - Modified Project Study Area



Legend

- MODIFIED PROJECT STUDY AREA BDRY
- STREAMS
- EXISTING LEVEE

N

0 0.45 0.9 1.8 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

ATTENTION

This product is reproduced from geospatial information prepared by the U.S. Army Corps of Engineers. GIS data and product accuracy may vary. They may be: developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised. etc... Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Corps of Engineers reserves the right to correct, update, modify, or replace GIS products without notification. For more information contact the Fort Worth District Planning office.

As of 8/24/2007

Ground water in the terrace and floodplain deposits is hydraulically connected to the river, its major tributaries, and larger lakes. The source is chiefly the infiltration of rainfall on the surface of the alluvial terrace and floodplain deposits. Most of the ground water accumulating in the floodplain deposits is discharged into surface water bodies, evaporated, or transpired. The primary aquifer for most of the ground water production in the study area is the Trinity Group which is of Lower Crustaceous age and consists of two sandstone formations.

Physiography

The study area falls within the Fort Worth Prairies area of the Cross Timbers and Prairies ecoregion of Texas as outlined by Correll and Johnston (1970), Gould (1975), Shinners (1988), Simpson (1988), (Hatch et al. 1990). The vegetation in the region displays tremendous biological diversity as a result of numerous factors, including the region's climatic and geologic variations and its location as a transition zone between the eastern deciduous forests and the central North American grasslands.

Fort Worth Prairie: Although often confused with the Blackland Prairie, the Fort Worth Prairie differs in many minor features. The chief one of these is that the Fort Worth Prairie typically has dark-colored calcareous soils established upon firm, persistent bands of limestone, as opposed to the softer underlying clayey substructure of the Blackland Prairie region. The Fort Worth Prairie, which along with the Lampasas Cut Plains comprises the Grand Prairie, extends as a continuous body of open grasslands, roughly 10 to 30 miles wide, from near the Red River in the north, south about 110 miles to where it ends in the wooded area along the Brazos River near the Johnson County-Hill County line. It is generally level, rolling, and hilly limestone country with extensive shallow or gravelly soils with some areas of deep clay soils. Original plant cover was mid to tall grass prairie broken by an occasional mesquite or juniper (cedar), or rocky places with desert species or endemics.

Soils

The various soil associations found in the study area can also be divided into three general depositional categories: Floodplain soils, river terrace soils, and upland soils. The Trinity River is located in the Fort Worth Prairies area of the Cross Timbers and Prairies vegetative ecoregion. Mollisols are found on the Fort Worth Prairie on various limestone layers and on the Blackland Prairie on rocks of the Austin Group. All these areas have high calcium carbonate levels and consolidated parent rocks. The shallow depth of the soils tend to restrict rooting and soil water storage. Under natural conditions, Blackland Prairies are dominated by grasses such as little bluestem, big bluestem, switch grass, Indian grass, and side-oats grama with narrow fringes of bottomland hardwoods being found along rivers and streams (Nixon and Willet 1974). Within the mainstem segment of the Trinity River, the topography is gently rolling to nearly level and elevations are approximately 400 feet above sea level (USFWS 1989). The predominant floodplain soil is classified as frequently flooded Trinity Clay (Coffee et al. 1980).

Hydrology and Hydraulics

Basic Hydraulic analyses were performed on the West Fork and the Clear Fork of the Trinity River for both the Trinity Regional EIS and the Upper Trinity River Programmatic EIS. The limits of the hydraulic analysis for the model for the West Fork extends from the confluence of the Elm Fork and the West Fork upstream to the Lake Worth Dam and the model for the Clear Fork extends from the confluence of the Clear Fork and the West Fork upstream to the Benbrook Lake Dam.

Water surface profiles were computed for a wide range of flood events including the 1-year, 2-year, 5-year, 10-year, 25-year, 50-year, 100-year, 500-year, and the Standard Project Flood (SPF). The Standard Project Flood is defined as the flood that would be expected from the most severe combination of meteorological and hydrologic conditions that are considered to be reasonably characteristic of the geographical region involved, excluding extremely rare combinations. The SPF usually has a 0.3 to 0.08 percent probability of being equaled or exceeded in any year, and is usually between 40 and 60 percent of a Probable Maximum Flood (PMF). The SPF represents a "standard" against which the degree of

protection for a project may be judged and compared with protection provided at similar projects in other localities.

High watermarks from the June 1989 and May 1990 flood events supplemented with United States Geologic Survey (USGS) gage data were used in the calibration process. The 1991 topographic data represented hydraulic conditions at the time of the June 1989 and May 1990 floods sufficiently to be used without revision for the calibration. The calibrated conveyance models were used as a basis for the development of the Existing Conditions storage models. The storage models were developed for the computation of elevation-discharge-storage ratings used in the hydrologic watershed models for the computation of flood event discharges. Flow areas that were considered ineffective in the conveyance models were included in the storage models to more accurately compute storage volumes. Development of the Baseline models was based on the requirements of the Upper Trinity River Feasibility Study to have certain projects that influence the hydraulic and hydrologic conditions within the floodplain incorporated into the models to form a basis for future hydraulic studies within the Trinity River corridor.

Vegetative Cover

Riparian and Bottomland Vegetation: Bottomlands occur in the transition zone between aquatic and upland ecosystems. Bottomland hardwood systems are considered to be Texas' most diverse ecosystem. Prior to European settlement, Texas had approximately 16 million acres of bottomland hardwood riparian habitat. Today the state has less than 5.9 million acres (Texas Center for Policy Studies 1995). Bottomlands serve several important functions. They contribute to the state's biodiversity. According to the Texas Environmental Almanac (1995), 189 species of trees and shrubs, 42 woody vines, 75 grasses, and 802 herbaceous plants occur in Texas' bottomlands. They are also known to support 116 species of fish, 31 species of amphibians, 54 species of reptiles, 273 bird species and 45 species of mammals. At least 74 species of threatened and endangered animals depend directly on bottomland hardwood systems and over 50 percent of Neotropical songbirds not listed as endangered or threatened are associated with these systems. Besides providing critical wildlife and bird habitat, bottomland hardwood systems 1) serve as catchments and water retention areas in times of flooding; 2) help control erosion; 3) contribute to the nutrient cycle, and 4) play a vital role in maintaining water quality by serving as a depository for sediments, wastes and pollutants from runoff. Despite these important functions, bottomland hardwoods ecosystems are one to the most endangered ecosystems in the United States (MacDonald et al. 1979). For all these reasons, the bottomland vegetation system is of great environmental concern in the analysis of the study area.

Wetlands: Interior wetlands which include bottomland hardwood forests, riparian vegetation, inland freshwater marshes, and the playa lakes of West Texas account for 80 percent of the total wetland acreage in Texas and the vast majority are located on private property. In the last 200 years, Texas has lost over 60 percent of these inland wetlands due to agriculture conversion, timber production, reservoir construction and urban and industrial development.

Open Water Areas: These are bodies of water that retain water on a continuous basis and includes rivers, perennial streams, and small ponds. In most cases there is little or no emergent vegetation and no evidence of any submersed or floating plants, especially within the open water zone. This lack of vegetation is due to a combination of reasons. The banks of these water bodies tend to be relatively steep making it difficult for vegetation to become established. A second reason is the continuous presence of water of varying depths prohibits the growth of most plant species which are not able to tolerate prolonged and/or deep water conditions. A final reason is the lack of light penetration needed to support this type of vegetation as the water in the ponds located within the floodplain is extremely turbid due to the continual addition and stirring of sediments resulting from rainfall events and runoff. Because the Trinity is an urban river and a main artery for a series of reservoirs, the amount and quality of water it receives is influenced by more factors than just upstream and local rainfall amounts.

Upland Vegetation: Open grasslands are located on upland sites and within the manicured floodway. Common grass species include purple threeawn, King Ranch bluestem, side-oats grama, Japanese brome, windmill grass, Bermuda grass, jungle rice, barnyard grass, plains lovegrass, perennial

rye grass, Texas winter grass, Dallis grass, annual bluegrass, and Johnson grass. A few remnant stands of mature post oak forest with openings dominated by little and silver bluestem may still be found in some high floodplain terraces and upland slopes of that portion of the study area which falls within the Cross Timbers and Prairies ecoregion.

During studies of the identified Central City and Riverside Oxbow projects, detailed vegetation and land use analyses were conducted. "Existing Conditions" were described and the "Future Without a Corps of Engineers Project Conditions" were forecast and discussed in the respective project reports. During this evaluation, revision of the previous analyses was required to a greater level of detail in some cases to assure avoidance of important resources on sites that would not have been affected by the prior valley storage requirements and to establish a similar level of detail for the study area. For example, the analysis conducted on the original Riverside Oxbow was based upon spectral analysis and limited ground-truthing to meet funding and time constraints for that study as compared to more detailed analysis with significantly more ground-truthing for the original Central City Study. Existing vegetation mapping for the Riverside Oxbow study was upgraded to match the level of analysis conducted for Central City. In addition, two additional areas that were not included in either of the previous study areas may potentially be affected by fill. One site is located on an existing closed sanitary landfill on the east side of the West Fork of the Trinity River just east of Gateway Park. The other potential fill site is within an old limestone quarry near North Interstate Highway Loop 820 near Meacham International Airport. Vegetation/land use mapping of both these sites was conducted solely for impact assessment as no habitat development would be feasible in these two sites. The vegetation data and mapping outputs for the study area are stored electronically and maintained by the Fort Worth District. See Figure E-1 of Appendix E for revised map of the vegetation of the entire study area. Table 2-1 summarizes the vegetative conditions determined during the current study.

Table 2-1
Vegetation Type or Land Use (acres) Within Central City and Riverside Oxbow Study Areas

	Disturbed	Forbland	Grassland	Grassland Savannah	Riparian Forest	Upland Forest	Shrub land	Water	Emergent Wetland
Central City	1827.6	0.0	2313.8	17.4	314.8	535.4	1.3	299.6	14.9
Riverside Oxbow	172.3	8.6	509.3	16	278	68.3	44.4	84.6	19
Total	1999.9	8.6	2823.1	33.4	592.8	603.7	45.7	384.2	33.9

Wildlife

The river channel, wetlands, open water areas, and bottomland hardwood forests support a variety of wildlife species for cover, food, and den or nesting sites. Bird species which were observed or have been reported in the area include migratory warblers, sparrows, meadowlark, mourning dove, crow, red-tailed hawk, red-shoulder hawk, American kestrel, herons, egrets, mallard, wood duck, blue-winged teal, green-winged teal, lesser scaup, grackle scissor-tailed flycatcher, kingbird, logger-head shrike, black bird, swallows, blue jay, chickadees, downy woodpecker, red-bellied woodpecker, and barred owl. Amphibians, reptiles, and mammals common to the area include frogs, toads, snakes, turtles, cottontail rabbit, cotton rat, field mice, opossum, raccoon, bobcat, beaver, nutria, and coyotes.

Wildlife habitats along the Clear Fork have been significantly altered and clearing of riparian vegetation has eliminated much of the terrestrial habitat; however, riparian corridors are still used by waterfowl, shorebirds, and mammals such as beaver and nutria. Wildlife species found along the Clear Fork are similar to other segments or streams located within the study area. The West Fork area contains a large resource base, which includes terrestrial, open water, and wetland habitats within the study area, such as the raccoon, striped skunks, grey and red foxes, coyote, bobcat, cottontail and swamp rabbits, fox squirrels, beaver, nutria and numerous small rodents and insectivores. A similar situation exists for birds and aquatic species. Species that are sensitive to human activity have declined, due to development along the corridor, while tolerant species; such as the house sparrow and red eared slider

(turtle) have flourished. The West Fork is home to a vast number of bird species. Both year-round residents (most significantly the wood duck) and migratory species (such as, waterfowl and warblers) rely on the resources that this area provides for survival. Turkey and white-tailed deer have recently been noted as increasing in distribution throughout both stream reaches.

Existing habitat conditions were determined by utilizing the U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP). HEP utilizes models selected to reflect the potential usability of each habitat type being evaluated. Specific parameters are measured in the field as required by the models used. Computation of habitat suitability is done for each species modeled at each field site. Habitat suitability varies from 0 to 1.0 with 1.0 reflecting the best suitability that could be expected within this ecoregion. Finally existing habitat quality is determined by multiplying the average habitat suitability for a habitat type by the number of acres of that habitat type. As this study was complex and covered a large area that is anticipated to have significantly varying existing and future without a project conditions, several study reaches were evaluated. A detailed discussion of the analysis conducted is contained in Appendix E of this SEIS as well as in the US Fish and Wildlife Service planning aid letters and Fish and Wildlife Coordination Act reports attached to this SEIS.

Threatened and Endangered Species

According to USFWS (2005), three federally listed threatened or endangered species could occur within the project area in Tarrant County Texas. In June 2007, the USFWS officially down-listed the bald eagle so the remaining federally listed species that might occur in the project area are the Interior least tern and the whooping crane as indicated in Table 2-2.

Table 2-2
Federally Listed Species, Upper Trinity River

Common Name	Scientific Name	Status	Distribution
Interior least tern	*Sterna antillarum*	E	Statewide/migrant/localized nesting Dallas County
Whooping crane	*Grus Americana*	E	Migrant - western basin

Aquatic Resources

Existing water quality in the project area is primarily influenced by base flows from upstream Lake Benbrook and Eagle Mountain Lake releases, urban runoff from upstream adjacent watershed areas, and the check dams at various locations along the watercourse. More details about existing water quality conditions were previously identified in the environmental discussion documented in the Final EIS for the Central City Project and the Riverside Oxbow Interim Feasibility Report with Integrated Environmental Assessment.

Water Quality and Designated Uses: According to the Draft 2004 Texas Water Quality Inventory Status of All Water, November 23, 2004 the immediate study area is designated for aquatic life use, contact recreation use, general use, fish consumption use, and public water supply use . The immediate study area is located in stream segments *0806 West Fork Trinity River below Lake Worth* and *0829 Clear Fork Trinity River below Benbrook Lake*. West Fork Segment 0806 extends from the Lake Worth dam in west-central Tarrant County downstream to the confluence of Village Creek in east-central Tarrant County. Segment 0806 is approximately 33 miles long and, and a relatively large portion of the project study area lies within the middle reach of this segment. Clear Fork Segment 0829 is located in Fort Worth and extends from Benbrook Lake dam in southwest Tarrant County, downstream to the confluence with the West Fork Trinity River. The study area on Clear Fork includes approximately 2 miles upstream from its confluence with the West Fork of the Trinity River. TCEQ has designated segments 0806 and 0829 as fully supporting their designated use for public water supply and general use (which includes parameters of pH, chlorides, sulfates, and total dissolved solids) . TCEQ has indicated that the water quality of assessed portions of Segments 0806 and 0829 are either "fully supporting" aquatic life use or of "no concern" to aquatic life use. However, TCEQ has deemed both segments as not supporting fish

consumption because of PCBs and chlordane in fish tissue. Fishing is not prohibited, but State law prohibits the possession of fish from water bodies with consumption advisories. Therefore, any fish caught must be released. There have been three fish kills documented in the West Fork Segment 0806 occurring from August 1996 to April 2000. Only one of these fish kills occurred in the vicinity of the project area (August 9, 1996). TCEQ has not fully assessed Segment 0829 with regard to contact recreation (such as swimming where there is a concern of water ingestion), but has determined that Segment 0806 does not fully support contact recreation because bacteria presence/counts in lower 22-mile segment portion. More details regarding designated uses are listed in the Final EIS for the Central City Project, the Riverside Oxbow Interim Feasibility Report with Integrated Environmental Assessment.

Water Quality Aesthetics: Aesthetics of the water course depend on water appearance, odor, and taste (if a potential drinking source). Water color and clarity in the general vicinity of the study area are similar to most portions of the Trinity River through Fort Worth. On occasion, stream water becomes occasionally turbid with suspended sediment following heavy rainfall events. Algae at certain times of the summer months are visible. In deeper impounded areas of the stream, the water may stratify in late summer and subsequently lead to notable odor changes in late fall as water in the stream impoundments overturn due to thermal changes and/or inflows from storms. TCEQ has stated that a mid-reach portion of existing waters on Clear Fork below Lake Benbrook and upstream of the project area is of "no algal growth concern" but the other two portions, one 4-mile segment immediately below the dam and one 1-mile segment above the West Fork confluence were "not assessed" regarding algal growth. TCEQ did not assess the Trinity West Fork immediately below the Lake Worth dam through most of the project area, but did indicate that there is an "algal growth concern" in the downstream 22-mile reach beginning near 4th Street and extending to Village Creek confluence.

Aquatic Habitat: The types of aquatic systems that are in the Upper Trinity River drainage area include wetlands, shallow ponds, oxbow lakes or their remnants, flooded sand and gravel quarry operations, large water supply reservoirs, second and third order streams, and larger river systems such as the Trinity River. Streams throughout the study area exhibit a wide variety of physical characteristics. Many of the smaller order streams have an annual detectable velocity and contain abundant typical riffle-run-pool complexes, while some of the larger aquatic systems are long, continuous unbroken channelized segments or a series of long interconnected pools with low exchange rates like the Clear Fork of the Trinity River. Physical features in an aquatic system which yield high aquatic habitat values are those which either directly or indirectly support some aspect of an aquatic organisms life history. Examples of these are features or objects that provide spawning substrate, shelter, food, or improve the water quality. Specific aquatic features include overhanging vegetation, stable stream banks with irregular features, silt-free, gravel or sandy bottom and in-stream structures. Aquatic systems of the study area range from sites that have very low quality and are virtually devoid of any habitat, to systems that are ecologically and structurally diverse having a great number of features representative of habitat value ecosystems.

Overhanging vegetation can provide shade, food, shelter or temperature moderation. Stream canopy cover can be anywhere from very heavy and thick around the headwater and lesser developed areas to nonexistent in sections of the streams and rivers which have been highly disturbed and developed. Stream banks in the study area range from being extremely steep and deeply incised around sections of the mainstem river and higher order streams, to the gently sloped banks which contain lower order streams and the mainstem river enclosed within levees. The composition of bank material in the study area includes concrete, calcareous rock, limestone rip rap, clay, loose silty mud, gravelly alluvium conglomerate, and urban refuse. Bottom substrate is important for providing shelter, food organisms, and spawning areas. Sand, clay mud, fine silt, sorted and unsorted small to large unconsolidated gravel, concrete, and solid limestone bedrock can be found comprising the bottom of the aquatic systems in the study area. The composition of stream bottoms throughout the study area is extremely variable ranging from areas that have clean, well-sorted gravel bottoms that provide excellent habitat for spawning and food such as the upper reaches of the small tributaries, to sites like the Trinity River mainstem that are primarily mud and silt and have little aquatic habitat value.

In-stream structure provides cover, resting areas, havens for food organisms and spatial reference points for higher aquatic organisms. In-stream structure of various types can be found

throughout the study area, some desirable and some less so. Common in-stream structural habitat features of aquatic systems in the study area include: snags, dead-fall trees and branches, rock-shelf outcrops, overhanging terrestrial vegetation, low water dams, bridge pilings, concrete slabs and rip-rap placed for shoreline and bank stabilization.

A detailed analysis of aquatic systems within the Central City study area was conducted by the U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department and the U.S Army Corps of Engineers. Aquatic Index of Biotic Integrity was determined for the Clear Fork and West Forks of the Trinity River, Marine Creek, Lebow Creek and Ham Branch. High quality habitat was found in the lower reaches of Marine Creek and Lebow Creeks and moderate scores were found higher in those streams, in Ham Branch and in parts of the Trinity River reaches. From these scores habitat suitability was derived and utilized to assess existing and future with and without project conditions. A detailed description of that aquatic analysis is contained in the main body of the Central City FEIS and within the Environmental Appendix to that report.

Aquatic conditions within the Riverside oxbow portion of the study area were not addressed as extensively as there were no substantial modifications proposed that would impact those resources. New aquatic resources were proposed, but the values that were attributed to these new resources were reflective of potential gains that could be expected to be obtained from similar aquatic habitat development on a regional basis.

Air Quality

This proposed project is located within EPA Air Quality Control Region (AQCR) 215 for the state of Texas. AQCR 215 consists of 19 counties including Dallas, Denton, Collin, and Tarrant counties, Texas. The EPA uses six “criteria pollutants” as indicators of air quality. These six are particulate matter, sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, and lead. AQCR 215 is classified as a non-attainment area for the eight-hour ozone standard (0.08 parts per million determined as average for 8-hour period) and as an attainment/unclassified area for all other criteria pollutants (particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead). Other information concerning these criteria pollutants are documented in Final EIS for the Central City Project and the Riverside Oxbow Interim Feasibility Report with Integrated Environmental Assessment.

Noise

The study area is located adjacent to Downtown, but is generally buffered from the main urban traffic noises. The western portion of the study area is located primarily in commercial retail/industrial land use area with outlying residential areas. Localized low speed traffic crosses the study area on Seventh, Henderson, Northside and Main Streets. On-going construction near the study area has increased the background sound level temporarily. Traffic conditions vary but generally are more intense during morning and evening rush hour periods. Traffic on I-30 and I-35 generally travels at higher speeds and often consists of trucks in addition to automobiles. The study area lies within the southern flight path of Fort Worth Meacham International Airport and is east of the Naval Air Station Joint Reserve Base Fort Worth. The eastern portion of the project area, also known as the Riverside/Gateway Park Area, is primarily vacated floodplain and parkland areas with adjacent residential areas. Noise in the Riverside/Gateway Park Area is primarily associated with adjacent residential traffic and park activities with some contributing highway noise from I-30. The Riverside/Gateway Park Area is generally considered to be a quieter environment than the western portion of the project area. No sound monitoring data or other existing background noise information are currently available for the study area.

Hazardous, Toxic, and Radioactive Waste

The Final Environmental Impact Statement (EIS) for the Central City Project, Appendix D dated January 2006 and the Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow Project were reviewed for technical adequacy, completeness, accuracy, and continuing relevance to the project. Upon review, the reports demonstrated a comprehensive breakdown of the

current land uses and expected challenges in the study area. To this end, the reports provide a framework and priority for conducting the needed future site characterizations. To date, the U.S Army Corps of Engineers has received continuing project updates from the Tarrant Regional Water District. From this information, it is concluded with confidence, that information contained within the reports are still relevant, have not changed appreciably, and continue to provide accurate information on expected project conditions. The recommended actions stated in the reports will provide a clear and manageable plan for achieving a project that will eventually pave the way for a cleaner Fort Worth.

Cultural Resources

Cultural resources are defined as the broad pattern of events, real properties, and cultural lifeways or practices that have significance to humans. Buildings and places where significant events occurred, archeological sites containing significant information about human activities, traditional places or activities that hold special significance, and folkways which are practiced as either cultural or life sustaining, are all part of the broad spectrum of cultural resources. These resources are usually identified through visual survey, a variety of excavation techniques, and through consultation with federally recognized Native American tribes who historically used, or continue to use the study area.

Surveys conducted in support of the Central City project, the Riverside Oxbow project and other undertakings carried out by various agencies indicate that the majority of cultural resources within the Upper Trinity River consist of prehistoric and historic archeological sites, as well standing structures with historic significance. No Traditional Cultural Properties or Sacred Sites have been identified by any Native American Indian tribal group as occurring within the Upper Trinity River area, however, properties of this type are not easily identifiable because of the non-specific nature of the site or its associated significance as identified by its Native American Indian participants. In addition, many tribal groups are reluctant to reveal such locations to non tribe members, therefore it is possible that TCPs and/or sacred sites could exist within the project vicinity but have not yet been identified. While it has never been demonstrated, it is possible that cultural resources of significance to maintaining traditional lifeways to groups other than Native American Indians may be identified within the Upper Trinity River project area as well.

Socioeconomic Setting

The socioeconomic assessment for the original Central City EIS found that the study area, as defined in that document, is predominantly Hispanic with several Census blocks displaying populations that are predominantly black. The inclusion of the Riverside Oxbow project does not significantly change the racial and ethnic composition of the study proposed in the Central City EIS. While there is essentially no one living within the actual footprint of the Riverside Oxbow project, the boundary does intersect two Census blocks containing subdivisions that may be potentially impacted due to their proximity. The following is a revision of the Central City study area demographics amended to reflect the addition of the Riverside Oxbow project. The revised study area adds two Census blocks that intersect the Riverside Oxbow project. A detailed analysis of the revised study area demographics is contained in Appendix C to this SEIS.

As was noted in the original Central City EIS, total population for Tarrant County increased almost 24 percent from 1990 to 2000 while the total population for the original study area increased by five percent. The Riverside Oxbow area increased by 28 percent between 1990 and 2000, giving the new study area an increase of 6.4 percent. All ethnic groups saw increases in population in Tarrant County with the Hispanic population having the largest, an increase of 113 percent. The Hispanic population increased almost 25 percent in the original study area and increased almost 200 percent for the Riverside Oxbow area. The revised study area Hispanic population increased by 28.2 percent.

The following table (Table 2-3) depicts the racial and ethnic makeup for Tarrant County, the Central City study area, the Riverside Oxbow area, and the combined study area for the years 2000 and 1990.

Table 2-3
Racial Composition – County, Original Study Area, Riverside Oxbow Area, and Combined Study Area

	Tarrant County				Original Study Area			
	1990		2000		1990		2000	
Total Population	1,170,103	100.0%	1,446,219	100.0%	36,932	100.0%	38,945	100.0%
Male	578,095	49.4%	713,549	49.3%	19,245	52.1%	20,409	52.4%
Female	592,008	50.6%	732,670	50.7%	17,687	47.9%	18,536	47.6%
Hispanic	133,979	11.5%	285,338	19.7%	18,930	51.3%	23,658	60.7%
White	859,883	73.5%	895,446	61.9%	11,348	30.7%	10,373	26.6%
Black	140,512	12.0%	180,457	12.5%	6,078	16.5%	4,275	11.0%
Asian, Hawaiian, PI	29,175	2.5%	52,303	3.6%	285	0.8%	306	0.8%
American Indian	5,575	0.5%	6,856	0.5%	189	0.5%	171	0.4%
Other	979	0.1%	25,819	1.8%	116	0.3%	162	0.4%

	Riverside Oxbow				Combined Study Area			
	1990		2000		1990		2000	
Total Population	1,602	100.0%	2,053	100.0%	38,534	100.0%	40,998	100.0%
Male	868	54.2%	1,091	53.1%	20,113	52.2%	21,500	52.4%
Female	734	45.8%	962	46.9%	18,421	47.8%	19,498	47.6%
Hispanic	375	23.4%	1,095	53.3%	19,305	50.1%	24,753	60.4%
White	1,123	70.1%	910	44.3%	12,471	32.4%	11,283	27.5%
Black	18	1.1%	11	0.5%	6,096	15.8%	4,286	10.5%
Asian, Hawaiian, PI	56	3.5%	0	0.0%	341	0.9%	306	0.7%
American Indian	30	1.9%	22	1.1%	219	0.6%	193	0.5%
Other	0	0.0%	15	0.7%	116	0.3%	177	0.4%

Average household income for the original study area was 32 percent less than the county in 1990 and 25 percent less than that of the county in 2000. The Riverside Oxbow area was almost 39 percent less than the county in 1990 but the gap shrunk to just over 10 percent in 2000. The patterns for the revised study area are very close to that of the original study area. The percentage of the population in Tarrant County living below the poverty level was eleven percent for 1990 and declined slightly to 10.6 percent in 2000. The original study area had 31.4 percent of its population living below the poverty level in 1990 and decreased to 22.4 percent in 2000. The Riverside Oxbow area by contrast, had 20.1 percent of its population living below the poverty level in 1990. The percentage living below the poverty decreased to 15.6 percent in 2000, a larger drop relative to the county. The study area is within a percentage point of the original study area in both 1990 and 2000.

In 1990, almost 28 percent of the population of the original study area had less than a ninth grade education of those 25 and over. This compares with only 7.4 percent of the population 25 and over for Tarrant County. Almost 26 percent of the population of the Riverside Oxbow area had less than a ninth grade education in 1990. The Riverside Oxbow area also had substantially lower rates of college attendance than the county as a whole. The combined study area had roughly the same educational pattern as the original study area.

The unemployment rate for Tarrant County for 1990 stood at 5.7 percent while the rate for the original study area was 11.9 percent (11.7 percent for the combined study area). The Riverside Oxbow area was 8.6 percent. In 2000, the unemployment rate for Tarrant was 4.6 percent for the combined area, 9.8 percent for the original study area (9.5 for the revised), and 3.9 percent for the Riverside Oxbow area. The original and revised study areas have lower home ownership rates than the County. The study area sees slightly higher average values for owner occupied housing compared to the original study area due to slightly higher values for the Riverside Oxbow area.

A forecast of population estimates has been developed by the Texas State Data Center for use in measuring economic growth. Because this forecast also provides population increases by ethnicity, it is useful here in demonstrating long term shifts in population makeup. Table 2-4 reflects estimates from the current 2000 Census levels and as projected thru 2000, 2010, 2020, and 2030.

Table 2-4
Predicted Population Growth for Tarrant County by Ethnicity

County	Year	Total	Non-Hispanic White	Hispanic	Non-Hispanic Black	Non-Hispanic Other
Tarrant	1990	1,170,103	858,901	139,886	138,608	32,708
	2000	1,446,219	908,197	285,290	188,144	64,588
	2010	1,662,880	911,369	430,915	225,189	95,407
	2020	1,896,328	886,652	617,564	260,444	131,668
	2030	2,153,223	829,786	858,506	290,030	174,901

In general, Fort Worth had a 2000 census population of 534,694 persons. The 2003 population estimate is 585,122, an increase of 50,428 persons. Current individual households for the city were 195,078 and 534,019 for Tarrant County in 2000. Vacant land within the city limits is currently at 49 percent of the city's 348 total square miles. Approximately 24 percent, 84 square miles, of the total land base were developed residential lands in 2005 and 15 percent, 52 square miles, were utilized for employable facilities. A total of 34.8 additional square miles is either part of dedicated parklands, or within the floodplain margins of the West and Clear Forks of the Trinity River. Employment in the City of Fort Worth in 2000 was 240,119, an increase of 33,152 since 1990. Unemployment for the City of Fort Worth was 6.0 percent of the employable labor force (256,942) living within the city limits.

Environmental Justice

On February 11, 1994, President Clinton issued Executive Order (EO) number 12898, "*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*." The order states in general that Federal agencies shall specifically analyze environmental effects of Federal actions, including health, economic, and social effects, on minority and low-income populations, as part of the analysis prepared for the National Environmental Policy Act (NEPA). The EO is designed to focus the attention of Federal agencies on the disproportionate impacts to health or environment that could result from undertakings in areas of minority and/or low income communities. Further, agencies are directed to identify potential effects and possible mitigation measures in consultation with the identified affected communities. In order to determine these potential impacts to minority and/or low-income populations within the study areas that are planning or participating in projects described in this SEIS, the information obtained from a review of the existing demographic and census data should be combined with a series of community participation meetings designed to draw responses from segments of the community which typically will not be responsive to traditional NEPA information requests and meetings.

As part of the collection of existing socioeconomic conditions, the Interagency Working Group (IWG) on Environmental Justice guidelines were consulted to assist in the assessment of minority and low-income populations that could be impacted by planned, proposed, or potential future, projects. The IWG guidance specifically notes that the minority population in the affected area should be meaningfully greater than the general population, or area of geographic analysis. The specific guidance suggests that the minority population in the affected area exceed 50 percent of the general population. The consideration for determining low-income populations is taken from the Bureau of Census reports as suggested by the IWG guidance. The review of existing general demographic and census data has identified potential areas where the criteria for minority and/or low-income populations may occur within

planned or potential project areas. While the general demographic data and a large portion of the aggregated census information reviewed may mask specific locations of populations where environmental justice may be of concern, it is possible to draw some inferences which allow the identification of specific areas which should be specifically sought out to determine what the project effects may be on the population and how to avoid disproportionate application of project impacts.

Within the study area associated with the Central City and Riverside Oxbow Projects, a number of areas within a core portion of the central portion of Fort Worth indicates areas of low income and/or poverty. Median income for census tract 1017 nearest the center of Fort Worth was $9,273. This tract, plus census tracts 1008, 1010 1017, 1012.02, and 1018 all indicate higher percentages of Hispanic and African-American populations and meet the criteria for specific consideration as minority communities that have the potential to be impacted by potential future projects in the area. Each of these areas and portions of the surrounding geographic areas should have a community outreach and participation to ensure potential issues are identified.

Recreation and Open Space

Public Use of Rivers, Tributaries, and Corridors. The study area is located within Region 4 of the Texas Outdoor Recreation Plan (TORP), which is prepared and coordinated by the Texas Parks and Wildlife Department. The most scenic wooded areas in Region 4 are often found in stream and river corridors. Scenic corridors along the Trinity, with natural meandering watercourses bordered by riparian hardwoods or dense stands of trees and shrubs, are the most desirable segments of the river and the portions most intensely used by the recreating public. Use of these segments is the heaviest during higher stream flow periods, generally during the spring and fall seasons. Recreation providers have expressed concern over stream bank erosion, instream flows and the quality of the water for contact recreation. Minimum instream flows are also needed to preserve fish and wildlife habitat and historical and recreational resources.

Recreational Needs. While there are substantial amounts of open space and recreational facilities available to the residents of the study area, projections show that the demand for these facilities is continuing to increase. Fresh water fishing, swimming, and picnicking will attract the most participation in the region for resource-based activities. Participation in urban oriented activities projected for 1995 were over eight times as high as the participation in resource based activities in the region. This ratio is one of the highest in Texas. Texans from outside Region 4 will have little impact on the region's resources.

Increases of more than 100 percent over existing supply are needed for five facilities (hiking, horseback, and multi-use trails, playgrounds, and freshwater swimming areas). Multi-use trails are the highest need followed by freshwater swimming, playgrounds, and hiking trails. Public recreation providers in the region have repeatedly expressed a need for more parks and passive open space. In recent years, park land and open space have become increasingly scarce as available sites have been reduced. Rapid development has replaced many natural areas with buildings and pavement. Most park providers have identified undeveloped land as their highest priority need (park sites, open space, and greenbelt acquisition). The next greatest need expressed is for upgrading facilities.

The cities and counties in the region have specific plans to acquire additional lands to meet future public recreational demands. Most of the larger municipalities and county governments have bond funded open space acquisition programs. Proposed acquisitions are usually dependent on the availability of public funds and are influenced by private development pressures and development permit approvals.

Chapter 3 - Alternatives

The Fort Worth District, U.S. Army Corps of Engineers (Corps), initiated evaluations of the technical feasibility and environmental acceptability of modifying the Central City project to incorporate features of the Riverside Oxbow project at the request of the City of Fort Worth. Cursory investigations by the Corps at the outset indicated that there could be merit in modifying the Central City project. In response to the proposal by the City of Fort Worth, alternatives considered in this Supplement include the No Action alternative, which assumes that each project would proceed separately as currently approved, and a Modified Central City alternative which has been formulated to incorporate the Riverside Oxbow project area to accommodate valley storage requirements. The Central City Project is described in detail in the Final Environmental Impact Statement for Central City and is defined as the Community Based Alternative in that document. The Riverside Oxbow Ecosystem Restoration Project is described in detail in the Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow, Upper Trinity River, Fort Worth, Texas. The Riverside Oxbow project is defined as the Locally Preferred Plan in that document. An addendum to the feasibility report, dated April 2005, was completed which revised the recommended project. A detailed description of each project will not be repeated here but each is summarized to the extent necessary to understand the differences in the alternatives.

It should be noted that during early evaluation of the City of Fort Worth's request to evaluate incorporating the Riverside Oxbow project area to accommodate valley storage requirements it became apparent to the study team that the location of the Samuel Avenue Dam should be reevaluated for geotechnical and environmental reasons. The geology of the originally proposed site is not ideal for that feature and the location would cause adverse effects to the aquatic and riparian systems. Therefore, the location of Samuels Avenue Dam has been reevaluated during the formulation of the Modified Central City alternative.

No Action Alternative

The "No Action" Alternative would be to continue with implementation of both the Central City project and the Riverside Oxbow project as they are currently described in their respective project reports. The Corps portion of the overall Central City project is authorized and funded for construction by Section 116 of Public Law 108-447. Although the Riverside Oxbow project is not currently authorized or funded for construction it or a variant of it is expected to be implemented.

For the "No Action" alternative, Corps of Engineers participation in the Central City project is limited by law to $110,000,000 and the total cost of features in which the Corps may cost share is limited to $220,000,000. Costs for the recommended Riverside Oxbow project were estimated in October 2002 to be $22,198,000 with the Corps share estimated at $9,178,500. The Addendum to the Riverside Oxbow Project Interim Feasibility Report, approved in April 2005 (still based on October 2002 price levels) modifies those costs to $20,797,000 for the total project and a Corps share of $8,280,300. Therefore, the total cost of features that the Corps can participate under the "No Action" alternative is estimated at $240,797,000, and the Corps share is $118,280,300 prior to any adjustments for inflation. When updated to 2005 dollars for comparative purposes for this SEIS, total cost of the Riverside Oxbow becomes $23,625,413 with a Federal cost of $9,426,540. Updated costs for the portion of the "No Action" alternative in which the Corps is authorized to participate are $243,625,413 total cost and $119,426,540 Federal cost in 2005 dollars.

The original Central City project, as part of the No Action alternative, requires hydraulic storage to compensate for the shortened channel length and the resultant increased stages or water surface elevations. Valley storage sites are located on the West Fork and include primarily the Riverbend site and in smaller areas near University Drive and upstream of Riverside Park. With these valley storage sites, construction of the original Central City project as part of the No Action alternative would attain an SPF +4 design level of protection throughout the project work areas. Although flood control modifications have not been constructed to provide an SPF level of protection, the Riverside Oxbow project includes planting densities and flow conveyance measures which assure that the project will not increase existing

flood elevations. Therefore, the No Action alternative, which assumes both projects to be implemented independently, would provide 100% of the required valley storage and would be in full compliance with the criteria established by the Trinity Regional EIS and the North Central Texas Council of Government' s (NCTCOG's) Corridor Development Certificate program.

The Central City Project is authorized for construction and the Riverside Oxbow Project as described in the Addendum to the feasibility report are considered part of the No Action alternative. No project purpose would be added or deleted with the implementation of the No Action plan. No further approval is required by or within the Corps or by the Assistant Secretary of the Army for Civil Works (ASA(CW)) for implementation of the No Action alternative. Additional authorization by Congress is required for implementation and funding of the Riverside Oxbow Project. The following paragraphs in this section provide brief descriptions of both projects as they are currently approved and as they are considered for the No Action alternative. More detailed descriptions can be found in the Project Reports and NEPA documentation for each project.

Central City Project Description

The bypass channel for the original Central City project is approximately 8,400 feet long and approximately 300 feet wide between the top of levees and would be approximately 15-30 feet below the existing grade. The channel would extend from the Clear Fork downstream of West Seventh Street to the West Fork, intersecting the West Fork approximately 2,600 feet upstream of the existing confluence with the Clear Fork. The channel would continue to the northeast and rejoins the West Fork 8,500 feet downstream of the existing confluence with the Clear Fork. Water levels in the bypass channel and adjacent waterways would be controlled by a dam located on the West Fork of the Trinity River just east of Samuels Avenue Bridge and would include adjustable gates designed to open downward, thus lowering the crest to allow major flood events to pass. The normal crest would be at 524.3 feet NGVD, and the dam is designed to maintain normal water levels of approximately 525 feet NGVD in the bypass channel and interior area. Three isolation gates would be located upstream at the confluence of the bypass channel and the Clear Fork, at the midpoint of the bypass channel and the West Fork confluence, and downstream at the confluence of the bypass channel and the West Fork. These gates are designed to protect the interior area east of the bypass channel from flood flows during large events.

Construction of the bypass channel, dam, and isolation gates would allow approximately two miles of the existing West Fork Trinity River to function as a controlled, quiescent watercourse. A water feature or urban lake, approximately 900 feet long, is proposed for the interior area. The interior water feature would extend from the bypass channel southeast to the existing West Fork and Clear Fork confluence of the Trinity River. Six bridges are proposed for the project, including four vehicular bridges and two pedestrian bridges. Vehicular bridges are proposed over the bypass channel at North Main Street, over the bypass channel and the Fort Worth and Western Railroad (FW&W Railroad) at Henderson Street and White Settlement Road, and on the White Settlement Road extension over the interior water feature. Two pedestrian bridges are also proposed, across the bypass channel downstream of Henderson Street, and across the West Fork, approximately 500 feet upstream of the existing FW&W Railroad Bridge. The project also includes proposed modifications to University Drive, which would effectively raise the roadway approximately 10 feet from existing grade and out of the 100-year floodplain. The proposed modifications begin north of the existing bridge over the West Fork extending to Jacksboro Highway (State Highway 199).

The Trinity Uptown Plan describes additional features which could be added to the project area by private developers once the infrastructure components have been implemented. These features represent the full maturation of the urban design. As such, they are a statement of design intent rather than a set of specific proposals having identified proponents. The actual private market response to the project could, in fact, take an infinite variety of forms over the anticipated 50-year build out period. Although it is impossible to predict with certainty the final outcome of future private development, the Trinity Uptown Features do represent the best description of the future development scenario anticipated. As such, and in order to meet the purpose of NEPA to disclose as fully as possible the impacts of all reasonable alternatives to both the decision-maker and the public, these features were used in the

Central City EIS as the basis for assessing impacts of actions related to and stemming from implementation of the Central City Project.

The Central City project would require approximately 5,250 acre-feet of additional valley storage to accommodate flow alterations caused by the project's configuration. That additional valley storage is provided for primarily in the Riverbend Valley Storage site and also in smaller areas near University Drive, Samuels Avenue, and in the I-35 sites slightly downstream of the dam in proximity to Riverside Park (Figure 5 – Valley Storage Sites for the Original Central City Project). Construction of the bypass channel with associated valley storage sites would not increase downstream water surface elevations or downstream flow.

Reestablishment of vegetation and habitat at the Riverbend valley storage site following excavation to increase hydraulic capacity and at the Rockwood Ecosystem Improvement Area is included to compensate for adverse impacts to wetland, riparian, and terrestrial resources and to develop or improve additional habitat. Following habitat development and compensation for adverse effects, the Central City project would result in 43.5 average annual habitat units (AAHUs) of riparian woodland outputs (this includes 2.04 AAHUs calculated following refinement of the Ham Branch mitigation plan and after finalization of the Central City EIS), 12.5 AAHUs of emergent wetland outputs, a loss of 33.4 AAHUs of upland woodland, and a loss of 163.9 AAHU of grassland. It was proposed that the loss of upland woodland could be compensated for by the riparian woodland outputs resulting in a gain of 10.1 AAHUs of riparian woodland. The loss of grassland is not considered significant since much of it is composed of non-native species such as Bermuda grass which has a low value to wildlife.

Significant impacts to aquatic habitat occur by the inundation of 3.2 acres of Marine Creek and filling approximately 400 feet of lower Lebow Creek. Mitigation measures for these impacts would occur in Lebow Creek and Ham Branch, a tributary of the West Fork of the Trinity River which enters the system a distance downstream of the Samuels Avenue Dam. Terrestrial and aquatic habitat mitigation measures required as part of the Central City Project are considered to be part of the No Action Alternative.

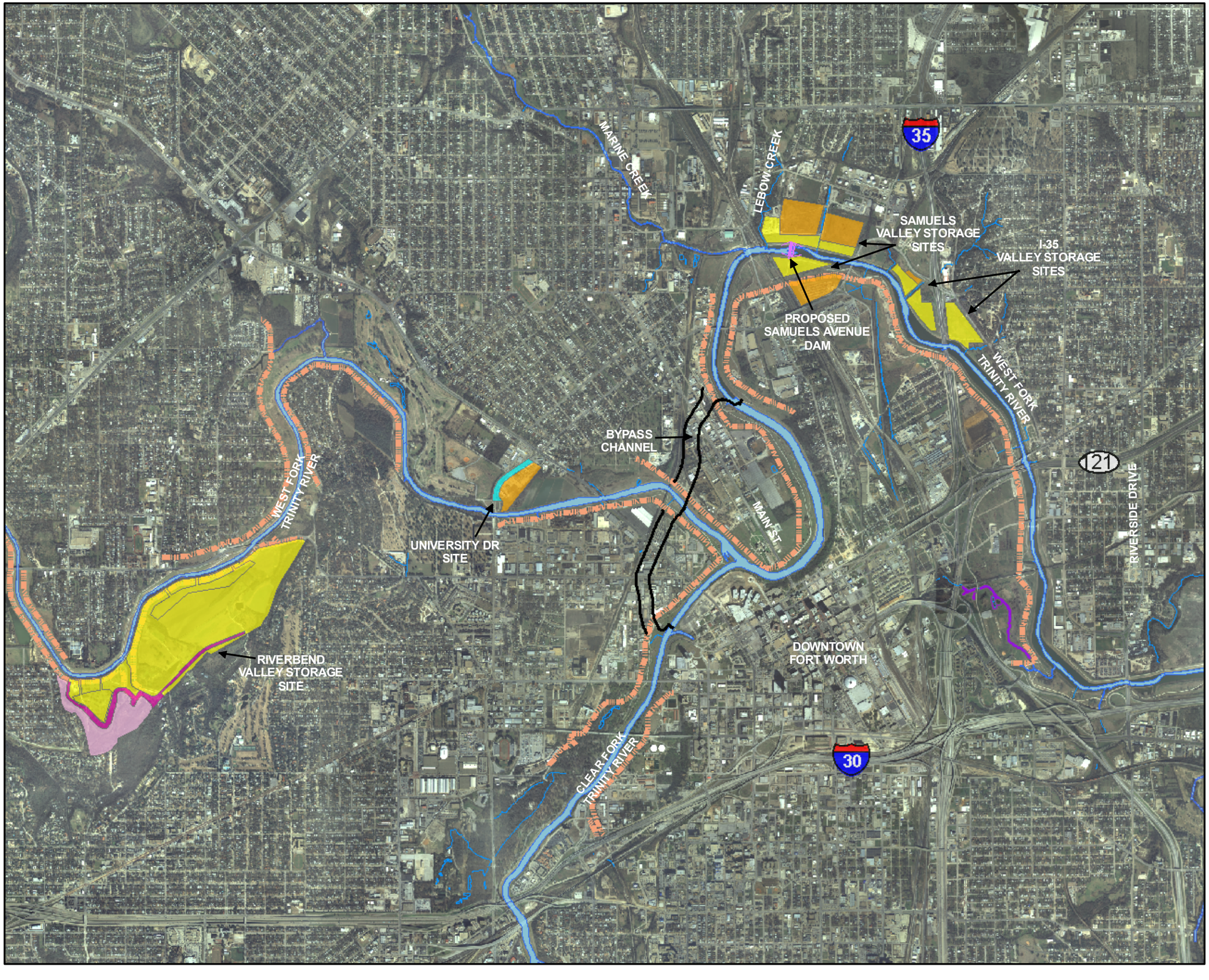
Riverside Oxbow Ecosystem Restoration Project Description

The approved plan for the Riverside Oxbow would restore the biological integrity of wetland and bottomland hardwood communities through a combination of measures directed at specific habitat types or specific ecological problems within the project area. Collectively, these restoration measures will help to restore the integrity, function, and dynamic processes of floodplain habitats and adjacent uplands to a less degraded, more natural condition. The project consists primarily of reconnecting the severed channel to the West Fork of the Trinity River. This restoration feature would involve a notched control structure in the existing floodway channel to allow reconnection to the old cutoff oxbow, thereby facilitating restoration of the oxbow's aquatic and riparian woodland complex. Restoration of the cutoff oxbow would include demolition and replacement the existing Beach Street Bridge. Additional features of the Riverside Oxbow Ecosystem Restoration plan include the creation of about 50 acres of emergent wetland maintained through a low water dam and pumping system, open water, and vegetative fringe habitat within the project area. Various hardwood improvement measures would be implemented on about 180 acres of existing riparian forest within the floodplain, including a 150 foot wide riparian corridor along the West Fork from Riverside Drive to East 1st Street. Additional features of the approved plan include reforestation of approximately 66 acres disturbed and grassland areas with a variety of native trees and shrubs along with preservation and habitat improvement measures of native prairie and scrub/shrub floodplain terrace.

Since the proposed overall restoration plan for the Riverside Oxbow Project is relatively complex, the description of specific project features has been broken down into zones as identified within Figure 2. Restoration measures for each zone including the number of acres for each restoration planting type are described below.

Central City

Figure 5 - Valley Storage Sites for the Original Central City Project



Legend

- BYPASS CHANNEL
- PROPOSED SAMUELS AVE DAM
- EXISTING LEVEE
- STREAMS
- AQUATIC HABITAT MITIGATION AREA

VALLEY STORAGE SITE WORK DESCRIPTION

- ROADWAY IMPROVEMENT
- CUT
- FILL/SPOIL
- SUMP
- PROPOSED LEVEE

N

0 0.25 0.5 1 Miles

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Fort Worth District

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Oxbow North. Restoration activities or features included in the approved plan for the Oxbow North zone include widening the riparian corridor to 330 feet (approximately 100 meters) by reforestation of 20 acres of grass and disturbed lands, habitat improvement of 20.33 acres of existing wood stands, establishing a 100-foot wide native grass buffer (36.4 acres), conversion of existing grasslands with a native grassland and tree mott combination (12 acres total – 10.8 acres of grasslands with 1.2 acres of reforestation). Within this zone the project would reconnect the upstream end of the oxbow to the river by removal of the earthen plug along with a maintenance bridge to span the opening. The plan would replace the culvert at Beach Street with a full span bridge and involve construction of an in-channel weir just upstream of the downstream confluence of the oxbow with the West Fork. Improvement of in-stream aquatic habitat would be accomplished by adding a series of boulder cluster complexes. It is anticipated that once the oxbow is reconnected to flows at both the upstream and downstream ends and is open to flush flows from flooding events, it will return to a more natural, less degraded condition and once again begin to reflect the more natural floodplain of the West Fork.

Oxbow Center. Various restoration activities or features included in the approved plan for the Oxbow Center zone include: creation of a 12.3 acre wetland complex with the addition of emergent wetland plantings (7.2 acres), a water control structure, and a permanent pump station; conversion of existing grasslands with a native grassland and tree mott combination (71.6 acres total – 64.4 acres of grasslands with 7.2 acres of reforestation); and preserving 3.1 acres of existing riparian woodlands.

Oxbow South. Restoration activities included in the approved plan for the Oxbow South zone include reforestation of 2 acres of bottomland hardwood corridor along IH-30 and Sycamore Creek, habitat improvement of 7.8 acres of existing wood stands, establishing 0.9 acres of native grass buffer, and conversion of existing grasslands or disturbed areas with a native grassland and tree mott combination (14.9 acres total – 13.4 acres of grasslands with 1.5 acres of reforestation).

Gateway Center. This zone consists of 27.3 acres of mostly disturbed area and/or mowed grasslands, of which 12.9 acres of native grassland and tree mott combination (1.3 acres of reforestation and 11.6 acres of native grasslands) would be restored.

Gateway South. The following restoration activities or features are included in the approved plan for the Gateway South zone. Restoration within this combined zone includes: reforestation of gaps in the existing riparian corridor along the oxbow; establishment of a bottomland hardwood corridor along IH-30 from Beach Street to the eastern boundary of the zone (13.3 acres); habitat improvement of 15.7 acres of existing hardwood stands; establishing 1.3 acres of native grass buffer; and conversion of existing grasslands with a native grassland and tree mott combination (15.6 acres total – 14 acres of grasslands with 1.6 acres of reforestation).

Gateway Beach. The Gateway Beach Zone restoration plan project area was modified by the 2005 Addendum to the project report from an original 138 acres to approximately 59 acres. The modified restoration plan for this zone now calls for habitat improvement of existing wetlands (approximately 10 acres) by recontouring slopes, planting emergent wetland vegetation, adding a water control structure and a permanent water supply, and removing the existing park road to reestablish the hydraulic connection between the wetland ponds and the oxbow; habitat improvement of existing forested wetland vegetation (27.4 acres), and reforestation of an additional 16 acres of this forested buffer habitat type. Additionally, the plan for the Oxbow Beach zone includes the removal of a culvert at the Beach Street crossing and replacement with a span bridge to allow flows for stream aquatic restoration.

Gateway East. Restoration activities for the Gateway East zone include reforestation of gaps and narrow areas in the existing riparian corridor along the West Fork (7 acres); habitat improvement of 97.1 acres of existing riparian woodland stands; creation of a 26.8-acre wetland complex, adding a water control structure, planting 10 acres of emergent wetland plants and 4 acres of moist soil plants, and adding a permanent water supply along with construction of a water control structure to u-shaped wetlands (old oxbow remnant); establishing 3.8 acres of native grass buffer to protect riparian habitat along the West Fork; and conversion of existing grasslands with a native grassland and tree mott combination (4.02 acres total – 3.62 acres of grasslands with 0.4 acres of reforestation).

It should be noted that the Riverside Oxbow report as revised by the 2005 Addendum did not separate habitat outputs by habitat type. In order to compare high priority habitat types between the No Action and Modified Central City alternatives, total outputs were separated by habitat type based on the extent of specific habitat type restoration measures described in the report and addendum. Following this, and to enable a direct comparison of habitat impacts and outputs between the alternatives, the updated vegetation mapping and habitat values used in the Modified Central City alternative for similar habitat measures were used to generate AAHUs by habitat type for the Riverside Oxbow project. This resulted in approximately 63.3 AAHUs of riparian woodland, 42.72 AAHUs of Emergent Wetland, 0 AAHUs of upland woodland, and 64.26 AAHUs of Grassland/Savannah.

Recreation features that are not specifically required for project construction or operations and maintenance are included in the Locally Preferred plan. These features are compatible with the purpose but are considered to be strictly recreational and would be cost shared accordingly between the Corps and the non-Federal project sponsors. Recreation features include about 7,520 feet of 10-foot wide equestrian trail, 8,970 feet of 10-foot wide reinforced concrete pedestrian trail along the improved channel and along the west side of Beach Street from the improved channel north to the limits of the project area and an additional 1,400 feet of 8-foot wide crushed aggregate pedestrian trail. Recreation access points with associated drives and parking would be located off of Riverside Drive just north of the river channel and west of the oxbow and to provide access to the project area near the upstream end of the oxbow channel. A second access point would be located west of Beach Street and south of the oxbow channel to provide access to the project area upstream of Beach Street. Restroom facilities would be provided at each of the access points.

The Tarrant Regional Water District, the City of Fort Worth, and Streams and Valleys support the incorporation of compatible recreation features into the Riverside Oxbow Project. The plan, as approved, is consistent with the city's Gateway Park Master Plan and the Fort Worth portion of the Trinity River Vision Master Plan, and it provides links to the east and west for trails as part the regional Trinity Trails Plan.

Additional features to be incorporated by local interests include relocation of the entrance to Gateway Park to include a new access road and bridge over the oxbow channel and three observation decks. As a feature of the Locally Preferred Plan for the Riverside Oxbow Project the local sponsor intends to acquire a 112-acre portion of Tandy Hills adjacent to and south of I-20, which drains to the Riverside Oxbow project area. The City plans to restore native prairie grasslands of that tract by removing eastern red cedar, mesquite, and other woody invasive species and to clear invading exotic species from the understory of the riparian woodlands and to replant with native understory vegetation. The City plans to fence the perimeter to limit access to off road vehicles and protect the natural resources of tract. Access parking and about 7,700 feet of crushed aggregate pedestrian trail are also planned for the area.

Modified Central City Alternative

The City of Fort Worth's request for the Corps to conduct an evaluation to consider the potential benefits of modifying the Central City Project to incorporate features of the Riverside Oxbow project was the driving force in the formulation of alternatives. The two primary public concerns that had been identified during the original coordination the Central City Project were the expenditure of public funds, in general and the acquisition of private lands for public purposes. Keeping these factors in mind, the initial focus of formulation of a modified Central City Project alternative was placed on reducing use of eminent domain by minimizing acquisition of private lands and considering publicly owned land within the Riverside Oxbow area for hydraulic mitigation. Following this the potential for habitat development within these hydraulic mitigation areas was evaluated.

Formulation

Valley Storage. Starting with a goal of minimizing acquisition of private lands, the first step in the formulation process was to evaluate the capability of the lands within the Riverside Oxbow Project area to accommodate the valley storage requirements of the Central City Project. This was an obvious first step, since a large percentage of the lands within the 1,060 acre footprint of the Riverside Oxbow Project are already either in public ownership or would be required for that project as the two projects proceed independently.

During the first step in the process of identifying potential valley storage sites in the combined project area, an inventory was made of all areas potentially available. This inventory included sites that had previously been considered for the Central City project, lands within the footprint of the Riverside Oxbow project, several modified areas and a few additional areas not previously considered. A total of 47 potential valley storage sites, as shown in Figure 6 – Valley Storage Analysis, were identified within the study area. Table 3-1 (Valley Storage Analysis) presents a summary of all sites initially considered, along with a break out of those lands that were identified for valley storage in the original Central City Project. The acre-feet of storage shown in the table for the potential valley storage sites are based upon preliminary planning estimates without detailed information of ultimate site configuration.

Table 3-1
Valley Storage Analysis
Initial Screening

Site Description	Original Project Valley Storage (acre-feet)	Potential Sites [4] Est. Valley Storage (acre-feet)
Riverbend Mitigation Site	3250	-
Riverbend (TRWD)		246
Riverbend (Rivercrest)		517
Riverbend (TRWD, Rivercrest Combined)		929
Samuels Mitigation Sites (II, III, & IV)	355	573
I-35 Mitigation Sites (V, VI, & XVI)	370	671
University Drive Modifications	1275	1275
Riverside Oxbow		1619
Riverside Gateway North		432
Riverside Gateway South		361
Ham Branch [2]		435
Riverside Park		269
Rockwood Park West		113
Rockwood Park East [1]		1050
Helipad / Delga Park		210
Northside Sump [2]		170
East of New Dam		187
Dam Relocation (drawdown reduction) [3]		350
Interior Storage		250

(1) Rockwood Park East, City property only
(2) Impact on Federal Floodway and sump to be determined
(3) Variable based on Dam re-sizing
(4) Estimated valley storage based on potential excavation volume. Volumes for preliminary screening only.

As can be noted from comparing Figure 6 with Table 3-1 in the initial valley storage analysis, not all of the identified 47 sites shown on the figure are specifically displayed in the table. Because of its very preliminary nature, this initial valley storage analysis as displayed in the table includes groupings of potential storage areas along with the estimated potential storage capacity of the overall area. For instance, the site identified as “Riverside Oxbow” in Table 3-1 potentially includes seven separate storage areas and the “Riverside Gateway North” potentially includes four sites. Absence of sufficient detail on depth and configuration of each of these potential individual sites at this early planning stage necessitated that estimates of the acre-feet of valley storage were based of optimum potential of the combined groupings.

Corps biologists working with representatives of the U.S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department (TPWD) then visited the sites within the study area with emphasis on the Riverside Oxbow project area to verify and update existing habitat types and condition. Using current (2007) digital orthophotography within a Geographic Information System (GIS) the team delineated and field verified the various habitats in the study area into the major types of Riparian Woodland, Emergent Wetland, Upland Woodland, Grassland/Savannah, and Disturbed. This classification scheme is consistent with that used previously in both the Central City and Riverside Oxbow project evaluations. The "Disturbed" classification includes roads, bare ground, gas well pads, and open water; all sites with minimal to no value to terrestrial species to be used in the habitat evaluations. Acreages of these habitats were computed through the GIS application with some minor changes from previous planning conditions noted in the imagery and verified in the field.

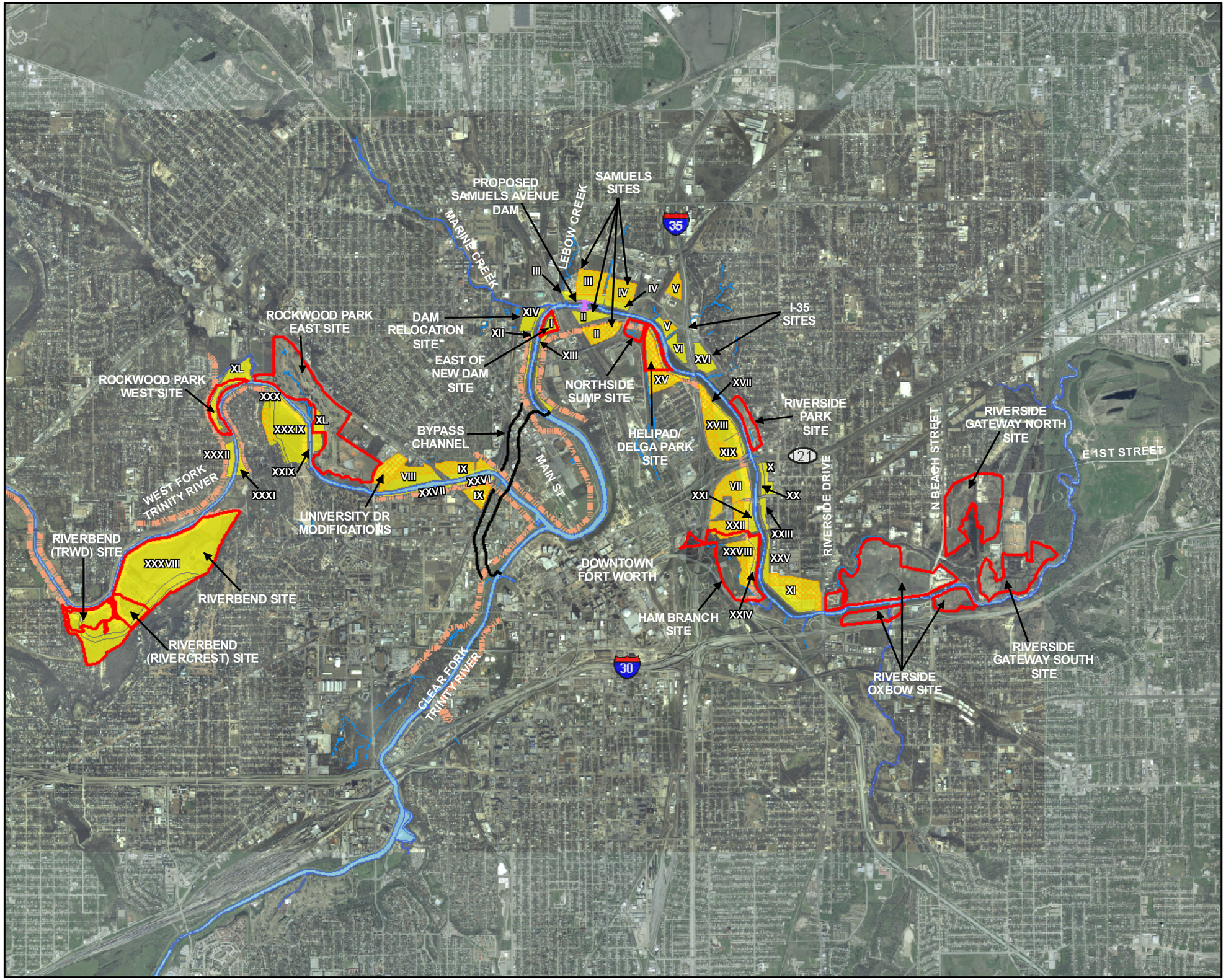
Working with the Corps' GIS personnel, the interagency team of biologists then prepared a GIS map of the Riverside Oxbow project area that delineates features of the Riverside Oxbow Project as well as other environmentally sensitive areas (Figure 7 – Environmentally Sensitive Areas within the Riverside Oxbow area). The areas identified as sensitive were predominantly Riparian Woodland and Emergent Wetlands, both of which are considered to be Resource Category II under USFWS's resource category system. Resource Category II includes habitats that are considered to have regional or national significance and for which adverse impacts either should be avoided or, if adverse impacts are unavoidable, should be mitigated equally and in-kind. This map was then provided to the study team's hydraulic engineers with the task of refining potential valley storage areas that would avoid adverse impacts to high quality habitats while still providing for implementation of features associated of the Riverside Oxbow Project.

Using the valley storage requirement of 5,250 acre-feet, the GIS map of environmentally sensitive areas, and a topographic layer within the GIS, hydraulic engineers preliminarily selected areas from the initial valley storage analysis that could, with excavation or appurtenant control structures accommodate additional valley storage. The engineers and biologists then worked together in an iterative process to maximize opportunities to accommodate valley storage while avoiding or minimizing adverse effects to significant habitats. Opportunities were also identified to optimize the dual purposes of attaining valley storage and potential habitat development by identifying valley storage areas that are primarily grassland and disturbed. It became apparent that some, but not all, of the valley storage requirement could be met within the Riverside Oxbow project area. Subsequently, the study team revisited other valley storage sites considered in the Central City Project with a view to minimizing sites within either area that would require the acquisition of private lands. The result of this analysis was the identification of a total of 22 sites within the modified study area that could accommodate the Central City Project's valley storage requirement while minimizing acquisition of private lands and retaining or optimizing opportunities for habitat development (Figure 8 – Potential Valley Storage Sites). Site ID numbers were assigned for ease of discussion and for future reference.

After identifying the 22 sites considered to have potential for valley storage, the Corps interdisciplinary study team met with the City of Fort Worth and the Tarrant Regional Water District to determine whether there were any known constraints to the use of any of the sites for valley storage. Based upon those discussions a number of sites were considered to have potential constraints that would make them a lower priority for more detailed consideration. Table 3-2 (Screening of Potential Valley Storage Sites) provides a summary of the considerations associated with this initial screening. In addition to screening the 22 potential valley storage sites, the Tarrant Regional Water District made it clear that their intention was to implement all of the features of the Riverside Oxbow Project to the extent that those features could be incorporated into a Modified Central City project. In that regard, the Water District plans to acquire all properties which may not be included in the potential valley storage sites, but which are essential to the purpose of the Riverside Oxbow project.

Central City

Figure 6 - Valley Storage Analysis



Legend

- BYPASS CHANNEL
- PROPOSED SAMUELS AVE DAM
- EXISTING LEVEE
- STREAMS
- SITES CONSIDERED FROM AUTHORIZED PROJECT
- FILL SITES CONSIDERED FROM AUTHORIZED PROJECT
- ADDITIONALLY CONSIDERED SITES

N

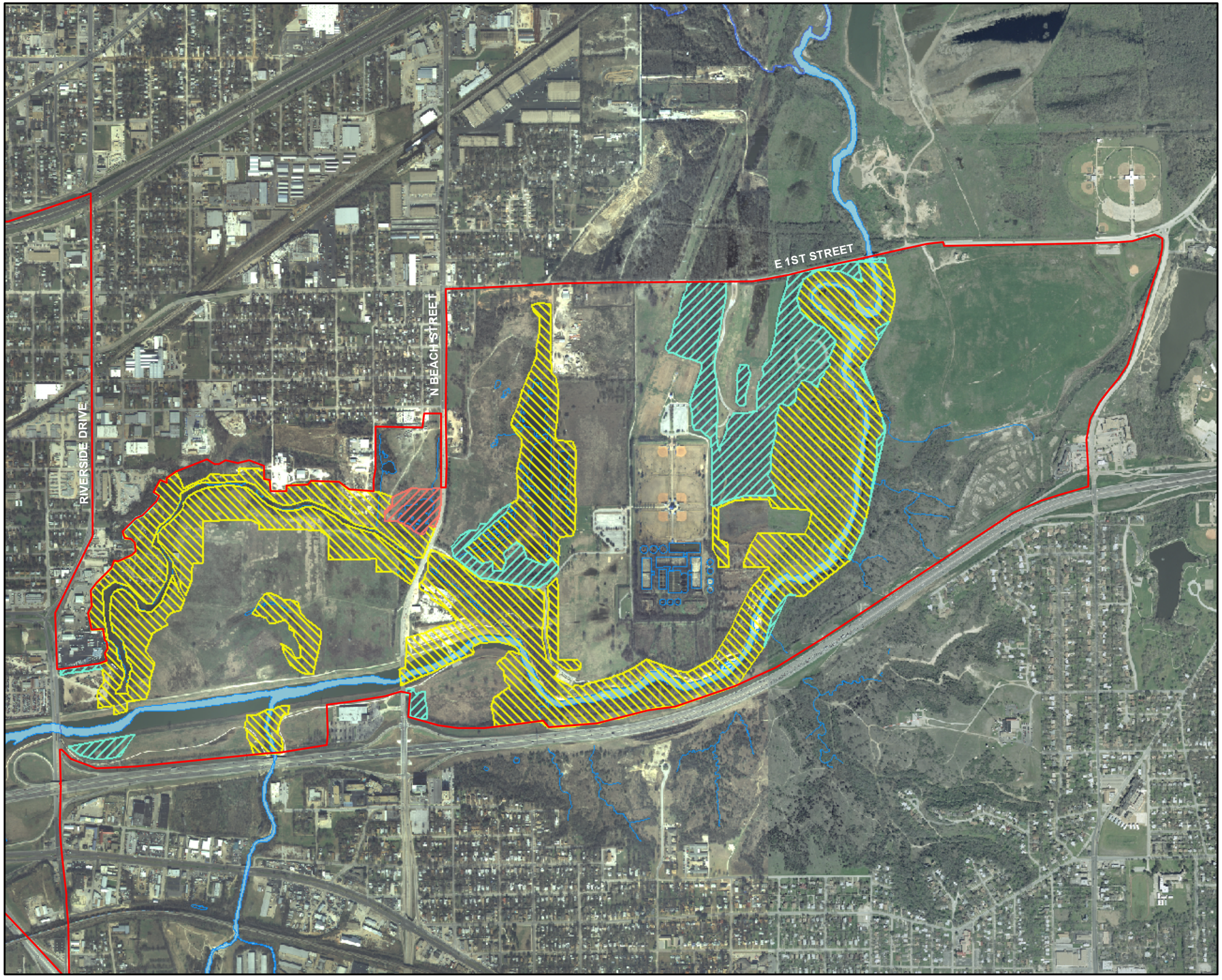
0 0.375 0.75 1.5 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

Central City

Figure 7 - Environmentally Sensitive Areas in Riverside Oxbow



Legend

- MODIFIED PROJECT STUDY AREA BDRY
- STREAMS

ENVIRONMENTALLY SENSITIVE AREAS

- ESSENTIAL RESTORATION LANDS
- IMPORTANT RESOURCES TO AVOID
- LIMITED TO VALLEY STORAGE ACCESS

N

0 0.125 0.25 0.5 Miles

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Fort Worth District

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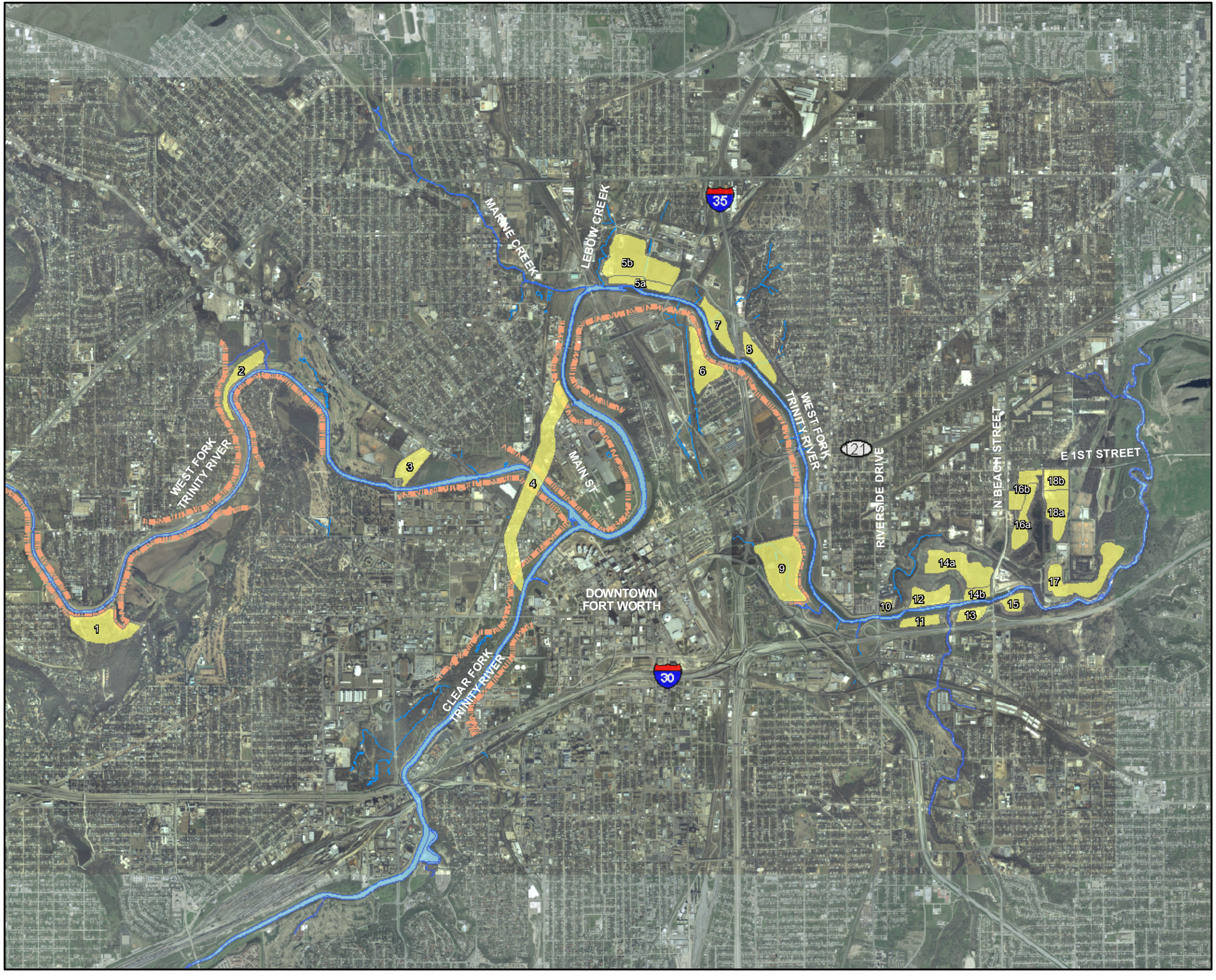
Central City

Figure 8 - Potential Valley Storage Sites



Legend

- POTENTIAL VALLEY STORAGE SITES
- STREAMS
- EXISTING LEVEE

N

0 0.375 0.75 1.5 Miles

Aerial Photography Date: January 2005

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Fort Worth District

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Table 3-2
Initial Screening of Potential Valley Storage Sites

Site ID	Consensus Status	Discussion
1	Potential Constraints	Due to costs associated with relocation of a 72" sewer line and requirement for a new levee, loss of high quality riparian and upland hardwood vegetation, and requirement to redesign drainage channel restoration to discharge downstream of Tucker Dam
2	Potential Constraints	Requires modification to footprint to expand site to the north even though it is narrow and to avoid impact to riparian vegetation on downstream portion of the site which can be used as focus for project mitigation requirements or for desired future
3	Potential Constraints	Identified imminent future development of the property. Site was not originally considered in the Central City project for valley storage but for disposal of excess material. Potential for valley storage gain due to vertical realignment of university drive will still be assessed as evaluations continue.
4	No Apparent Constraints	This is the bypass channel which provides valley storage as an integral part of the Central City Project
5a	No Apparent Constraints	Conditional on the relocation of Samuels Dam to a site upstream of the confluence of Marine Creek
5b	Potential Constraints	Landfill site with unacceptable excavation and relocation costs
6	No Apparent Constraints	Conditional that site be reduced in size to keep on public lands in order to reduce acquisition of private lands with associated reduction of costs
7	Potential Constraints	Sponsor is aware of development plans for property and land cost could be too high
8	No Apparent Constraints	Conditional to the elimination of the north portion of the site which is currently under consideration for private development with associated high acquisition cost. Reduce central portion of the site to avoid quality vegetation. Explore possible increase of site south along narrow strip of public lands
9	Potential Constraints	Conditional to re-analysis of the site for valley storage without impact to current or restored habitat values. Aquatic and Riparian habitat restoration along Ham Branch will continue to be an integral part of the Central City project either as mitigation for other project features and/or as an ecosystem restoration feature of the project
10	No Apparent Constraints	Accepted as delineated
11	No Apparent Constraints	Accepted as delineated
12	No Apparent Constraints	Accepted as delineated
13	Potential Constraints	Private property with existing development which is currently undergoing extensive renovation
14a	No Apparent Constraints	Accepted as delineated
14b	No Apparent Constraints	Accepted as delineated
15	No Apparent Constraints	Accepted as delineated
16a	No Apparent Constraints	Accepted as delineated
16b	No Apparent Constraints	conditional on elimination of western road frontage portion of the site
17	Potential Constraints	Habitat values for the Without Project condition must be recalculated and will likely drop significantly beginning at Target Year 2011 since the damage to habitat values will be caused by non-project related actions associated with mandated soil cleanup
18a	No Apparent Constraints	Accepted as delineated
18b	No Apparent Constraints	Accepted as delineated

Based upon the screening of the 22 identified potential valley storage sites, Corps hydraulic engineers, GIS staff, and biologists undertook a third iteration at refining the footprints of those sites in order to minimize any adverse effects on riparian woodlands and emergent wetlands while maximizing valley storage. Using the planning objective of obtaining approximately 5,250 acre-feet of storage, and considering the potential constraints the study team refined the site list to a group of 17 preferred valley storage sites. During this refining process, an attempt was also made to identify the density of riparian woodlands that could be reestablished within each of the sites.

Table 3-3 and Figure 9 (Initially Identified Valley Storage Sites to Meet Minimum Requirements) present those sites identified as preferred, along with their updated acreages to avoid significant habitats, updated valley storage estimates, existing dominant habitat types, and potential revegetation densities associated with the required hydraulic roughness for each site.

Table 3-3
Initially Identified Valley Storage Sites (Minimum Requirement)
Re-vegetation Potential

Site ID	Acres	Est. Volume (acre-feet)	Predominant Existing Habitat Type	Revegetation Potential
2	14.6	183	floodway grassland	grassland/savannah
3	21.6	600	disturbed	grassland
4	100.2	200	grassland/upland wooded	bypass channel
5a	17.4	272	floodway grassland	grassland/savannah
6	16.0	264	grassland/disturbed	grassland/savannah
8	11.8	120	grassland	grassland/savannah
9	71.0	774	grassland	grassland/savannah
10	4.2	44	disturbed	5% riparian woods
11	12.5	94	grassland	5% riparian woods
12	21.3	98	grassland	5% riparian woods
14a	47.2	659	grassland	5% riparian woods
14b	9.6	125	grassland	5% riparian woods
15	10.9	95	grassland	5% riparian woods
16a	23.8	357	grassland	dense riparian woods
16b	15.0	283	riparian woods/ grassland	dense riparian woods
17	48.9	817	riparian woods/ grassland	emergent wetland after soil remediation
18a	21.2	214	grassland	dense riparian woods
Total	467.2	5200		

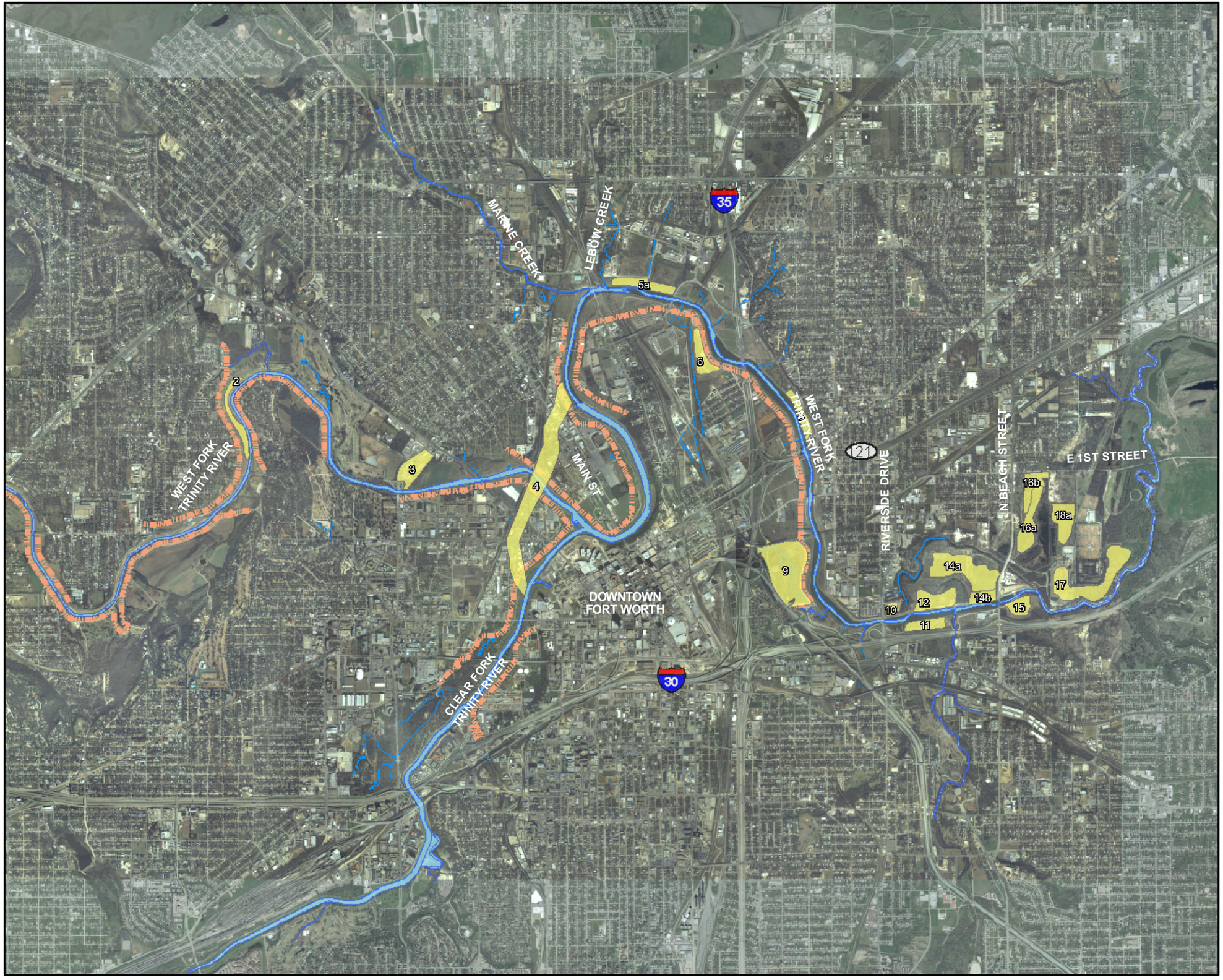
Note: Estimated valley storage volume based on potential excavation volume. Volume subject to change during more detailed hydraulic modeling.

These initially identified 17 sites that would marginally meet the 5,250 acre-feet valley storage requirement were then coordinated with the Tarrant Regional Water District and the City of Fort Worth. The City at that time was in the process of coordinating their Recreation Master Plan Update for Gateway Park with the public and locally affected community leaders, which provided excellent opportunity for public input to the planning process. That public input combined with the need for more detailed hydraulic modeling required further coordination between the hydraulic engineers and environmental planners. The follow-on detailed analysis indicated that storage values could not be achieved without significant modification of the sites geometries, depth and extent of excavations, and probable adverse effects to existing riparian habitats. The refined analysis combined with public input led to identification of additional sites to be included in a recommended valley storage plan.

The Recommended Valley Storage Plan is presented in Figure 10 – Recommended Valley Storage Plan and in Table 3-4. The Recommended Plan consists of 21 sites that were identified as locally preferred valley storage sites. The Recommended Plan has four significant strengths. First, it provides flexibility in assuring that valley storage requirements could be achieved as planning progresses into more detailed design. Second, it allows for almost total avoidance of adverse impacts to habitat resources of significance. Third, the Recommended Plan would maximize opportunities for riparian

Central City

Figure 9 - Identified Valley Storage Sites to Meet Minimum Requirement



Legend

- POTENTIAL VALLEY STORAGE SITES
- STREAMS
- EXISTING LEVEE

N

0 0.375 0.75 1.5 Miles

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Figure 10 - Modified Central City Recommended Valley Storage Plan

MEACHAM SITE

SAMUELS SITES

I-35 SITES

DAM RELOCATION (20)

ROCKWOOD PARK - EAST SITE

ROCKWOOD PARK - WEST SITE

WEST FORK TRINITY RIVER

HELIPAD/DELGA PARK

RIVERSIDE PARK SITE

BAZAAR SITE

INTERIOR STORAGE AREA

GATEWAY BALLFIELDS LEVEES

UNIVERSITY DR MODIFICATIONS

HAM BRANCH SITE

1ST STREET SITE

WEST FORK TRINITY RIVER

RIVERBEND SITE

RIVERSIDE OXBOW/GATEWAY PARK SITE

CLEAR FORK TRINITY RIVER

Legend

- BYPASS CHANNEL
- VALLEY STORAGE SITE - CUT
- VALLEY STORAGE SITE - FILL
- VALLEY STORAGE SITE - LEVEE MODIFICATIONS
- VALLEY STORAGE SITE - ROADWAY RAISE (NO CHANGE - FROM CENTRAL CITY EIS)
- VALLEY STORAGE SITE - CONTINGENCY
- VALLEY STORAGE SITE - POTENTIAL FILL SITE (NO CHANGE - FROM CENTRAL CITY EIS)

N

0 1,750 3,500 7,000 Feet

Aerial Photography Date: January 2005

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woodland development consistent with expressed public desires. And, finally, it accommodates public input by providing for compatible recreation development consistent with the City's Gateway Park Master Plan. Another important aspect of the Recommended Plan is that it would restore flows through the old Sycamore Creek Oxbow as well as restoration of the old cutoff Trinity River Oxbow (Riverside Oxbow).

Table 3-4
Recommended Valley Storage Plan

Site ID	Site Description	Environmental Study Reach	Approximate Cut Elevation	Acres	Est. Volume (acre-feet)	Habitat Impacts (AAHU's) [3]			Costs[4]
Primary Sites						Wetland	Riparian	Upland	
2	Rockwood Park West	West Fork Rockwood (West)	Normal Pool @ 525 +1' (526 NGVD)	22.8	92	0	-0.05	0	$2,979,900
3	University Drive	North Main	No Cut, gains by backwater	13.3	1275	0	0	-0.50	$3,913,000
5a	Samuels Sites	West Fork North	Normal Pool @ 501 +1' (502 NGVD)	20.8	538	0	0	-0.20	$5,122,100
5c		West Fork South		16.1		0	0	0	
9	Ham Branch	West Fork South	No Cut, relocate levee	99.6	750	0	2.04	-0.98	$802,000
10	Riverside Oxbow Sites	Oxbow North	500 to 506 NGVD	8.2	1373	Habitat Outputs not available for individual valley storage sites but are displayed in Table 4-1 for the Environmental Study Reaches			$54,728,800
11		Oxbow South		16.4					
12		Oxbow Center		38.7					
13		Oxbow South		4.6					
14a		Oxbow Center		85.7					
14b		Oxbow Center		17.4					
15	Gateway Park Sites	Gateway South	Variable (new 2 yr elevation or greater) 492 to 500 NGVD	20.0					
16a		Gateway Beach		111.5	533				
16b		Gateway Beach							
18a		Gateway Beach							
18b		Gateway Beach							
17		Gateway Park/Gateway East		65.0	273				
20	Dam Relocation - drawdown reduction [1]	Several	No Cut			0	0	0	N/A
21	Riverside Park	West Fork North	504 to 510 NGVD	20.0	187	0	0	-0.17	$5,617,400
23	Interior Storage Area	North Main	No Cut	412.6	140	0	0	0	N/A
24	Gateway Park Ball fields	Gateway Park	No Cut	25.8	270	0	0	0	$100,000
Subtotal					**5431**[2]	**0**	**1.99**	**-1.85**	**$73,263,200**
Contingency Sites [5]									
1	Riverbend Site	West Fork Riverbend (TRWD Owned)	2 yr @ 536 + 1' (537 NGVD)	32.1	246	-0.04	0	-2.68	$8,344,700
7	I-35 Sites	West Fork North	Normal Pool @ 501 + 1' (502 NGVD)	26.1	671	0	-0.11	-0.03	$19,216,200
8		West Fork North		18.0		0	0	0	
6	Helipad / Delga Park	West Fork South		26.1	210	0	0	-0.16	$5,884,800
22	Rockwood Park East	West Fork Rockwood (East)	2yr @ 529 + 1' (530 NGVD)	184.4	1050	0	-0.12	-1.42	$40,505,700
Subtotal					2177	-0.04	-0.11	-4.29	$73,951,400
Total					**7608**				

[1] Valley storage volume to be determined by hydraulic modeling and future design refinement.
[2] Estimated storage volume based on potential excavation volume. Volumes subject to change during more detailed hydraulic modeling.
[3] Habitat impacts represent those impacts due to construction that must be mitigated. The mitigation plan for Ham Branch for the original Central City Project, which would be implemented with the Modified Project, more than offsets riparian habitat losses of the primary sites.
[4] Cost shown include valley storage site preparation and excavation, habitat development, and all advanced planning, engineering, and design costs.
[5] Use of any contingency site is not anticipated unless advanced planning, engineering, and design indicates a need for additional storage. In the event that contingency storage may be required, the smallest, least costly site(s) would be selected to meet the additional requirement.

It should be noted that even though the primary valley storage sites of the Recommended Plan shown on Table 3-4 are preliminarily estimated to provide substantially more valley storage than the required 5,250 acre feet, five additional sites were identified as "contingency" sites within the Recommended Plan. These contingency sites could be used to supplement or replace valley storage requirements in the event that roughness coefficients of optimal riparian woodland development as refined during detailed design, or other design constraints, necessitate additional storage. If it is determined during detailed design that additional valley storage might be required, use of any contingency site would be on an "as needed" basis only. For example, if it was determined during detailed design that the primary sites might result in a valley storage shortfall of 150 acre-feet, only Site 6 (Helipad / Delga Park) would be modeled in detail and then included in the plan if it could meet the shortfall requirement. Habitat outputs in Average Annual Habitat Units (AAHUs) shown in Table 3-4 are net outputs which reflect reductions due to adverse effects from construction.

Habitat outputs in Average Annual Habitat Units (AAHUs) shown in Table 3-4 are the estimated direct impact due to construction prior to formulation of a habitat restoration plan for each site. Configurations of valley storage sites were selected and aligned to avoid adverse effects to riparian woodlands thereby minimizing the need for habitat mitigation due to excavations. Dominant habitat types currently existing in all of the primary sites (and contingency sites) are either grassland or disturbed. Additionally, the primary sites are configured and aligned to preserve and enhance existing mature trees and tree motts within the existing floodplain grassland/savannah habitats. Depths of cut indicated in Table 3-4 are preliminarily designed to be at an elevation above the normal groundwater elevation, thereby allowing for maximum restoration of riparian and bottomland hardwoods within the side slopes and bottoms of the excavated sites. While a goal of excavation depth, or depth of cut, is to retain a bottom elevation of 5 feet above normal ground water elevation in sites to be restored to riparian woodland, some of the preliminary site designs call for a depth of cut to one foot above pool elevation in the bypass channel. Most of those sites, however, are associated with the channel and levee system and are not proposed for intensive riparian woodland development.

Hydraulic modeling indicates that the roughness coefficients associated with the currently existing riparian forest within the Gateway Park East environmental study reach is appropriate to accomplish valley storage requirements. Based upon that analysis, this Gateway East riparian forest site was evaluated to determine vegetation components that contribute to that roughness. Those vegetation components were then incorporated into the excavated valley storage sites to provide the required roughness and riparian woodland development. Refer to Appendix E for a detailed description of this evaluation and analysis.

Other Formulation Considerations. Two structural features of the Central City Project, in addition to potential valley storage sites, were also given consideration in the formulation process for project modification. The two structural features considered to have potential to reduce habitat mitigation requirements and project costs were the Samuels Avenue Dam and the Marine Creek Low Water Dam.

Modified Central City Description:

As has been stated, the Modified Central City alternative consists of changes in three categories or features from the original Central City Project. These changes from the original project include the: location, size, and public versus private ownership of the valley storage sites; location and configuration of the Samuels Avenue Dam; and inclusion of the Marine Creek low water dam and boat channel and lock facility between the Trinity River impoundment and Marine Creek. All other design features of the Modified Project Alternative remain unchanged from the Central City Project as described in the Final EIS for that project. The following paragraphs provide descriptions of the features of the Modified Central City alternative that are changed from the original Central City Project.

Valley Storage Sites: Rockwood Park West is a 23 acre site, publicly owned (City of Fort Worth), within the existing Trinity River floodplain on the southwestern portion of the existing Rockwood Park Golf Course. The 27-hole golf course is owned and operated by the City of Fort Worth and located south of Henderson Street (Jacksboro Hwy) on the West Fork Trinity River between the White Settlement

Road and University Drive bridges. The site is bounded by the Trinity River on the east and existing federal levee to the west. Currently the site contains several golf course holes which would be eliminated as part of the City's plan to scale down the course. Vegetative cover on the site is primarily grassland with minimal tree coverage. Tree coverage to north and south of the site are to be preserved. Site elevations vary from 522-540 NGVD and slopes toward the river. The proposed work includes grading the site to gently slope towards the river to a bank elevation approximately 1ft above the proposed normal pool elevation (E.L. 525.0 NGVD) to obtain optimize valley storage mitigation. A minimum 30 foot buffer is to be provided from the base of the levee to the proposed excavation to maintain the integrity of the levee and provide a maintenance road and trail access in front of the levee. An existing 36-inch sanitary sewer (M-217) located near the levee will remain in place. Excavated materials will be transported and disposed of off-site. The majority of the spoil materials generated by the proposed excavation at Rockwood Park – West will be transported to the University Drive valley storage mitigation site to raise the roadway. The remainder of the material will be transported to the Bypass Channel construction zone for use in backfilling the hard edge or Bazaar Fill Site as shown on Figure 10. The proposed haul route from Rockwood Park – West to University Drive will be through the use of a temporary access road along the edge of the existing Rockwood Golf Course to Jacksboro Highway (SH 199) and south approximately 1.25 miles to University Drive. The haul route to the Bypass Channel/Bazaar area will be the same, but continuing an additional one mile south on Jacksboro Highway. Hauling will be frequent during excavation work to minimize the number of hauling activity days. Additional detail is available in the Technical Appendix C- Volume I. This valley storage site was previously analyzed as part of the original Central City EIS. Storage in the Interior Storage Area is being credited as a function of how the isolation gates and downstream dam are operated.

The Samuels Avenue sites cover approximately 37 acres within the Trinity River floodplain and are located downstream of the Samuels Avenue Bridge. The sites lie along the north and south banks of the West Fork Trinity River and consist of three sites that were previously analyzed and recommended as part of the original Central City EIS. The sites are bounded by Brennen Avenue to the north, Northside Drive to the east and south, and the Union Pacific Railroad right-of-way to the west. The southern site is bounded by a federal levee while the northern site is flanked by two old landfills. Property ownership is a combination of City of Fort Worth and Tarrant Regional Water District. Vegetative cover on the site is primarily grassland. Site elevations vary from 518-526 NGVD and slope towards the river. A high voltage transmission line transects the southern portion of the site. Along the northwest corner of the northern property an existing 42-inch sanitary sewer (M-106 R*), runs across Lebow Creek and will not be impacted. Proposed work includes grading the sites to gently slope towards the river to a bank elevation approximately 1ft above the static water elevation (EL 501.0) which is controlled by the 4th Street low water dam. Access to the high voltage transmission lines will be maintained by providing a 50-ft grading offset. A maintenance road and recreation trail access will be reconstructed within the offset area to provide access and continuity of the existing trail system. Excavated materials from the sites will be disposed of in the adjacent City owned impound lot and Brennen Avenue landfill. No offsite hauling of excavated material is anticipated.

The Riverside Park site is a 20 acre, publicly owned (City of Fort Worth) property located on the east bank of the West Fork Trinity within the existing Trinity River floodplain. The site is located immediately north of E. Belknap Street and is bounded by Oakhurst Scenic Drive on the east. The north side of the site is defined by an area of large old growth trees which are to be preserved. Existing park features include a soccer field, baseball field and associated parking and trails facilities. Current site elevations vary from 518-524 NGVD and slope gradually towards the river. Vegetative cover on the site is mainly mowed grass. Proposed work includes grading the site to an elevation ranging from EL 504 to EL 510 NGVD, gently sloping towards the river to maintain a minimum of approximately 3 ft above the static water elevation (EL 501 NGVD) which is controlled by the 4th Street low water dam. An existing 18-inch sanitary sewer (M-1728) located on the east side of the site near Oakhurst Scenic Drive will require relocation. An existing 30-inch storm water outfall and box culvert under Oakhurst Scenic Drive, located on the south of the site, will be removed and replaced. Overhead power lines cross the site and will need to be relocated to accommodate the proposed work. Excavated materials will be transported and disposed of off-site. The spoil materials from Riverside Park will be placed at the Brennen Avenue landfill site which is less than one mile away via a combination of Oakhurst Scenic Drive and Northside Dr.

Borrow material, estimated at 15,000-20,000 CY that is suitable for levee construction will also be transported to the Ham Branch Site via a combination of Belknap, Sylvannia Blvd, and 4th Street for use in reconstruction of the back levee. Additional detail is available in the Technical Appendix C- Volume I.

The Ham Branch site is a 100 acre property located along the east of US Hwy 287 and Spur 280 (Martin Luther King Freeway) which is currently protected by the Fort Worth Floodway levee on the east and south sides. The site is bounded by Interstate-30 to the south, the West Fork Trinity River to the east, North Freeway service road to the west. The northern extents of the site are approximately 150 feet north of the railroad centerline. The site is primarily owned by the City of Fort Worth and is used as a park known as Harmon Park. Vegetation on the site consists mainly of mowed turf and prairie grass. Transecting the site is a small creek that runs diagonally across from the northwest to southeast prior to discharging into the West Fork Trinity River through a gate controlled structure. The creek is lined by dense vegetation and is included as a component of the Central City Project as an aquatic mitigation site. The site also functions as an interior drainage feature (Sump 31) of the Fort Worth Floodway. The concrete sluice drainage structure is located within the levee and is used to drain the interior portion of the Ham Branch area (Sump No. 31). Other significant site features include a recreation center, three competition soccer fields, and a baseball field. A dense network of sanitary sewer lines along with gas and fiber optic lines exist on the property with a majority being located on the eastern side of the site. Site elevations for the enclosed sump area vary from 512-520 NGVD. The site was previously identified and evaluated during the Central City EIS for ecosystem restoration and valley storage purposes.

The proposed work at the Ham Branch site includes lowering portions of the existing levee to allow inundation of the site during high flow events on the Trinity River. Rehabilitation of a portion of a former levee is proposed to the north of the railroad embankment to maintain existing levels of protection to areas outside of the Ham Branch valley storage site. Aside from the levee area, minimal grading work is proposed because of the site's relatively low grade and habitat mitigation requirements. The recreational features will be maintained by rerouting of portions of the trails to accommodate the levee lowering. Several manhole and inspection chambers will require modification to seal or raise their elevation above the SPF water surface elevation. Spoil material is to be reused on site with additional borrow material to be imported from the Riverside Park site for rehabilitation of the former levee.

The Riverside Oxbow Sites are located immediately north of Interstate 30 and bounded by Beach Street on the east and Riverside Drive on the west consisting of approximately 170 acres entirely within the existing floodplain. The site is primarily encompassed within the current river channel and the old river oxbow; however portions of the site extend to the north for habitat development purposes. The oxbow valley storage site also includes some property on the south bank near Sycamore Creek. The property is primarily publicly owned with the exception of a gas drilling site located in the northeast corner of the property, however no excavation is planned for this area. Much of the oxbow area is vegetated with tall grass with a number of scattered mature trees, mostly pecan. The old river oxbow channel is lined by dense riparian vegetation consisting of mature trees. Evidence of an old oxbow from Sycamore Creek also runs through the interior of the site. Existing site elevations vary from 510-514 NGVD. Excavation within these sites will be limited to 500 NGVD because hydraulic analysis indicates that below 500 NGVD water surface elevation is frequent enough to impair riparian woodland establishment.

The Gateway Park sites are located to the east of the Riverside Oxbow. The approximately 197 acres are bounded by Beach Street on the west, East 1st St on the north Trinity River on the east and I-30 to the south. Northeast and eastern portions of the site are characterized by fairly dense and mature riparian woodlands while the central and southern portions of the site are predominantly park and athletic facilities. The northwest portion of the site is largely vacant land with some commercial development along Beach Street. The site includes a closed wastewater treatment plant. Property ownership is a combination of public (City of Fort Worth, Tarrant Regional Water District) and private property. Existing site elevations generally vary from 506-510 NGVD. Proposed work includes grading the sites to elevations ranging from 5-year to less than 2-year frequency event flood elevations to maximize valley storage benefits. Due to the site's proximity to Gateway Park, the City has included the site as part of the Gateway Park Master Plan. Proposed recreational features which will be constructed by the local

partners include soccer fields, basket-ball courts, splash park and picnic areas. Recreational trails would be constructed as part of the grading work. Critical facilities will be constructed at or above the 2-year flood frequency elevation. Associated access roads, maintenance road, and parking will also need to be constructed. Habitat development includes riparian woodlands, emergent wetlands, and native grassland. An 84-inch sanitary sewer (M-245P) and an 18-inch main (M-126) will need to be protected during excavation activities in some areas. An existing natural gas line and water mains which transect the property will remain in place. Additional storage at the Gateway Park Ball Fields will be attained by a small raise in the top of the existing levee (likely less than 2 feet but detailed survey is needed during final design to confirm) and modification of the existing cuts through the levees. The spoil material from the Riverside Oxbow and Gateway Park sites will need to be disposed of at a combination of off-site and on-site disposal areas. The on-site disposal areas, as shown on Figure 10, include an old WWTP site to the north of Site 17 and area adjacent to Beach Street. Off-site disposal will occur at a site south of 1st Street and west of and Oakland Boulevard, as shown on Figure 10 which is approximately 2.3 mi from the Riverside Oxbow site and 1.5 mi from the Gateway Site. Off-site material will be transported primarily on Beach Street (0.8mi) and 1st Street (1.5mi). Less frequent haul routes will include Riverside Drive (3/4 mi) from the West Fork Trinity River to 1st Street, 1st Street (0.7 mi) from Riverside Drive to Beach Street and Lancaster Avenue (0.7mi). Hauling of material will be stagger based on the final construction sequence but is generally anticipated to occur during daylight hours. Additional detail is available in the Technical Appendix C- Volume I.

Existing woodland vegetation near the Gateway Park drive, along the Trinity River, and northeastern portions of the site would be preserved and enhanced as part of the habitat development activities. The proposed work consists of the northeast and southwestern portions of the site to obtain valley storage. The northern area would be restored with a combination of woodlands and native grasslands to enhance the site. The southern portion of the Gateway site will consist of two soccer fields and a wetland pond area. The pond area will be constructed by the City of Fort Worth as part of their on-going activities. The closed wastewater treatment plant site is proposed for disposal of the excavated materials to minimize transport expenses. The site contains an existing 10-inch water main and numerous sanitary sewer mains which now carry wastewater flow to the Village Creek Wastewater Treatment plant. Additional utilities include an overhead high voltage transmission line. The proposed work includes the construction of numerous walking trails.

Contingency Valley Storage Sites: Although the hydraulic analyses conducted at the planning level indicate that the primary valley storage sites should more than accommodate the estimated requirement of 5,250 acre-feet of valley storage by providing an estimated 5,431 acre-feet, five sites have been identified in the contingency that detailed design and hydraulic analyses indicate the need for additional storage or one or more of the primary sites becomes infeasible. These contingency sites are shown on Table 3-4 and in Figure 10. Among the contingency sites is a portion of the Riverbend Site, which is a 32 acre parcel currently owned by the Tarrant Regional Water District and located on the western end of the larger Riverbend site identified in the original Central City EIS. This Riverbend parcel would require excavation to the 2-year frequency elevation of 537 NGVD in that area and would generate approximately 246 acre-feet of valley storage. There is currently a fairly diverse re-growth of riparian woodland within this site that would be impacted by the excavations and would require revegetation as a habitat mitigation measure.

The I-35 and the Helipad/Delga Park contingency sites shown on Table 3-4 and in Figure 10 are currently mostly in grassland habitat. If required for valley storage, these sites, consisting of about 70 acres, would be excavated to an elevation of 502 NGVD and would generate 880 acre-feet of valley storage. A final contingency site, identified at the Rockwood Park East site consists of 184 acres of the publicly owned Rockwood Park golf course. If required, this site would be excavated to the 2-year flood elevation of 530 NGVD to potentially generate 1,050 acre-feet of valley storage. The site would be re-established as a golf course with mostly manicured grasses and scattered trees.

It is not currently anticipated that any of the contingency sites would be required but they are discussed and disclosed here in case they are needed following detailed design. As can be seen from Table 3-4, the primary valley storage sites of the recommended plan are projected to achieve up to 5,431

acre-feet of valley storage, based on planning level hydraulic analyses. Again, if it is determined during detailed design of the primary valley storage sites that roughness coefficients of the desired habitat development measures or constraints on depth of cut combine to yield less than the required 5,250 acre-feet of storage, use of one or possibly more of the contingency sites may be required. In the event that additional valley storage may be required, the use of contingency sites would be prioritized so that the additional requirement would be met through use of the contingency site(s) to minimally meet the requirement.

Samuels Avenue Dam. The original Central City Project includes an in-channel dam to achieve the urban design objective of maintaining water levels in the project interior at a relatively constant normal water surface elevation of approximately 525 NGVD. The dam also must have the capability to lower the crest elevation to allow passage of flood flows. Navigability throughout the Central City area to connect Downtown to the Stockyards, the Cultural District, and the Rockwood Park area is also desired. To meet this project objective of water connectivity and to create desired neighborhood linkages, dam site considerations were limited to locations near the confluence of Marine Creek in the West Fork of the Trinity River.

The original Central City EIS proposed to site the dam downstream from Samuels Avenue and the adjacent three railroad bridges, approximately 1,300 feet downstream from the confluence with Marine Creek. Several alternative configurations and types of gates for the dam were conducted as part of the original site evaluations. The selected location resulted in adverse impacts to Marine Creek due to both the high backwater elevation of 525 NGVD as well as additional operations when passing flood flows on the Marine Creek watershed. The original site also impacted the lower segment of Lebow Creek by loss of habitat resulting from rerouting of the creek downstream of the dam.

During this re-evaluation, alternative sites for the dam were evaluated from a geotechnical standpoint on the West Fork upstream of the Marine Creek confluence, ranging from immediately at the confluence to just downstream of Northside Drive. Sites south of Northside Drive were eliminated due to impacts on Northside Drive, limited area, and conflicts with the bypass channel. Placing the dam too close to the confluence could introduce scour potential at the Samuels Avenue Bridge, while placing it further upstream towards Northside Drive reduced or eliminated options to maintain water connectivity with Marine Creek. In addition, any selected site must allow adequate area for construction and temporary diversions.

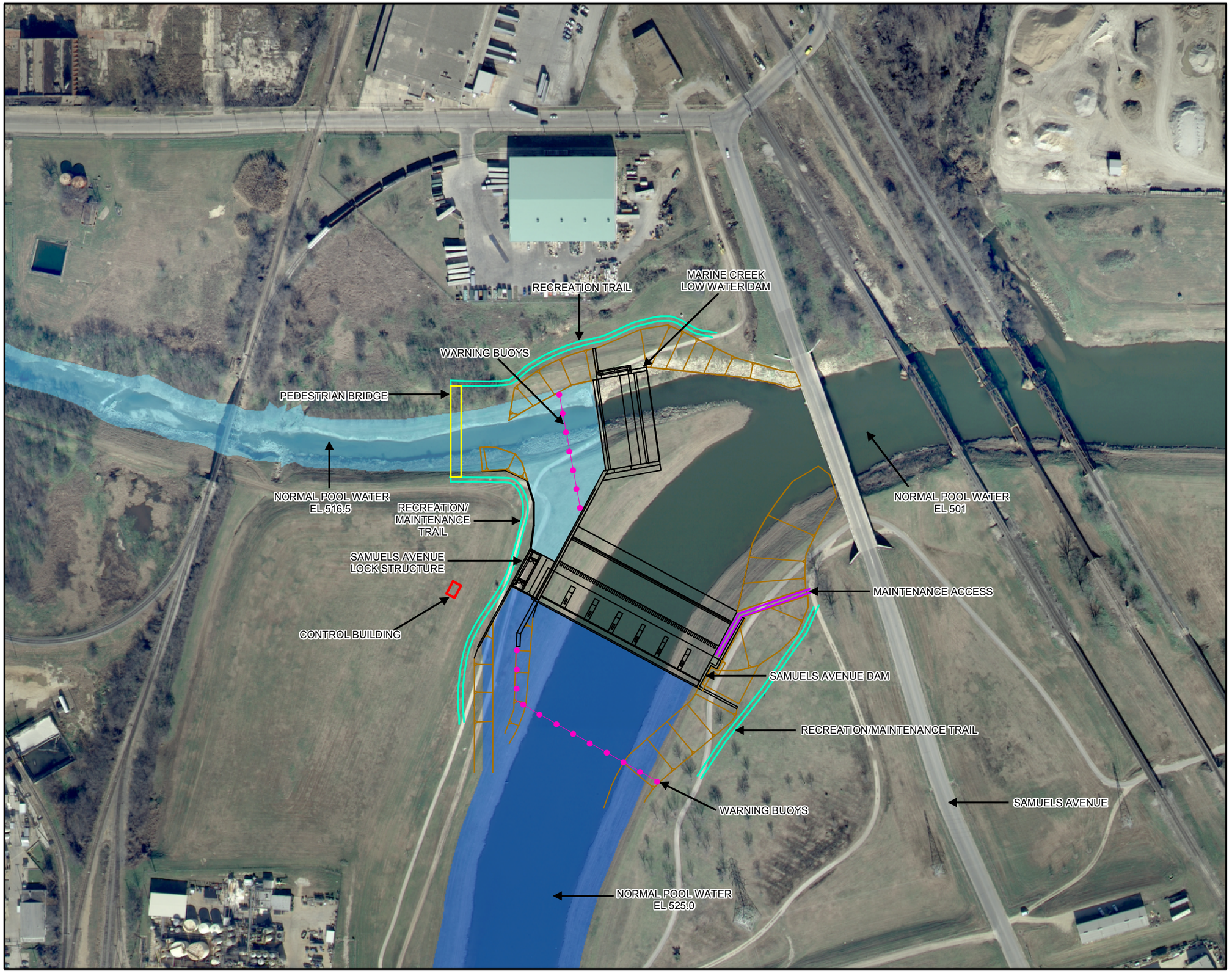
The selected site for the gated dam is proposed on the main stem of the West Fork of the Trinity River just upstream of the confluence with Marine Creek. This dam site is still referred to as the Samuels Avenue dam due to its proximity to the Samuels Avenue Bridge. The proposed Samuels Avenue Dam site for this re-evaluation is located approximately 1,750 feet downstream of Northside Drive, immediately upstream from the confluence of Marine Creek.

During normal dry weather operation the proposed dam would maintain the normal water pool level elevation of 524.3 NGVD. Based on hydraulic modeling, the dam was sized to operate with seven 48-feet wide and 18-feet high gates. The gate width was chosen as the maximum reasonable width, enhancing the hydraulic capacity, while providing reasonably operable gates. The proposed structure would also incorporate low flow conduits 4-feet wide by 6-feet high located at the base of three piers to minimize the use of the large flood gates and to simplify operations. Under this design concept, a stilling basin would also be needed. It would be fully sized to contain a hydraulic jump for energy dissipation of the gate releases. Vertical walls would be required for both the approach and the exit to transition to and from the 390-foot wide structure to the approximately 250-foot wide channel.

The downstream end of the northern stilling basin wall will connect to a low water dam located on Marine Creek which will maintain a normal water pool level elevation of 516.5 NGVD. The two pools will maintain hydraulic connectivity through the use of a lock and channel located on the west side of the dam, allowing small boat traffic to travel upstream and downstream of Samuels Avenue Dam. The lock structure will be approximately 40-feet long by 16-feet wide and have a maximum lift of 8.5 feet. Figure 11 provides an overview of the location of these structural features.

Central City

Figure 11 - Proposed Samuels Avenue Dam and Site Layout Features



Legend

- STRUCTURAL COMPONENTS
- CHANNEL GRADING
- RELOCATED TRAIL

N

0 100 200 400 Feet

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

The benefits of this dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational demands of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Water connectivity is maintained, which satisfies project objectives. A significant benefit to this dam site is the elimination of impacts to stream aquatic and riparian habitat of Lebow Creek.

Marine Creek Low Water Dam. In association with the proposed new site and configuration for the Samuels Avenue Dam, a fixed low water dam is proposed on Marine Creek at the confluence with the main stem of the West Fork of the Trinity River to meet project objectives of water connectivity. Several alternatives were evaluated for the Marine Creek low water dam including both the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek as it is able to meet the design requirements of maintaining existing 100-year water surface elevations on Marine Creek while also reducing construction, operation, and maintenance costs. This fixed dam would also pass lower frequency storms without operation or controls, which was not possible under the previous Samuels Avenue Dam location downstream of the Marine Creek confluence. This structure will have a crest elevation of 516.5 NGVD and a crest length of 200 feet. The Marine Creek channel will need to be widened by approximately 50 feet near the dam site in order to accommodate the 200 feet of crest length needed to pass the 100-year flow without causing increases in water surface elevations upstream.

Widening of Marine Creek and construction of a turnaround basin is proposed just upstream of 23rd Street at the limits of the 516.5 NGVD pool elevation. Bank stabilization would be accomplished through the use of compacted concrete with rip-rap at appropriate locations. Maintenance access would be provided for trash and debris removal. The downstream or outfall of the low water dam would be sloped and appropriately rip-rapped to assure adequate re-aeration of both low and high flows.

This combination of structures meets the goals and objectives of the TRV Master Plan to enhance neighborhood linkages by impounding water to a point upstream on Marine Creek, thus providing a waterway within the combined Clear Fork and West Fork system to connect the Cultural District, Downtown, and the Rockwood Park area to the Stockyards area. This revised proposal also reduces adverse impacts to aquatic and riparian habitats of Marine Creek.

Project Costs:

As formulated, the Modified Central City Project alternative would have an initial total cost of about $519.0 million (2005 dollars). This cost updated to 2007 would be approximately $576.0 million. Federal costs of the Modified Project alternative would remain subject to the provisions of Section 116 of Public Law 108-447, dated 8 December 2004, which authorized Corps of Engineers' participation for construction to a limit of $110.0 million. A breakout of project costs of the Modified Projective alternative relative to the original Central City Project and the Riverside Oxbow Project is presented in the comparison of alternatives section of Chapter 4 – Environmental Consequences, of this SEIS.

Project Outputs:

The Modified Project Alternative outputs are primarily in the areas of retention of existing or design level flood protection, habitat development, and recreation. Although not actual outputs, the need for habitat mitigation and the acquisition of private lands would both be reduced with the Modified Central City Project alternative. These outputs and effects are discussed in detail in the comparison of alternatives section of Chapter 4 – Environmental Consequences, of this SEIS.

Other Considerations:

The use of public lands in lieu of the acquisition of private lands is a primary consideration with the Modified Project alternative. Institutional constraints or implementability is also a significant

consideration for any alternative considered. As with project outputs of the Modified Project alternative, detailed discussion of these issues is contained in Chapter 4 – Environmental Consequences.

Comparison of Alternatives

Refer to the discussion on page 4-17 and Table 4-2 for a detailed comparison between the No Action and Modified Central City alternatives. The primary differences between the alternatives is the location of the valley storage mitigation sites, the changed location of Samuels Avenue Dam to upstream of the Marine Creek mouth, a channel and lock structure connecting Marine Creek with the Trinity River, and a low water dam on Marine Creek. Under the Modified Central City alternative, the valley storage mitigation sites are located downstream in the Riverside Oxbow area instead of the upstream Riverbend area. This reduces the amount of private land acquisition and increases the amount of excavation required to attain the necessary valley storage. These Riverside Oxbow valley storage sites are located primarily in grassland areas so the extent of impacts to existing riparian and wetland habitat from construction is reduced. Following excavation, these valley storage sites will be developed into riparian woodland and wetland habitat which will result in more riparian woodland and slightly less wetland habitat than under the No Action alternative. In addition, the extent of impacts to stream habitat is reduced with the Modified Central City alternative due to less inundation of Marine Creek and the Modified alternative would develop more stream habitat by also restoring Sycamore Creek in the Riverside Oxbow area. The Modified Central City alternative would cost approximately $60.0 million more than the No Action alternative and both alternatives would provide similar levels of flood protection.

Chapter 4 - Environmental Consequences

For the purposes of this Supplement No. 1 to the Final EIS for Central City, the "No Action" alternative assumes that the Central City Project and the Riverside Oxbow Project will be implemented as described in their respective project reports. The study area for evaluation of the City of Fort Worth's proposal is displayed on Figure 4 – Modified Central City alternative Study Area. This section compares the impacts of proceeding with each project separately as they are currently approved (No Action) to the Modified Central City alternative. These alternatives are evaluated within this Supplemental EIS for their effects on technical soundness, environmental acceptability, real estate requirements, habitat development and recreation outputs, project costs, and institutional reasonableness. A 50-year period of analysis was used for this evaluation.

No Action Alternative

Land Use, Hydrology, and Hydraulics

Without hydraulic mitigation, the Central City portion of the No Action alternative would result in a loss of floodplain or valley storage due to the fact that the bypass channel is shorter and more efficient than the existing river channel. With no corrective action, as much as 5,250 acre feet of valley storage could be lost. To mitigate for this potential loss of storage, valley storage mitigation sites are included. Three areas would provide valley storage mitigation: along the West Fork of the Trinity River upstream of the project area at the Riverbend site; in the vicinity of the Samuels Avenue Dam; and slightly downstream of the dam in proximity to I-35. Construction of the bypass channel and associated valley storage sites would not increase downstream water surface elevations or downstream flow.

Implementation of the bypass channel and other flood protection measures that are part of the Central City Project would include removal of the existing levees, thereby providing a river orientation of the area which would be conducive to urban revitalization. These flood protection measures (in particular the bypass channel and the dam described previously) would be designed in such a manner as to reintroduce the river's importance to the settlement of Fort Worth. The bypass channel would incorporate a series of retaining walls along the east edge, which would allow future urban revitalization immediately adjacent to the amenities offered by the river. An interior water feature would expand the water surface within the area, further emphasizing the importance of the riverine system.

An anticipated result with implementation of the Central City Project would be land use changes within the study area. These private or community sector actions outside the flood conveyance system provided by the Central City Project would not be implemented by the Corps of Engineers but are described as follows.

Levee Removal. The bypass channel and its appurtenant structures would replace the flood protection currently provided by portions of the existing levee system, rendering some 8,800 linear feet of existing levee unnecessary. Since this portion of the existing levee serves as a barrier to the river, the Trinity Uptown Plan envisions removal of the remaining portions of levees at some future time in conjunction with private sector redevelopment project(s). Complete removal would require the movement of some 460,000 cubic yards of earthen fill. That excess material could be used at that time to further level the interior area as envisioned by the Trinity Uptown Plan.

Land Use Changes. The Trinity Uptown Plan envisions the project interior (some 327 acres) to transition from predominately heavy industry to mixed land uses with an emphasis on urban residential with support retail and commercial. The 50-year build out is estimated to be approximately 12 million square feet of total development, which would include about 10,000 homes, about 1.1 million square feet of retail/commercial, and about 500,000 square feet of civic and educational facilities. The land use goals are designed to complement and support the surrounding districts which include the Near North Neighborhoods (north of Oakwood Cemetery), Samuels Neighborhood, North Main corridor, Stockyards Area, Cultural District, and Downtown. Combined with these districts Trinity Uptown can provide a much

needed sustainable population to support the economic base of this greater central city area.

Transportation Modifications. In addition to the bridges and street improvements the Trinity Uptown Plan envisions improvements to the transportation system in conjunction with land use changes. Examples of the type of street improvements which may be appropriate include realignment of North 4th Street in order to link the proposed campus of Tarrant County Community College to North Main Street and extension of Northeast 7th Street across the river to connect with Samuels Avenue. A new Waterfront Drive along the base of the bluff is also contemplated, as presented in the Trinity Uptown Plan. All such street improvements would be subject to the standard State and local processes for financial approval and environmental evaluation at the time definitive plans are developed.

Modification/Extension of the Water Linkages. Water is the main theme of the urban design for the Trinity Uptown Plan and is used in that design to create a variety of unique places within the site. The water and associated landscape are intended to create an urban oasis. To extend the presence of water throughout the project site, the Trinity Uptown Plan envisions one or more canals extending through the project interior. Other potential modifications to the system of water linkages include reduction in the width and depth of the original river channel to enhance connectivity across the river and increase the variety of potential uses. Another option is extension of the interior water feature to accommodate a small boat marina. These concepts, if actually proposed, would be developed as components of future private sector projects, and would be subject to engineering evaluation and environmental review tiered to this document.

Riverside Oxbow Effects on Land Use, Hydrology, and Hydraulics. Ecosystem restoration activities as part of the Riverside Oxbow Project would increase wooded vegetation thereby slowing floodwaters and affecting valley storage in the immediate Riverside Oxbow study area. The Riverside Oxbow Ecosystem Restoration Project incorporates hydraulic mitigation consisting of excavation of floodplain material near the south shoreline of the existing channelized segment of the West Fork. With this hydraulic mitigation, the Riverside Oxbow plan meets the criteria of the Trinity Regional Environmental Impact Statement and Record of Decision (ROD) in 1988. Meeting these criteria minimizes the cumulative hydraulic and hydrologic impacts of the project to the Upper Trinity River Basin. No significant impacts to hydrology or hydraulics would occur from implementation of the Riverside Oxbow project. In the area of the Riverside Oxbow Project, the study area includes undeveloped private lands and publicly owned properties. There is currently low demand for business development along the private lands because most of these properties are within the 100 yr floodplain and therefore implementation of the restoration plan would have minimal negative impact on future land use. Land use within the ecosystem restoration areas would remain essentially the same as is currently exists, but with enhanced wildlife habitat, recreational, and aesthetic values. Placing the entire Riverside Oxbow area in public ownership and management for restoration and improvement of ecosystem values would provide a positive environmental and economic benefit to the immediately adjacent community.

Water Quality

Temporary Impacts. The No Action Alternative would cause temporary adverse water quality impacts associated with construction activities. Construction of the channel/impoundment and oxbow features (bypass channel, Samuel Avenue Dam, isolation gates, pump station, interior water feature, recreation, bridge construction/modification, hydraulic mitigation, and ecosystem improvements) would generate the production of dust and temporarily subject the watercourse to turbidity conditions. Direct construction in the water course would mix sediment into the water column. These turbidity conditions are expected to be temporary and have no long term after-effects to the water course. These conditions would be further lessened with the implementation of standard storm water controls and best management practices, such as screen curtains, hay bales, and temporary detention structures during construction. The construction of the additional Trinity Uptown Features (including urban development, associated water body modifications, transportation modifications, and levee removal) would also generate the production of dust and temporarily subject the watercourse to increased turbidity. The conditions are expected to be temporary with no long term effects. These conditions would be further lessened as operators comply with storm water control measures required by TCEQ permit requirements.

Long-term Impacts. The No Action Alternative consists of two implementation components: (1) direct channel alterations including bypass channel, instream impoundments, and diversion/release control mechanisms and (2) Riverside Oxbow habitat improvements. The direct channel alteration component, which involves various features including linear impoundments for the main pass-through and bypass channel, isolation gates, and pump station is operationally complex, while the Riverside Oxbow Project component involves no operational flow controls to operate once completed. With the increased water surface and depth of the channel alterations and impoundment there is a potential for water stagnation and algal problems to occur on a slightly greater frequency during summer. Evaporation would increase as impoundment surface area is enlarged. In summertime, as is typical for water bodies of the region, thermal water stratification is expected to occur on occasion in the deeper impounded areas with depressed dissolved oxygen at lower elevations. Events of depressed dissolved oxygen concentrations would not be expected to exceed stream standards. These occurrences would be minimized with fresh water circulation maintained in the project area. It should be noted that the design for the Central City component of the No Action Alternative is flexible and includes optional features that could produce improved water quality. A dialog has been initiated with TCEQ to provide them with the information and modeling analyses developed as part of the water quality assessment for the Central City project. TCEQ's initial comments on the technical analyses are included in the Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006.

Since maintenance of acceptable water quality is critical to the overall success of the Central City component of the No Action Alternative, a number of operational strategies were identified to mitigate water quality problems should they develop. These strategies include variation in water depth with the project interior to minimize temperature stratification and the opportunity for water "turning", periodic flushing of the interior waterways with flood flows or make-up water, control of nutrient runoff through the institution of storm water controls with water quality monitoring, the operations of the Central City Project could be further improved to best jointly meet pool elevation and water quality purposes.

The implementation of the direct channel alterations part of the No Action alternative creates an additional 112 acres of water surface and an additional 2,114 acre-feet of volume within the system as corresponded to the existing watercourse conditions. The additional annual evaporative loss as a result of this increase in surface area is estimated to be about 275 acre-feet. The TRWD has the water management capability to minimize evaporative losses throughout their system, as well as the means to manage the level of the waterway (avoiding drawdown in dry periods) and to assist in maintaining aesthetics of the water body.

Several means are currently available to TRWD of inducing additional flow within the system and will be considered during the detailed design phase of the project. Each of these methods has a review and approval process within the State of Texas, which upon selection of any appropriate method(s) will be followed:

- *Augmenting flow with additional surface water*. Additional water rights might be cost-effectively secured that allow for additional releases from upstream reservoirs during dry periods to supplement flow in the proposed waterways.

- *Augmenting flow with groundwater*. The Trinity Aquifer can produce water of suitable quality at rates up to 300 gallons per minute per well. Wells could be placed in the area to draw water from the aquifer to supplement the surface water supply.

- *Augmenting flow with reclaimed wastewater*. Reclaimed wastewater, most likely from a new ultra-pure satellite wastewater treatment facility located in the project area could be used to supply additional water to the water body.

Wetland development is a beneficial feature to the No Action Alternative. Depending on the wetland size and water retention characteristics, this feature could offset much of the slight adverse effects. Wetland development proposed in the two projects would contribute to water quality improvement.

With the additional implementation of the Trinity Uptown Features, several changes in water quality could occur based on connected items.

- The potential addition of more canals and extension of the urban water feature would tend to create more water surface subject to evaporation. As a result, water would be held in the impounded sections for longer detention times and relatively less water would be released unless an additional make-up water supply source is provided. This condition could result in stagnation without fresh make-up water or aeration mechanisms.

- Land use intensification through real estate development in the project area would also tend to slightly degrade the water quality as impervious surfaces are increased with parking lot pavements, concrete sidewalks, hard road surfaces, and buildings. The increase in impervious surfaces near to the water course would increase the incidence for urban contaminants to be picked up in storm water runoff and carried directly to the water. Additional concrete and pavement would also tend to become irradiated and conduct heat during the hot summertime months. During such occurrences, the stream water would have a tendency to also be heated due to close proximity of pavement and concrete structures. However, urban design concepts for re-development associated with the Central City project outline aggressive storm water quality practices.

- As development progresses, transportation modifications would be necessary to accommodate the increased traffic resulting in the project area. The effects of this activity are similar to land intensification discussed above. Construction of impervious road surfaces (asphalt, concrete, etc.) would also allow contaminants on these surfaces to be readily picked-up by storm water runoff. Typical contaminants lying on these surfaces include exhaust particulates, various petroleum residues (oils, greases, etc.), and street litter. Because there would be more traffic in the project area, there is also a greater risk for accidental chemical spills on bridges and ramps. Road and bridge construction would also incur temporary increases in stream turbidity.

- Levee removal would also likely temporarily increase stream turbidity during the construction activity. The use of best management construction techniques (i.e., screen curtains, temporary detention and diversion structures, etc.) to prevent and control storm water pollution would offset most of these temporary adverse effects. Long term effects from the removal of the levee itself are not considered to be significant and could be slightly beneficial or slightly adverse depending on the associated follow-up activity. Removal of the levee and creation of wetlands would create an opportunity to improve instream water quality. Whereas, increased urban infrastructure development in closer proximity to the water course because of levee removal could tend to slightly degrade the water quality.

As part of the No Action alternative, the separate construction of the Riverside Oxbow would have a net positive long term affect. The additional vegetation planted for the project would act as a filter buffer removing sediments, heavy metals and hydrocarbons. Overall, the long term impacts associated with the No Action Alternative are not considered to be significant. The ability to control downstream flow releases at the Samuel Avenue Dam will allow a measure of system flexibility to optimize water quality conditions. As stated previously, Riverside Oxbow habitat development would slightly improve the long term water quality condition of the downstream portion of the project area. Trinity Uptown Features would tend to slightly degrade water quality with extensive urban development that increases adjacent impervious ground surfaces allowing runoff of urban pollutants, and by channel modifications that tend to increase evaporation. As with any modern construction activities, it is anticipated that standard abatement measures and storm water controls, as have been mentioned above and as required by State and local codes, will be placed in effect for any and all private development activities prior to approval of construction as Trinity Uptown Features are incorporated.

Aquatic Resources

The Central City Project adds approximately 112 acres of impounded river through construction of the bypass channel and approximately 6 acres by increasing the existing water surface elevation in the West and Clear Fork and in Marine Creek. Samuels Avenue Dam would be operated so that at most inflows, the existing water surface elevation would be increased to 525 feet NGVD. This would increase depth and water surface area throughout the existing impounded river and bypass channel and could increase the probability and duration of stratification during the summer months. The capability to cause mixing of the water column and maintain water quality is possible through operation of the isolation gates and outlet gates at Samuels Avenue Dam depending on inflows. The increase in water surface area of 112 acres was not considered to be a significant effect because impounded river habitat is abundant in the study area. Evaluation of the information available indicates that the better impounded river habitat is associated with the shallow inundated edges of the channel. The project would shorten the channel length, but would increase the impounded water's edge. The Corps and USFWS have concluded based on the analysis in the FEIS for Central City and in the USFWS Report that the additional inundation would not cause significant adverse impact to the impounded Trinity River channel (other than to Marine Creek).

Reconnection of 5.1 acres of abandoned oxbows would occur with the Central City Project in the Rockwood Park Ecosystem Improvement Areas and would result in a gain of 4.3 AAHUs of oxbow habitat. This oxbow habitat would provide better quality spawning and nursery habitat for the local fish population due to decreased water velocity and better cover.

The most significant permanent change to the aquatic habitat values would be the inundation of 3.2 acres of Marine Creek by Samuels Avenue Dam. Preliminary investigations by the US Fish and Wildlife Service indicate this stream has exceptional riffle pool habitat during some times of the year and there is particular concern about the loss of approximately 1,875 linear feet of riffle pool habitat that exists from just below the railroad to just upstream of 23rd Street. Following a survey and analysis using the Index of Biotic Integrity, this impact was determined to be 1.08 AAHUs of stream habitat. In addition, the original Central City Project would fill the lowermost 400 linear feet of Lebow Creek which would result in an impact of 0.1 AAHUs of stream habitat.

The USFWS's Planning Aid Letters, and Draft and Final Fish and Wildlife Coordination Act Reports on the original Central City Project include their analyses of the fish and wildlife habitat, ecosystem mitigation requirements, and habitat improvement measures. The reports contain the Services' recommendations which were incorporated into the Central City Project to the extent practicable. The Service's recommendation to minimize the aquatic impacts by relocating Samuels Avenue Dam were evaluated but found not to be feasible to implement at that time, resulting in the need to include aquatic habitat mitigation in the project. The Service subsequently concurred with the proposed project based on inclusion of the aquatic mitigation. The Service reviewed the aquatic mitigation plan and concurred that the plan was feasible and would offset adverse impacts.

The plan to mitigate the stream habitat impacts to Marine and Lebow Creek is part of the "No Action" alternative. Mitigation measures include diverting flows, varying by season up to 5 cubic feet per second, to the mid-reach of Lebow Creek. A gravity flow pipeline would be included from the Samuels Avenue Dam to a point on the stream where the bottom elevation is approximately 525 feet NGVD, which appears to be near Brennan Avenue. Aquatic habitat would be created by modifying the channel bottom of Lebow Creek within the reach downstream of Brennan Avenue including the 1500 feet of new channel. This would result in a gain of 0.56 AAHUs of stream habitat in Lebow Creek. In addition to these in-stream habitat mitigation measures, stream habitat mitigation would also be required along Ham Branch to fully compensate for adverse aquatic impacts. Approximately 305 feet of the existing channel would be relocated to provide adequate width for riparian forest development adjacent to an existing fenced soccer field. Riparian forest would be planted on 7.4 acres and the existing 1.4 acres of riparian forest would be improved to provide a total 8.8 acres along the creek, resulting in 2.04 AAHUs of riparian habitat. Approximately 25 percent of the total length (3,568 feet) of the stream segment would be modified to provide approximately 900 linear feet of rock based riffles at locations to be determined by additional studies. This would result in a gain of 0.55 AAHU of stream habitat in Ham Branch which, in conjunction

with Lebow Creek mitigation, would fully compensate for stream habitat impacts.

One concept of the master plan for the area of impact considered for the Trinity Uptown Features is that local runoff would be treated and improved through series of artificial wetland areas or holding areas that could provide some improvement in storm water runoff quality. While these singular improvements are not quantifiable, they should be encouraged as cumulatively there could be demonstrable benefits to the West Fork Trinity River aquatic habitats if more of these type runoff treatment facilities are incorporated into other proposed developments.

Development of forested areas around and over the stream would provide shade to help maintain water temperatures within optimum ranges for growth and development of aquatic organisms. More trees and vegetation within the riparian zone plus the native grass buffer along the wooded riparian area of the oxbow would improve the ability of corridor to provide buffering against environmental pollutants in stormwater runoff and balance the input of organic nutrients to the oxbow and ultimately the West Fork. Permanent aquatic resources of the Riverside Oxbow, aquatic resources of the pond areas and deeper pools of the proposed emergent wetlands would provide refugia during drought. Wetland management activities would support a high diversity and resilient aquatic biota such as bass, bluegill, crappie, channel catfish, shiners, darters, zooplankton, aquatic insects, mussels, and various species of snails could ultimately inhabit the study area.

Implementation of the Riverside Oxbow project would also cause minor short-term negative impacts to the aquatic resources in the study area during the demolition and construction phase of the project until channel conditions stabilize. However, because of the buffering and shading effects of vegetation along the riparian zone, the long-term impacts are expected to be positive. No significant adverse impacts to aquatic resources would occur from implementation of the Riverside Oxbow Project and over time the project would result in significantly increased quality of aquatic resources in the project area.

Vegetative Cover and Wildlife Habitat Values

Habitat values for the No Action alternative were derived from the Final EIS for Central City and the Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow project as revised by the addendum to that report, dated April 2005. As discussed in the Alternatives Chapter, habitat outputs of the Riverside Oxbow project were not separated by habitat type in the original documents. In order to compare high priority habitat types between the No Action and Modified Central City alternatives, total outputs were separated by habitat type based on the extent of specific habitat type restoration measures described in the report and addendum. Following this, and to enable a direct comparison of habitat impacts and outputs between the alternatives, the updated vegetation mapping and habitat values for similar habitat measures used in the Modified Central City alternative were used to generate AAHUs by habitat type for the Riverside Oxbow project.

Ecosystem improvements in the original Central City Project are tied to the areas proposed for valley storage mitigation as well as the Rockwood Park Ecosystem Improvement Area. The proposed habitat development activities include establishment of native grasslands, enhancement of upland woodlands where appropriate, enhancement of existing riparian woodlands, creation of a large area of riparian woodlands with breaks in existing levees, reestablishment of historic oxbow stream channels, and creation of emergent wetlands.

Construction activities in the Riverbend area associated with mitigation of valley flood storage would result in an initial loss of 8.8 acres of emergent wetlands. However, following these activities, 15 acres of wetlands would be restored in this area and would be of higher value due to more frequent interchange with the river and long-term maintenance commitments. The original Central City Project would result in a net increase of 6.2 acres and 12.5 AAHUs of emergent wetlands. No wetlands were identified within the area potentially impacted by the Trinity Uptown Features, and therefore, no impacts to wetlands are anticipated due to the Trinity Uptown Features.

The original Central City Project would result in the initial loss of 34.5 acres of riparian woodlands. The majority of these losses would occur in the Riverbend site due to excavation for valley storage. Approximately 1.2 acres of riparian woodlands would be lost due to the Trinity Uptown Features. These represent a permanent impact to the existing trees but only a short term impact to riparian woodlands values because the Central City Project includes riparian habitat improvement and development in the Riverbend Area and in the Rockwood Park Ecosystem Improvement Area, which, taken together, would result in a net increase of 84.2 acres and 41.5 AAHUs. Riparian habitat improvement and development would include control of invasive species, planting trees and shrubs to increase the density and diversity of existing woodlands, and reforestation. In addition there would be a gain of 8.8 acres and 2.04 AAHUs of riparian woodland associated with the Ham Branch mitigation area which was computed following more detailed design of this mitigation and following finalization of the Central City EIS.

As a result of construction and valley storage with the Central City Project, there would be an initial loss of 51.5 acres of upland woodlands. The anticipated development which would occur within the study area as a result of the Trinity Uptown Features would impact an additional 16.4 acres of upland woodlands. However, within the Riverbend valley storage site and the Rockwood Park Ecosystem Improvement Area, proposed ecosystem improvements would include management of 13.3 acres of existing upland woodland and creation of 45.5 acres of upland woodland. With these measures taken together there would be a net loss of 19.7 acres of upland woodland and a net loss of 33.4 AAHUs with the original Central City Project.

The original Central City Project would result in a net loss of 271.3 acres of grassland and 100.3 AAHUs. These impacts primarily occur in the Riverbend and West Fork North study reaches and are related to construction of the bypass channel and the hydraulic mitigation at Riverbend. This accounts for the 42.4 acres of native grassland that would be established in the Riverbend area. Additional grassland losses would be associated with various other features such as recreational trail development, maintenance access, interior water feature, and future Trinity Uptown developments. The identified Trinity Uptown Features would impact an estimated 122.9 acres of grassland habitat resulting in a total loss of 394.2 acres and 163.9 AAHUs. This loss of grassland habitat is not considered significant due to its low value to wildlife and its relative abundance in the area.

The estimated cost of all required and planned habitat mitigation for the total original Central City Project for all habitat types, including direct effects of the valley storage, bypass channel, interior water feature, transportation developments, and future Trinity Uptown developments is $4,600,000. That habitat mitigation cost estimate is included in the overall costs of the original Central City Project.

The Riverside Oxbow Project would restore the biological integrity of the wetland and bottomland hardwood communities through a combination of measures directed at either specific habitat types or specific problems within the existing ecosystem. Collectively, these restoration measures would help restore the ecological integrity, function, and dynamic processes of the floodplain and adjacent uplands to a less degraded, more natural condition. Because the Riverside Oxbow project was formulated as an ecosystem restoration project, no adverse habitat effects or compensation would occur.

Air Quality

Impacts to air quality from implementation of the No Action alternative would primarily occur during by-pass channel construction activities. Because the project area lies within the nonattainment area for eight-hour ozone standard, the No Action Alternative must be reviewed regarding compliance with the “General Conformity” requirements for ozone as established in Section 176(c) (1) of the Clean Air Act (CAA) and 40 CFR 51 Subpart W. The General Conformity rule prohibits any Federal agency from supporting or approving any action or project that does not conform to an EPA-approved State Implementation Plan (SIP). In the Texas SIP, EPA has approved TCEQ’s request for *“de minimis*” levels for determining what projects require a detailed General Conformity analysis; projects that have annual emissions less than the *de minimis* levels (or threshold levels) do not require a conformity analysis. For the D/FW non-attainment area, the *de minimis* levels established in the SIP are 100 ton/yr of nitrous

oxides (NOx) or volatile organic compounds (VOC) (Texas Administrative Code Title 30, Chapter 101, Subchapter A, Rule 101.30). Both NOx and VOC are precursors for ozone.

Emissions of NOx and VOC from the No Action alternative would result primarily from engines in off-road construction equipment. Emissions for NOx and VOC were calculated using emission factors from EPA's draft NONROAD 2004 emission model. Construction activity levels, in the form of hours of operation for specific types of construction machinery, were estimated for the highest-activity year (i.e., the year with the most equipment activity). Under the No Action alternative, the basic activities of the direct channel modifications and Riverside Oxbow would be independent projects with their own independent phased construction schedules. The projected highest-activity year for the No Action Alternative would be the year assigned for the construction of the by-pass channel phase. Based upon reasonable estimations on the type and operation of equipment, the calculated NOx and VOC emissions for the construction within the highest activity year of the by-pass channel are less than 100 tons/year for each pollutant; the highest emitted pollutant was NOx at 75 tons/yr. Further details on the by-pass channel pollutant calculations are discussed in Air Quality Technical Section of Appendix G of *Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006*.

Under the No Action alternative, there is a possibility that Riverside Oxbow construction activity as an independent project, managed separately, could occur concurrently as the by-pass channel construction, but the scope of the oxbow construction activity is significantly less than the by-pass channel construction activity. Even if the two independent construction projects were conducted concurrently within the same construction year under the No Action alternative, it is not anticipated that any air pollutant de minimis emissions would be exceeded if respective pollutant emission were combined

Depending on the underlying bedrock/substrate conditions, limited/short duration blasting isolated to the construction of bypass channel may be required to excavate material. If required, a steel blanket would be used to limit air dispersion of blast particulates. Under these controlled and temporary conditions, blasting would not significantly affect air quality. No NOx and VOC emissions would be introduced with blasting. Other indirect impacts to air quality resulting from any of the Trinity Uptown Features associated with the No Action alternative would be long-term temporary impacts related to construction activities. As these actions are not clearly defined and no construction schedules are developed, the length of construction, and thus the impact is unknown; however, given the nature of these types of activities, it is anticipated that the impacts would be intermittent for five or more years

Noise

Implementation of the No Action alternative would result in impacts to noise levels associated with construction activities. Noise impacts would be expected to be confined to daylight hours and would be temporary in nature, as construction activities would not be occurring throughout the entire project area simultaneously. It is anticipated that most of the noise generated for the No Action alternative would be associated with the construction of the bypass channel, since construction in the Riverside Oxbow restoration area is comparatively less with this alternative. In the sensitive residential neighborhoods within the western portion of the study area, temporary construction noise would be more noticeable than in the highly urbanized commercial and industrial areas adjacent to the bypass channel feature. Construction in the Riverside Oxbow area (Eastern portion) for the No Action Alternative would be relatively minor and considered to be much less of a contributor to adverse noise levels than the western portion in the No Action Alternative.

Also it is anticipated that blasting techniques used in certain areas will incur noise impacts, but that these events would occur relatively infrequently and would not result in noise levels of significant concern to nearby sensitive receptors (schools, hospitals, and residences).

There could be some long term noise impacts associated with implementation of the transportation features of the No Action Alternative where road alignments would be modified. These potential impacts would be expected to be confined to the downtown portions of the project where ambient levels already reflect a highly urbanized setting.

Cultural Resources

In the original Central City project, historic architectural properties were found to be adversely affected and those impacts were mitigated through stipulations defined in an August 2006 Programmatic Agreement (PA) between the Army, the City of Fort Worth and the Texas Historical Commission (THC). No archaeological resources were identified; however the PA requires coordination with the THC prior to construction activities. Separate, on-site investigations conducted during the feasibility study for the Riverside Oxbow Restoration Project resulted in the identification of an archeological site and project features were configured to avoid impacts to this site in consultation with the Texas Historical Commission. No architectural properties exist in the Riverside Oxbow Restoration Project area.

Recreation

Although planning for the development of the Central City Project and the Riverside Oxbow Restoration Project was conducted independently, a key goal of both projects was to provide recreational amenities that increased direct public access to the Trinity River and public interaction with the natural ecosystem. Together, the two projects include a total of 32,767 feet of concrete-paved trails, 25,815 feet of composite trails, 1,326 feet of access roadway, 10,080 square feet of parking and two restroom facilities. These totals represent only those recreational features in which the Corps of Engineers can participate. The Tarrant Regional Water District and the City of Fort Worth both have access and recreation plans that would be implemented within each project area independently from those which can be federally cost shared. For example, the City of Fort Worth's Master Plan for Gateway Park includes the construction of a new bridge associated with relocation of the entrance to Gateway Park, as well as development of more intensive flood compatible recreation facilities within the park. More detail regarding the proposed recreation development associated with each project is presented in the previously referenced project reports and NEPA documentation.

Public Versus Private Lands

Land requirements for both the Central City Project and the Riverside Oxbow Project are described in the project reports and NEPA documentation for the respective projects. Only those real estate requirements that are associated with valley storage and the Samuels Avenue Dam for the Central City Project, and the lands that are required for ecosystem restoration associated with the Riverside Oxbow Project are subject to change in the event of selection of the Modified Central City alternative. All features of the original Central City Project, including valley storage, bypass channel, water feature, and Samuels Avenue Dam would require the acquisition of 453 acres of private and use of 198 acres of public lands. Cost for acquisition of private lands is estimated at $72,600,500. Lands required for implementation of the Riverside Oxbow Project and associated compatible recreation development would include acquisition of 232 acres of private lands and use of 336 acres of lands already in public ownership. Cost of private land acquisition associated with implementation of the Riverside Oxbow Project is estimated at $2,277,218. Total acreages for the No Action alternative (which assumes both projects will proceed independently) would therefore be 685 acres currently in private ownership and 534 acres currently in public ownership. Total cost for acquisition of private lands for the No Action alternative is estimated at $74,877,718.

Project Costs

Total project costs for the Central City project were estimated in the project report at $435,414,650 in 2005 dollars. The authorizing legislation for the Central City Project limits the amount in which the Corps can share to $220,000,000 with the Corps share being $110,000,000. The remainder of the total project cost beyond the $220,000,000 is a local cost. The total cost of the Riverside Oxbow Project in the 2005 Addendum is about $20,800,000 with a Federal cost of about $8,300,000 (in October 2002 dollars). When updated to 2005 dollars, the cost of the Riverside Oxbow Project is $23,625,413, making the total project cost of the No Action Alternative $459,040,063 in 2005 dollars.

Modified Central City Alternative

Those features that would not change with the Modified Central City alternative include the bypass channel, interior water feature, all related flood control gates, all pedestrian and vehicular bridges, and future development by private interests of the Trinity Uptown area. Among the changes associated with the Modified Central City alternative are the relocation of the Samuels Avenue Dam with a small craft lock facility and Marine Creek low water dam, the removal of the primary valley storage at Riverbend, addition of new valley storage areas along West Fork including the Ham Branch area and the Riverside Oxbow and Gateway Park areas. Avoidance of riparian and upland forest and wetlands was maximized during the selection of alternate valley storage sites. Habitat development within the Riverside Oxbow and Gateway Park areas are made possible by using the excavated valley storage sites for dense riparian forest and wetland development.

Hydrology and Hydraulics

The hydraulic evaluation of the proposed valley storage changes with a Modified Central City Project was performed using the U.S. Army Corps of Engineers model, HEC-RAS version 3.1.3. The hydraulic elements of the modified valley storage sites and features were incorporated into the previously approved proposed conditions model to create the modified alternative proposed conditions model. Valley storage sites no longer used in the modified alternative were removed. The revised dam location was also incorporated into the modified proposed conditions model. The gate opening, crest elevation, and dam configuration remained the same as in the approved project. The dam was modeled assuming the gates were in the fully open position for both the 100-year and the SPF flood events. The goal of initial or planning level hydraulic modeling in an iterative process was to identify a valley storage capacity of 5,250 acre-feet. Through that iterative planning process, compensation for valley storage loss is proposed to be provided by those sites identified earlier in Table 3-4 and summarized below as:

- Riverside Oxbow – Gateway Park valley storage sites
- Off-line storage within the existing Gateway Park ball park levees
- Two in-line, overbank sites downstream of Samuels Avenue
- One in-line, overbank site in Riverside Park upstream of Belknap Avenue
- One in-line, overbank site in Rockwood Park West
- Ham Branch (West Fork Sump 31) off-line storage site;
- Drawdown mitigation by raising University Drive
- Utilization of the interior water feature for valley storage

The Riverside Oxbow – Gateway Park valley storage sites are located adjacent to the West Fork. These sites would provide a preliminarily estimated 2,179 acre-feet in the SPF flood. Refer to Appendix C, Volume 2 for proposed Riverside Oxbow – Gateway Park grading plans. Existing Manning “n” values in the Riverside Oxbow – Gateway Park overbank area vary from 0.04 to 0.20. Coordination between the study team’s Biologists and Hydraulics Engineers was maintained to determine acceptable Manning “n” values for the areas that would be incorporated for habitat development measures.

The Ham Branch Sump (West Fork Sump 31) is located on the west side of the West Fork downstream of East 4th Street. The proposed Modified Project alternative would convert the existing sump near the confluence of Ham Branch and the West Fork to a dual use storage area. Under the dual use plan, the sump would serve as valley storage in river floods exceeding the 100-year stage at the Ham Branch location. At all other times, the sump would continue to store runoff from the Ham Branch watershed. Based on the unsteady flow analysis, the Ham Branch Sump would provide 750 acre-feet of valley storage during the SPF event on the West Fork.

To recover a portion of the drawdown loss, the University Drive roadway would be raised to return the 100-year and SPF water levels upstream of University Drive to near the levels of baseline conditions model. This site was evaluated and reviewed during the Central City EIS process. The area identified as fill in the Central City Project at University Drive would no longer be required.

The Modified Project alternative would require appropriate interior drainage storage and conveyance facilities to prevent structure flooding in interior areas. The three distinct interior drainage areas were evaluated and reviewed during the Central City EIS process. No changes are proposed to the approved interior drainage plan. Based on preliminary operations modeling of the interior area, approximately 140 acre-feet of valley storage will be available during the SPF event.

The revised Samuels Avenue dam site and configuration was incorporated into the hydraulic model for analyzing proposed modified project conditions. The benefits of this revised dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational demands of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Hydraulic connectivity is maintained, which satisfies project objectives. Secondarily, a benefit to this dam site is the elimination of environmental impacts to Lebow Creek and associated habitat.

The channel and lock structure connecting the Trinity River impoundment with Marine Creek in conjunction with the low water dam on Marine Creek would result in a normal pool elevation of 516.5 NGVD in Marine Creek. Although this would reduce adverse impacts from the original project pool elevation of 525 NGVD, some modifications to existing structures would still be required. Several existing railroad bridge piers would still be inundated by the 516.5 NGVD pool elevation. An analysis of existing storm drain systems was conducted to ensure these systems are not impacted by the proposed revised pool elevation. Hydraulic modeling results indicate that backwater impacts from the low water dam would be minimal. An existing low water dam in Saunders Park maintains a pool elevation of approximately 518.5 NGVD. Since the pool elevation of 516.5 NGVD is below the existing Saunders Park elevation no impacts are anticipated upstream

The valley storage loss associated with the Modified Central City project features would be mitigated well over 100% in the 100-year flood event. The net gain of valley storage in the SPF event is approximately 71 acre feet. Therefore the SPF level of protection would be retained as well. The modeled geometry is expected to change during the detailed design process as field survey data is incorporated into the model. During the detailed design process, the final design will be configured to provide valley storage at the SPF+4 level in all areas where that is the design elevation.

The sediment transport analysis originally conducted for the Central City Project did not indicate any change after construction of the bypass channel that would indicate a substantial change from existing conditions. The proposal for the bypass channel has not changed within the Modified Central City Project Alternative and, as a result, the proposed project would not appear to affect sediment deposition from that of the existing condition.

Water Quality

Temporary Impacts. The Modified Central City alternative would have essentially the same temporary water quality impacts due to construction as the No Action alternative, as disclosed in the Final EIS and the Interim Feasibility Report. The major physical differences in the Modified Central City alternative and the No Action Alternative include relocation of the Samuel Avenue Dam, addition of lock and dam system tie-in with Marine Creek, relocations of valley storage excavations and fill sites, and more extensive conversion of grassland to forested areas in the downstream areas in the vicinity of Riverside Oxbow area. The approximate level of construction with the Modified Central City alternative would differ from the combined activity of the separate Riverside Oxbow and original Central City project primarily in location of excavation for valley storage with only minor changes in duration of excavation activities. Therefore, it is anticipated that the watercourse will have the same temporary mainstream turbidity conditions that would occur during construction with the Modified Central City alternative as previously disclosed for the separate projects.

Long-term Impacts. The Modified Central City alternative would have similar long term water quality impacts as the No Action Alternative. Major physical differences in the Modified Central City alternative over the No Action alternative include relocation upstream of Samuel Avenue Dam, addition of

lock and dam system tie-in with Marine Creek, relocations of valley storage excavations and fill sites, minor wetland changes, and some exchange of grassland to forested areas in the downstream areas in the vicinity of Riverside Oxbow area. The approximate level of construction with the Modified Central City alternative is very similar to the combined activity of the separate Riverside Oxbow and original Central City project. Motorized boat traffic past the dam and along Marine Creek would not be expected to change from what was projected for the original Central City Project, and boating in the Riverside/Gateway area would be non-motorized. Therefore, it is anticipated that the watercourse will have the same long term water quality impacts with the Modified Central City alternative as the No Action alternative as described above.

Results of modeling conducted for the Modified Central City Project alternative under a worst case summer condition for seven-day/ two-year low flow (7Q2) and median flow depicted that instream dissolved oxygen conditions for the principle impoundment areas of the mainstream would be above the Texas Surface Water Standard of 5.0 mg/L. Further details are discussed in the Technical Memorandum, Supplemental Water Quality Assessment of the Fort Worth Central City Project, dated 21 September 2007. The results of this modeling does not discount the possibility of occurrences low dissolved oxygen in certain undersurface stratified portions of the deeper stream cross-sections as has been exhibited on certain summertime occasions in the past. The implementation of the Modified Central City alternative creates approximately 4.4 acres of less water surface area with the upstream movement of the Samuel Avenue Dam (approximately 1600 feet). This is less than a 5% reduction of the No Action alternative. As a result, the evaporation losses from the Modified Central City alternative would be slightly less than that of the No Action alternative.

Aquatic Resources

The extent of impounded river would be about the same for the Modified Central City alternative except there would be less inundation of Marine Creek. The oxbow restoration features within the Rockwood Park Ecosystem Improvement areas would remain as a component of the Modified Central City alternative. Restoration along those two severed oxbows is projected to result in a net increase of about 5.1 acres (converted from length of stream by stream width) and 4.3 AAHUs of oxbow habitat.

Losses to Lebow Creek would be avoided due to relocation of Samuels Avenue Dam and impacts to Marine Creek would be reduced to 0.97 AAHU due to the reduced length of stream inundated with the Modified Central City alternative. These losses would be largely mitigated by the Ham Branch stream mitigation features which result in 0.55 AAHUs and are part of the Modified alternative. The proposed stream mitigation features within Lebow Creek as part of the authorized Central City Project would not be developed with the Modified Central City alternative because it would no longer be feasible to construct a gravity flow pipeline from the Trinity River impoundment to Lebow Creek near Brennan Avenue because of the relocated dam site. Therefore, the remaining mitigation requirement of 0.42 AAHU for Marine Creek would be compensated by restoring the severed Sycamore Creek channel. This would include removing the channel plug at the severed channel confluence and incorporating stream habitat restoration features (rock weirs) to restore riffle/pool complexes. Outputs for the Sycamore Creek restoration, after accounting for mitigation of Marine Creek (0.42 AAHUs) that is not addressed by the Ham Branch improvements, are estimated at 0.25 acres and 0.22 AAHUs.

The Modified Central City alternative also includes removing the channel plug to a 2-year frequency elevation at the Riverside Oxbow confluence to the operating water surface elevation of the mainstem channel. This will allow both base flows and flushing flows through the severed Riverside Oxbow channel and additional in-stream measures (rock weirs) will be incorporated into the channel to help restore riffle and pool complexes resulting in approximately 4.6 AAHUs. This AAHU estimate is calculated from the length of severed channel to be restored (1.3 miles) and an estimated average stream width of 35 feet resulting in 5.5 acres to be restored. The same AAHU/area ratio that resulted for stream aquatic restoration for similar areas within the authorized Central City Project (0.84) was used to calculate 4.6 AAHUs. This output combined with net outputs from Sycamore Creek would result in 5.75 acres and 4.8 AAHUs of stream habitat outputs for the Modified Central City alternative.

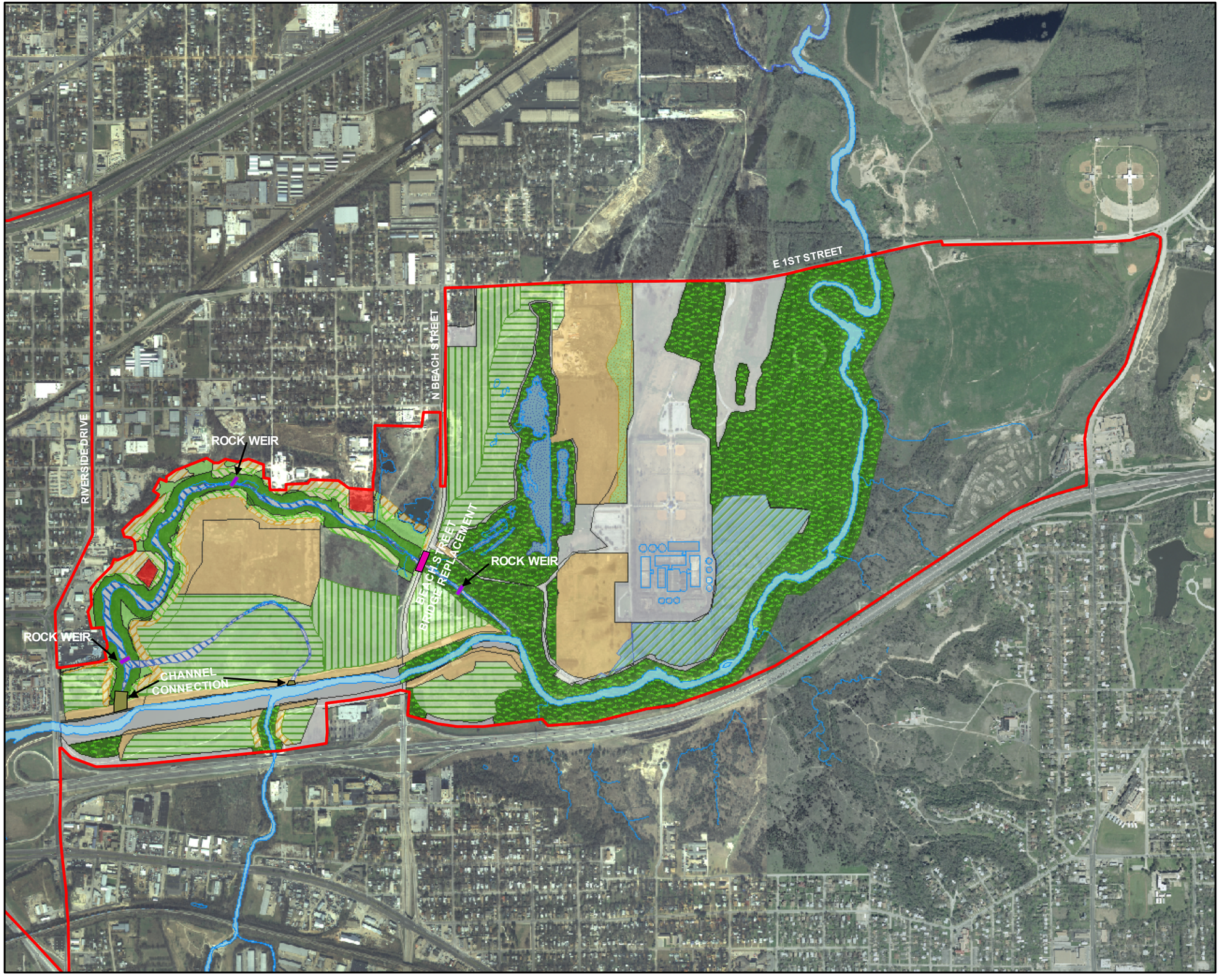
Vegetative Cover and Wildlife Habitat Values

The iterative planning process for valley storage site selection and site configuration with the Modified Central City alternative described earlier in the Alternatives Chapter resulted in avoidance of significant resources to the extent possible, thereby significantly reducing habitat impacts. Valley storage sites were selected only after evaluation of each site for potential impacts to riparian woodland and wetlands. Even with this process, however, some minor impacts to resources would occur that must be mitigated. These losses would be due to construction related features of the Central City project that would not change, excavation of the valley storage sites, to the footprints of the Samuels Avenue and Marine Creek dams, and to inundation impacts along the lower portion of Marine Creek. Most of the losses to riparian and upland woodlands would be within Sites 16 and 18 in the Riverside Oxbow area. In order to optimize valley storage within these sites it was necessary to extend the excavation areas to within the drip line of some existing wooded areas, thereby creating unavoidable losses of habitat value that would require compensation. Mitigation for riparian woodland impacts with the Modified Central City alternative would be small and would be accomplished by in-kind riparian woodland development within the valley storage sites. The overall Modified Central City Project alternative, would require compensation for loss of about 18.3 acres of riparian woodlands, 59 acres of upland woodlands, and less than an acre of emergent wetlands. The cost for all required habitat mitigation is estimated at $3,120,000 on prorated basis of the habitat mitigation cost associated with the original Central City Project.

Habitat development outputs of the Modified Central City Project alternative were calculated based on the vegetation species and densities described in the Alternatives Chapter, Appendix E, and consistent with the habitat development plan depicted on Figure 12 and are summarized in Table 4-1. All acreages, qualitative values, and assumptions used in calculating habitat development outputs of the Modified Project alternative are contained in Attachment 1 to Appendix E – Habitat Evaluations of this Supplement to the EIS.

Central City

Figure 12 - Habitat Development Plan for the Riverside/Gateway Area



Legend

- MODIFIED ALTERNATIVE STUDY AREA BOUNDARY
- STREAMS

RESTORATION DESCRIPTION

- STREAM RESTORATION
- DISTURBED (GAS WELL)
- NATIVE GRASS BUFFER
- TURF GRASS PLANTINGS
- CREATE RIPARIAN FOREST, <165 FT
- CREATE RIPARIAN FOREST, >165 FT
- IMPROVE RIPARIAN FOREST, <165 FT
- IMPROVE RIPARIAN FOREST, >165 FT
- RIPARIAN FOREST DEVELOPMENT IN EXCAVATIONS
- IMPROVE EXISTING RIPARIAN FOREST
- SAVANNAH (90% GRASSLAND, 10% RIPARIAN FOREST)
- SAVANNAH (95% GRASSLAND, 5% RIPARIAN FOREST)
- CREATE WETLAND COMPLEX
- CONVERT WATER TO WETLANDS
- NO HABITAT IMPROVEMENT PROPOSED

N

0 0.125 0.25 0.5 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

Table 4-1
Habitat Outputs (AAHUs) By Study Reach for No Action and Modified Central City Alternatives
(Outputs reflect reduction due to unavoidable direct impacts)

Study Reach	No Action Alternative[1]				Modified Central City Alternative			
	Riparian	Wetland	Upland	Grass/Sav	Riparian	Wetland	Upland	Grass/Sav
Clear Fork West	0	0	-10.43	-24.56	0	0	-10.48	-24.87
Clear Fork East	0	0	-0.81	-0.38	0	0	-0.81	-0.38
North Main	-2.87	0	-11.09	-71.85	-2.87	0	-12.18	-74.27
West Fork North	0	0	-0.77	-26.89	0	0	-1.17	-40.50
West Fork South	2.04	0	-1.49	-11.88	2.04	0	-1.27	-16.65
West Fork Riverbend [2]	44.34	12.47	-8.8	-28.4		0	0	0
West Fork Rockwood[2]					7.15	0	-0.05	-12.93
SUBTOTAL	**43.51**	**12.47**	**-33.39**	**-163.96**	**6.32**	**0**	**-25.96**	**-169.60**
Oxbow North	20.25	2.68	0	27.49	22.14	0	0	-7.17
Oxbow Central	-1.37	10.26	0	25.74	16.39	-0.14	0	-38.76
Oxbow South	1.68	0	0	13.62	9.50	0	0	-0.10
Gateway Central	7.92	0	0	13.17	0.96	0	0	11.03
Gateway South	7.44	0.96	0	-0.6	8.24	0	-0.12	-2.20
Gateway Beach	12.26	6.4	0	-6.45	21.15	16.71	-5.35	28.64
Gateway Park				-7.79	5.31	0	-0.23	-5.89
Gateway East	15.15	22.42	0	-0.92	19.81	31.21	-0.09	-0.87
SUBTOTAL	**63.33**	**42.72**	**0**	**64.26**	**103.5**	**47.78**	**-5.79**	**-15.33**
Gateway Oakland[3]	NA	NA	NA	NA	0	0	-0.07	0.54
Meacham Airfield Fill Site[3]	NA	NA	NA	NA	0	0	-2.3	-0.85
SUBTOTAL					**0**	**0**	**-2.37**	**-0.31**
Totals	**106.84**	**55.19**	**-33.39**	**-99.7**	**109.82**	**47.78**	**-34.12**	**-185.23**

[1] Derived from original project reports and addendum
[2] Reaches combined in final Central City
[3] Fill sites not included in the approved plans

The Modified Central City alternative would shift the primary location of habitat development from the previously proposed Riverbend area of the West Fork on the west side of Fort Worth to the Riverside Oxbow and Gateway Park locations on the east side of downtown Fort Worth. The primary restoration features of the Riverside Oxbow including the development and improvement of riparian woodland values, creation and improvement of wetlands and development of native grassland buffer along the oxbow corridor have also been retained. A primary difference of the Modified Central City alternative is to significantly increase the area of riparian woodland development in the reaches above and below Beach Street within the valley storage sites. Excavation of predominantly grassland and disturbed areas provides the valley storage needed, but additional hydraulic roughness (i.e., trees to slow the flow) is also required to balance the hydrology and hydraulics of the study area to avoid adverse downstream flooding impacts.

Based on the available data and the known attributes of the floodway system, a conservative estimate of sediment deposition has been estimated to be approximately 3.5 inches of sediment over a 30-year period. Therefore, there is not a significant concern that sediment deposition would have a detrimental effect on the proposed habitat development within the Riverside Oxbow portion of the combined study area, especially based on the fact that existing vegetation and forest on the eastern side of the Gateway Park area are not currently exhibiting detrimental effects from sediment deposition.

Air Quality

Impacts to air quality from implementation of the Modified Central City alternative would primarily occur during excavation in the Riverside/Gateway area as this is the most significant change from the No Action alternative. As discussed previously in the No Action alternative, the same *de minimis* levels of 100 ton/yr each for NOx and VOC are used for determining whether there is an air conformity concern within the DFW non-attainment area for ozone.

Assessment of the air impacts from the increased grading operations from the Modified Central City alternative where considered in a second general conformity analysis to assess whether air impacts had changed from those previously discussed in the Air Quality Section of Appendix G of the *Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006.* Emissions of NOx and VOC from the Modified Central City alternative would result primarily from engines in off-road construction equipment however on-road emissions as the result of hauling excavation materials off-site were also considered. Emissions for NOx and VOC were calculated using emission factors from EPA's draft NONROAD 2004 emission model. Construction activity levels, in the form of hours of operation for specific types of construction machinery, were estimated for the highest-activity year (i.e., the year with the most equipment activity). Under Modified Central City Project, the basic construction activities would be conducted in eight sequential stages: roadway bridges, interior by-pass channel, Riverside/Gateway Park area for valley storage and habitat development, by-pass channel tie-ins, elevation of University Drive, isolation gate construction, Samuel Avenue Dam construction, and construction of interior water feature and connector.

The projected highest-activity year for the Modified Central City alternative would be the year assigned for the construction of the Riverside/Gateway Park area (including both creation of hydraulic valley storage and subsequent habitat development) as the remainder of the construction activities were previously analyzed. Based upon construction engineering estimations on the type and operation of equipment, the calculated NOx and VOC emissions for construction within the Riverside/Gateway Park area for the highest activity year are less than 100 tons/year for each pollutant; the highest emitted pollutant was NOx at 86 tons/yr. Further details on the Riverside/Gateway Park construction area pollutant calculations are discussed in the General Conformity Analysis, Fort Worth Central City Riverside Oxbow/Gateway Park Site dated 4 October, 2007.

Similar to the No Action Alternative, temporary dispersion of dust particulates from short-duration blast operations with applicable controls such as a steel blanket would not be significant. No NOx and VOC emissions would be introduced with blasting.

Overall, although the annual maximum pollutant emissions for the Modified Central City alternative is projected to be slightly but not significantly greater than the No Action alternative due to concurrent construction, the long term emission after construction are expected to be somewhat reduced due to uptake of pollutants by the more intensive riparian woodland plantings. Indirect air quality impacts associated with future development of subsequent Trinity Uptown Features would also be similar with Modified Central City Project as with the No Action Alternative.

Noise

Implementation of the Modified Central City alternative would generally result in greater construction impacts to noise levels than the No Action Alternative. Construction noise effects would be expected to be greater in the eastern portion than the Western portion of the study area due to the larger sites and more intensive construction activities.

Relative noise impacts were assessed with respect to nearby sensitive receptors for schools, hospitals, and residences. A noise analysis was conducted for construction in the Riverside/Gateway Park Area (eastern portion of the project area). Based on this analysis, it was determined that the maximum predicted construction noise level would be 80.1 A-weighted decibels (dBA) equivalent sound

level (Leq) to the nearest residence within 50 meters on the outer edge of the construction site during the final grading and stabilization phase of construction in the Riverside/Gateway Park Area. However, the maximum noise levels predicted for the other school and hospital receptors for all construction phases in the area were less than 57 dBA Leq and the levels for other residential receptors during the other construction phases were less 65 dBA Leq. In addition, nominal noise levels were also predicted from the center of the construction area to the sensitive receptor. In all these nominal noise level predictions, all results for receptors in each of the construction phases were less than 58 dBA Leq. As a rough comparison, HUD designates a day-night *average* of 65 dBA as being acceptable (Title 24 CFR Part 51). Refer to Noise Impacts Review for Modified Fort Worth Central City, Riverside/Gateway Area, dated 8 October 2007 for more analysis details.

Based on another worst case with all excavation activities occurring during a compressed two-phase approach, noise levels along construction haul roads were also analyzed. Noise levels along haul roads could vary from 49.7 to 71.8 dBA Leq depending on one of sixteen routes during the applicable construction phase. However, in practice, haul traffic would be less concentrated as actual excavation would be more staggered among sites.

Since construction activities will be typically performed during the daylight hours after 7:00 AM, the more sensitive times of the night would be minimized. All construction activities would be temporary. Best management practices, including proper equipment maintenance and use, and retention of vegetative buffers, would also be used onsite to minimize adverse noise conditions immediately offsite.

Similar to the No Action Alternative, there will be occasions for blasting to be used for the Modified Central City alternative. Also it is anticipated that blasting techniques used in certain areas will incur noise impacts, but that these events would occur sparingly and infrequently in a manner muffled by the material being excavated and would not result in noise levels that could be anticipated to be of concern to nearby sensitive receptors (schools, hospitals, and residences).

Like the No Action Alternative, there could be some long term noise impacts associated with implementation of the transportation features of the Modified Central City alternative where road alignments would be modified. These potential impacts would be expected to be confined to the downtown portions of the project where ambient levels already reflect a highly urbanized setting.

Cultural Resources

The archaeological site identified in the Riverside Oxbow area would be impacted by excavations associated with the Modified Central City Project. As a result of that finding, this site will be excavated in accordance with a mitigation plan designed in consultation with the THC prior to project construction. Site specific investigations for archeological sites in the Central City area will be conducted before construction. Any NRHP-eligible sites located during those studies will be excavated in accordance with a mitigation plan designed in consultation with the SHPO prior to project construction.

Architectural properties over fifty years of age occur within the Riverside Oxbow\Gateway Park area and are within the Modified Central City alternative's area of potential effect. A city-owned abandoned waste water treatment facility in Gateway Park has been identified as a possible location for placement of borrow material. The Army has found it not eligible for the NRHP due to loss of integrity of character defining elements such as materials and workmanship. In addition, the city is scheduled to clean up the plant under a separate project and the facility may not be extant at the time of the undertaking.

Oakhurst Scenic Drive is found to be eligible for the NRHP and is potentially affected by the undertaking. The roadway surface materials have been continuously replaced over the years and are not original to the road. The character defining elements of Oakhurst Scenic Drive are its location and setting and not the materials and workmanship of the road surface. Oakhurst Scenic Drive has the potential to be effected by the hauling of excavated material in trucks and by the replacement of a sewer line that requires temporary disturbance of use and removal and replacement of roadway materials. Hauling of

excavated material is not anticipated to affect the integrity of the roadway surface, which is not a character defining element. The interruption of the use of the road is temporary and not found to be an adverse effect as the primary character defining elements, location and setting, are undisturbed during the work.

Several NRHP eligible bridges and structures span the floodway in the Riverside Oxbow project. These structures are only visually affected by the undertaking. No physical impacts will occur to any NRHP bridges either by direct construction of project features or by the hauling of excavated material by trucks using the roadway. The visual effect of occasional water storage within the valley storage sites is limited to changes in the volume or level of the water in the active floodway. The Corps has found this to be no adverse effect physically or visually on these properties.

Recreation

The City of Fort Worth has a long history of improving the quality of life for its citizens by capitalizing on opportunities to preserve and enhance the natural environment and recreational amenities. Gateway Park is one of several major urban recreational areas within the City. Located east of downtown and along the north bank of the West Fork of the Trinity River, Gateway Park's current recreational facilities include the Fort Worth Rowing Club, athletic fields, pedestrian trails, and a dog park. Additional facilities that are part of the City of Fort Worth's Master Plan for Gateway Park include soccer fields, basketball courts, a concession stand, a water park, an amphitheater and additional roadway and parking areas. These features are shown in Figure 13, Conceptual Recreation and Infrastructure Plan for the Riverside Oxbow/Gateway Park Area.

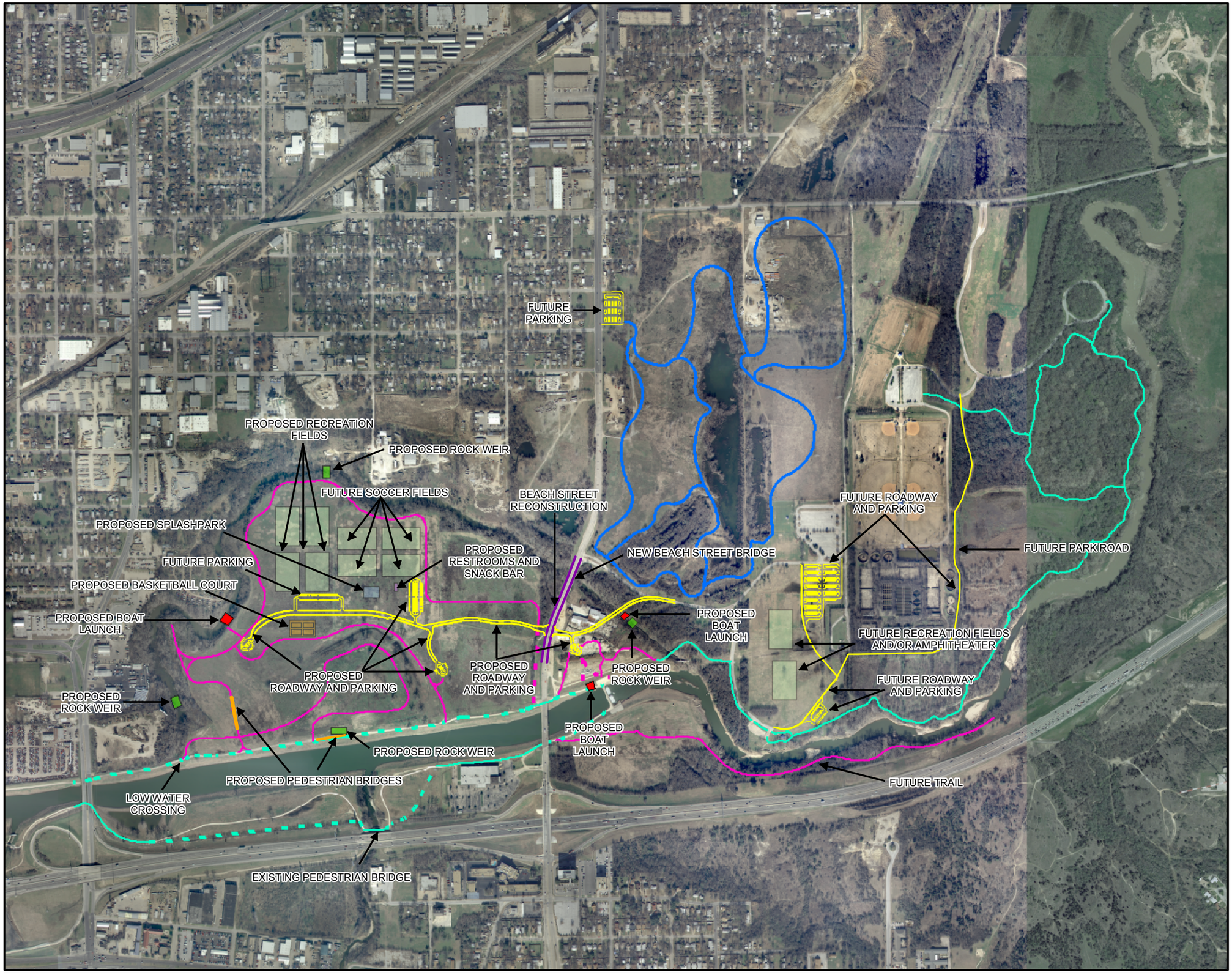
As was previously stated for the No Action Alternative, during the independent development of both the Central City Project and Riverside Oxbow Project, a key goal was to provide recreational amenities that increased public access to the Trinity River and to the natural environment of the project area. The two projects together include a total of 32,767 feet of concrete-paved trails, 25, 815 feet of composite trails, 1,326 feet of access roadway, 10,080 square feet of parking and two restroom facilities. The Modified Central City Project Alternative further enhances the goal of recreation and natural environmental access by providing an additional 1,533 feet of paved trails, 19,985 feet of composite trails, 2,154 feet of access roadway and 37,980 square feet of parking to the existing Trinity Trail system.

In addition to restoring existing trails and facilities that will be impacted during construction activities associated with the valley storage portion of the Modified Project alternative, the proposed trail system within the Riverside Oxbow area has been expanded to provide increased public access to the proposed habitat development areas. The trail system includes concrete-paved stretches that can also be used for maintenance and access. In addition composite-paved stretches that are less expensive to construct and maintain will provide continuous public access along the waterway and equestrian trails. The numerous access points to the trail system create linkages to neighborhoods along the river. Benches and picnic areas along the trail system also encourage public use of the facilities and appreciation for the natural environment.

The expanded trail system in the Riverside Oxbow Area will include additional roadway and parking facilities that not only provide easier public access to the varied habitats but also protect the same habitats from unauthorized vehicular access. The proposed 2,154 feet of Riverside Oxbow roadway follows a natural divide between upland and lowland areas and will provide access to a new boat launch on the upstream stretch of the oxbow. The boat launch will provide access to a quiescent stretch of the river. An additional boat launch is located at the downstream end of the oxbow, just above the water control structure. Three new parking areas along the roadway will provide an additional 37,980 square feet of parking facility enhancing the park accessibility. An overview of all of the recreation features associated with the Modified Central City alternative is presented in Figure 14 - Modified Alternative Recreational Features. It is important to note that most of the features that are within the Central City portion of the Modified Central City Project area are essentially the same as the recreation features proposed for the original Central City Project. Those facilities, therefore, would also be considered as part of the No Action condition.

Central City

Figure 13 - Modified Central City Project Conceptual Recreation and Infrastructure Plan for the Riverside Oxbow/Gateway Park Area



Legend

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

N

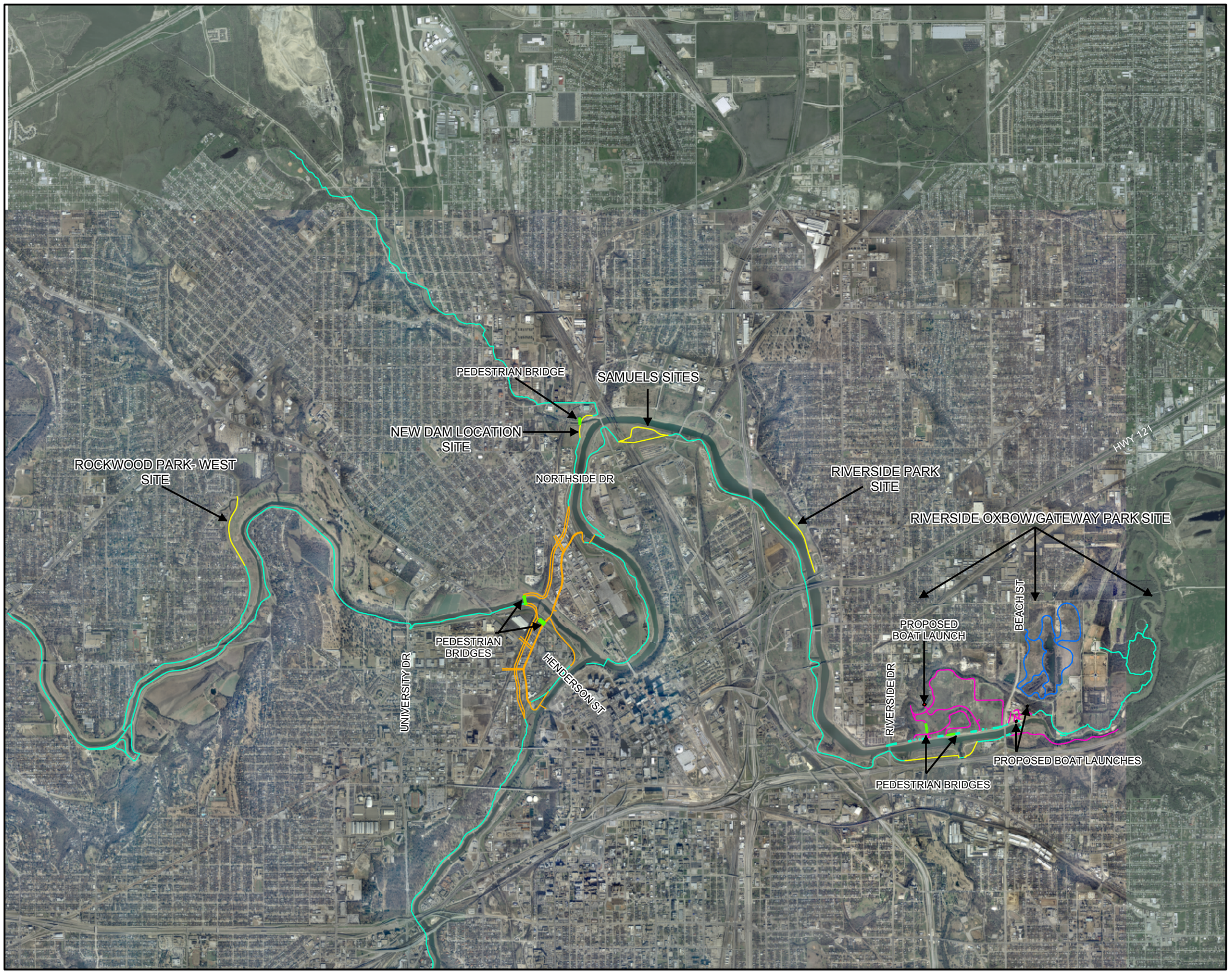
0 430 860 1,720 Feet

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

Central City

Figure 14 - Modified Central City Project Recreational Features



Legend

- APPROVED CENTRAL CITY TRAILS
- EXISTING TRAIL
- EXISTING TRAIL TO BE REBUILT
- PROPOSED NEW TRAIL
- PROPOSED EQUESTRIAN TRAIL
- PROPOSED RELOCATED TRAIL

N

0 1,700 3,400 6,800 Feet

Aerial Photography Date: January 2005

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Fort Worth District

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As of 10/1/07

Public Versus Private Lands

The only land uses subject to change from the approved Central City Project with implementation of the Modified Central City Alternative are those lands required for valley storage and the Samuels Avenue Dam. All other features of the original Central City Project would remain unchanged. Lands required for the Riverside Oxbow Project would also be required for the Modified Central City Project Alternative, but the lands would serve the additional function of valley storage. A total acquisition of 685 acres of private land and utilization of 534 acres of public land is currently required for the No Action alternative. The Modified Central City Project alternative would utilize the same public lands as the No Action alternative but would incorporate the additional valley storage function and more extensive habitat development measures within the Riverside/Gateway area. The total requirement for acquisition of private lands with the Modified Project would be 397 acres at an estimated cost of $60.0 million.

Project Costs

As has been stated, the total project cost for the No Action alternative is estimated at $459.0 million in 2005 dollars. The Modified Central City Project alternative would remove certain components of the original Central City project but would also incorporate additional features to accommodate the new dam site and structures, additional recreation facilities that would not be developed with the No Action alternative, excavation, site preparation prior to habitat plantings and more extensive development of riparian woodland. The net result of the changes would be a cost increase of approximately $60.0 million to an estimated total project cost of $519.0 million (2005 dollars). This estimated cost in 2007 dollars is $576.0 million. Current Authorizing legislation for the Central City Project would limit Corps participation to $110.0 million of the estimated total project costs for the Modified Central City Project alternative.

Comparison of Project Alternatives

Table 4-2, Comparison of Alternative Outputs and Effects, presents an overview of the two alternatives relative to specific evaluation categories or affected resources. Those categories for comparison are Technical Soundness, Habitat Impacts, Habitat Outputs, Recreation, Real Estate, Total Project Costs, and Other Considerations. The table summarizes the information presented earlier in the Environmental Consequences chapter of this SEIS. Although the information in the table is pretty much self-explanatory, each of the comparison categories is briefly discussed in the following paragraphs.

Technical Soundness

Both the No Action and the Modified Central City alternative would meet the planning objective of retaining existing levels of flood protection throughout the project study area. Planning criteria for valley storage requirements to compensate for the hydraulic efficiency of the bypass channel is 5,250 acre-feet. With that additional valley storage, the existing levees within the study area would retain their design level of protection without increasing flood elevations downstream of the existing levee system. In the case of the No Action plan, that requirement would be met primarily with the Riverbend valley storage site, along with an plan for the Riverside Oxbow. Based on planning level hydraulic analysis it appears that the primary Valley storage sites of the Modified Central City Project alternative would achieve the planning objective with the potential to achieve even greater valley storage (5,431 acre-feet). The location of the primary valley storage sites downstream of the Central City Project features allows for greater development of riparian woodlands in the Riverside/Gateway area in order to transition the volumes and velocities to current levels downstream of the combined project study area. In the event that detailed hydraulic analysis of the Modified Project alternative indicates that additional valley storage may be required or one or more of the primary sites become infeasible, the contingency sites could be used to replace these primary sites. The currently approved projects (No Action) do not provide that same flexibility in assuring adequacy of valley storage during detailed project design.

Habitat Impacts

Valley storage and dam location features of the original Central City Project would adversely impact 35.7 acres of riparian woodland, 67.9 acres of upland woodland, and 8.8 acres of emergent wetland. These impacts would require mitigation if no habitat development was proposed, however the proposed habitat development would more than compensate for these impacts. The original Central City project would also impact 3.2 acres of Marine Creek stream habitat valued at 1.08 AAHUs and 0.1 AAHU in Lebow Creek, requiring mitigation at Lebow Creek and Ham Branch. The Riverside Oxbow project would not adversely affect any habitat and no compensation would be required.

The Modified Central City alternative would impact 18.3 acres of riparian woodland, 59.0 acres of upland woodland, and 0.8 acres of emergent wetland habitat. Again, these impacts would require mitigation if no habitat development occurred, but the proposed habitat development would more than compensate for these impacts. The Modified Central City alternative would impact less Marine Creek stream habitat but would still require some mitigation. This mitigation is proposed at Ham Branch and the severed Sycamore Creek channel and in combination with restoration of stream habitat in the severed Riverside Oxbow channel would result in a net gain of stream habitat.

By comparison, then, the Modified Central City alternative would reduce habitat impacts from the approved projects by 49% for riparian woodlands, 13% for upland woodland and 91% for emergent wetland. Stream aquatic mitigation requirements would also be significantly reduced with the Modified Projective alternative relative to proceeding with both projects independently. Costs for required habitat mitigation would be reduced with implementation of the Modified Project alternative from $4,600,000 to an estimated cost of $3,120,000 (32% reduction)

Table 4-2
Comparison of Alternative Outputs and Effects

Affected Resource	No Action			Modified Central City (Assuming Primary Valley Storage Sites)	
	Central City	Riverside Oxbow	Total		% Change
Technical Soundness					
Level of Protection	SPF +4	n/a[1]	SPF +4[1]	SPF +4[1]	No change
CDC Compliance	100%	100%	100%	100%	No change
Valley Storage Required	5,250 ac-ft	0 ac-ft	5,250 ac-ft	5,250 ac-ft	No change
Valley Storage Achieved	5,250 ac-ft	n/a	5,250 ac-ft	5,431 ac-ft	3% increase
Initial Habitat Losses (Acres)					
Riparian Woodland	35.7	0	35.7	18.3	49% reduced
Upland Woodland	67.9	0	67.9	59.0	13% reduced
Emergent Wetland	8.8	0	8.8	0.8	91% reduced
Grassland [2]	394	0	394	737.9	87% increase
Stream Habitat	3.2	0	3.2	2.3	28% reduced
Mitigation Cost	$4,600,000	$0	$4,600,000	$3,120,000	32% reduced
Habitat Outputs (Acres reflect reductions due to Initial Losses) [3]					
Riparian Woodland					
Preservation acres	0	26.8	26.8	0.6	98% reduced
Improvement acres	26.6	178.0	204.6	271.0	32% increase
Creation acres	66.4	65.4	131.8	147.1	12% increase
Total Riparian Woodland Acres	93.0	270.2	363.2	418.7	15% increase
Overall Riparian Woodland AAHU's	43.5	63.3	106.8	109.8	3% increase
Upland Woodland					
Preservation	0	0	0	0	No change
Improvement	13.3	0	13.3	0	>100% reduced
Creation (impact then create)	-33.0	0	-33.0	-59.0	>79% reduced
Total Upland Woodland Acres	-19.7	0	-19.7	-59.0	>100% reduced
Overall Upland Woodland AAHU's	-33.4	0	-33.4	-34.1	2% reduced
Emergent Wetland					
Improvement acres	0	0	0	6.9	>100% increase
Creation acres	6.2	49.1	55.3	51.4	7% reduced
Total Emergent Wetland Acres	6.2	49.1	55.3	58.3	5% increase
Overall Emergent Wetland AAHU's	12.5	42.7	55.2	47.8	13% reduced
Grassland/Savannah					
- Acres [2]	-394.2	176.4	-217.8	NA	NA
- AAHU's	-163.9	64.3	-99.7	(-185.2)	86% reduced

#% = beneficial effect, #% = adverse effect, #% = no change compared to "No Action"

Table 4-2 (Continued)

Affected Resource	No Action			Modified Central City (Assuming Primary Valley Storage Sites)	
	Central City	Riverside Oxbow	Combined		% Change
Habitat Development Outputs (continued)					
Oxbow Aquatic – Acres	5.1	0	5.1	5.1	No Change
- AAHU's	4.3	0	4.3	4.3	No Change
Stream Aquatic - Acres	0	0	0	5.8	>100% increase
- AAHU's	0	0	0	4.8	>100% increase
Recreation [4]					
Concrete Trails – linear feet	23,800	8,967	32,767	34,300	5% increase
Composite Trails – linear feet	16,900	8,915	25,815	45,800	77% increase
Maintenance Access – linear feet	-	1,326	1,326	3,480	162% increase
Parking – sq ft	-	10,080	10,080	48,060	376% increase
Rest Rooms - ea	-	2	2	2	No change
Real Estate					
Private Land Acquisition - Acres	453	232	685	397	42% reduction
Land Acquisition - Cost	$72,600,500	$2,277,218	$74,877,718	$60,132,218	20% reduction
Project Costs*					
Non-Federal **	$110,000,000	$14,198,873	$124,198,873	$110,000,000	11% reduction
Corps of Engineers	$110,000,000	$9,426,540	$119,426,540	$110,000,000	8% reduction
Total Federal Project Cost	$220,000,000	$23,625,413	$243,625,413	$220,000,000	10% reduction
Total Project Cost ***	$435,414,650	$23,625,413	$459,040,063	$519,047,360	13% Increase
*All costs shown are adjusted to 2005 dollars. ** Non-Federal costs do not include costs for local features beyond the Authorized or approved Federal cost sharing. ***Total Project Costs include all local costs.					
Other Considerations					
Changes Project Purposes	No	No	No	No	
Requires Additional Project Report	No	No	No	Yes	
Requires Higher Corps Approval	No	No	No	Yes	
Requires ASA(CW) Approval	No	No	No	Yes	
Requires Congress' Authorization	No	Yes	Yes	No (if within Corps HQ discretion)	
Requires Congressional Funding	No	Yes	Yes	Yes	

#% = beneficial effect, #% = adverse effect, #% = no change compared to "No Action"

(1) For Central City/Fort Worth Floodway only. Riverside Oxbow area has no flood damage reduction or increases with either plan or with the contingency sites.

(2) Due to classification as Resource Category III, and relatively easy replacement, habitat mitigation is not required for the grassland habitat. See narrative in this chapter under Habitat Outputs for additional on Grasslands.

(3) Acres of Habitat Development Outputs for all conditions are totals at the end of the period of analysis, which account for all planting, management, improvement, and preservation measures applied to the various habitat types. AAHUs shown represent net gains and losses by habitat type and reflect any reductions due to mitigation for initial impacts.

(4) Only those Recreation features in which the Corps can participate are reported in this table for comparative purposes. Many additional compatible recreation features are planned by the project sponsors.

Habitat Outputs

The following discussion is based on a comparison of the Modified Central City Project alternative with the No Action alternative, which includes substantial habitat development. Therefore, even though the Modified Project alternative may in some instances result in less habitat gains than the No Action alternative, it still produces substantial gains from the "without project" (without a Federal project) condition.

The Modified Central City Project alternative would improve 32% more existing riparian woodland than the No Action alternative due to improvement measures proposed for riparian woodlands in the Gateway area. It would also create 12% more riparian woodlands because of the relatively large contribution of riparian woodlands created in the valley storage sites in the Riverside Oxbow area. The Modified Central City Project alternative would result in a net gain of 109.8 AAHUs on 413 acres of riparian woodland at the end of the 50-year period of analysis. Overall, the Modified Central City alternative would increase riparian woodland acres by 15% and riparian woodland value (as indicated by AAHUs) by 3% over the No Action alternative. The Modified alternative would reduce upland woodland value (AAHUs) primarily due to excavation and then conversion to riparian woodland but this is not considered significant because of the habitat gains in riparian and wetland habitats.

The Modified Project alternative would reduce wetland value (AAHUs) by 13% from the No Action alternative due to elimination of wetland creation in the Riverbend Area and from within the Sycamore Creek area of the Riverside Oxbow Project. Substantial gains in wetland habitat would still occur in the Gateway areas with the Modified Project alternative. Emergent wetland outputs of the Modified Project alternative would be 47.8 AAHUs on 58.3 acres, with a gain of about 5% in acreage of that habitat type through the period of analysis compared to the No action alternative. Additionally, the Modified Central City Project alternative would eliminate the operationally intensive pumping system that is proposed for converting the remnant Sycamore Creek channel to emergent wetland with the Riverside Oxbow project. Under the Modified Central City Project alternative old Sycamore Creek channel would be restored as stream aquatic habitat. Elimination of the pumping facilities in that area would result elimination of the first cost of the pumping system as well as the long term operation and maintenance costs.

There would be greater impacts to grassland with the Modified Project alternative than for the No Action alternative. This greater loss of grassland is due to locating the valley storage sites in grassland or disturbed areas and developing riparian woodland in its place. It is important to note that outputs for the grassland habitat types are a much lower priority than are outputs for riparian woodland and emergent wetlands, both of which are the primary output objectives of the alternatives. Grassland types include turf grasses, managed (mowed) grasses for stabilization on channel and levee slopes, and planted, managed, and improved native grasslands. The native grassland plantings and management areas are also inclusive of savannah (10% tree canopy) and scattered trees (5% tree canopy).

The Modified Central City Project alternative would impact less stream aquatic habitat and would result in a gain of stream habitat value relative to the No Action alternative. The modified damsite would reduce adverse stream aquatic impacts to Marine and Lebow creeks. Offsetting that beneficial effect somewhat would be the loss of stream restoration measures that would be implemented within Lebow Creek with implementation of the originally Authorized Central City Project. Modifications in the instream habitat structures and in restoration of flow through Riverside Oxbow would also increase stream aquatic habitat Additionally, the Modified Project alternative would restore flows through the old Sycamore Creek channel within the Oxbow Central zone resulting in an overall gain of 5.8 acres and 4.8 AAHUs of stream aquatic habitat.

Recreation

The No Action alternative would consist of about 32,770 feet of concrete trails, 25,800 feet of composite trails, 1,300 feet of road for maintenance access, and 10,080 square feet of parking at two access points with restroom facilities. The Modified Central City Project alternative would include 34,300 feet of concrete trails (5% increase), 45,800 feet of composite trails (77% increase), 3,480 feet of

maintenance access (162% increase), and 48,060 square feet of parking (376% increase). There would be no change in the number of restroom facilities between alternatives. Costs of these recreation facilities with No Action alternative are estimated at $1,449,636 (2005 dollars) and at $4,876,939 (2005 dollars) for the Modified Project alternative.

Real Estate

Implementation of the No Action Alternative would require the acquisition of about 685 acres of private lands for valley storage, ecosystem restoration, and the Samuels Avenue Dam needs at a cost of about $74,877,718. With implementation of the Modified Central City Project alternative, requirements for private lands would be reduced by about 42% to 397 acres, with an associated decrease in land acquisition costs of 20% to about $60,132,218.

Total Project Costs

Total costs of the cost-sharable features of the original Central City Project are prescribed in the authorizing legislation at $220,000,000, of which local cost and Federal Cost would each be $110,000,000. Costs of the Riverside Oxbow Project were estimated in 2005 at $20,787,000 in October 2002 dollars. In proceeding with each project separately (No Action), the total cost of those features in which the Corps can participate (Total Federal Project Cost) costs would be $240,797,000 shared at $122,516,700 local and $118,280,300 Federal Cost. That estimate, however, is based on mixed year dollars as identified in the two approved project reports. When the Riverside Oxbow costs are updated to 2005 dollars, consistent with the Central City Project cost estimates, the Riverside Oxbow costs become $23,625,413, of which about $14,198,873 would be local costs and $9,426,540 would be Federal costs.

Total project costs of cost-sharable features of the Modified Central City Project alternative would be limited by the Central City Project construction Authorization to $220.0 million, with the local sponsor and the Federal Government each sharing half of that cost, or $110.0 million each. When compared to the No Action alternative, and based on 2005 dollars, the Modified Central City Project alternative would result in a 10% reduction in total Federal Project costs. The local cost-sharing responsibility for the "Federal Project" features of the Modified Central City Project would be reduced from the No Action cost sharing responsibility by 11% and the Federal costs would be reduced by 8% compared to proceeding with each project independently. When all local costs of the total Modified Project alternative are considered, however, there would be a 13% increase in Total Project Cost from about $459.0 million to about $519.0 million. This estimated cost in 2007 dollars is $576.0 million. All project costs beyond the authorized Federal Project cost of $220.0 million would be the responsibility of the local project sponsors.

The increase in Total Project Costs of about $60.0 million for the Modified Central City Project alternative, all of which would be local costs, are the net result of both savings and increases in costs of the No Action alternative of proceeding with each project separately. Savings would come primarily in the costs of lands and damages. Costs increases would be primarily in the development of the valley storage areas, dams and structures, fish and wildlife facilities, and recreation facilities. The associated benefits with these cost are the additional acreage of riparian woodland, additional recreational components consisting of equestrian, chat and hard trails, soccer fields, covered basketball goals and additional public use and access including boat launches, pedestrian bridges and public roads and parking.

Other Considerations

Implementation of the No Action alternative would continue in the absence of modifications that might alter the features of either the original Central City Project or the Riverside Oxbow Project. Both projects have been approved by higher Corps of Engineers authority and by the Assistant Secretary of the Army for Civil Works (ASA(CW)) and the Central City Project has been Authorized by Congress for construction. The Riverside Oxbow Project has not received Congressional funding authority as of this date. There would be no additional report preparation or approval requirements associated with proceeding with each of these projects independently. As the detailed design of the original Central City Project continues, it is anticipated that relocation of the dam site to the more upstream location that has

been selected for the modified Central City project alternative will be recommended. Such modification of the dam location and features during detailed design would, however, be within the approval authority of the Chief of Engineers under the current construction Authorization. Given this status of authorization and approval of each of the projects, construction or implementation schedules of the two projects are likely to differ fairly significantly. Different implementation or construction schedules will require duplication of many efforts, such as advertising and award of design and construction contracts, along with differing construction periods. It is also likely that the overall construction period would be extended by proceeding separately with each project, thereby extending the duration of construction related erosion control measures as well as temporary impacts including noise and air quality.

With the implementation of the Modified Central City alternative, the Project Report as discussed in the Final EIS, will be developed and submitted to higher Corps of Engineers offices and to the ASA (CW) for review and approval. This Project Report provides information necessary for the execution of a Project Cooperation Agreement (PCA) for construction. Because construction of the Central City project has been authorized, there was no typical feasibility report required, and project information needed to support the PCA will be provided through the Project Report. The Corp component would continue to include the funding and/or design participation in the overall Central City Project. With the Modified Central City Project alternative, all impacts to significant resources would be reduced. While some beneficial outputs would increase beyond those of the approved projects, others would be slightly reduced. The effect to the high priority resource categories of riparian woodland and emergent wetland acreages is beneficial but not to the extent requiring additional construction authorization.

The Modified Central City Project alternative would not add or delete any project purpose, nor would it require the acquisition of lands or waters specifically for mitigation of fish and wildlife values. It therefore appears that the Modified Central City Project does not require additional Congressional Authorization and would be within the discretionary authority of the Chief of Engineers.

Irreversible or Irretrievable Commitment of Resources

The Council on Environmental Quality (CEQ) regulations for implementing NEPA requires consideration of irreversible and irretrievable commitment of resources that would result from implementing any of the study alternatives. Irreversible and irretrievable resources are those that cannot be recovered if the project is implemented. Irreversible effects primarily result from use and destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action. In addition to the irretrievable commitment of non-renewable energy resources, which would occur as a result of constructing, maintaining, and operating either the No Action or Modified Central City Alternative, other resources which would be impacted are discussed below.

Energy requirements for construction of the No Action Alternative would include those used to relocate the levee at the Riverbend hydraulic and environmental mitigation area, contour the area for drainage, and for long term operations and maintenance of that area. Additional energy requirements would be required to modify University Drive and to construct other valley storage mitigation as identified within the FEIS. Construction of Samuels Avenue Dam, internal dams, and the bypass channel and hauling away of surplus material would also require irretrievable use of energy resources.

As the No Action Alternative also includes development of the Riverside Oxbow, irretrievable use of energy would be used to construct ecosystem restoration and hydraulic mitigation features as required. Energy would be used to open the old oxbow to flows from the West Fork of the Trinity River, to widen the wetlands within the abandoned Sycamore Creek channel within the oxbow area, construct additional wetlands within the Gateway Beach and Gateway East planning reaches, remove and replace the Beach Street bridge crossing of the oxbow, develop the recreation trail, and to plant and improve riparian forests within the study area. Long term operation and maintenance would require energy uses over the life of the project, including mowing and otherwise restricting forest growth within savannahs, pumping water to wetlands and maintenance of other constructed facilities.

The Modified Central City Alternative would not require construction in the Riverbend area, but would require construction of the main elements leading to the Uptown development including construction the Samuels Avenue Dam and support facilities, valley storage mitigation at multiple sites, with the majority of the valley storage being developed by excavation within the Riverside Oxbow area. With exceptions at University Drive and within a portion of valley storage in Site 18a, material excavated would be placed outside of the floodplain in order to meet the valley storage requirements. The Modified Central City Alternative would result in a greater use of energy resources for construction activities than the No Action Alternative.

The No Action Alternative and the Modified Central City Alternative would have an irreversible impact to grassland quality and/or quantity. These grasslands consist primarily of non-native Bermuda grasses, which are mowed and maintained within an urban environment. Some non-managed native grasses occur primarily within the Riverside Oxbow portion of the study area and would be affected by the Modified Central City Alternative if implemented. The value of these grasslands is not considered to be of significance due to their abundance and low value as wildlife habitat and, therefore, impacts to this resource would not require mitigation. The No Action alternative would impact approximately 100 AAHUs of grassland habitat while the Modified Central City Alternative would impact about 185.2 AAHUs of grassland habitat. Some of the acreage and habitat impacts to grasslands with the Modified Project alternative would occur due to planned changes to improve environmental resources by implementing dense riparian forest development over a large area of the Riverside Oxbow area.

Implementation of the No Action Alternative and Modified Central City Alternative would cause an irreversible and/or irretrievable loss to upland woodlands within the study area. The upland woodlands within the overall study area are located within a highly disturbed urban environment and generally would not constitute habitat requiring local, regional, or Federal conservation or protection. However, the upland forests impacted in the Riverbend area are considered of higher quality, and losses to the woodlands associated with No Action Alternative are proposed to be mitigated. Similarly, if the Modified Central City Alternative were implemented, some upland losses associated with the build out of the Trinity Uptown would occur. Some upland forest and shrubland on higher elevations of the Riverside Oxbow area would also be removed with implementation of the Modified Central City Alternative.

While construction activities associated with the Community Based Alternative identified in the FEIS, would initially impact wetlands, the quality and quantity of this resource would ultimately be increased, and therefore, there would be no irretrievable or irreversible impact to wetland resources from implementing the No Action alternative. Initial impacts were similarly identified within the Riverside Oxbow area should the Modified Central City Alternative be implemented. However, as with the No Action Alternative, new wetlands would be developed and managed resulting in higher quality wetlands for fish and wildlife resources uses. The No Action Alternative would result in a net gain of approximately 55.2 AAHUs of wetland habitat and the Modified Central City Alternative would result in a net gain of 47.8 AAHUs over the without a project condition.

With the No Action Alternative, there would be 1875 linear feet of exceptional riffle-pool habitat value within Marine Creek which would be irretrievably lost due to inundation, and 400 linear feet of Lebow Creek that would be irreversibly lost due to fill activities. These aquatic resources are considered significant by both the Corps and USFWS, and mitigation for these losses would be required if the No Action Alternative is implemented. The USFWS has coordinated with the Corps and local sponsors and has approved a mitigation plan for the impacts to Marine and Lebow Creeks. Mitigation measures for the No Action alternative include diverting flows varying by season up to 5 cubic feet-per-second to the mid-reach of Lebow Creek. A gravity flow pipeline from Samuels Avenue Dam impoundment would be possible to a point on the stream where the bottom elevation is approximately 525 NGVD feet, which appears to be near Brennan Avenue. In addition, there is the potential to add additional aquatic habitat by modifying the channel bottom of 1500 feet of Lebow Creek downstream of Brennan Avenue. Additional aquatic mitigation would occur at Ham Branch to fully compensate for adverse stream aquatic impacts. Mitigation at Ham Branch would be completed following studies to determine a stream

configuration that is geomorphically stable based upon hydrology, sediment characteristics and slope. A typical cross-section and plan view of proposed mitigation features are presented in Appendix G of the original Central City FEIS.

With the Modified Central City Alternative, the same exceptional quality riffle-pool complex in Marine Creek would be irretrievably lost due to inundation to an elevation of 516.5 NGVD associated with the in-channel dam. However, relocation of the Samuels Avenue Dam to above the Marine Creek confluence would avoid direct aquatic impacts to Lebow Creek. The proposed aquatic mitigation plan for impacts within Marine Creek include Implementing the Ham Branch mitigation plan as well as development of stream aquatic mitigation within Sycamore Creek as recommended as part of the Modified Central City Alternative. The aquatic habitat compensation plan proposed would fully compensate for identified adverse aquatic impacts.

Cumulative Impact Analysis

The Council on Environmental Quality (CEQ) developed a handbook that contained guidelines for addressing cumulative impacts in analyses prepared under the National Environmental Policy Act in 1997. The CEQ defined cumulative impacts as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. The term "reasonably foreseeable" implies that the project may only have a general public knowledge or acceptance at a point in time and that detail of design and project specific impacts are yet to be developed or disclosed by the project proponent.

The Corps has previously addressed cumulative impacts of its various programs and specific project recommendations within the geographic and administrative responsibility of the Fort Worth District. Previous Corps of Engineer documents addressing cumulative impacts in the upper Trinity River basin include the Regional Environmental Impact Statement Trinity River & Tributaries(1988), Programmatic Environmental Impact Statement Upper Trinity River Basin, Trinity River, Texas (2000), Supplement No. 1 to the Environmental Impact Statement for the Dallas Floodway Extension, Trinity River, Texas (2003), and in the Central City EIS (2006). The cumulative impact analysis for this SEIS uses information available at the time this SEIS was prepared to describe these other projects, their respective potential impacts on the environment, and incorporates by reference the cumulative impact assessments as documented from the prior Corps documents. This cumulative impact analysis considers existing conditions to be a result of the past and present projects that have occurred in the study area and serves as a baseline to address impacts of the reasonably foreseeable projects.

Identification of Reasonably Foreseeable Projects

Information for this SEIS was gathered following methodologies adopted for the Central City FEIS. The Corps’ regulatory data base was queried for the period of March 2005 until November 30, 2007 to update the list of reasonably foreseeable projects within the geographic area of the Central City study. In addition, several Corps Regulatory personnel were interviewed based upon their knowledge of reasonably foreseeable projects. Searches of the internet and newspapers were also used to update the list of projects. Energy development was identified as a new source of potential cumulative impacts and information from the Railroad Commission was utilized to identify reasonably foreseeable energy development projects within the study area. Table 4-3 identifies new permit projects and projects that have been modified, or are proposed for modification, in addition to previously identified reasonably foreseeable projects. The cumulative impacts of previously permitted actions were considered and addressed within the Programmatic Environmental Impact Statement, Upper Trinity River Basin, Trinity River, Texas, that was finalized in June 2000 and in the Central City FEIS dated January 2006. Cumulative impacts discussed in both documents are incorporated here by reference.

The study area for social resources was determined to coincide primarily with the general project study area, however, any projects identified as “reasonably foreseeable” for environmental resource impacts were also considered in the cumulative impact assessment. The cumulative impact assessment

study area for hydrology and hydraulics includes the contributing watersheds above the Central City study area and extends downstream to the confluence of West and Elm Forks.

Table 4-3
Reasonably Foreseeable Projects Considered

PROJECT	RESPONSIBLE ENTITY	DESCRIPTION	LOCATION	PHASE
Project Status Updates				
Johnson Creek	USACE/City of Arlington	Referenced in Programmatic EIS (2000), however 90 acres of the restoration was de-authorized with requirement that City substitute 90 acres that would provide equivalent habitat restoration values	City of Arlington, Johnson Creek upstream of de-authorized segment and Village Creek and Rush Creek floodplain downstream of Division Street	Remainder of authorized project not yet constructed being reevaluated.
TCC Campus	Tarrant County College	Develop new downtown campus	East side of N. Main at Trinity River	Seeking Section 408 approval
Section 404, Section 10, Other Permitted Projects				
Fills, Permits, Utilities, and Other Activities	Multiple	15 actions identified by updated search	Upper Trinity Watershed area extending from Benbrook Lake and Lake Worth to confluence of Elm Fork.	Planning to construction
Transportation Projects				
East 1st Street	Multiple	Street realignment and bridge replacement at West Fork of Trinity	Immediately downstream of combined Central City study area, City of Fort Worth	Awaiting funding
Energy Development				
Natural Gas Exploration	Multiple	Estimated 50 constructed pads and 66 sites permitted by Texas Railroad Commission	West Fork and Clear Fork Floodplains, Tarrant and Dallas Counties	Various stages

The flood damage reduction and ecosystem restoration project on Johnson Creek within the City of Arlington had previously been identified as a Corps of Engineers project that had positive contributions to fish and wildlife habitat and recreation associated with riparian forest development. As originally authorized in 1999, the project would have provided ecosystem restoration on approximately 155 acres providing approximately 117 AAHUs of habitat value. Approximately 11,900 linear feet of recreational trail would have been constructed on restoration and flood damage reduction lands acquired for the Johnson Creek Project.

The authorized Johnson Creek project also provided direct benefits by removing over 144 structures from flood prone areas (25 year floodplain). Ninety acres of the ecosystem restoration between Union Pacific Railroad and Randol Mill Road was subsequently de-authorized by Section 134 of Public Law 109-103 in 2005. That legislation required the City of Arlington to locate substitute lands that would provide the same (estimated to be 65.5 AAHUs) or greater level of national ecosystem restoration benefits as the 90 acres that were de-authorized would have provided. To date Arlington has identified substitute lands, but plans to produce the restoration benefits have not been developed. The project as originally authorized and partially constructed would have provided cumulative benefits to riparian forest as identified in the Programmatic EIS as incorporated by reference into the FEIS. The de-authorization and subsequent legislation to re-evaluate the entire Johnson Creek project, in effect, delays the accumulation of positive benefits for riparian forests to some undefined future date.

Potential projects within the Corps of Engineers Regulatory program that might have cumulative impacts within the geographic area are identified in the original Central City EIS. Since August 2005, there have been 15 new actions identified as reasonably foreseeable. However, only one of these projects would contribute to cumulative impacts in evaluating the Central City project, that being the Tarrant County Campus construction in downtown Fort Worth. This project is currently being evaluated in

an Environmental Assessment (EA) to support a request to the Corps of Engineers for permission to modify a portion of the existing Federal levee system along the West Fork of the Trinity River. Among the impacts identified in the EA for the campus are 5.0 acres of riparian vegetation that has already been or ultimately would be removed. The Corps Regulatory staff has also identified potential adverse effects to historic properties as a result of the project. Other identified permit actions are covered by various nationwide permits or are merely administrative actions such as changing name of responsible individuals for the originally issue permits. Projects having adverse cumulative impacts may not be permitted under a nationwide permit.

The number of permitted gas well exploration sites within the Regulatory area considered for the Central City FEIS was determined by manually comparing sites shown by a map reader available at the Railroad Commission Web Site and Figure 4-4 of the original Central City EIS. This information will be reviewed as it is made available by the Railroad Commission.

Based upon this current review of reasonably foreseeable projects that were not considered within the original Central City EIS, either by direct review or through incorporation by reference from previous documents, it appears that the road crossing at East 1st Street and the extensive network of developed or permitted gas well exploration sites constitute newly identified projects that might have cumulative impacts in association with the proposed project. In addition, the Tarrant County Campus plan is now more fully developed and some additional construction details and potential impacts have been updated and considered in this cumulative impact assessment.

Assumptions

Several key assumptions were made to ensure consistency of this cumulative impact analysis with previous analyses. Key assumptions used, consistent with the Central City EIS, are identified below:

- All Trinity Uptown Features (transportation modifications, levee removal, canals, and land use changes) would occur after implementation of the Community Based Alternative and implementation of the Riverside Oxbow Ecosystem Restoration Project and, therefore, all are considered as part of the No Action Alternative

- All reasonably foreseeable projects listed in Table 4-9 of the FEIS as modified by updated search for projects displayed in Table 4-3 of this SEIS would be implemented and are considered for cumulative impacts for the No Action Alternative as well as the Modified Central City Alternative.

- Only those resources that were impacted by direct or indirect impacts of the No Action or Modified Central City Alternatives were considered for cumulative impacts.

Methodology

Cumulative impact evaluation requires analysis of direct and/or indirect impact of the No Action and Modified Central City alternatives with consideration of past, present, and future reasonably foreseeable projects in such a way to disclose impacts that otherwise might not be identified. To assess the cumulative impacts to economic, environmental, and other resources that could be affected by these alternatives, interdisciplinary Corps team members with technical expertise qualitatively assessed cumulative impacts of reasonably foreseeable projects identified in previous documents along with newly identified projects. The results of the team's inputs and consideration of cumulative impacts are disclosed in Table 4-4 and in within the discussions in the following sections.

Table 4-4
Cumulative Impact Analysis of Alternatives
(In consideration of all Reasonably Foreseeable Actions)

Environmental or Economic Resource	No Action Alternative	Modified Project Alternative
Hydrology and Hydraulics (greater than 100-year flood)	□	□
Hydrology and Hydraulics (less than 100-year flood)	○	○
Water Quality	□	□
Wetlands	□	□
Terrestrial Habitat		
Woodlands	□	□
Grasslands	○	□
Aquatic Habitat	○	□
Cultural		
Archaeological	□	□
Architectural	□	□
Hazardous, Toxic, Radioactive Waste	□	□
Recreation	□	□
Socio-economic	□	□
Aesthetics	○	○
Air Quality	○	○
Noise	□	□
Light	□	□
Public Services and Facilities	○	○
Human Health and Safety	○	○

Legend: ○ No Effect □ Adverse □ Beneficial

Cumulative Impact by Resource

Hydrology and Hydraulics

Cumulative impacts to hydrology and hydraulics will continue to occur in the study area due to the fact that some of the reasonably foreseeable activities will have fills and other floodplain alterations that do not invoke hydraulic mitigation requirements as required by the Corridor Development Certificate (CDC) process adopted by the North Central Texas Council of Governments or Regulatory Programs of the Corps of Engineers. For example, gas exploration pads have been identified as a source of cumulative impacts, and other alterations associated with developments in the floodplain above the 100 year event could also induce impacts. As a result, the effort to provide compensatory valley storage mitigation for reasonably foreseeable projects, where regulated, and for either the No Action alternative or the Modified Central City Project as proposed is deemed necessary and prudent.

Either alternative, No Action or the Modified Central City Project, in and of themselves, would have a neutral effect on hydraulics and hydrology of the Upper Trinity River Basin. The requirement of 5,250 acre-feet of valley storage can and will be met by either alternative in accordance with the CDC process to which the Corps will adhere. Detailed design of either alternative will assure that there will be no net loss of valley storage and that elevations and velocities in areas both upstream and downstream of the projects will not be adversely affected. Although the cumulative effects with either alternative in conjunction with all reasonably foreseeable activities has the potential to be adverse, the modified project alternative appears to have slightly greater flexibility in meeting hydraulic criteria and an additional cumulative benefit of the Modified Central City project alternative is that, based use of primary valley storage sites within the Riverside Oxbow area allows for use of roughness coefficients that are associated with development of additional riparian woodland habitat outputs compared to what could be obtained with the No Action alternative.

The extensive development of valley storage in the Riverside Oxbow area with the Modified Project alternative might pose problems to future considerations for providing additional flood risk management benefits in the vicinity of Riverside Drive, which contains areas that are not protected from the 100-year event at present. Earlier studies have shown that area lacks economic justification from a

Corps of Engineers perspective for developing a feasible flood damage reduction project. However, non-federal interests may find it necessary to be creative in attempting to provide valley storage mitigation should they desire to remove some of the residual areas from the 100-year floodplain in the future. In comparison, the Riverside Oxbow Project as a component of the No Action alternative would cause minimal adverse impacts to valley storage requiring mitigation and would leave excavation options open for future creation of valley storage in that area.

Water Quality

Increases in impervious surface area associated with land use intensification within the Central City project area under the No Action Alternative or the Modified Central City Project Alternative combined with projected Trinity Uptown Features would be expected to contribute cumulatively to nonpoint source water quality issues, along with similar increases in impervious cover associated with other downtown/uptown development projects. These impacts can be extensively ameliorated through the consistent application of innovative Best Management Practices to minimize or eliminate pollution loadings due to storm water runoff during construction. The City of Fort Worth is currently performing a comprehensive evaluation of the existing stormwater management practices with the intent of improving the quality of urban stormwater runoff on a city-wide basis. These improvements have the potential to reduce or eliminate cumulative water quality impacts. With both the No Action and the Modified Central City project alternatives, the extensive riparian woodland and emergent wetland restoration measures within the Riverside Oxbow and Gateway Park areas are expected to contribute substantially and positively to water quality of the Upper Trinity River basin over the long term. The positive contribution of riparian buffer zones and wetlands to long-term water quality by slowing flow, uptake of nutrients, and through binding and converting other pollutants is documented and discussed in the Programmatic EIS for the Upper Trinity River Basin and in the Riverside Oxbow Ecosystem Restoration Report and EA.

Wetlands

The original Central City Project would result a net increase of about 6 acres of emergent wetlands and the Riverside Oxbow project would create, restore, or manage about 49 acres of emergent wetlands. A significant feature of the Riverside Oxbow project would be to create an emergent wetland in the remnant Sycamore Creek channel with a pumping system from the West Fork and control structures to manage soil saturation and water depths. The net effect of the two projects would be the creation and management of about 55 acres of emergent wetlands. The Modified Central City Project alternative proposes to restore the Sycamore Creek channel as stream aquatic habitat by reconnecting the remnant channel to the West Fork at the current water surface elevation of the mainstem channel, rather than creating operationally intensive wetlands. The Modified Central City Project alternative would utilize the valley storage area in the southern part of Gateway Park where sludge beds will be remediated by the City of Fort Worth to establish a water body with emergent wetlands. The Modified Central City project would also convert some open-water areas in the northern part of Gateway to emergent wetlands. Total acreage of emergent wetlands to be established and managed under the Modified Central City Project alternative would be about 58 acres. Given the importance of emergent wetlands to migrating waterfowl and other wildlife resources, and given the historic losses of wetland resources over the last century, the cumulative effects of either alternative on wetlands within the Upper Trinity River Basin are considered to be significant and beneficial.

Terrestrial Habitat

Effects of the No Action alternative on vegetative cover and wildlife habitat values would be a relatively small but positive contribution in consideration of all reasonably foreseeable activities in the upper Trinity River basin. The original Central City Project would be essentially neutral in that fairly substantial habitat mitigation measures would be required to offset adverse impacts caused by creation of required valley storage. These improvements would occur within a 9.6 mile reach of the West Fork and a 2.3 mile reach of the Clear Fork Trinity River. A primary component of the Riverside Oxbow Project is reconnection of the upstream end of a historic river remnant with the mainstem of the Trinity River. The original Central City Project includes measures which would also reconnect two remnant oxbow channels

to the mainstem. Re-establishing the riverine function to these remnant stream channels would provide beneficial cumulative impacts for bird species which rely upon these types of communities, which can be scarce in an urban environment. Removal of exotic and invasive species within both project areas would provide beneficial cumulative impacts for downstream riparian communities. The net effect of the two projects would be restoration, management, or improvement of 363 acres of riparian woodland habitat with a loss of about 218 acres of grassland habitat that is mostly in manicured grasses.

As with the No Action alternative, the cumulative effects of the Modified Central City Project alternative on vegetative cover and wildlife habitat values would be relatively small but the net effect would be positive when considered in the context of the Upper Trinity River Basin. The modified central city project would result in the establishment, preservation, and management of about 419 acres of riparian woodlands. A larger proportion of the riparian woodland habitat outputs of the Modified Central City Project alternative would be the result of restoration of woodlands in areas that are now primarily disturbed areas and grasslands as opposed to preservation and management of existing resources. Much of the area that would be restored to riparian woodlands would be excavated to create required valley storage prior to riparian restoration. These sites, however, have been configured to avoid adverse impacts to riparian woodlands and upland woodland prior to excavation and then restoration. The Modified Central City Project alternative also includes improvement and management measures for essentially all of existing riparian woodlands in the combined project area. The cumulative impact of the Modified Central City Project alternative would be slightly more beneficial than that of proceeding with the two projects independently.

Aquatic Habitat

The No Action alternative would result in the restoration of about 5.1 acres of oxbow aquatic habitat in the Rockwood Park ecosystem improvement area of the original Central City Project. The original Central City project, however, would have adverse effects on the stream aquatic habitats of Marine Creek and Lebow Creek for which mitigation measures have been formulated. Mitigation for stream losses along Marine and Lebow creeks include stream habitat improvement measures along Ham Branch and within the upper reaches of Lebow Creek, which would offset the losses due to inundation. Additionally, in the event that the two projects do proceed to construction, it is likely that the Samuels Avenue damsite would be relocated to avoid adverse impacts to Marine and Lebow Creeks, while retaining the Ham Branch stream habitat improvements.

The Modified Central City Project alternative would retain the oxbow habitat improvements in the Rockwood Park area and would avoid most of the adverse impacts to Marine and Lebow Creeks with the relocation of the Samuels Avenue damsite to just upstream of the West Fork confluences with the two creeks. The Modified Central City Project alternative would also retain the stream habitat improvement measures along Ham Branch as well as the Riverside Oxbow restoration measures. The main additional benefit of the Modified Central City Project alternative over the No Action alternative, other than avoidance of most of the adverse impacts to Marine and Lebow creeks, would be the restoration of about 1.3 acres of the severed Sycamore Creek channel within the Riverside Oxbow area. The net positive effect of the Modified Central City Project alternative would therefore be the restoration of about 10.9 acres of stream and oxbow aquatic habitats.

While these stream restoration acreages and habitat values of either alternative are relatively small when considered in the backdrop of the Upper Trinity River Basin, they do represent a positive cumulative contribution to aquatic resources of the larger area.

Cultural Resources

The Modified Central City project will result in increased impacts to cultural resources. Impacts to known archeological resources were avoided by design in the Riverside Oxbow project. Under the original Central City Project, these resources cannot be avoided. Excavation will be conducted, in consultation with the SHPO, to mitigate for the impacts by extracting relevant information and data from the sites prior to project implementation.

Either alternative has the potential to adversely impact buried archeological resources, as many of the key project features require extensive excavation of culturally sensitive river bank locations. In addition, many of the reasonably foreseeable projects could be done by private developers and would not be required to follow Federally mandated legal mitigation procedures. However, due to Federal involvement, a legal requirement exists that would ensure impacts to resources identified as significant would be mitigated prior to impact. Thus, the No Action and Modified Project alternatives would not be expected to contribute to the cumulative loss of archeological data which could result from the actions of others which do not have Federal involvement and which might engender unmitigated impacts to archaeological resources.

The No Action alternative and the Modified Project alternative could have impacts, some possibly adverse, on architectural properties eligible for the National Register of Historic Places. In accordance with legal requirements, any adverse impacts would be avoided, reduced or fully mitigated through NHPA Section 106 consultation when meeting the definition of a federal undertaking under 36 CFR Part 800. In conjunction with projects of others including, but not limited to, the 7th Street Bridge, North Main Corridor Project, Hemphill Underpass, Trinity Bluffs Housing Project, Bluff Street Housing Project, TCC Campus, Radio Shack Headquarters, TRWD Trailhead Improvements, and various improvements to the Trinity Trail System, significant modifications to the setting and context of historic resources may be identified.

If Federal funds or approvals are involved, those historic properties adversely affected within the area of potential effect of the proposed action would have to be avoided, reduced or mitigated through an agreement developed in consultation between the Corps, the Texas Historical Commission, and other consulting parties.

Hazardous, Toxic, and Radioactive Waste

Construction of the Central City project features under either the No Action or the Modified Central City Project alternative will likely require HTRW remediation at several locations. As a precursor to use or future development of the area currently occupied by abandoned sludge drying beds within the Riverside Oxbow area, the City of Fort Worth will be removing soils contaminated by PCBs and metals.

The City of Fort Worth has also applied for and received from the TCEQ a Municipal Setting Designations (MSD) for groundwater within the Trinity Uptown area, encompassing the Central City project area. MSDs complement efforts of the TCEQ Voluntary Cleanup Program to encourage reuse and redevelopment of urban properties, rather than have the economic development occur in more 'pristine' environments on the outskirts of the urban area, i.e. urban sprawl, and its attendant negative environmental impacts. Groundwater remediation is typically the most intractable, difficult, and costly environmental media to remediate. In areas where ubiquitous, low-level contamination of groundwater is present with little chance of identifying a primary source or enforcing groundwater remediation, MSDs can foster contaminated soil remediation by relieving businesses or potential property owners from the burden and liability of groundwater remediation.

Groundwater within an MSD is restricted from use as a potable water or irrigation supply, so surface water quality should marginally benefit from the MSD. Considering the additional contaminated soil remediation and Brownfields redevelopment the project will catalyze, either alternative is anticipated to have a beneficial cumulative effect with respect to HTRW.

Recreation Resources

Features of the recreation plan developed in conjunction with both the No Action Alternative and the Modified Central City alternative were expressly intended to interact with other ongoing projects to produce cumulative benefits. Enhancing connectivity to neighborhoods throughout the City, existing trails, environmental education opportunities, and recreation resources associated with the Riverside Oxbow area, TRWD trailhead improvements, and various Trinity Trail improvements proposed by others were driving forces in formulation of the recreation components of both alternatives. Recreational

features specified in the original Riverside Oxbow interim feasibility report include pedestrian and equestrian trails, recreation access points with parking, and restroom facilities. The draft concept recreation master plan, which is currently being updated by the City of Fort Worth for Gateway Park depicts the following amenities.

- Soccer and baseball fields
- Mountain bike course
- Amphitheater and river education center
- Dog park
- Hiking and equestrian trails
- Equestrian center
- Skate park
- Boat house with canoe launch
- Picnic/playground areas
- Basketball courts
- Splash park

These facilities are considered viable opportunities with either the No Action or the Modified Central City Project alternative. While all of these amenities may not be realized, this concept demonstrates the ability to accommodate valley storage requirements while providing environmental restoration components. In assessing the balance between the short-term impacts of construction versus the longer-term beneficial impacts of the recreational amenities and environmental restoration features of the Modified Central City Project, depending on the level and amount of recreation amenities, potentially impacted neighborhoods should benefit significantly from the recreational opportunities and the improved environmental quality afforded by the Modified Project alternative. These locally beneficial long term impacts to open space, environmental quality, and recreational amenities would have incrementally beneficial impacts, on a cumulative basis, to the broad Upper Trinity River basin study area.

Socio-Economic Variables, Environmental Justice, Community Structure

There are numerous public, residential, and commercial and mixed-use development projects evolving in proximity to the project area. Major new developments are planned, or are in place, for the area immediately to the west of the Central City (e.g. Montgomery Ward), to the south (e.g. Pier One, Radio Shack, and the TCC campus), to the east (e.g. Trinity Bluffs), and to the north (The Mercado, North Main Streetscape Improvements, Stockyards Hotel.) A clear sentiment in the local business community is that the No Action Alternative, particularly related to the original Central City plan with Trinity Uptown Features, would create significant synergy with these projects and provide an impetus for major shifts in economic activity and land use patterns. The cumulative effect of this growth and economic activity is predicted to be major increases in employment, households, property values, and tax revenues. A significant portion of the increase in tax revenues would be initially diverted through the Trinity River Vision Tax Increment Financing District to finance the Central City infrastructure. However, 20% of the increase in tax revenues generated by the increase in tax base would be immediately available to augment the City's General Revenues and thereby support public initiatives throughout the City. The fiscal analysis suggests that the City of Fort Worth would recoup its initial investment of general revenue funds within 25 years; after that time, the TIF would be phased out and the full value of the $1.1 billion dollar increase in tax base would be available to the general revenue fund.

In addition to the Trinity River Vision Tax Increment Financing District, the City of Fort Worth has established eight other TIF Districts, each supporting major city infrastructure initiatives. These include TIF's for the Speedway, Downtown, the Southside/Medical District, Riverfront, North Tarrant Parkway, Lancaster, Lone Star, and Southwest Parkway. These additional TIF's should adequately address the concerns that public investment in the Central City project area will not disproportionately impact the economic development of other sectors of the City.

The net effect of the cumulative changes to land use and patterns of economic activity on minority populations within the study area is strongly dependent on the actions of local governments, primarily the City of Fort Worth to ensure the provision of affordable housing. The City has achieved affordable housing goals in association with other downtown development projects such as the Hillside Apartments, the Historic Electric Building and others through the use of affordable housing set-asides. Similar institutional tools are envisioned to be incorporated into the Trinity Bluffs project and other development projects in the study area in order to maintain diversity in the area's population and avoid adverse impacts to minority populations. Riverside Oxbow project would provide increased opportunities for a variety of recreational pursuits, nature study and other environmental enjoyment opportunities based upon improvements to the ecosystem as described in detail in the project report (2005).

Lands required for the Riverside / Gateway area valley storage sites and subsequent habitat development with the Modified Central City Project alternative would be essentially the same lands that would be required for the Riverside Oxbow Project. If eminent domain would be required in the study area considered for Environmental Justice issues, the issues would be the same whether considering acquisition requirements for the Riverside Oxbow as part of the No Action alternative or the Modified Central City Project alternative. Community input from the Riverside/Gateway communities to date, however, indicates that the affected communities are in favor of increased open space, natural habitat development, and compatible recreation development.

The primary concern of environmental justice is to address adverse and disproportionate effects that might result from the construction and associated development of the project on those populations and businesses that could be potentially impacted, namely minority populations and minority-owned businesses. Appendix D identifies two census blocks that intersect the Riverside Oxbow study area, both of which contain significant numbers of Hispanics to warrant consideration under EO 12898. These populations do not however warrant consideration on the basis of income. Specific details regarding the socioeconomic characteristics of the Original Central City and the Modified Central City project including descriptions of racial composition, income, and employment can be found in Appendix D. Based upon consideration of the No Action alternative and known reasonably foreseeable projects, there would be a net benefit in the socio-economic condition of those populations given special consideration under EO 12898. While the potential exists for adverse short-term impacts from construction related air emissions and noise, the analyses mentioned earlier in this chapter indicates that any impacts to potentially impacted populations can be minimized by utilizing Best Management Practices with no expected long-term impacts.

A number of activities were undertaken to elicit comments and concerns from the public regarding the Modified Central City project including public meetings, distribution of the Notice of Intent, and a public meeting held during the 45-day public comment period. The concerns of those potentially impacted populations were initially addressed during the scoping phase for the original Riverside Oxbow project beginning with a series of public meetings held with local residents and interest groups regarding the future of the Trinity River and its tributaries. Two public meetings were held at the local library branch with citizens interested in the river segment that includes the Riverside Oxbow area. The city also conducted public meetings regarding for citizens interested in updates to the Gateway Park Master Plan. Additionally, dissemination of the Draft SEIS was coordinated with the Hispanic Chamber of Commerce. Comments from the public meeting, both written and oral were overwhelmingly in favor of the project including those from both the Black and Hispanic Chambers of Commerce. No comments regarding impacts to protected populations were submitted. Specifics regarding public involvement and outreach are discussed in Chapter 5. The Public Meeting was held on January 24, 2008 during the 45-day public comment period and conducted at a location approximately one mile from those identified neighborhoods providing another opportunity for those residing around the Riverside Oxbow area to articulate potential concerns.

Aesthetics

Aesthetics are subjective and dependent upon individual or societal preferences. Within the modified study area for the Central City project, aesthetic resources range from man-made features such as river channels, low-water dams, manicured grasses, and high-rise buildings of downtown to natural features such as those found in Gateway Park and the remnant riparian woodlands associated with relatively unaltered stretches of the Trinity River and its tributaries. Those preferring the linear predictability of man-made and man-maintained features will find more aesthetic value in features such as the bypass channel and the structural formality of the Samuels Avenue dam and spillway. That aesthetic would be similar to the area where the water surface elevation of the man-made channel was recently increased by construction of the Beach Street Low-Water Dam, with an accompanying downstream riffle complex. Individuals preferring the randomness of natural systems will find aesthetic value and an emotional connection to preserved and restored natural riverine ecosystems. The West Fork Channel, which flows through Gateway Park remains in a natural condition providing natural visual values to that area. Riparian woodland preservation and restoration associated with either the No Action Alternative or the Modified Central City Project Alternative would incrementally add to that type of aesthetic value over the long term. In reality, many individuals living and working in the highly urbanized Metroplex will likely find a positive aesthetic experience in a harmonious blending of man-made structural features with natural riparian ecosystems.

Both the No Action and Modified Central City Project alternatives would provide the same man-made features of a bypass channel, dam and stilling basin, bridges, and trail and access facilities within the core Central City area, as well as essentially the same compatible recreation development in the Riverside/Gateway area. The No Action Alternative would include riparian habitat mitigation and some measures within the Riverbend valley storage site and would provide relatively limited preservation and restoration of riparian woodland values within the Riverside Oxbow project area. The Modified Central City Project Alternative would preserve essentially all existing high quality natural resource values in the Riverside Oxbow and Gateway Park areas and would provide for significantly greater riparian woodland restoration and open space than the Riverside Oxbow project. Considering the broad perspective of aesthetic resources associated with the No Action and Modified Central City alternatives under and other reasonably foreseeable projects, it was determined that no cumulative effects would occur.

Air Quality

An expressed purpose of the No Action alternative as well as the Modified Central City Project alternative is to encourage the development of high-density residential neighborhoods in the Central City area. At full build-out some 10,000 additional households are predicted to be located in the project area. Additional developments planned by others have the similar goal of expanding the residential component of the downtown land use mix. Cumulatively, these households would be expected to include automobiles, with a net increase in automobile traffic and associated discharges. However, the cumulative impacts of the Central City component of the project on air quality would be mitigated by the project's emphasis on high-density development, where non-motorized methods of transportation are feasible, with emphasis on public transportation infrastructure. Where such conditions exist, automobile density on a per-household basis is significantly less than that associated with more typical low-density suburban environments. Results of the carbon monoxide (CO) model analysis of the street intersection to be most affected by increased traffic indicate infrastructure modifications and urban development associated with the Central City project will not result in exceedance of CO standards. Further details are discussed in the *Air Quality Assessment Report Fort Worth Central City Project, Fort Worth, Texas (*February 2005) in Appendix G.7 of the Final Environmental Impact Statement for Upper Trinity River Central City, Fort Worth, Texas, January 2006 and General Conformity Analysis, Fort Worth Central City Riverside Oxbow/Gateway Park Site dated 4 October, 2007.

Noise and Light

Both the No Action alternative and the Modified Central City Project alternative would be expected to contribute cumulatively to minor increases in noise and light levels in the Central City and the

Riverside Oxbow areas. However, since a substantial part of the Central City project area is currently within and surrounded by a dense urban fabric, and the Riverside Oxbow area would have only temporary disturbances related to construction of the project features the implications of this increase are predicted to be minor for the No Action condition.

The adverse effects of construction noise upon a community have historically been considered to be an inevitable, short-term, and unavoidable impact. Best practice mitigation measures are employed and then adjusted once construction begins in order to ensure ongoing mitigation of noise impacts. Such analysis was conducted for the features of the Central City Project and are addressed in the FEIS for that project. The discussion bellow addresses the changes in noise impacts that would occur with implementation of the Modified Central City Project alternative with its associated changes in location of valley storage areas.

Heavy machinery, the major source of noise in construction, will be constantly moving in unpredictable patterns. However, construction will normally occur during daylight hours when occasional loud noises are more tolerable. Potential noise receivers in the Riverside and Gateway areas include commercial, residential, and industrial sites mainly to the north and west of the project area. Background noise includes nearby Interstate 30 as well as commercial and light industrial sources. Noise impacts will be significantly mitigated by the extended distance between construction activity and sound receptors, trees and vegetation along the Trinity River bottom area and elsewhere between the construction area and noise receptors, the depressed elevation of the construction area due to excavation, and the addition of an elevated excavation deposit area southeast of the intersection of North Beach Street and 1st Street. It is expected that these mitigating factors will be effective in reducing noise impacts. Overall, the excavation and grading activities are expected to be consistent with typical noise levels associated with normal urban development activities.

Excess material excavated from the construction area is expected be hauled via truck to designated disposal areas and, as a result, there will be a noise impact from the hauling activity. Potential haul routes were identified based on the approximate excavation volumes and potential deposit sites. Each of the potential haul routes was driven prior to being selected to determine approximate route time and other considerations including left hand turns (cross traffic), stop signs, traffic lights, and railroad crossing. Sensitive noise receptors, load restrictions on bridges, and construction sequencing were also considerations in determining the preferred haul routes. A directory search indicates there are no hospitals in the area of the Riverside Oxbow and Gateway Park areas or the associated haul routes. The nearest school is Meadowbrook Elementary, which is located one quarter-mile off of the Riverside Drive haul route. Mitigation of haul truck noise could be accomplished by ensuring trucks have working muffler systems installed, managing haul truck speed and acceleration, and limiting haul truck activity to daytime hours. The noise impact from the haul trucks will be temporary. With appropriate mitigation measures it is expected that noise impacts would be minimized to the greatest extent possible.

Based on analysis of noise receptors, background noise levels, disposal haul routes, and appropriate mitigation measures, implementation of the Modified Central City Project alternative will result in only temporary, construction-related impacts to noise levels. No long-term adverse impacts will occur within or adjacent to the Riverside or Gateway sites given that the designated land use will not change. The temporary impacts would occur for the duration of the estimated 3 year construction period. Cumulatively, noise impacts of the Modified Central City Project alternative would not be significantly different than noise associated with implementation of the Central City and Riverside Oxbow projects separately. With the Modified Central City Project, however, those impacts would be more likely to occur during the same construction period.

Public Services and Facilities

Estimates based on construction activities of the original Central City project and the associated residential and commercial development and recurring business will generate $4.3 billion in economic activity and employ almost 42,000 over a 40-year period. While the majority of this anticipated economic activity is expected to directly benefit those parts of the city in close proximity to Trinity Uptown, the

beneficial impacts from the Modified Central City Project to be realized by those neighborhoods close to the Riverside Oxbow area will generally come in the form of recreational amenities and improved environmental quality. Growth of infrastructure related to public services will be required and must be funded through the projected direct and indirect economic benefits of either alternative.

Environmental Compliance

Endangered Species

The U.S. Fish and Wildlife Service has reviewed the proposed project and provided concurrence that the proposed the project is not likely to adversely affect threatened or endangered species. Prior to construction a review would be conducted to determine if additional new species or impact information become available sufficient to warrant further consultation.

Section 404 Clean Water Act

The Corps of Engineers regulates the discharge of dredged and fill material into all waters of the United States, including wetlands. Although the Corps of Engineers does not issue itself permits for construction activities that would affect waters of the United States, the Corps must meet the legal requirement of the Clean Water Act. A Section 404 (b)(1) analysis has been completed and is presented as Appendix F to this SEIS. The Modified Central Project Alternative fulfills the overall objective of the sponsor and is the least damaging practicable alternative. Corps participation is a component of this plan. As such all discharge activities were reviewed in the analysis to address the cumulative impacts. This evaluation also forms the basis of future coordination with the Texas Commission on Environmental Quality in order to obtain a State Water Quality Certificate prior to the initiation of construction activities involving discharges to waters of the United States.

Construction activities that disturb upland areas (land above Section 404 jurisdictional waters) are subject to National Pollutant Discharge Elimination System (NPDES) requirements of Section 402(p) of the Clean Water Act (CWA). Within Texas, Texas Commission of Environmental Quality (TCEQ) is the permitting authority and administers the federal NPDES program through its Texas Pollutant Discharge Elimination System (TPDES) program. Construction activities that disturb one or more acres are subject to complying with TPDES requirements. Operators of construction activities that disturb 5 or greater acres must prepare a Storm Water Pollution Prevention Plan (SWPPP), submit a Notice of Intent to TCEQ, conducting onsite posting and periodic self-inspection, and accordingly follow and maintain the requirements of the SWPPP. In accordance with these requirements, during construction, the operator will assure that measures are taken to control erosion, reduce litter and sediment carried offsite (silt fences, hay bales, sediment retention ponds, litter pick-up, etc.), promptly clean-up accidental spills, utilize best management practices onsite, and stabilize site against erosion before completion. The operator of Modified Central City Project will be required to comply with these construction storm water permits requirements.

Sections 9 and 10 Rivers and Harbors Act

Navigability extends up the West Fork of the Trinity River to Riverside Drive. Therefore the project has been reviewed for compliance with Section 10. Stream flow diversion from the impounded section of the channelized West Fork would be diverted for stream restoration within Riverside Oxbow. During mean low flow events the diversion would be approximately 10 cubic feet per second or approximately 33% of the flow in the West Fork during those events. However, because of the existing dam structure below Beach Street on the channelized segment, no modification to depths or navigability would result. The proposed restoration activities would not affect navigability and therefore the project is in compliance with Section 10

Executive Order 11988 - Flood Plain Management

In addition to Section 404, Executive Order 11988, Floodplain Management, was considered during the development of the proposed project. There are no practical alternatives to achieve the project purposes of and recreation trail development without placing fill within the floodplain. Material removed from the project area requiring disposal, as part of the plan, would be placed in approved landfills for the types of materials involved. The proposed fill actions would not result in adverse environmental impacts and further, floodplain fill for recreational trail and would not directly or indirectly induce additional development in the floodplain and would therefore be in compliance with Executive Order 11988.

Executive Order 11990 - Protection of Wetlands

Executive Order 11990, Protection of Wetlands was considered during the development of the proposed project. The proposed project would increase the size and quality of wetlands in the area without adversely impact existing wetland areas so the project is in compliance with Executive Order 11990.

Executive Order 12898 - Environmental Justice

Implementation of the proposed project would not cause any adverse impacts to the economically depressed or minority areas adjacent to the study area. The project would improve existing environmental conditions that would enhance values of adjacent lands. Other than temporary impacts attributable to increased traffic flow during implementation, no adverse impacts to residents adjacent to the area should occur. The project is in compliance with the Executive Order on Environmental Justice.

Section 106 of the National Historic Preservation Act

Consultation with the Texas SHPO, in accordance with Section 106 of the National Historic Preservation Act, is currently underway concerning cultural resources compliance issues for the Modified Central City Project. In the original Central City project, historic architectural properties were found to be adversely affected and those impacts were mitigated through stipulations defined in an August 2006 Programmatic Agreement between the Army, the City of Fort Worth and the Texas Historical Commission. Architectural properties have been identified in the Riverside Oxbow area that are within the area of potential effect of the Modified Central City. The Corps determination of effects is being coordinated with the THC.

Separate, on-site investigations conducted during the feasibility study for the Riverside Oxbow Project resulted in the identification of archeological properties that would be impacted by excavations associated with the Modified Central City Project. As a result of that finding, this site will be excavated in accordance to a mitigation plan designed in consultation with the SHPO prior to project construction. Site specific investigations for archeological sites in the Central City project area will be conducted before project implementation. Any NRHP-eligible sites located during those studies will be excavated in accordance to a mitigation plan designed in consultation with the SHPO prior to project construction.

Cumulative Impacts

In addition to the Cumulative Impact assessment included in this document, the Corps of Engineers prepared a Programmatic Environmental Impact Statement (PEIS) in 2000 that addresses cumulative impacts of Corps of Engineers proposed activities associated with the Upper Trinity River Basin. That document identified concern related to the continued loss of riparian or bottomland forests and wetlands within the study area. The Modified Central City Project would not result in adverse cumulative impacts to the resources identified as important in the PEIS. The project would provide improvement to most resources. The hydraulic and hydrologic impacts would be mitigated as identified in the plan and therefore would also be in compliance with criteria identified during a previous Trinity Regional EIS for the Corps Regulatory program. It has been determined that the Modified Central City

Project would not cause negative cumulative impacts to resources of significance as identified during this and past studies.

Hydrology and Hydraulics

The Record of Decision (ROD) for the Trinity Regional EIS applies to all project actions requiring a permit under Section 10 or Section 404 within the Standard Project Flood (SPF) floodplain of the study area. The ROD established criteria for minimizing cumulative impacts to hydrology and hydraulics and compliance with its intent was the fundamental consideration in evaluations leading to the proposed Modified Central City Project. To help assure continued long term compliance with the ROD, the TREIS raised awareness that a large area of floodplain lands within the Upper Trinity River could be developed outside the jurisdiction of the Corps of Engineers and that if developed following only FEMA requirements, significant increases in flooding frequency and extent would continue to occur in adjacent and downstream areas. Subsequently, the Corridor Development Certificate (CDC) process was developed as a means to address those floodplain actions that were not within the jurisdictional areas administered by the Corps of Engineers. The CDC process is a joint effort of the North Central Texas Council of Governments (NCTCOG), the Corps of Engineers and member NCTCOG cities with jurisdiction over the Trinity River floodplain. The purpose of the CDC process is to affirm local government authority for local floodplain management while establishing a set of common permit criteria and procedures for development within the Trinity River Corridor. The CDC process, administered by member cities, ensures that a proposed development's effect on future flooding will be considered in floodplain permitting decisions. Emphasis is placed on preservation of valley storage. After a public review by all other cities within the CDC, the proponent city decides on whether to allow the floodplain alteration. It should be noted, however, that the CDC process does not require consideration of environmental issues within the decision-making process.

Chapter 5 - Public Involvement

A Notice of Intent (NOI) to prepare a Draft Supplemental No. 1 to the Final EIS for the Central City Project was published in the Federal Register on February 16, 2007. The NOI provided background information related to the proposal to modify the Central City Project, current status of ongoing studies and the rationale for preparing the SEIS. A formal public Scoping meeting was not held, but a Public Notice was mailed to the known interested public with more than 2,000 notices being mailed concurrently with publication of the NOI in the Federal Register.

Scoping

As a result of the NOI and Public Notice, total of 11 telephone contacts or visits to Corps offices and five letters were received in response to the NOI and Public Notice. Two of the phone calls were from the local media seeking interviews with the Corps' Project Manager regarding the proposed study of modification of the Central City Project. Three calls or visits were by individuals seeking to determine whether their property would be affected. Four calls were to either correct mailing addresses or to obtain digital copies of the Public Notice. One call was from a State Representative's office to clarify that the local cost of the proposal was not from State general funds, but from the Tarrant Regional Water District's flood operation funding. The three additional telephone contacts were to inquire about status of the study and Supplemental EIS.

Of the five letters received, three were from land owners or attorneys representing land owners in the combined project study area. One individual, although in support of re-opening the oxbow to flows, was not in favor of combining the projects because funding has not been authorized, and he was opposed to restoring riparian woodlands on his property. Another individual expressed concerns regarding the taking of private lands for public purposes, health hazards, increased flooding in the Riverside Oxbow area for political expediency, project costs, and questioned whether the Corps could participate in small canals that are "essential for a water theme". An attorney representing two land owners suggested that the Supplement to the EIS offered an opportunity to correct flaws in the Final EIS for Central City and to address additional hydraulic storage alternatives, including possible additional valley storage that could be achieved with design of the Samuels Avenue dam site. A scoping letter was received from the US Fish and Wildlife Service, which indicated that changes have occurred within the study areas of the two projects that warrant additional field verification, and that opportunities exist to avoid adverse impacts that would occur with the original Central City Project. The League of Women Voters expressed support for the study as an opportunity to improve Gateway Park and to preserve riverbank trees and restore previously damaged or destroyed forest areas. The League suggested maximizing reforestation in the Oxbow area as a fair balance to the dense urban development expected in the main Trinity Uptown area.

Review of the Draft Supplemental EIS

The draft Supplement No. 1 to the Final EIS for the Central City project was filed with EPA and a Notice of Availability was published in the Federal Register on January 4, 2008. Approximately 3000 Notices of Availability were mailed to interested citizens and the document was made available on the Corps' Fort Worth District website, at local libraries, and on CD's available upon request. A Public Meeting was held on January 24, 2008 during the 45-day public comment period which ended on February 19, 2008. Approximately 200 people attended the public meeting which was a combined "open house" for the first hour followed by a formal hearing of comments. Kiosks, presenting information on Habitat Development, Recreation, Valley Storage Sites, and Samuels Avenue Dam features, were staffed by Corps and sponsor team members to answer questions. Approximately 200 people attended the meeting of which 25 provided verbal statements and 48 provided written comments. Twenty-six additional letters were received during the comment period.

Comments from the Public Meeting, letters received in review of the Draft SEIS, and the Corps' response to these comments are included in Appendix H. The majority of comments received were in

support of the Modified Central City project, specifically supporting the recreational and habitat improvements in the Riverside Oxbow and Gateway Park areas. Some comments were received that expressed concern regarding the effects of the valley storage mitigation sites on existing recreation facilities, neighborhood roads, and public use in the Riverside Oxbow and Gateway Park areas. Comments from agencies such as the Department of Interior, Texas Council on Environmental Quality, and Texas Parks and Wildlife were primarily concerned with avoiding impacts to important ecological resources during detailed design and provided specific recommendations regarding habitat development and mitigation design.

Extensive coordination has occurred with the U.S. Fish and Wildlife Service, Texas Parks and Wildlife, and the Texas Council on Environmental Quality regarding the planning of habitat development and ecological mitigation. This coordination will continue during the preparation of construction plans and specifications for these features to address their recommendations. Coordination will also continue with the Texas Council on Environmental Quality in order to obtain Water Quality Certification of the project prior to construction and with the Texas Historic Commission to complete Section 106, NHPA compliance.

Conclusions and Recommendations

Conclusions

The Central City Project is located within the immediate vicinity of the downtown area of Fort Worth, Texas, along the West Fork and Clear Fork of the Trinity River. The river is currently channelized with levees along the entire project area as part of the original Fort Worth Floodway. The approved Central City project consists of a bypass channel, levee system, and associated improvements to divert flood flows around a segment of the existing floodway system adjacent to downtown Fort Worth. Water levels in the bypass channel and adjacent waterways would be controlled by a downstream dam with crest gates. The dam would be located on the West Fork of the Trinity River just east of Samuels Avenue with three isolation gates used to protect the interior area east of the bypass channel from flood flows during large events. Two miles of the existing West Fork would function as a controlled, quiescent watercourse with a water feature or urban lake approximately 900-feet long in the interior area. Land acquisition and excavation would be required in the Riverbend area along the West Fork Floodway just west of downtown, and existing levees would be modified to provide hydraulic mitigation for the downtown features. Six bridges, four vehicular and two pedestrian, are proposed for the project.

The Corps component of the approved Central City project includes the bypass channel the isolation gates, the Samuels Avenue Dam, and real estate, business and property owner relocations, and soft costs associated with these features. Included in the Corps project are all hydraulic (valley storage) mitigation requirements as well as habitat mitigation and certain cultural resources mitigation. Section 116 of Public Law 108-447, dated 8 December 2004 authorizes construction of the Corps of Engineers component of the Central City Project. Corps participation is limited to $110 million with a total project cost $220 million for that portion of the infrastructure plan in which the Corps can participate. A Final Environmental Impact Statement (FEIS) was completed for the Central City Project in January 2006 and the Project Report was completed in March 2006. The Record of Decision (ROD) was signed, and the Project Report recommending the Community-Based Alternative was endorsed as being technically sound and environmentally acceptable, by the ASA(CW) on 7 April 2006.

The Riverside Oxbow project area encompasses about 1,060 acres just east of downtown Fort Worth, Texas, on the West Fork of the Trinity River. The project area is located downstream of Riverside Drive (the downstream end of the Fort Worth Floodway) and extends to the East 1st Street bridge crossing of the West Fork. This 3-mile reach includes a portion of the old natural channel of the West Fork, which was severed as a cut-off oxbow when the channel was realigned, the West Fork and Sycamore Creek confluence, and a low water dam downstream of Beach Street. Corps of Engineers participation in the Riverside Oxbow Project consists of reestablishment of low flows through the old river oxbow, including replacement of the Beach Street bridge; creation emergent wetlands, open water, and vegetative fringe habitat; habitat improvement of existing forest tracks; establishment of native grasses and forbs buffer zones; reforestation of 67 acres; and preservation and habitat improvement to about 207 acres of native floodplain grasslands. Corps participation also includes linear recreation along 9,000 feet of concrete trail, 1,400 feet of crushed aggregate trail, 7,600 feet of wood mulch equestrian trail as well as associated access points, and parking and restroom facilities. An Interim Feasibility Report and Integrated Environmental Assessment was completed in April 2003 for the Riverside Oxbow Project. A Finding of No Significant Impact (FONSI) was signed by the Acting Fort Worth District Commander on 22 May 2003. On 29 May 2003 the recommended Plan for the Riverside Oxbow was approved by the Chief of Engineers. An addendum, dated April 2005, was completed which resulted in revised cost estimates including a total cost of about $20,800,000 with a Federal cost of about $8,300,000 (in October 2002 dollars). Neither construction funding nor authority for implementation of this project has been provided by Congress and it was not included in the projects authorized in the Water Resource Development Act enacted on 8 November 2007.

In June of 2006 the City of Fort Worth requested that the Corps of Engineers evaluate the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow project. In response to that request, the Fort Worth District Corps of Engineers performed an initial evaluation and confirmed that merging features of the two projects had the potential to increase hydraulic efficiency, provide additional environmental restoration outputs, reduce acquisition of private lands, and lower overall project costs relative to proceeding separately with each of the two projects. The result of those initial evaluations led to the detailed evaluations presented in this Supplement No. 1 to the Final EIS for the Central City Project.

Alternatives considered during more detailed evaluation include the No Action Plan, which assumes that each project would proceed separately as currently approved and a Modified Central City Project alternative. The total hydraulic system was evaluated in an iterative process resulting in the identification of 22 primary valley storage sites that could meet the valley storage requirement of 5,250 acre-feet. The analysis also considers five contingency valley storage sites that could be used in the event that more detailed hydraulic analyses conducted during the detailed design phase of the project indicate that the primary storage sites are not sufficient to achieve the required valley storage.

Major categories for comparison of the No Action and Modified Central City Project alternatives are Technical Soundness, Habitat Mitigation Required, Habitat Outputs, Recreation, Real Estate, Total Project Costs, and Other Considerations. In regard to Technical Soundness, it has been determined that implementation of the Modified Central City Project would more efficiently accommodate the valley storage requirements of the Central City Project by using existing lands within the Riverside Oxbow restoration area rather than new lands upstream of the project. The identification of potential contingency valley storage sites helps to assure that valley storage requirements can be met while still providing for the roughness coefficients that would be attributable to extensive riparian woodland restoration.

Habitat mitigation requirements of the Modified Central City Project alternative for riparian woodland would be decreased with utilization of valley storage sites within the Riverside Oxbow area, relative to the upstream Riverbend site, due to the fact that much of the land that would be excavated for valley storage and then restored to riparian woodland is currently disturbed or in grassland. Relocation of the Samuels Avenue damsite to just upstream would reduce the adverse effect on the riparian and aquatic systems along Marine and Lebow Creeks. However, creation of a boat channel from the Central City bypass channel to Marine Creek associated with relocation of the damsite would still require some mitigation for adverse impacts to riparian and aquatic habitats

The Modified Central City Project alternative would result in increased outputs for riparian woodland and acreage of emergent wetland relative to proceeding with each project independently. These increased ecosystem outputs are due to the lower elevations created by excavations within the Riverside Oxbow project area associated with relocation of the valley storage component of the Central City project. By relocating the valley storage areas to the downstream Riverside Oxbow location the hydraulic roughness can be increased, thereby allowing for increased density of riparian woodland plantings, further increasing those outputs.

Land acquisition costs would be reduced with implementation of the Modified Central City Project alternative due to the fact that much of the land within the Riverside Oxbow project area that would be used for valley storage and habitat development is already in public ownership or would be acquired for that project. Recreation outputs consistent with the Federal purposes of Flood Damage Reduction and would be somewhat increased with the Modified Central City Project alternative.

Authorizing language for construction of the Central City Project limits the total cost of those features in which the Corps can participate to $220,000,000, with a Federal cost of $110,000,000. Those limitations would still apply to the Modified Central City Project alternative. By contrast, total costs of the two Corps projects proceeding independently would be $243,625,413 with Federal costs of $119,426,540 based on 2005 dollars. Overall, implementation of the Modified Central City Project alternative would not have any adverse effects to flood protection, habitat mitigation, outputs, land acquisition, or project cost requirements relative to the No Action alternative of proceeding with each project independently.

Recommendations

Based upon detailed evaluations presented in this Supplement No. 1 to the Final EIS for the Central City Project, and prior to public coordination under the National Environmental Policy Act, the Fort Worth District has selected the Modified Central City alternative for recommendation, pending receipt of any substantial comments that would lead to a decision to the contrary. The major differences between the Modified and original Central City Projects are in location of valley storage sites required to accommodate the increased hydraulic efficiency of the bypass channel, a primary component of the approved project. The Modified Central City Project alternative retains the major physical components and features of the Central City Project but utilizes existing public lands and minimizes use of private lands to a greater extent to accommodate the valley storage requirement. The Recommended Plan also involves relocation of the Samuels Avenue Dam to a location slightly upstream of the dam site in the approved plan.

The net effect of the recommended changes in the original Central City Project that would result from the Modified Central City Project alternative are considered beneficial. The Modified Central City Project alternative would not add or delete any project purpose, nor would it require the acquisition of lands or waters specifically for mitigation of fish and wildlife values. Pending public review of this Supplement No. 1 to the FEIS, and pending receipt of any comments to the contrary, the Fort Worth District also recommends that a formal report be prepared and submitted to the Chief of Engineers seeking approval of the proposed project modifications.

List of Preparers

The people primarily responsible for contributing to the preparation of this Draft Supplement #1 to the Final Environmental Impact Statement for the Central City Project are listed below.

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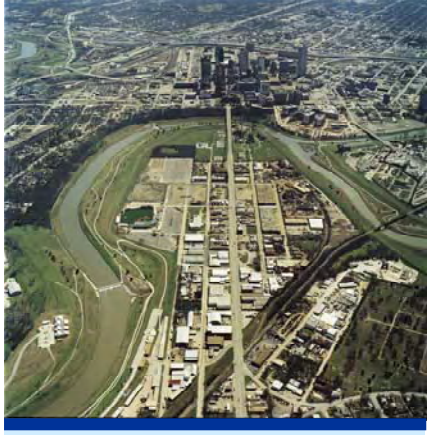
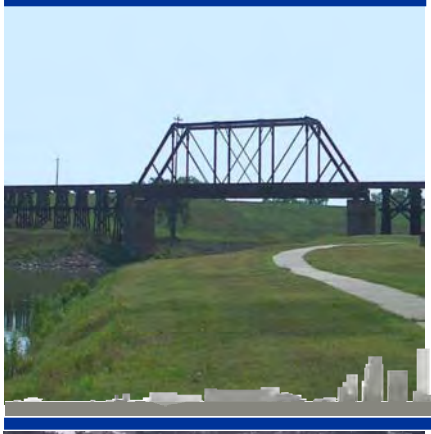
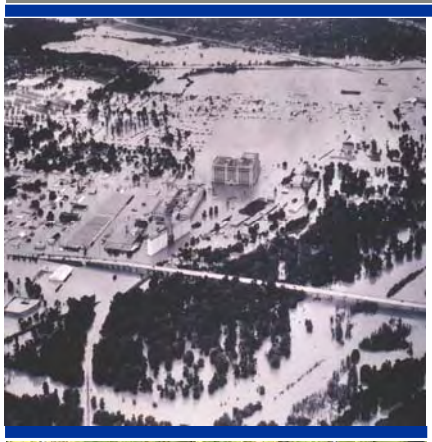
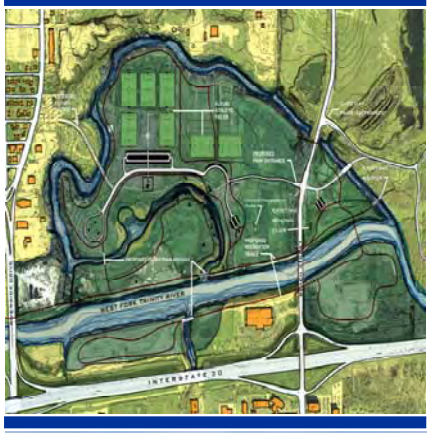




Fort Worth Central City Preliminary Design

Hydrology and Hydraulics





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Final Supplement No. 1
to the Final Environmental
Impact Statement

Appendix A

March 2008

Fort Worth Central City Preliminary Design

Hydrology and Hydraulics

Final Supplement No.1 to the Final Environmental Impact Statement

Appendix A

March 2008

This document is released for the purpose of review under the authority of Eric D. Loucks, Texas PE License 94545 on 28-February-2008. It is not to be used for construction, bidding, permitting or other purposes.

FORT WORTH CENTRAL CITY
Preliminary Design Supplement

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Appendix A
Hydraulics and Hydrology

1.0 Hydraulics and Hydrology

This appendix summarizes the development of the hydrologic and hydraulic models and associated hydrologic and hydraulic analyses for the modified Fort Worth Central City (FWCC) Project. These analyses were completed by CDM on behalf of the U.S. Army Corps of Engineers (USACE) in collaboration with the Tarrant Regional Water District (TRWD), and the City of Fort Worth.

1.01 Background

Hydraulic analyses included revisions to the previously approved HEC-RAS proposed conditions model to reflect the changes resulting from combining the approved Central City project and the Oxbow Ecosystem Restoration project. The essential components of the modified Central City project are shown in Figure 1-1.

2.0 Regulatory Constraints

2.01 USACE Record of Decision

In the mid-1980's, USACE prepared a regional programmatic environmental impact statement (EIS) to establish a floodplain development permitting strategy for the Upper Trinity River and its tributaries. USACE issued a Record of Decision (ROD) in April 1988 specifying criteria the USACE would use to evaluate permit applications in the Upper Trinity River Corridor. The Record of Decision sets forth various criteria for hydraulic impacts, level of protection, habitat mitigation and other considerations related to the Regional EIS.

2.02 Corridor Development Certificate

As a result of the 1988 Record of Decision, the cities and counties in the Upper Trinity River Corridor formed the Trinity River Steering Committee, facilitated by the North Central Texas Council of Governments. The Steering Committee developed and is responsible for implementing the Corridor Development Certificate (CDC) process to meet the 1988 Record of Decision.

Criteria

The CDC process has adopted a common set of permit criteria based on the Record of Decision which describe a consistent design level of protection that should be met for all projects unless granted a variance. These criteria applicable to the Central City project include:

1. Water Surface Elevations. No rise in the 100-year flood or significant rise in the Standard Project Flood water surface elevations for the proposed condition will be allowed.

2. Valley Storage Capacity. The maximum allowable loss in storage capacity for projects in the regulatory zone for the 100-year flood and Standard Project Flood discharges will be 0% and 5%, respectively. The decrease in allowable storage is computed with respect to the amount of storage originally available in the proposed project tract. The loss in storage capacity will be determined on a project-by-project basis.

3. Velocities. Alterations of the floodplain may not increase erosive water velocity on-site or off-site.

4. Conveyance. Alterations of the floodplain must be modeled using equal conveyance reductions on both sides of the channel.

2.03 Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) maintains maps of local floodplains as a part of its administration of the National Flood Insurance Program. For the Central City Project area, Figure 2-1 illustrates the existing 100-yr and 500-yr floodplains as maintained by FEMA. The floodplains shown in Figure 2-1 were obtained from FIRM Panels 48439C0290J, 48439C0295J, 48439C0270J, and 48439C0410J, all effective August 23, 2000.

3.0 Analysis

The baseline conditions hydraulic model used for the initial study was the current CDC model which was developed and is maintained by the USACE. The CDC model was originally developed using the hydraulic step-backwater software program HEC-2 Water Surface Profiles which calculates water surface elevations and computes resulting river reach storage (usually referred to as valley storage) and flow velocities. The model was subsequently converted to HEC-RAS River Analysis System version 3.1.3 by the USACE.

The West Fork Trinity River CDC model limits are the confluence of the West Fork and the Elm Fork in Dallas County on the downstream side and the confluence to Lake Worth Dam on the upstream side, a distance of 58.08 miles.

The original CDC West Fork hydraulic models were developed by extensive use of digitized 2-foot contour interval topography. The topographic data in the channel and overbank areas above the water surface was developed from February/March 1991 aerial photography. The majority of the cross-section data was supplied by the surveying contractor and generated from the topographic data, with cross section locations developed by the USACE. Channel data below

the water surface originated from 1975 field surveys. Additional cross sections were developed from the topographic files and included in the models as necessary. Other information used in the development of the CDC models originated from bridge plans, bridge surveys, field reconnaissance, and levee surveys. Aerial photographs and field reconnaissance were used to determine roughness coefficients.

The hydraulic evaluation of the proposed bypass channel alignment for the FWCC Project was performed using the latest version of U.S. Army Corps of Engineers (USACE) HEC-RAS version 3.1.3. In order to demonstrate compliance with the CDC criteria, the steady-flow capabilities of HEC-RAS were employed and flow inputs were obtained from the HEC-1 hydrologic analysis developed for the regional CDC process.

3.01 FWCC Baseline Conditions

Hydrologic and Hydraulic Models

The hydrologic and hydraulic analyses of the Fort Worth Central City Project were based upon models of the Upper Trinity River system provided by the USACE. The models were developed for the regional CDC process and are maintained by the USACE Fort Worth District. These models are the basis for the baseline conditions and proposed conditions models for the project area.

The baseline HEC-1 model was developed to provide the best available representation of Year 2050 flows in the existing configuration of the floodway. Discussion of the hydrologic and hydraulic baseline condition models was previously presented and approved in Appendix A to the Final EIS for the authorized Central City project. No changes were made to the baseline conditions models due to the merged projects. Therefore, no further discussion is presented.

3.02 Modified Central City Proposed Conditions

The hydraulic evaluation of the proposed valley storage changes to the Modified Central City Project was performed using the U.S. Army Corps of Engineers (USACE) HEC-RAS version 3.1.3. The hydraulic elements of the modified valley storage sites and features were incorporated into the previously approved proposed conditions model to create the modified proposed conditions model. Valley storage sites no longer used in the modified project were removed.

The revised dam location was also incorporated into the modified proposed conditions model. The gate opening, crest elevation, and dam configuration remained the same as in the approved project. The dam was modeled assuming the gates were in the fully open position for both the 100-year and the SPF flood events.

Construction of the proposed bypass channel effectively shortens the West Fork by approximately 7,000 feet and is estimated to cause a net loss of approximately 2,850 acre feet of valley storage under SPF conditions. An estimated additional 2,400 acre-feet would be lost due to drawdown if no action is taken to reduce drawdown. The drawdown on the West Fork is caused by a combination of this shortening of the river as well as the efficient conveyance of the bypass channel, which has a steeper slope and higher velocity than the existing West Fork channel it bypasses. Figure 3-1 shows an overview of proposed valley storage mitigation sites in relation to the HEC-RAS cross sections. Mitigation of valley storage loss is proposed to be provided by:

- Riverside Oxbow – Gateway Park storage mitigation site;
- Off-line storage within the existing Gateway Park ball field levees;
- Two in-line, overbank sites downstream of Samuels Avenue;
- One in-line, overbank site in Riverside Park upstream of Belknap Avenue;
- One in-line, overbank site in Rockwood Park West;
- Ham Branch (West Fork Sump 31) off-line storage mitigation site;
- Drawdown mitigation by raising University Drive; and
- Utilization of the interior water feature for valley storage.

The Riverside Oxbow – Gateway Park valley storage mitigation site is located adjacent to the West Fork between Station 2063+40 and 2228+96 in the HEC-RAS model. This site would provide an additional 1,975 acre feet of storage in the 100-year flood and an additional 1,845 acre feet in the SPF. Figure 3-2 shows the proposed Riverside Oxbow – Gateway Park storage sites in relation to the HEC-RAS cross sections. Refer to Appendix C, Volume II – Supplemental Plans for proposed Riverside Oxbow – Gateway Park grading plans. Existing Manning "n" values in the Riverside Oxbow – Gateway Park overbank area vary from 0.04 to 0.20. CDM coordinated with the USACE Ecosystem and Hydrology and Hydraulics branches to determine acceptable Manning "n" values for the areas modified in the proposed restoration plan. The recommended Manning "n" values for the areas to be modified are shown in Table 3-1, Riverside Oxbow – Gateway Park Proposed Manning "n" Values.

Table 3-1
Riverside Oxbow - Gateway Park
Proposed Manning "n" Values

n	Description
0.06	Recreation Fields
0.065	Scattered Vegetation
0.085	Light Vegetation - Clusters of Trees, Minimal Shrubs
0.15	Dense Vegetation - High/Low Canopy Trees, Low-Lying Shrubs

In the baseline and proposed HEC-RAS models, the area within the existing Gateway Park ball field levees is modeled as a blocked obstruction, and therefore does not contribute to valley storage. The existing levees provide only partial flood protection. The proposed project will raise the levees to SPF, thus allowing this area to provide approximately 270 acre feet of additional valley storage when constructed with appropriate inlet and outlet structures.

Downstream of Samuels Avenue, two valley storage areas will be developed by excavating overbank areas between Station 2417+08 and 2392+62. These sites were incorporated into the model cross-sections because portions of the facilities can both convey and store flow. The storage volume they provide was calculated in HEC-RAS and is approximately 490 acre feet in the SPF.

Upstream of Belknap Avenue, within Riverside Park, a storage area will be developed by excavating the east overbank between Station 2330+91 and 2317+00. This site was incorporated into the HEC-RAS model cross-sections and provides approximately 147 acre feet of storage volume in the SPF.

An additional overbank excavation area will be developed in the upper West Fork, in the vicinity of Rockwood Golf Course, between Station 2723+77 and 2702+49. The proposed excavation will occur in the west overbank, and provides approximately 58 acre feet of storage volume in the SPF.

The Ham Branch Sump (West Fork Sump 31) is located on the west side of the West Fork downstream of East 4th Street. The proposed project will convert the existing sump near the confluence of Ham Branch and the West Fork to a valley storage area. Under the plan, the sump would serve as a valley storage facility by leaving the existing gate structure open at all times, allowing the sump level to rise and fall with the adjacent river level. The performance of the proposed facility was evaluated in a separate analysis using the proposed conditions unsteady flow HEC-RAS model that was developed to evaluate system operation in the EIS for the authorized Central City project. Based on the analysis, Ham Branch Sump will provide 750 acre feet of valley storage during the SPF event on the West Fork.

University Drive at Station 2625+48 on the West Fork would be raised to return the 100-year and SPF water levels upstream of University Drive to near the levels

of baseline conditions, thereby recovering a portion of the drawdown loss. This site was evaluated and reviewed during the authorized Central City EIS process. No changes are proposed to the approved plan to raise University Drive.

Interior Drainage

The project will require appropriate interior drainage storage and conveyance facilities to prevent structure flooding in interior areas. Three distinct interior drainage areas were evaluated and reviewed during the authorized Central City EIS process. No changes are proposed to the approved interior drainage plan. Based on preliminary operations modeling of the interior area with HEC-RAS, approximately 140 acre feet of valley storage will be available during the SPF event.

3.03 Samuels Avenue Dam Modification

The authorized Central City EIS proposed to site the dam downstream from Samuels Avenue and the adjacent three railroad bridges, approximately 1,300 feet downstream from the confluence with Marine Creek. This location resulted in potential impacts on Marine Creek due to both the high backwater elevation of 525 NGVD as well as additional operations when passing flood flows on the Marine Creek watershed. The original site also impacted the lower segment of Lebow Creek by loss of habitat resulting from rerouting of the creek downstream of the dam. In addition, the geotechnical conditions at this site were not optimal; therefore a review of alternate site locations was conducted.

Alternative sites for the dam were evaluated on the West Fork upstream of the Marine Creek confluence, ranging from immediately at the confluence to just downstream of Northside Drive. Sites south of Northside Drive were eliminated due to impacts on Northside Drive, limited area, and conflicts with the bypass channel. Placing the dam too close to the confluence could introduce scour potential at the Samuels Avenue Bridge, while placing it further upstream towards Northside Drive reduced or eliminated options to maintain hydraulic connectivity with Marine Creek.

The revised location of the dam is proposed on the main stem of the West Fork of the Trinity River just upstream of the confluence with Marine Creek. This dam is still referred to as the Samuels Avenue dam due to its proximity to the Samuels Avenue Bridge. The dam is sited approximately 1,750 feet downstream of Northside Drive, immediately upstream from the confluence of Marine Creek. During normal dry weather operation the dam will maintain the normal water pool level elevation of 524.3. The revised site plan for the dam was incorporated into the modified proposed conditions HEC-RAS model.

The benefits of this dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational requirements of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. Hydraulic connectivity is maintained, which satisfies project objectives.

An additional benefit to this dam site is the elimination of impacts to Lebow Creek and associated habitat.

3.04 Marine Creek Baseline Conditions

Marine Creek is a tributary of the West Fork of the Trinity River which enters the river along its north bank just upstream of Samuels Avenue. The baseline condition hydraulic model used for Marine Creek was the current effective FEMA Flood Insurance Study (FIS) model which was provided by the USACE. The FIS model was originally developed using the hydraulic step-backwater software program HEC-2. The model was subsequently converted to HEC-RAS version 3.1.3. Marine Creek is not within the CDC Regulatory Zone, and therefore is only regulated by FEMA criteria.

3.05 Marine Creek Proposed Conditions

A fixed low water dam is proposed on Marine Creek approximately 300 feet upstream of the confluence with the main stem of the West Fork of the Trinity River. Several alternatives were evaluated for the Marine Creek dam including both the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek as it is able to meet the design requirements of maintaining existing 100-year water surface elevations on Marine Creek while also reducing construction, operation, and maintenance costs.

The fixed dam will pass lower frequency storms on Marine Creek without operation or controls, which was not possible under the previous Samuels Avenue Dam location downstream of the Marine Creek confluence. This structure will have a crest elevation of 516.5 and a crest length of 200 feet. The Marine Creek channel will need to be widened by approximately 50 feet near the dam site in order to accommodate the 200 feet of crest length needed to pass the 100-year flow without causing adverse impacts to water surface elevations upstream. Table 3-2 shows a comparison of 100-year and 500-year baseline and proposed water surface elevations for Marine Creek based on the HEC-RAS model. While the minor water surface elevation increases shown in Table 3-2 would be reduced or eliminated during final design, they would be allowable under FEMA criteria.

4.0 Results

4.01 Valley Storage

Computed valley storage for baseline and proposed conditions for both the 100-year and SPF events is summarized in Table 4-1. All valley storage volumes were obtained from HEC-RAS models except for the Gateway Park ball field levee sites, which were obtained using MicroStation InRoads software. As indicated in Table 4-1, the valley storage loss in the 100-year flood is mitigated well over 100%. The net gain of valley storage in SPF is approximately 37 acre feet. Therefore the SPF

mitigation is 100% as well. The modeled geometry is expected to change slightly during the design process as field survey data is collected and incorporated into the baseline and proposed condition models. During the design process, the final design will be configured to provide 100% mitigation of valley storage in SPF.

4.02 Water Surface Elevation

Steady-flow baseline and proposed conditions water surface elevations for both 100 year and SPF events are shown in Table 4-2. The project decreases or maintains baseline water levels at all locations with just a few minor exceptions. Water levels increase in the 100-year event at the ten cross-sections between Samuels Avenue Dam and the bypass channel. The maximum water level increase is 0.25 feet immediately upstream of Samuels Avenue Dam. Water levels increase in the SPF a maximum of 0.02 feet at the downstream end of the Clear Fork. The increases are confined to areas that will be purchased and maintained by TRWD, thus would have no impact on private property if the increases actually occur. As new levees will be constructed in the immediate project area, additional levee protection can easily be provided to compensate.

4.03 Head Loss

The construction of the bypass channel effectively shortens the West Fork by approximately 7,000 feet. The drawdown on the West Fork is caused by a combination of this shortening of the river as well as the efficient conveyance of the bypass channel, which has a steeper slope and higher velocity than the existing West Fork channel it bypasses. This results in a reduction in head loss that must be partly restored in order to prevent significant additional loss of valley storage. Head loss has been put back into the system through modification or addition of structures. These include raising University Drive, restrictive bypass channel sections, Samuels Avenue Dam and the two pedestrian bridges. As shown in Table 4-2, the SPF drawdown is 5.39 feet at the confluence of the West Fork and the bypass channel, and this drawdown is reduced significantly upstream of University Drive (RS 262599). Approximately 0.5 feet of drawdown remains at this point, which is then gradually reduced to 0.02 feet at the upstream end of the West Fork model (RS 306246), which is approximately 400 feet downstream of Lake Worth Spillway.

Table 3-2: Marine Creek Water Surface Elevations - Baseline and Proposed Conditions

100-yr					500-yr				
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
upper	6080	546.28	546.28	0	upper	6080	547.57	547.57	0
upper	6010	546	546	0	upper	6010	547.23	547.23	0
upper	5950				upper	5950			
upper	5890	545.61	545.61	0	upper	5890	546.83	546.83	0
upper	5810	545.7	545.7	0	upper	5810	546.94	546.94	0
upper	5730	545.62	545.62	0	upper	5730	546.9	546.9	0
upper	5500	545.23	545.23	0	upper	5500	546.53	546.53	0
upper	5410	545.09	545.09	0	upper	5410	546.44	546.44	0
middle	5370	545.13	545.13	0	middle	5370	546.49	546.48	-0.01
middle	5330	544.96	544.96	0	middle	5330	546.21	546.21	0
middle	5280				middle	5280			
middle	5230	541.78	541.77	-0.01	middle	5230	543.2	543.21	0.01
middle	5180	540.65	540.65	0	middle	5180	542.49	542.49	0
middle	5130	540.27	540.27	0	middle	5130	542.31	542.31	0
middle	5030	540.08	540.08	0	middle	5030	542.13	542.13	0
middle	4990	539.88	539.88	0	middle	4990	541.87	541.88	0.01
middle	4930	539.72	539.72	0	middle	4930	541.72	541.72	0
middle	4840	539.44	539.44	0	middle	4840	541.49	541.49	0
middle	4795	539.68	539.67	-0.01	middle	4795	541.71	541.71	0
middle	4765	539.84	539.84	0	middle	4765	541.86	541.87	0.01
middle	4675				middle	4675			
middle	4585	538.88	538.88	0	middle	4585	540.45	540.45	0
middle	4570	538.92	538.92	0	middle	4570	540.49	540.49	0
middle	4535	538.51	538.51	0	middle	4535	540.08	540.09	0.01
middle	4465	538.6	538.6	0	middle	4465	540.19	540.2	0.01
middle	4455	538.18	538.18	0	middle	4455	539.8	539.8	0
middle	4450				middle	4450			
middle	4445	538.09	538.09	0	middle	4445	539.73	539.73	0
middle	4340	537.98	537.97	-0.01	middle	4340	539.64	539.64	0
middle	4310	537.96	537.96	0	middle	4310	539.62	539.62	0
middle	4280	537.99	537.98	-0.01	middle	4280	539.64	539.64	0
middle	4210	537.16	537.16	0	middle	4210	538.87	538.88	0.01
middle	4160	536.08	536.08	0	middle	4160	538.02	538.03	0.01
middle	4120	535.73	535.74	0.01	middle	4120	537.83	537.84	0.01
middle	4090	534.3	534.31	0.01	middle	4090	536.15	536.17	0.02
lower	4030	534.12	534.12	0	lower	4030	536.03	536.05	0.02
lower	3970	533.89	533.9	0.01	lower	3970	535.67	535.69	0.02
lower	3900	533.69	533.69	0	lower	3900	535.52	535.54	0.02
lower	3840	533.56	533.56	0	lower	3840	535.43	535.45	0.02
lower	3780	533.54	533.55	0.01	lower	3780	535.4	535.43	0.03
lower	3725	533.55	533.56	0.01	lower	3725	535.4	535.42	0.02
lower	3610	533.41	533.42	0.01	lower	3610	535.27	535.29	0.02
lower	3480	533.28	533.29	0.01	lower	3480	535.13	535.16	0.03
lower	3385	532.96	532.97	0.01	lower	3385	534.82	534.85	0.03
lower	3060	532.79	532.8	0.01	lower	3060	534.66	534.68	0.02
lower	2930	531.08	531.09	0.01	lower	2930	532.71	532.75	0.04
lower	2890	531.27	531.28	0.01	lower	2890	532.94	532.98	0.04
lower	2865				lower	2865			
lower	2840	531.02	531.03	0.01	lower	2840	532.66	532.7	0.04
lower	2790	530.69	530.71	0.02	lower	2790	532.26	532.31	0.05
lower	2410	529.7	529.72		lower	2410	531.15	531.21	
lower	2360	529.55	529.57	0.02	lower	2360	531	531.06	0.06
lower	2355				lower	2355			
lower	2350	528.77	528.79	0.02	lower	2350	529.96	530.05	0.09
lower	2300	528.82	528.85	0.03	lower	2300	530.05	530.14	0.09
lower	1760	527.53	527.57	0.04	lower	1760	528.63	528.77	0.14
lower	1710	527.39	527.43	0.04	lower	1710	528.52	528.67	0.15
lower	1700	527.45	527.49	0.04	lower	1700	528.67	528.83	0.16
lower	1650	526.89	526.93	0.04	lower	1650	527.63	527.79	0.16
lower	1480	526.63	526.67	0.04	lower	1480	527.31	527.49	0.18
lower	1430	526.51	526.56	0.05	lower	1430	527.17	527.35	0.18
lower	1420				lower	1420			
lower	1410	526.11	526.16	0.05	lower	1410	526.6	526.81	0.21
lower	1360	525.98	526.03	0.05	lower	1360	526.41	526.64	0.23
lower	1240	525.91	525.96	0.05	lower	1240	526.32	526.56	0.24
lower	840	525.33	525.39	0.06	lower	840	525.48	525.77	0.29
lower	600				lower	600			
lower	550	525.03	525	-0.03	lower	550	525.05	525	-0.05
lower	500	525	525	0	lower	500	525	525	0

Table 4-1
Valley Storage Calculations for Baseline and Proposed Conditions

		100-year			SPF		
Reach	**River Station**	**Baseline (ac-ft)**	**Proposed (ac-ft)**	**Difference (ac-ft)**	**Baseline (ac-ft)**	**Proposed (ac-ft)**	**Difference (ac-ft)**
East First St. to Riverside Dr. (Gateway / Oxbow)	206218 - 222998	9709	11681	1972	17890	19733	1843
Riverside Dr. to Bypass Confluence[1]	222998 - 245866	6652	7147	495	12594	13101	507
Lower Bypass	0 - 3656	0	579	579	0	1073	1073
Upper Bypass	3656 - 8421	0	505	505	0	1135	1135
West Fork above Bypass[2]	257426 - 306246	9105	8950	-155	18446	17787	-659
Clear Fork above Bypass	3590 - 65616	5382	5313	-69	22529	22587	58
Clear Fork Interior	0 - 3590	584	0	-584	1592	0	-1592
West Fork wf3 Interior	245866 - 254346	1378	0	-1378	2879	0	-2879
West Fork wf4 Interior	255442 - 257426	297	0	-297	608	0	-608
Additional storage areas							
Interior Area (estimated)	-	0	0	0	0	140	140
Gateway Park Ball Field Levees	-	0	0	0	0	270	270
Ham Branch	-	0	0	0	0	750	750
TOTAL		33107	34175	1068	76539	76576	37

[1] Includes Riverside Park and Samuels Avenue Mitigation Sites

[2] Includes Rockwood West Mitigation Site

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

100-yr					SPF				
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf4	306246	569.28	569.28	0	wf4	306246	574.24	574.22	-0.02
wf4	305256	568.92	568.91	-0.01	wf4	305256	573.78	573.76	-0.02
wf4	304259	567.85	567.84	-0.01	wf4	304259	572.63	572.6	-0.03
wf4	304214	567.79	567.79	0	wf4	304214	572.56	572.53	-0.03
wf4	304213	567.94	567.93	-0.01	wf4	304213	572.74	572.71	-0.03
wf4	304208	567.93	567.93	0	wf4	304208	572.73	572.7	-0.03
wf4	304207	568.06	568.06	0	wf4	304207	572.81	572.78	-0.03
wf4	304157	568.03	568.03	0	wf4	304157	572.77	572.75	-0.02
wf4	303421	567.57	567.57	0	wf4	303421	572.41	572.38	-0.03
wf4	302041	566.6	566.59	-0.01	wf4	302041	571.79	571.75	-0.04
wf4	301177	565.9	565.9	0	wf4	301177	571.26	571.22	-0.04
wf4	300278	564.59	564.58	-0.01	wf4	300278	570.6	570.55	-0.05
wf4	299590	563.86	563.85	-0.01	wf4	299590	570.26	570.2	-0.06
wf4	299546	563.81	563.8	-0.01	wf4	299546	570.23	570.18	-0.05
wf4	299545	563.72	563.71	-0.01	wf4	299545	570.22	570.17	-0.05
wf4	299540	563.71	563.7	-0.01	wf4	299540	570.22	570.17	-0.05
wf4	299539	563.72	563.71	-0.01	wf4	299539	570.21	570.15	-0.06
wf4	299489	563.66	563.65	-0.01	wf4	299489	570.18	570.12	-0.06
wf4	298645	562.5	562.48	-0.02	wf4	298645	569.6	569.53	-0.07
wf4	298300	561.56	561.54	-0.02	wf4	298300	569.38	569.31	-0.07
wf4	298260	561.39	561.36	-0.03	wf4	298260	569.17	569.09	-0.08
wf4	298259	561.24	561.21	-0.03	wf4	298259	569.18	569.11	-0.07
wf4	298249	561.22	561.19	-0.03	wf4	298249	569.18	569.1	-0.08
wf4	298248	561.63	561.61	-0.02	wf4	298248	569.2	569.13	-0.07
wf4	298198	561.6	561.57	-0.03	wf4	298198	569.18	569.11	-0.07
wf4	297822	561.42	561.4	-0.02	wf4	297822	569.07	569	-0.07
wf4	297265	561.01	560.98	-0.03	wf4	297265	568.37	568.3	-0.07
wf4	297146	560.96	560.93	-0.03	wf4	297146	568.16	568.09	-0.07
wf4	297126				wf4	297126			
wf4	297107	560.87	560.84	-0.03	wf4	297107	568.05	567.98	-0.07
wf4	296992	560.68	560.66	-0.02	wf4	296992	568.03	567.95	-0.08
wf4	296125	560.18	560.15	-0.03	wf4	296125	567.76	567.68	-0.08
wf4	295195	559.56	559.52	-0.04	wf4	295195	567.15	567.06	-0.09
wf4	294211	559.14	559.1	-0.04	wf4	294211	566.92	566.83	-0.09
wf4	293744	558.89	558.85	-0.04	wf4	293744	566.91	566.81	-0.1
wf4	293642	558.46	558.42	-0.04	wf4	293642	566.18	566.07	-0.11
wf4	293621				wf4	293621			
wf4	293600	558.35	558.31	-0.04	wf4	293600	566.1	565.99	-0.11
wf4	293499	558.51	558.47	-0.04	wf4	293499	566.42	566.32	-0.1
wf4	292711	557.81	557.76	-0.05	wf4	292711	565.64	565.53	-0.11
wf4	291834	557.27	557.22	-0.05	wf4	291834	565.15	565.03	-0.12
wf4	291282	556.98	556.93	-0.05	wf4	291282	565.36	565.24	-0.12
wf4	290271	556.32	556.27	-0.05	wf4	290271	564.35	564.22	-0.13
wf4	289479	555.84	555.78	-0.06	wf4	289479	563.83	563.69	-0.14
wf4	289442	555.81	555.75	-0.06	wf4	289442	563.8	563.66	-0.14
wf4	289441	555.82	555.75	-0.07	wf4	289441	563.84	563.7	-0.14
wf4	289429	555.81	555.74	-0.07	wf4	289429	563.84	563.69	-0.15
wf4	289428	555.79	555.73	-0.06	wf4	289428	563.69	563.55	-0.14
wf4	289379	555.77	555.7	-0.07	wf4	289379	563.66	563.52	-0.14
wf4	289313	555.58	555.52	-0.06	wf4	289313	563.25	563.1	-0.15
wf4	289274				wf4	289274			
wf4	289236	555.4	555.34	-0.06	wf4	289236	563.03	562.88	-0.15
wf4	289136	555.55	555.48	-0.07	wf4	289136	563.39	563.24	-0.15
wf4	288475	555.19	555.12	-0.07	wf4	288475	562.95	562.79	-0.16
wf4	287615	554.54	554.46	-0.08	wf4	287615	562.51	562.34	-0.17
wf4	286976	554.17	554.09	-0.08	wf4	286976	562.04	561.87	-0.17
wf4	286880	554.08	554	-0.08	wf4	286880	561.73	561.55	-0.18
wf4	286844				wf4	286844			
wf4	286808	553.91	553.83	-0.08	wf4	286808	561.5	561.32	-0.18
wf4	286710	553.81	553.72	-0.09	wf4	286710	561.53	561.34	-0.19
wf4	285970	553.46	553.37	-0.09	wf4	285970	561.23	561.03	-0.2
wf4	284944	552.84	552.74	-0.1	wf4	284944	560.65	560.44	-0.21
wf4	283853	551.97	551.85	-0.12	wf4	283853	559.82	559.58	-0.24
wf4	283400	551.68	551.56	-0.12	wf4	283400	559.5	559.25	-0.25
wf4	282801	551.17	551.03	-0.14	wf4	282801	559.03	558.76	-0.27
wf4	281871	551.28	551.15	-0.13	wf4	281871	559.24	558.98	-0.26
wf4	281832	551.27	551.14	-0.13	wf4	281832	559.23	558.97	-0.26

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

100-yr					SPF				
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf4	281831	551.21	551.07	-0.14	wf4	281831	559.25	558.99	-0.26
wf4	281821	551.2	551.06	-0.14	wf4	281821	559.15	558.88	-0.27
wf4	281820	551.05	550.91	-0.14	wf4	281820	559.11	558.84	-0.27
wf4	281771	551.02	550.88	-0.14	wf4	281771	558.97	558.7	-0.27
wf4	281199	550.28	550.13	-0.15	wf4	281199	558.08	557.78	-0.3
wf4	280042	549.68	549.51	-0.17	wf4	280042	557.55	557.23	-0.32
wf4	279002	549.2	549.02	-0.18	wf4	279002	557.3	556.95	-0.35
wf4	278130	548.81	548.61	-0.2	wf4	278130	556.9	556.54	-0.36
wf4	277391	548.43	548.22	-0.21	wf4	277391	556.56	556.17	-0.39
wf4	276853	547.8	547.57	-0.23	wf4	276853	555.91	555.49	-0.42
wf4	276692	547.74	547.5	-0.24	wf4	276692	555.9	555.48	-0.42
wf4	276627				wf4	276627			
wf4	276562	547.38	547.12	-0.26	wf4	276562	555.62	555.19	-0.43
wf4	276325	547.08	546.81	-0.27	wf4	276325	555.18	554.73	-0.45
wf4	275969	546.9	546.62	-0.28	wf4	275969	555.04	554.58	-0.46
wf4	275461	546.2	545.89	-0.31	wf4	275461	554.51	554	-0.51
wf4	274754	546.23	545.9	-0.33	wf4	274754	554.74	554.23	-0.51
wf4	273902	545.43	545.03	-0.4	wf4	273902	554.31	553.76	-0.55
wf4	273102	544.67	544.17	-0.5	wf4	273102	553.99	553.41	-0.58
wf4	272377	544.89	544.58	-0.31	wf4	272377	554.06	553.58	-0.48
wf4	271794	544.71	544.47	-0.24	wf4	271794	553.92	553.49	-0.43
wf4	271402	544.49	544.35	-0.14	wf4	271402	553.82	553.42	-0.4
wf4	270730	544.49	544.29	-0.2	wf4	270730	553.88	553.43	-0.45
wf4	270249	544.07	543.94	-0.13	wf4	270249	553.72	553.27	-0.45
wf4	269743	544.01	543.8	-0.21	wf4	269743	553.72	553.24	-0.48
wf4	269070	543.75	543.53	-0.22	wf4	269070	553.62	553.14	-0.48
wf4	268190	543.46	543.23	-0.23	wf4	268190	553.41	552.92	-0.49
wf4	267221	542.97	542.71	-0.26	wf4	267221	553.23	552.71	-0.52
wf4	266213	542.95	542.68	-0.27	wf4	266213	553.27	552.76	-0.51
wf4	264804	542.87	542.59	-0.28	wf4	264804	553.25	552.74	-0.51
wf4	263531	542.78	542.45	-0.33	wf4	263531	553.22	552.68	-0.54
wf4	262705	542.07	541.53	-0.54	wf4	262705	552.99	552.27	-0.72
wf4	262599	541.38	540.17	-1.21	wf4	262599	553.02	551.42	-1.6
wf4	262548				wf4	262548			
wf4	262497	540.64	539.7	-0.94	wf4	262497	552.88	548.78	-4.1
wf4	262394	540.55	539.6	-0.95	wf4	262394	552.88	548.98	-3.9
wf4	261002	540.7	539.25	-1.45	wf4	261002	552.75	548.77	-3.98
wf4	260385	540.62	539.07	-1.55	wf4	260385	552.68	548.59	-4.09
wf4	259657	539.69	537.9	-1.79	wf4	259657	551.76	547.26	-4.5
wf4	259538	538.93	536.34	-2.59	wf4	259538	551.47	546.51	-4.96
wf4	259500				wf4	259500			
wf4	259463	538.57	535.4	-3.17	wf4	259463	551.28	546.18	-5.1
wf4	259337	538.97	535.73	-3.24	wf4	259337	551.59	546.51	-5.08
wf4	259003	538.98	535.69	-3.29	wf4	259003	551.69	546.63	-5.06
wf4	258678	539	535.69	-3.31	wf4	258678	551.73	546.65	-5.08
wf4	258103	539.02	535.72	-3.3	wf4	258103	551.73	546.68	-5.05
wf4	257654	538.33	535.47	-2.86	wf4	257654	551.4	546.54	-4.86
wf4	257557	538.21	533.89	-4.32	wf4	257557	551.37	545.96	-5.41
wf4	257546				wf4	257546			
wf4	257536	538.06	533.38	-4.68	wf4	257536	551.19	545.8	-5.39
wf4	257535	538.06	533.37	-4.69	wf4	257535	551.19	545.8	-5.39
wf4	257426	538.01	528.42	-9.59	wf4	257426	551.19	545.8	-5.39
wf3	245866	526.33	526.41	0.08	wf3	245866	539.26	539.2	-0.06
wf3	244898	525.84	525.91	0.07	wf3	244898	538.45	538.39	-0.06
wf3	244798	525.75	525.83	0.08	wf3	244798	538.37	538.32	-0.05
wf3	244797	525.75	525.83	0.08	wf3	244797	538.37	538.31	-0.06
wf3	244766				wf3	244766			
wf3	244736	525.62	525.7	0.08	wf3	244736	538.17	538.11	-0.06
wf3	244735	525.62	525.7	0.08	wf3	244735	538.17	538.11	-0.06
wf3	244635	525.54	525.62	0.08	wf3	244635	538.05	537.99	-0.06
wf3	243785	525.24	525.32	0.08	wf3	243785	537.72	537.66	-0.06
wf3	243471	525.04	525.13	0.09	wf3	243471	537.72	537.7	-0.02
wf3	242998	525.04	525.29	0.25	wf3	242998	537.95	537.93	-0.02
wf3	242813	524.98	524.93	-0.05	wf3	242813	537.9	537.78	-0.12
wf3	242451	524.7	524.36	-0.34	wf3	242451	537.59	537.33	-0.26
wf3	242363	524.66	524.33	-0.33	wf3	242363	536.89	536.62	-0.27
wf3	242340				wf3	242340			

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

100-yr					SPF				
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf3	242318	524.39	524.04	-0.35	wf3	242318	536.58	536.28	-0.3
wf3	242259	524.31	523.95	-0.36	wf3	242259	536.79	536.49	-0.3
wf3	242222	524.35	523.99	-0.36	wf3	242222	536.86	536.56	-0.3
wf3	242121	524.35	524	-0.35	wf3	242121	536.76	536.46	-0.3
wf3	242120	524.35	524	-0.35	wf3	242120	536.76	536.46	-0.3
wf3	242110				wf3	242110			
wf3	242100	524.29	523.94	-0.35	wf3	242100	536.57	536.27	-0.3
wf3	242099	524.29	523.94	-0.35	wf3	242099	536.57	536.27	-0.3
wf3	241948	524	523.63	-0.37	wf3	241948	536.2	535.89	-0.31
wf3	241947	524	523.62	-0.38	wf3	241947	536.19	535.88	-0.31
wf3	241937				wf3	241937			
wf3	241927	523.94	523.56	-0.38	wf3	241927	535.83	535.55	-0.28
wf3	241926	523.94	523.56	-0.38	wf3	241926	535.83	535.55	-0.28
wf3	241839	523.94	523.57	-0.37	wf3	241839	535.86	535.58	-0.28
wf3	241838	523.94	523.57	-0.37	wf3	241838	535.86	535.58	-0.28
wf3	241825				wf3	241825			
wf3	241812	523.76	523.38	-0.38	wf3	241812	535.18	534.9	-0.28
wf3	241811	523.76	523.38	-0.38	wf3	241811	535.18	534.9	-0.28
wf3	241708	523.89	523.5	-0.39	wf3	241708	535.39	535.1	-0.29
wf3	241255	523.8	523.59	-0.21	wf3	241255	535.37	535.26	-0.11
wf3	240517	523.67	523.53	-0.14	wf3	240517	535.14	535.13	-0.01
wf3	239744	523.48	523.31	-0.17	wf3	239744	534.74	534.67	-0.07
wf3	239369	523.34	523.17	-0.17	wf3	239369	534.38	534.35	-0.03
wf3	239262	523.32	523	-0.32	wf3	239262	534.22	533.86	-0.36
wf3	239261	523.32	523	-0.32	wf3	239261	534.22	533.86	-0.36
wf3	239229				wf3	239229			
wf3	239198	523.25	522.93	-0.32	wf3	239198	534.12	533.75	-0.37
wf3	239197	523.25	522.93	-0.32	wf3	239197	534.12	533.75	-0.37
wf3	239095	523.19	522.87	-0.32	wf3	239095	534	533.63	-0.37
wf3	238751	522.99	522.66	-0.33	wf3	238751	534.01	533.62	-0.39
wf3	238508	522.98	522.64	-0.34	wf3	238508	534.1	533.72	-0.38
wf3	238412	523.09	522.76	-0.33	wf3	238412	534.23	533.86	-0.37
wf3	238411	523.09	522.76	-0.33	wf3	238411	534.23	533.86	-0.37
wf3	238401				wf3	238401			
wf3	238391	523.07	522.73	-0.34	wf3	238391	534.19	533.84	-0.35
wf3	238390	523.06	522.73	-0.33	wf3	238390	534.19	533.84	-0.35
wf3	238288	522.91	522.57	-0.34	wf3	238288	534.01	533.64	-0.37
wf3	237615	522.87	522.53	-0.34	wf3	237615	533.88	533.51	-0.37
wf3	236729	522.9	522.56	-0.34	wf3	236729	533.95	533.58	-0.37
wf3	235522	522.68	522.33	-0.35	wf3	235522	533.51	533.13	-0.38
wf3	235413	522.7	522.35	-0.35	wf3	235413	533.52	533.14	-0.38
wf3	235412	522.7	522.35	-0.35	wf3	235412	533.52	533.14	-0.38
wf3	235354				wf3	235354			
wf3	235297	522.66	522.31	-0.35	wf3	235297	533.46	533.07	-0.39
wf3	235296	522.66	522.31	-0.35	wf3	235296	533.46	533.07	-0.39
wf3	235192	522.7	522.35	-0.35	wf3	235192	533.57	533.19	-0.38
wf3	234857	522.65	522.3	-0.35	wf3	234857	533.48	533.09	-0.39
wf3	233994	522.6	522.25	-0.35	wf3	233994	533.36	532.96	-0.4
wf3	233091	522.49	522.18	-0.31	wf3	233091	533.1	532.84	-0.26
wf3	232217	522.21	521.99	-0.22	wf3	232217	532.47	532.4	-0.07
wf3	231700	522.12	521.92	-0.2	wf3	231700	532.29	532.27	-0.02
wf3	231452	522.22	521.95	-0.27	wf3	231452	532.5	532.3	-0.2
wf3	231341	522.01	521.73	-0.28	wf3	231341	532.01	531.8	-0.21
wf3	231340	522.01	521.73	-0.28	wf3	231340	532.01	531.8	-0.21
wf3	231316				wf3	231316			
wf3	231292	521.92	521.64	-0.28	wf3	231292	531.81	531.6	-0.21
wf3	231291	521.92	521.64	-0.28	wf3	231291	531.81	531.6	-0.21
wf3	231242	521.95	521.68	-0.27	wf3	231242	531.9	531.69	-0.21
wf3	231188	522.02	521.75	-0.27	wf3	231188	532.05	531.85	-0.2
wf3	231101	522	521.72	-0.28	wf3	231101	532.01	531.8	-0.21
wf3	231100	522	521.72	-0.28	wf3	231100	532.01	531.8	-0.21
wf3	231025				wf3	231025			
wf3	230950	521.95	521.67	-0.28	wf3	230950	531.84	531.64	-0.2
wf3	230949	521.95	521.67	-0.28	wf3	230949	531.84	531.64	-0.2
wf3	230852	521.94	521.66	-0.28	wf3	230852	531.82	531.62	-0.2
wf3	230254	521.8	521.52	-0.28	wf3	230254	531.41	531.2	-0.21
wf3	229630	521.64	521.36	-0.28	wf3	229630	530.99	530.77	-0.22

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
wf3	229527	521.63	521.34	-0.29	wf3	229527	530.91	530.7	-0.21
wf3	229526	521.63	521.34	-0.29	wf3	229526	530.91	530.69	-0.22
wf3	229494				wf3	229494			
wf3	229463	521.59	521.3	-0.29	wf3	229463	530.72	530.52	-0.2
wf3	229462	521.59	521.3	-0.29	wf3	229462	530.72	530.52	-0.2
wf3	229429	521.57	521.28	-0.29	wf3	229429	530.72	530.51	-0.21
wf3	229428	521	520.68	-0.32	wf3	229428	529.59	529.35	-0.24
wf3	229412	520.99	520.67	-0.32	wf3	229412	529.57	529.33	-0.24
wf3	229394	521.34	521.03	-0.31	wf3	229394	530.24	530.02	-0.22
wf3	229360	521.32	521.02	-0.3	wf3	229360	530.26	530.04	-0.22
wf3	228755	521.17	520.86	-0.31	wf3	228755	530.05	529.82	-0.23
wf3	228208	521.1	520.79	-0.31	wf3	228208	529.9	529.66	-0.24
wf3	228106	521	520.68	-0.32	wf3	228106	529.52	529.28	-0.24
wf3	228105	521	520.68	-0.32	wf3	228105	529.52	529.28	-0.24
wf3	228095				wf3	228095			
wf3	228085	520.94	520.62	-0.32	wf3	228085	529.3	529.06	-0.24
wf3	228084	520.94	520.62	-0.32	wf3	228084	529.3	529.06	-0.24
wf3	227980	521.02	520.7	-0.32	wf3	227980	529.66	529.42	-0.24
wf3	227288	521.02	520.71	-0.31	wf3	227288	529.63	529.39	-0.24
wf3	226962	520.99	520.67	-0.32	wf3	226962	529.61	529.37	-0.24
wf3	225923	520.91	520.58	-0.33	wf3	225923	529.47	529.22	-0.25
wf3	225658	520.89	520.57	-0.32	wf3	225658	529.43	529.18	-0.25
wf3	225271	520.89	520.56	-0.33	wf3	225271	529.45	529.21	-0.24
wf3	224594	520.82	520.49	-0.33	wf3	224594	529.34	529.09	-0.25
wf3	223820	520.7	520.36	-0.34	wf3	223820	529.23	528.98	-0.25
wf3	223377	520.29	519.92	-0.37	wf3	223377	528.51	528.22	-0.29
wf3	223089	520.18	519.81	-0.37	wf3	223089	528.19	527.88	-0.31
wf3	222998	520.01	519.63	-0.38	wf3	222998	527.81	527.48	-0.33
wf3	222947				wf3	222947			
wf3	222897	519.35	518.83	-0.52	wf3	222897	526.78	526.44	-0.34
wf3	222896	519.35	518.83	-0.52	wf3	222896	526.78	526.44	-0.34
wf3	222789	519.69	519.1	-0.59	wf3	222789	527.53	526.99	-0.54
wf3	222503	519.7	519.12	-0.58	wf3	222503	527.52	527.02	-0.5
wf3	221820	519.67	519.05	-0.62	wf3	221820	527.57	526.98	-0.59
wf3	221650	519.66	519.07	-0.59	wf3	221650	527.56	526.97	-0.59
wf3	221044	519.65	519.08	-0.57	wf3	221044	527.56	526.99	-0.57
wf3	220594	519.63	519.06	-0.57	wf3	220594	527.52	526.96	-0.56
wf3	220310	519.61	519.01	-0.6	wf3	220310	527.5	526.88	-0.62
wf3	220050	519.59	518.99	-0.6	wf3	220050	527.46	526.83	-0.63
wf3	219536	519.44	518.79	-0.65	wf3	219536	527.32	526.61	-0.71
wf3	218677	519.32	518.7	-0.62	wf3	218677	527.12	526.46	-0.66
wf3	218560	518.84	518.17	-0.67	wf3	218560	526.12	525.37	-0.75
wf3	218528				wf3	218528			
wf3	218496	518.77	518.04	-0.73	wf3	218496	525.45	524.78	-0.67
wf3	218384	518.79	518.11	-0.68	wf3	218384	525.5	525	-0.5
wf3	218000	518.78	518.19	-0.59	wf3	218000	525.59	525.14	-0.45
wf3	217999	518.57	518.19	-0.38	wf3	217999	525.5	525.15	-0.35
wf3	217981.5	518.57	518.18	-0.39	wf3	217981.5	525.49	525.14	-0.35
wf3	217980.5	518.64	518.18	-0.46	wf3	217980.5	525.52	525.11	-0.41
wf3	217780	518.6	518.16	-0.44	wf3	217780	525.48	525.08	-0.4
wf3	217369	518.63	518.09	-0.54	wf3	217369	525.57	525	-0.57
wf3	215762	517.7	517.48	-0.22	wf3	215762	524.8	524.46	-0.34
wf3	214946	517.27	517.01	-0.26	wf3	214946	524.32	523.94	-0.38
wf3	214788	517.13	516.9	-0.23	wf3	214788	524.14	523.78	-0.36
wf3	213435	516.17	516.07	-0.1	wf3	213435	523.26	522.94	-0.32
wf3	212737	515.5	515.11	-0.39	wf3	212737	522.44	522.17	-0.27
wf3	212018	514.97	514.59	-0.38	wf3	212018	521.98	521.65	-0.33
wf3	211133	514.3	513.44	-0.86	wf3	211133	521.5	520.97	-0.53
wf3	210574	513.91	513.4	-0.51	wf3	210574	521.16	520.84	-0.32
wf3	209960	513.3	513.16	-0.14	wf3	209960	520.82	520.65	-0.17
wf3	209288	513.08	513	-0.08	wf3	209288	520.57	520.48	-0.09
wf3	208797	512.92	512.82	-0.1	wf3	208797	520.38	520.31	-0.07
wf3	206439	512.12	512.15	0.03	wf3	206439	519.9	519.92	0.02
wf3	206340	512.16	512.16	0	wf3	206340	519.93	519.93	0
wf3	206327				wf3	206327			
wf3	206314	511.87	511.87	0	wf3	206314	519.8	519.8	0
wf3	206218	511.83	511.83	0	wf3	206218	519.72	519.72	0

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	65616	629.39	629.39	0	cf	65616	636.28	636.28	0
cf	65344	629.39	629.39	0	cf	65344	636.28	636.28	0
cf	64380	629.39	629.39	0	cf	64380	636.28	636.28	0
cf	62953	629.39	629.39	0	cf	62953	636.28	636.28	0
cf	62405	629.39	629.39	0	cf	62405	636.28	636.28	0
cf	61472	629.39	629.39	0	cf	61472	636.28	636.28	0
cf	60451	628.76	628.76	0	cf	60451	635.56	635.56	0
cf	58850	626.31	626.31	0	cf	58850	634	634	0
cf	57021	623.98	623.98	0	cf	57021	632.64	632.64	0
cf	54806	622.09	622.09	0	cf	54806	631.3	631.3	0
cf	53901	620.82	620.82	0	cf	53901	630.46	630.46	0
cf	53352	619.91	619.91	0	cf	53352	629.79	629.79	0
cf	52242	618.54	618.54	0	cf	52242	629.15	629.15	0
cf	52192	618.4	618.4	0	cf	52192	629.13	629.13	0
cf	52140	618.41	618.41	0	cf	52140	629.09	629.09	0
cf	51599	617.88	617.88	0	cf	51599	628.88	628.88	0
cf	50598	616.53	616.53	0	cf	50598	628.32	628.32	0
cf	49420	614.5	614.5	0	cf	49420	627.62	627.62	0
cf	46736	610.62	610.62	0	cf	46736	624.37	624.37	0
cf	46611	610.44	610.44	0	cf	46611	622.77	622.77	0
cf	46610	610.44	610.44	0	cf	46610	622.77	622.77	0
cf	46550				cf	46550			
cf	46490	610.16	610.16	0	cf	46490	621.09	621.09	0
cf	46489	610.16	610.16	0	cf	46489	621.08	621.08	0
cf	46175	610.12	610.12	0	cf	46175	621.3	621.3	0
cf	45544	609.27	609.27	0	cf	45544	620.22	620.22	0
cf	45015	608.02	608.02	0	cf	45015	618.34	618.34	0
cf	44342	607.02	607.02	0	cf	44342	616.16	616.16	0
cf	43324	606.26	606.26	0	cf	43324	615.14	615.14	0
cf	41045	600.93	600.93	0	cf	41045	611.05	611.05	0
cf	40178	597.99	597.99	0	cf	40178	607.63	607.63	0
cf	40064	598.12	598.12	0	cf	40064	607.64	607.64	0
cf	40020.5				cf	40020.5			
cf	39977	597.98	597.98	0	cf	39977	607.46	607.46	0
cf	39879	598	598	0	cf	39879	607.73	607.73	0
cf	39380	597.59	597.59	0	cf	39380	606.93	606.93	0
cf	39101	597.35	597.35	0	cf	39101	607.1	607.1	0
cf	39068	594.87	594.87	0	cf	39068	601.76	601.76	0
cf	39056	593.81	593.81	0	cf	39056	600.69	600.69	0
cf	39023	592.16	592.16	0	cf	39023	601.88	601.88	0
cf	38738	591.15	591.15	0	cf	38738	600.67	600.67	0
cf	38091	590.61	590.61	0	cf	38091	600.28	600.28	0
cf	37449	590	590	0	cf	37449	600.04	600.04	0
cf	36466	588.65	588.65	0	cf	36466	599.07	599.07	0
cf	35969	587.87	587.87	0	cf	35969	598.78	598.78	0
cf	35519	587.4	587.4	0	cf	35519	598.56	598.56	0
cf	35076	586.56	586.56	0	cf	35076	598.27	598.27	0
cf	35016	585.91	585.91	0	cf	35016	598.03	598.03	0
cf	34957	586.3	586.3	0	cf	34957	597.89	597.89	0
cf	34915	585.15	585.15	0	cf	34915	595.77	595.77	0
cf	34896.5				cf	34896.5			
cf	34878	584.56	584.56	0	cf	34878	595.15	595.15	0
cf	34846	584.32	584.32	0	cf	34846	594.81	594.81	0
cf	34830				cf	34830			
cf	34814	583.37	583.37	0	cf	34814	593.47	593.47	0
cf	34699	584.08	584.08	0	cf	34699	594.61	594.61	0
cf	34116	582.55	582.55	0	cf	34116	592.43	592.43	0
cf	33577	581.58	581.58	0	cf	33577	591.32	591.32	0
cf	32940	580.42	580.42	0	cf	32940	590.11	590.11	0
cf	32371	579.68	579.68	0	cf	32371	590.11	590.11	0
cf	31770	578.46	578.46	0	cf	31770	589.02	589.02	0
cf	30913	577.14	577.14	0	cf	30913	587.83	587.83	0
cf	30174	576.01	576.01	0	cf	30174	587.25	587.25	0
cf	29663	574.71	574.71	0	cf	29663	586.56	586.56	0
cf	29638	571.69	571.69	0	cf	29638	584.38	584.38	0
cf	29613	573.35	573.35	0	cf	29613	585.1	585.1	0
cf	29535	573.3	573.3	0	cf	29535	585.59	585.59	0

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	29485	572.7	572.7	0	cf	29485	585.2	585.2	0
cf	29435	572.83	572.83	0	cf	29435	585.13	585.13	0
cf	28689	571.64	571.64	0	cf	28689	582.4	582.4	0
cf	27364	569.33	569.32	-0.01	cf	27364	579.95	579.95	0
cf	26300	567.98	567.98	0	cf	26300	578.79	578.79	0
cf	25421	567.17	567.17	0	cf	25421	577.86	577.86	0
cf	25371	566.93	566.93	0	cf	25371	577.51	577.51	0
cf	25321	566.88	566.88	0	cf	25321	577.29	577.29	0
cf	24456	565.44	565.44	0	cf	24456	576	576	0
cf	24355	565.58	565.58	0	cf	24355	576.31	576.31	0
cf	24326				cf	24326			
cf	24298	565.42	565.42	0	cf	24298	576.13	576.13	0
cf	24297	565.42	565.42	0	cf	24297	576.12	576.12	0
cf	24198	564.71	564.71	0	cf	24198	575.02	575.02	0
cf	23535	563.57	563.57	0	cf	23535	573.72	573.72	0
cf	22604	562.19	562.19	0	cf	22604	572.11	572.11	0
cf	21844	561.09	561.09	0	cf	21844	570.85	570.85	0
cf	21329	560.47	560.47	0	cf	21329	570.14	570.14	0
cf	21279	559.99	559.99	0	cf	21279	569.66	569.66	0
cf	21239	560.29	560.29	0	cf	21239	570.01	570.01	0
cf	20351	559.26	559.26	0	cf	20351	568.32	568.32	0
cf	19645	558.49	558.49	0	cf	19645	567.22	567.22	0
cf	18867	557.63	557.62	-0.01	cf	18867	566.07	566.07	0
cf	18275	557.08	557.08	0	cf	18275	565.87	565.87	0
cf	17746	556.79	556.79	0	cf	17746	565.72	565.72	0
cf	17302	556.22	556.21	-0.01	cf	17302	565.41	565.41	0
cf	17206	556.15	556.14	-0.01	cf	17206	565.15	565.15	0
cf	17183.5				cf	17183.5			
cf	17162	556.02	556.01	-0.01	cf	17162	564.59	564.59	0
cf	17161	556.02	556.01	-0.01	cf	17161	564.59	564.59	0
cf	17057	555.59	555.58	-0.01	cf	17057	564.57	564.57	0
cf	16746	555.52	555.52	0	cf	16746	564.61	564.61	0
cf	16547	555.3	555.29	-0.01	cf	16547	564.09	564.09	0
cf	16268	555.3	555.29	-0.01	cf	16268	564.23	564.23	0
cf	16161	555.26	555.26	0	cf	16161	563.92	563.92	0
cf	16140				cf	16140			
cf	16120	555.19	555.19	0	cf	16120	563.69	563.69	0
cf	16100	555.26	555.25	-0.01	cf	16100	563.81	563.81	0
cf	16077.5				cf	16077.5			
cf	16054	555.2	555.2	0	cf	16054	563.6	563.61	0.01
cf	15948	555.15	555.14	-0.01	cf	15948	563.67	563.67	0
cf	15613	554.57	554.56	-0.01	cf	15613	562.76	562.76	0
cf	15442	554.45	554.44	-0.01	cf	15442	562.92	562.92	0
cf	14949	554.05	554.04	-0.01	cf	14949	562.17	562.17	0
cf	14297	553.62	553.61	-0.01	cf	14297	561.72	561.72	0
cf	13396	552.71	552.69	-0.02	cf	13396	561.17	561.17	0
cf	13386				cf	13386			
cf	13381	552.66	552.65	-0.01	cf	13381	560.98	560.99	0.01
cf	13376	552.65	552.64	-0.01	cf	13376	560.98	560.98	0
cf	12988	552.37	552.36	-0.01	cf	12988	560.59	560.59	0
cf	12887	552.29	552.28	-0.01	cf	12887	559.47	559.47	0
cf	12886	552.29	552.28	-0.01	cf	12886	559.47	559.47	0
cf	12826				cf	12826			
cf	12766	552.07	552.06	-0.01	cf	12766	559.11	559.11	0
cf	12765	552.07	552.06	-0.01	cf	12765	558.99	558.99	0
cf	12719	552.11	552.09	-0.02	cf	12719	558.94	558.94	0
cf	12703.5				cf	12703.5			
cf	12688	551.93	551.92	-0.01	cf	12688	558.53	558.53	0
cf	12665	551.95	551.93	-0.02	cf	12665	558.6	558.6	0
cf	12626	551.96	551.95	-0.01	cf	12626	558.72	558.72	0
cf	12616				cf	12616			
cf	12565	547.53	547.38	-0.15	cf	12565	557.82	557.83	0.01
cf	12541	547.2	547.05	-0.15	cf	12541	557.46	557.47	0.01
cf	12411	547.09	546.94	-0.15	cf	12411	557.18	557.18	0
cf	12313	546.97	546.81	-0.16	cf	12313	556.94	556.94	0
cf	12287				cf	12287			
cf	12262	546.69	546.52	-0.17	cf	12262	556.41	556.42	0.01

Table 4-2: Trinity River Water Surface Elevations - Baseline and Proposed Conditions

		100-yr					SPF		
Reach	River Station	Water Surface Elevation (ft)			Reach	River Station	Water Surface Elevation (ft)		
		Existing	Proposed	Proposed - Baseline			Existing	Proposed	Proposed - Baseline
cf	12261	546.69	546.52	-0.17	cf	12261	556.41	556.42	0.01
cf	12131	546.68	546.51	-0.17	cf	12131	556.37	556.37	0
cf	12130	546.67	546.51	-0.16	cf	12130	556.54	556.54	0
cf	12075				cf	12075			
cf	12020	546.48	546.31	-0.17	cf	12020	556.21	556.21	0
cf	12019	546.48	546.31	-0.17	cf	12019	556.21	556.21	0
cf	11918	546.33	546.15	-0.18	cf	11918	555.86	555.87	0.01
cf	11006	545.91	545.72	-0.19	cf	11006	555.83	555.83	0
cf	10956	544.91	544.66	-0.25	cf	10956	555.54	555.54	0
cf	10906	545.51	545.29	-0.22	cf	10906	555.73	555.74	0.01
cf	10175	545.17	544.94	-0.23	cf	10175	555.5	555.5	0
cf	9614	544.9	544.66	-0.24	cf	9614	555.29	555.29	0
cf	9566	544.3	544.02	-0.28	cf	9566	555.16	555.16	0
cf	9515	544.63	544.37	-0.26	cf	9515	555.18	555.19	0.01
cf	9045	544.28	544	-0.28	cf	9045	554.98	554.99	0.01
cf	8293	543.46	543.11	-0.35	cf	8293	554.61	554.62	0.01
cf	8243	542.69	542.12	-0.57	cf	8243	554.67	554.67	0
cf	8200	542.96	542.49	-0.47	cf	8200	554.31	554.32	0.01
cf	8189				cf	8189			
cf	8179	542.78	542.27	-0.51	cf	8179	554.06	554.06	0
cf	8178	542.78	542.27	-0.51	cf	8178	554.06	554.06	0
cf	8073	542.75	542.23	-0.52	cf	8073	554.24	554.24	0
cf	7400	541.96	541.34	-0.62	cf	7400	553.79	553.79	0
cf	6757	541.64	540.95	-0.69	cf	6757	553.69	553.69	0
cf	6707	541.53	540.8	-0.73	cf	6707	553.67	553.67	0
cf	6656	541.65	540.94	-0.71	cf	6656	553.69	553.7	0.01
cf	6258	541.58	540.83	-0.75	cf	6258	553.75	553.76	0.01
cf	6158	541.19	540.33	-0.86	cf	6158	553.62	553.63	0.01
cf	6129.5				cf	6129.5			
cf	6102	541.13	540.26	-0.87	cf	6102	553.59	553.6	0.01
cf	6101	541.13	540.26	-0.87	cf	6101	553.59	553.6	0.01
cf	5990	541.25	540.42	-0.83	cf	5990	553.58	553.59	0.01
cf	5170	540.16	539.12	-1.04	cf	5170	552.33	552.34	0.01
cf	4535	539.81	538.6	-1.21	cf	4535	552.41	552.42	0.01
cf	4433	539.7	538.44	-1.26	cf	4433	552.4	552.41	0.01
cf	4402				cf	4402			
cf	4372	539.58	538.27	-1.31	cf	4372	552.27	552.28	0.01
cf	4371	539.58	538.27	-1.31	cf	4371	552.27	552.28	0.01
cf	4267	539.56	538.25	-1.31	cf	4267	552.19	552.2	0.01
cf	4057	539.67	538.4	-1.27	cf	4057	552.22	552.24	0.02
cf	3803	539.42	538.04	-1.38	cf	3803	552.1	551.98	-0.12
cf	3590	539.4	537.93	-1.47	cf	3590	552.09	551.83	-0.26

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LEGEND

- BYPASS CHANNEL
- MARINE CREEK LOW WATER DAM
- SAMUELS AVENUE DAM
- PEDESTRIAN BRIDGES
- INTERIOR WATER FEATURE
- ROAD IMPROVEMENTS
- TRINITY UPTOWN AREA
- PREFERRED VALLEY STORAGE MITIGATION SITES

MARINE CREEK LOW WATER DAM
SAMUELS SITES
MARINE CREEK
PEDESTRIAN BRIDGE
SAMUELS AVENUE DAM
WEST FORK TRINITY RIVER
SAMUELS AVE
ROCKWOOD PARK - WEST SITE
WEST FORK TRINITY RIVER
N MAIN ST BRIDGE
TRWD GATE
RIVERSIDE PARK SITE
BYPASS CHANNEL
UNIVERSITY DR
PEDESTRIAN BRIDGE
WHITE SETTLEMENT RD BRIDGE
TRINITY POINT GATE
TRINITY UPTOWN AREA
PEDESTRIAN BRIDGE
HENDERSON ST BRIDGE
MAIN ST
HAM BRANCH SITE
PARK ROAD ENTRANCE
WHITE SETTLEMENT RD BRIDGE
INTERIOR WATER FEATURE
SYCAMORE CREEK
CLEAR FORK GATE
PEDESTRIAN BRIDGES
BEACH STREET RECONSTRUCTION
CLEAR FORK TRINITY RIVER
RIVERSIDE OXBOW/GATEWAY PARK SITES

0 2,500 5,000
SCALE IN FEET

CDM

FORT WORTH CENTRAL CITY
SUPPLEMENT NO. 1 TO THE FEIS
APPENDIX A - HYDROLOGY AND HYDRAULICS

FIGURE 1-1
PROJECT LOCATION

DATE: MARCH 2008 | SHEET 1 OF 1

FORT WORTH CENTRAL CITY
SUPPLEMENT NO. 1 TO THE FEIS
APPENDIX A - HYDROLOGY AND HYDRAULICS

FIGURE 2-1

EXISTING
FEMA FLOODPLAINS

CDM

DATE: MARCH 2008

SHEET 1 OF 1

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LEGEND

- BYPASS CHANNEL
- MARINE CREEK LOW WATER DAM
- SAMUELS AVENUE DAM
- PREFERRED VALLEY STORAGE MITIGATION SITES
- CROSS SECTIONS

SAMUELS AVENUE

MARINE CREEK

WEST FORK TRINITY RIVER

WEST FORK TRINITY RIVER

ROCKWOOD PARK WEST

RIVERSIDE PARK

HAM BRANCH SUMP

CLEAR FORK TRINITY RIVER

RIVERSIDE OXBOW / GATEWAY PARK

242421 240517 239744 239369 238508 242813 243471 242353 241255 244898 244635 245960 247207 247178 248861 249891 250903 251970 252218 252603 253414 254165 255442 256107 257010 257654 258103 257426 259337 259657 258678 261002 262394 263531 262705 264804 266213 267221 268190 270249 271402 272377 273102 273902 274754 275461 275969 276853 276325 277391 278130 279002 281831 235192 236729 234957 233994 233091 232217 231452 230852 230254 229462 229360 228755 227980 225271 224594 222789 221650 221044 220310 219536 210574 209960 206439 206218 4+77 13+24 22+49 34+23 45+35 51+70 62+58 66+56 67+57 74+00 80+79 82+99 96+14 109+06

0 2,500 5,000

SCALE IN FEET

CDM

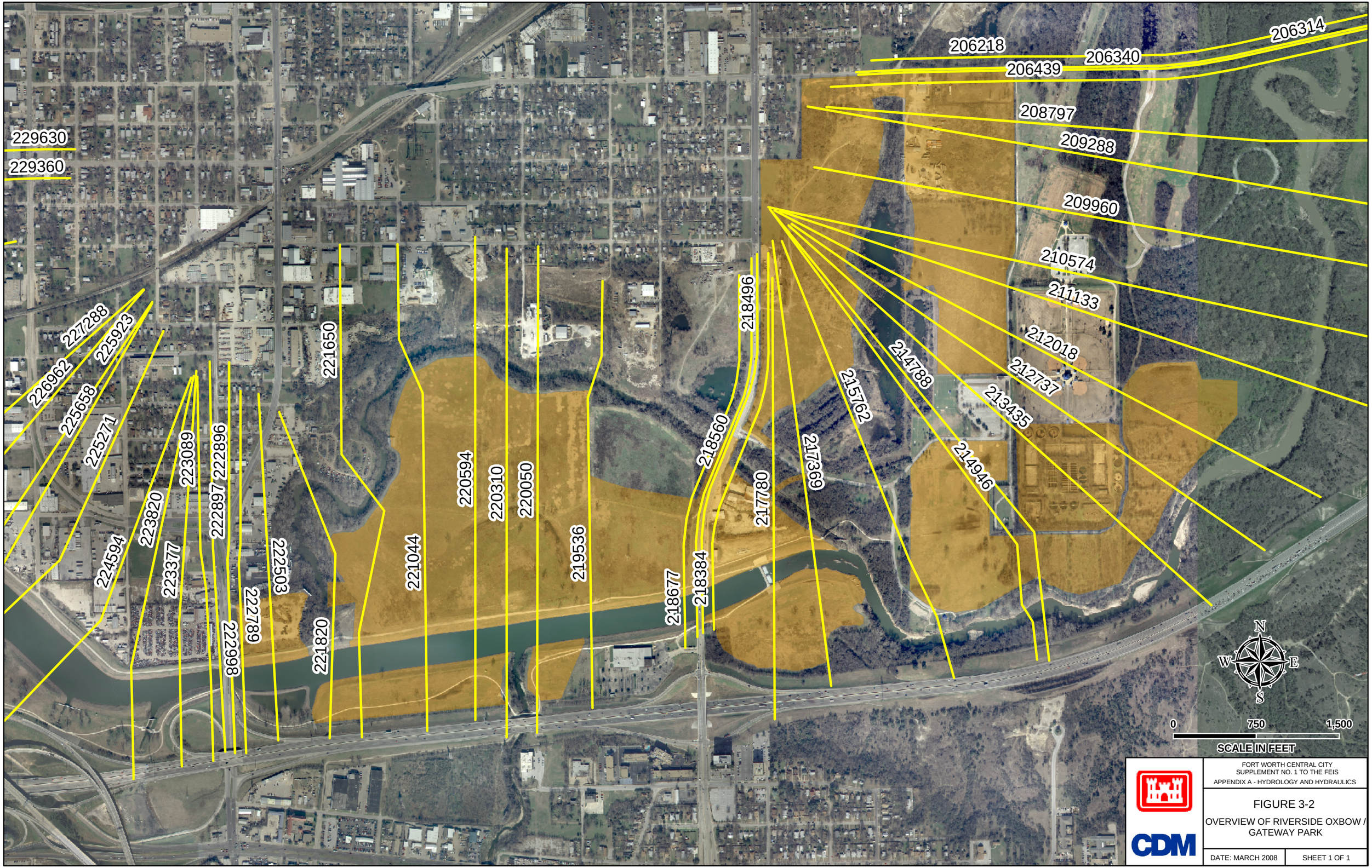
FORT WORTH CENTRAL CITY
SUPPLEMENT NO. 1 TO THE FEIS
APPENDIX A - HYDROLOGY AND HYDRAULICS

FIGURE 3-1

OVERVIEW OF VALLEY STORAGE MITIGATION

DATE: MARCH 2008

SHEET 1 OF 1



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FORT WORTH CENTRAL CITY
SUPPLEMENT NO. 1 TO THE FEIS
APPENDIX A - HYDROLOGY AND HYDRAULICS

FIGURE 3-2

OVERVIEW OF RIVERSIDE OXBOW / GATEWAY PARK

DATE: MARCH 2008

SHEET 1 OF 1

FORT WORTH CENTRAL CITY
SUPPLEMENT NO. 1

APPENDIX A - HYDROLOGY AND HYDRAULICS

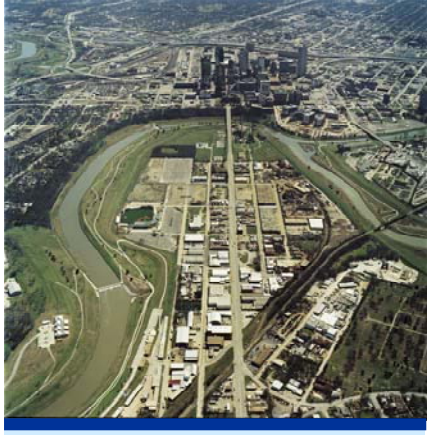
FIGURE 4-1

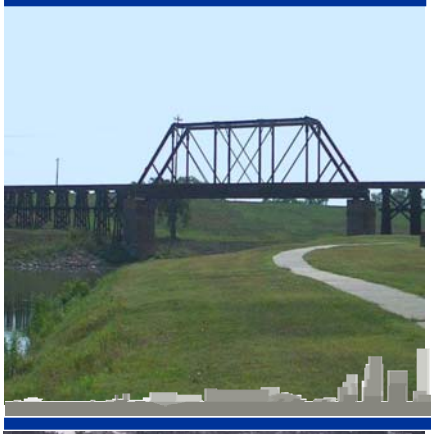
PROPOSED
FEMA FLOODPLAINS

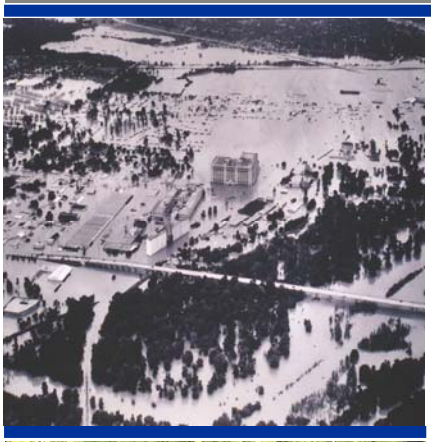
CDM

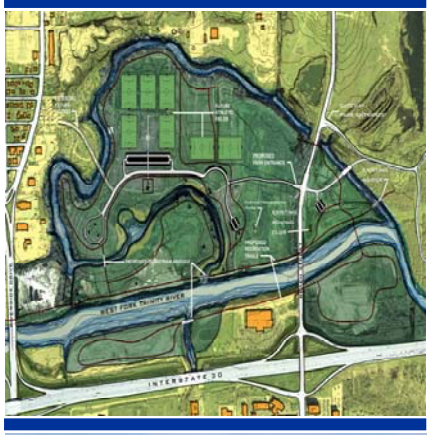
DATE: MARCH 2008

SHEET 1 OF 1









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Geotechnical

Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix B

March 2008

CENTRAL CITY / RIVERSIDE OXBOW COMBINATION PROJECT
Fort Worth, TX

Appendix B, Geotechnical

1. DESCRIPTION of PROPOSED PROJECT.

The authorized Central City Project in Fort Worth, TX includes a by-pass channel approximately 8,400 feet long that will divert high flows from the Clear Fork of the Trinity directly to the West Fork of the Trinity in the vicinity of Samuels Avenue. A dam just upstream of Samuels Avenue was proposed to provide a constant water level of 525 msl to allow small craft access from the West Fork into Marine Creek. Isolation gates are included upstream of the confluence of the by-pass and the Clear Fork channel (the Clear Fork Gate), near the midpoint of the by-pass channel (the Trinity Point Gate), and downstream of the confluence of the by-pass channel and the West Fork (the TRWD Gate). Three new vehicular bridges; designed by others, which would cross the by-pass channel, and two pedestrian bridges (one across the by-pass channel downstream of Henderson Street, and one across the West Fork upstream of the existing FW&W Railroad Bridge) were included. Hydraulic mitigation was included in the Riverbend area where the levee would be breached to allow storage of flood water and habitat restoration.

The approved Riverside Oxbow Ecosystem Restoration Project (RSO) encompasses about 1,060 acres just east of downtown Fort Worth on the West Fork of the Trinity River at the downstream end of the Fort Worth Floodway. The restoration project will help to restore the ecological integrity, function and dynamic processes that were disrupted when the West Fork channel was realigned in the 1950's. Ecosystem restoration of this area includes reestablishment of low flows through the old oxbow, reforestation; creation of emergent wetlands, and habitat improvement including the establishment of a riparian buffer along the West Fork. Replacement of the Beach Street Bridge and construction of an access bridge over the oxbow will be required. Other improvements in the RSO include 9,000 feet of concrete trail for Operations and Maintenance (O&M) and recreation access, 1,400 feet of crushed aggregate trail, and 7,600 feet of wood mulch equestrian trail. Associated access points, parking and restroom facilities will also be provided.

Because of the proximity of the two projects, the City of Fort Worth requested that the US Army Corps of Engineers (USACE) investigate the possibility of modifying the Central City Project to incorporate the Riverside Oxbow Projects features in order to analyze areas within the Riverside Oxbow project as replacement hydraulic mitigation to the Riverbend area. A change in the location of Samuels Avenue Dam upstream of Marine Creek confluence is also being analyzed and would include a lock chamber to provide small craft permitted access to Marine Creek. A low water dam added across Marine Creek would be required to support the water craft access to Marine Creek. This report documents the geotechnical design considerations of the following proposed actions: 1) re-location of the Samuels Avenue Lock and Dam, 2) construction of a low water dam at Marine Creek and 3) to replace 5250 acre-feet of hydraulic mitigation valley storage from a mix of 25 alternatives identified to allow flexibility to assure the valley storage requirements could be achieved as planning and design progresses.

2. GENERAL GEOLOGY and PHYSIOGRAPHY.

A. Physiography. The combined Central City and Riverside Oxbow project is located entirely in Tarrant County in north central Texas. Tarrant County is located near the southeastern boundary of the Great Plains physiographic province and the Atlantic and Gulf Coastal Plains province. Located within the Grand Prairie sub-province of the Great Plains, surface expressions are flat. Valley slopes are angular with scarps and terraces in evidence. The residual soils and regolith are shallow and dark brown to brown in color. The Grand Prairie sub-province is underlain by alternating beds of limestone and calcareous clay shales of the Washita and Fredericksburg Groups. In the study area, these materials are represented by the Goodland, Kiamichi, Duck Creek and Fort Worth Formations. A generalized geologic map of the project area is provided as Figure 1.

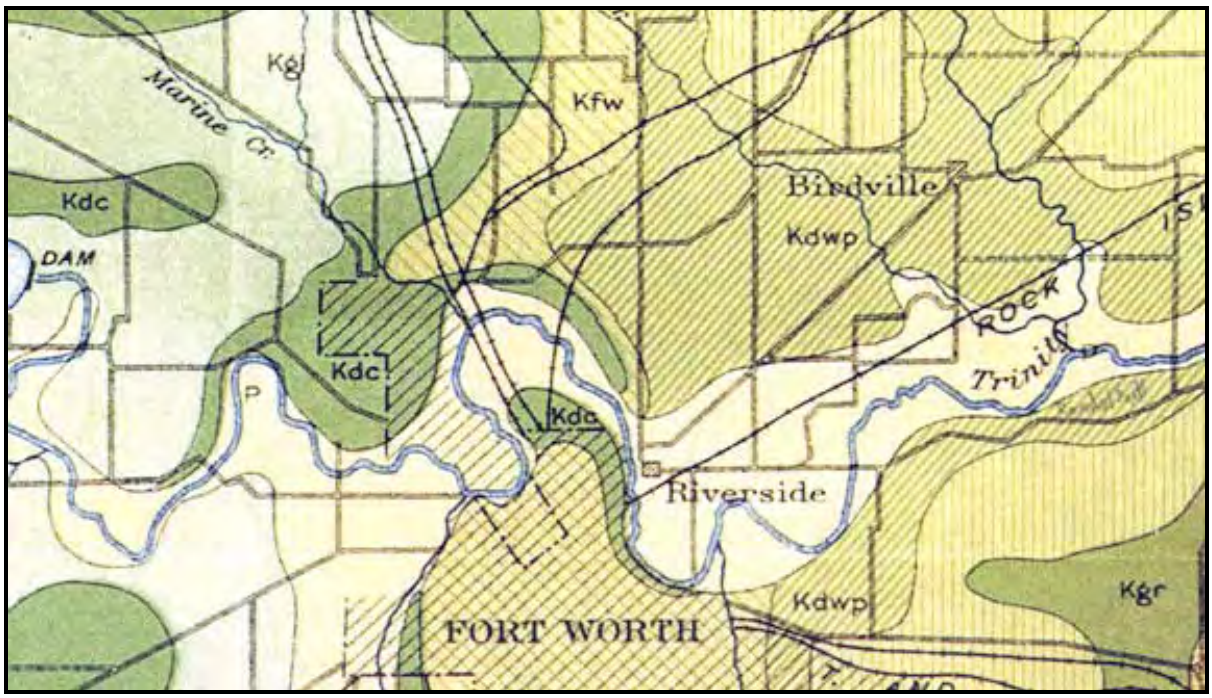


Figure 1. *Geologic Map of the Central City and Riverside Oxbow Project Area [Source: Geology of Tarrant County, UT Austin Bulletin No. 1931, circa 1919]*

B. Geologic History. The geologic history of the Tarrant County region is complex. During the Triassic and Jurassic periods, withdrawal of the seas from north central Texas along with subsidence of the Gulf Coast Embayment reversed the direction of drainage. This, in turn, led to extensive truncation of the Pennsylvanian strata in the Fort Worth Basin. At the close of the Jurassic, the rocks of the Paleozoic era had been reduced to a nearly flat surface. This eroded surface was covered with marine sediments during the Cretaceous period. Throughout Tarrant County, the truncated Pennsylvania strata dip westward, while the succeeding Cretaceous strata dip to the southeast. Two major invasions of the Cretaceous Age are represented by the Comanche Series and the younger Gulf Series. Tarrant County lies between these two major geologic series. Minor pulsations of the seas during the Comanche period are indicated by the separate limestone and marl sequences of the Fredericksburg and Washita groups of the Comanche series. As the sea withdrew

toward the Gulf at the end of the Cretaceous, the surface of Tarrant County was exposed [Sellards, 1932].

During the deposition of the Fredericksburg Group, sea heights varied from 40 to 120 feet in depth. The sedimentary rocks of the Fredericksburg are mainly limestone and marl with lesser amounts of sandstone, shale and shell agglomerate. The thickness of the Fredericksburg Group varies from 135 to 185 feet, increasing southward, with the rock dipping southeastward at a rate of 38 feet per mile. The Kiamichi wedges out toward the south between the Goodland and the overlying Washita Group. Members of the Fredericksburg Group which are exposed in the project area provide the primary geologic formation for construction of the project. This includes the Goodland Limestone, the Kiamichi Formation, the Washita Group, the Duck Creek Formation and the Fort Worth Formation.

Much of the project area is covered with alluvium and terrace materials of Quaternary Age. Bottom-land gravels have formed terraces or benches closer to the stream valleys. These terraces become more distinct as proximity to the current stream channels gets closer. The lowermost terrace is the present floodplain and includes alluvium a few feet above the present stream bed. The alluvial deposits were derived from formations that outcrop within the drainage basin, and range in thickness from a feather-edge to approximately 45 feet. The upland gravels in the area consist of angular gravels, clay and silt. The sand and gravel are mostly poorly sorted fragments of platy limestone. The lower terrace and floodplain deposits consist of rounded gravel, sand and clay. These deposits are generally well sorted and not well cemented.

In the project area, Quaternary Age deposits provide a deeper profile than the residual soils. The depth of the soils controls the major vegetation types; therefore, tree growth in the Grand Prairie sub-province is sparse except in the areas where moderate tree growth is supported by alluvial and terrace deposits [Sellards, 1932].

C. Seismicity. The Fort Worth area is located in Uniform Building Code (U.B.C.) Seismic Zone Zero, the lowest earthquake hazard region in the United States. There are no known active geological faults within the North-Central Texas region, although inactive normal faults of the Balcones fault system do occur throughout the southern and eastern North-Central Texas. *[Source: http://www.hazmap.nctcog.org/risk_assessment/Chapter8.asp]*

3. SUBSURFACE INVESTIGATIONS.

Preliminary geotechnical investigations have been performed for both the original Central City study and the Riverside Oxbow Restoration project. Investigations will be conducted during design stage to develop final design parameters and to further define conditions within the combined project area, including the various valley storage mitigation sites, the low water dam at Marine Creek, and for the Samuels Avenue Lock and Dam. For purposes of this supplemental EIS, available geotechnical data obtained by USACE for other projects in the area has been reviewed, as has data obtained by others in support of the design of other structures near the Fort Worth Floodway. These investigations are described below.

A. Central City.

1. Phase 1A Geotechnical Investigation. USACE, September – November 2006. In order to obtain feasibility level geotechnical data for this project, a Phase 1 investigation plan was developed. Due to issues associated with obtaining rights-of-entry for drilling, and potential environmental contamination on several of the drill sites, the Phase 1 investigation was originally split into two phases: 1A and 1B. Phase 1A was completed in Fall 2006, while Phase 1B was initiated in July 2007.

Twenty-two borings were advanced for the Phase 1A investigation in order to obtain data for design of the by-pass channel, evaluation of structures, and to investigate alternative locations for the Samuels Avenue Dam. The location of each of these borings is shown on Exhibit 1A, with the logs of each boring provided in Exhibit 2. Borings in Phase 1A were considered by Camp, Dresser, McKee Engineers (CDM) to have the lowest potential for soil and/or groundwater contamination due to current and previous site usage (see Table 1 for a summary of the investigation). Sixteen of the Phase 1A borings included the installation of monitoring wells for periodic observation of groundwater fluctuations during the design phase.

Central City, Phase 1A Geotechnical Investigation			
Boring Number	**Project Feature**	**Boring Number**	**Project Feature**
CC06-002*	Samuels Avenue Dam Relocation	CC06-030*	Clear Fork Isolation Gate SE Abutment
CC06-006*	Samuels Avenue Dam Relocation	CC06-031*	Clear Fork Isolation Gate NW Abutment
CC06-007*	Samuels Avenue Dam Relocation	CC06-032*	General Geotechnical Data
CC06-009*	Samuels Avenue Dam Relocation	CC06-033*	General Geotechnical Data
CC06-012*	Samuels Avenue Dam Relocation	CC06-035	Trinity Point Isolation Gate
CC06-014*	TRWD Isolation Gate North Abutment	CC06-036	Trinity Point Isolation Gate
CC06-015	TRWD Isolation Gate South Abutment	CC06-037*	West Fork Pedestrian Bridge NW Abutment
CC06-016	General Geotechnical Data	CC06-038*	West Fork Pedestrian Bridge SE Abutment
CC06-027	Water Feature General Geotechnical Data	CC06-039*	Pedestrian Bridge Northwest Abutment
CC06-028	Water Feature General Geotechnical Data	CC06-040*	Pedestrian Bridge Southeast Abutment
CC06-029*	General Geotechnical Data	CC06-042*	General Geotechnical Data
** - monitoring well installed*			

Table 1. Summary of Phase 1A Subsurface Explorations

The Phase 1A investigation was performed by the Core Drill Unit of the Fort Worth District of the US Army Corps of Engineers using a Failing 1500 conventional truck-mounted drilling rig. Advancement of the boreholes and sample recovery were accomplished using short flight augers, Shelby tube samplers, nominal two-inch diameter split-spoon samplers, carbide tip roller rock bits, and four-inch diameter diamond core barrels. Specific drilling information for each boring is provided on the boring logs in Exhibit 2.

Overburden samples were generally obtained at five-foot intervals over the soil column, with 4-inch diameter core samples obtained from the underlying rock primary. Standard Penetration Tests in accordance with ASTM D 1586 were performed during the investigation in order to determine the relative density of the granular materials that were encountered. Shelby tube, split spoon, and four-inch diameter rock core samples that were collected during the investigation were sealed in airtight containers and taken to the laboratory of TEAM Consultants, Incorporated in Arlington, Texas for testing.

2. Central City Feasibility Environmental Impact Statement (FEIS). CDM, May – June 2005. In support of the FEIS for the original Central City project, twenty borings were drilled by the Core Drill Unit of the Fort Worth District of the US Army Corps of Engineers. Nine borings were drilled along the by-pass channel alignment with additional borings in the vicinity (within 500 feet) of the proposed locations of the Samuels Avenue Dam, the three isolation gates; and bridges at Main Street, Henderson Street and White Settlement Road. The location of these borings is shown on Exhibit 1. Details of this investigation are located in the 'Draft Environmental Impact Statement, Appendix B: Initial Geotechnical Investigation for the Preliminary Design of the Fort Worth Central City Project' [CDM, April 2006], and are summarized in Table 2.

Central City, FEIS Geotechnical Investigation			
Boring Number	**Project Feature**	**Boring Number**	**Project Feature**
B-1	Main Street Bridge NW Abutment Vicinity	C-6	By-Pass Channel
B-2	Main Street Bridge SE Abutment Vicinity	C-7	By-Pass Channel
B-3	Henderson Street Bridge NW Abutment Vicinity	C-8	By-Pass Channel
B-4	Henderson Street Bridge SE Abutment Vicinity	C-9	By-Pass Channel
B-5	White Settlement Bridge NW Abutment Vicinity	C-10	By-Pass Channel
B-6	White Settlement Bridge SE Abutment Vicinity	D-1*	Samuels Dam Right Abutment Vicinity
C-1	By-Pass Channel	D-2*	Samuels Dam Left Abutment Vicinity
C-2	By-Pass Channel	F-1*	TRWD Gate Vicinity
C-3	By-Pass Channel	F-2*	Trinity Point Gate Vicinity

C-4	By-Pass Channel	F-3*	Clear Fork Gate Vicinity
** - monitoring well installed adjacent these boreholes*			

Table 2. Summary of FEIS Subsurface Explorations [CDM, 2006]

As part of CDM's investigation, five monitoring wells were installed in or adjacent to the boreholes for observation of groundwater fluctuations at the original dam site, and in the vicinity of the isolation gates.

3. Marine Creek. USACE, May 1987. Rone Engineers performed preliminary geotechnical investigations for evaluation of a proposed flood control and channel improvement project along Tony's Creek and Marine Creek. Ten borings were drilled across the area at depths ranging from 17 to 50 feet. As part of the investigation, Rone also provided boring logs from other projects in the Marine Creek area. Although all the borings from this investigation were obtained at least 0.5-mile from the location of the proposed Marine Creek low water dam, they are helpful in characterizing the overall geology and ambient groundwater conditions of this portion of the project. Of particular significance is the large amount of fill encountered along the creek banks, and the presence of significant sand seams underlying more impervious overburden. These conditions raise concerns with respect to seepage and stability along the channel, concerns that were evident when the investigation was performed 20-years ago.

B. Riverside Oxbow.

1. Riverside Oxbow Ecosystem Restoration Project. USACE, May 2003. Under contract to USACE, TetraTech NUS performed subsurface investigations of the original Riverside Oxbow project in May 2002. Seven borings were advanced from which jar, tube and rock core samples were collected for testing; and 24-hour water level readings were obtained. Drilling information, laboratory test data, and water level readings with complete information, discussions and recommendations from this investigation can be found in Appendix C of the 'Interim Feasibility Report and Integrated Environmental Assessment, Riverside Oxbow, Upper Trinity, Fort Worth, TX' [USACE, 2003].

Summary of Drilling for the Original Riverside Oxbow Project			
Boring Number	**Project Feature**	**Depth (Elevation*)**	**Remarks**
8A4C-1	Riverside Drive Bridge Vicinity of South Abutment	63' (442.75*)	TOR 63'.
8A4C-2	Riverside Drive Bridge Vicinity of North Abutment	70' (435.78*)	TOR 60'
8A4C-3	Riparian Corridor	60' (442.45*)	Rock was not encountered.
8A4C-4	Beach Street Bridge Vicinity of Northeast Abutment	35' (470.74*)	TOR 25'
8A4C-5	Beach Street Bridge Vicinity of Southwest Abutment	60' (452.03*)	Rock was not encountered.
8A4C-6	Levee Bridge	60' (466.95*)	Rock was not encountered.

8A4C-7	Parkroad Access Bridge	52' (454.08*)	Rock was not encountered.
** - Elevations obtained with GPS. Vertical accuracy is 5'±)*			

Table 3. Summary of Feasibility Subsurface Explorations for RSO [USACE, 2003]

2. Riverside Oxbow, Waste Water Treatment Plant. As part of the closure of the Riverside Waste Water Treatment Plant (RWTTP), several investigations of this site have been performed. The location of portions of this site generally corresponds to the south and eastern limits of valley storage mitigation site 17, so geotechnical data from the subsurface investigation and groundwater data collected since monitoring wells were installed were reviewed to evaluate conditions in this area.

The monitor well borings ranged from between 20 and 50 feet deep, however, only one encountered rock (MW-15 encountered limestone at 35 feet below top of ground). The overburden in this area appears to be clay and clayey sands with significant lenses of sand and gravel throughout. A generalization of conditions documented on the monitoring well logs and borings is provided in Table 4.

Valley Storage Mitigation Site 17	
Well Number	**Borehole Depth and Overburden Characteristics**
MW-1	Depth 27'. Sand throughout (hydrocarbon contamination noted)
MW-2	Depth 20'. Sand throughout
MW-3	Depth 20'. Sand throughout
MW-4	Depth 25'. Sandy clay to 5'. All sand and gravel from 5' to 25'
MW-5	Depth 32.5'. All sand and gravel, except sandy clay from 2' to 11'
MW-6	Depth 32.5'. Sand and gravel, except sandy clay from 7' to 11' (chemical odor noted)
MW-7	Depth 35'. Sand throughout
MW-8	Unknown
MW-9	Unknown
MW-10	Depth 45'. Clayey overburden throughout
MW-11	Depth 35'. Clayey overburden to 23'. Sands and gravels from 23' to 35'.
MW-12	Depth 50'. Clayey overburden with Sand 10' to 18', 23' to 27', and 44' to 50'.
MW-13	Depth 35'. Clayey overburden to 25'. Sandy gravel from 25' to 35'.
MW-14	Depth 35'. Clayey overburden throughout (concrete rubble from 3' to 4').
MW-15	Depth 35'. Clayey overburden with Sands and gravels 30' to 34'. Marl at 34'.

Table 4. Summary of Explorations for RWTTP Monitoring Wells [Kleinfelder, et al, 2003]

It is noted that there was no lab test data provided with monitoring wells MW-1 through MW-7, so it is assumed that the classifications shown on the boring logs were made by the field geologist. Importantly, it is noted that the soil descriptions that accompany the monitoring well logs for MW-1 through MW-7 sometimes vary from those reported on the boring log.

C. Currently USACE Subsurface Investigations, July 2007. A work order to perform subsurface investigations of the combined project using contract drilling services was awarded in July 2007. In addition to sampling for geotechnical design considerations, sampling to determine the presence of hazardous, toxic or radioactive wastes (HTRW) is also being performed in specified boreholes. This work order includes drilling for Phases 1B, 1C and 1D as described below.

1. USACE, Phase 1B. Thirty-one borings will be advanced in the Phase 1B investigation. Phase 1B borings are located primarily within the footprint of the original Central City project and include investigations on properties that CDM determined to have medium to high potential for HTRW contamination. In addition, areas to be drilled include the potential site for the Samuels Avenue Lock and Dam and the abutments of the proposed Marine Creek Low Water Dam. Twenty-eight monitoring wells will be installed as part of this investigation for monitoring groundwater fluctuations during design.

2. USACE, Phase 1C. Phase 1C investigations are located within the footprint of the Riverside Oxbow project. Data from these borings will be used to evaluate soil and groundwater conditions for valley storage mitigation sites, reforestation areas, oxbow reestablishment and the design of access roads, trails, and miscellaneous structures and facilities. Twenty-seven borings will be drilled, with monitoring wells installed in each borehole for long-term monitoring.

3. USACE, Phase 1D. Investigations for Phase 1D are generally concentrated on the valley storage mitigation sites associated with the combined project. Twenty-nine borings will be drilled, one of which will become a monitoring well.

Soil and rock samples obtained from the Phase 1B, 1C and 1D borings will be submitted for laboratory testing. Groundwater levels in the boreholes will also be measured during drilling and 24 hours after completion of the drilling. HTRW sampling will be performed in specified boreholes. (*NOTE: Reporting of HTRW project impacts is not specifically addressed in this Geotechnical Appendix*)

4. LABORATORY TESTING.

All samples from the Phase 1A investigation were delivered to TEAM Consultants, Incorporated in Arlington, Texas for testing. Property testing, consolidation, direct shear, unconfined compression on soft rock samples, and unconsolidated-undrained testing of soil samples were performed by TEAM. Consolidated-undrained triaxial tests, and rock testing was performed by Fuller, Mossbarger, Scott and May Engineers in Lexington, KY.

Testing requirements for each sample were specified by USACE based upon

examination of each of the samples by the project geotechnical engineer, and included the following procedures listed in Table 5.

Test Method	Parameter	Number of Tests
ASTM D 422	Gradation	38
ASTM D 2166	Unconfined Compression (Soft Rock)	8
ASTM D 2216	Moisture Content	123
ASTM D 2435	Consolidation	8
ASTM D 2487	Visual Classification (USCS)	all samples
ASTM D 2488	Visual Classification (Visual-Manual)	all samples
ASTM D 3080	Consolidated Drained Direct Shear	122
ASTM D 3148	Unconfined Compression w/Elastic Moduli and Poisson's Ratio	14
ASTM D 4318	Atterberg Limits	120
ASTM D 2938	Unconfined Compression Strength	8
EM 1110-2-1906 ASTM D 4767	Consolidated-Undrained Triaxial Strength	8
EM 1110-2-1906	Permeability	16
RTH 203	Rock Direct Shear	3

Table 5. Phase 1A Soil and Rock Testing Summary

Results of laboratory visual classification and moisture content tests are shown on the individual boring logs that are included with this Appendix as Exhibit 2. Actual test data from this investigation are voluminous. Summary of test data is provided in Exhibit 3. Complete test data is available upon request.

5. GENERAL CHARACTERIZATION of the COMBINED PROJECT AREA.

Subsurface investigations were conducted in order to make preliminary characterizations of the geotechnical conditions across the area of the original Central City Project [CDM, 2006] and the original Riverside Oxbow Environmental Restoration Project [USACE, 2003]. The borings drilled as part of the FEIS study for the preliminary design of isolation gates and other structures were drilled in the proximity of the structures (boreholes were from 200 to 500 feet away from the proposed structure locations). Once design stage investigations are complete, the preliminary design recommendations based on the initial investigation effort that are documented in both the Central City FEIS and the original Riverside Oxbow report will be modified to reflect the additional information.

As described below, information obtained from the Phase 1A investigation enhances our understanding of the subsurface conditions for this project.

A. Central City Area.

1. Samuels Avenue Lock and Dam. The newly proposed location of this structure near the confluence of two streams, suggests that the problematic granular soils found at other previously investigated sites will most likely be present at the new location as well. These problematic granular soils will be addressed during design stages.

a. Overburden. Phase 1A borings obtained since the CDM investigation included 2 potential dam site locations (see Exhibit 1A). Unfortunately, due to the unavailability of rights-of-entry for drilling access purposes, only borings to define the right abutment conditions at each of these sites have been made at this time. Additional borings to evaluate conditions on the left descending bank are part of the Phase 1B investigation.

Two borings made downstream of Samuels Avenue (CC06-02 and CC06-06) indicate that the overburden in the area that would constitute the right abutment of the dam consists of low plasticity clays overlying sands and gravels. Overburden in this area is 48 to 51 feet thick. Sands and gravels from 7 to 28 feet thick directly overlay the shale and limestone primary.

Borings CC06-07 and CC06-09 were made downstream of the Northside Bridge. Soil conditions here are similar to borings made downstream of Samuels Avenue (CC06-02 and CC06-06), with 32 to 36 feet of low plasticity clays overlying 15 to 23 feet of sands and gravels.

b. Primary Material. The four borings made along the right bank of the potential dam relocation sites indicate that the top of rock is variable. Unweathered, massive gray to dark gray limestone was encountered in each of the four borings at depths of between 51 and 59 feet. In borings CC06-02 and CC06-06, the limestone was overlain by two to three feet of unweathered dark gray shale.

c. Groundwater Levels. Groundwater readings obtained during the drilling process are recorded on the boring logs provided in Exhibit 2. Readings obtained periodically from the monitoring wells installed during the Phase 1A investigation are provided in Exhibit 5.

2. Marine Creek Low Water Dam. Investigations for this project feature will be completed during design stage. Although we have no borings at the proposed location it is expected that subsurface conditions will be very similar to those encountered at Samuel Avenue Lock and Dam.

3. Investigations Completed. Since additional subsurface investigations have been completed since the FEIS, those borings are presented as part of this SEIS. Preliminary subsurface profiles of the generalized geologic conditions along the right and left banks of the by-pass channel have been prepared using the information available to date. These profiles are included with this report as Exhibit 4.

a. Overburden. Examination of the subsurface profiles indicates that the overburden across the area generally consists of low to medium plasticity clays with occasional high plasticity clays. In general, the overburden becomes coarser with depth.

Lenses and layers of sands and gravels are found across the area at various depths and thicknesses. A layer of coarse to fine gravel is generally found at the top of rock contact. The borings indicate that this layer varies in thickness from approximately three feet along the Clear Fork channel (Borings CC06-029, 031 and 033) to as much as 36 feet near the confluence of the Clear and West Forks.

b. Primary Material. The rock primary in the by-pass channel area generally consists of massively bedded unweathered limestone and unweathered shale. As shown on Table 6, the top of rock varies significantly across the channel alignment.

	Approximate Station (Boring Number)	Primary Rock Material	TOR Elevation (approximate)
DOWNSTREAM ↓	Station 78 (CC06-032)	Unweathered limestone	494
	Station 58 (B-4)	Unweathered shale	493
	Station 44 (CC06-040)	Unweathered shale	484
	Station 42 (CC06-036)	Unweathered limestone	472
	Station 40 (CC06-035)	Unweathered limestone with shale	476
	Station 29 (C-4)	Unweathered limestone	516
	Station 21 (C-3)	Unweathered limestone with shale zone	512
	Station 7 (C-2)	Unweathered limestone with shale zone	513

Table 6. Approximate Top of Rock, Right Bank of By-Pass Channel

c. Groundwater Levels. Groundwater readings obtained during the drilling process are recorded on the boring logs provided in Exhibit 2. Readings obtained periodically from the monitoring wells installed during the Phase 1A investigation are provided in Exhibit 5.

B. Riverside Oxbow Area. Current data available from subsurface investigations for the Beach Street bridge, pavements, and the riparian corridor made in the previous report [USACE, 2003] are unchanged at this time.

1. Subsurface Conditions at the Low Water Dam Downstream of Beach Street. The Interim Feasibility Study [USACE, 2003] shows that the low water dam will be a rip-rap structure with an embedded concrete overflow weir at Elevation 492. The geotechnical discussion in that study refers to a subsurface investigation performed in the vicinity of the abutments for this structure. Although boring logs and subsurface information were not included with that report, the following information has been excerpted:

> *Mas-Tek Engineering & Associates performed a subsurface investigation at the low water dam site. Two boreholes were drilled at the dam site, one on each side of the Trinity River. The boring drilled on the north side of the river was advanced to a depth of 50 feet and the boring drilled on the south side was advanced to a total depth of 40 feet. Undisturbed cohesive soil samples were collected using seamless tube samplers and standard penetration testing was performed within the non--*

cohesive materials encountered in each test hole. Representative soil samples were subjected to laboratory testing for identification, moisture content, grain size distribution, Atterberg limits, and dry unit weight. Undisturbed samples were subjected to shear strength and consolidation testing as well.

Soils encountered in the boring drilled on the north side of the river consist of an initial 6 foot layer of very stiff to hard, dark brown clay. Underlying the clay is a 3 foot layer of tan to light brown sandy gravel and a deeper deposit of dark brown to brown clay. The clay transitions from hard to soft with increasing depth and is present to depths of 9 to 43 feet. The last soil feature is a gray, soft, and very wet sand that was present to the total depth investigated, 50 feet.

Subsurface conditions encountered on the south side of the river consist of a surface layer of hard, dark brown gravelly clay to a depth of 3 feet. Beneath the clay is a brown, very stiff to hard clay deposit that extends to an approximate depth of 20 feet. From depths of 20 to 30 feet, the clay becomes slightly sandy and soft, and below 30 feet, the clay becomes very moist to wet. The final soil feature encountered is a tan to light brown sandy clay/clayey sand. This material was penetrated at a depth of 37 feet and is present to the total depth investigated, 40 feet. Source: 'Interim Feasibility Report and Integrated Environmental Assessment, Riverside Oxbow, Upper Trinity, Fort Worth, TX' [USACE, May 2003]

2. Mitigation Site 17. USACE has not performed investigations of this area, however, data obtained from previous investigations of the area made by Freese and Nichols, Kleinfelder, and others offers the following:

a. Overburden. Based on data obtained from monitoring well installations across the site, overburden in this area appears to be clay and clayey sands with significant lenses of sand and gravel throughout. Fifteen monitoring wells were installed at depths ranging 20 to 50 feet deep, however, only one encountered rock (see Table 3).

b. Primary Material. MW-15 encountered limestone at 35 feet below top of ground. None of the other monitoring wells installed in the area encountered rock.

c. Groundwater Levels. Ongoing groundwater studies associated with the closure of the waste water treatment plant in the Riverside Oxbow area include the monitoring of the hydraulic gradient across the wastewater treatment site. Review of this data indicates that groundwater levels across the site increase with distance from the river, indicating a perched aquifer or aquiclude.

Groundwater maps were developed from June 2003 and November 2005 data. These particular maps reflect groundwater conditions during a year with average spring precipitation (2003) and a year of drought (2005). On the June 2003 map, groundwater approximately 300 feet from the left bank of the West Fork of the Trinity River was at Elevation 482. Groundwater levels rose to Elevation 492 approximately 900 feet northwest of the river. On the November 2005 map, the effects of the drought were clearly evident. Approximately 900 feet from the river, groundwater levels had dropped ten feet to Elevation 482. New wells added approximately 3,200 feet northwest of the river indicated groundwater levels of 492.

6. GEOTECHNICAL ENGINEERING CONSIDERATIONS for PRELIMINARY DESIGN.

A. Central City.

1. **Samuels Avenue Lock and Dam.** Although subsurface investigation for the current proposed site of this structure have not been completed it is expected that the sands and gravels encountered at each of the 2 other proposed dam locations will also be encountered at the newest dam location (several hundred feet upstream of the confluence of the West Fork of the Trinity and Marine Creek). The presence of these granular soils is considered problematic since their relatively high permeability will complicate both design and construction. Locating a dam at a site with such permeable soils will require substantial measures to control seepage around, under and through the abutments. With seepage control measures in place, seepage will not be eliminated entirely, so analyses will be required during final design to assure design addresses these conditions. For cost estimating purposes it can be assumed that concrete diaphragm walls socketed into rock and extending laterally a distance of at least 100 feet at both abutments will be required for permanent seepage control.

2. Marine Creek Low Water Dam. Based on other borings in the general project area, it is expected that the top of rock surface will vary from one abutment to the other, and that relatively permeable soils will necessitate the use of seepage cutoffs to accommodate lateral and under seepage. Construction phasing will incorporate temporary cofferdams and dewatering methods to control the surface water and under seepage to allow foundation preparation and construction of the dam in the dry.

B. Riverside Oxbow. The available geotechnical data is minimal, but is sufficient enough to indicate that the valley storage mitigation features are feasible. Subsurface conditions indicate that required excavations for valley storage will be in clay and sand overburden and will be above the static water levels.

7. FUTURE INVESTIGATIONS and STUDIES.

A. Additional Geotechnical Investigations. Investigations performed to date are considered to be feasibility level only, so additional investigations will be required to support final design and preparation of plans and specifications for all project features. It is expected that extensive investigations will be required for the Samuels Avenue Lock and Dam, the Marine Creek Low Water Dam, the low water dam in the Riverside Oxbow, and all three isolation gates. All future subsurface investigations and laboratory investigation undertaken for this project will be performed in accordance with the USACE standards. All laboratories utilized for geotechnical testing for this study will be certified in accordance with requirements made in ER 110-1-261, “Quality Assurance of Laboratory Testing Procedures”.

B. Design Requirements. The development of the designs will be in accordance with USACE standards. Specifically, all design work to be performed in completion of this study, including underseepage and stability analyses, and assessment of dewatering requirements

for construction purposes, will be performed in accordance with requirements made in the Southwest Division AEIM and the Department of the Army engineering manuals and regulations. Other engineering manuals and engineering regulations cited in the AEIM or these standards are incorporated by reference. Copies of these manuals may be downloaded from the following websites:

- http://www.usace.army.mil/inet/usace-docs/
- http://www.army.mil/usapa/eng/

9. REFERENCES.

The following references were used in the development of the geotechnical design for this Supplemental Draft Environmental Impact Statement.

CDM [April 2006]. 'Draft Environmental Impact Statement, Appendix B: Initial Geotechnical Investigation for the Preliminary Design of the Fort Worth Central City Project'

Geology of Tarrant County [circa 1919], UT Austin Bulletin No. 1931

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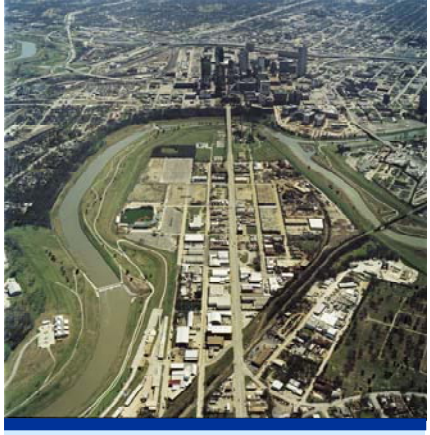

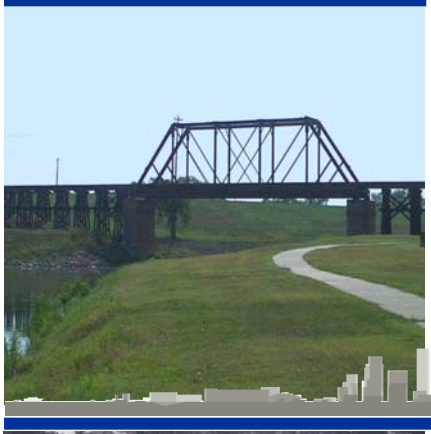

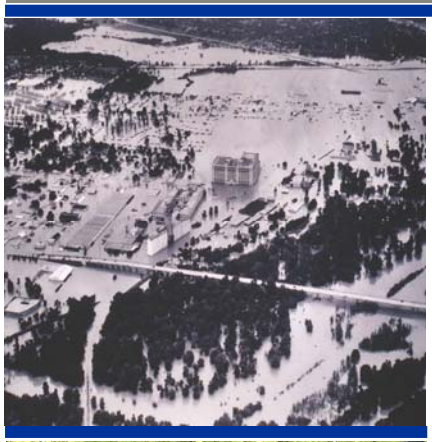

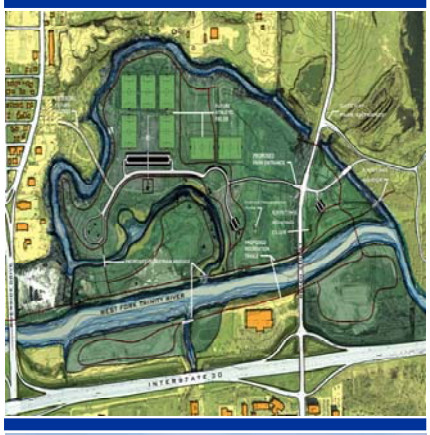

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Fort Worth Central City Preliminary Design

Civil/Structural Preliminary Design

Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix C

Volume I- Narrative

March 2008

Fort Worth Central City Preliminary Design

Civil/Structural Preliminary Design

Final Supplement No.1 to the Final Environmental Impact Statement

Appendix C

March 2008

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FORT WORTH CENTRAL CITY
Preliminary Design Supplement

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ATTACHMENTS

Volume II- Supplemental Plans

Volume III- Structural Calculations

Appendix C
Civil/Structural

1.0 Introduction

This Appendix supports Supplement No. 1 to the Final Environmental Impact Statement (FEIS) for the Central City Project, Upper Trinity River. The supplement to the FEIS is limited to those components of the project which are modified as a result of the evaluation of alternatives to merge the authorized Central City Project with the Riverside Oxbow Ecosystem Restoration Project. Specifics of the previously approved plans are summarized in the text of the FEIS for the Authorized Central City project and Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow Ecosystem Restoration Project (April 2003) and Addendum dated April 2005.

1.01 Background

The following paragraphs provide a brief summary of the two projects, Central City and Riverside Oxbow Ecosystem Restoration.

1.01.01 Central City Project

The Central City Project is a multi-agency endeavor involving several Federal agencies (primarily the US Army Corps of Engineers) and at least three non-Federal partners (Tarrant Regional Water District, City of Fort Worth and Streams and Valleys). The primary focus of the Central City Project is to enhance existing levels of flood protection while restoring components of the natural riverine system that were sacrificed in construction of the existing flood control system and facilitating urban revitalization. Authorization for Federal participation for construction was provided by Public Law 108-447 dated 8 December 2004. The FEIS was completed for the Authorized Central City Project in January 2006 and the Project Report was completed in March 2006. The Record of Decision (ROD) was signed, and the Project Report recommending the Community-Based Alternative was endorsed as being technically sound and environmental acceptable, by the ASA(CW) on 7 April 2006.

The Community-Based Alternative consisted of the following elements:

- construction of an approximately 8,400-foot long bypass channel extending from just downstream of 5th Street in the Clear Fork to just upstream of Northside Drive on the West Fork;
- construction of a dam on the West Fork, approximately 1,100 feet downstream of Samuels Avenue;
- construction of three isolation gates to direct flood flows through the bypass channel and to create a controlled, quiescent watercourse in the

approximately two-mile stretch of the existing West Fork channel adjacent to downtown Fort Worth;

- construction of numerous street and highway improvements, including raising University Drive out of the 100-year floodplain; and
- valley storage mitigation for 5,250 acre-feet of storage at various sites.

1.01.02 Riverside Oxbow Ecosystem Restoration Project

The Riverside Oxbow Ecosystem Restoration project encompasses approximately 1,060 acres with a focus on restoring both the biological integrity of wetland and bottomland hardwood communities and the integrity and function of floodplain habitats and adjacent uplands. An Interim Feasibility Report and Integrated Environmental Assessment for the Riverside Oxbow Ecosystem Restoration Project were completed in April 2003 and a Finding of No Significant Impact (FONSI) was signed by the USACE, Fort Worth District Commander, on 22 May 2003. The recommended Locally Preferred Plan was approved by the USACE Chief of Engineers on 29 May 2003. An Addendum dated April 2005 was prepared to respond to comments from the Assistant Secretary of the Army. Neither construction funding nor authorization for implementation of this project has been provided to date.

The Locally Preferred Plan included:

- construction of a notched control structure in the existing floodway channel to allow flows through the old cutoff oxbow;
- demolition and replacement of the existing Beach Street Bridge;
- construction of a new parkway entrance and bridge; and
- restoration of almost 600 acres of diverse aquatic and riparian woodland habitats previously impacted by the channel improvements.

1.01.03 Modified Central City Project

In June 2006 the City of Fort Worth submitted a letter requesting that the Fort Worth District Corps of Engineers conduct an evaluation to consider the potential benefits of combining the authorized Central City Project with the Riverside Oxbow Ecosystem Restoration Project. Following an initial evaluation of the merits of combining the two projects, the Corps of Engineers determined that merging the two projects had the potential to increase hydraulic efficiency and to provide additional environmental restoration opportunities. Based on this determination, the Corps of Engineers proceeded with the detailed evaluation of alternatives to prepare a supplement to the FEIS for the Central City Project.

The civil components of the Modified Central City Project that have changed due to the result of merging the two existing projects include:

- Alternative valley storage sites at:

  - Rockwood Park- West
  - Riverside Park
  - Ham Branch
  - Riverside Oxbow
  - Gateway Park
- Modification to previously approved valley storage sites at:
  - University Drive
  - Samuels Avenue

The design criteria, assumptions and findings are discussed in Sections 1.02, 1.03 and 1.04, respectively.

The structural components of the Modified Central City Project that have changed or been added as a result of merging the two projects include:

- Relocation of the Samuels Avenue Dam,
- Addition of a low water fixed dam on Marine Creek, and
- Construction of a controlled lock structure to accommodate movement of small boat traffic from the Interior Water Feature to Marine Creek.

The structural design criteria, assumptions, loading conditions, method of analysis and results of computations for these components are discussed in Sections 1.05 through 1.08. In addition to the above components, these sections also present reference drawings and data from the Riverside Oxbow Project related to the Beach Street Bridge and Park Road Entrance Bridge.

1.02 Civil References

The design for the valley storage mitigation sites, Samuels Avenue Dam and Marine Creek low water dam is in accordance with standard engineering practices and guidance as set forth in various manuals as published by the USACE as follows and applicable:

EM 1110-2-301, Guidelines for Landscape Planting at Floodwalls, Levees & Embankment Dams, 01 Jan 00

EM 1110-2-410, Design of Recreation Areas and Facilities - Access and Circulation, 31 Dec 82

EM 1110-2-1205, Environmental Engineering and Local Flood Control Channels, 15 Nov 89

EM 1110-2-1206, Environmental Engineering for Small Boat Basins, 31 Oct 93

EM 1110-2-1601, Hydraulic Design of Flood Control Channels Change 1 ENG 4794-R, 30 Jun 94

EM 1110-2-1913, Design & Construction of Levees, 30 Apr 00

EM 1110-2-2607, Planning and Design of Navigation Dams, 31 July 95

EM 1110-2-2610 Change 1, Lock and Dam Gate Operating and Control Systems, 02 Apr 04

EM 1110-2-2902, Conduits, Culverts and Pipes, 31 Mar 98

EP 1130-2-550, Recreation Operations and Maintenance Guidance and Procedures, CH 3, 15 Aug 02

Pamphlet No. 11650-2-1, X Criteria for Construction within the Limits of Existing Federal Flood Protection Projects, Fort Worth District, 31 Oct 03

1.03 Civil Specifications

Design criteria and base assumption for the civil design are as follows:

Excavation	
Maximum Cut Slope	3H:1V
Maximum Fill Slope	3H:1V
Aerial Utilities Vertical Clearance	Min 20 ft
Pole Setback from Toe	Min 10 ft
Seeding	Bermuda Grass
Roads and Bridge	
Cross Slope	Max 2%
Park Road Maximum Design Speed	25 mph
Beach Street Maximum Design Speed	45 mph
Recreational Trails and Ramps	
Cross & Longitudinal Slope	Max 2% and 5%
Ramp Slope	Max 10%

1.04 Valley Storage Mitigation Civil Design

1.04.01 Background

As noted in Appendix C of the Central City FEIS dated January 2005, construction of the bypass channel required mitigation of lost floodplain storage, referred to as "valley storage", due to increased efficiency of flow through the bypass channel rather than through the existing channel. The valley storage loss caused by the construction of the bypass channel is comprised of two components. First, routing the existing Clear Fork and West Fork through the bypass channel instead of the

interior area reduces the total length of channel resulting in less in-line floodplain storage. In addition, the hydraulic efficiency of the shortened channel length also creates a drawdown effect on both the Clear Fork and West Fork 100-year and Standard Project Flood (SPF) water surface elevations upstream of the bypass channel which reduces the upstream valley storage.

The amount of valley storage mitigation required to compensate for this loss was determined by hydraulic modeling analysis in compliance with the criteria established by the Corridor Development Certificate (CDC) guidelines. The original hydraulic analyses (contained in Appendix A of the Central City Project FEIS) quantified the approximate volume of valley storage lost as 5,250 acre-ft without mitigation. This volume consisted of an estimated loss of 2,850 acre-feet due to the construction of the bypass channel and approximately 2,400 acre-feet due to upstream drawdown.

1.04.02 Alternative Analysis

As part of the analysis for the Modified Central City Project, valley storage mitigation was re-evaluated on the basis of eliminating the Riverbend Site and incorporating the Riverside Oxbow/Gateway Park Site. Primary goals of the re-evaluation of the valley storage mitigation sites were to maximize use of existing public lands rather than privately owned land for valley storage and, at the same time, enhance the opportunities for ecosystem restoration and recreation.

The amount of valley storage mitigation required to compensate for valley storage loss by the Modified Project was determined by hydraulic modeling analysis in compliance with the criteria established by the Corridor Development Certificate (CDC) guidelines. The design criteria and hydraulic analyses (contained in Supplement No. 1 Appendix A, Hydrology and Hydraulics) quantify the approximate volume of valley storage lost as 5,250 acre-ft without mitigation.

Potentially available areas included all of the areas previously considered for the Authorized Central City Project, lands identified within the footprint of the former Riverside Oxbow Ecosystem Restoration Project, sites identified by the USACE during evaluation of the merits of combining the two projects and a few additional areas not previously considered. Potential valley storage sites within the combined project area were ranked based on the ability of the site to accommodate additional valley storage while minimizing both adverse effects on significant habitat areas and the need to acquire privately owned land. Further evaluation also included analysis of potential constraints such as utility relocations, constructability and hazards associated with prior land use.

The results of the re-evaluation of valley mitigation storage sites indicated that the majority of the required valley storage mitigation provided by the original Riverbend Mitigation Site could be accommodated within the confines and project area of the Riverside Oxbow Ecosystem Restoration project. In addition to the

proposed Riverside Oxbow Sites, the University Drive Mitigation Site and the Samuels Avenue Sites, the remaining valley storage would come from three newly identified sites. The following storage mitigation sites, discussed in further detail in the next section, comprise the Locally Preferred Valley Storage Plan proposed for the Modified Project:

- Rockwood Park –West Site
- Samuels Avenue Sites
- Riverside Park Site
- Ham Branch Site
- Riverside Oxbow/Gateway Park Sites and
- University Drive Modification.

1.04.03 Rockwood Park - West Site

1.04.03.01 *Site Description and Constraints*

Rockwood Park- West is a 23 acre site, located between River Stations 2702+00 and 2724+00, within the existing Trinity River floodplain on the southwestern portion of the existing City of Fort Worth Rockwood Park Golf Course. The 27-hole golf course is located south of Henderson Street (Jacksboro Hwy) on the West Fork Trinity River between the White Settlement Road and University Drive bridges. The site is bounded by the Trinity River on the east and existing federal levee to the west. The proposed mitigation area is within an inactive portion of the golf course. Vegetative cover on the site is primarily grassland with minimal tree coverage. This mitigation site was analyzed as part of the original Central City FEIS, but was excluded from the final valley storage mitigation plan due to the selection of the Riverbend Site.

Within the reaches of the site, the top of bank elevation ranges from 524 to 526. Immediately upstream of the site, the northern bank, from the river to the toe of the levee, is comprised of an 'upper shelf' with an elevation of 540. Most of the Rockwood Park-West Site is on a 'lower shelf' with an elevation ranging from 528 to 538. The elevation of the top of levee is approximately 554.

The proposed work includes grading the site to gently slope towards the river, to a new top of bank elevation of 526, which is approximately 1 foot above the proposed normal pool elevation, to obtain optimum valley storage mitigation. A minimum 30 foot buffer is to be provided from the base of the levee to the proposed excavation to maintain the integrity of the levee and provide a maintenance road and trail access in front of the levee. Excavated materials will be transported and disposed of off-site. The toe of the levee from Station 2723+00 to Station 2710+00 is marked by a 2-wire cable fence, with 4-foot high metal posts, to

prevent vehicular access. There are no apparent surface obstructions or structures within the site limits.

1.04.03.02 *Utility Relocations*

There are no proposed utility relocations associated with the Rockwood Park – West Site. An existing 36-inch sanitary sewer line that runs along and parallel to the toe of the levee traverses the site from Station 2723+00 to 2710+00. Field observations revealed no visible manholes, although, based on existing utility maps, several are known to exist throughout the reaches of this site. The top of slope of the proposed excavation will establish a minimum 10 foot offset from the sanitary sewer alignment to protect any potential erosion into the limits of the sewer.

1.04.03.03 *Material Handling*

Earthwork Quantities

The top of the river bank excavation is set at Elevation 526.0. Excavation quantities for the Rockwood Park – West Site, based on the contours presented on grading plan sheet CG-02, using 3:1 side slopes with a 1% cross fall slope across the site, from toe of levee to river bank are 148,000 CY. These are presented as raw quantities with no shrinkage or swell factors considered.

Haul Routes & Disposal Sites

The majority of the spoil material generated by the proposed excavation at Rockwood Park – West will be transported to the University Drive Modification site to be used in filling the site to raise the roadway. Of the estimated 148,000 CY generated, 130,000 CY will go to the University Drive Site. The remaining 18,000 CY will be transported to the Bypass Channel construction zone for use in backfilling the hard edge or Bazaar Fill Site. The proposed haul route from Rockwood Park – West to University Drive will be through the use of a temporary access road along the edge of the existing Rockwood Golf Course to Jacksboro Highway (SH 199) and south approximately 1.25 miles to University Drive. The haul route to the Bypass Channel/Bazaar area will be the same, but continuing an additional one mile south on Jacksboro Highway. Transportation of the spoil materials to the University Drive will need to be coordinated with the City of Fort Worth and their roadway improvements as well as within the overall staging of the project.

1.04.04 Samuels Avenue Sites

1.04.04.01 *Site Description and Constraints*

The Samuels Avenue Sites cover approximately 40 acres within the Trinity River floodplain and are located downstream of the Samuels Avenue Bridge. The sites

lie along the north and south banks of the West Fork Trinity River and were previously analyzed and included as part of the Central City FEIS. The sites are bounded by Brennen Ave to the north, Northside Drive to the east and south, and the Union Pacific Railroad right-of-way to the west. The southern site is flanked by a federal levee while the northern site is flanked by two old construction waste landfills. Property ownership is a combination of City of Fort Worth and Tarrant Regional Water District.

The Samuels Avenue North Site is an approximately 15 acre site along the north bank of the West Fork of the Trinity River (River Station 2392+00 to 2417+00). It abuts an existing inactive City of Fort Worth Landfill located on Brennan Drive from Station 2403+00 to 2412+00 and a completed (i.e., capped) portion of the landfill from Station 2393+00 to 2403+00. Being immediately adjacent to the river and within the floodway, the area is well maintained and regularly mowed.

Within the reaches of this site, the elevation of the top of riverbank ranges from approximately 524 to 529, with the top side relatively flat (less than 1% slope). The proposed lower excavation elevation (new top of bank) is 502.0.

The 'back' property line (adjacent to the existing and completed landfill properties) from Station 2493+00 to Station 2417+00 is marked by a 6-ft cyclone fence. Outside the fence, from Station 2404+00 to 2413+00 is a 20 ft asphalt paved landfill road, including street lighting (20 ft light poles on 200 ft centers). The only apparent obstructions or structures within the site limits are described below in the Utility Impacts section.

The Samuels Avenue South Site is an approximately 25 acre triangular-shaped site along the south bank of the West Fork of the Trinity River from River Station 2398+00 to 2414+00. The site contains approximately 1,600 linear feet of concrete-paved trails within its limits that are part of the Trinity Trails system. Being immediately adjacent to the river and within the floodway, the area is well maintained and regularly mowed.

Within the reaches of this site, the elevation of the top of bank ranges from approximately 516 to 522 and extends at a gentle slope to the south to the edge of a small upper shelf. A high-voltage electric transmission line is located at the southern edge of the lower shelf at a ground surface elevation ranging from 523 to 526. The top of levee along the south side of the site is at approximate elevation 538. The proposed lower excavation elevation (new top of bank) is 502.0.

Scattered along the 1,600 ft reach of this site are approximately 20-30 transplantable (4" to 6") oak trees, that have been planted for landscape purposes in recent years. In addition, there is a Monument Boulder (approximately 6-8 ft in length), adjacent to the trail, near Station 2410+00.

Proposed work includes grading the sites to gently slope towards the river to a bank elevation approximately 1 foot above the static water elevation (EL 501) which is controlled by the 4th Street low water dam. The existing high voltage

transmission lines will have a minimum 50-foot wide set-back between the power lines and the beginning of the grading. The existing maintenance road and access point to recreation trails will be reconstructed within the set-back area to provide access and continuity of the existing trail system. The existing trail along the river bank will also be reconstructed to provide scenic access closer to the river.

1.04.04.02 *Utility Relocations*

The Samuels Avenue North Site has an existing concrete-lined stormwater discharge channel at Station 2403+00, which drains an area north of the river, including part of the landfill and adjacent properties along Brennan Avenue. According to historical topographic map sources, this channel originally had a dirt road crossing along the top of the slope, but that crossing no longer exists.

There is also a concrete structure, located approximately 100 feet back of the top of the bank, near Station 2415+00, that is suspected to be a vent structure for an abandoned sanitary sewer siphon as no structure exists on the other bank. To date, no historical plans have been located to document this approximately 8-foot by 8-foot by 8-foot concrete structure which has a "sewer" manhole lid. City of Fort Worth personnel have been made aware of this site and have made site visits to assess the situation. The city staff believes that the manhole is for an abandoned storm sewer line, rather than a sanitary sewer. Regardless of the nature of the structure, it and the associated piping will require removal and replacement if determined through additional investigation to be active. Along the northwest corner of the northern property an existing 42-inch sanitary sewer (M-106 R*), runs across Lebow Creek and will not be impacted.

The Samuels Avenue South Site is traversed from Station 2412+00 to 2398+00 by an existing high voltage electric transmission line that runs parallel to the top of the proposed excavated slope. This line is supported on three large four-legged steel towers on approximate 650 foot centers. A minimum 50-foot set-back from the nearest steel tower leg to the top of slope of the proposed excavation was established to protect against any potential erosion into the limits of the tower base.

In addition, the Samuels Avenue South Site has an existing area inlet, located near the top of existing bank at Station 2404+00 to prevent erosion due to localized run-off. The Samuels Avenue North Site has a similar existing area inlet, located near the top of existing bank at Station 2396+00. Both inlets will be removed due to the significant lowering of the bank elevation.

1.04.04.03 *Material Handling*

Earthwork Quantities

The top of the river bank excavation is set at Elevation 502.0. Excavation quantities for the Samuels Avenue Sites, based on the contours presented on grading plan sheets CG-06 and CG-07, using 3:1 side slopes with a 1% cross fall slope across the site, from toe of levee to river bank are 552,000 CY for the north site and 315,000 CY for the south site for a total of 867,000 CY. These are presented as raw quantities with no shrinkage or swell factors considered.

Haul Routes & Disposal Sites

The Samuels Avenue Sites (both north and south) have immediately adjacent City-owned properties that lend themselves to serve as disposal sites. The north site is adjacent to an existing City Landfill, which has two separate cells (west and east). The east cell has been completed and capped at an approximate elevation of 555 while the west cell is still partially active. A significant portion of the east side of the west cell has been completed and capped to an approximate elevation of 550. It is intended to use both of these landfill sites for disposal of the excavated soil. Filling to an elevation of 572 for both cells yields a fill capacity of 560,000 CY for the west cell and 330,000 CY for the east cell, for a total volume of 890,000 CY.

In addition to the landfill area, there is a tract of land, located north and west of Northside Drive and south of the Samuels Avenue South site that is currently being used as a City of Fort Worth auto impoundment lot and is graded to an elevation of approximately 525. Filling the impound site to an elevation of 550 yields a fill capacity of 490,000 CY. Some adjustment in final elevations is anticipated but current grading plans indicate a surplus capacity so reductions in fill elevations should not significantly impact the site.

The proposed grading plan will use the west landfill site to accommodate excavation from the Samuels Avenue North site (approximately 552,000 CY), which is within 8,000 CY capacity of balancing, and to utilize the south auto impound lot to accommodate excavation from the Samuels Avenue south site. Given an estimated excavation quantity of 315,000 CY and a fill capacity of and a fill capacity 490,000 CY, there will be a surplus fill capacity of approximately 175,000 CY. This surplus fill capacity and the northeast landfill area (capacity of 330,000 CY) will provide a total excess fill capacity of 505,000 CY. This remaining capacity of the Samuels Avenue north site, east landfill and south auto impound lot area would be available as a disposal area for Riverside Park excavation and/or other spoils materials, if needed.

1.04.05 Riverside Park Site

1.04.05.01 *Site Description and Constraints*

The Riverside Park Site is a 20 acre site, publicly owned (City of Fort Worth) property located on the east bank of the West Fork Trinity within the Trinity River

floodplain (River Station 2316+00 to 2334+00). The site is located immediately north of East Belknap Street and is bounded by the Oakhurst Scenic Drive on the east. The north side of the site is defined by an area of large old growth trees which are to be preserved. Existing park features include an asphalt and gravel parking lot, a lighted softball field, two soccer fields and trail facilities. Being currently used as a park and immediately adjacent to the river and within the floodway, the area is well maintained and regularly mowed. Current site elevations vary from 518 to 524 and slope gradually towards the river.

Within the reaches of this site, the elevation of the top of bank ranges from approximately 518 to 520. The proposed lower excavation elevation (new top of bank) varies throughout the site from 504.0 to 510.0, depending on the location. By varying the excavation limits, the existing park facilities (soccer fields, softball field and parking lot) can be set at elevations that will be appropriate for each use, thereby maximizing the amount of excavation and valley storage generated.

Excavation elevations were based on providing 1 foot above the 2-year frequency event flood elevation of 508 for the main athletic fields while maintaining a minimum of 3 feet above the static water elevation (EL 501) which is controlled by the 4th Street low water dam. An existing 18-inch sanitary sewer (M-1728) located on the east side of the site near Oakhurst Scenic Drive will remain in place. An existing 30-inch storm water outfall and box culvert under Oakhurst Scenic Drive, located on the south of the site, will also remain in place. Overhead power lines crossing the site will need to be relocated to accommodate the proposed work. Excavated materials will be transported off-site for disposal.

The entire site is marked by a 2-wire cabled fence along the riverbank, with 4 ft metal posts and a paved trail located outside (toward the river). The existing trail will be replaced along the bank with a combination maintenance and recreational trail. The City of Fort Worth has future plans to tie in the trail with planned sidewalk improvements along Race Street. The parking and athletic facilities have been shifted to the north end of the site for this reason. Access to the parking lot will be provided by a new access road aligned with Race Street. The maximum slope will be 12% or less.

1.04.05.02 *Utility Relocations*

The Riverside Park Site is crossed by an existing high voltage electric transmission line, located at Station 2330+00. The line is conveyed on three single wooden poles, one located near the Oakhurst Scenic Drive ROW and two within the property boundary, on approximate 125 ft centers. Near the river bank is a dual pole, with dual guy wires, that serves as an anchor for the 450 ft span across the river to the west. The transmission line and pole will be need to relocated to accommodate the excavation work.

In addition, there is a storm sewer that crosses the site, near Station 2318+00, from an outfall of a 3′ x 3′ box culvert, along Oakhurst Scenic Drive, immediately into a 36″ RCP storm sewer. There is a 2′ x 2′ Y-inlet, in an open area in the middle of the parking area, which connects to the 36″ storm line, which outfalls at the river's edge. The 2′ x 2′ inlet will be removed by the grading operations which will also remove the existing parking lot. The existing 36-in storm drain will be replaced.

The Riverside Park Site is traversed from Station 2334+00 to 2316+00 by an existing 18″ sanitary sewer line (M-1728), that runs along and parallel to the west ROW line of Oakhurst Scenic Drive, to near Station 2326+00, where it jogs to the toe of the slope (downhill of the tree line) along the east side of the site. Near Station 2321+00, the line jogs slightly into the parking area to an observed sanitary sewer manhole, located near the aforementioned Y-inlet, then exits the site just west (and downhill) of the building located south of the south end of the site. Approximately 1600 ft of the 18″ sanitary line will need to be re-laid due to grading encroachments as shown on plan sheet CG-09. The sanitary sewer alignment will be shifted to the south travel lane of Oakhurst Scenic Drive to avoid impacting the existing trees along the roadway.

1.04.05.03 *Material Handling*

Earthwork Quantities

Excavation quantities for the Riverside Park site, based on the contours presented on grading plan sheet CG-10, using 3:1 side slopes with a 1% cross fall slope across the site, from toe of levee to river bank are 302,000 CY. These are presented as raw quantities with no shrinkage or swell factors considered.

Haul Routes & Disposal Sites

The excavation from Riverside Park will be placed at the Samuels Avenue east landfill site which is less than one mile away via a combination of Oakhurst Scenic Drive and Northside Dr. With a cut quantity of 302,000 CY and an available fill quantity of 505,000 CY at the Samuels Avenue Sites which are less than one mile haul. Spoils material that is suitable for levee construction will also be transported to the Ham Branch Site via a combination of Belknap, Sylvannia Blvd, and 4th Street for use in reconstruction of the back levee.

1.04.06 Ham Branch Site

1.04.06.01 *Site Description and Constraints*

The Ham Branch site is a 100 acre property located east of US Hwy 287/Spur 280 (Martin Luther King Freeway), midway between Interstate 30 to the south and Highway 121 (Airport Freeway) to the north. The site is further bounded by the West Fork Trinity River to the east and the northern extents of the site are approximately 150 ft to the north of the railroad centerline. The property is currently protected by a system of levees on the east and south sides. The site is

primarily owned by the City of Fort Worth and used as a City park identified as Harmon Park. Transecting the site is a small creek that runs diagonally from the northwest to southeast prior to discharging into the West Fork Trinity River through a gate controlled structure. The creek is lined by dense vegetation and is included as a component of the Central City for aquatic habitat mitigation. The site also functions as a storm water sump (Sump No. 31). Other significant site features include a recreation center, three competition soccer fields and a baseball field. A network of sanitary sewer lines along with gas and fiber optic lines exist on the property with a majority being located on the eastern side of the site. Elevations within the enclosed sump area vary from 512 to 520.

The proposed work includes lowering a portion of the existing levee to allow inundation of the site during greater then 100-yr storm events on the Trinity River. Restoration of a portion of a former levee is proposed to the north of the railroad embankment to maintain existing levels of protection to areas outside of the Ham Branch site. Outside of the levee footprint, minimal grading work is proposed because of the site's relatively low grade and ecosystem benefits. The recreational features will be maintained by rerouting a portion of the existing trails to accommodate the levee lowering. Several manholes and inspection chambers will require modification to raise and/or seal their elevation above the SPF water surface elevation.

1.04.06.02 *Utility Relocations*

The Ham Branch site has five large (10 ft + x 10 ft+) concrete structures, that function as utility manholes and/or siphon structures, that will be required to be adjusted, in height, to an elevation above the SPF flood elevation of 530. This will require an extension of height of up to 15 ft, for some of the structures.

The site is also traversed by an existing high voltage electric transmission line that runs northwest to southeast across the site. This line is supported on large four-legged steel towers and will not be impacted by the proposed work. Existing gas lines and fiber optic lines that cross the site should not be impacted by the proposed exposure to floodwaters.

1.04.06.03 *Material Handling*

Earthwork Quantities

The lower limits of the river levee 'notch' excavation is set at Elevation 524.0. The proposed northern levee elevation is set at Elevation 534.0. Fill quantities for the Ham Branch site, based on the contours presented within the grading plan, using the 10:1 slopes, along the levee 'notch' and 3:1 side slopes, along the levee, are 15,500 CY (3,300 CY excavation, along the notch and 18,800 CY fill, along the levee). These are presented as raw quantities with no shrinkage or swell factors

considered. The additional fill will come from the Riverside Park Site should suitable levee material be available on site.

Haul Routes & Disposal Sites

The excavation from the Ham Branch levee 'notch' will be used if suitable for construction of the new levee. If this material is deemed to be unsuitable it will be spoiled to the backside of the proposed levee. Additional spoil materials that are suitable for levee constructions will be transported to the Ham Branch Site from the Riverside Park site for construction of the proposed levee.

1.04.07 Riverside Oxbow/ Gateway Park Sites

1.04.07.01 *Site Description and Constraints*

Located immediately north of Interstate 30 and bounded by Beach Street on the east and Riverside Drive on the west, the Riverside Oxbow site consists of approximately 200 acres that are entirely within the existing 100-yr floodplain. The site is primarily within the confines of the current river channel and the old river oxbow, however, portions of the site extend to the north beyond the oxbow boundaries which are proposed for ecosystem restoration purposes. The Oxbow site also includes some property on the south bank near the former Sycamore Creek channel. The Oxbow property is primarily publicly owned with the exception of a gas drilling site located in the northeast corner of the property that is currently in use. No excavation is planned for this area as shown on the grading sheets. Existing site elevations vary from 510 to 514.

The Gateway Park site is located east of the Riverside Oxbow site. The approximately 225 acre site is bounded by Beach Street on the west, East 1st St on the north and the Trinity River Channel on the east and south. Northeast and eastern portions of the site are characterized by woodland vegetation while the central and southern portions of the site are predominantly park and athletic facilities. The northwest portion of the site is largely vacant land with some commercial development along Beach Street. The site includes an abandoned wastewater treatment plant (WWTP) in the southeast quadrant. Property ownership is a combination of public (City of Fort Worth and Tarrant Regional Water District) and private entities. This site is also entirely within the existing 100-yr and SPF floodplain with the exception of a small area along Beach St and the existing ball field and old WWTP which have some protection due to existing fill embankment. Existing site elevations generally vary from 506 to 510.

Proposed work for the Oxbow/Gateway Park area includes grading the two sites to elevations ranging from 5-year to less than 2-year frequency event flood elevations to maximize valley storage benefits. Existing woodland vegetation near the Gateway Park drive, along the Trinity River, and northeastern portions of the site will be preserved and enhanced as part of the ecosystem restoration activities.

Proposed recreational features which will be constructed include recreational fields, restrooms and snack bar facilities, covered basketball courts, boat launches, and splash park. As a related future project the City intends to construct additional recreational fields, parking lots and picnic areas. Recreational trails will be constructed as part of the grading work and include a combination of hard and soft paved trails and equestrian trails. Critical infrastructure facilities will be constructed at or above the 2yr flood frequency elevation. Associated access roads, maintenance road, and parking will also need to be constructed.

Ecosystem enhancements are proposed throughout the site including riparian woodlands, buffer, and native grassland areas. A series of four rock weir structures, large riprap placed in a vane arrangement, are proposed along the old oxbow channel and reconstituted Sycamore Creek channel to create a series of pools and riffles. Dredging of portions of the old channel will be required to create the proposed pools and riffles. All work will be maintained within the existing channel.

Proposed work on the Oxbow portion of the site will encounter an 84-inch sanitary sewer (M-245P*) and an 18-inch main (M-126) will need to be protected during excavation activities in some areas. A portion of the 18-inch (M-126) line will be replaced to accommodate excavation and grading work. Existing natural gas line and liquid fuel lines which transect the property will remain in place and will also need to be protected during construction. A 54-in water main (E-21) adjacent and to the west of the Beach St bridge may need to be relocated pending survey of the sewer and old oxbow channel during detailed design. A proposed north-south gas line has been proposed from the existing gas well on the northeast corner of the site to the existing Sycamore Creek area. Coordination activities are continuing with the gas company so that the line will not interfere with future grading work on the site. Portions of the excavated material from this site will need to be transported off-site for disposal.

On the Gateway portion of the site the pond area on the southeast will be constructed by the City of Fort Worth as part of their on-going park development activities. The abandoned wastewater treatment plant site is proposed for demolition and subsequent disposal of excavated materials to minimize transport expenses. Demolition and clean-up activities of the abandoned wastewater treatment plant are to be conducted by the City of Fort Worth under a separate project. The site contains an 84-inch sanitary sewer (M-245P*), 72-inch (M-245-AR), 60-inch (M-389), and 21-inch (M-181A) s which now carry wastewater flow to the Village Creek Wastewater Treatment plant will need to be protected during excavation activities in some area. An existing 10-inch water main will also need to be protected. Additional utilities include an overhead high voltage transmission line.

1.04.07.02 *Utility Relocations*

The Riverside Oxbow Site is crossed by an existing high voltage electric transmission line on the southeastern portion of the site. The line is support on a series of large four legged steel towers. The line crosses Beach Street to the north of the existing Beach Street Bridge over the West Fork. Relocation of the line is not proposed with existing grades being maintained at each respective tower. The electrical utility corridor will be maintained and free of trees and large woody vegetation.

An 84-inch sanitary sewer (M-245-P*) runs parallel to I-30 along the south edge of the Oxbow site until it crosses the West Fork to the west of Sycamore Creek. The line proceeds east, parallel to and north of the West Fork until crossing the old oxbow channel with an above grade crossing where the line continues east to the old WWTP. A 60-in (M-389) sewer main lies parallel and south of the West Fork until it crosses the West Fork, downstream of the existing Beach Street low water dam, and continues east parallel to the M-245-P* line to the old WWTP. Both of these lines will require special precautions during excavation work to protect these lines, see utility sheets CU-02 and CU-03. The southeast corner of the site has an 18-inch main (M-126) vitrified clay sanitary line that is proposed to be replaced and relayed at its existing grade, see utility sheet CU-03. Replacement is necessary due to adjacent excavation activities and concerns that this line may be disturbed and damaged during construction activities. Two water lines, 36-in (E-11) and 46-in (E-21) are located within the Beach Street ROW near the Beach Street Bridge crossing over the West Fork. Proposed improvements to Beach Street will require existing water vales to be adjusted. Modification of the old oxbow channel and replacement of the existing box culvert with a clear span bridge over the channel, see Section 2.03, may necessitate the lowering of a 54-in (E-21) the water main to accommodate the channel and bridge improvements, see utility sheet CU-04. The City has also planning for a new parallel 54-inch water main in Beach Street which will need to be coordinated with this project. Construction of this line is outside of the context of this project.

The Gateway Site is crossed by the same high voltage electric transmission line as previously stated. The line diagonally crosses the middle of the site. Relocation of the line or towers will not be required based on the proposed grading.

Several sanitary sewer lines cross the site including the 84-inch (M-245-P*) and 60-inch (M-389) line previously discussed. A 72-inch (M-245-AR) line crosses the site from Beach Street to the old WWTP on the north side of the existing park road entrance. These sanitary sewer lines converge at junction boxes located on the southwest corner of the abandoned WWTP site. Relocation or adjustment of the junction structure will not be required based on the proposed grading. A 21-inch (M-181-A) sanitary sewer line and 10-inch water line run north-south through the middle of the site as shown on sheet CU-01. These lines will require special precautions during excavation work to protect these lines, see utility sheets CU-04 and CU-05. In addition, two sanitary lines, 90-inch (M-388-B) and 54-inch (M-280-B) lie on the eastern edge of the site. Both of these lines are outside the current

grading limits but will need to be reviewed during future design efforts to protect them from impacts which could be caused by hauling of excavated materials. One 18-inch abandoned sewer line (M-131) is planned to be removed to allow grading work, see sheet CU-04.

1.04.07.03 *Roadways*

The Riverside/ Gateway site includes three new roadways and one roadway improvement as shown on sheets CP-01 to CP-06. The roadway improvement consists of replacing the existing box culvert on Beach Street with a new clear span bridge over the old oxbow. As previously noted, a potential utility conflict with a 54-inch (E-21) water main exists to the west side of the bridge. Detailed survey during final design will be required to confirm the location and depth of the line and the required action. In addition the project includes the relocation of the existing park entrance, north of the bridge, to a location between the West Fork and old oxbow. Replacement of the bridge and entrance will necessitate reconstruction of the roadway. New roadways will include the aforementioned new park entrance, referred to as the East Park Road which will connect Beach St to the Gateway site. On the Riverside Oxbow sites a new entrance roadway and spur, West Park Road and West Park Road Spur, will be constructed to provide access to the proposed recreational facilities.

1.04.07.04 *Material Handling*

Earthwork Quantities

Excavation quantities for the Riverside Oxbow, are based on the contours presented on grading plan sheets CG-21 to CG-29 are 2,215,000 CY. Total excavation quantities from the Gateway Park Site are 860,000 CY which does not include the proposed grading by others on the southeast corner of the site. See Sheets CG-28 and CG-29, Appendix C, Vol. II Supplemental Plans. In addition, approximately 13,500 CY is anticipated to be excavated from the old oxbow channel to develop the riffle pools for the ecosystem restoration work. These are presented as raw quantities with no shrinkage or swell factors considered.

Haul Routes & Disposal Sites

The excavation spoils from Riverside Oxbow will be placed at a combination of an off-site disposal site and the old WWTP site. Approximately 1,163,500 CY is estimate to be transported to an offsite disposal site with the remaining 1,925,000 CY being used to fill on-site at the old WWTP, area adjacent to Beach Street and hill area north of the existing Dog Park. Offsite material will be transported primarily on Beach and 1st Street.

1.04.08 University Drive Modification

The University Drive Modification was previously included in the original approved Central City FEIS and Technical Appendix C. Since no changes to the proposed roadway raise are proposed the site it is not discussed in this Supplement.

2.0 Structural Component Design

The following sections provide design information on the structural components of the Modified Central City project.

2.01 Structural References

The Structural design for the relocated Samuels Avenue Dam, Marine Creek Low Water Dam and lock structure is in accordance with standard engineering practices and guidance as set forth in various published manuals as follows and applicable:

US Army Corps of Engineers

EM 1110-1-1905, Bearing Capacity of Soils, 30 Oct 92

EM 1110-2-1418, Channel Stability Assessment for Flood Control Projects, 31 Oct 94

EM 1110-2-1901, Seepage Analysis and Control for Dams, CH1, 30 Apr 93

EM 1110-2-2000, Standard Practice for Concrete for Civil Works Structures, CH2, 31 Mar 01

EM 1110-2-2006, Roller-Compacted Concrete, 15 Jan 00

EM 1110-2-2100, Stability Analysis of Concrete Structures, 01 Dec 05

EM 1110-2-2104, Strength Design for Reinforced - Concrete Hydraulic Structures, CH1, 20 Aug 03

EM 1110-2-2105, Design of Hydraulic Steel Structures, CH1, 31 May 94

EM 1110-2-2200, Gravity Dam Design, 30 Jun 95

EM 1110-2-2400, Structural Design and Evaluation of Outlet Works, 02 Jun 03

EM 1110-2-2502, Retaining and Flood Walls, 29 Sep 89

EM 1110-2-2504, Design of Sheet Pile Walls, 31 Mar 94

EM 1110-2-2602, Planning and Design of Navigation Locks, 30 Sep 95

EM 1110-2-2607, Planning and Design of Navigation Dams, 31 July 95

EM 1110-2-2610, Lock and Dam Gate Operating and Control Systems, CH1, 02 Apr 04

EM 1110-2-2703, Lock Gates and Operating Equipment, 30 Jun 94

EM 1110-2-2704, Cathodic Protection Systems for Civil Works Structures, 01 Jan 99

EM 1110-2-2705, Structural Design of Closure Structures for Local Flood Protection Projects, 31 Mar 94

EM 1110-2-2906, Design of Pile Foundations, 15 Jan 91

ER 1110-2-110, Instrumentation for Safety – Evaluations of Civil Works Projects, 08 July 85

ER 1110-2-1806, Earthquake Design & Evaluation of Civil Works Projects, 31 July 95

TL 1110-2-256, Sliding Criteria for Concrete Structures, 24 Jun 81

Unified Facilities Guide Specifications

UFGS 09 97 02 (09964), Painting: Hydraulic Structures

American Concrete Institute Specifications

ACI 318-05, Building Code Requirements for Structural Concrete

American Institute of Steel Construction

AISC 360-05, Specification for Structural Steel Buildings

American Association of State Highway Officials

LRFD Bridge Design Specifications, 3rd Edition, 2004

2.02 Structural Specifications

Loading parameters, unit weights and properties of materials used in the design of the relocated dam and lock structures, as well as the allowable stresses calculated, are as follows:

Unit weight of water	62.5 pcf
Unit weight of concrete	150 pcf
Unit weight of steel	490 pcf
Concrete compressive strength (f'c):	
Typical:	4,000 psi
Access bridge prestressed girders	5,000 psi

Steel:	
Wide Flanges:	ASTM A992
Channels:	ASTM A36
Pipes:	ASTM A53, TYPE E OR S, GRADE B
HSS:	ASTM A500, GRADE B
Plates:	ASTM A36
Misc.:	ASTM A36
Anchor Rods:	ASTM F1554, Grade 36 or 55, WELDABLE
Reinforcing steel:	ASTM A615, Grade 60
Backfill materials:	
Moist unit weight	120 pcf
Saturated unit weight	120 pcf
Submerged unit weight	57.5 pcf
Cohesion (Q-case)	0 psf
Internal friction angle (Q-case)	32 degrees
Cohesion (S-case)	0 psf
Internal friction angle (S-case)	32 degrees
Foundation Materials:	
Moist unit weight	120 pcf
Saturated unit weight	120 pcf
Submerged unit weight	57.5 pcf
Cohesion (Q-case)	0 psf
Internal friction angle (Q-case)	32 degrees
Cohesion (S-case)	0 psf
Internal friction angle (S-case)	32 degrees
Roller Compacted Concrete (RCC):	
Moist unit weight	140 pcf
Saturated unit weight	140 pcf
Submerged unit weight	77.5 pcf
Cohesion	300 psf
Internal friction angle	45 degrees

Many of the preceding material properties are based on properties which are reasonably anticipated or based on very limited geotechnical investigations. As

the design progresses and geotechnical design parameters are developed, these properties will require reevaluation.

2.03 Beach Street Bridge

The proposed Beach Street Bridge was previously included in the Riverside Oxbow Ecosystem Restoration Study and no changes are proposed at this time. Plans for the bridge from the previous study are included by reference in Appendix C, Volume II – Supplemental Plans. The preliminary design for the Beach Street Bridge is a 115-foot long clear span bridge consisting of a concrete deck on prestressed concrete girders and supported on 16 3'-diameter drilled shafts, based on current, limited geotechnical data. The design includes four lanes of traffic (two each way) with pedestrian walkways on each side for a total width of 80 feet. The bridge replaces an existing 10' X 12' box culvert. One of the pedestrian walkways will be 10 feet wide to accommodate both pedestrian and bicycle traffic.

2.04 Park Road Bridge

The proposed Park Road Bridge was previously included in the Riverside Oxbow Ecosystem Restoration Study and no changes are proposed at this time. Plans for the bridge from the previous study are included by reference in Appendix C, Volume II – Supplemental Plans. The preliminary design for the Park Road Bridge is a 103-foot wide clear span bridge consisting of a concrete deck on prestressed concrete girders and supported on 6 3'-diamter drilled shafts, based on current, limited geotechnical data. The design includes two lanes of traffic (one each way) with pedestrian walkways on each side for a total width of 44 feet. One of the pedestrian walkways will be 10 feet wide to accommodate both pedestrian and bicycle traffic.

2.05 Samuel Avenue Dam and Lock

2.05.01 Location

The Fort Worth Central City Project included an in-channel dam to achieve the urban design objective of maintaining water levels in the project interior at a relatively constant normal water surface elevation of approximately 525 NGVD. The original dam site location resulted in potential impacts on Marine Creek due to both the high backwater elevation as well as a resulting increase in operations to pass flood flows on the Marine Creek watershed. The original site also impacted the lower segment of Lebow Creek by loss of habitat resulting from rerouting of the creek downstream of the dam.

As part of the evaluation of the Modified Central City Project, relocation of the Samuels Avenue Dam was considered for potential impacts on valley storage requirements, to address potential upstream impacts on Marine Creek and the hydraulic constraints posed by the original location. Alternative sites for the dam

on the West Fork upstream of the Marine Creek confluence, ranging from immediately at the confluence to just downstream of Northside Drive, were evaluated. Placing the dam to close to the Marine Creek confluence could introduce scour potential at the Samuels Avenue Bridge, while placing it further upstream towards Northside Drive reduced or eliminated options to maintain hydraulic connectivity with Marine Creek. Sites south of Northside Drive were eliminated from consideration due to impacts on Northside Drive, limited area, and conflicts with the bypass channel.

The selected revised location of the gated dam is proposed on the main stem of the West Fork of the Trinity River just upstream of the confluence with Marine Creek. The dam is still referred to as the Samuels Avenue dam due to its proximity to the Samuels Avenue Bridge. The dam is sited approximately 1,750 feet downstream of Northside Drive, immediately upstream from the confluence of Marine Creek. The dam was sited upstream from Samuels Avenue Bridge and the adjacent three railroad bridges in order to allow for a lower, separately maintained water level on Marine Creek.

The downstream end of the northern stilling basin wall will connect to a low water dam located on Marine Creek which will maintain a normal water pool level elevation of 516.5. The location was set with the front, upstream edge of the structure 670 feet upstream from the centerline of Samuels Avenue Bridge. As shown on sheet SS-01, this location provides sufficient room for the structure to be constructed with appropriate grading that transitions both the 390-foot wide main dam and the 200-foot wide Marine Creek dam to the 250-foot wide channel. The two dams were oriented so that their discharges could be directed and aligned with the downstream channel.

The two pools will maintain hydraulic connectivity through the use of a lock and channel located on the west side of the dam, allowing small boat traffic to travel upstream and downstream of Samuels Avenue Dam. The lock structure will be approximately 40-feet long by 16-feet wide and have a maximum hydraulic lift of 8.5 feet.

The benefits of this dam site include reduced backwater impacts to Marine Creek as well as simplifying the operational demands of Samuels Avenue Dam by allowing Marine Creek flood flows to pass without affecting the urban lake pool elevation. In addition, hydraulic connectivity between the Stockyards and Downtown is maintained so that all project objectives are met. A secondary benefit to the revised dam site is the elimination of adverse impacts to Lebow Creek and associated habitat.

2.05.02 Design Assumptions

The Corps of Engineers is currently in the process of acquiring additional geotechnical information. Due to unavailability of this additional information at the present time, geotechnical data from the previous investigation (contained in Appendix B of the Central City Project FEIS) as well as historical boring information from the Northside Drive bridge and previous USACE floodway work was used in the following feasibility-level design. For the basis of this design, the parameters were considered conservative. As additional data becomes available in future design phases, these parameters will be reviewed and refined as appropriate.

Based on the available data, the top of rock elevation was assumed to be uniformly at elevation 474.0 NGVD. Should the actual top of rock be determined to be substantially higher than this, other structural systems such as roller compacted concrete (RCC), as was proposed at the original location, may become more viable. If the depth to rock is deeper, the only impact to the proposed design should be a marginal increase in cost due to increase drilled shaft lengths. The same soil parameters used in the previous FEIS were used in this design analysis.

2.05.03 Design Criteria

A series of hydraulic loads were reviewed, ranging from static normal pool with minimal base flows to the 100-year and up to the SPF. Selected combinations of headwater and tailwater that would prove to be the critical design loading were utilized in the structural design

Hydrostatic Loads:

Case	Classification	Head Water Elev. (ft-MSL)	Tail Water Elev. (ft-MSL)
No flow	Usual	524.3	499.0
10-yr	Usual	524.3	509.8
25-yr	Unusual	524.4	520.8
100-yr	Unusual	526.5	525.0
500-yr	Extreme	533.6	531.4
SPF	Extreme	540.7	537.8

Silt Loads: Silt loads are based on silt up to the gate sill elevation. Silt load is computed using a buoyant weight of 40 pcf and a lateral coefficient of pressure of 0.6.

Dynamic Water Loads: Hydraulic loads such as wave action will be considered as appropriate. Unless the actual hydraulic jump profile is modeled, the tailwater contribution to lateral stability will be based on an aerated unit weight of 60% of

normal. If the actual hydraulic jump profile is modeled, the full unit weight of the tailwater will be used.

Uplift Loads: Uplift loads will be computed based on cutoff location, drain location, drain efficiency and linear reduction to tailwater pressure.

Seismic Loads: Seismic Loads are expected to be negligible in the project area and are not anticipated to provide any controlling factor in the final design. Once suitable geotechnical information is available, this assumption will be verified.

2.05.04 Design Methodology

The dam structure will be constructed primarily of reinforced concrete, with much of the structure supported on drilled shafts that extend down to bedrock, which was assumed to be at elevation 474 NGVD.

Stability design will be based on USACE criteria (EM 1110-2-2100, Stability Analysis of Concrete Structures) except where reinforced concrete strength is provided by lateral bearing in soil and rock. Where lateral bearing in soil and rock is used, the software program Lpile Plus, version 4.0 by Ensoft, Inc. will be used in general conformance with the methodology of USACE criteria (EM 1110-2-2906, Design of Pile Foundations).

It should be noted that seepage data for the soils on site were not available for the preliminary design. Underdrains and wall drains are indicated where anticipated by the preliminary design. The type and extent of these drains will be determined in the final design based on the seepage data available at that time.

2.05.05 Design of Foundations

The preliminary design of the Dam on the main channel is based on a drilled shaft supported platform. The assumed depth of rock was such that the previous foundation approach to expose the rock and place roller compacted concrete was no longer feasible. The revised design philosophy is to found the platform on rock using drilled shafts embedded into the bedrock below a sufficient depth to develop the moment capacity of the shafts at the top of rock elevation. Due to the indeterminate nature of the platform bearing on the underlying soils and the drilled shafts, it is conservatively assumed that the platform receives all of its support from the drilled shafts. It is consistently assumed that the soils resist lateral movement without benefit of any overburden pressure due to the presence of the structural platform.

The foundation analyses were generally performed using MathCad software version 13.1 by MathSoft. MathCad provides a versatile automated calculation sheet. Calculation methodology was performed in conformance with the principles and procedures in the referenced design manuals.

The drilled shafts are designed to resist the net lateral load in the structural platform. The drilled shafts are designed to bear laterally in the soil and rock below the dam. The behavior of the shafts is identified using Lpile Plus, version 4.0 by Ensoft, Inc. The lateral bearing pressure of the shafts in the soil will be integrated along each shaft and summed for the group of shafts and compared to the lateral shear capacity of the surrounding soil to check shaft group behavior. Distribution of lateral load within the group is believed to be very uniform. The shafts have relatively large spacings and all shafts are of the same size, length and have similar surrounding soil. Additionally, the dam slab has a relatively large size and stiffness when compared to the drilled shaft and soil system. The slab should be capable of transmitting lateral load to the entire drilled shaft group in a reasonably uniform manner.

The stilling basin is cast-in-place concrete and has been thickened to resist uplift. The joint between the stilling basin and the dam superstructure will be an expansion joint and will not be dowelled to allow for differential settlement. The stilling basin side of the joint will be stepped down slightly to avoid water impacting the joint.

The preliminary design is based on the material below the dam being cohesionless and having an angle of internal friction of 32-degrees.

2.05.06 Design of Superstructure

The design of the concrete superstructure is based on EM 1110-2-2104, Strength Design for Reinforced - Concrete Hydraulic Structures, EM 1110-2-2906, Design of Pile Foundations and the principles of EM 1110-2-2200, Gravity Dam Design. Steel elements will be designed per AISC 360-05, Specification for Structural Steel Buildings.

The forces in the superstructure are statically determinate except for those resulting from the direct connection to the drilled shafts. No other changes to the superstructure are required due to the revised dam location.

2.05.06.01 Gate Configuration

No changes to the proposed gates or their operating system are needed due to the change in dam location. For additional information on the previous gate analysis, refer to Section 8.3, Gate Configuration, in Appendix C of the Central City Project FEIS.

A separate small control building to house the operational controls for the gates and the lock system will be needed in the area. The proposed location is on the west abutment as shown on the plans. This location would be above SPF flood levels but have a direct line-of-sight with both the lock and gates.

The spillway bridge will provide access to the gates for routine maintenance and operations. Primary gate operations, both low flow and flood gates, are planned from the control building, but manual override capabilities will necessary at the gate. This bridge is assumed to be designed for light vehicular traffic only. Cranes for heavy repair or maintenance will access the gates from the downstream side.

2.05.06.02 Dam Features

In addition to the gates described above, the dam will have several features that are recommended at this time. Their layout and conceptual design criteria are described below.

The stilling basin for the dam was sized to fully contain a hydraulic jump for energy dissipation of the gate releases. In order to contain the hydraulic jump, the basin was set to an elevation of 491.0, with the downstream exit channel graded to 495.0. The lower portion of the stilling basin was set to a length of 60 feet. The critical configuration was based on two gates fully opened, which would pass slightly less than the 10-yr flood, or 21,300 cfs. At higher flows, the tailwater rises sufficiently so that less stilling basin length would be required. The basin would not be of sufficient length to fully dissipate the energy from one gate fully open, which would release approximately 10,600 cfs, slightly less than the 2-yr flood. For this reason, the gates are recommended to be operated using partial gate openings for multiple gates before any one gate is opened fully. This is described more fully in the following sections.

A sheet piling system will be utilized as a positive seepage cutoff for the dam and in each abutment. It will also be used for diversion and construction sequencing, as described in section 2.07. The front face of the dam will be connected to the final top of the sheetpiling when cut to final grade, in a water tight manner, as shown on Sheet SS-4. Since subsurface information is not available, the viability of the sheetpiling providing a positive cutoff with the rock foundation is unknown. Additional options that will be considered once geotechnical information is available include:

- In the abutments and where the sheetpiling has a moderate contact with the rock, grouting of the top of the rock and the material behind the sheetpiling can be performed.

- If boulders are encountered or other evidence that the sheetpiling has a poor contact with the rock, jet grouting would be a feasible additional item to provide a cutoff in these zones.

- If sheetpiling is determined to be an ineffective cutoff, a slurry trench, either concrete or soil bentonite, could be used for the subsurface cutoff. However, sheetpiling will still likely be needed for diversion and phasing of construction, though likely at a reduced cost.

The Samuels Avenue Dam will be constructed on soil well above the bedrock and underseepage control will be a design issue. The seepage flow rate is not critical to the hydraulic design. The design is anticipated to be primarily a structural concern; however the length of the cutoff could trigger environmental issues that must be incorporated in the final choice of seepage control. According to USACE's EM 1110-2-1901, methods for control of underseepage include horizontal drains, cutoffs (compacted backfill trenches, slurry walls, concrete walls, and steel sheetpiling), upstream impervious blankets, downstream seepage berms, toe drains, and relief wells.

The method selected for the conceptual design is a combination of a steel sheetpile cutoff and a horizontal drain. Steel sheet piles are well suited to serve both as the permanent cutoff and as the construction cofferdam. Although the USACE does not encourage the use of steel sheet pile cutoffs to prevent underseepage because relatively minor flaws may reduce the efficiency, precedents do exist. In our opinion, the steel sheet pile cutoff can be effective for this project if the subsurface deposits do not include boulders that can damage the sheets, the bedrock surface is not too irregular, and the bedrock near its surface is reasonably intact and impervious. Design of sheet piling will be in accordance with EM 1110-2-2504, Design of Sheet Pile Walls. If exploration shows the subsurface conditions are unfavorable, a slurry trench cutoff or a concrete wall constructed in a slurry-filled trench may be necessary. The soils are expected to be too permeable and deep for economical construction of a compacted backfill trench, particularly with staged construction, and the staging does not favor construction of an upstream pervious blanket. An initial efficiency of 25% has been assumed for the cutoff.

A horizontal drainage blanket is planned to control hydrostatic uplift and prevent piping by providing a filtered outlet for water that passes through or around the cutoff. Uplift and stability analyses were based on an assumed straight-line distribution of head between the cutoff and the toe of the structure. This assumption is conservative because the drain will extend under the entire structure downstream of the cutoff, providing much shorter seepage paths.

The quantity of underseepage will be highly dependent on the efficiency of the cutoff. Seepage loss of stored water is not a critical design issue for these dams.

Both abutments require a positive cutoff in the floodplain adjacent to the structure to minimize seepage losses once the normal water level is reached. The right, or east, abutment was assumed to have about 50 feet of sands and gravels above the competent rock. This entire zone would need to be cut off. The most cost effective method would be the use of the same sheet piling that is to be used for diversion. An alternative would be a soil-bentonite slurry trench cutoff. It will be constructed from the back side of the structure wall to the toe of the levee. The cutoff is not likely to be able to be extended laterally far enough to reach an impervious zone and will, therefore, need to extend sufficiently into the abutment to reduce the final seepage gradient down to an acceptable level. The left, or west,

abutment was assumed to have a similar foundation and will also have a sheet pile cutoff, though it will also be integral with the lock system. It is known that this abutment also contains similar pervious material but that it does not extend as far until competent rock is at a suitable elevation to provide a full positive cutoff. It is assumed that the sheet pile cutoff will be extended to a point in the west abutment at which an open cutoff trench filled with compacted clay will be more economical. This cutoff trench will extend to a point where the rock is high enough to complete the positive cutoff. This location can only be determined once the geotechnical exploration is complete and the depth to rock, the depth to the water table, and the overburden soil properties are determined. Assumed extents of the sheet piles are shown in the drawings.

A physical model study of the Samuels Avenue Dam, the Marine Creek Low Water Dam and the gate operations is recommended as part of the final design process. This will aid in designing the final configuration of the structure, particularly the stilling basin and adjacent erosion protection measures; fine tuning the hydraulic control parameters, and validating appropriate gate operations and sequencing procedures. The physical model study will also confirm flow patterns as the water transitions to the current channel under the Samuel Avenue Bridge and the railroad bridge.

2.05.06.03 Spillway Operation

Preliminary sequencing was assumed to consist of partial gate openings for up to four gates, assumed to be gates 2 through 5, assuming the gates are numbered sequentially starting at the east end. This will align most flows better with the original channel and the opening of Samuels Ave. bridge. Once tailwater is sufficiently high, the remaining gates can be opened in the order of 1, 6, and 7. Once the last gate is fully opened, at approximately the 100 year flood level, the tailwater will be sufficiently high to prevent scour and erosion at the left downstream training wall, which also serves as the right training wall for the Marine Creek Dam. At the 100 year flood level, the difference between headwater and tailwater at the gates is only about 1.5 feet and the average velocity in the downstream channel is only about 4 fps. Though local turbulence will exist, significant scouring is not anticipated. In addition, at these higher flow levels, the angled training wall will also serve to redirect the higher flows more towards the Samuels Ave. bridge, reducing erosion potential there. These assumptions will need to be verified in a physical hydraulic model study of the dams. A full gate operating plan has not been developed at this time and will be developed as part of the recommended physical model study.

2.05.07 Design of Lock and Appurtenances

This section summarizes the conceptual design criteria and major mechanical components of the water connectivity lock. The following subsections include the overall lock dimensions and operational narrative; basis of lock gate selection; illustrative details of the lock gate components; lock gate structural and

mechanical design; lock gate operating machinery design; lock pumping system hydraulic and mechanical design; and miscellaneous lock structures and appurtenances.

The proposed lock will be constructed within a channelized section of the Trinity River adjacent to the Samuels Avenue Dam and will provide connectivity for light vessels between the Central City reach of the Trinity River and Marine Creek, providing access to the Stockyards. Design of the lock will be based on EM 1110-2-2602, Planning and Design of Navigation Locks, as applicable to this structure.

The structural design of the lock is based on EM 1110-2-2104, Strength Design for Reinforced - Concrete Hydraulic Structures. The lock will be founded on on-site soils and has a relatively low bearing stress. The sheet pile cutoff will pass under the upstream end of the lock structure. In order to prevent differential movement, the lock will be rigidly connected to the sheet piles. Because this connection creates a possibility of the sheet piles becoming a support point, the lock design should be conservatively designed as if the upstream end is supported entirely by the sheet piles.

2.05.07.01 Lock Dimensions and Operation Narrative

The maximum lift of the proposed lock is 8.5 feet, which classifies the structure as a *very-low-lift* type based upon USACE nomenclature. The dimensions and design features of the lock are as follows:

Upper pool elevation (Trinity River):	525.0
Lower pool elevation (Marine Creek):	516.5
Maximum navigation lift:	8.5 ft
Design vessel maximum length:	39 ft
Design Vessel width:	12 ft
Design Vessel Side clearance:	2ft
Design vessel draft:	4 ft
Sill clearance:	3 ft
Lock chamber width:	16 ft
Usable length of lock:	40 ft
Operation Time (estimated)	
Fill (raise):	10 min

Drain (lower):	10 min
Lock chamber volume at maximum lift:	55,000 gal
Lock sill monolith spacing:	46 ft 8 in
Downstream sill elevation:	509.5
Upstream sill elevation:	518.0

The lock system will be operated manually by a lock system operator. The lock will be filled and drained through a side-port-flume. The flume will be constructed as part of the shore-side lock wall. The flume will be filled from the upstream pool and drained to the downstream pool.

Flow into and out of the flume will be controlled by two hydraulically-operated stainless steel slide gates installed at the upstream and downstream ends of the flume. The hydraulic cylinder operators on the slide gates will be controlled by the operator from the lock control panel. The hydraulic cylinders will be mounted on support beams installed above the side-port-flume. A single dedicated hydraulic power unit (HPU) will be installed in the lock house. The HPU system will be custom designed with each component individually specified for heavy duty industrial service. A detailed description of the hydraulic power unit design is provided below.

2.05.07.02 Lock Gate Selection and Design Criteria

For locks in this size classification, the standard Corps design utilizes sector gates. However, for this application, miter gates were preferred over sector gates due to their simplicity in design and successful implementation on similar very-low-lift dam and lock schemes. In addition miter gates require less civil concrete and overall width of the lock structure when compared to sector gates. A detailed structural and mechanical design will be prepared for the lock gates, suitable for fabrication by a firm experienced in the construction of steel hydraulic structures. Firms meeting the experience qualifications will be listed in the specifications. All components and materials will be selected to minimize custom fabrication of the major wear component replacement parts. Consideration shall be given during bid/ contract document development for the procurement of selective spare parts which are custom or may become obsolete in the future.

In addition, a detailed corrosion assessment will be included during the next phase of design. Where necessary, corrosion resistant materials will be selected and a detailed cathodic protection system will be added to the design. Cathodic protection system will be designed in accordance with the guidelines included in EM 1110-2-2704 “Cathodic Protection Systems for Civil Works Structures”.

The following is a summary of design data for the proposed lock miter gates:

Miter Angle:	24 degrees
Pintle-to-Pintle spacing:	54 ft 11¾ in
Clear opening at each gate:	16 ft

Upstream Gate Leaf Dimensions:

Width:	113 in
Height:	115 in

Downstream Gate Leaf Dimensions:

Width:	113 in
Height:	217 in

Gate Leaf Bottom Clearance:	4 in

Gate structural design will be based upon the Load and Resistance Factored design (LRFD) load criteria included in EM 1110-2-2105, "Design of Hydraulic Steel Structures", with the exception that the ice load criteria will not be used, given the local weather conditions. Additional loading and other design criteria will be adapted from EM 1110-2-2703, "Lock Gates and Operating Equipment".

The miter gate design for this project will differ from the typical USACE design since the size of the gate is much smaller than the standard miter gates illustrated in the Corps manuals. Illustrative details of the miter gates, including plan and elevation views, and important details of construction are included on Sheet SS-10, and Figure C-1 to C-7. These drawings and the following descriptive paragraphs, describing the lock gates and operating machinery, should be reviewed concurrently.

The miter gates will be horizontally framed; constructed of structural steel as specified above; and fit into lock wall recesses when in the open position. The major components of each gate leaf include the following:

1. Skin Plate
2. Horizontal girders
3. Diagonals
4. Miter contact post assembly
5. Leaf quoin
6. Quoin pivot shaft

7. Upper quoin pivot shaft gudgeon bracket and torque arm assembly
8. Bottom quoin pivot shaft gudgeon bracket
9. Quoin, bottom and miter contact seal assemblies
10. Access walkway
11. Gate leaf fenders

The miter gate skin plate will be reinforced by horizontal girders and diagonal members (see Figure C-1 and C-2. Wherever possible open members that are not susceptible to trapping mud and other debris will be used. Where the use of open framed members is not practical, horizontal members will include drain holes, outside the locations of the largest moment reactions, to allow easy removal of mud and other trapped debris by high pressure hose. Other locations susceptible to silt and debris build-up will be reviewed and provisions made for maintenance during the next phase of design.

The materials of construction for the gate leaf, embedded parts and hardware will be reviewed in detail and selected during final design. The evaluation of these materials will be economics and performance-based. Miter gates are typically constructed of A36 structural steel and coated with a high performance epoxy spray coating system. Alternatives to this approach include the use of stainless steels, carbon steel coated with thermal sprayed corrosion resistant metal overlays. Hardware will be constructed of corrosion resistant materials selected to meet the mechanical requirements of the installation, and protect against excessive material loss during service.

The leaf quoin will be constructed of a tubular steel section fitted with welded steel guide plates for the pivot shaft. The tubular members will be seal welded to prevent moisture infiltration and corrosion to the member. The use of open framing members for the leaf quoin, having less potential to trap moisture requiring frequent maintenance, will also be evaluated in subsequent phases of design.

The quoin shaft will be constructed of 400 series or 17-4PH stainless steel, machined to a reduced diameter at the top to form drive shafts with square key-seats for linkage to the torque-arm (see Figure C-3). The torque arms will operate on ultra-high molecular weight polyethylene (UHMW-PE) thrust bearings mounted above the upper pivot shaft bearing barrel. The bearing barrel will be welded to the upper bearing bracket, which will be anchored into the lock wall. The sleeve bearings will have machined grooves for grease lubrication. The bottom of the pivot shafts will be machined to form a smaller diameter hinge pin, which will operate in a bottom hinge bracket fitted with bronze sleeve and thrust bearings (See Figure C-6).

The gate leaf mitered ends will be constructed of vertical structural sections, welded to reinforced contact blocks fabricated from break-formed welded steel plate. The contact blocks will be fitted with elastomer pads as shown in Figure C-4.

Fenders will be incorporated into the gate leaf to provide protection to boats in the lock during operation. Fenders will be EPDM rubber arch-type utilized on larger USACE lock gates. The fenders will be specified with adapted language from UFGS specification Section 39.59.13.19, "Arch-Type Rubber Marine Fenders".

2.05.07.03 Miter Gate Seals

The gate seals will be constructed of neoprene rubber, containing reinforcing carbon black, zinc oxide, accelerators, antioxidants, vulcanizing agents, and plasticizers. The gates will be designed to operate under a differential head of 19 ft. The allowable leakage rate at this head pressure will be no greater that 1-fl.oz/ft-of-seal/sec. Gate seals will be arranged on the skin plate for upstream sealing. Sealing will occur in one direction. Seals will be fabricated from molded neoprene having a Shore-A Durometer hardness of 65 (See Figure C-4 and C-5).

Seals will be clamped to the skin plate by stainless steel retaining strips and UHMW-PE spacers, machine screws and nuts. Stainless steel ferrules will be inserted into the screw holes, passing through the retaining strips and seal material, to ensure even clamping of the seals.

2.05.07.04 Miter Gate Operating Machinery

A lock house will be constructed on the parapet adjacent to the lock chamber. The lock house will contain all of the hydraulic operating machinery for the lock gates. The miter gates will be hydraulically operated via the torque arm linkage to the pivot shaft (see Figure C-7). An electrically-operated hydraulic power unit (HPU) will be installed in the lock house. A gimbal-mounted double-acting hydraulic cylinder will operate the gate from a recess at the top of the lock wall. Hydraulic cylinders will be constructed of stainless steel.

The HPU will control both the hydraulically operated miter gates and slide gates at the side-port-flume. The HPU controls will be PLC-based, and operator interface terminals will be installed inside the lock house and locally at the lock wall. A pedestal-mounted local control panel will be installed outside the lock house adjacent to the shore-side lock wall. During final design, consideration will be given to programming the PLC for automated operation with a human machine interface (HMI) installed on the lock parapet for use by boaters when the lock operator is not available or potentially phased out in the future. The PLC will also be programmed to prevent accidental opening of the lock gates prior to equalization of the pools on both sides. A process instrumentation diagram and detailed control descriptions will be developed during the next phase of design.

Two hydraulic power units will be custom designed for the project, one for the stainless steel slide gates on the side-port-flume, and the other for the lock gate mechanism. A system of accumulators will be provided for emergency gate operation during a power outage. This will be accomplished by manual override controls provided on the valve stacks. Accumulators will be the piston type with auxiliary nitrogen bottles provided as necessary. The system will be provided with variable volume pumps or constant volume pumps having adjustable frequency drives to meet the load demand during gate operation.

2.05.08 Design of Ancillary Walls

The basic configuration of ancillary retaining and flood walls is a cast-in-place concrete inverted T. The design of retaining walls will be based on stability criteria consistent with EM 1110-2-2100, Stability Analysis of Concrete Structures. The strength of these structures will be based on EM 1110-2-2104, Strength Design for Reinforced Concrete Hydraulic Structures.

The walls will be designed to bear on and be backfilled with onsite soils. It may be necessary to use select on site soils as backfill to meet required soil parameters used in the analysis. The final design will confirm that the parameters used are consistent with the data from the geotechnical investigation.

In general, the walls will be designed to have independent foundation systems from the adjacent structures and will be provided with expansion joints at the transition points. The exception to this is abutment walls at the dam and basin sections. These walls receive adequate sliding stability from the adjoining structure. Rotational stability and strength design for abutment walls will be similar to those of the typical retaining walls. Detailing of articulation and transition points will be provided during final design.

2.06 Marine Creek Low Water Dam

2.06.01 General

A fixed low water dam is proposed on Marine Creek at the confluence with the main stem of the West Fork of the Trinity River to meet project objectives of water connectivity between the Central City Project area and the Stockyards. Several alternatives were evaluated for the Marine Creek dam including both the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek as it is able to meet the design requirements of not increasing the existing 100-year water surface elevations on Marine Creek while also reducing both construction and operation and maintenance costs.

The fixed dam on Marine Creek also addresses the hydraulic constraints associated with the Samuels Avenue Dam location downstream of the Marine Creek confluence. The dam structure will have a crest elevation of 516.5 and a crest length of 200 feet. The Marine Creek channel will need to be widened by

approximately 50 feet near the dam location in order to accommodate the 200 feet of crest length needed to pass the 100-year flow without causing increases in water surface elevations upstream.

Although upstream impacts on Marine Creek are reduced by lowering the pool elevation, several existing railroad bridge piers will be inundated by the proposed 516.5 pool elevation, but the impacts are much less than the previously proposed FEIS pool elevation of 525. Individual owners of these structures have been previously notified of the potential inundation created by the project and not indicated a concern at this time. An analysis of existing storm drain systems was conducted to ensure these systems are not impacted by the proposed pool elevation. Hydraulic modeling results indicate that backwater impacts from the low water dam are minimal and the existing and proposed water surface profiles converge in the vicinity of the sidewalk bridge in the Saunders Park area.

An existing low water dam in Saunders Park maintains a pool elevation of approximately 518.5. Since the revised Marine Creek pool elevation of 516.5 is below the existing Saunders Park elevation, no impacts are anticipated further upstream. Widening of Marine Creek and construction of a turnaround basin is proposed just upstream of 23rd Street at the limits of the 516.5 pool elevation.

The proposed combination of structures meets the goals and objectives of the Trinity River Vision Master Plan to enhance neighborhood linkages by impounding water upstream on Marine Creek, thus providing water connectivity between the Cultural District, Downtown, and the Rockwood Park area to the Stockyards area.

2.06.02 Location Analysis

The dam was sited upstream from the Samuels Avenue Bridge and the adjacent three railroad bridges primarily in order to allow for the lower, separately maintained water level on Marine Creek. The actual location was specifically set with the front, upstream edge of the structure 450 feet upstream from the centerline of Samuels Avenue Bridge. As shown on Sheet SS-1, this location was selected in order to provide sufficient room for the structure to be constructed with appropriate grading that transitions back to the approximately 250-foot wide channel. The two dams were oriented so that their discharges could be directed and aligned with the downstream channel.

The initial dam location, downstream from the Samuels Ave. bridge did not allow for separate water levels on the main stem and on Marine Creek. The higher level needed on the river created unacceptable flood levels on Marine Creek. By siting the structure upstream of both the bridge and the confluence, a separate lower water level could be maintained on Marine Creek. However, this would require a separate structure on Marine Creek as well as a lock system to allow boat traffic to travel between the two lakes. After the decision was made to place the dam

upstream from the bridges, the actual location was specifically set with the front, upstream edge of the structure 450 feet upstream from the centerline of Samuels Avenue Bridge. As shown in Figure SS-01, this location was selected in order to provide sufficient room for the structure to be constructed with appropriate grading that transitions back to the approximately 250-foot wide channel at the bridge. The two dams were oriented so that their discharges could be directed and aligned with the downstream channel.

Conflicting information has been found on a 45-inch (M-279) sanitary sewer line that runs east west near the north abutment of the dam. City GIS information suggests that it is located immediately adjacent to the abutment however site reconnaissance indicates a manhole further to the north which would place the line outside of the immediate vicinity of the dam work. The mitigation of the large sanitary sewer line will depend on its actual depth and location. Verification of the precise location of the line, both horizontally and vertically is needed in order to develop an appropriate remedy but indications are that it can be accommodated without relocation.

2.06.03 Design Criteria

Hydrostatic Loads: Similar to the main dam, a range of hydraulic loads were reviewed in order to determine the critical combination of headwater and tailwater loading conditions. The tailwater levels listed are different from those for the main dam because of the widely varying drainage areas and discharges on the Trinity River and Marine Creek. The cases used frequency flood levels for Marine Creek with tailwater on the main stem based on an assumed limited contribution to flows from the main stem. This provides a conservatively low potential tailwater level. The preliminary design is based on the following water levels.

Case	Classification	Head Water Elev. (ft-MSL)	Tail Water Elev. (ft-MSL)
Normal Pool	Normal	516.5′	499.0′
10-yr	Normal	522.6	510.0
50-yr	Unusual	524.8	513.0
100-yr	Unusual	525.7	515.0
500-yr	Extreme	526.9	517.0
Top of Walls	Extreme	530.0	521.0

Silt Loads: Silt loads are based on silt up to elevation 511.0 ft-MSL. Silt load is computed using a buoyant weight of 40 pcf and a lateral coefficient of pressure of 0.6.

Dynamic Water Loads: Hydraulic loads such as wave action will be considered as appropriate. Unless the actual hydraulic jump profile is modeled, the tailwater contribution to lateral stability will be based on an aerated unit weight of 60% of

normal. If the actual hydraulic jump profile is modeled, the full unit weight of the tailwater will be used.

Uplift Loads: Uplift loads will be computed based on cutoff location, drain location, drain efficiency and linear reduction to tailwater pressure.

Seismic Loads: Similar to the main dam, seismic Loads are expected to be negligible in the project area and are not anticipated to provide any controlling factor in the final design. Once suitable geotechnical information is available, this assumption will be verified.

2.06.04 Design Methodology

Stability design will be based on USACE criteria in EM 1110-2-2100, Stability Analysis of Concrete Structures and EM 1110-2-2006, Roller-Compacted Concrete.

It should be noted that seepage data for the soils on site were not available for the preliminary design. Underdrains and wall drains are indicated where anticipated by the preliminary design. The type and extent of these drains will be determined in the final design based on the seepage data available at that time.

2.06.05 Design of Foundations

The preliminary design of the channel dam on Marine Creek is based on a reinforced concrete capped section. It is assumed that the excess soil material to be removed from the main channel dam will provide an excess of material to select good quality granular fill material for the channel dam. It is also assumed that the materials below the dam location are granular without any significant amount of clay. Based on these assumptions, the anticipated settlement is anticipated to be low and to occur during construction.

The bulk of the dam is composed of RCC. A cast-in-place facing is provided at the dam and stilling basin. A thickened RCC mass at the toe of the dam and within the stilling basin was provided to resist uplift forces.

Similar to the Samuels Avenue, the Marine Creek Dam will be constructed on soil well above the bedrock, and underseepage control will be a design issue. For reasons discussed in the previous sections, the same combination of a steel sheetpile cutoff and a horizontal drain will be utilized, as shown in the drawings.

Both abutments require a positive cutoff in the floodplain adjacent to the structure to minimize seepage losses once the normal water level is reached. The right, or south, abutment will have a sheet piling system continuous with that of the main dam that will be part of the connecting training wall. The left, or north, abutment will likely have a similar foundation though competent rock is likely to be

relatively close, as was found at the original downstream dam location. It is assumed that the sheet pile cutoff will be extended to a point in the west abutment at which an open cutoff trench filled with compacted clay will be more economical. This cutoff trench will extend to a point where the rock is high enough to complete the positive cutoff. This location can only be determined once the geotechnical exploration is completed and the depth to rock, the depth to the water table, and the overburden soil properties are determined. Assumed extents of the sheet piles are shown in the drawings.

2.06.06 Design of Superstructure

The bulk of the dam will be RCC. A cast in place facing will be provided at all faces and in the stilling basin with the uppermost portion of the structure rounded/ curved. The stilling basin will be structurally continuous with the dam superstructure. The sill wall and baffle blocks will be structurally connected to the concrete facing layer.

2.06.07 Design of Ancillary Walls

The basic configuration of ancillary retaining and flood walls is a cast-in-place concrete inverted T. The design of retaining walls will be based on stability criteria consistent with EM 1110-2-2100, Stability Analysis of Concrete Structures. The strength of these structures will be based on EM 1110-2-2104, Strength Design for Reinforced Concrete Hydraulic Structures.

The walls will be designed to bear on and be backfilled with on site soils. It may be necessary to use select on site soils as backfill to meet required soil parameters used in the analysis. The final design will confirm that the parameters used are consistent with the data from the geotechnical investigation.

In general, the walls will be designed to have independent foundation systems from the adjacent structures and will be provided with expansion joints at the transition points. The exception to this is abutment walls at the dam and basin sections. These walls receive adequate sliding stability from the adjoining structure. Rotational stability and strength design for abutment walls will be similar to those of the typical retaining walls. Detailing of articulation and transition points will be provided during final design.

2.07 Temporary Diversion Construction Sequences

The construction of the Samuels Ave Dam (SAD) and the Marine Creek Dam (MCD) will be performed in three primary stages to allow for temporary diversion of stormwater flows on the West Fork of the Trinity River and Marine Creek at all times during construction. In general, Phase I will consist of the western half of the SAD and the lower portions of the southern half of the MCD. Phase II would consist of the eastern and northern portions of the respective dams. Phase III would consist of the upper portion of the southern half of the MCD. The sheetpiling used for diversion will be incorporated into the final structure as a

permanent foundation cutoff. The phased construction sequencing of the two dams is described below.

Phase I:

1. Install sheetpiling as shown on Figure SS-02, outlining the southern half of the MCD and the western half of the SAD. Sheetpiling would be extended from the rock foundation, assumed to be at elevation 474, up to at least elevation 520, which would prevent overtopping from approximately a 10-year flood.
2. Flow would continue through the primary channels limited by the sheetpiling.
3. Construct the western 3½ bays of the SAD, appropriate portions of the stilling basin and the western retaining wall, which also forms the southern retaining wall of the MCD.
4. Construct the southern 100 ft of the MCD up to elevation 503.5 and the entire stilling basin.

Phase II:

1. Install sheetpiling as shown on Figure SS-02, outlining the northern two-thirds of the MCD and the eastern half of the SAD. Sheetpiling would be extended from the rock foundation, assumed to be elevation 474, up to at least elevation 520 and will use the common wall that divides the structures.
2. Cut/remove appropriate portions of the sheetpile walls from Phase I.
3. Flow would travel through the low flow piers and the three westernmost gates on the SAD and over the 100-foot section at elevation 503.5 on the MCD.
4. Construct the eastern 3½ bays of the SAD, appropriate portions of the stilling basin, and the eastern retaining wall.
5. Construct the northern 100 ft of the MCD including its portion of the stilling basin.

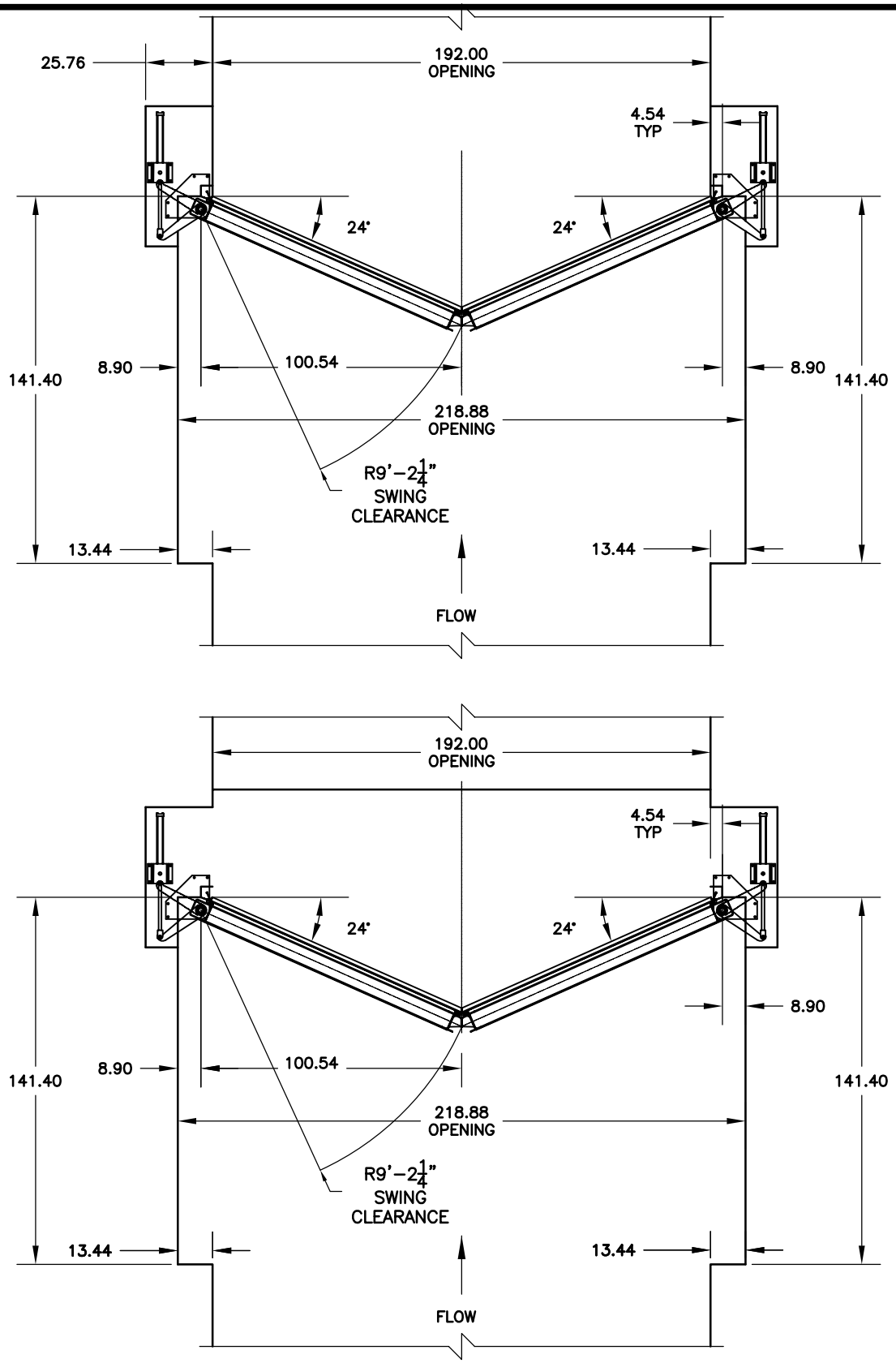
Phase III:

1. Cut/remove appropriate portions of the sheetpile walls from Phase I.
2. Flow would travel through all of the gates on the SAD and through the low flow release structure at the MCD.
3. Construct the remaining portions of the southern 100ft of the MCD above elevation 503.5.

Other:

- The lock system and related retaining walls can be constructed as part of Phase I, II, or both, as its work area can be separated from the river flow in both phases.
- All required excavation upstream from the structures and their related sheetpiling can be performed during any phase, as the excavated surfaces are above the normal water level in the river created by the 4th Street dam downstream, which is about elevation 500.

- The majority of the required excavation downstream from the designated sheetpiling can be excavated in the dry during any phase. A portion will require a temporary lowering of the water level at the 4th Street dam for the final exaction and placement of riprap.
- Gates on the main dam can be constructed either during the appropriate phase or behind individual stop logs at appropriate times in the sequence.



PLAN VIEW

US Army Corps
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Fort Worth District

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN

SAMUELS AVENUE LOCK
MITER GATE PLAN VIEW

DATE NOV 2007

FIGURE No. C-1

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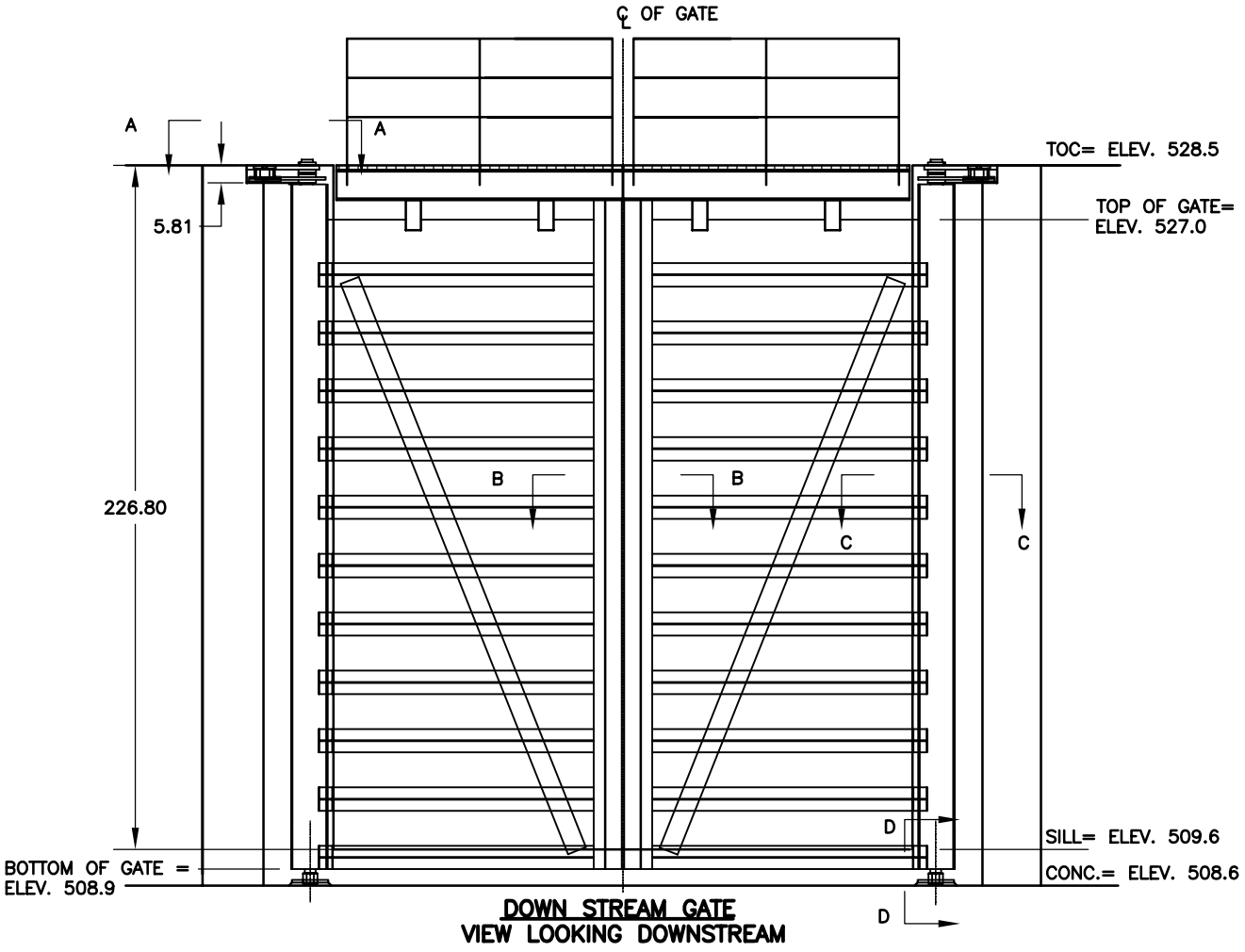
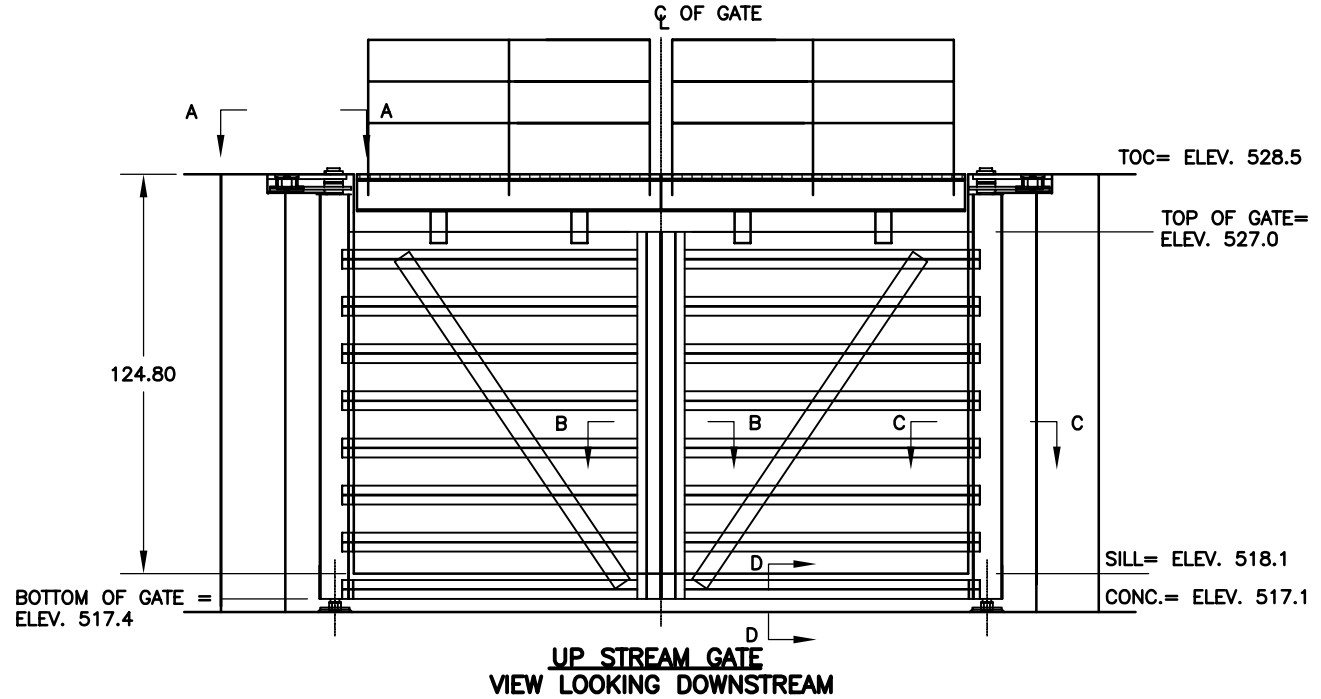


DOWN STREAM GATE
VIEW LOOKING DOWNSTREAM



UP STREAM GATE
VIEW LOOKING DOWNSTREAM

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FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN

SAMUELS AVENUE LOCK
MITER GATE ELEVATIONS

DATE NOV 2007

FIGURE No. C-2

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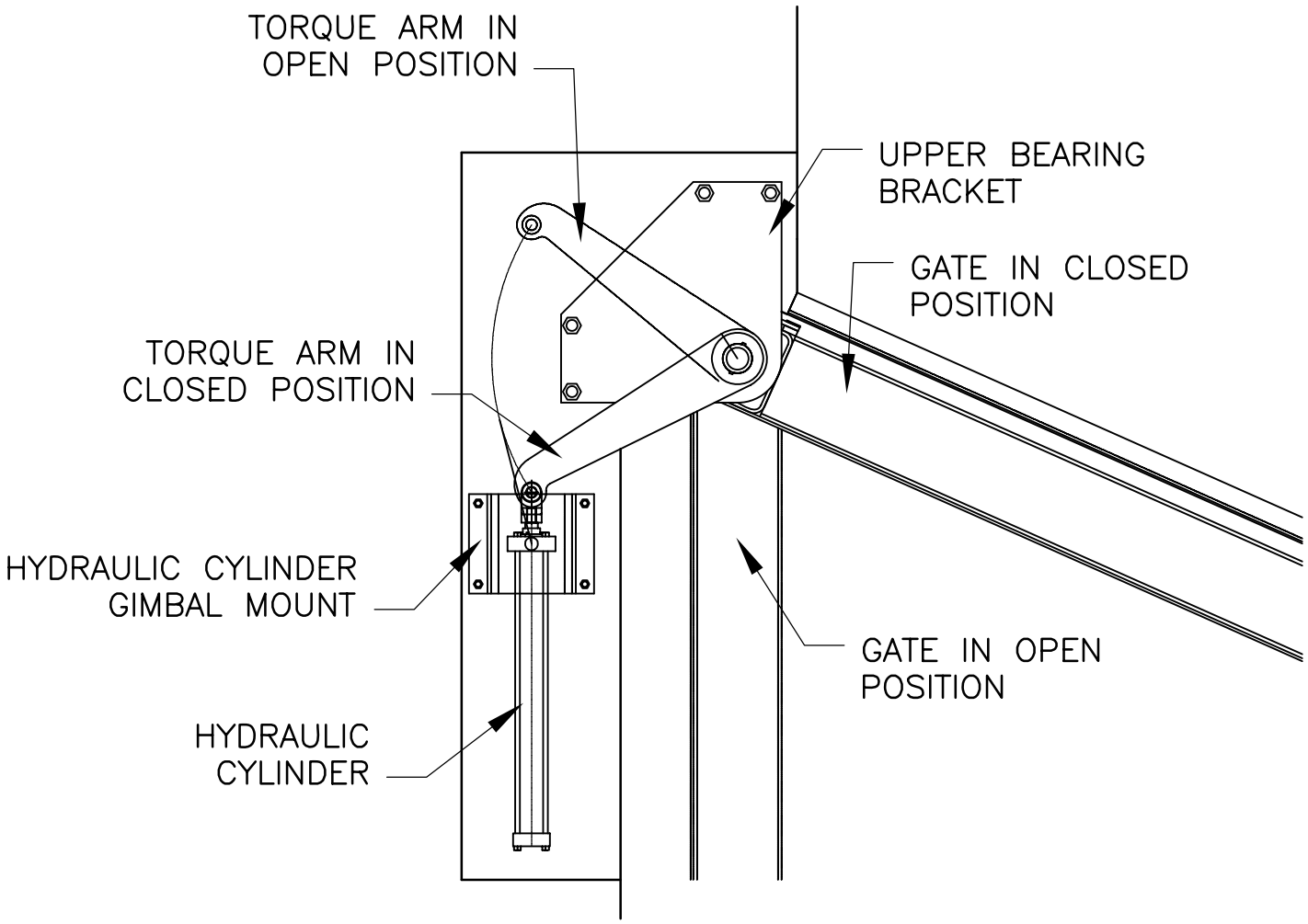

SECTION A–A

US Army Corps of Engineers
Fort Worth District

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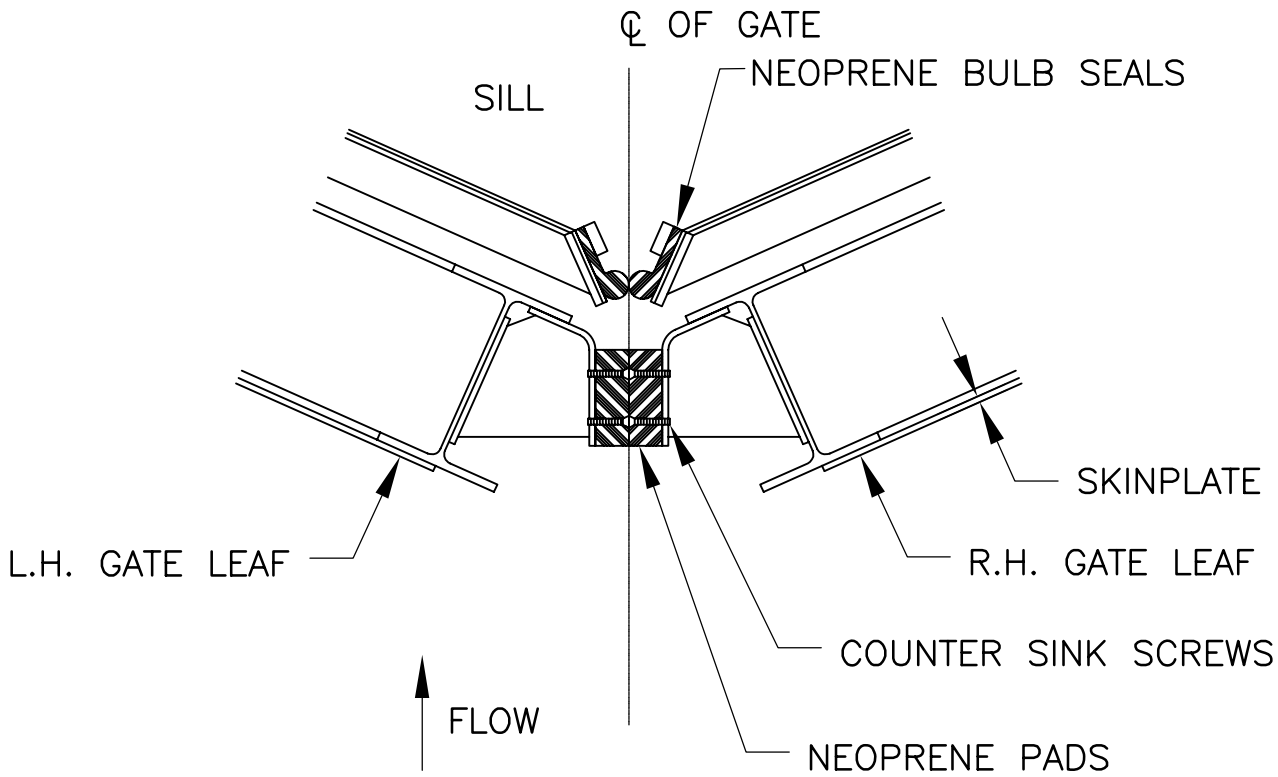
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN

SAMUELS AVENUE LOCK
MITER GATE
TORQUE ARM ASSEMBLY

DATE NOV 2007

FIGURE No. C-3



SECTION B–B

US Army Corps of Engineers
Fort Worth District

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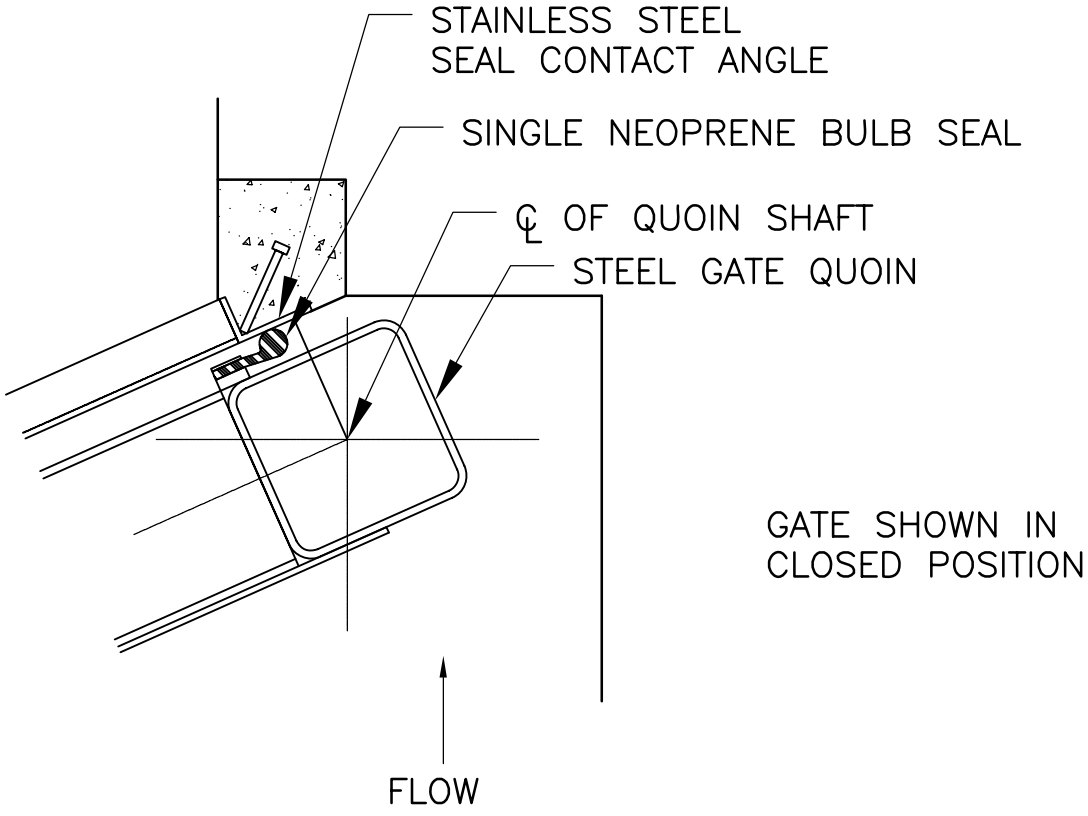
FORT WORTH CENTRAL CITY PRELIMINARY DESIGN

MITER CONTACT DETAIL

DATE NOV 2007

FIGURE No. C-4



SECTION C–C

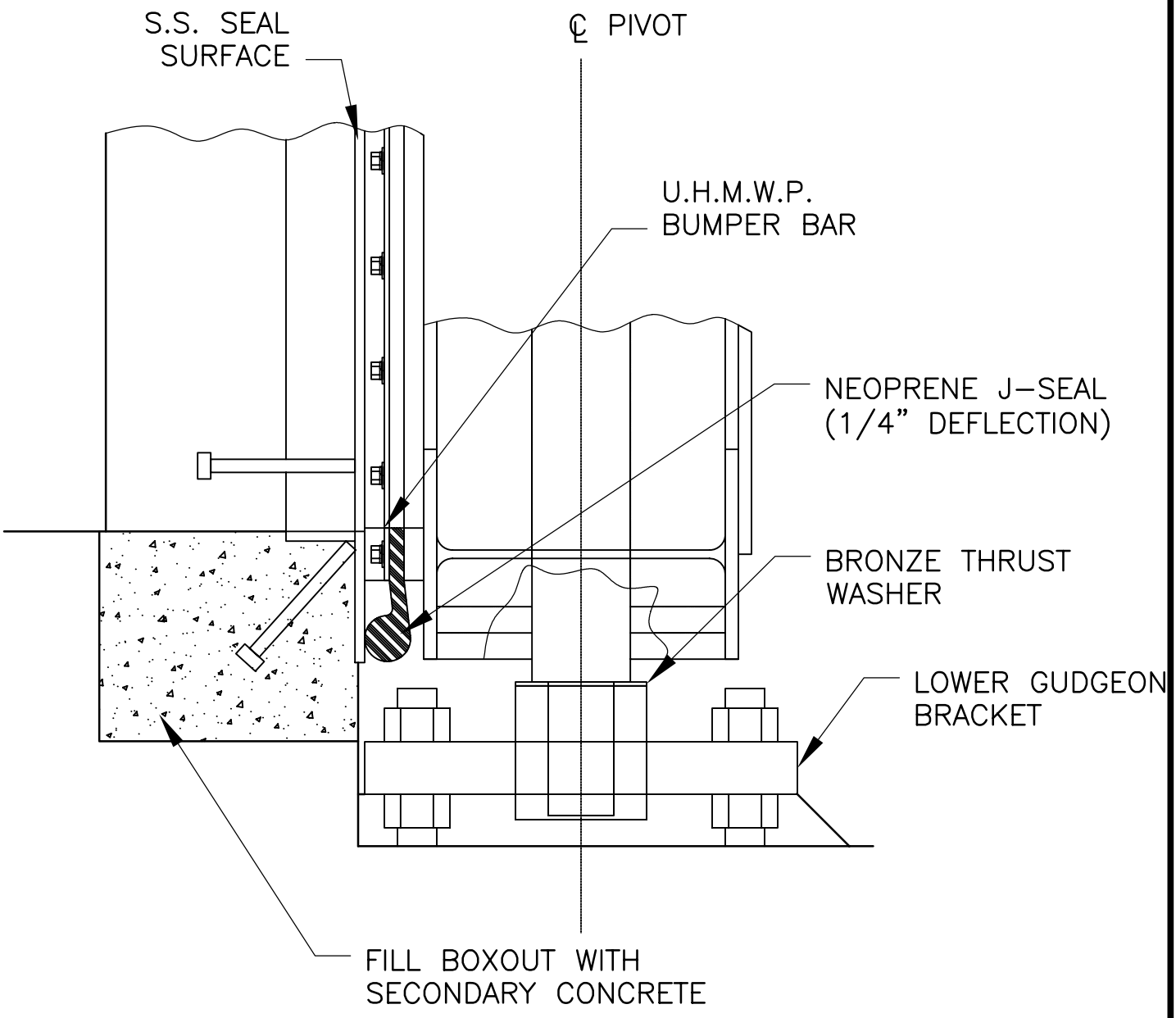
US Army Corps of Engineers
Fort Worth District

CDM

**FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN**

SAMUELS AVENUE LOCK
GATE QUOIN SEAL ASSEMBLY

DATE NOV 2007 | FIGURE No. C-5



SECTION D–D

US Army Corps of Engineers
Fort Worth District

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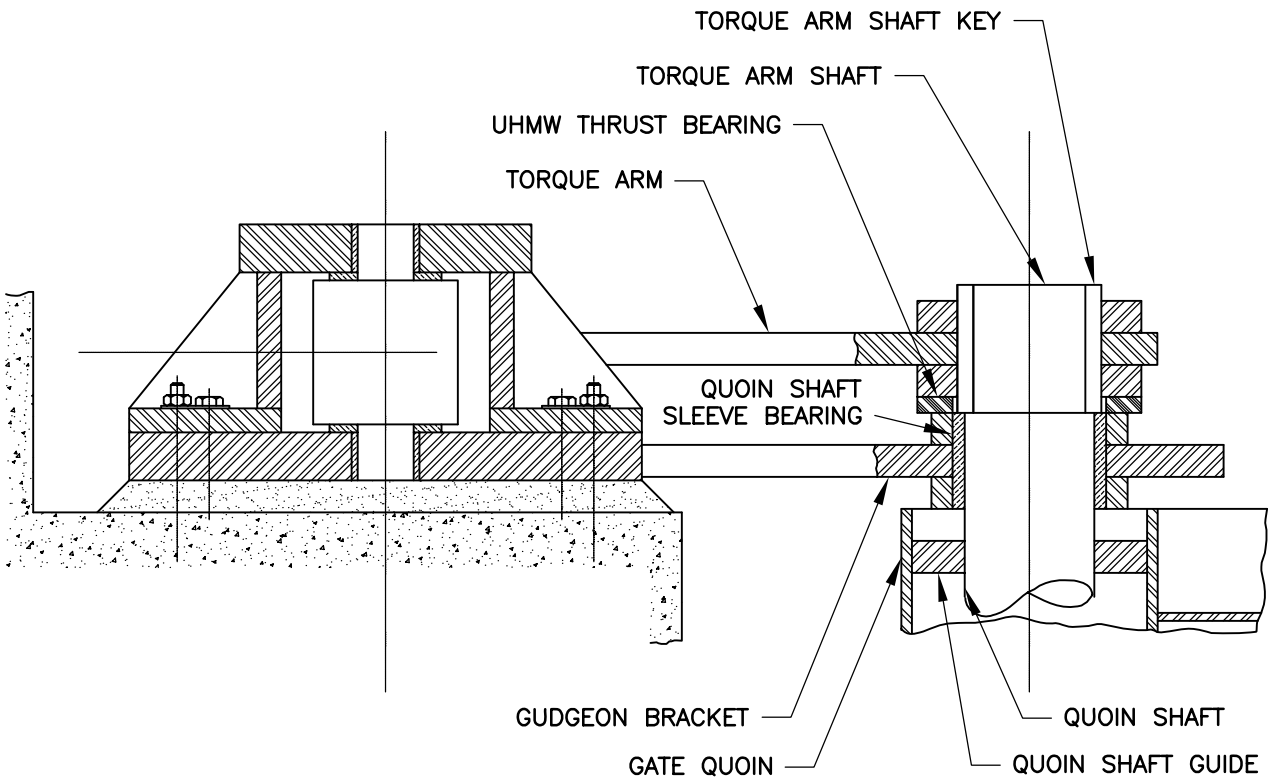
FORT WORTH CENTRAL CITY PRELIMINARY DESIGN

SAMUELS AVENUE LOCK
BOTTOM PIVOT
SHAFT BRACKET

DATE NOV 2007 | FIGURE No. C-6



US Army Corps
of Engineers
Fort Worth District

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN

TORQUE ARM ASSEMBLY AND QUOIN SHAFT BRACKET

DATE NOV 2007

FIGURE No. C-7

FT. WORTH, TEXAS FORT WORTH CENTRAL CITY PRELIMINARY DESIGN SOL. NO. XXXX

PRELIMINARY DESIGN

FORT WORTH CENTRAL CITY

US ARMY CORPS
OF ENGINEERS
Ft. Worth District

FORT WORTH CENTRAL CITY

FORT WORTH, TEXAS

CIVIL / STRUCTURAL PRELIMINARY DESIGN

APPENDIX C

VOLUME II - SUPPLEMENTAL PLANS

MARCH 2008

NOT FOR CONSTRUCTION

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CDM

TARRANT REGIONAL WATER DISTRICT

IN ASSOCIATION WITH Freese and Nichols

ARS Engineers, Inc.
5910 N Central Expressway Suite 1000
Dallas, Texas 75206
(214) 739-3152 Fax (214) 739-3169

FORT WORTH, TEXAS SOL. NO. XXXX CONTR. NO. XXXXX

SHEET LIST

Sheet Number	File Name	Sheet Title 1	Sheet Title 2	Sheet Title 3
G-01	00001_COE_G-001xx01			
GI-01	00001_COE_GI-001xx02	Drawing Index		
GI-02	00001_COE_GI-002xx03	Vicinity and Location Map		
CS-01	00001_COE_CS-101xx04	Valley Storage Mitigation	Key Plan	
CG-01	07040_COE_CG-101xx05	Valley Storage Mitigation	Site Plan	Rockwood Park - West (Site 2)
CG-02	07040_COE_CG-102xx06	Valley Storage Mitigation	Grading Plan	Rockwood Park - West (Site 2)
CG-03	07040_COE_CG-303xx07	Valley Storage Mitigation	Cross Sections	Rockwood Park - West (Site 2)
CG-04	07030_COE_CG-104xx08	Valley Storage Mitigation	Site Plan	Samuels Avenue (Site 5A)
CG-05	07030_COE_CG-105xx09	Valley Storage Mitigation	Site Plan	Samuels Avenue (Site 5C)
CG-06	07030_COE_CG-106xx10	Valley Storage Mitigation	Grading Plan	Samuels Avenue (Site 5A)
CG-07	07030_COE_CG-107xx11	Valley Storage Mitigation	Grading Plan	Samuels Avenue (Site 5C)
CG-08	07030_COE_CG-308xx12	Valley Storage Mitigation	Cross Sections	Samuels Avenue (Site 5A & 5C)
CG-09	07020_COE_CG-109xx13	Valley Storage Mitigation	Site Plan	Riverside Park (Site 21)
CG-10	07020_COE_CG-110xx14	Valley Storage Mitigation	Grading Plan	Riverside Park (Site 21)
CG-11	07020_COE_CG-311xx15	Valley Storage Mitigation	Cross Sections	Riverside Park (Site 21)
CG-12	07010_COE_CG-112xx16	Valley Storage Mitigation	Site Plan	Ham Branch
CG-13	07010_COE_CG-113xx17	Valley Storage Mitigation	Site Plan	Ham Branch
CG-14	07010_COE_CG-114xx18	Valley Storage Mitigation	Grading Plan	Ham Branch
CG-15	07010_COE_CG-115xx19	Valley Storage Mitigation	Grading Plan	Ham Branch
CG-16	07010_COE_CG-316xx20	Valley Storage Mitigation	Cross Sections	Ham Branch
CG-17	07010_COE_CG-317xx21	Valley Storage Mitigation	Profile	Ham Branch
CG-18	00001_COE_CG-118xx22	Valley Storage Mitigation	Site Plan	OxBow-Gateway Site
CG-19	00001_COE_CG-119xx23	Valley Storage Mitigation	Riverside Oxbow Enlarged Plan	OxBow-Gateway Site
CG-20	00001_COE_CG-120xx24	Valley Storage Mitigation	Gateway Park Enlarged Plan	OxBow-Gateway Site
CG-21	00001_COE_CG-121xx25	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-22	00001_COE_CG-122xx26	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-23	00001_COE_CG-123xx27	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-24	00001_COE_CG-124xx28	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-25	00001_COE_CG-125xx29	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-26	00001_COE_CG-126xx30	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-27	00001_COE_CG-127xx31	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-28	00001_COE_CG-128xx32	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-29	00001_COE_CG-129xx33	Valley Storage Mitigation	Grading Plan	OxBow-Gateway Site
CG-30	00001_COE_CG-330xx34	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CG-31	00001_COE_CG-331xx35	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CG-32	00001_COE_CG-332xx36	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CG-33	00001_COE_CG-333xx37	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CG-34	00001_COE_CG-334xx38	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CG-35	00001_COE_CG-335xx39	Valley Storage Mitigation	Cross Sections	OxBow-Gateway Site
CP-01	00001_COE_CP-101xx40	Valley Storage Mitigation	Plan and Profile	Beach Street
CP-02	00001_COE_CP-102xx41	Valley Storage Mitigation	Plan and Profile	West Park Road
CP-03	00001_COE_CP-103xx42	Valley Storage Mitigation	Plan and Profile	West Park Road
CP-04	00001_COE_CP-104xx43	Valley Storage Mitigation	Plan and Profile	West Park Road Spur
CP-05	00001_COE_CP-105xx44	Valley Storage Mitigation	Plan and Profile	East Park Road
CP-06	00001_COE_CP-306xx45	Valley Storage Mitigation	Typical Pavement Sections	
CU-01	00001_COE_CU-101xx46	Valley Storage Mitigation	Utility Key Plan	Oxbow-Gateway Site
CU-02	00001_COE_CU-102xx47	Valley Storage Mitigation	Utility Plan	Oxbow-Gateway Site
CU-03	00001_COE_CU-103xx48	Valley Storage Mitigation	Utility Plan	Oxbow-Gateway Site
CU-04	00001_COE_CU-104xx49	Valley Storage Mitigation	Utility Plan	Oxbow-Gateway Site
CU-05	00001_COE_CU-105xx50	Valley Storage Mitigation	Utility Plan	Oxbow-Gateway Site
SS-01	00001_COE_SS-101xx51	Samuels Avenue Dam	Samuels Avenue Lock & Dam	Site Plan
SS-02	00001_COE_SS-102xx52	Samuels Avenue Dam	Samuels Avenue Lock & Dam	Phasing Plan
SS-03	00001_COE_SS-403xx53	Samuels Avenue Dam	Plan	
SS-04	00001_COE_SS-304xx54	Samuels Avenue Dam	Section and Elevation	
SS-05	00001_COE_SS-605xx55	Samuels Avenue Dam	Stability Analysis	
SS-06	00001_COE_SS-606xx56	Samuels Avenue Dam	Training Walls and Right Abutment Wall	Dimensions
SS-07	00001_COE_SS-607xx57	Samuels Avenue Dam	Right Training Wall	Stability Analysis
SS-08	00001_COE_SS-608xx58	Samuels Avenue Dam	Left Training Wall	Stability Analysis
SS-09	00001_COE_SS-609xx59	Samuels Avenue Dam	Right Abutment Wall	Stability Analysis
SS-10	00001_COE_SS-410xx60	Samuels Avenue Dam	Lock	Plan and Section
SS-11	00001_COE_SS-611xx61	Samuels Avenue Dam	Upstream, Downstream and Floodwalls	Dimensions
SS-12	00001_COE_SS-612xx62	Samuels Avenue Dam	Upstream Lockwall	Rotational and Stability Analysis
SS-13	00001_COE_SS-613xx63	Samuels Avenue Dam	Downstream Lockwall	Rotational and Stability Analysis
SS-14	00001_COE_SS-614xx64	Samuels Avenue Dam	Floodwall	Rotational and Stability Analysis
SS-15	00001_COE_SS-415xx65	Marine Creek Dam	Plan	
SS-16	00001_COE_SS-316xx66	Marine Creek Dam	Section	
SS-17	00001_COE_SS-617xx67	Marine Creek Dam	Stability Analysis	
SS-18	00001_COE_SS-618xx68	Marine Creek Dam	Left Training Wall	Dimensions
SS-19	00001_COE_SS-619xx69	Marine Creek Dam	Left Training Wall	Rotational and Stability Analysis
SS-20	00001_COE_SS-620xx70	Marine Creek Dam	Abutment Walls	Dimensions
SS-21	00001_COE_SS-621xx71	Marine Creek Dam	Left Abutment Wall	Stability Analysis
SS-22	00001_COE_SS-622xx72	Marine Creek Dam	Right Abutment Wall	Rotational Analysis

REFERENCE SHEETS

Sheet Number	Sheet Title 1	Sheet Title 2	Sheet Title 3
RS-01		Beach Street	Elevation
RS-02		Beach Street	Plan
RS-03		Beach Street	Slab
RS-04		Beach Street	Abutment
RS-05		Beach Street	I-Beam
RS-06		Park Road	Elevation
RS-07		Park Road	Plan
RS-08		Park Road	Slab
RS-09		Park Road	Abutment
RS-10		Park Road	I-Beam

US Army Corps of Engineers
Fort Worth District

No.	Description	Date	App'd

CDM

Design file: Datafile
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: ANDREE
Drawn by: JONES
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
LicenseState: PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
DRAWING INDEX

SheetDescription3

SHEET IDENTIFICATION

GI-01

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BASE TOPOGRAPHIC AND FEATURE MAPPING AS SHOWN IS FROM DATA CD PROVIDED BY THE TARRANT REGIONAL WATER DISTRICT ON SEPTEMBER 10, 2004 AS USED FOR THE FORT WORTH CENTRAL CITY FINAL ENVIRONMENTAL IMPACT STATEMENT, PRELIMINARY DESIGN. DATA IS DERIVED FROM MAPPING DATA COMPLIED FROM 1"=800' AERIAL PHOTOGRAPHY OBTAINED ON FEBRUARY 22 AND 23, 1991 AS PREPARED BY GREENHORNE & O'MARA, INC (DULUTH, GA) FOR USACE AND SUBSEQUENTLY UPDATED BY THE TARRANT REGIONAL WATER DISTRICT.

COORDINATE BASIS IS TEXAS STATE PLANE GRID, ZONE 5351 FPS 4202, TEXAS NORTH CENTRAL (FEET), HORIZONTAL CONTROL BASED ON NAD83, AND VERTICAL CONTROL BASED ON NAD 1929.

SAMUELS AVENUE DAM

SAMUELS AVENUE VALLEY STORAGE SITES

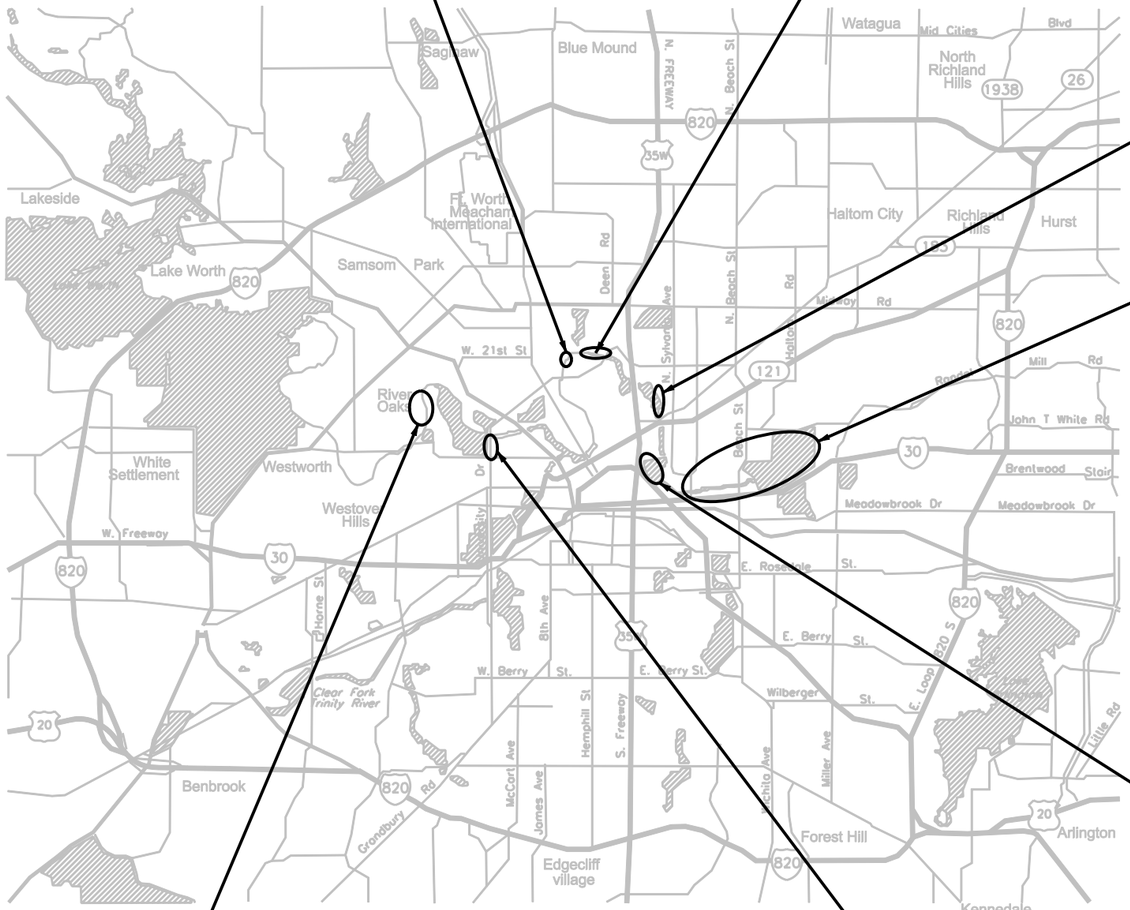
RIVERSIDE PARK VALLEY STORAGE SITE

RIVERSIDE OXBOW / GATEWAY PARK ECOSYSTEM RESTORATION AND VALLEY STORAGE SITE

HAM BRANCH VALLEY STORAGE SITE

ROCKWOOD PARK – WEST VALLEY STORAGE SITE

UNIVERSITY DRIVE VALLEY STORAGE SITE (REFER TO CENTRAL CITY FEIS)



VICINITY MAP
NTS

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US Army Corps of Engineers
Fort Worth District

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FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VICINITY AND LOCATION MAP

SHEET IDENTIFICATION

GI-2

N

0 1500' 3000'

SCALE: 1" = 1500'

SAMUELS AVENUE NORTH SITE

CG-04/ 06

SAMUELS AVENUE LOCK AND DAM

SS-01

CG-05/ 07

SAMUELS AVENUE SOUTH SITE

I-35

ROCKWOOD WEST SITE

CG-01/ 02

JACKSBORO HWY

MAIN ST

RIVERSIDE PARK SITE

CG-09/ 10

BEACH STREET

EAST 1ST STREET

CG-25

HAM BRANCH SITE

CG-12/ 14

CG-13/ 15

CG-21

CG-23

CG-26

CG-28

CG-22

CG-24

CG-27

CG-29

I-30

RIVERSIDE OXBOW / GATEWAY PARK SITE

WHITE SETTLEMENT RD

UNIVERSITY DRIVE

WHITE SETTLEMENT RD

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appd

Design File: Usagphs
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: MARSON
Drawn by: D. FUNDERLIC
Checked by: D. FUNDERLIC
Responsible P.E.: PERespondsible
License Number: PELicenseNum
License/State: PEState

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
KEY PLAN

SHEET IDENTIFICATION

CS-01

NOTE

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

END EXISTING PIPE FENCE REMOVAL AND REPLACEMENT

EXISTING 36" SANITARY SEWER

NEW MAINTENANCE/ RECREATION TRAIL

END NEW MAINTENANCE/ RECREATION TRAIL

EXISTING TRAIL TO REMAIN

EXISTING 36" SANITARY SEWER

30' MIN. TRAIL/ MAINT. ACCESS

BEGIN EXISTING PIPE FENCE REMOVAL AND REPLACEMENT

BEGIN NEW MAINTENANCE/ RECREATION TRAIL

0 100' 200'

SCALE:1"=100'

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US Army Corps of Engineers Fort Worth District

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ARS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
ROCKWOOD PARK - WEST (SITE 2)

SHEET IDENTIFICATION

CG-01

10' MIN SETBACK TOP OF CUT TO C.L. OF EXISTING 36" SEWER

530

3H:1V CUT SLOPE

13 CG-03

STA 2715+00

10' MIN SETBACK TOP OF CUT TO C.L. OF EXISTING 36" SEWER

530

3H:1V CUT SLOPE

14 CG-03

340

530

GRADING LIMITS CUT TO 526 AT BANK

STA 2720+00

3H:1V CUT SLOPE

15 CG-03

340

530

STA 2724+00

END PROPOSED CUT SLOPE

GRADING LIMITS CUT TO 526 AT BANK

STA 2705+00

12 CG-03

530

11 CG-03

530

STA 2701+40

END PROPOSED CUT SLOPE

0 100' 200'

SCALE:1"=100'

US Army Corps of Engineers Fort Worth District

No.	Description	Date	App'd

CDM

ARS Engineers Inc.

Design File: W900_CPW_CG-10150	
Set ID:	Set0
Size:	ANSI D
Plot date:	Plotdate
Designed by: C. PAUL	
Drawn by: C. PAUL	
Checked by: C. PAUL	
Responsible P.E.: B. McDANIEL	
License Number:	46339
License State:	TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
ROCKWOOD PARK - WEST (SITE 2)

SHEET IDENTIFICATION

CG-02

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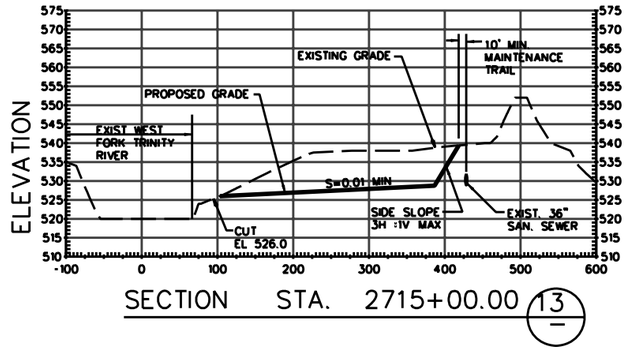

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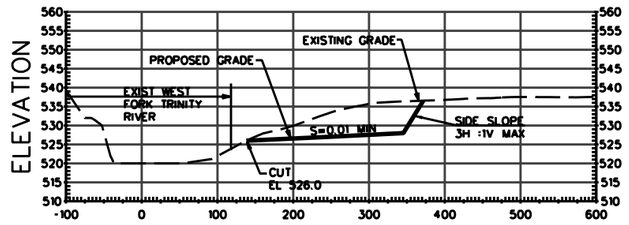

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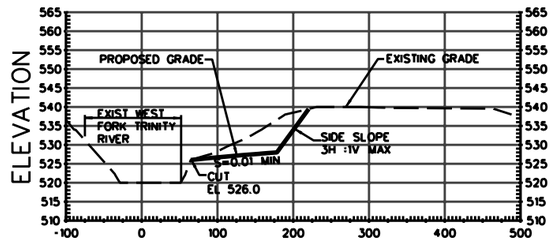

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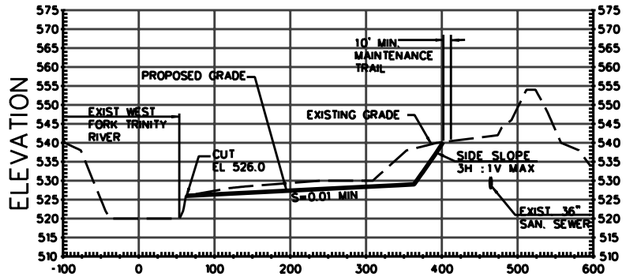
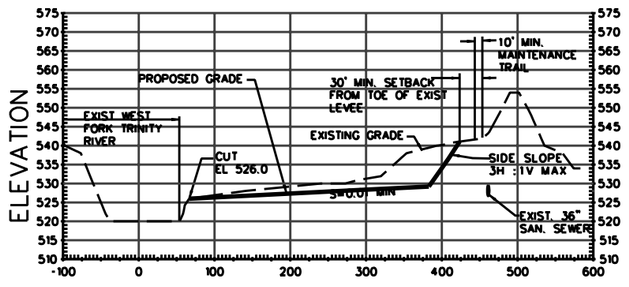


SECTION STA. 2724+00.00 (15)



SECTION STA. 2720+00.00 (14)

0 100' 200'

SCALE
HORIZ: 1"=100'
VERT: 1"=20'

SITE 2

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US Army Corps of Engineers
Fort Worth District

Mark	Date	Description

Design file: Datapha
Set ID: SetID
Size: ANSI D
Plot date: Plotdate
Designed by: C. Paul
Drawn by: C. Paul
Checked by: C. Paul
Responsible P.E.: Brian A. McDaniel
License Number: 46339
License State: TEXAS

CDM

ARS Engineers, Inc.

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
ROCKWOOD WEST PARK (SITE 2)

SHEET IDENTIFICATION

CG-03

NOTE

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

N

0 100' 200'

SCALE:1"=100'

EXIST 42" SANITARY SEWER

M-106R 42"

TRAIL DRIVERS PARK

EXISTING 8" SANITARY SEWER

M-122 B

M-122 B

M-106R 42"

PROP LINE

AREA U/C

SPOILS DISPOSAL AREA

M-106R 42"

EXISTING 42" SANITARY SEWER

PROP LINE

TANK

PROP LINE

SPOILS DISPOSAL AREA

PRESERVE EXISTING VEGETATION

PROP LINE

EXISTING UNKNOWN SANITARY OR STORM SEWER 6'X6'X7'H CONCRETE MANHOLE STRUCTURE

PROP LINE

PROP LINE

PROP LINE

EXISTING OUTFALL TO REMAIN

PROP LINE

PROP LINE

PROPOSED CONC. DRAINAGE

PROP LINE

PROPOSED MAINTENANCE/ RECREATION TRAIL

WEST FORK TRINITY RIVER

PROP LINE

EXISTING AREA DRAIN TO BE REMOVED

AREA DRAIN TO BE REMOVED

TRAIL

EXISTING ROCK MONUMENT TO BE RELOCATED

SEE SHEET CG-05 FOR CONTINUATION BELOW

M-119R 18"

ROW

ROW

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US Army Corps of Engineers Fort Worth District

No.	Description	Date	App'd

Design File: D:\00_CFW_CIP\101520_Samuels\Civil\Sheets\CG-04.dgn
Set ID: SamID
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: B. McDANIEL
License Number: 46339
License State: TEXAS

CDM

ARS Engineers, Inc.

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
SAMUELS AVENUE (SITE 5A)

SHEET IDENTIFICATION

CG-04

NOTE

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PROPOSED CONC. DRAINAGE

SEE SHEET CG-04 FOR CONTINUATION ABOVE

PROPOSED MAINTENANCE/ RECREATION TRAIL

PROP LINE

EXISTING AREA DRAIN TO BE REMOVED

AREA DRAIN TO BE REMOVED

WEST FORK TRINITY RIVER

EXISTING ROCK MONUMENT TO BE RELOCATED

END PROPOSED MAINTENANCE/ RECREATION TRAIL

EXISTING OVERHEAD ELECTRIC TRANSMISSION LINES

EXISTING HEADWALL TO BE REMOVED

BEGIN PROPOSED MAINTENANCE/ RECREATION TRAIL

EXISTING BUILDING TO BE REMOVED (BY OTHERS)

EXISTING 18" SANITARY SEWER

CITY AUTO POUND

SPOILS DISPOSAL AREA

ROW

TRAIL

UNION PACIFIC

ATCHISON TOPEKA AND SANTA FE

BURLINGTON NORTHERN

SAMUELS AVE

E NORTHSIDE DR

N

0 100' 200'

SCALE:1"=100'

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US Army Corps of Engineers Fort Worth District

CDM

ARS Engineers, Inc.

Design File: 07000_CHK_SDP-101.dgn
Set ID: SetID
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: B. MCDANIEL
License Number: 46339
Issued/Seals: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
SAMUELS AVENUE (SITE 5C)

SHEET IDENTIFICATION

CG-05

NOTE

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

N

0 100' 200'

SCALE:1"=100'

US Army Corps of Engineers
Fort Worth District

3H:1V FILL SLOPE

SPOILS DISPOSAL AREA
FILL TO EL 572
GRADE AT 1% TO PROVIDE DRAINAGE

AREA U/C

3H:1V FILL SLOPE

SPOILS DISPOSAL AREA
FILL TO EL 572
GRADE AT 1% TO PROVIDE DRAINAGE

3H:1V FILL SLOPE

3H:1V CUT SLOPE

GRADING LIMITS CUT TO EL 502 AT BANK

STA 2415+00

STA 2407+25

STA 2400+00

STA 2395+00

STA 2412+00

3H:1V CUT SLOPE

GRADING LIMITS CUT TO EL 502 AT BANK

3H :1V CUT SLOPE

GRADING LIMITS CUT TO EL 502 AT BANK

3H :1V CUT SLOPE

TRAIL DRIVERS PARK

WEST FORK TRINITY RIVER

TANK

SEE SHEET CG-07 FOR CONTINUATION BELOW

NOT FOR CONSTRUCTION

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CDM

ARS Engineers, Inc.

Design File: 07030_CFW_CG-106xx
Set ID: SetID
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: R. PAUL
Checked by: C. PAUL
Responsible P.E.: B. McDANIEL
License Number: 46339
Home State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
SAMUELS AVENUE (SITE 5A)

SHEET IDENTIFICATION

CG-06

...\ARS\07030_CFW_CG-106xx06.dgn 3/8/2008 2:31:10 PM

NOTE

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

SEE SHEET CG-06 FOR CONTINUATION ABOVE

N

0 100' 200'

SCALE:1"=100'

WEST FORK TRINITY RIVER

STA 2412+00

STA 2400+00

STA 2395+00

STA 2392+00

3H :1V CUT SLOPE

GRADING LIMITS CUT TO EL 502 AT BANK

3:1 CUT SLOPE

50' MIN. SETBACK TO TOP OF CUT

EXISTING OVERHEAD POWER LINES

ACCESS RAMP

3H:1V FILL SLOPE

SPOILS DISPOSAL AREA
FILL TO EL 544 TO EL 550

510

520

530

540

550

TRAIL

NORTH PARK DR

NE 17TH ST

NE 28TH ST

E NORTHSIDE DR

GOLD SPRINGS RD

CHICAGO, ROCK ISLAND & GULF RAILROAD

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

CDM

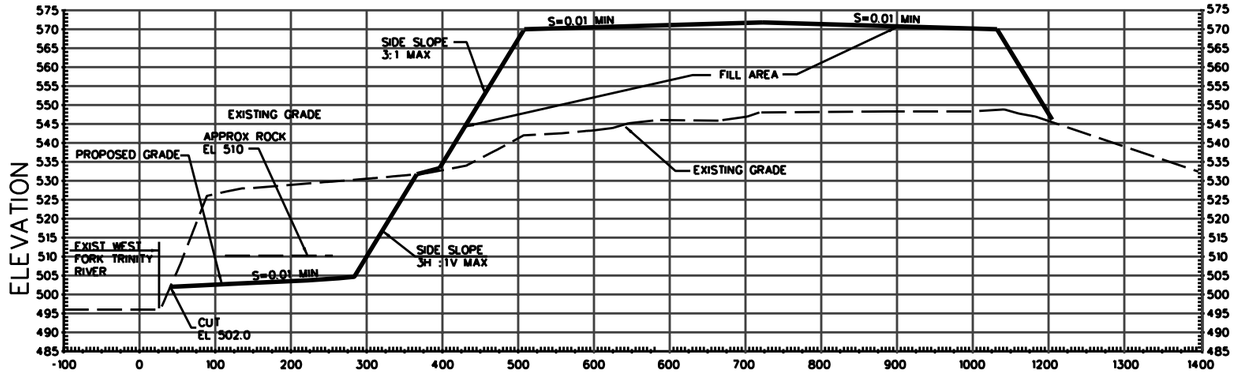
ARS Engineers Inc.

Design File: 01300-CH_ACP-101.DGN
Set ID: SetID
Size: ANSI D
Plot date: PlotDate
Designed by C. PAUL
Drawn by C. PAUL
Checked by C. PAUL
Responsible P.E.: B. MCDANIEL
License Number: 46339
Licensed State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
SAMUELS AVENUE (SITE 5C)

SHEET IDENTIFICATION

CG-07



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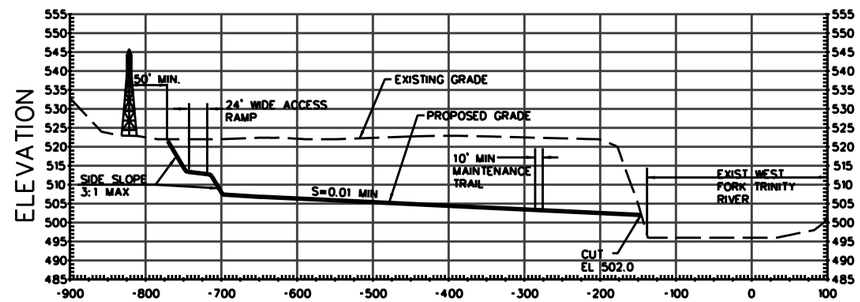

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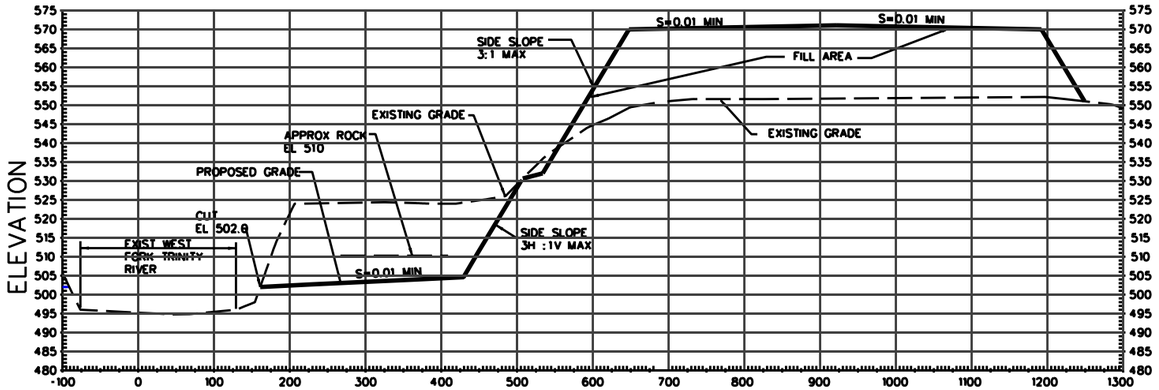

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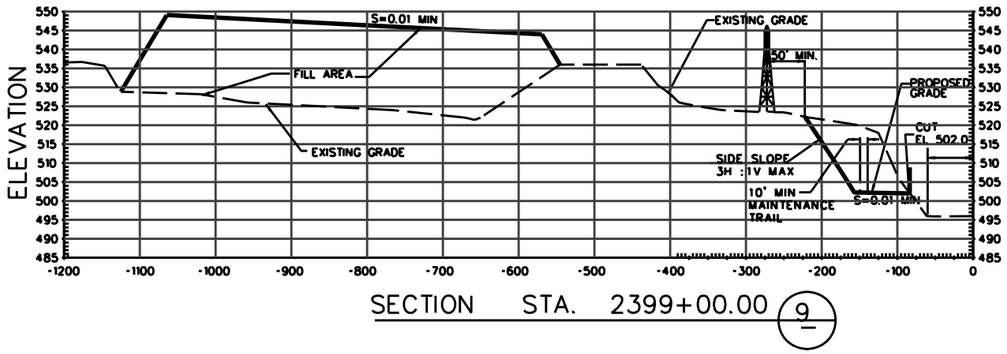

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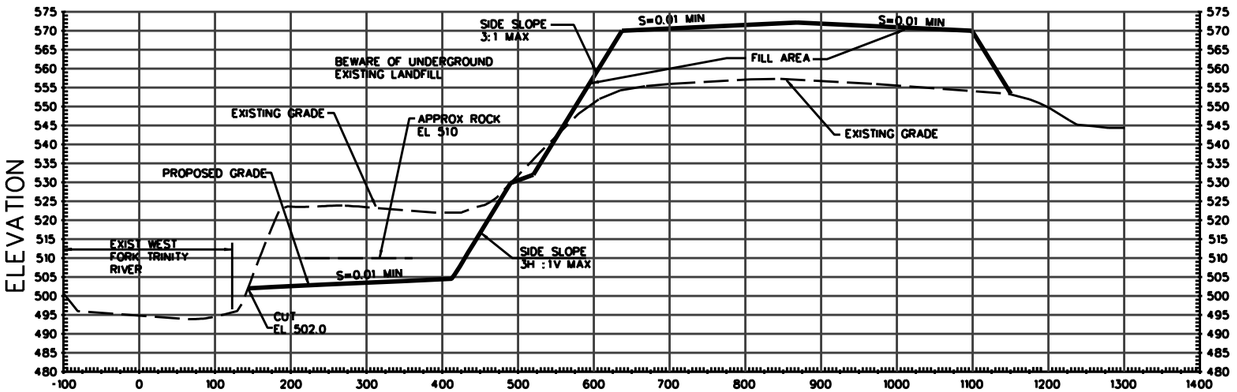

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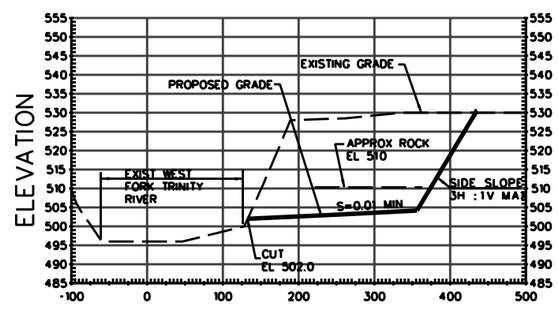

SECTION STA. 2415+00.00 (8)

SITE 5a / 5c

0 100' 200'

SCALE
HORIZ: 1"=100'
VERT: 1"=20'

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

CDM

ARS Engineers, Inc.

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
SAMUELS AVENUE (SITE 5A & 5C)

SHEET IDENTIFICATION
CG-08

...\ARS\07030_CFW_CG-108xx08.dgn 3/8/2008 2:35:06 PM

NOTE

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

END PROPOSED MAINTENANCE/ RECREATION TRAIL

RELOCATED SOCCER FIELD

EXIST CULVERT AND HEADWALLS TO REMAIN PROTECT IN PLACE

EXIST ONE TRANSMISSION POLES TO BE RELOCATED / REPLACED AT GRADE

BEGIN RELOCATED 18" SANITARY SEWER CONNECT TO EXISTING 18" SANITARY SEWER

PARKING

EXIST ONE TRANSMISSION POLES TO BE RELOCATED / REPLACED AT GRADE

RELOCATED SOCCER

EXIST CULVERT AND HEADWALLS TO REMAIN PROTECT IN PLACE

PROPOSED PIPE FENCE

PROPOSED MAINTENANCE/ RECREATION TRAIL

24"X 24" STORM SEWER INLET TO BE RELOCATED TO FINISHED GRADE

RELOCATED BALL FIELD

RELOCATED 18" SANITARY SEWER

EXISTING 18" SANITARY SEWER TO BE RELOCATED

OPEN SPACE

END REMOVAL EXISTING FENCE

24"X 24" STORM SEWER INLET TO BE REMOVED

EXISTING 36" IN STORM SEWER TO BE REMOVED AND REPLACED

PROPOSED MAINTENANCE/ RECREATION TRAIL

EXISTING BUILDING TO BE RELOCATED BY OTHERS

BEGIN PROPOSED MAINTENANCE/ RECREATION TRAIL

END RELOCATED 18" SANITARY SEWER CONNECT TO EXISTING 18" SANITARY SEWER

BEGIN REMOVAL EXISTING FENCE

N

0 100' 200'

SCALE:1"=100'

NOT FOR CONSTRUCTION

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US Army Corps of Engineers Fort Worth District

CDM

ARS

Design file: 07000_CFW_CG-109xx09
Set ID: SetID
Size: ANSI D
Plot date: PlotDate
Designed by: C. PAUL
Drawn by: A. LEWIS
Checked by: C. PAUL
Responsible P.E.: B. MCDANIEL
License Number: 46339
Licensed State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
RIVERSIDE PARK (SITE 21)

SHEET IDENTIFICATION

CG-09

07020_CFW_CG-109xx09.dgn 11/14/2007 11:10:12 AM

4H :1V CUT SLOPE

MAINTAIN 25' MIN SETBACK TO EXISTING TREES

GRADING LIMITS END CUT SLOPE

SOCCER FIELD CUT TO 510

PARKING CUT TO 506

SOCCER CUT TO 504

BALL FIELD CUT TO 509

OPEN SPACE CUT TO 504

3H :1V CUT SLOPE

PROTECT EXISTING TREES IN PLACE (TYP.)

24' WIDE ACCESS

STA 2330+00

STA2325+00

STA2320+00

STA 2316+00

WEST FORK TRINITY RIVER

RIVERSIDE

DRIVING SCHOOL

BALL FIELD

PLAYGROUND

GREENWAY PARK

TRAIL

PROP LINE

ROW

RACE ST

AKERS ST

MARSHALL ST

ILLIS ST

PARRR ST

US HIGHWAY 377 (E BELKNAP ST)

NORTH FREEWAY SERVICE RD E

HIGHWAY 377 (NORTH FWY)

WEST SCENIC DR

AREA D/C

TRFS-29

N

0 100' 200'

SCALE:1"=100'

US Army Corps of Engineers Fort Worth District

CDM

ARS Engineers Inc.

Design File: 07020_CFW_CG-110xx10.dgn
Set ID: SetID
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Created by: C. PAUL
Responsible P.E.: B. MCDANIEL
License Number: 46339
State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
RIVERSIDE PARK (SITE 21)

SHEET IDENTIFICATION

CG-10

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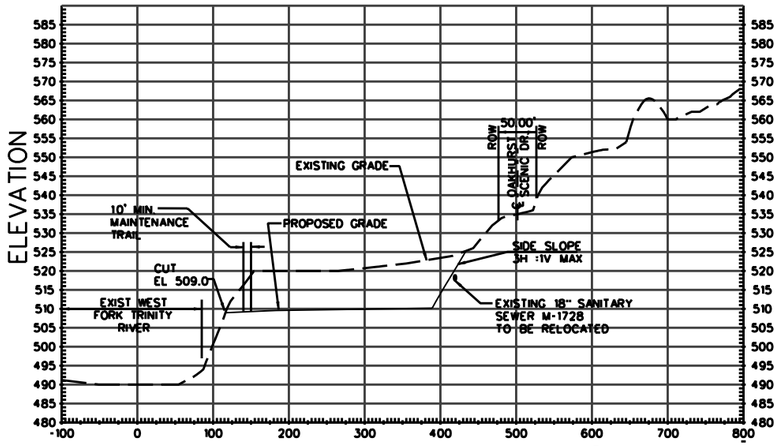

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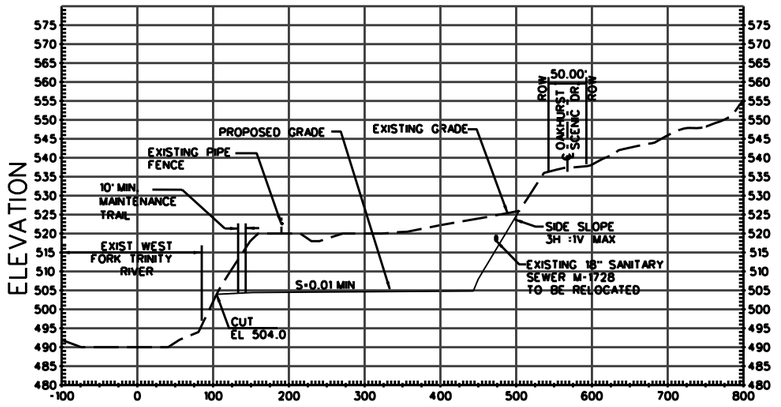

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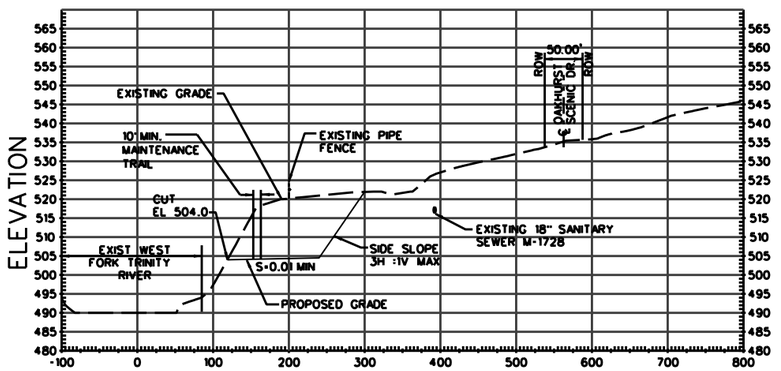

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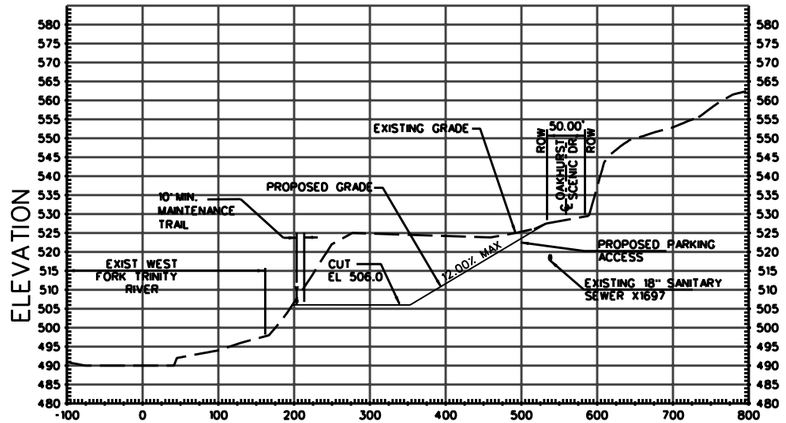
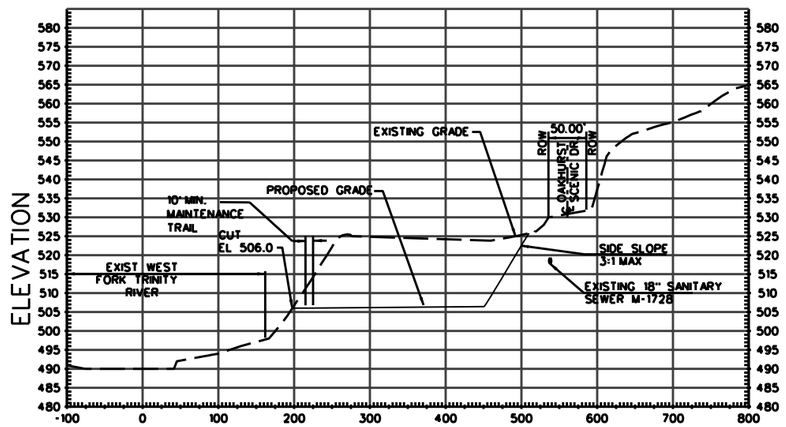


PROFILE PARKING LOT DRIVEWAY



SECTION STA. 2330+00.00 (4)

SITE 21

0 100' 200'

SCALE
HORIZ: 1"=100'
VERT: 1"=20'

US Army Corps of Engineers
Fort Worth District

CDM

ARS Engineers Inc

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
RIVERSIDE PARK (SITE 21)

SHEET IDENTIFICATION
CG-11

NOT FOR CONSTRUCTION

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NOTE

ALL EXISTING SANITARY & STORMWATER SEWER STRUCTURES SUBJECT TO INUNDATION DURING FLOOD STORAGE EVENTS, MUST BE SEALED WITH LOCKING GASKETED COVERS OR EXTENDED ABOVE EL 533.0

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

N

0 100' 200'

SCALE:1"=100'

PC0+00.00

HORIZ. CURVE DATA
R= 560.00
Δ= 28 59'04"
L= 283.29'
T= 144.75

PI1+81.37

HORIZ. CURVE DATA
R= 560.00
Δ= 6 54'27"
L= 67.51'
T= 33.80-'

PCC2+83.29

PRC2+50.80

PI6+34.92

HORIZ. CURVE DATA
R= 580.00
Δ= 52 11'47"
L= 528.38
T= 284.12

PT8+79.18

BEGIN ACCESS ROAD HORIZONTAL & VERTICAL REALIGNMENT

END ACCESS ROAD HORIZONTAL & VERTICAL REALIGNMENT

EXISTING SANITARY SEWER

EXISTING STORM SEWER

EXISTING HIGH PRESSURE GAS MAIN

EXISTING OVERHEAD ELECTRICAL TRANSMISSION LINES

EXISTING SANITARY SEWER STRUCTURES TO BE EXTENDED ABOVE EL.533.0

EXISTING 72" SANITARY SEWER

EXISTING 54" SANITARY SEWER

EXISTING 8" SANITARY SEWER

REMOVE AND REPLACE EXISTING RECREATION/ MAINTENANCE TRAIL

END CUT FOR LEVEE OPENING TOP EL 533.0

384 LF LEVEE OPENING

ROW

PROP LINE

SEE SHEET CG-13 FOR CONTINUATION BELOW

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US Army Corps of Engineers
Fort Worth District

CDM

ARS

Design Ind: Usephne
Set ID: Set0
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: BRIAN A. MCDANIEL
License Number: 46339
Licensed State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
HAM BRANCH (SITE 9)

SHEET IDENTIFICATION

CG-12

07010_CFW_CG-112xx12.dgn 11/14/2007 11:07:22 AM

NOTE

ALL EXISTING SANITARY & STORMWATER SEWER STRUCTURES SUBJECT TO INUNDATION DURING FLOOD STORAGE EVENTS, MUST BE SEALED WITH LOCKING GASKETED COVERS OR EXTENDED ABOVE EL 533.0

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

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SEE SHEET CG-12 FOR CONTINUATION ABOVE

EXISTING 8" SANITARY SEWER

EXISTING HP GAS MAIN

EXISTING 8" SANITARY SEWER

END CUT FOR LEVEE OPENING TOP EL 533.0

REMOVE AND REPLACE EXISTING RECREATION/ MAINTENANCE TRAIL

EXISTING SANITARY SEWER

EXISTING UG COMMUNICATIONS LINE

EXISTING OVERHEAD ELECTRICAL TRANSMISSION LINES

EXISTING SANITARY SEWER

EXISTING SANITARY SEWER

EXISTING SANITARY SEWER STRUCTURES TO BE EXTENDED ABOVE EL.533.0

EXISTING HIGH PRESSURE GAS MAIN

EXISTING RECREATION/ MAINTENANCE TRAIL TO REMAIN

EXISTING HIGH PRESSURE GAS MAIN

EXISTING 72" SANITARY SEWER

EXISTING STORM SEWER

PROP LINE

CARVER JR HIGH SCHOOL

HARMON FIELD PARK

ATHLETIC FIELDS

PLAYGROUND

BASKETBALL COURT

TRAIL

E 12TH ST

E 14TH ST

LUBBOCK AVE

STEPHENSON AVE

SUMMERS AVE

INTERSTATE HIGHWAY 35W (NORTH SOUTH FWY)

NORTH FREEWAY SERVICE RD E

US HIGHWAY 287 (MARTIN LUTHER KING FWY)

N

0 100' 200'

SCALE:1"=100'

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US Army Corps of Engineers Fort Worth District

No.	Description	Date	Appd

Design for: Design
Set ID: Set0
Size: ANSI D
Plot date: Plotdate
Designed by: C. Paul
Drawn by: C. Paul
Checked by: C. Paul
Responsible P.E.: BRIAN A. McDANIEL
License Number: 46339
LicenseState: TEXAS

CDM

ARS Engineers Inc.
3001 S Cooper Highway, Suite 100
Arlington, Texas 76015-3744
(817) 784-7474 Fax (817) 784-7444

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CIVIL SITE PLAN
HAM BRANCH (SIRE 9)

SHEET IDENTIFICATION

CG-13

BEGIN ACCESS ROAD HORIZONTAL & VERTICAL REALIGNMENT

END NEW LEVEE CONSTRUCTION EL 534.0

NEW LEVEE LOCATION MIN ELEVATION 534.00

15' MIN.

3H :1V FILL SLOPE

BEGIN LEVEE CONSTRUCTION MIN EL. 534.00

SECTION 4/CG-16

SECTION 3/CG-16

SECTION 2/CG-16

SECTION 1/CG-17

BEGIN CUT FOR LEVEE OPENING TOP EL 533.0

END CUT FOR LEVEE OPENING TOP EL 533.0

484 LF LEVEE OPENING

FL 524.0

SEE SHEET CG-15 FOR CONTINUATION BELOW

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N

0 100' 200'

SCALE:1"=100'

US Army Corps of Engineers Fort Worth District

Design Ref: Usgsphs
Set ID: Set0
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: BRIAN A. MCDANIEL
License Number: 46339
Licensed State: TEXAS

CDM

ARS Engineers, Inc.

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
HAM BRANCH

SHEET IDENTIFICATION

CG-14

NOTE

ALL EXISTING SANITARY & STORMWATER SEWER STRUCTURES SUBJECT TO INUNDATION DURING FLOOD STORAGE EVENTS, MUST BE SEALED WITH LOCKING GASKETED COVERS OR EXTENDED ABOVE EL 533.0

UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

SEE SHEET CG-14 FOR CONTINUATION ABOVE

N

0 100' 200'

SCALE:1"=100'

EXISTING 8" SANITARY SEWER

EXISTING HP GAS MAIN

EXISTING 8" SANITARY SEWER

END CUT FOR LEVEE OPENING

REMOVE AND REPLACE EXISTING RECREATION/ MAINTENANCE TRAIL

EXISTING SANITARY SEWER

EXISTING UG COMMUNICATIONS LINE

EXISTING OVERHEAD ELECTRICAL TRANSMISSION LINES

EXISTING SANITARY SEWER

EXISTING SANITARY SEWER

EXISTING SANITARY SEWER STRUCTURES TO BE EXTENDED ABOVE EL.533.0

EXISTING HIGH PRESSURE GAS MAIN

EXISTING RECREATION/ MAINTENANCE TRAIL TO REMAIN

EXISTING HIGH PRESSURE GAS MAIN

EXISTING 72" SANITARY SEWER

EXISTING STORM SEWER

ATHLETIC FIELDS

HARMON FIELD PARK

ATHLETIC FIELDS

CARVER JR HIGH SCHOOL

PLAYGROUND

BASKETBALL COURT

PLAYGROUND

BASKETBALL COURT

TRAIL

TRAIL

DAM

PLAYGROUND

E 12TH ST

E 13TH ST

E 14TH ST

LUBELIA ST

STEPHENSON ST

CHAMBERS AV

INTERSTATE HIGHWAY 35W (NORTH SOUTH FWY)

NORTH FREEWAY SERVICE RD E

US HIGHWAY 287 (MARTIN LUTHER KING FWY)

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US Army Corps of Engineers Fort Worth District

No.	Description	Date	Appd.

Design Ind: Geophire
Set ID: Set0
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: BRIAN A. MCDANIEL
License Number: 46339
License State: TEXAS

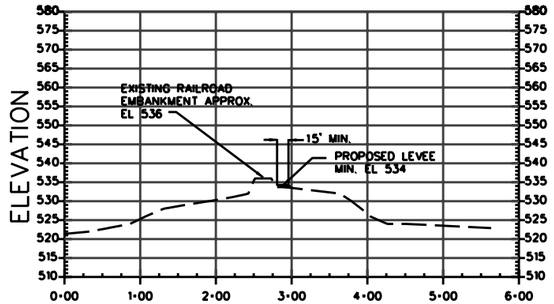
CDM

ARS Engineers, Inc.

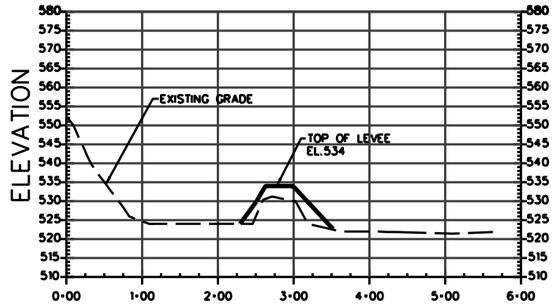
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
HAM BRANCH (SITE 9)

SHEET IDENTIFICATION

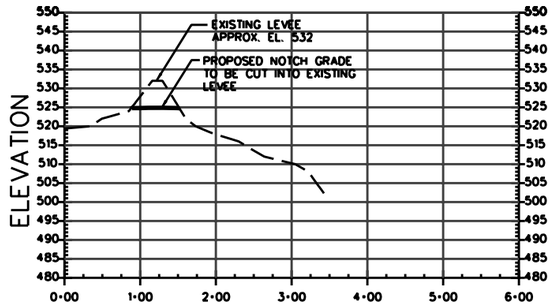
CG-15



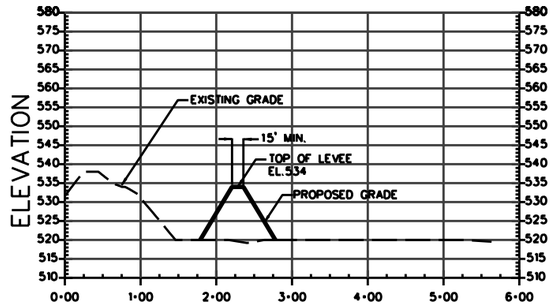
SECTION 2



SECTION 4



SECTION 1



SECTION 3

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

Design file: Designfile
Set ID: SetID
Size: ANSI D
Plot date: Plotdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: BRIAN A. McDANIEL
License Number: 46339
License State: TEXAS

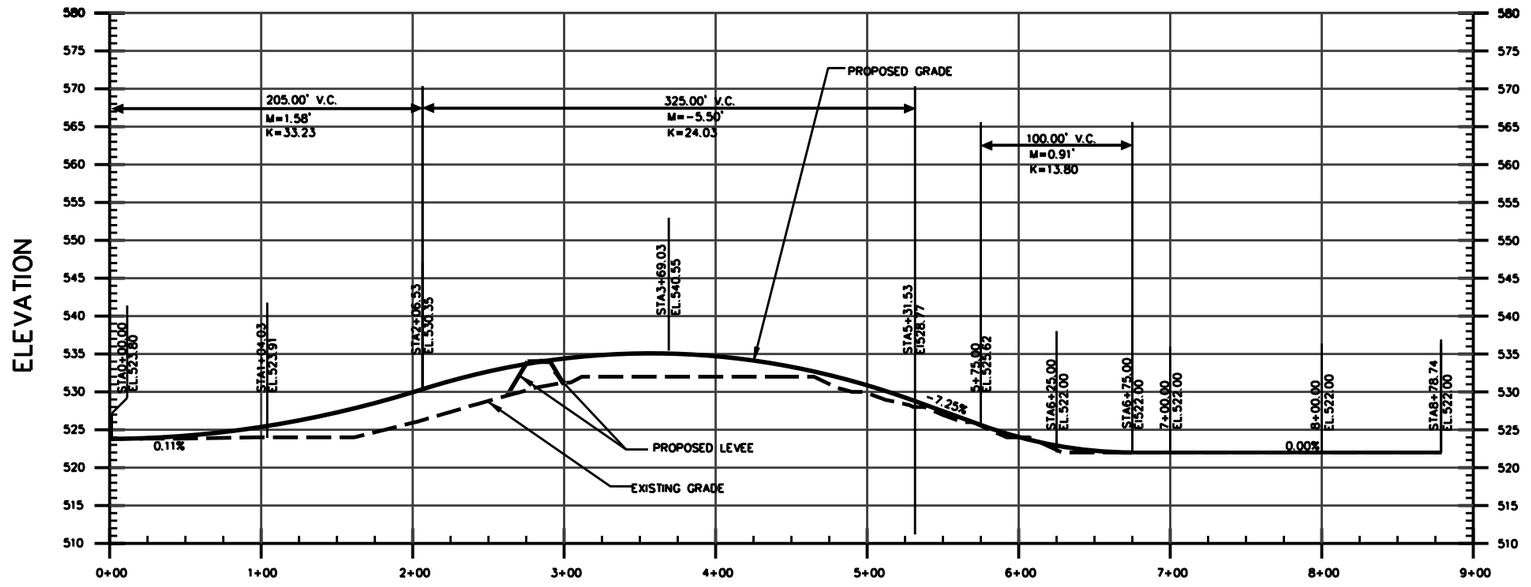
CDM

ARS Engineers, Inc.
3616 S. Cooper Street, Suite 100
Arlington, TX 76015-3906
(817) 795-7711 FAX (817) 795-7744

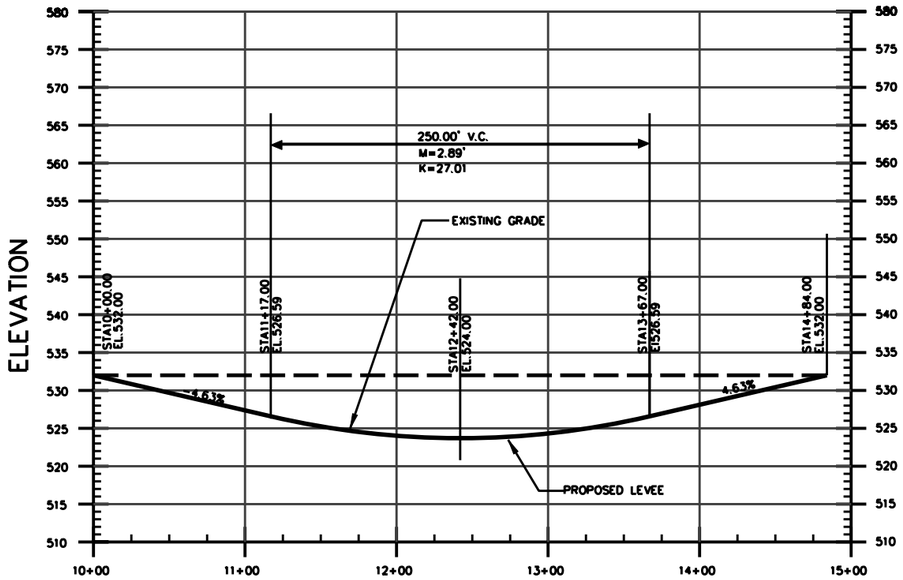
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
HAM BRANCH (SITE 9)

SHEET IDENTIFICATION

CG-16



PROFILE NORTH FREEWAY SERVICE ROAD



PROFILE LEVEE OPENING

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

Design File: Design-a
Set ID: SetID
Size: ANSI D
Proj. date: Projdate
Designed by: C. PAUL
Drawn by: C. PAUL
Checked by: C. PAUL
Responsible P.E.: BRIAN A. MCDANIEL
License Number: 46339
License State: TEXAS

CDM
ARS Engineers, Inc.

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PROFILE
HAM BRANCH (SITE 9)

SHEET IDENTIFICATION

CG-17

GATEWAY PARK ENLARGED SITE PLAN (SEE SHEET CG-20)

RIVERSIDE OXBOW ENLARGED SITE PLAN (SEE SHEET CG-19)

RIVERSIDE OXBOW/GATEWAY PARK SITE BOUNDARY

EAST 1ST STREET

BEACH STREET

RIVERSIDE DRIVE

WEST FORK TRINITY RIVER

SYCAMORE CREEK

I-30

16B 18B 18A 16A 14A 14B 12 10 13 11 15 17

N

0 400' 800'

SCALE:1"=400'

LEGEND

(17) USACE SITE ID NUMBER

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US Army Corps of Engineers Fort Worth District

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
SITE PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-18

Design File Name: Sht1D
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: M. MASON
Drawn by: M. MASON
Checked by: D. FUNDERLIC
Responsible P.E.: PERespons
License Number: PELicenseNum
LicenseState: PEState

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PROPOSED GRADING LIMIT

PROPOSED ROCK WEIR STRUCTURE

PROPOSED FUTURE RECREATIONAL FIELDS

PROPOSED RECREATION FIELDS

PROPOSED CHANNEL LOWERING WITHIN OLD OXBOW CHANNEL

EXISTING PARK ENTRANCE TO BE REMOVED

PROPOSED RECREATION TRAIL

RIVERSIDE OXBOW/GATEWAY PARK SITE BOUNDARY

PROPOSED SPLASH PARK

PROPOSED RESTROOM AND SNACK BAR

PROPOSED BEACH STREET BRIDGE

PROPOSED FUTURE PARKING

PROPOSED EAST PARK ROAD

PROPOSED FUTURE PARKING

PROPOSED CHANNEL LOWERING WITHIN OLD OXBOW CHANNEL

PROPOSED WEST PARK ROAD

PROPOSED BEACH STREET ROADWAY IMPROVEMENTS

PROPOSED PARKING

PROPOSED PARKING

EXISTING PEDESTRIAN BRIDGE

PROPOSED BOAT LAUNCH

PROPOSED MAINTENANCE/ RECREATION TRAIL

PROPOSED PARK ROAD BRIDGE

PROPOSED BASKETBALL COURTS

PROPOSED RECREATION TRAILS

PROPOSED PARKING

PROPOSED BOAT LAUNCH

PROPOSED WEST PARK ROAD SPUR

PROPOSED PARKING

PROPOSED BOAT LAUNCH

PROPOSED ROCK WEIR STRUCTURE

PROPOSED PEDESTRIAN BRIDGE

PROPOSED ROCK WEIR STRUCTURE

PROPOSED ROCK WEIR STRUCTURE

WEST FORK TRINITY RIVER

BEACH ST

EXISTING BEACH STREET LOW WATER DAM

PROPOSED MAINTENANCE/ RECREATION TRAIL

SYCAMORE CREEK

RIVERSIDE DR

EXISTING PEDESTRIAN BRIDGE

I-30

I-30

N

0 200' 400'

SCALE: 1" = 200'

US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.
Symbol			

Design File: Datgfile
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: M. ROBSON
Drawn by: J. HUNSUCKER
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Meters&Bounds: PESeals

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
RIVERSIDE OXBOW ENLARGED PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-19

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PROPOSED GRADING LIMITS

PROPOSED BOAT LAUNCH

EXISTING PEDESTRIAN BRIDGE

PROPOSED ROCK WEIR STRUCTURE

EXISTING PARK ROAD TO BE REMOVED

EXISTING PARK ROAD TO REMAIN

PROPOSED FUTURE EQUESTRIAN PARKING

NO GRADING WORK IN THIS AREA

FUTURE PROPOSED RECREATION FIELDS

EXISTING PARKING

PROPOSED GRADING LIMITS

EXISTING DOG PARK

WEST FORK TRINITY RIVER

PROPOSED EQUESTRIAN TRAILS

EXISTING PARKING

PROPOSED GRADING LIMITS

PROPOSED FUTURE PARKING

EXISTING BALL FIELDS

PROPOSED FUTURE PARK ROAD

PROPOSED WETLAND PONDS (BY OTHERS)

PROPOSED FUTURE PARKING

RIVERSIDE OXBOW/GATEWAY PARK SITE BOUNDARY

PROPOSED RECREATION TRAIL

EXISTING RECREATION FIELDS

EXISTING PARKING

EXISTING RECREATION TRAIL

PROPOSED WETLAND PONDS (BY OTHERS)

0 200' 400'

SCALE: 1" = 200'

US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Approved

CDM

Design File:	Design1a
Set ID:	Set0
Size:	ANSI D
Plot date:	AUGUST 2007
Designed by:	DKLSON
Drawn by:	AKLSON
Checked by:	D. FUNDERLIC
Responsible P.E.:	PEResponsible
License Number:	PELicenseNum
License Seals:	PESeals

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GATEWAY PARK ENLARGED PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-20

NOT FOR CONSTRUCTION

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N

0 100' 200'

SCALE: 1" = 100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

GRADING OFFSET (25 FT MIN TYP.)

APPROXIMATE LOCATION OF EXISTING TREELINE

10H:1V CUT SLOPE

3H:1V CUT SLOPE

RIVERSIDE OXBOW/GATEWAY PARK SITE BOUNDARY

NO GRADING WORK IN THIS AREA

CUT TO ELEVATION 501

PROPOSED RECREATION FIELDS

CUT TO ELEVATION 501

ECOSYSTEM RESTORATION WORK ZONE

PROPOSED CHANNEL LOWERING WITHIN OLD OXBOW CHANNEL (EXTENTS TO BE DETERMINED AFTER FINAL DESIGN SURVEY)

PROPOSED RECREATION TRAIL SEE SHEET CP-01

PROPOSED DRAINAGE SWALE

EXISTING TRAIL TO BE REMOVED

PROPOSED WEST PARK ROAD SEE SHEET CP-02 & 03

PROPOSED COVERED BASKETBALL COURTS

PROPOSED BOAT LAUNCH

FOR CONTINUATION SEE SHEET CG-22

FOR CONTINUATION SEE SHEET CG-23

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US Army Corps of Engineers
Fort Worth District

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-21

RIVERSIDE OXBOW/
GATEWAY PARK
SITE BOUNDARY

ECOSYSTEM RESTORATION
WORK ZONE

PROPOSED RECREATION TRAIL
SEE SHEET CP-01

GRADING OFFSET
(25 FT MIN TYP)

APPROXIMATE LOCATION
OF EXISTING TREELINE

PROPOSED CHANNEL LOWERING
WITHIN OLD OXBOW CHANNEL
(EXTENTS TO BE DETERMINED
AFTER FINAL DESIGN SURVEY)

FOR CONTINUATION SEE SHEET CG-21

PROPOSED PARKING LOT
SEE SHEET CP-01

PROPOSED PREFABRICATED
STEEL PEDESTRIAN BRIDGE
(150LF SPAN)

NOTE:
1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

EXISTING TREES
TO BE PRESERVED

FOR CONTINUATION SEE SHEET CG-24

PROPOSED ROCK
WEIR STRUCTURE

3H:1V CUT SLOPE

5H:1V CUT SLOPE

CUT TO ELEVATION
498 AT BANK

60 INCH

48 INCH

WEST FORK TRINITY RIVER
(NORMAL WSE 492)

EXISTING TREES TO BE
PRESERVED

EXISTING MITIGATION
AREA (NO WORK IN THIS AREA)

PROPOSED MAINTENANCE
RECREATION TRAIL
SEE SHEET CP-01

CUT TO ELEVATION
500 AT BANK

3H:1V CUT SLOPE

EXISTING TRAIL

WEST FORK TRINITY RIVER

RIVERSIDE DR

S SYLVANIA AV

RACETRACK

TRAIL

INTERSTATE HIGHWAY 30 (I.H. 30)

N

0 100' 200'

SCALE: 1" = 100'

US Army Corps
of Engineers
Fort Worth District

No.	Description	Date	Appd.
Symbol			

Design Ind. Usage:	
Set ID:	Set0
Size:	ANSI D
Plot date:	AUGUST 2007
Designed by:	DRAWN
Drawn by:	CHECKED
Checked by:	D. FUNDERLIC
Responsible P.E.:	PERespons ible
License Number:	PELicenseNum
Notes/Sets:	PESets

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET
IDENTIFICATION

CG-22

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PROPOSED ROCK WEIR STRUCTURE

10 CG-34

9 CG-33

RIVERSIDE OXBOW/GATWAY SITE BOUNDARY

APPROXIMATE LOCATION EXISTING TREELINE

PROPOSED CHANNEL LOWERING WITHIN OLD OXBOW CHANNEL (EXTENTS TO BE DETERMINED AFTER FINAL DESIGN SURVYE)

ECOSYSTEM RESTORATION WORK ZONE

GRADING OFFSET (25 FT MIN TYP)

TRIBUTARY WEST FORK TRINITY RIVER (OLD CHANNEL)

PROPOSED FUTURE RECREATION FIELD

FOR CONTINUATION SEE SHEET CG-16

CUT TO ELEVATION 501

CUT TO ELEVATION 507

PROPOSED FUTURE RECREATION FIELDS

GRADING LIMITS

NO WORK IN THIS AREA

5H:1V CUT SLOPE

PROPOSED RESTROOM AND SNACK BAR (EL 514)

PROPOSED RECREATION TRAIL SEE SHEET CP-01

PROPOSED FUTURE PARKING EXPANSION

PROPOSED FUTURE PARKING LOT

PROPOSED PARKING LOT SEE SHEET CP-01

PROPOSED WEST PARK ROAD (SEE CP-03 & 04 FOR PROFILE)

EXISTING TREES TO BE PRESERVED TREE WELLS CONSTRUCTED AS NEEDED (12 TYP)

PROPOSED BEACH STREET ROADWAY IMPROVEMENTS SEE CP-02 FOR PROFILE

PROPOSED MAINTENANCE GATE & PIPE RAIL (40FT EA)

PROPOSED SPLASH PARK (EL 514)

PROPOSED COVERED BASKETBALL COURTS

36 INCH

60 INCH

30 INCH

30 INCH

18 INCH

8 CG-33

3 CG-45

FOR CONTINUATION SEE SHEET CG-24

FOR CONTINUATION SEE SHEET CG-26

POND WE 515.6

POND WE 506.5

AREA U/C

N

0 100' 200'

SCALE: 1" = 100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

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US Army Corps of Engineers
Fort Worth District

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Design File: Design1a
Set ID: Set0
Size: ANSI D
Plot date: AUGUST 2007
Designed by: M. WILSON
Drawn by: M. WILSON
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
LicenseState: PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
GATEWAY-OXBOW SITE

SHEET IDENTIFICATION

CG-23

FOR CONTINUATION SEE SHEET CG-23

PROPOSED WEST PARK ROAD SPUR (SEE PROFILE CP-05)

APPROXIMATE CUT SLOPE

EXISTING TREES TO BE PRESSERVED IN THIS AREA TREE WELLS CONSTRUCTED AS NEEDED (12 TYP)

PROPOSED PARKING LOT SEE DETAIL

8 CG-33 PROPOSED MAINTENANCE/ RECREATION TRAIL SEE SHEET CP-01

PROPOSED BEACH STREET ROADWAY IMPROVMENTS (SEE CP-02 FOR PROFILE)

N

0 100' 200'

SCALE:1"=100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

10 CG-34

9 CG-33

EXISTING TREES TO BE PRESERVED IN THIS AREA TREE WELLS CONSTRUCTED AS NEEDED (TYP 12)

PROPOSED RECREATION TRAIL SEE DETAIL

EXISTING TREE TO BE REMOVED

CUT TO ELEVATION 505

EXISTING OVERHEAD TRANSMISSION TOWER TO REMAIN

FOR CONTINUATION SEE SHEET CG-17

FOR CONTINUATION SEE SHEET CG-27

WEST FORK TRINITY RIVER (NORMAL W.S. EL 492.0)

PROPOSED MAINTAINENCE/ RECREATION TRAIL SEE SHEET CP-01

PROPOSED ROCK WEIR STRUCTURE

PROPOSED PREFABICATED PEDESTRIAN BRIDGE (130FT SPAN)

5H:1V CUT SLOPE

APPROXIMATE LOCATION EXISTING TREELINE

GRADING OFFSET (25 FT MIN TYP)

EXISTING OVERHEAD TRANSMISSION LINE

EXISTING PIPE & RAIL TO BE REMOVED/ REPLACED

RIVERSIDE OXBOW/GATEWAY PARK BOUNDARY

BEACH ST

CUT TO ELEVATION 500 AT BANK

CUT TO ELEVATION 500 AT BANK

SYCAMORE CREEK

PROPOSED MAINTENANCE/ RECREATION TRAIL SEE SHEET CP-01

3H:1V CUT SLOPE

3H:1V CUT SLOPE

I-30

INTERSTATE 30 RAMP

EXISTING PEDESTRIAN BRIDGE

POTENTIAL GAS LINES NATURAL GAS/FUEL LINES IN THIS AREA (SURVEY REQUIRED)

8 CG-33

10 CG-34

9 CG-33

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US Army Corps of Engineers Fort Worth District

No.	Description	Date	Appd.

Design file: Designfile
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: R. HUGHES
Drawn by: Drawnby
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
License State: PEState

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-24

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RIVERSIDE OXBOW/
GATEWAY PARK
SITE BOUNDARY

FILL TO ELEVATION
548

PROPOSED FUTURE
EQUESTRIAN PARKING LOT
SEE SHEET CP-01

APPROXIMATE LOCATION
OF EXISTING TREELINE

PROPOSED EQUESTRIAN TRAIL
SEE SHEET CP-01

GRADING OFFSET (25FT TYP)

CUT TO ELEVATION
500

GRADING LIMITS

CUT SLOPE

CUT SLOPE 5H:1V

NO GRADING WORK
IN THIS AREA

FILL SLOPE 4H:1V

CUT SLOPE 10H:1V

PROPOSED DRAINAGE SWALE

FILL TO
ELEVATION
513.0

FILL TO ELEVATION
548

FOR CONTINUATION SEE SHEET CG-26

EAST FIRST ST

DISPOSAL RD

BEACH ST

POND
WE
497.8

TEST

NOTE:
1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

N

0 100' 200'

SCALE: 1" = 100'

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

CDM

Design Ind: Design
Set ID: Set0
Size: ANSI D
Plot date: AUGUST 2007
Designed by: DESIGN
Drawn by: DRAWN
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Notes/Sheets: PFSheets

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-25

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FOR CONTINUATION SEE SHEET CG-25

FOR CONTINUATION SEE SHEET CG-23

CUT SLOPE 3H:1V

GRADING OFFSET (25FT TYP)

APPROXIMATE LOCATION OF EXISTING TREELINE

NO GRADING WORK IN THIS AREA

CUT TO ELEVATION 500

CUT SLOPE 4H:1V

PROPOSED EQUESTRIAN TRAIL SEE SHEET CP-01

REMOVE EXISTING CULVERT

NO GRADING WORK IN THIS AREA

EXISTING PARK ROAD ENTRANCE TO BE REMOVED

EXISTING TREES TO BE REMOVED FOR ROADWAY

PROPOSED CHANNEL LOWERING WITHIN OLD OXBOW CHANNEL (EXTENTS TO BE DETERMINED AFTER FINAL DESIGN SURVEY)

PROPOSED EAST PARK ROAD SEE CP-06 FOR PROFILE

PROPOSED PARK ROAD BRIDGE SEE REFERENCE PLANS

FOR CONTINUATION SEE SHEET CG-27

3H:1V FILL SLOPE

APPROXIMATE LOCATION OF EXISTING TREELINE

GRADING OFFSET (25FT TYP)

FILL TO ELEVATION 514.50

EXISTING TRANSMISSION TOWER TO REMAIN

PROPOSED BALLPARK LEVEE MODIFICATIONS (EXTENTS TO BE DETERMINED AFTER FINAL DESIGN SURVEY)

PROPOSED EQUESTRIAN TRAIL SEE SHEET CP-01

EXISTING PARKING LOT TO REMAIN

GRADING LIMITS

EXISTING DOG PARK TO REMAIN

EXISTING PARKING LOT TO REMAIN

PROPOSED FUTURE PARKING LOT

PROPOSED FUTURE RECREATION FIELDS

EXISTING PARK ROAD TO REMAIN

CUT TO ELEVATION 504.5

FOR CONTINUATION SEE SHEET CG-28

N

0 100' 200'

SCALE: 1" = 100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

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US Army Corps of Engineers Fort Worth District

No.	Description	Date	Appd.

CDM

Design File:	Design1.a
Set ID:	SetID
Size:	ANSI D
Plot date:	AUGUST 2007
Designed by:	DRJ/SDN
Drawn by:	PROJECTOR
Checked by:	D. FUNDERLIC
Responsible P.E.:	PERresponsible
License Number:	PELicenseNum
House/Suite:	PERSuite

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-26

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FOR CONTINUATION SEE SHEET CG-26

PROPOSED BOAT LAUNCH

EXISTING PEDESTRIAN BRIDGE TO REMAIN

PROPOSED ROCK WEIR STRUCTURE

EXISTING TREES TO BE PRESERVED IN THIS AREA

EXISTING PARK ROAD TO REMAIN

PROPOSED FUTURE RECREATION FIELDS

PROPOSED FUTURE PARK ROAD

PROPOSED BOAT LAUNCH

EXISTING BEACH STREET LOW WATER DAM TO REMAIN

WEST FORK TRINITY RIVER

GATEWAY PARK

TRAIL

FOR CONTINUATION SEE SHEET CG-24

FOR CONTINUATION SEE SHEET CG-29

CUT TO ELEVATION 496

EXISTING PARKING LOT TO REMAIN

PROPOSED FUTURE PARKING LOT

GRADING LIMITS

APPROXIMATE LOCATION OF EXISTING TREELINE

PROPOSED FUTURE RECREATION TRAIL

RIVERSIDE OXBOW/GATEWAY PARK SITE BOUNDARY

INTERSTATE 30 RAMP

INTERSTATE HIGHWAY (DALLAS - FT WORTH TP)

I-30

7 CG-33

6 CG-32

5 CG-31

4 CG-31

N

0 100' 200'

SCALE: 1" = 100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

US Army Corps of Engineers
Fort Worth District

CDM

Design file: Design.ai
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: DESIGN
Drawn by: DRAWN
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Horizontal Datum: HDatum
Vertical Datum: VDatum

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MTIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-27

NOT FOR CONSTRUCTION

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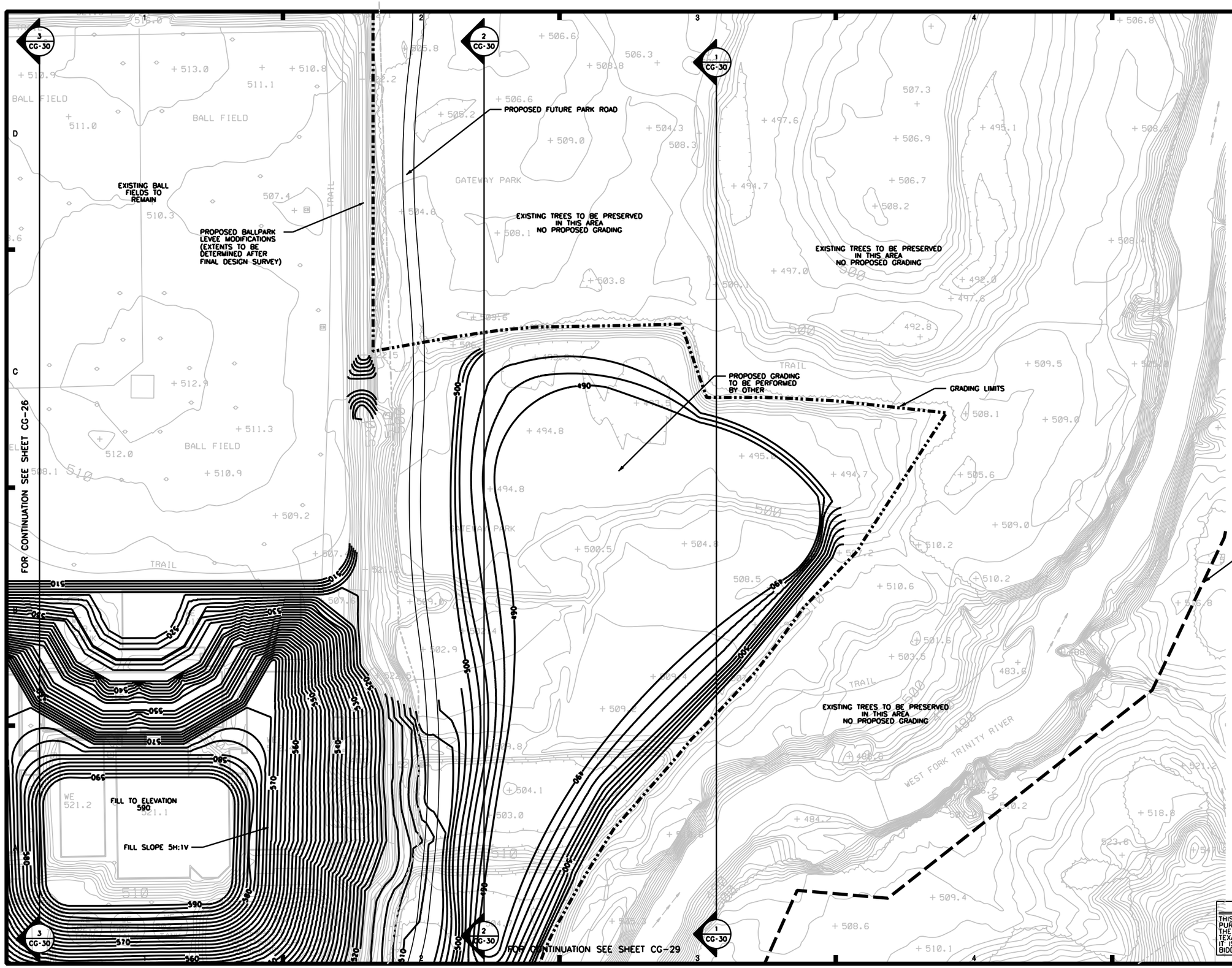
...\Sheet\00001_COE_CG-127xx31.dgn 3/3/2008 5:58:08 PM



NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

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US Army Corps of Engineers
Fort Worth District

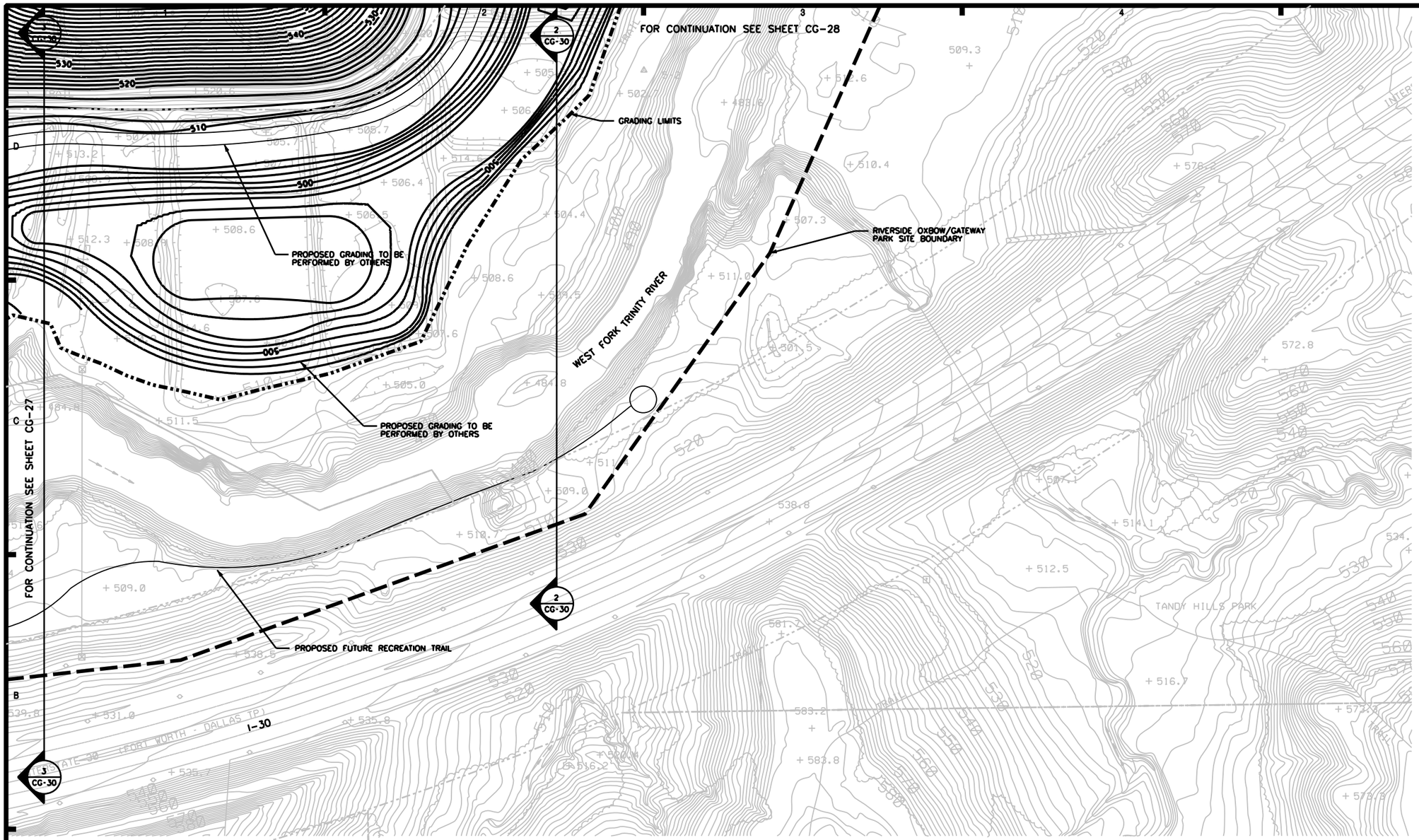
Appvd	Date	Description	Symbol

CDM

Design file: Design1.4
Set ID: Set0
Size: ANSI D
Plot date: AUGUST 2007
Designed by: GLASSON
Drawn by: MWEBB
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Licensed State: PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION
CG-28



N

0 100' 200'

SCALE: 1" = 100'

NOTE:

1. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appd.

CDM

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Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: ANDREW
Drawn by: ANDREW
Checked by: D. FUNDERLIC
Responsible P.E.: PERespondHa
License Number: PELicenseNum
Last Date/Time: PESeals

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
GRADING PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-29

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SCALE:
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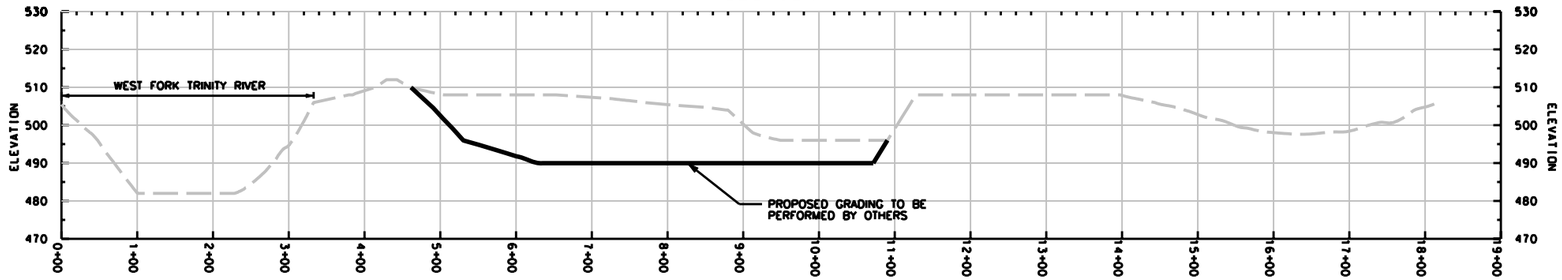

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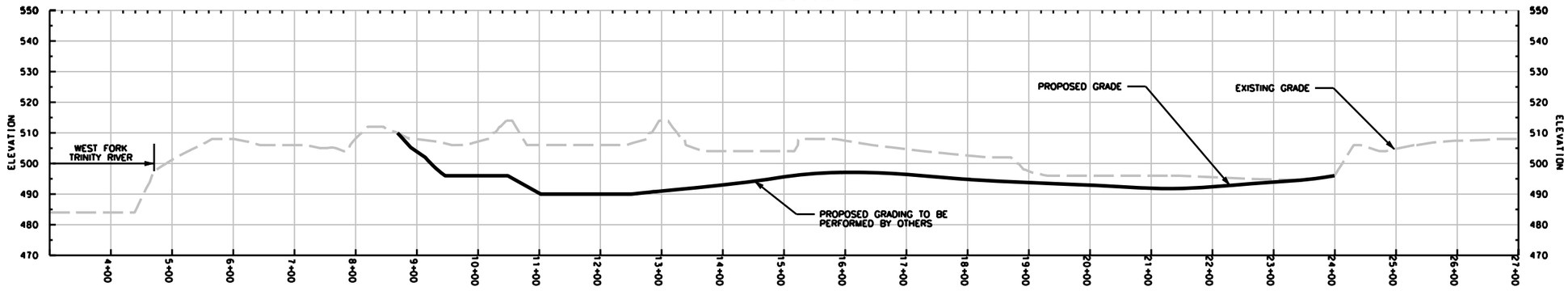

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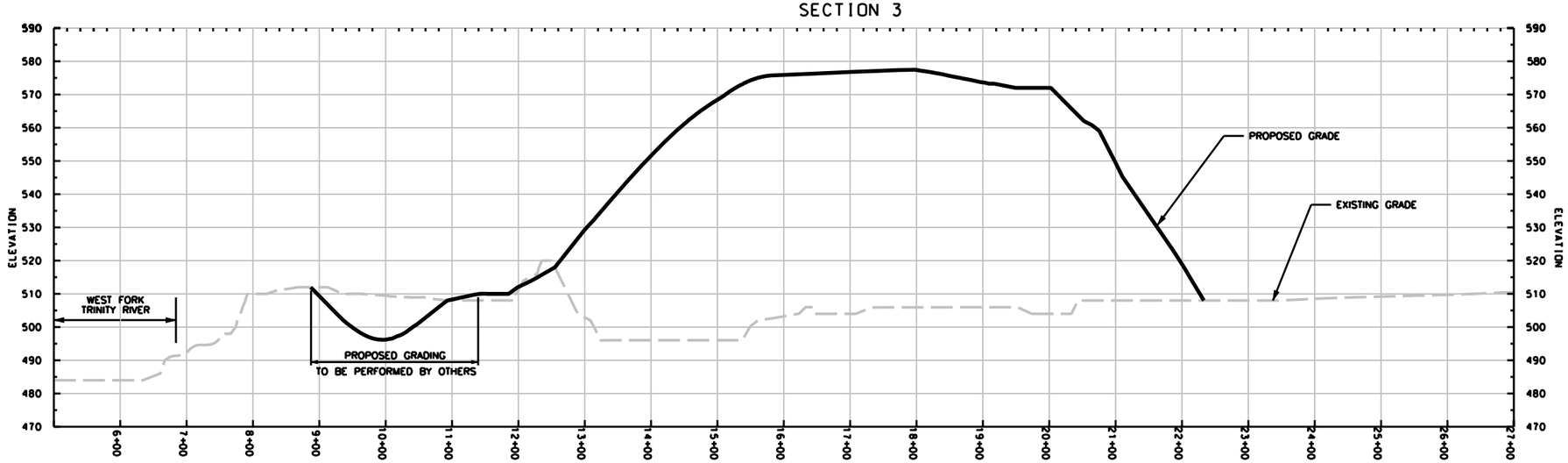

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.
Symbol			

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Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: Initials
Drawn by: Initials
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
LicenseState: PEState

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS-SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-30

SCALE:
HORIZ: 1" = 100'
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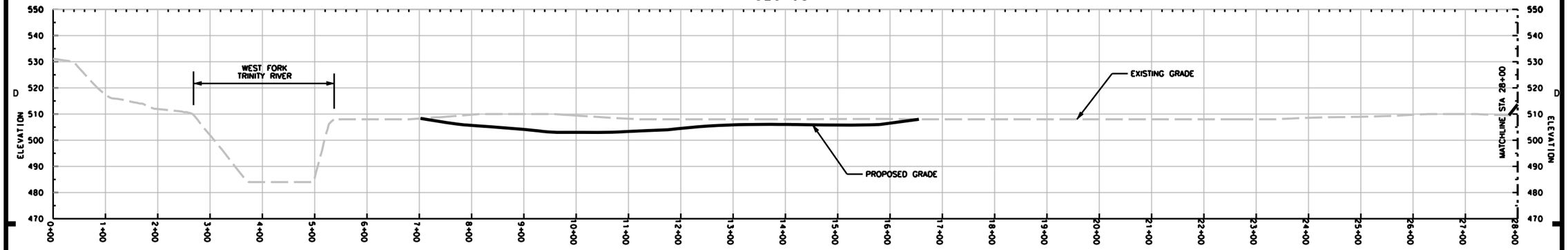
SECTION 4



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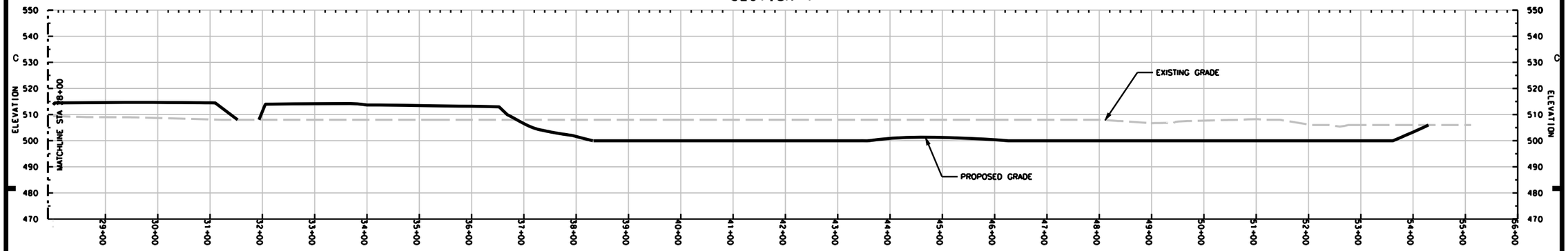

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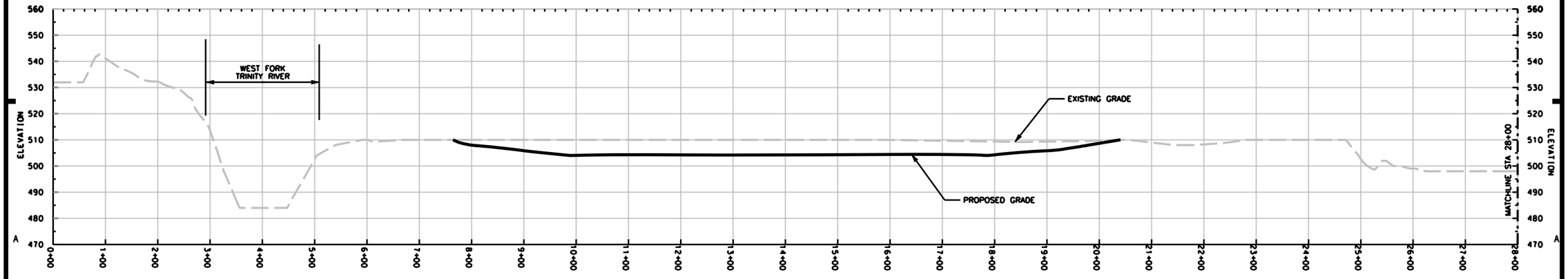

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US Army Corps of Engineers
Fort Worth District

CDM

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Size: ANSI D
Plot date: AUGUST 2007
Designed by M. GIBSON
Drawn by J. HAWES
Checked by D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Licensed State: PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-31

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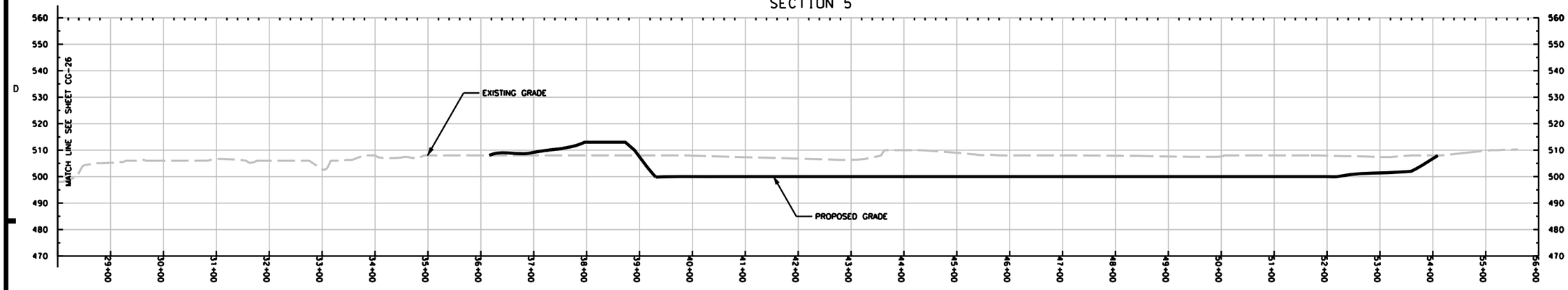
VERT: 1" = 20'

SECTION 5



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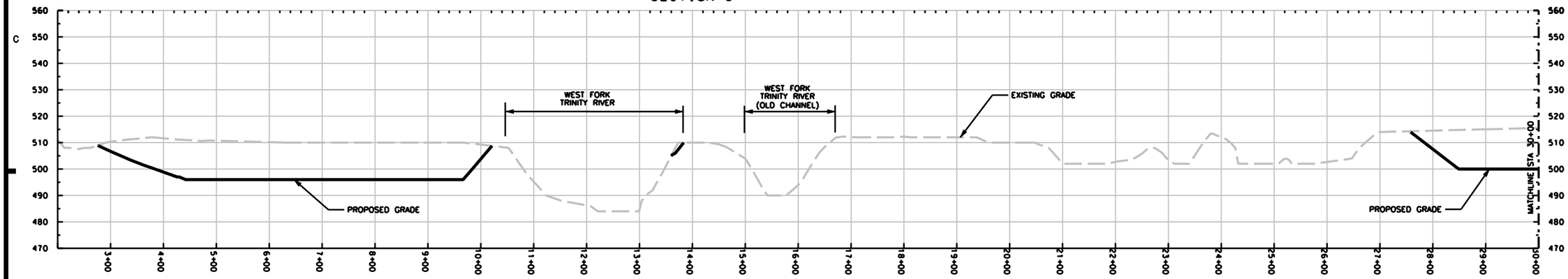

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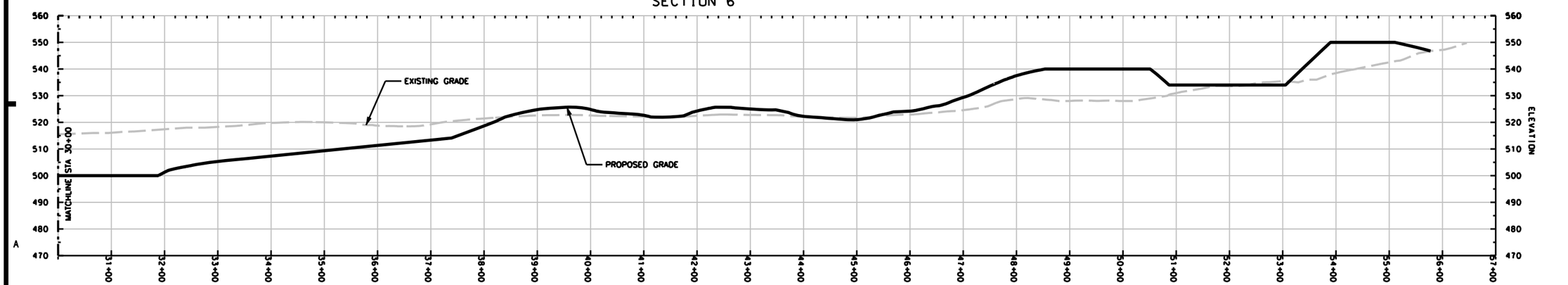

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

CDM

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Size:	ANSI D
Plot date:	AUGUST 2007
Designed by:	DRESSON
Drawn by:	DRESSON
Checked by:	D. FUNDERLIC
Responsible P.E.:	PERresponsible
License Number:	PELicenseNum
LicenseState:	PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-32

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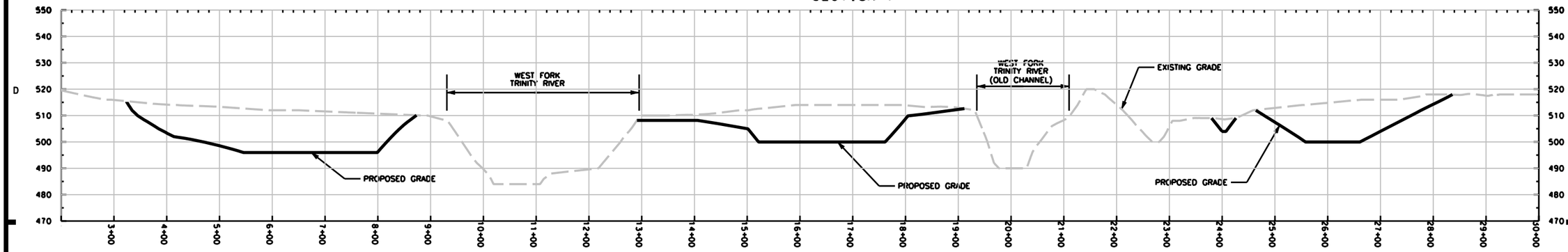
SCALE:
HORIZ: 1" = 100'
VERT: 1" = 20'

SECTION 7



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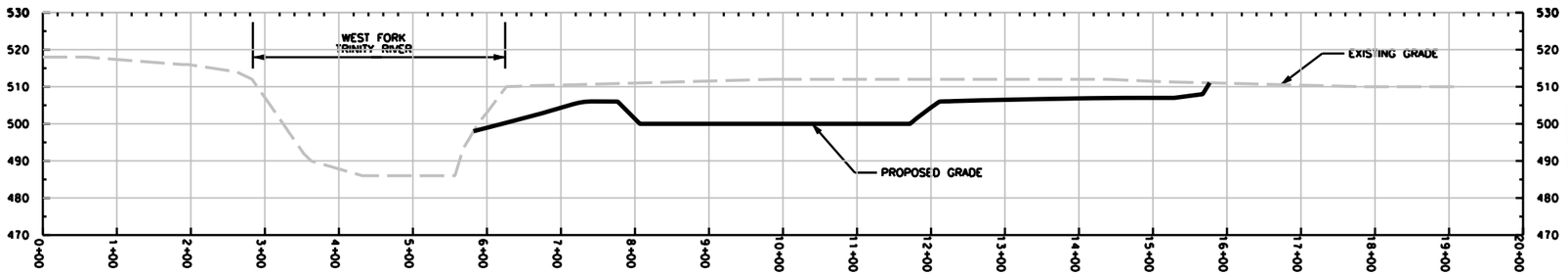

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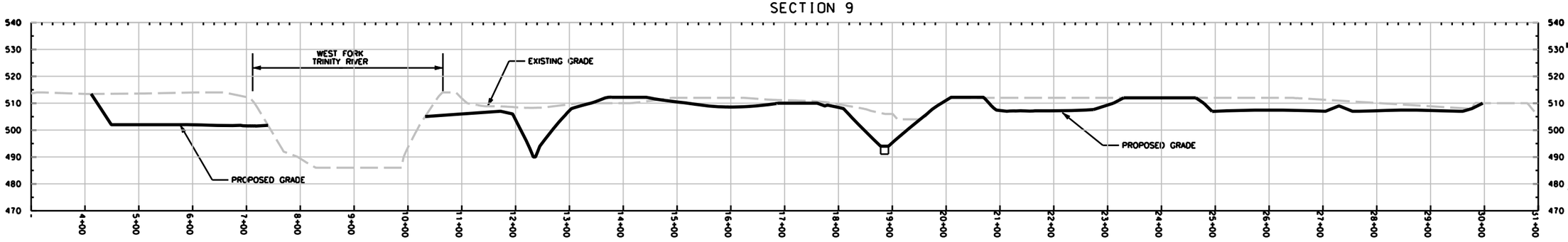

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US Army Corps of Engineers
Fort Worth District

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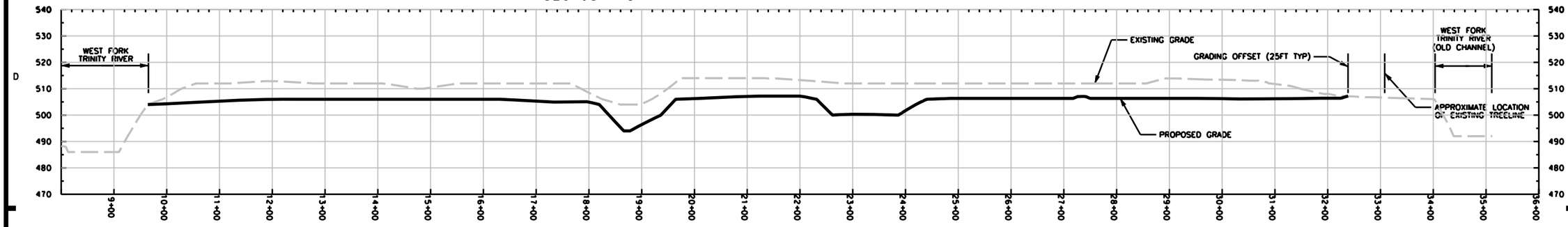
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION
CG-33

SCALE:
HORIZ: 1" = 100'
VERT: 1" = 20'

SECTION 10



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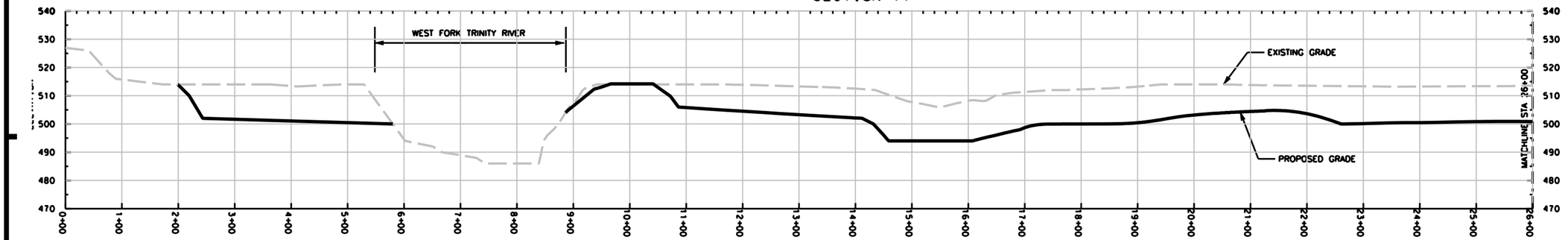

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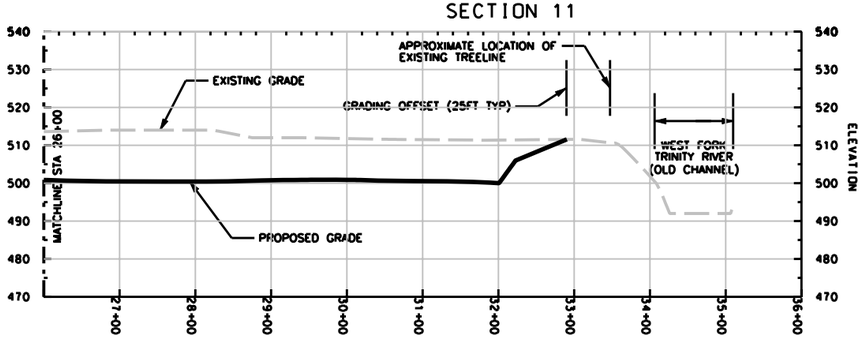

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.
Symbol			

CDM

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Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: PE/ASSOC.
Drawn by: PE/ASSOC.
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Licensee/State: PEState

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-34

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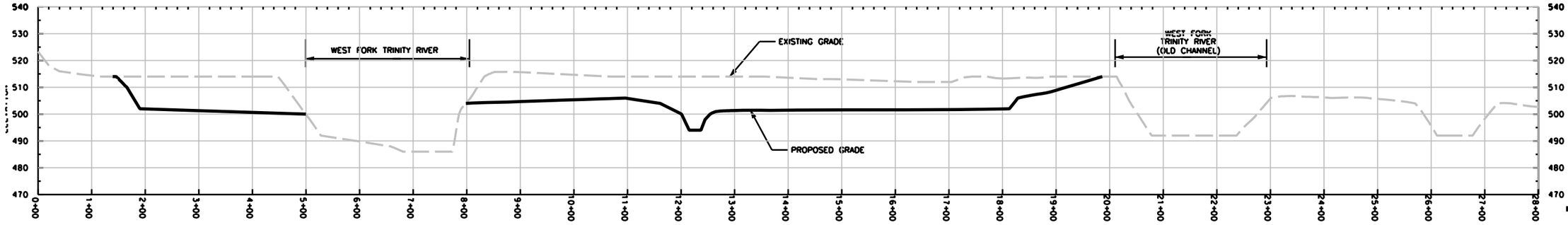
SCALE:
HORIZ: 1" = 100'
VERT: 1" = 20'

SECTION 12



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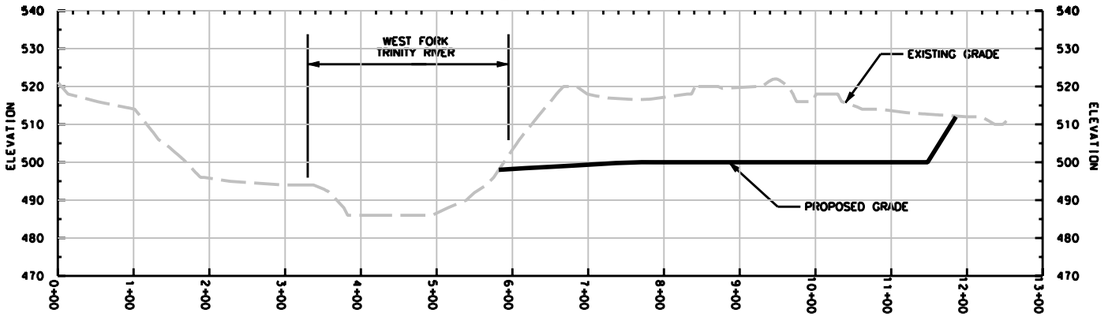

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd
Symbol			

Design file: Designfile
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Size: ANSI D
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Designed by: REASON
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Responsible P.E.: PEResponsible
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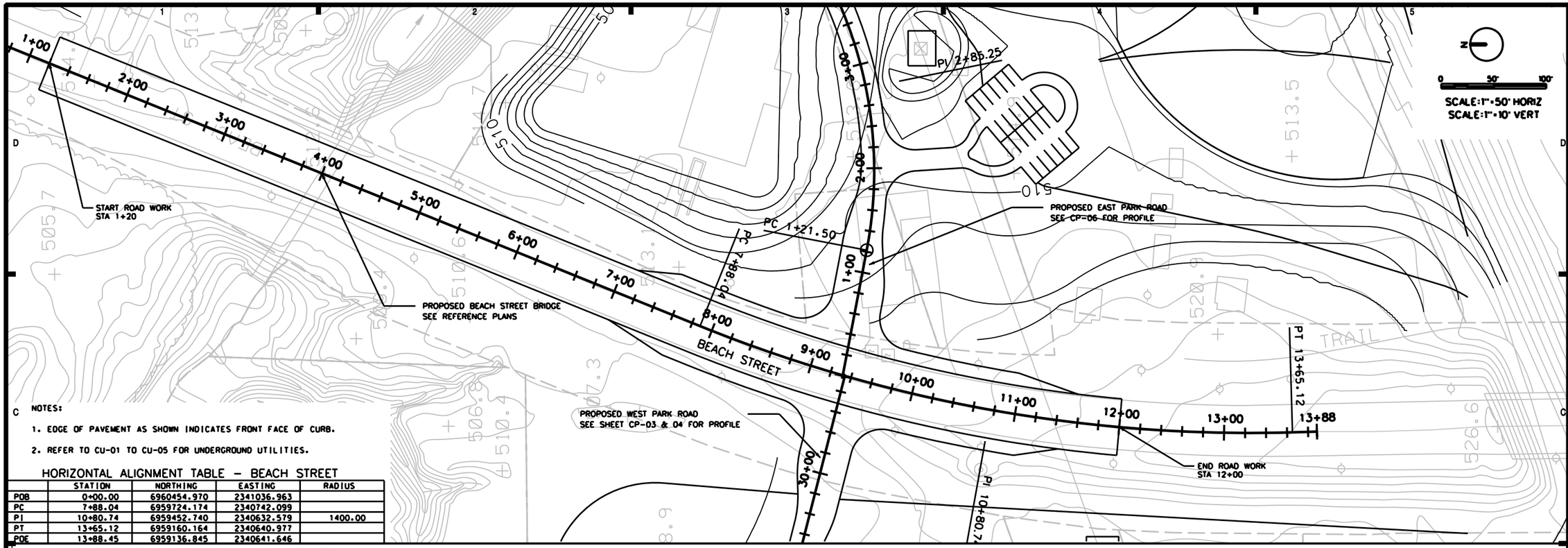
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
CROSS SECTIONS
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CG-35



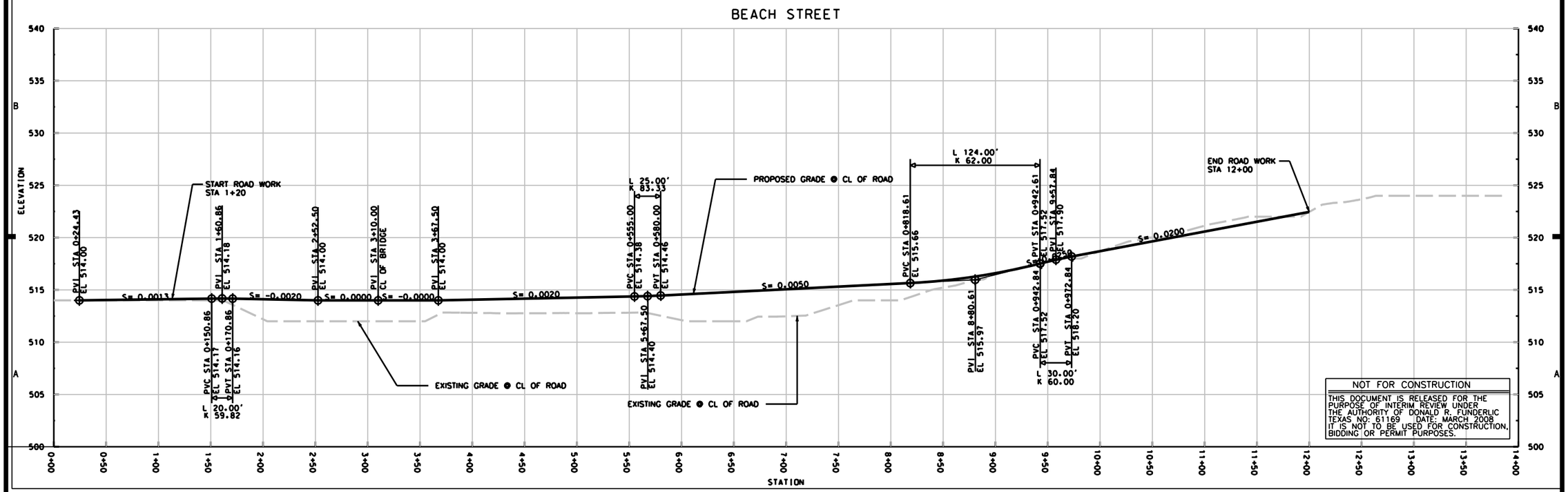
NOTES:

1. EDGE OF PAVEMENT AS SHOWN INDICATES FRONT FACE OF CURB.
2. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES.

HORIZONTAL ALIGNMENT TABLE – BEACH STREET

	STATION	NORTHING	EASTING	RADIUS
POB	0+00.00	6960454.970	2341036.963	
PC	7+88.04	6959724.174	2340742.099	
PI	10+80.74	6959452.740	2340632.579	1400.00
PT	13+65.12	6959160.164	2340640.977	
POE	13+88.45	6959136.845	2340641.646	

ALL COORDINATES ARE IN TEXAS STATE PLANE, ZONE 2, GRID, FEET



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US Army Corps of Engineers
Fort Worth District

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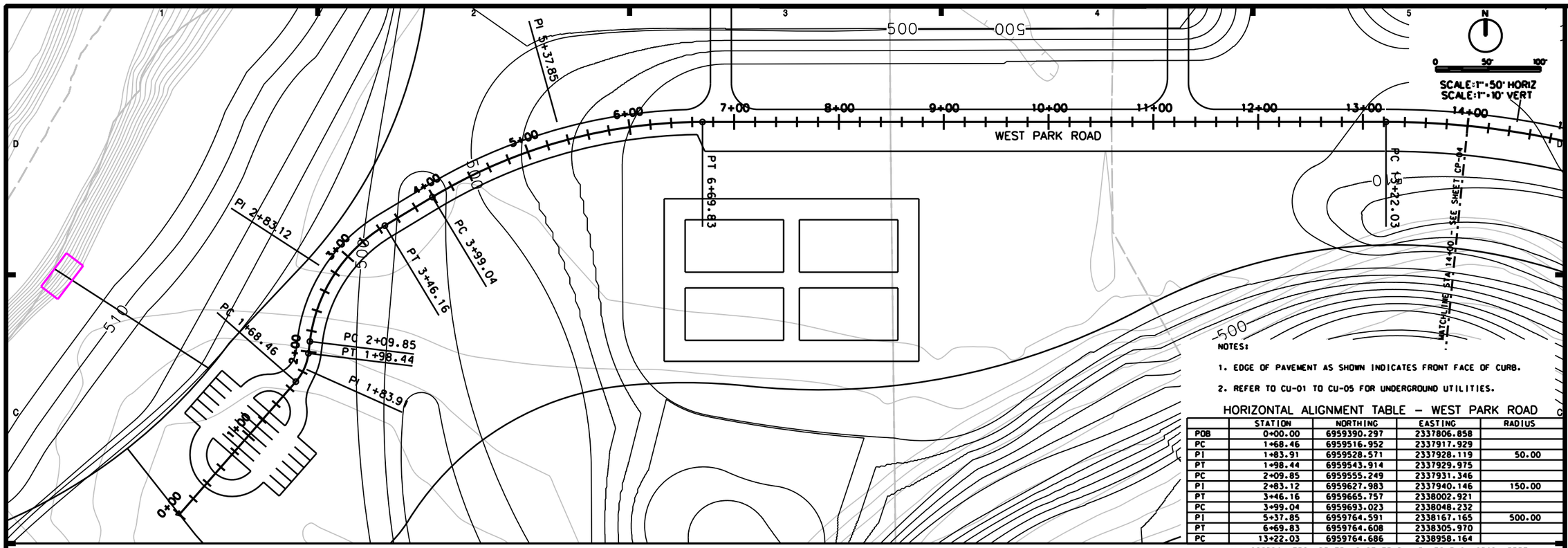
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PLAN AND PROFILE
WEST PARKWAY

SHEET IDENTIFICATION
CP-01



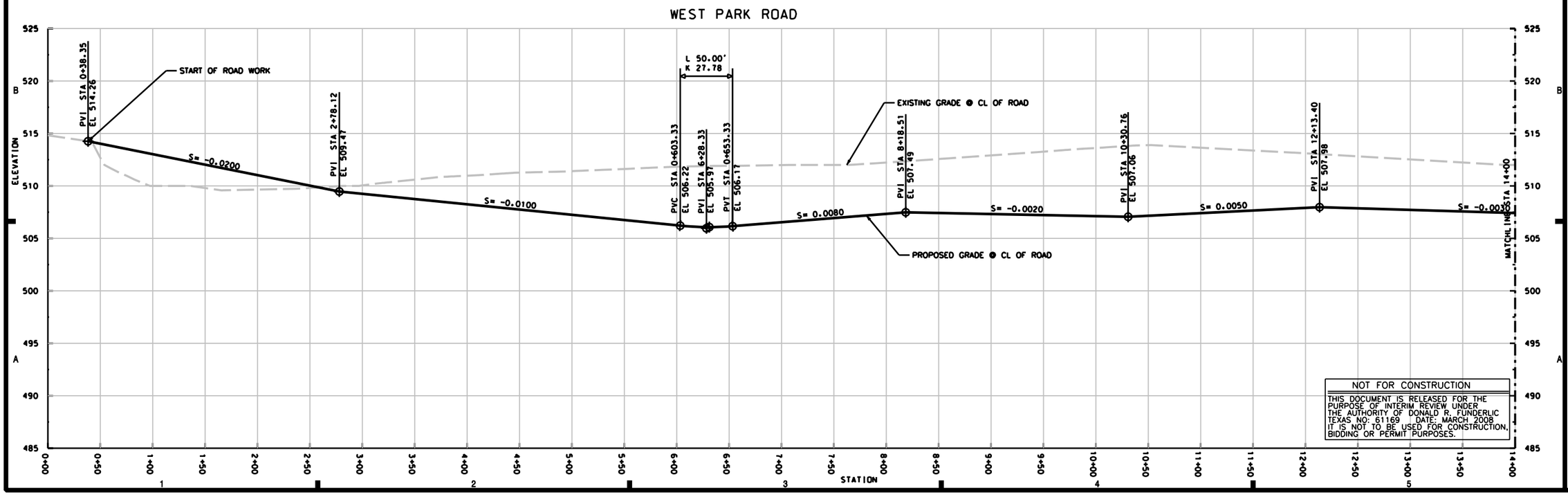
NOTES:

1. EDGE OF PAVEMENT AS SHOWN INDICATES FRONT FACE OF CURB.
2. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES.

HORIZONTAL ALIGNMENT TABLE – WEST PARK ROAD

	STATION	NORTHING	EASTING	RADIUS
POB	0+00.00	6959390.297	2337806.858	
PC	1+68.46	6959516.952	2337917.929	
PI	1+83.91	6959528.571	2337928.119	50.00
PT	1+98.44	6959543.914	2337929.975	
PC	2+09.85	6959555.249	2337931.346	
PI	2+83.12	6959627.983	2337940.146	150.00
PT	3+46.16	6959665.757	2338002.921	
PC	3+99.04	6959693.023	2338048.232	
PI	5+37.85	6959764.591	2338167.165	500.00
PT	6+69.83	6959764.608	2338305.970	
PC	13+22.03	6959764.686	2338958.164	

ALL COORDINATES ARE TEXAS STATE PLANE. ZONE 2. GRID. FEET



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US Army Corps of Engineers
Fort Worth District

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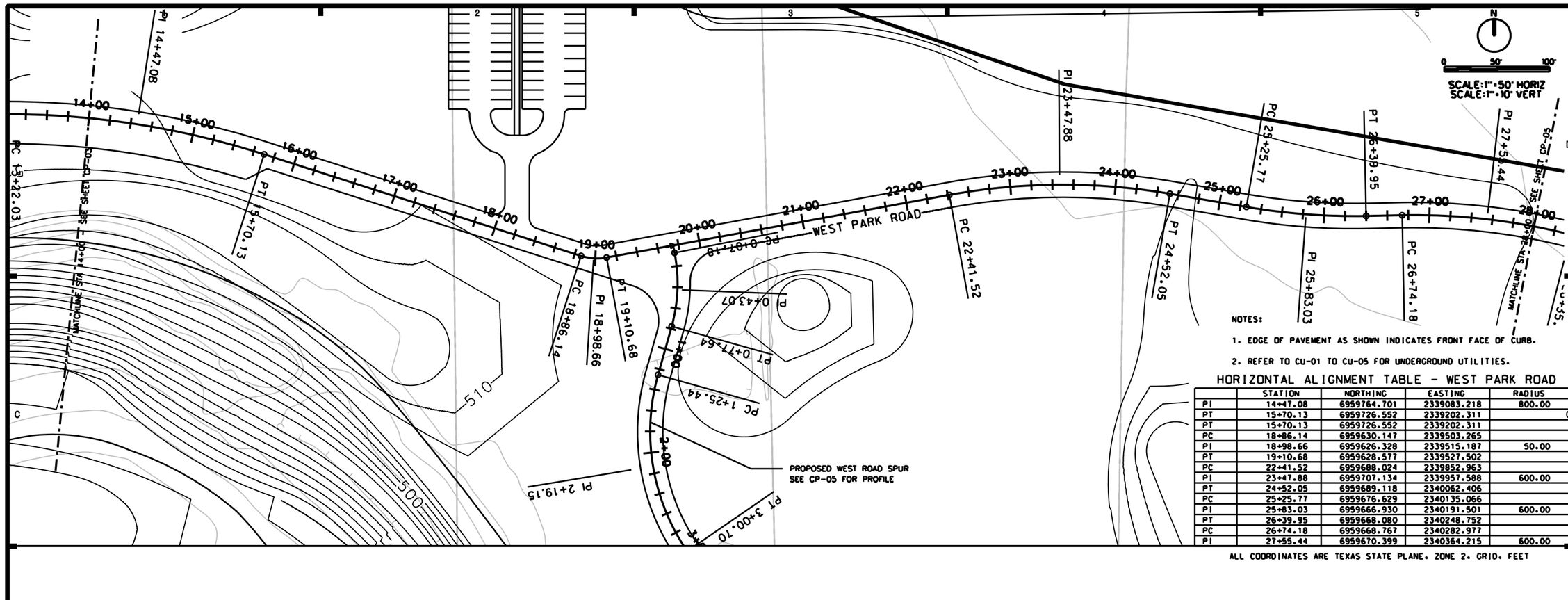
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PLAN AND PROFILE
WEST PARK ROAD

SHEET IDENTIFICATION

CP-02



HORIZONTAL ALIGNMENT TABLE - WEST PARK ROAD

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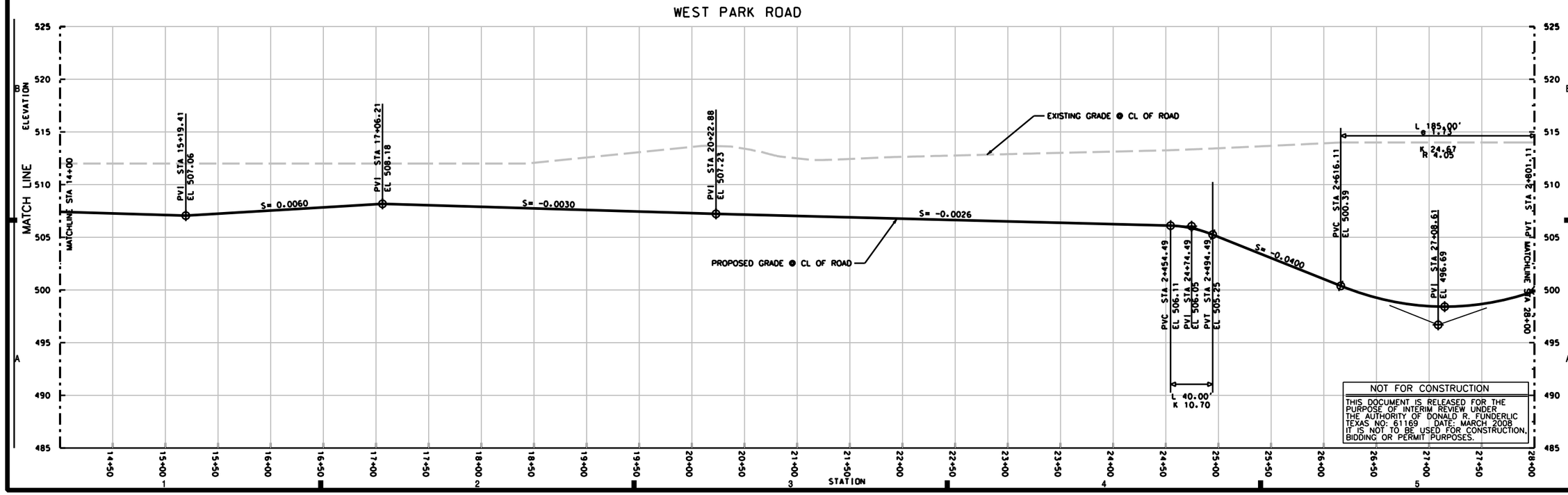
PI	14+47.08	6959764.701	2339083.218	800.00
PT	15+70.13	6959726.552	2339202.311	C
PT	15+70.13	6959726.552	2339202.311	
PC	18+86.14	6959630.147	2339503.265	
PI	18+98.66	6959626.328	2339515.187	50.00
PT	19+10.68	6959628.577	2339527.502	
PC	22+41.52	6959688.024	2339852.963	
PI	23+47.88	6959707.134	2339957.588	600.00
PT	24+52.05	6959689.118	2340062.406	
PC	25+25.77	6959676.629	2340135.066	
PI	25+83.03	6959666.930	2340191.501	600.00
PT	26+39.95	6959668.080	2340248.752	
PC	26+74.18	6959668.767	2340282.977	
PI	27+55.44	6959670.399	2340364.215	600.00

ALL COORDINATES ARE TEXAS STATE PLANE, ZONE 2, GRID, FEET

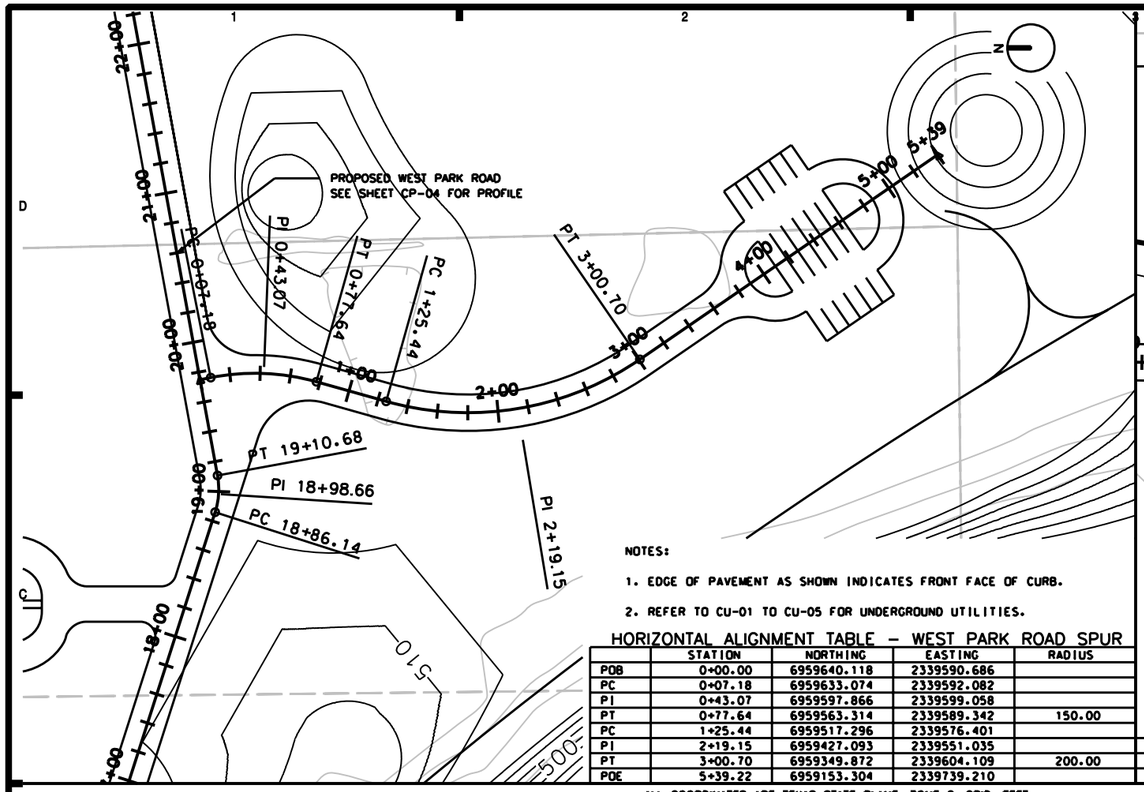


US Army Corps of Engineers
Fort Worth District

CDM

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PLAN AND PROFILE
WEST PARK ROAD

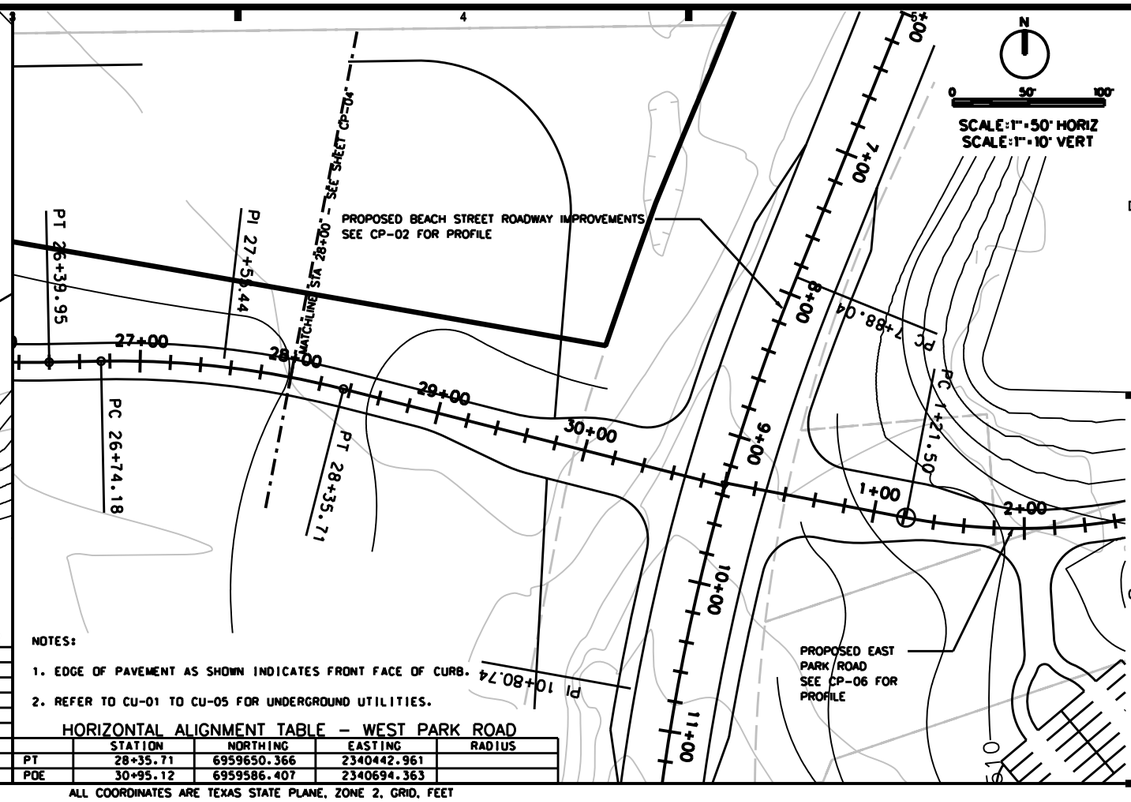
SHEET IDENTIFICATION
CP-03



HORIZONTAL ALIGNMENT TABLE – WEST PARK ROAD SPUR

	STATION	NORTHING	EASTING	RADIUS
POB	0+00.00	6959640.118	2339590.686	
PC	0+07.18	6959633.074	2339592.082	
PI	0+43.07	6959597.866	2339599.058	
PT	0+77.64	6959563.314	2339589.342	150.00
PC	1+25.44	6959517.296	2339576.401	
PI	2+19.15	6959427.093	2339551.035	
PT	3+00.70	6959349.872	2339604.109	200.00
POE	5+39.22	6959153.304	2339739.210	

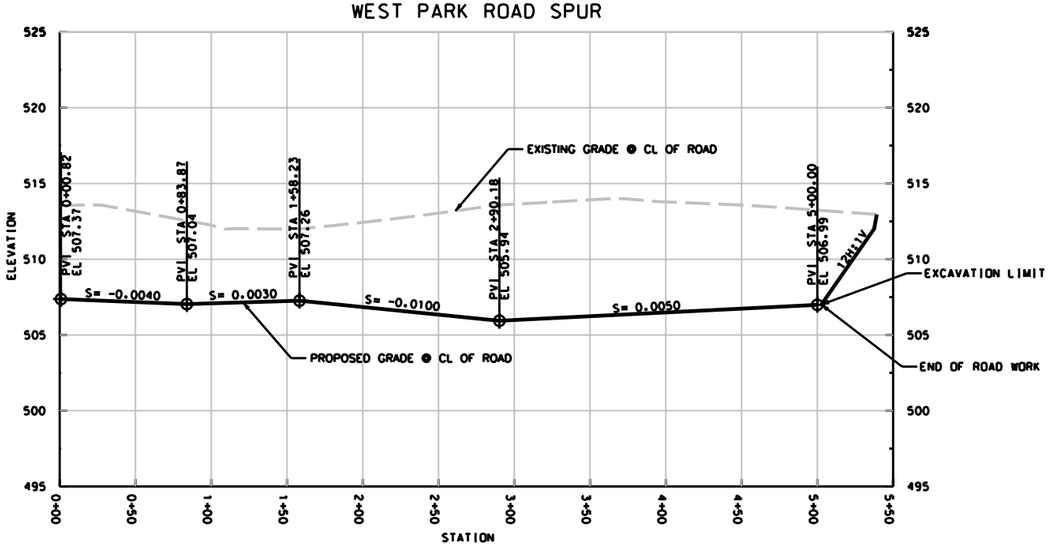
ALL COORDINATES ARE TEXAS STATE PLANE, ZONE 2, GRID, FEET

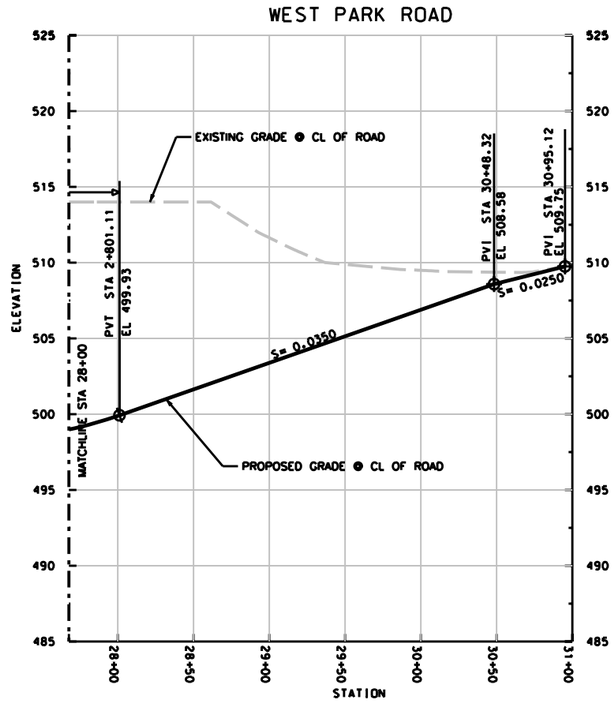


HORIZONTAL ALIGNMENT TABLE – WEST PARK ROAD

	STATION	NORTHING	EASTING	RADIUS
PT	28+35.71	6959650.366	2340442.961	
POE	30+95.12	6959586.407	2340694.363	

ALL COORDINATES ARE TEXAS STATE PLANE, ZONE 2, GRID, FEET





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US Army Corps of Engineers
Fort Worth District

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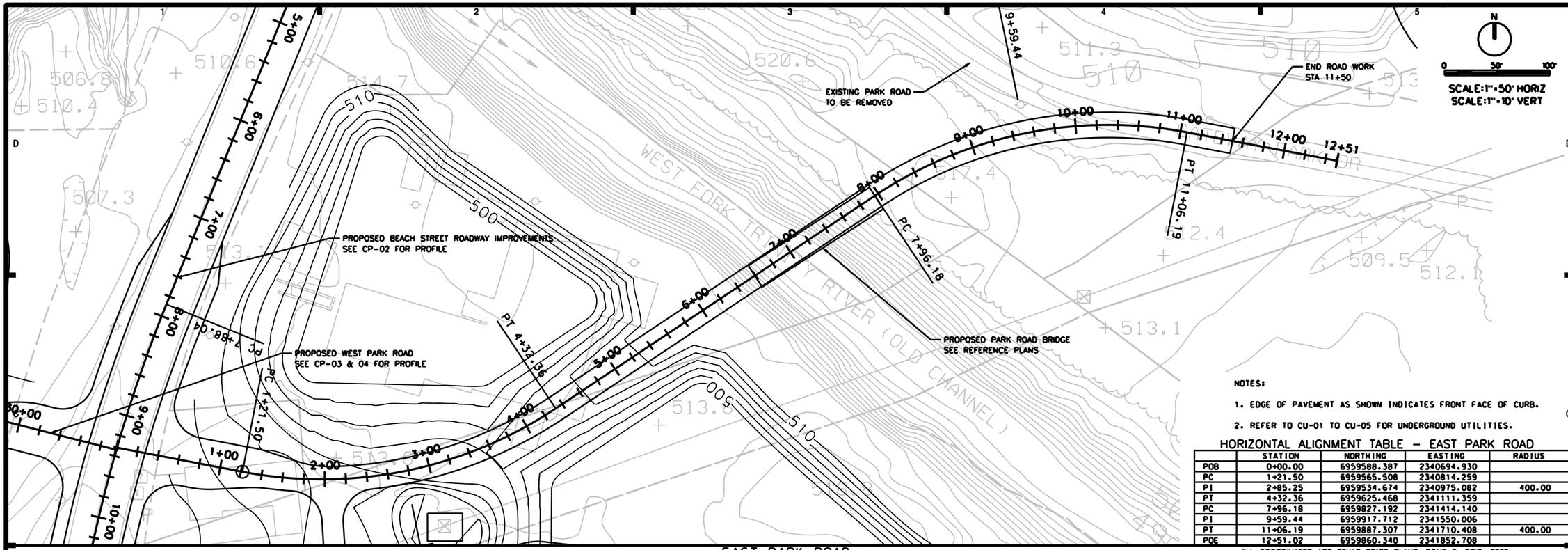
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PLAN AND PROFILE
WEST PARK ROAD SPUR

SHEET IDENTIFICATION
CP-04



NOTES:

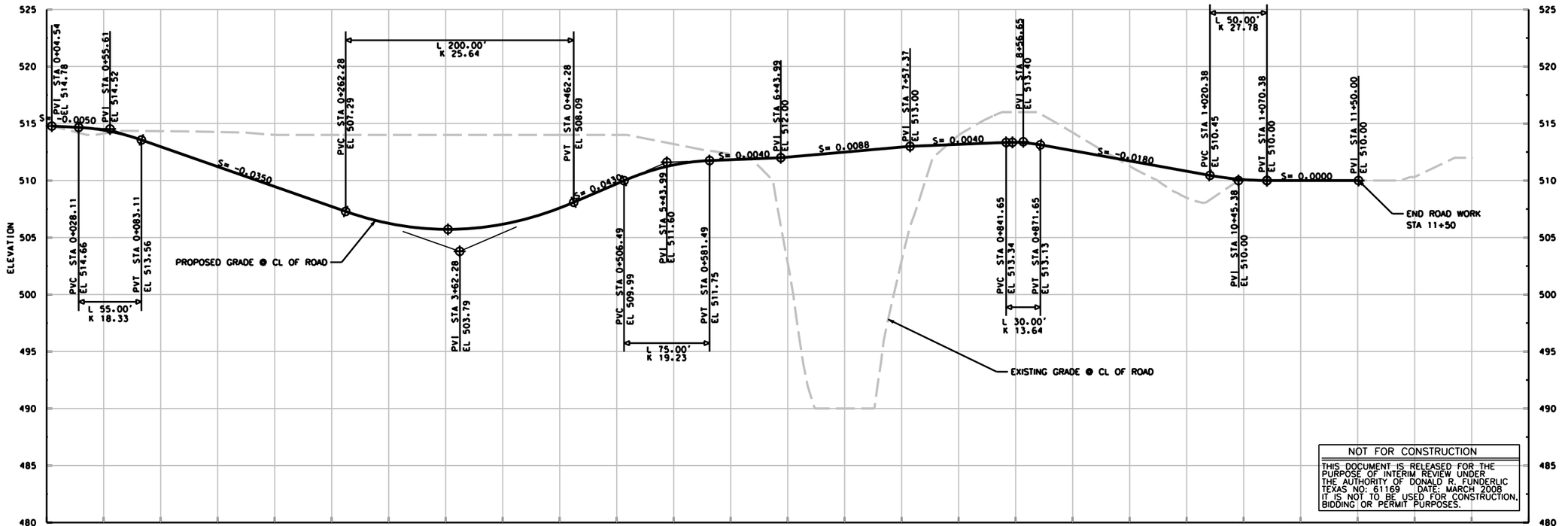
1. EDGE OF PAVEMENT AS SHOWN INDICATES FRONT FACE OF CURB.
2. REFER TO CU-01 TO CU-05 FOR UNDERGROUND UTILITIES.

HORIZONTAL ALIGNMENT TABLE – EAST PARK ROAD

	STATION	NORTHING	EASTING	RADIUS
POB	0+00.00	6959588.387	2340694.930	
PC	1+21.50	6959565.508	2340814.259	
PI	2+85.25	6959534.674	2340975.082	400.00
PT	4+32.36	6959625.468	2341111.359	
PC	7+96.18	6959827.192	2341414.140	
PI	9+59.44	6959917.712	2341550.006	
PT	11+06.19	6959887.307	2341710.408	400.00
POE	12+51.02	6959860.340	2341852.708	

ALL COORDINATES ARE TEXAS STATE PLANE, ZONE 2, GRID, FEET

EAST PARK ROAD



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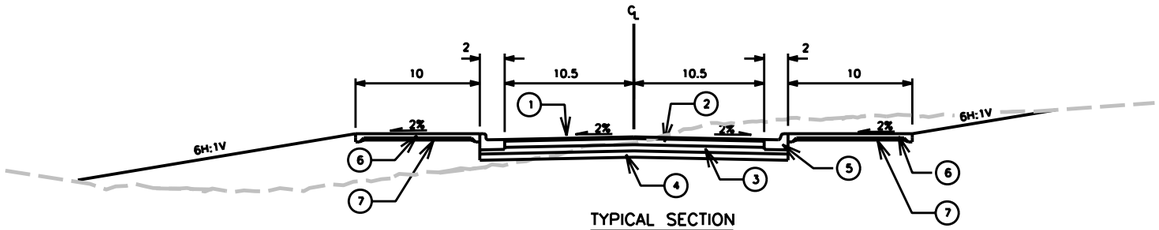
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
PLAN AND PROFILE
EAST PARK ROAD

SHEET IDENTIFICATION

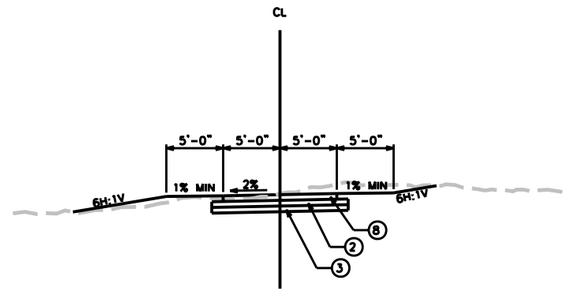
CP-05



TYPICAL SECTION

PARK ROADS

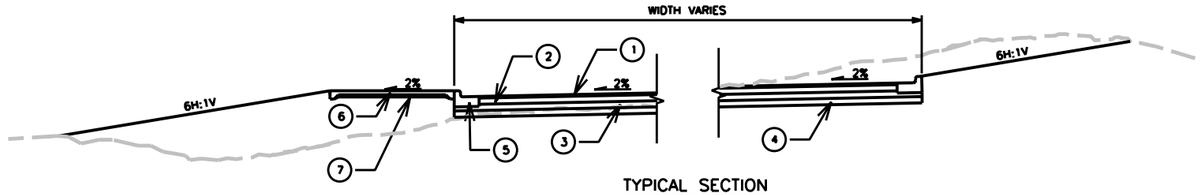
1. 1.5" HMAC SURFACE COURSE AND 2.5" HMAC BINDER COURSE
2. 6" AGGREGATE BASE COURSE AT 95%
3. 6" COMPACTED SUBBASE AT 90%
4. 6" RAW COMPACTED SUBGRADE
5. 2' CONCRETE CURB WITH 3-#4 BARS REINF. STL.
6. 4" THICK CONC. TRAIL WITH #3 STL. REINF. @ 24" CENTERS EACH WAY
7. 2" WASHED SAND
8. 6" PORTLAND CEMENT CONCRETE W/ #4 BARS SPACED AT 16" OC
9. 9" MULCH
10. 9" REINFORCED CONCRETE PAVEMENT
11. STABILIZED SUBGRADE



TYPICAL SECTION

MAINTENANCE/ RECREATION TRAIL

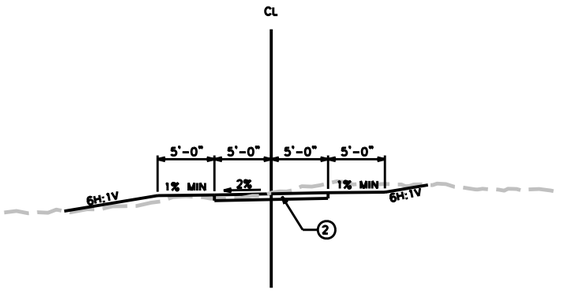
NOT TO SCALE



TYPICAL SECTION

PARKING AREAS

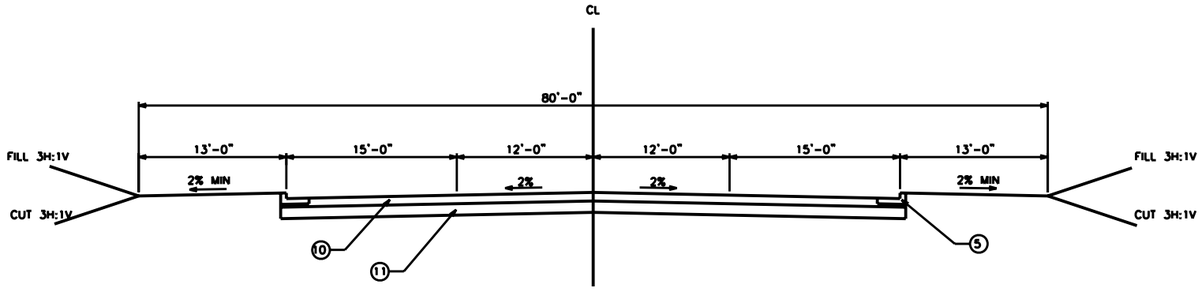
NOT TO SCALE



TYPICAL SECTION

RECREATION ONLY TRAIL

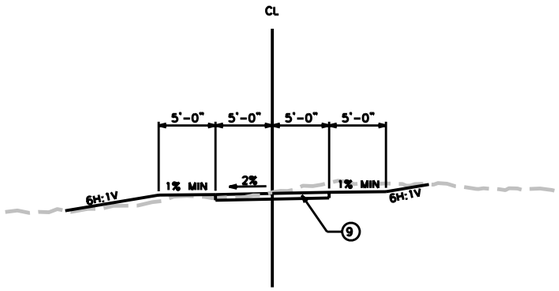
NOT TO SCALE



TYPICAL SECTION

BEACH STREET

NOT TO SCALE



TYPICAL SECTION

EQUESTRIAN TRAIL

NOT TO SCALE

NOT FOR CONSTRUCTION

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF DONALD R. FUNDERLIC TEXAS NO: 61169 DATE: MARCH 2008 IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

CDM

Design file: Datapha
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: ROLSON
Drawn by: ROLSON
Checked by: D. FUNDERLIC
Responsible P.E.: PERespons
License Number: PELicenseNum
Date/Seal: PESeal

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
TYPICAL PAVEMENT SECTION

SHEET IDENTIFICATION

CP-06

NOTES

1. UNDERGROUND PUBLIC UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY.

2. FRANCHISE UTILITIES AS SHOWN ARE BASED ON TEXAS RAILROAD COMMISSION GIS FILE (JAN 2008) AND PLANIMETRIC SURVEY DATA AS PROVIDED FROM USACE AERIAL MAPPING.

3. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

N

0 400' 800'

SCALE:1"=400'

CU-05

CU-04

CU-02

CU-03

EAST 1ST STREET

BEACH ST

RIVERSIDE DR

I-30

LPC

M-388-B (90" CONC)

M-280-B (54" CONC)

M-181A (21" CONC)

10" WATER

E-21 (54" CONC)

M-131 (18" CONC) *ABANDONED

M-245-AR (72" CONC)

M-245-P (84" CONC)

M-389 (66" CONC)

M-389 (60" CONC)

E-21 (46" CONC)

E-11 (36" CONC)

M-126 (18" VC)

SS

W

G

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.
	Symbol		

CDM

Design File:	Design.ai
Set ID:	SetID
Size:	ANSI D
Plot date:	AUGUST 2007
Designed by:	DRESCH
Drawn by:	PERESCH
Checked by:	D. FUNDERLIC
Responsible P.E.:	PEResponsible
License Number:	PELicenseNum
Horizontal Datum:	NAD83

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
UTILITY KEY PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CU-01

NOTES:

1. UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY.

2. LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

3. FRANCHISE UTILITIES ARE BASED ON TEXAS RAILROAD COMMISSION GIS FILES (JAN 2008) AND PLANIMETRIC SURVEY DATA AS PROVIDED FROM USACE AERIAL MAPPING.

4. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

N

0 100' 200'

SCALE: 1" = 100'

PROPOSED FUTURE GAS PIPELINE- 20" LINE TO BE COORDINATED WITH PROPOSED GRADING WORK

PROPOSED FUTURE FRESH WATER LINE- 24" PROPOSED FUTURE PRODUCED WATER LINE- 20" LINES TO BE COORDINATED WITH PROPOSED GRADING WORK

EXISTING NATURAL GAS LINES CARE TO BE TAKEN DURING CONSTRUCTION

EXISTING LINE TO BE PROTECTED DURING CONSTRUCTION

M-245-P (84" CONC)

EXISTING DROP SHAFT TO REMAIN

EXISTING FUEL AND NATURAL GAS LINES CARE TO BE TAKEN DURING CONSTRUCTION

M-380 (60" CONC)

L-2048

EXISTING LINE TO BE PROTECTED DURING CONSTRUCTION

WEST FORK TRINITY RIVER

SYCAMORE CREEK

TRAIL

LEGEND

- SS — SANITARY SEWER
- W — WATER LINE
- G — NATURAL GAS LINE
- LPG — LIQUID FUEL LINE

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Appd. | Date | Description | Symbol

CDM

Design Ltr: Designer
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: DESIGN
Drawn by: DRAWN
Checked by: D. FUNDERLIC
Responsible P.E.: PERresponsible
License Number: PELicenseNum
Horizontal Datum: HDatum
Vertical Datum: VDatum

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
UTILITY PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CU-02

EXISTING LATERALS TO BE ABANDONED

EXISTING WATER VALVE TO BE ADJUSTED

EXISTING LINE TO BE PROTECTED DURING CONSTRUCTION

EXISTING LIQUID FUEL LINE CARE TO BE TAKEN DURING CONSTRUCTION

EXISTING PEDESTRIAN BRIDGE

EXISTING ABOVE GRADE CROSSING TO REMAIN

EXISTING BEACH STREET LOW WATER DAM

EXISTING SIPHON CROSSING

EXISTING LINE TO BE PROTECTED DURING CONSTRUCTION

PROPOSED 24" CONCRETE CULVERT (100 FT)

EXISTING NATURAL GAS LINE CARE TO BE TAKEN DURING CONSTRUCTION

REPLACE EXISTING 18" VC WITH 18" CONCRETE ENCASED SEWER (400 FT)

EXISTING LINES TO BE PROTECTED DURING CONSTRUCTION

M-245-AR (72" CONC)

M-245-P (84" CONC)

M-389 (60" CONC)

M-126 (18" VC)

E-21 (24" CONC)

E-11 (36" CONC)

L-2048

WEST FORK TRINITY RIVER (OLD CHANNEL)

WEST FORK TRINITY RIVER

GATEWAY PARK

ATHLETIC FIELD

BEACH ST

INTERSTATE 30 RAMP

INTERSTATE HIGHWAY 30 (DALLAS - FT WORTH TP)

N

0 100' 200'

SCALE: 1" = 100'

NOTES:

1. UNDERGROUND PUBLIC UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY.

2. LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

3. FRANCHISE UTILITIES ARE BASED ON TEXAS RAILROAD COMMISSION GIS FILES (JAN 2008) AND PLANIMETRIC SURVEY DATA AS PROVIDED FROM USACE AERIAL MAPPING.

4. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

LEGEND

- SS — SANITARY SEWER
- W — WATER LINE
- G — NATURAL GAS LINE
- LPG — LIQUID FUEL LINE

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

CDM

Design file: Design1.d
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: MARSON
Drawn by: MARSON
Checked by: D. FUNDERLIC
Responsible P.E.: PERresponsible
License Number: PELicenseNum
Discipline: DISCIPLINE

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
UTILITY PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CU-03

NOTES:

1. UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY.

2. LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

3. FRANCHISE UTILITIES ARE BASED ON TEXAS RAILROAD COMMISSION GIS FILES (JAN 2008) AND PLANIMETRIC SURVEY DATA AS PROVIDED FROM USACE AERIAL MAPPING.

4. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

EXISTING NATURAL GAS LINES CARE TO BE TAKEN DURING CONSTRUCTION

CUT AND PLUG EXISTING SANITARY LINE

M-131 (18" CONC) ABANDONED

EXISTING 18" CONCRETE SEWER TO BE REMOVED

EXISTING LINE TO BE PROTECTED DURING CONSTRUCTION

EXISTING WATER LINE TO BE PROTECTED DURING CONSTURUCTION OR RELOCATED.

M-245-AR (72" CONC)

POTENTIAL FUTURE WATER LINE TO BE COORDINATED WITH CITY OF FORT WORTH

PROPOSED 36" CONCRETE CULVERT (70 FT)

EXISTING LIQUID FUEL LINE CARE TO BE TAKEN DURING CONSTRUCTION

M-388-B (60" CONC)

M-381-A (21" CONC)

10" WATER

SCALE: 1" = 100'

0 100' 200'

N

LEGEND

- SS — SANITARY SEWER
- W — WATER LINE
- G — NATURAL GAS LINE
- LPG — LIQUID FUEL LINE

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

CDM

Design file: Datagrid
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by M. OLSON
Drawn by J. HAWES
Checked by D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Last Modified: PEDate

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
UTILITY PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CU-04

...\Sheet\00001_COE_CU-104xx49.dgn 3/8/2008 5:05:02 PM

NOTES:

1. UNDERGROUND UTILITIES AS SHOWN ARE BASED ON CITY OF FORT WORTH GIS DATA AND AS SUPPLEMENTED BY PRELIMINARY GPS SURVEY AND HAVE NOT BEEN CONFIRMED BY DETAILED FIELD INVESTIGATION OR SURVEY.

2. LINE IDENTIFICATION NUMBERS REFER TO CITY OF FORT WORTH NOMENCLATURE AND ARE FOR REFERENCE PURPOSES.

3. FRANCHISE UTILITIES ARE BASED ON TEXAS RAILROAD COMMISSION GIS FILES (JAN 2008) AND PLANIMETRIC SURVEY DATA AS PROVIDED FROM USACE AERIAL MAPPING.

4. ALL UTILITIES SHALL BE CONFIRMED BY SURVEY DURING SUBSEQUENT DESIGN PHASES.

N

0 100' 200'

SCALE: 1" = 100'

LEGEND

- SS — SANITARY SEWER
- W — WATER LINE
- G — NATURAL GAS LINE
- LFC — LIQUID FUEL LINE

EXISTING WATER LINES TO BE PROTECTED DURING CONSTURUCTION.

EXISTING NATURAL GAS LINES CARE TO BE TAKEN DURING CONSTRUCTION

EXISTING NATURAL GAS LINES CARE TO BE TAKEN DURING CONSTRUCTION

EXISTING LIQUID FUEL LINE CARE TO BE TAKEN DURING CONSTRUCTION

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

No.	Description	Date	Appd.

CDM

Design file: Designfile
Set ID: SetID
Size: ANSI D
Plot date: AUGUST 2007
Designed by: DESIGN
Drawn by: DRAWN
Checked by: D. FUNDERLIC
Responsible P.E.: PEResponsible
License Number: PELicenseNum
Letters/Slots: PESlots

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
VALLEY STORAGE MITIGATION
UTILITY PLAN
OXBOW-GATEWAY SITE

SHEET IDENTIFICATION

CU-05

N

0 50' 100'
SCALE IN FEET

CONCRETE SLOPE PROTECTION

520

530

498 MAX

MARINE CREEK DAM

PRECAST CONCRETE SLOPE PROTECTION

PRECAST CONCRETE SLOPE PROTECTION

10' NEW RECREATIONAL/ MAINTENANCE TRAIL

516.5

EXISTING PEDESTRAIN BRIDGE TO BE REMOVED

MARINE CREEK

503.5 MAX

522

503.5 MAX

520

EL 494.0 MAX

5:1

5:1

3:1

5:1

3:1

FLOW

CB

PRECAST CONCRETE SLOPE PROTECTION

5-50' SEGMENTS TOP EL 530.0

EL 506

530

ACCESS ROAD

503.5

NEW PEDESTRIAN BRIDGE-180 FT SPAN

SAMUELS AVENUE LOCK

SAMUELS AVENUE DAM

3.75:1

530

CONCRETE SLOPE PROTECTION

CONCRETE SLOPE PROTECTION

CONTROL BUILDING

530

LOCK WALLS 530.0 TOP, FLOOR 506, BRIDGE SAME AS OVER S/W

EL 515

3:1

EL 503.5 MAX.

10' NEW RECREATIONAL/ MAINTENANCE TRAIL

NOTES:

1. 12' BRIDGE NOT SHOWN FOR CLARITY.
2. ACCESS TO BRIDGE FROM WEST ABUTMENT, SEE SS-03 AND SS-04 FOR DETAILS.

FLOW

BOUYLINE

10' RELOCATE EXISTING RECREATIONAL MAINTENANCE TRAIL

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

CDM

Freese and Nichols

Design file:	0001_COE_SS-101XX43.dgn
Set ID:	BaltD
Size:	ANSI D
Plot date:	SEPTEMBER 2007
Designed by:	JLR
Drawn by:	MLP
Checked by:	JRC
Responsible P.E.:	JOHN L. RUTLEDGE
License Number:	65045
License/State:	TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
SAMUELS AVENUE LOCK & DAM
SITE PLAN

SHEET IDENTIFICATION

SS-01

SCALE IN FEET
0 50' 100'

CONCRETE SLOPE PROTECTION

PRECAST CONCRETE SLOPE PROTECTION

PRECAST CONCRETE SLOPE PROTECTION

PRECAST CONCRETE SLOPE PROTECTION

5-50' SEGMENTS TOP EL 530.0

CONCRETE SLOPE PROTECTION

CONCRETE SLOPE PROTECTION

CONTROL BUILDING

LOCK WALLS 530.0 TOP, FLOOR 506, BRIDGE SAME AS OVER S/W

498 MAX

503.5 MAX

503.5 MAX

EL 484.9 MAX

EL 506

EL 515

EL 503.5 MAX.

520

530

518.4

5:1

3.75:1

3:1

CB

MARINE CREEK

TRAIL

NOTES:
1. 12' BRIDGE NOT SHOWN FOR CLARITY.
2. ACCESS TO BRIDGE FROM WEST ABUTMENT, SEE SS-03 AND SS-04 FOR DETAILS.
3. ACTUAL END POINT OF SHEETPILING IN ABUTMENT TO ABUTMENT TO BE DETERMINED AFTER COMPLETION OF STRUCTURAL ANALYZE.

NOT FOR CONSTRUCTION

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PHASE I

PHASE II

PHASE III

SHEETPILING

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

CDM

Freese and Nichols

Design File:	00001_COE_BS-1002X44.dgn
Set ID:	BaseD
Size:	ANSI D
Plot date:	SEPTEMBER 2007
Designed by:	JLR
Drawn by:	MLF
Checked by:	JLR
Responsible P.E.:	JOHN L. RUTLEDGE
License Number:	65045
License State:	TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
SAMUEL AVENUE LOCK & DAM
PHASING PLAN

SHEET IDENTIFICATION

SS-02

MicroStation V8 User: mmt Office: FWCAD1
Workset: Default Level: COE_SS-102X44
Printer: JVPrinter_XAMPDF_FilePDF-Monochrome.pltt
Print Scale: 100.000 B1 in. Model: Default
Print Date: 30 OCT 2007 04:45:45 PM
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C-SP1x31.dgn
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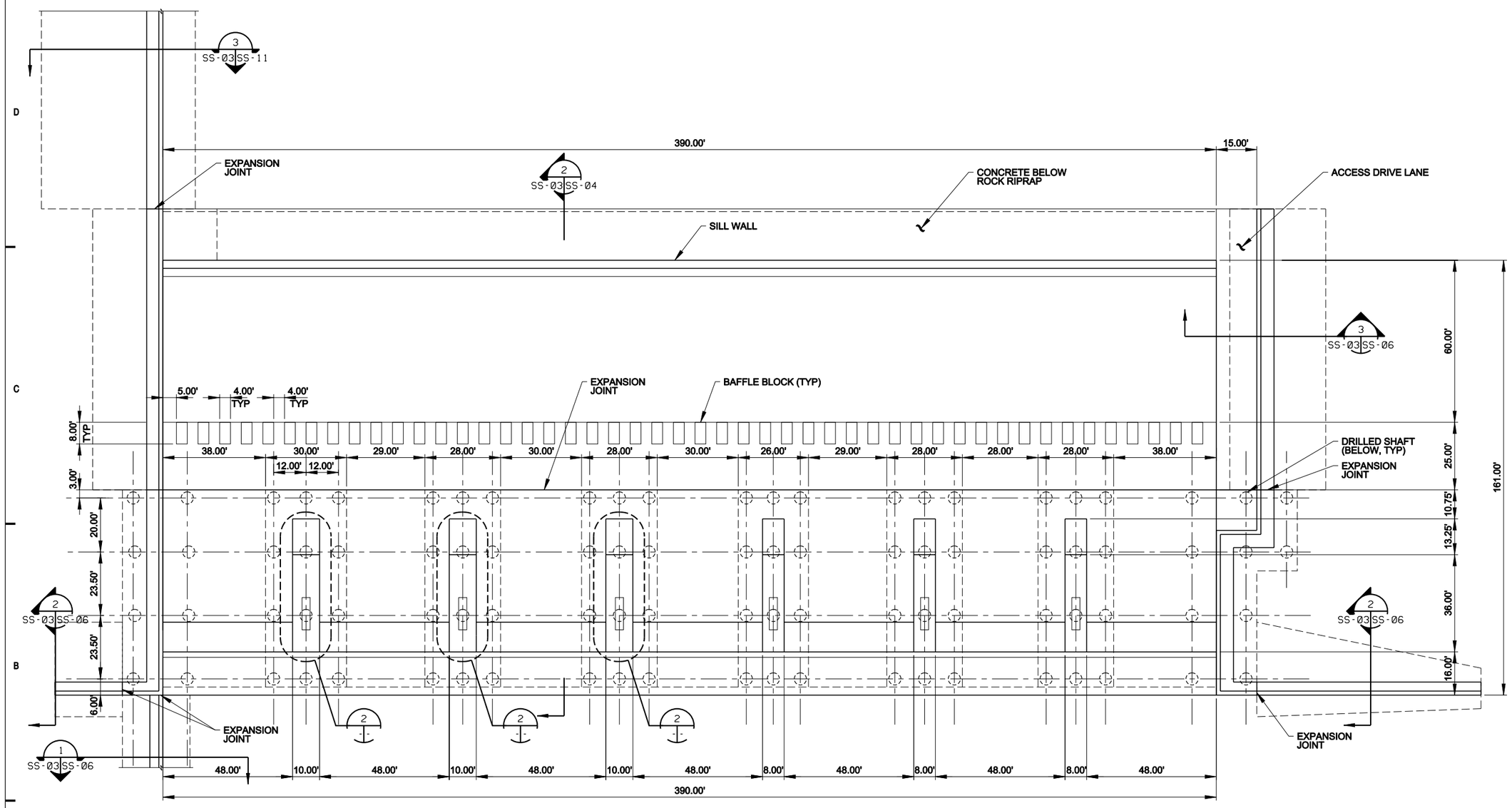
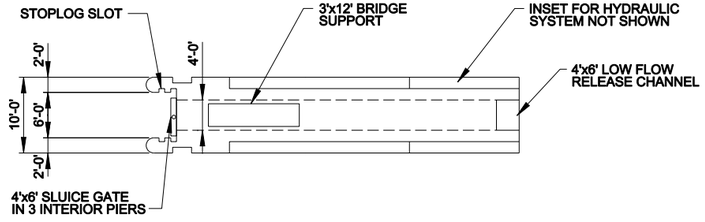


FLOW

1 SAMUEL AVENUE DAM PLAN
1" = 20'



2 PLAN OF LOW FLOW PIER
1" = 10'

NOTE:
STOP LOGS TO BE STORED ON UPSTREAM SIDE OF BRIDGE, NOT SHOWN. STEM FOR SLUICE GATES WILL EXTEND TO AND BE ATTACHED TO THE BRIDGE.

NOT FOR CONSTRUCTION

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0 10' 20'
SCALE: 1" = 10'

0 10' 20' 40'
SCALE: 1" = 20'

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file:	ST-SAM-PL-FNDN.dgn
Set ID:	BaseD
Size:	ANSI D
Plot date:	SEPTEMBER 2007
Designed by:	BWW
Drawn by:	BWW/JAW
Checked by:	
Responsible P.E.:	BRAD B. WATSON
License Number:	80318
License State:	TEXAS

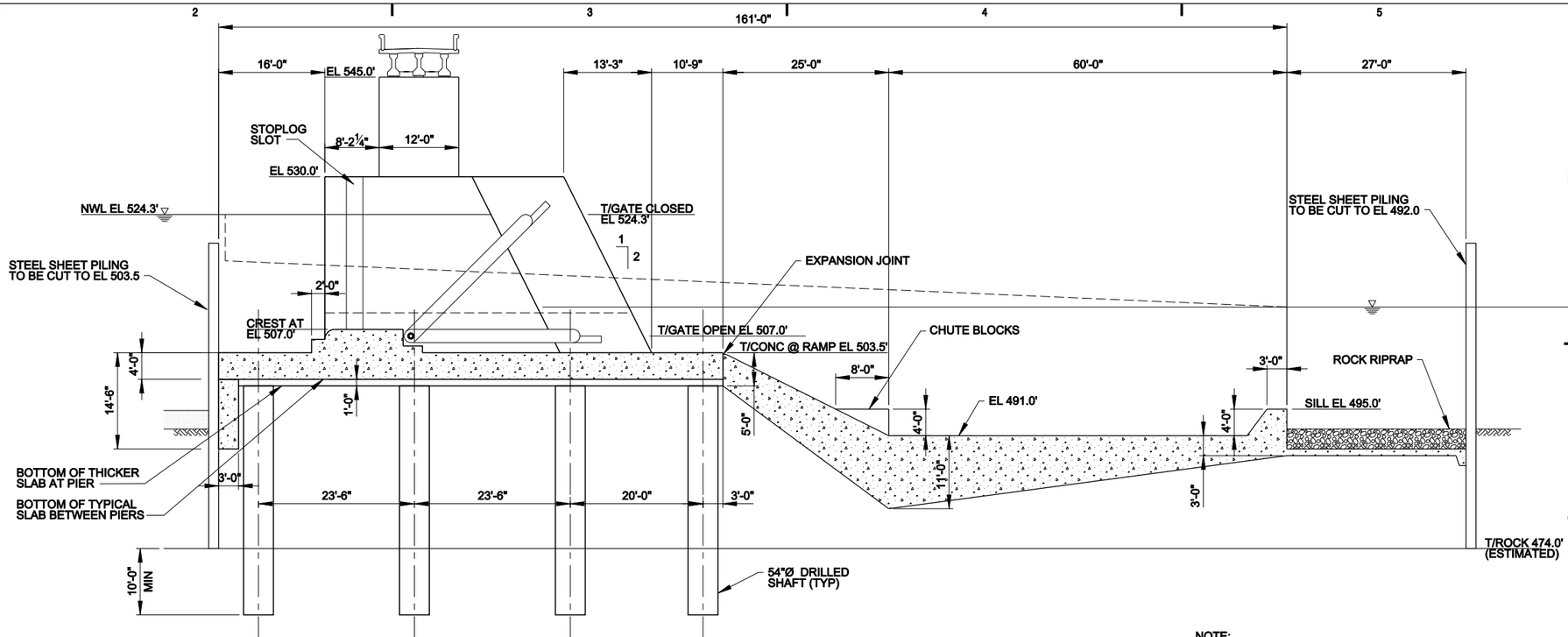
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
PLAN
-

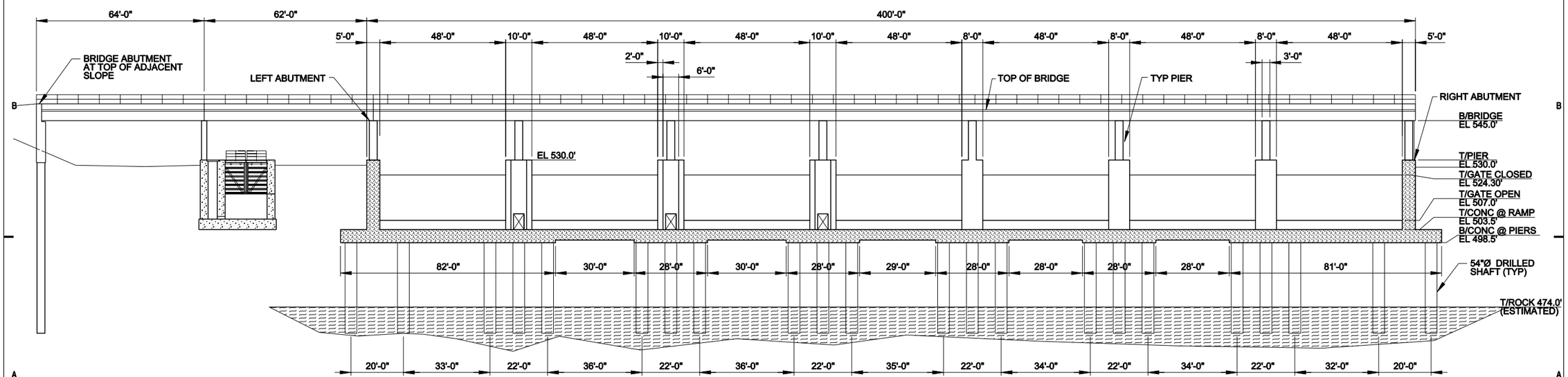
SHEET IDENTIFICATION
SS-03

MicroStation V8 User: mmt Office: FWCAD1
Level: All Levels Off Plotter: 24Pedro_XWPDF_FileDP-Mono-Half.plt Mode: Default
Plot Scale: 40.000 '/ In. Plot Date: Oct. 26, 2007 - 08:13:55 AM
ST-SAM-PL-BASE.DGN
00000-BSS011.dgn



1 SECTION
SS-03|SS-04 1"=10'

NOTE:
ALL ELECTRICAL AND HYDRAULIC LINES FOR GATE OPERATORS ARE TO BE RUN IN CONDUITS ON THE BRIDGE AND IN ENCASED CONDUIT AT EACH PIER.



2 UPSTREAM ELEVATION
SS-03|SS-04 1"=20'

NOT FOR CONSTRUCTION
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SCALE: 1"= 10'

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SAM-SC-CONC.dgn
Set ID: SetID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BBW
Drawn by: BBW/JAW
Checked by: TBH
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License/State: TEXAS

CDM

Freese and Nichols

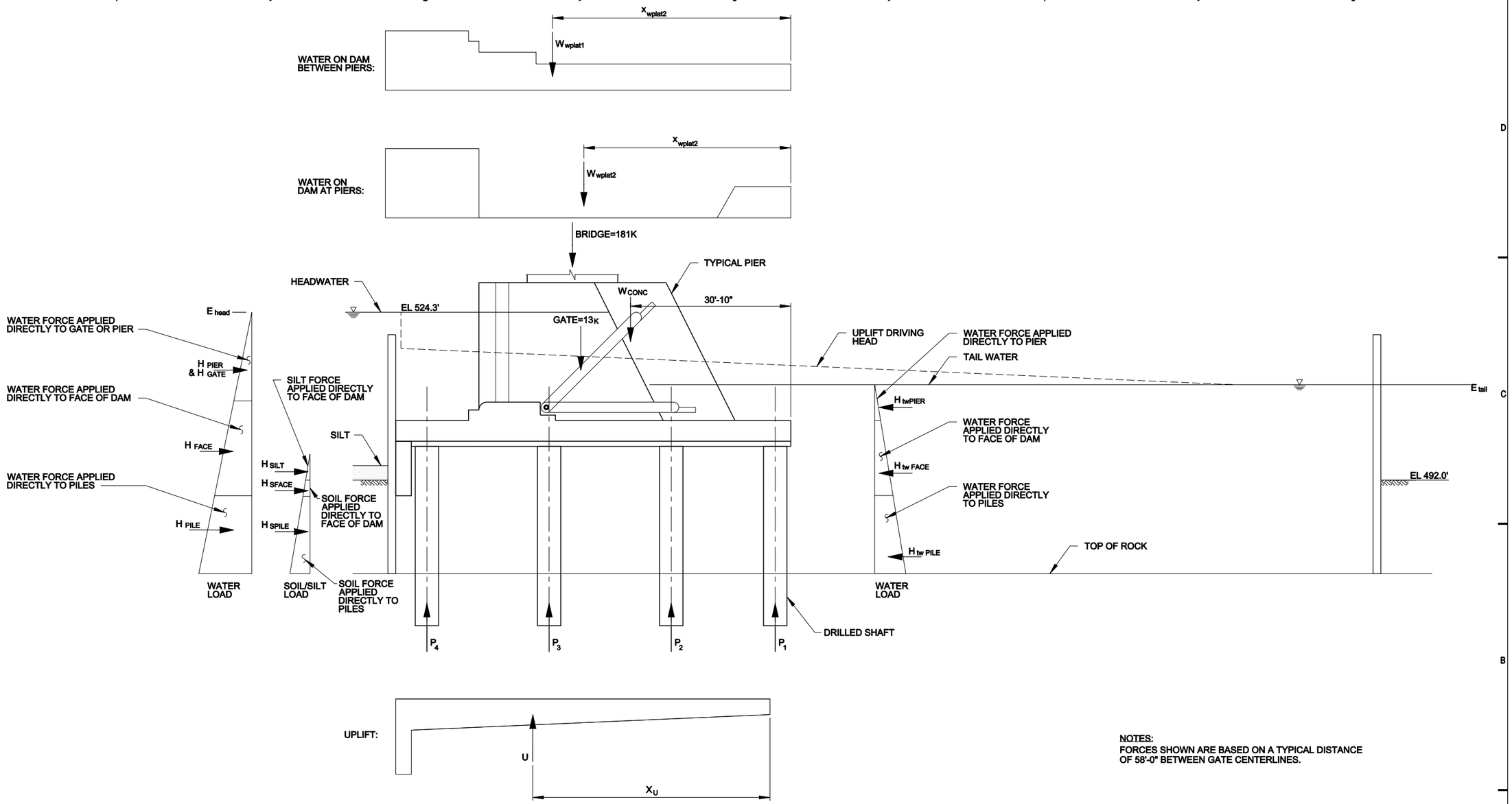
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
SECTION AND ELEVATION
-

SHEET IDENTIFICATION
SS-04

ST-SAM-SC-BASE.dgn
ST-SAM-EL-BASE.dgn
000000-BSize11.cel
ST-SAM-EL-BASE.dgn

MicroStation V8 User: mmt Office: FWCAD1
Project: ST-SAM-SC-BASE.dgn
Plotter: APNdoc_24APDF_FreePDF-Micro-Hard.pltPlot Scale: 200.000 ' = 1 in.
Date: Oct. 26, 2007 - 08:12:46 AM
Mode: Default

Office:FWCAD1 CDM07244 Date:Oct. 26, 2007 - 08:12:46 AM User:mmt File: N:\st\00001_COE_SS-304cv46.dgn



NOTES:
FORCES SHOWN ARE BASED ON A TYPICAL DISTANCE OF 58'-0" BETWEEN GATE CENTERLINES.

STABILITY ANALYSIS

1" = 10'

	Load Case	E_{head} (ft-MSL)	E_{tail} (ft-MSL)	Vertical Forces on Drilled Shaft Supported Platform (kips per pier)							Lateral Forces (kips per pier)									Forces on Drilled Shafts (kips per pier for line of shafts)			
				Concrete	Water Above Platform				Uplift														
				W_{conc}	W_{wplat1}	x_{wplat1}	W_{wplat2}	x_{wplat2}	U	x_U	H_{pier}	H_{gate}	H_{face}	H_{pile}	H_{sface}	H_{spile}	H_{twface}	H_{twpile}	H_{twpier}	P_1	P_2	P_3	P_4
1	No Flow	524.3	499	4923.5	1573.9	-62.9	204.6	-68.1	2786.0	-42.9	104.7	502.3	1651.5	1095.7	60	234.9	150	407.8	31.3	-27.8	189.3	444.4	699.5
2	10-yr	524.3	517.6	4923.5	3329.1	-42.5	309.4	-47.4	4295.1	-39.3	104.7	502.3	1651.5	1095.7	60	234.9	1050.4	855.4	218.8	135.4	270.4	429	587.6
3	25-yr	524.4	520.8	4923.5	4009.8	-39.5	361.7	-42.0	4565.6	-38.9	105.8	507.8	1657.7	1098.4	60	234.9	1445.9	980	301.2	211.1	323.3	455.1	587
4	100-yr	526.5	525	4923.5	5051.6	-37.8	456.6	-38.1	5134.9	-38.7	131.3	633.1	1787.1	1155.5	60	234.9	1943.3	1114.7	405	286.5	381.4	493	604.6
5	500-yr	533.6	531.4	4923.5	6617.2	-37.9	696.8	-37.8	6427.2	-38.6	234	1012.9	2224.7	1348.5	60	234.9	2621	1288.7	561.2	328.8	424.1	536	647.9
6	SPF	540.7	537.8	4923.5	8159.0	-37.9	1018.0	-37.9	7719.4	-37.9	340.5	1402.2	2662.2	1541.5	60	234.9	3298.8	1462.7	725.2	373.3	470.4	584.6	698.8

NOT FOR CONSTRUCTION

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0 10' 20'

SCALE: 1" = 10'

US Army Corps of Engineers Fort Worth District

Symbol	Description	Date	Appr.

Design File: ST-SAM-SC-DAM07.dgn
Set ID: SetID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWW
Drawn by: BWW/JB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

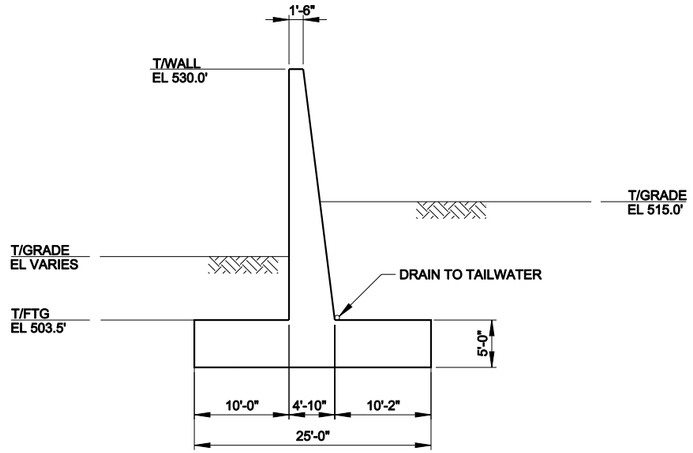
CDM

Freese and Nichols

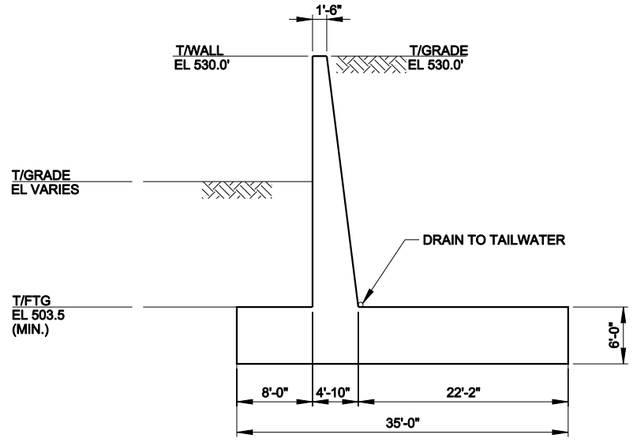
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
STABILITY ANALYSIS
-

SHEET IDENTIFICATION

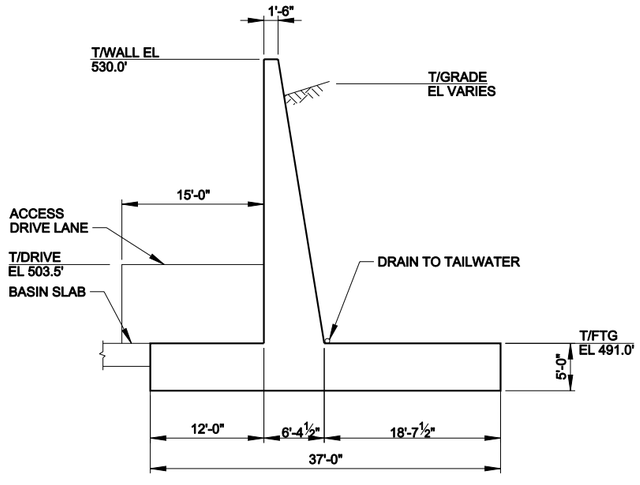
SS-05



1 RIGHT TRAINING WALL AT LOCK
SS-03|SS-06 1/8"=1'-0"



2 LEFT AND RIGHT TRAINING WALLS
SS-03|SS-06 1/8"=1'-0"



3 RIGHT ABUTMENT WALL
SS-03|SS-06 1/8"=1'-0"

NOT FOR CONSTRUCTION

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8' 0 8' 16'
1/8"=1'-0"

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: BT-SAM-SC-DIA01.dgn
Set ID: BatD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWW
Drawn by: BWW/JB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
TRAINING WALLS AND RIGHT ABUTMENT WALL
DIMENSIONS

SHEET IDENTIFICATION

SS-06

MicroStation V8 User: mmt Office: FWCAD1
Workspace: Workset: 00000-BStxx11.dgn
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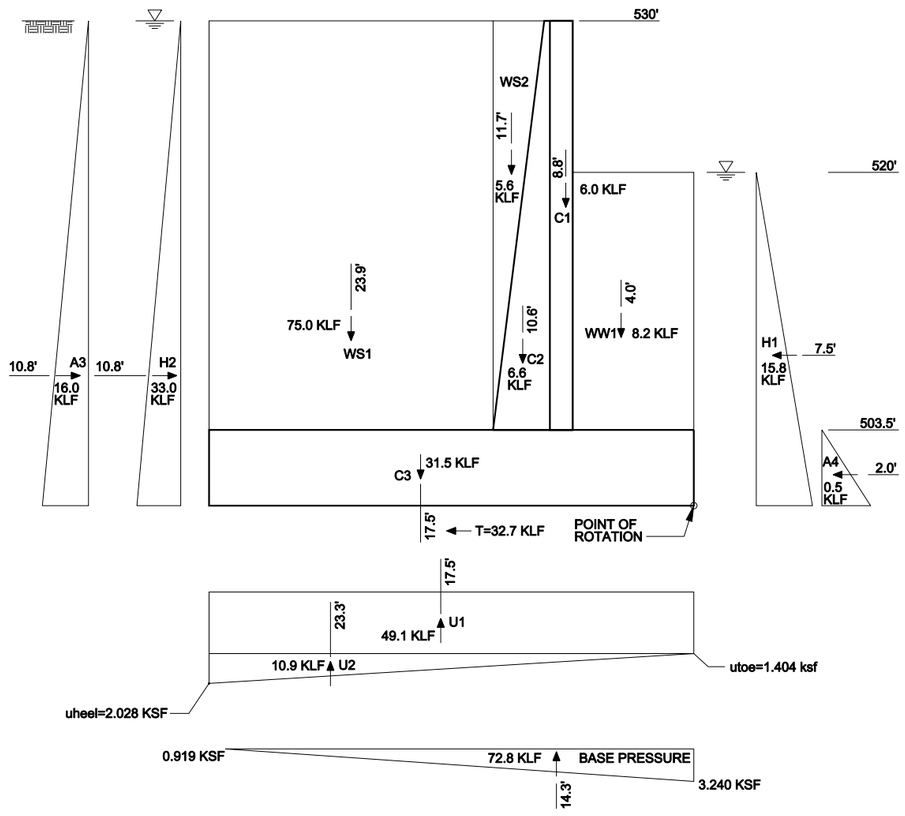
Date: Oct. 26, 2007 - 08:16:01 AM



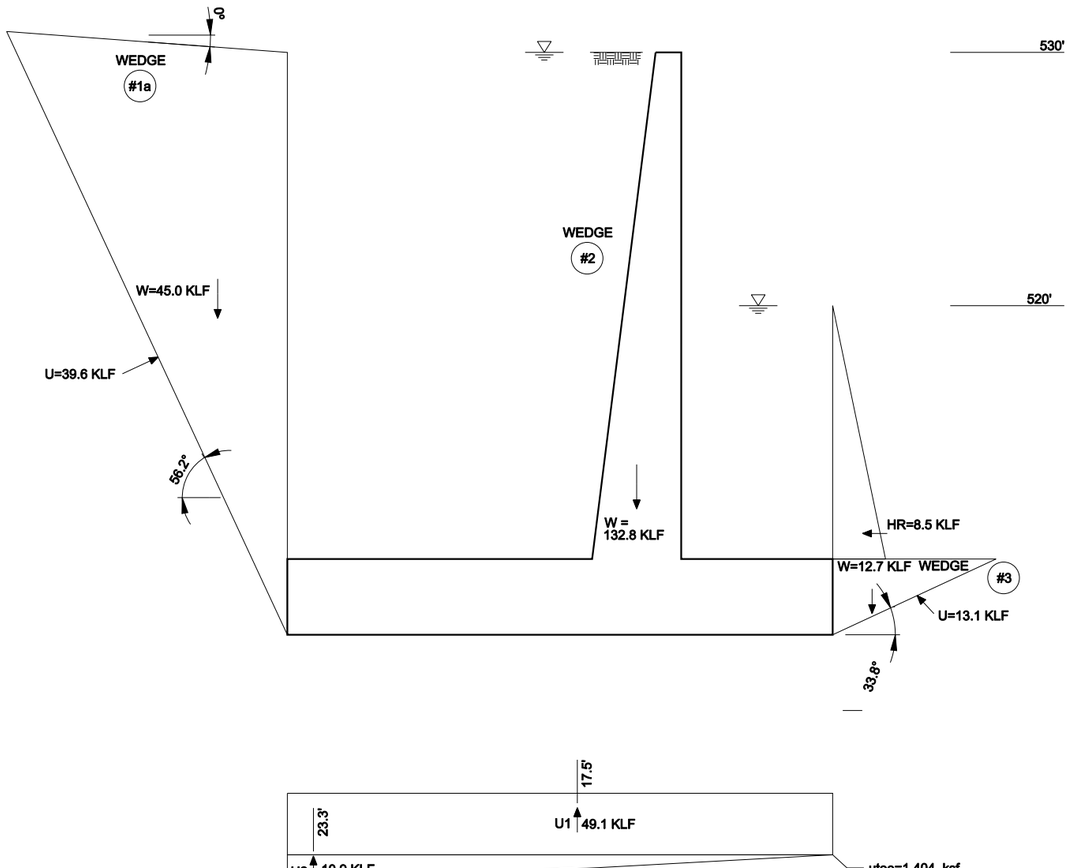
ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	520.0	32.7	0.0	72.8	3.25	100.0	0.919	3.240	13.73
1(b)	523.4	513.4	34.5	0.0	84.4	2.10	100.0	1.544	3.276	13.98
1(c)	516.8	506.8	35.0	0.0	95.9	1.14	100.0	2.205	3.246	14.31
1(d)	510.1	503.5	33.1	0.0	105.5	0.40	100.0	2.806	3.221	14.81
1(e)	503.5	503.5	31.2	0.0	113.1	-0.10	100.0	3.288	3.174	15.14

SLIDING ANALYSIS SUMMARY									
LOAD CASE	WATER @ HEEL	WATER @ TOE	DRIVING WEDGE		STRUCTURAL		RESISTING		FS SLIDE
			Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	530.0	520.0	32	0.0	32	0.0	32	0.0	1.51
1(b)	523.4	513.4	32	0.0	32	0.0	32	0.0	1.61
1(c)	516.8	506.8	32	0.0	32	0.0	32	0.0	1.73
1(d)	510.1	503.5	32	0.0	32	0.0	32	0.0	1.89
1(e)	503.5	503.5	32	0.0	32	0.0	32	0.0	2.03

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	24.1	2899	36.7	4164
1(b)	24.7	2654	46.4	5643
1(c)	23.9	2418	56.5	7183
1(d)	22.2	2293	65.2	8547
1(e)	21.5	2274	72.1	9640



SLIDING STABILITY ANALYSIS

NOT TO SCALE

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE HEEL RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 530.0-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Appr.	Date	Description	Symbol

Design file: ST-SAM-SC-DA001.dgn
Set ID: BatD
Site: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BRW
Drawn by: BRW/AW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

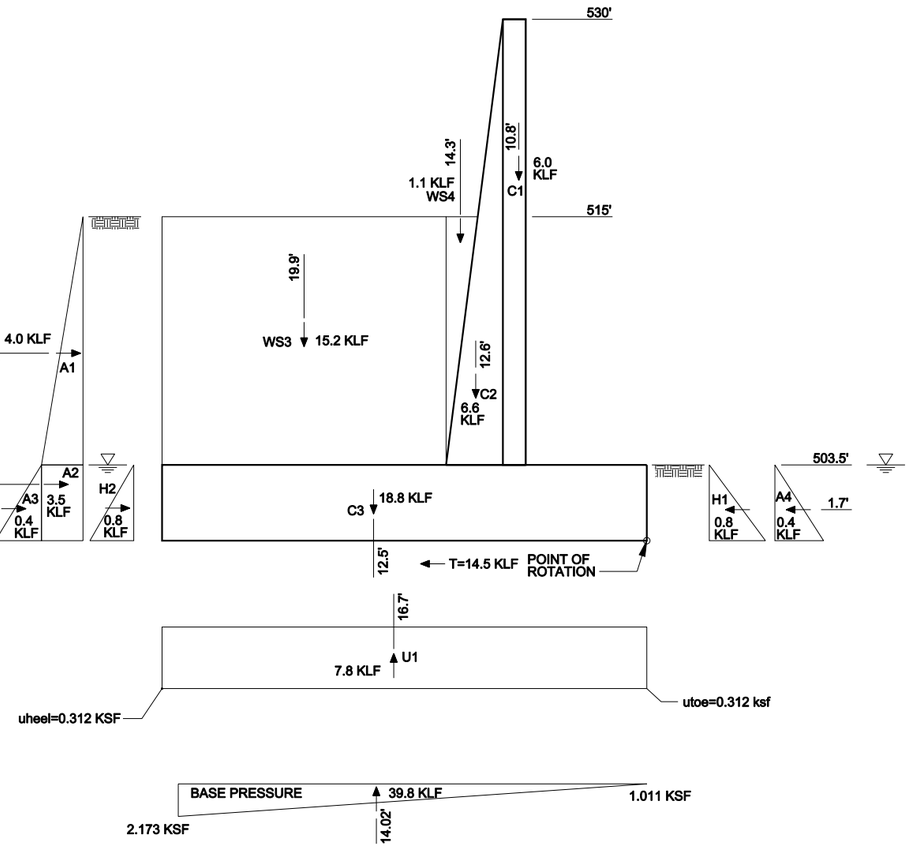
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
RIGHT TRAINING WALL
STABILITY ANALYSIS

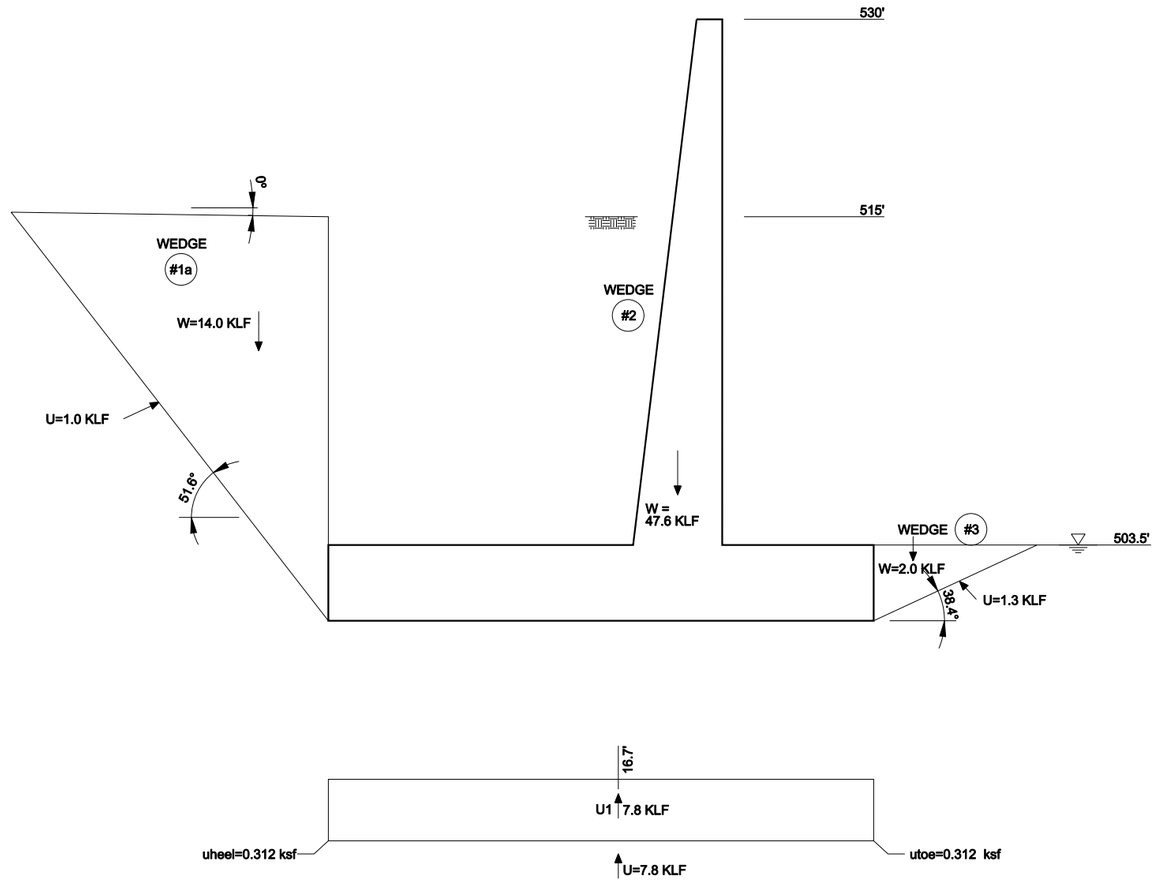
SHEET IDENTIFICATION

SS-07



ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE



SLIDING STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	530.0	3.8	0.0	26.4	-1.12	100.0	1.341	0.774	61.18
1(b)	523.4	523.4	3.8	0.0	27.2	-1.04	100.0	1.361	0.817	60.51
1(c)	516.8	516.8	3.8	0.0	28.4	-0.95	100.0	1.394	0.875	59.33
1(d)	510.1	510.1	5.9	0.0	33.4	-1.07	100.0	1.679	0.995	49.00
1(e)	503.5	503.5	7.6	0.0	39.8	-1.52	100.0	2.173	1.011	36.98

SLIDING ANALYSIS SUMMARY									
LOAD CASE	WATER @ HEEL	WATER @ TOE	DRIVING WEDGE		STRUCTURAL		RESISTING		FS SLIDE
			Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	530.0	530.0	32	0.0	32	0.0	32	0.0	5.55
1(b)	523.4	523.4	32	0.0	32	0.0	32	0.0	4.62
1(c)	516.8	516.8	32	0.0	32	0.0	32	0.0	3.75
1(d)	510.1	510.1	32	0.0	32	0.0	32	0.0	2.84
1(e)	503.5	503.5	32	0.0	32	0.0	32	0.0	2.66

SHEAR AND MOMENT ANALYSIS SUMMARY				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	2.0	93	12.5	787
1(b)	2.0	93	12.7	802
1(c)	2.0	93	13.1	824
1(d)	3.4	168	15.7	988
1(e)	4.0	186	19.7	1255

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS RAGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 503.5-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: BT-SAA-SC-DIAG01.dgn
Set ID: Bet0
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWK
Drawn by: BWK/JB
Checked by: BWK
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

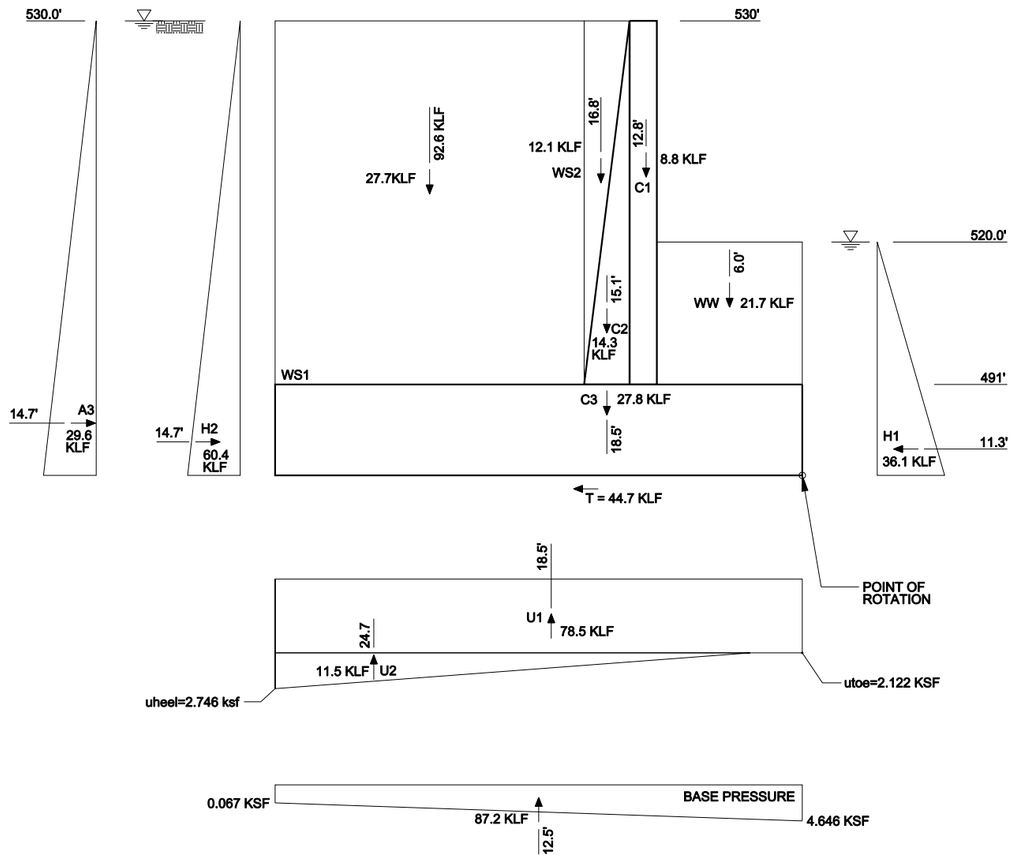
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
LEFT TRAINING WALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-08



ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	520.0	53.9	0.0	87.2	5.99	100.0	0.067	4.646	4.47
1(b)	521.5	511.5	58.9	0.0	100.9	4.57	100.0	0.707	4.749	4.43
1(c)	513.0	503.0	61.7	0.0	114.7	3.20	100.0	1.493	4.705	4.53
1(d)	504.5	494.5	62.4	0.0	128.4	2.00	100.0	2.342	4.596	4.68
1(e)	496.0	491.0	60.0	0.0	140.0	1.16	100.0	3.074	4.494	4.83

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	44.5	7984	46.8	3587
1(b)	48.2	7982	49.1	3726
1(c)	49.7	7713	50.2	4229
1(d)	49.0	7401	54.2	5662
1(e)	46.9	7258	63.9	6895

LEGEND:

FX= SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY= SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ= SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

NOTE:

THE DAM AND BASIN ARE ASSUMED TO BE CAPABLE OF RESISTING THE NET SLIDING FORCE ON THE WALL.

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE HEEL RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 499.0-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: 87-SAM-SC-DAM01.dgn
Set ID: BaseD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BMW
Drawn by: BMW/KB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 88318
LicenseState: TEXAS

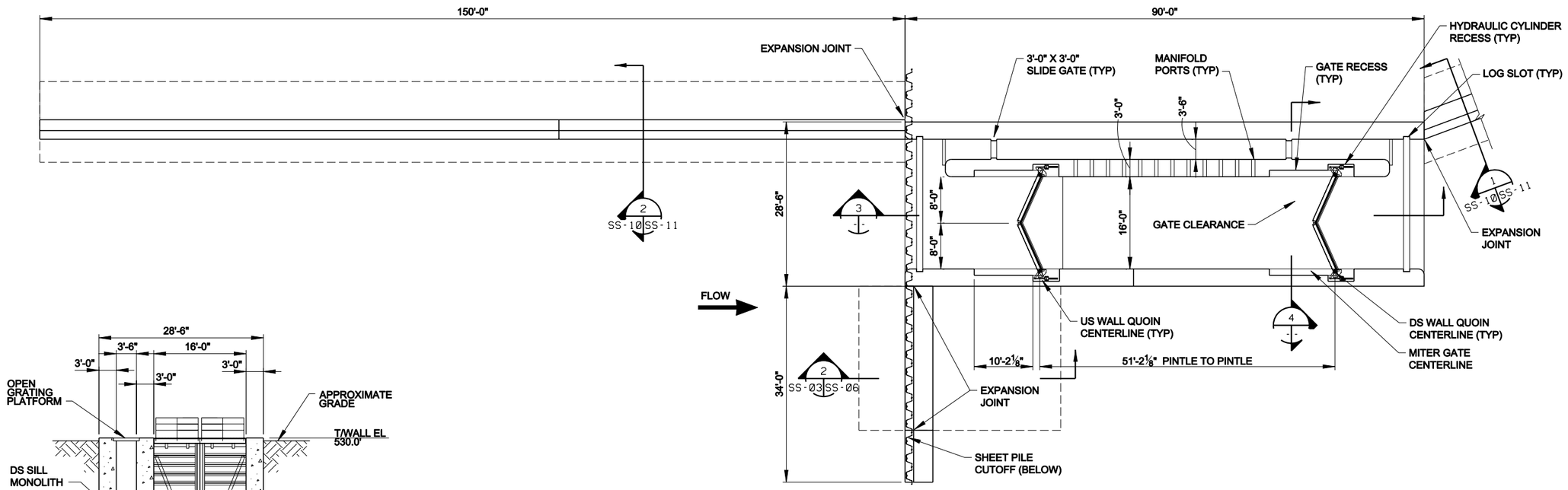
CDM

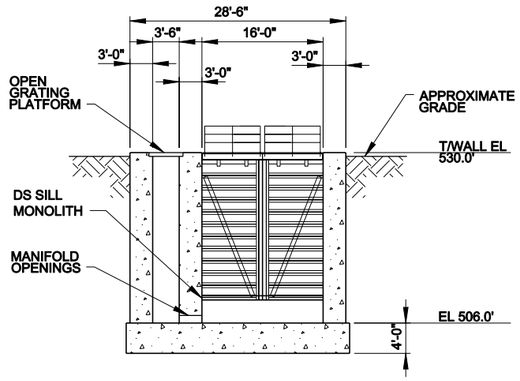
Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
RIGHT ABUTMENT WALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

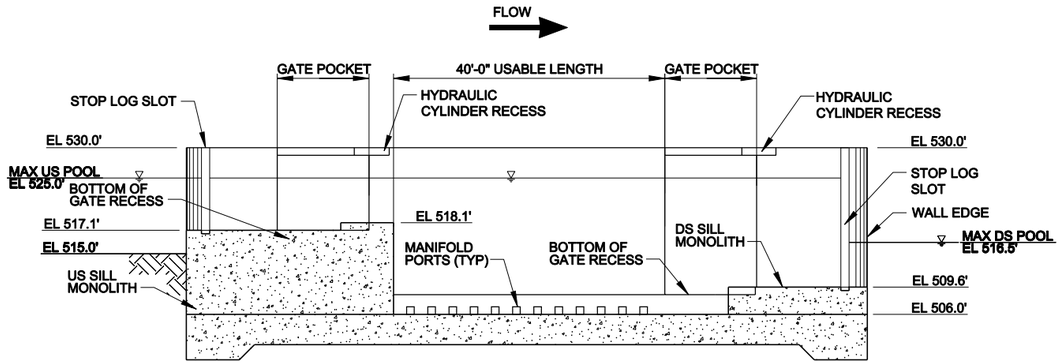
SS-09



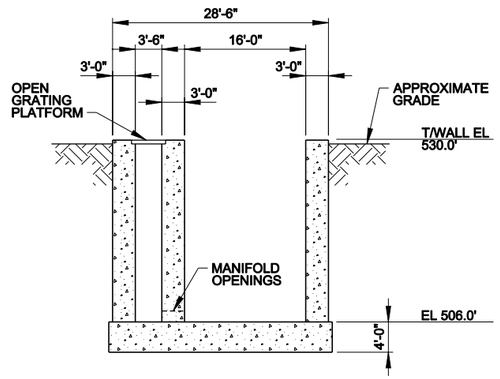


2 LOCK SECTION
1" = 10'

1 LOCK PLAN
1" = 10'



3 LOCK SECTION
1" = 10'



4 LOCK SECTION
1" = 10'

NOT FOR CONSTRUCTION

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0 10' 20'

SCALE: 1" = 10'

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SAM-PL-PRDN.dgn
Set ID: SetID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

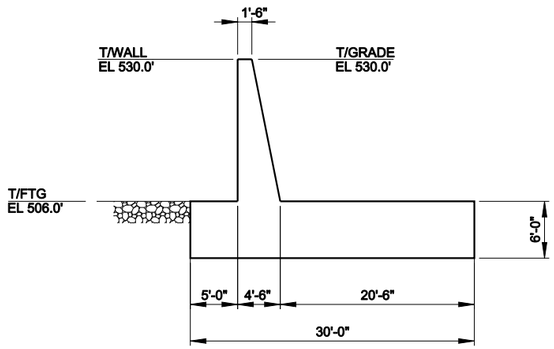
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
LOCK
PLAN AND SECTION

SHEET IDENTIFICATION

SS-10

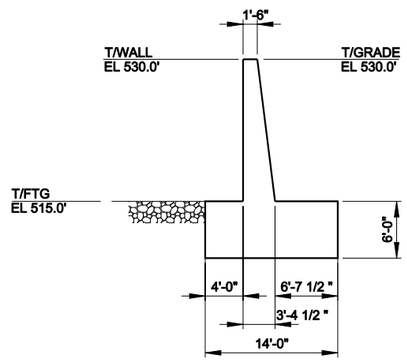
MicroStation V8 User: mmt Office: FWCAD1
Project: CDM07244 CDM07244_COE_SAM-PL-PRDN
Plotter: JPPostScript_XAMPP_PlotPDF-Mono-Half.pltt
Plot Scale: 200.0 '/ In. Model: Default
Plot Date: Oct 26, 2007 - 08:14:28 AM

Office:FWCAD1 CDM07244 Date:Oct. 26, 2007 - 08:14:28 AM User:mmt File: N:\st\00001_COE_SS-410\ss52.dgn



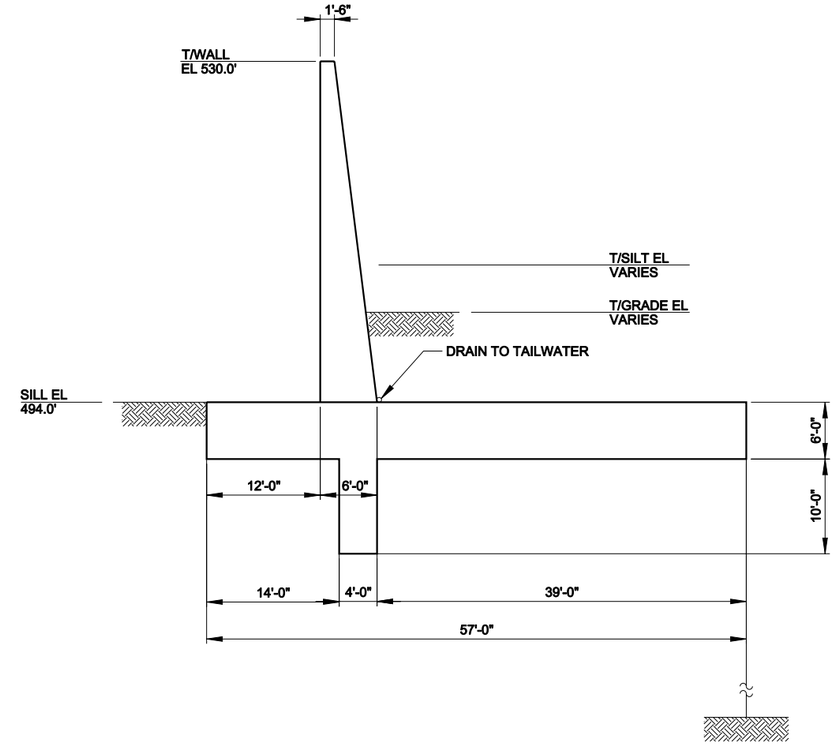
1 SS-10 SS-11 1/8"=1'-0"

DOWNSTREAM TRAINING WALL AT LOCK



2 SS-10 SS-11 1/8"=1'-0"

LEFT TRAINING WALL AT LOCK



3 SS-10 SS-11 1/8"=1'-0"

FLOOD WALL

NOT FOR CONSTRUCTION

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRAD B. WATSON TEXAS NO. 80318 DATE: OCT 2007. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

8' 0 8' 16'
1/8"=1'-0"

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design File: ST-SAM-SO-DIAG01.dgn
Set ID: BaseD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
TRAINING WALLS AT LOCK AND FLOOD WALL
DIMENSIONS

SHEET IDENTIFICATION

SS-11

MicroStation V8 User: mmt Office: FWCAD1
Project: Master.dgn Cell Lib: CDM_Base.cel
Plotter: JPredrv_XAPGE_FlexPDF-Mono-Half.pltt Model: Default
Plot Scale: 192.000 '=1" in
Plot Date: Oct. 26, 2007 - 08:16:38 AM

00000-BBsht1.dgn
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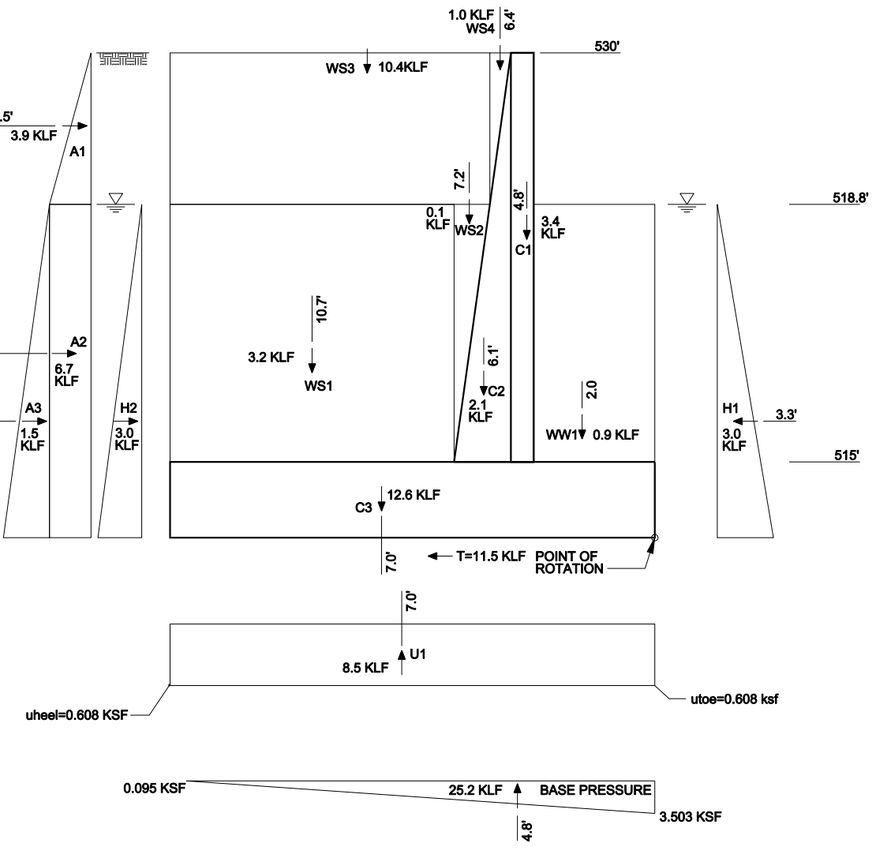
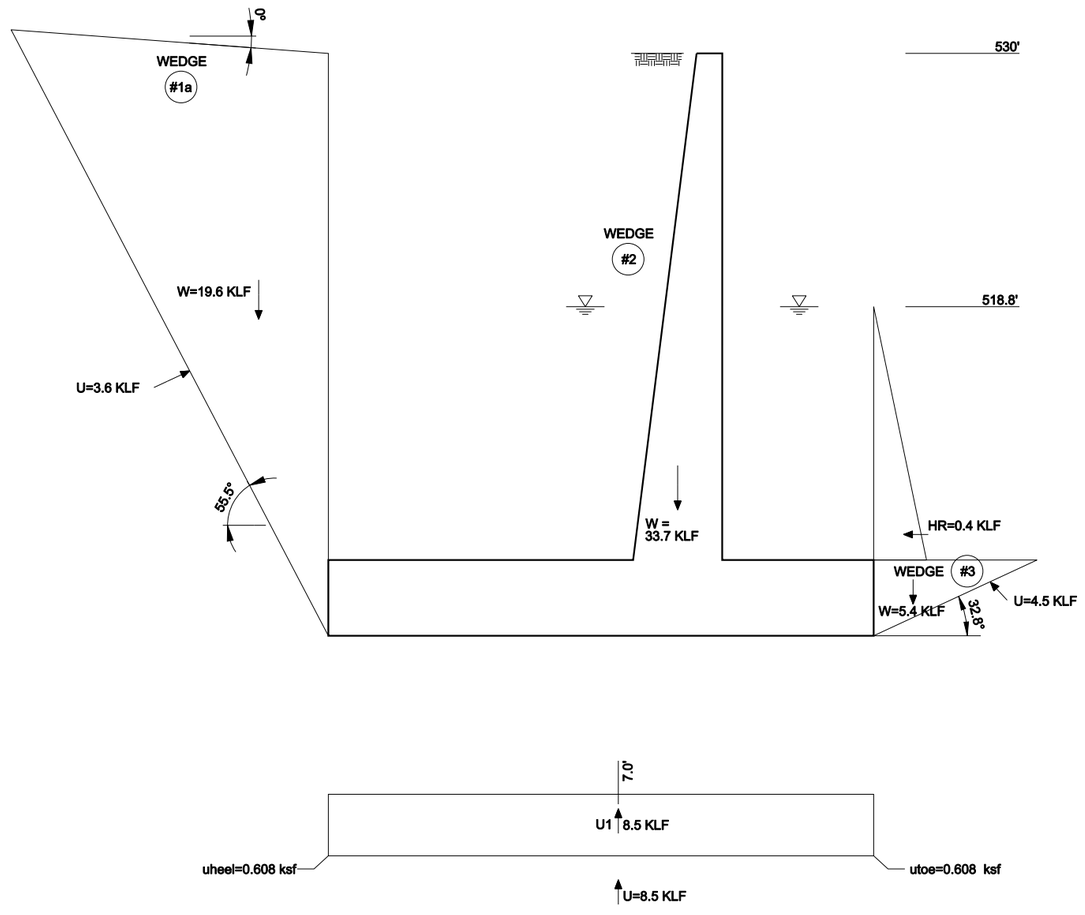
Office:FWCAD1 CDM07244 Date:Oct. 26, 2007 - 08:16:38 AM User:mmt File: N:\st\00001_COE_SS-611\ss53.dgn



ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE



SLIDING STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	530.0	6.2	0.0	17.9	1.56	100.0	0.426	2.137	14.41
1(b)	526.3	526.3	8.4	0.0	20.4	2.16	100.0	0.106	2.804	10.84
1(c)	522.5	522.5	10.1	0.0	22.8	2.32	100.0	0.011	3.242	9.34
1(d)	518.8	518.8	11.5	0.0	25.2	2.21	100.0	0.095	3.503	8.67
1(e)	515.0	515.0	12.4	0.0	27.6	1.97	100.0	0.306	3.635	8.39

SLIDING ANALYSIS SUMMARY									
LOAD CASE	WATER @ HEEL	WATER @ TOE	DRIVING WEDGE		STRUCTURAL		RESISTING		FS SLIDE
			Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	530.0	530.0	32	0.0	32	0.0	32	0.0	2.00
1(b)	526.3	526.3	32	0.0	32	0.0	32	0.0	1.77
1(c)	522.5	522.5	32	0.0	32	0.0	32	0.0	1.67
1(d)	518.8	518.8	32	0.0	32	0.0	32	0.0	1.63
1(e)	515.0	515.0	32	0.0	32	0.0	32	0.0	1.63

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	3.4	206	7.6	190
1(b)	4.9	325	9.7	244
1(c)	6.0	387	11.1	282
1(d)	6.7	409	12.1	305
1(e)	6.9	412	12.6	319

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS RANGING FROM THE RETAINED GRADE ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 518.8-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF INTERIM REVIEW UNDER THE AUTHORITY OF BRAD B. WATSON TEXAS NO. 80318 DATE: OCT 2007. IT IS NOT TO BE USED FOR CONSTRUCTION, BIDDING OR PERMIT PURPOSES.

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SAM-SC-SAG01.dgn
Set ID: Set0
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWK
Drawn by: BWK/JB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
UPSTREAM LOCKWALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-12

MicroStation V8 User: mmt Office: FWCAD1
Design File: C:\Projects\...\ST-SAM-SC-SAG01.dgn
Plotter: JAPrinter_XAMP2E_FlexPDF-Mono-Half.plt Model: Default
Plot Scale: 100.000 % Ft.
Date: Oct. 25, 2007 - 04:12:30 PM

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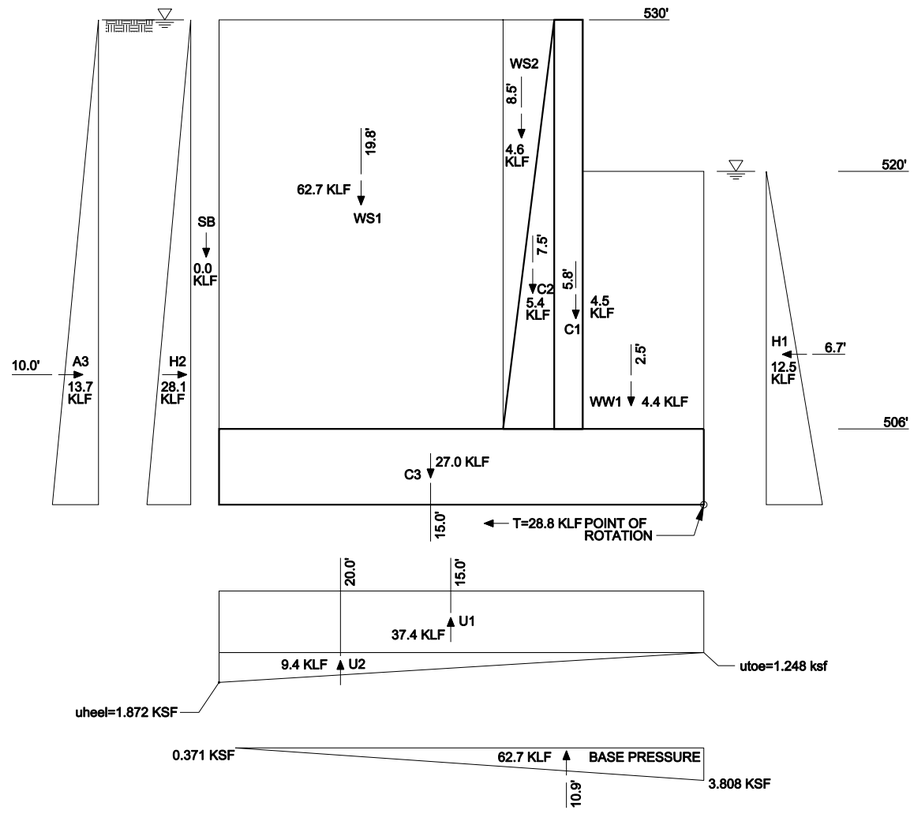
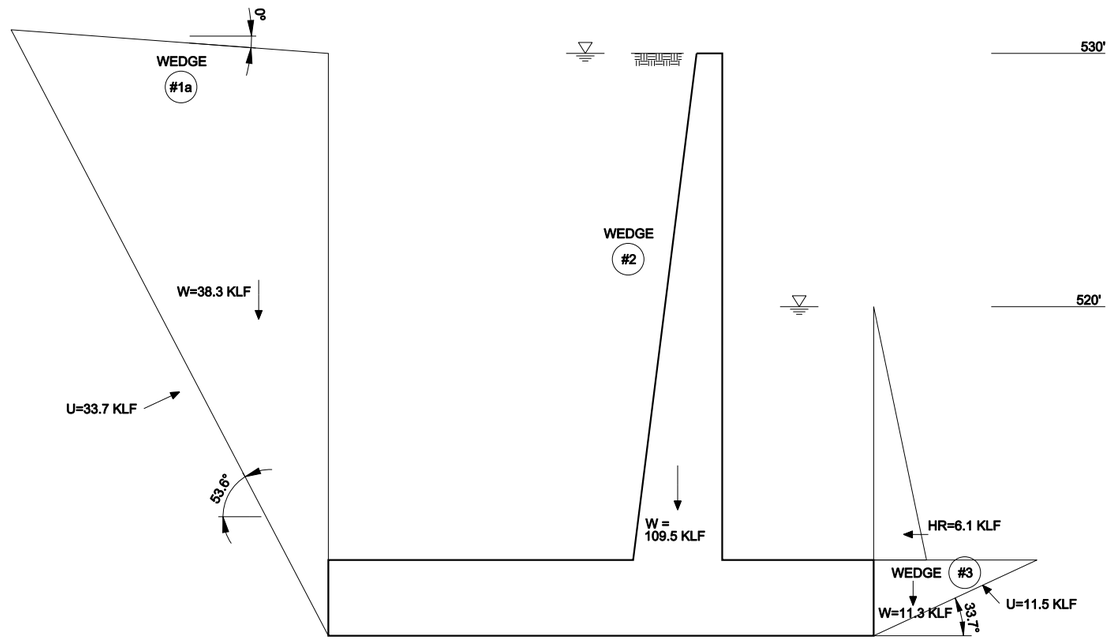
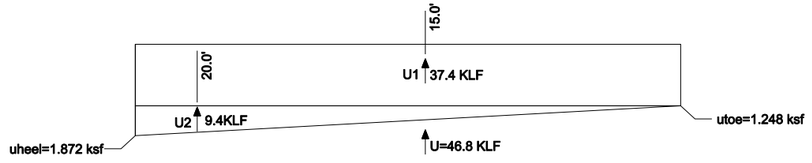


ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE





SLIDING STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	520.0	28.8	0.0	62.7	4.11	100.0	0.371	3.808	11.37
1(b)	526.3	516.3	29.6	0.0	68.4	3.44	100.0	0.710	3.847	11.48
1(c)	516.3	516.3	22.8	0.0	78.3	1.42	100.0	1.866	3.352	13.96
1(d)	511.3	511.3	25.0	0.0	86.7	1.22	100.0	2.185	3.592	13.10
1(e)	506.0	506.0	26.4	0.0	95.2	0.94	100.0	2.575	3.773	12.57

SLIDING ANALYSIS SUMMARY									
LOAD CASE	WATER @ HEEL	WATER @ TOE	DRIVING WEDGE		STRUCTURAL		RESISTING		FS SLIDE
			Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	530.0	520.0	32	0.0	32	0.0	32	0.0	1.50
1(b)	526.3	516.3	32	0.0	32	0.0	32	0.0	1.56
1(c)	516.3	516.3	32	0.0	32	0.0	32	0.0	1.98
1(d)	511.3	511.3	32	0.0	32	0.0	32	0.0	1.99
1(e)	506.0	506.0	32	0.0	32	0.0	32	0.0	2.03

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	20.7	2228	31.7	2910
1(b)	20.9	2094	36.5	3591
1(c)	15.9	1619	48.7	5558
1(d)	17.2	1680	54.7	6318
1(e)	17.6	1690	61.2	7180

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUMDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS RANGING FROM THE RETAINED GRADE ELEVATION DOWN TO THE TOP OF THE CREST (ELEVATION 516.5'). ONLY THE MOST CRITICAL (WATER ELEVATION OVER HEEL AT 530.0-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SAM-SC-DIAG01.dgn
Set ID: SetID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BRW
Drawn by: BRW/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

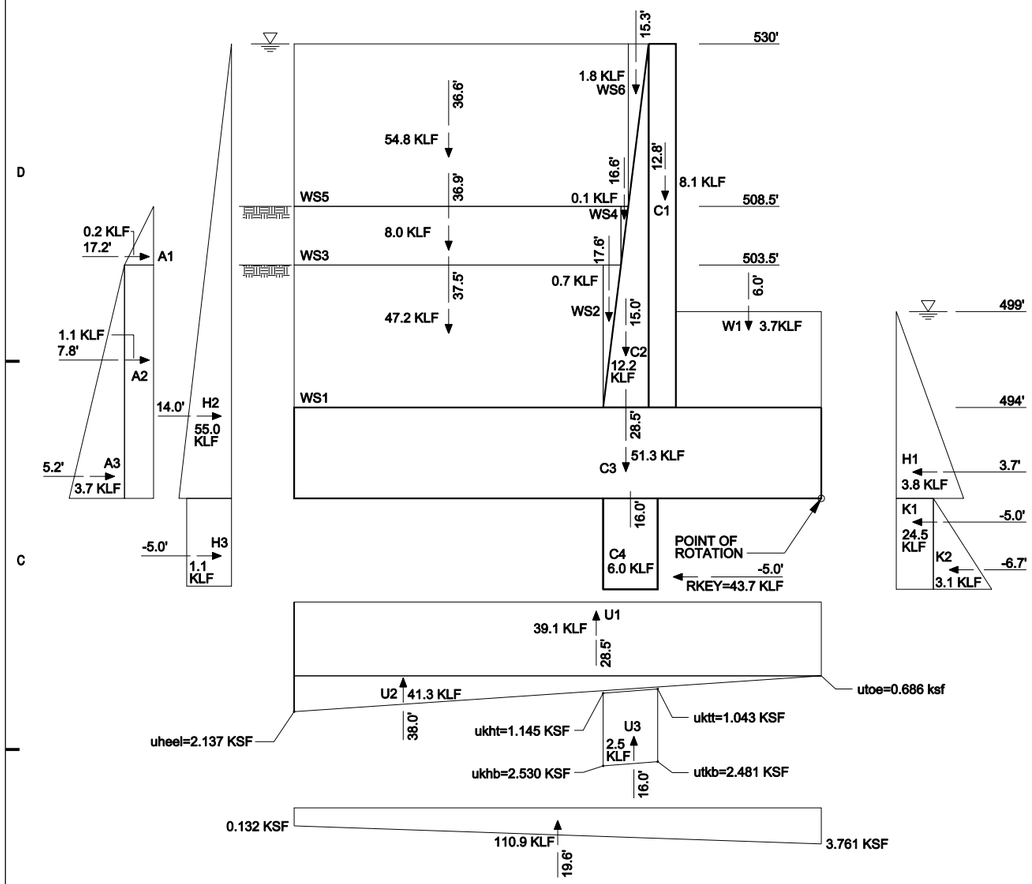
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
DOWNSTREAM LOCKWALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-13



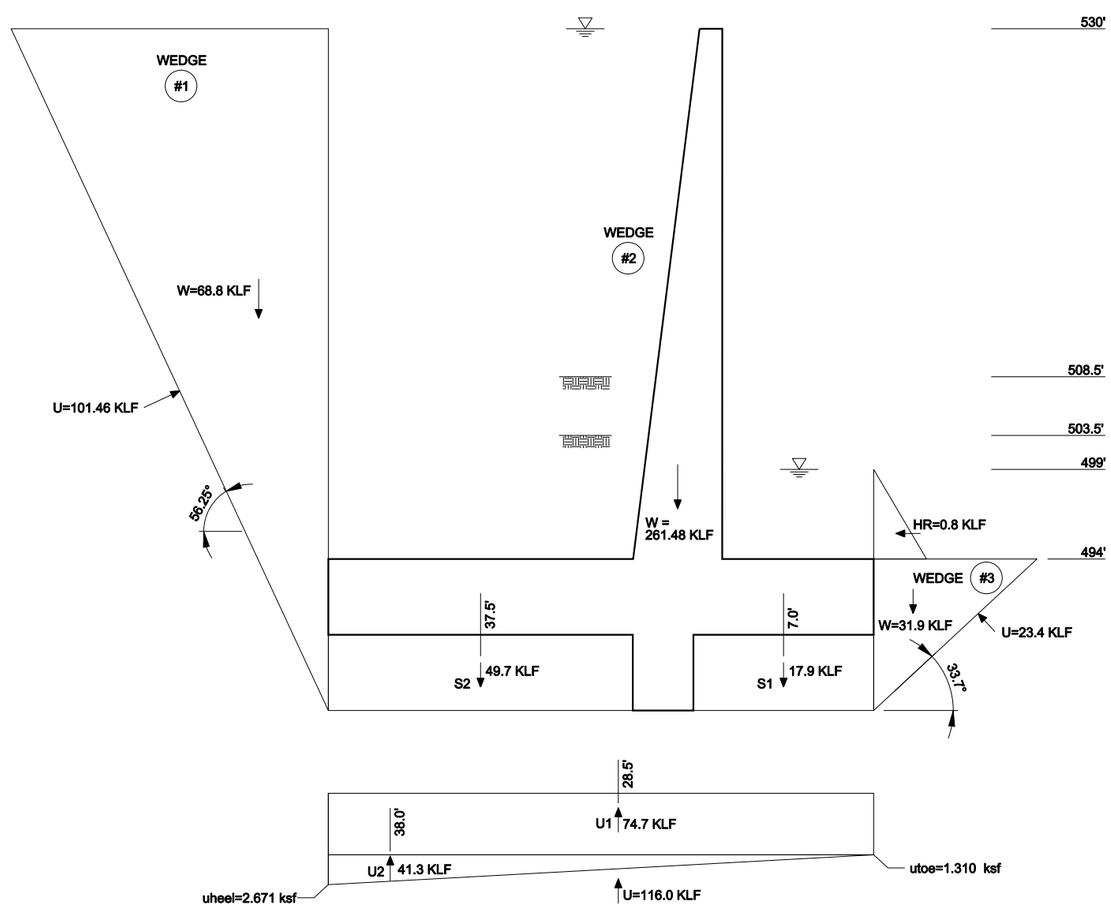
ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY									
LOAD CASE	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
							HEEL	TOE	FS
1(a)	515.0	9.0	0.0	87.4	8.74	100.0	0.122	2.943	9.65
1(b)	510.0	17.1	0.0	94.7	9.24	100.0	0.046	3.278	8.63
1(c)	505.0	23.5	0.0	102.1	9.25	100.0	0.047	3.535	8.00
1(d)	500.0	28.4	0.0	109.5	8.94	100.0	0.112	3.729	7.61
1(e)	499.0	29.2	0.0	110.9	8.86	100.0	0.132	3.761	7.55

SLIDING ANALYSIS SUMMARY								
LOAD CASE	WATER @ TOE	DRIVING WEDGE (#1)		STRUCTURAL WEDGE (#2)		RESISTING WEDGE (#3)		FS SLIDE
		Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	515.0	32	0.0	32	0.0	32	0.0	2.06
1(b)	510.0	32	0.0	32	0.0	32	0.0	1.78
1(c)	505.0	32	0.0	32	0.0	32	0.0	1.62
1(d)	500.0	32	0.0	32	0.0	32	0.0	1.52
1(e)	499.0	32	0.0	32	0.0	32	0.0	1.51

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	28.9	4782	42.4	6985
1(b)	34.7	5427	44.9	7145
1(c)	38.9	5772	48.4	7691
1(d)	41.6	5911	52.6	8552
1(e)	41.9	5923	53.6	8755



SLIDING STABILITY ANALYSIS

NOT TO SCALE

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE AT ELEVATION 530.0-FT. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE TOE RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 499.0-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design File: ST-SAM-SC-DIAG01.dgn
Set ID: BatID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/JB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

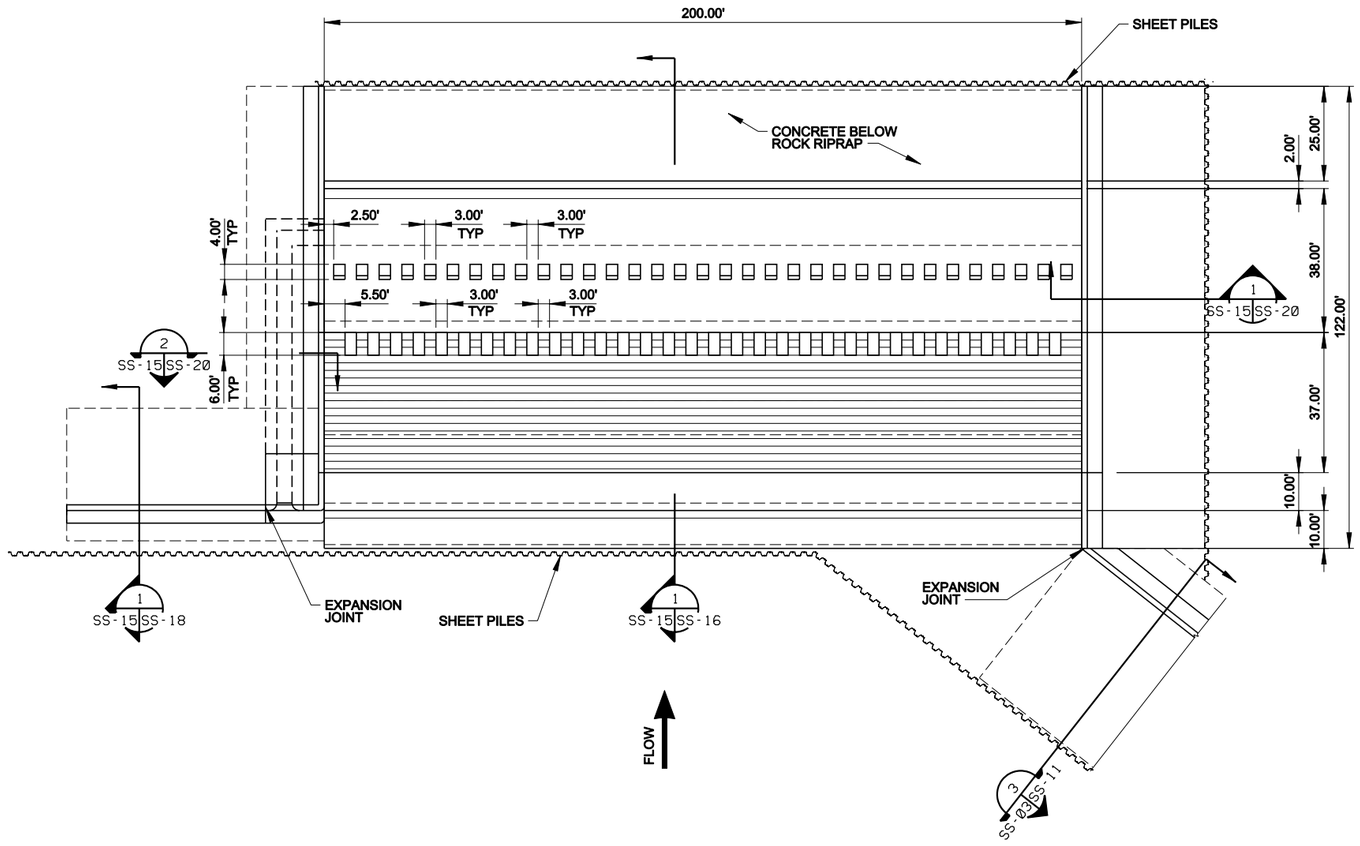
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
SAMUELS AVENUE DAM
FLOODWALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-14



1 MARINE CREEK DAM PLAN
1" = 20'

NOT FOR CONSTRUCTION

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0 10' 20' 40'
SCALE: 1" = 20'

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-MAR-PL-FINAL.dgn
Set ID: BaseD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
PLAN
-

SHEET IDENTIFICATION
SS-15

MicroStation V8 User: mmt Office: FWCAD1
Workset: CDM07244 Level: BASE-ADDON
Plotter: JAPlotter_XAMP2E_FlipPDF-Mono-Half.plt Mode: Default
Plot Scale: 400.000 '/ In.
Date: Oct. 26, 2007 - 08:14:58 AM
ST-MAR-PL-BASE-DON
(700)Sheet-Ref.dgn
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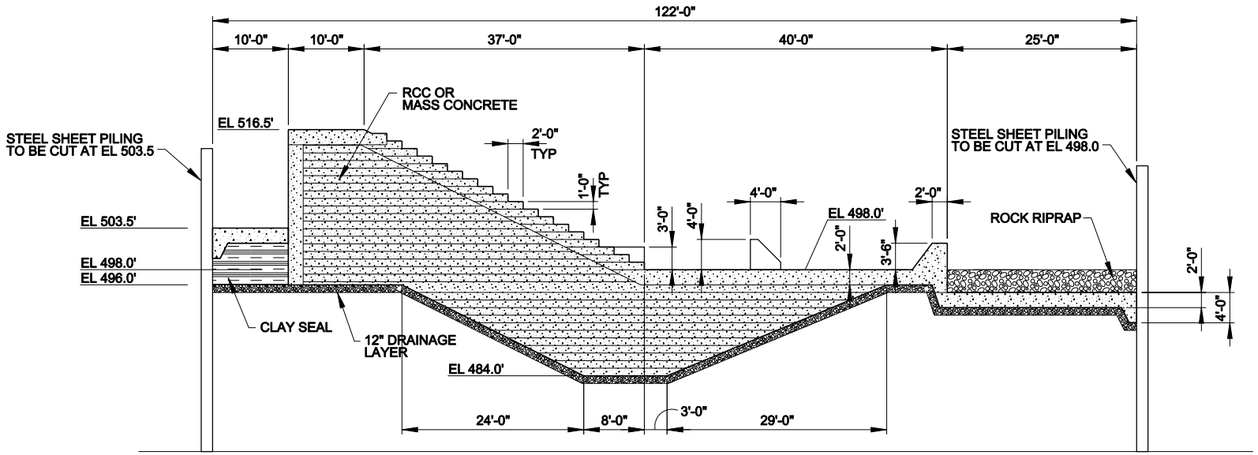
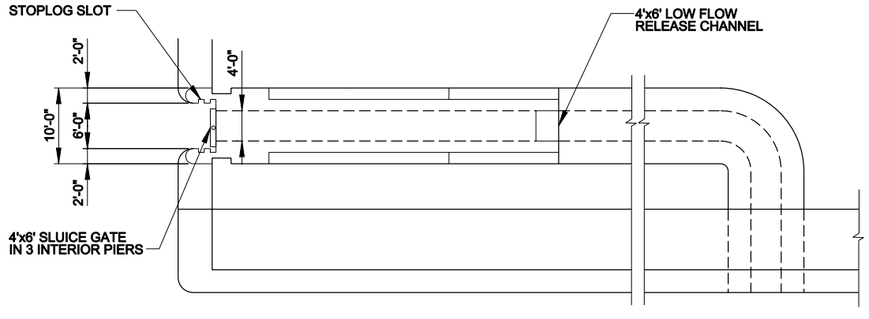


1 SECTION
SS-15 SS-16 1"=10'



2 PLAN OF LOW FLOW PIER
SS-15 SS-16 1"=5'

NOT FOR CONSTRUCTION

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0 5' 10'
SCALE: 1" = 5'

0 10' 20'
SCALE: 1" = 10'

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-MAR-SC-CONC.dgn
Set ID.: BatD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BRW
Drawn by: BRW/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
SECTION
-

SHEET IDENTIFICATION

SS-16

MicroStation V8 User: mmt Office: FWCAD1
Workset: CDM07244 Config: ST-MAR-SC-BASE.dgn
Plotter: JXPrinter_XAMP2E_FlipPDF-Mono-Half.pltt 00000-BStext11.dgn
Plot Scale: 203.000 '=1" Model: Default
Date: Oct 26, 2007 - 08:13:28 AM

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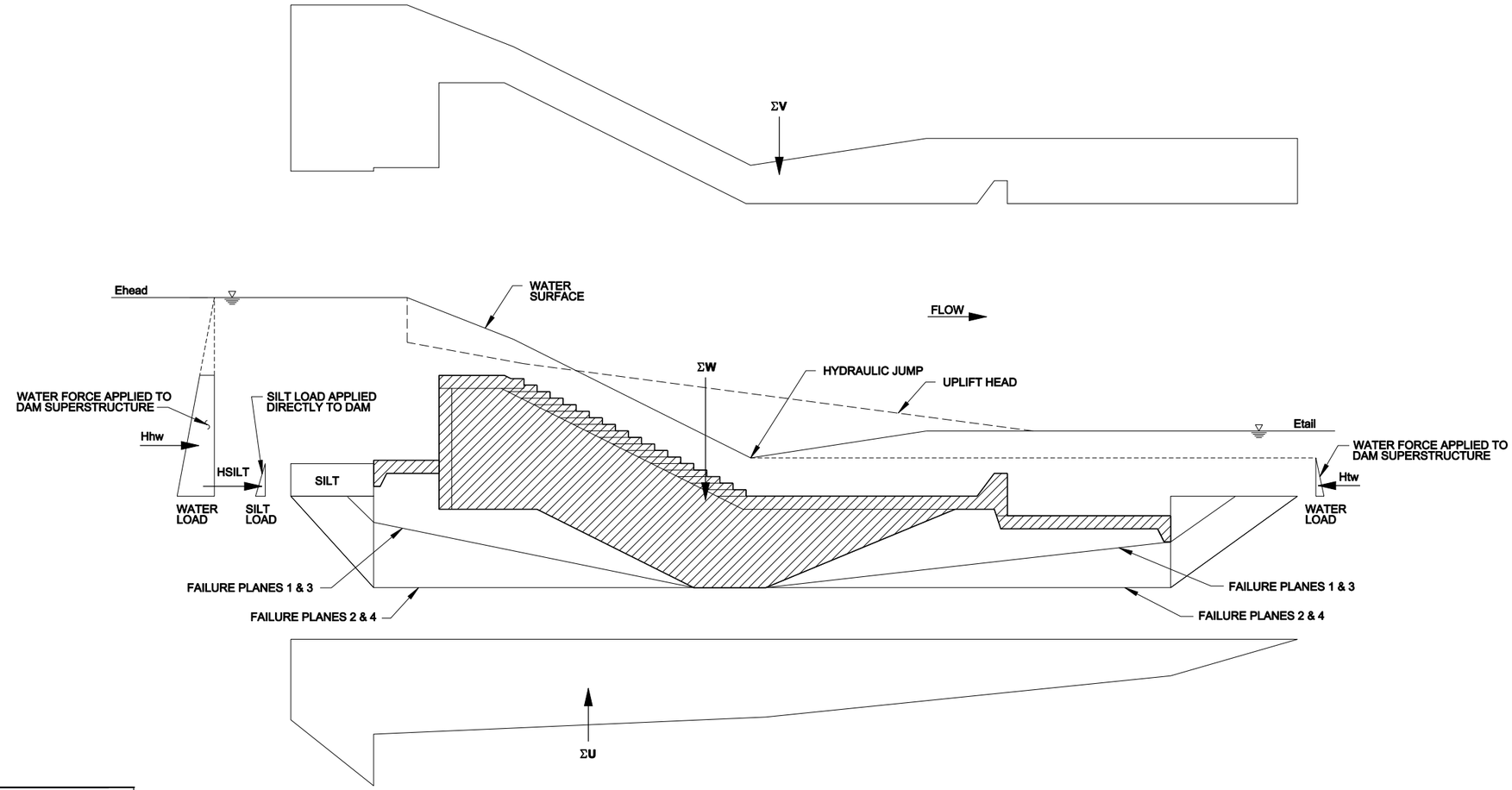

STABILITY ANALYSIS

1" = 10'

Marine Creek Dam Schedule

	Load Case	E_{head} (ft-MSL)	E_{tail} (ft-MSL)	Req'd FS (Sliding)	General Wedge Theory Failure Plane	Summation of Vertical Loads (klf) ΣW	ΣV	ΣU	Summation of Lateral ΣH_L	ΣH_R	FS
1	Normal Pool	516.5	499	2	1	236.2	22.5	125.4	10.9	0.0	2.5
					2	288.6	34.6	168.2	10.9	0.0	4.1
					3	289.6	23.3	151.6	10.9	0.0	3.2
					4	341.6	35.6	194.5	10.9	0.0	5.0
2	10-yr	522.6	510	2	1	236.3	73.9	206.1	18.0	0.0	1.9
					2	288.3	88.5	253.1	18.0	0.0	3.0
					3	290.3	82.1	241.7	18.0	0.0	2.7
					4	341.9	97.1	288.8	18.0	0.0	4.0
3	50-yr	524.8	513	1.7	1	236.6	87.0	229.6	20.5	0.0	1.7
					2	287.9	102.4	278.0	20.5	0.0	2.6
					3	290.6	97.6	268.1	20.5	0.0	2.4
					4	342.0	113.2	316.4	20.5	0.0	3.5
4	100-yr	525.7	515	1.7	1	236.6	102.2	243.7	21.5	0.0	1.7
					2	287.9	118.3	292.8	21.5	0.0	2.7
					3	290.5	114.0	283.8	21.5	0.0	2.5
					4	341.8	130.4	333.0	21.5	0.0	3.5
5	500-yr	526.9	517	1.3	1	236.2	119.5	258.6	22.9	0.1	1.8
					2	288.2	136.2	308.8	22.9	0.1	2.8
					3	290.5	132.7	300.4	22.9	0.1	2.5
					4	342.0	149.5	350.4	22.9	0.1	3.5
6	Extreme	530	521	1.3	1	236.7	133.2	290.8	26.5	0.3	1.4
					2	287.4	150.1	342.3	26.5	0.3	2.1
					3	291.3	149.5	336.4	26.5	0.3	2.1
					4	342.0	167.0	388.1	26.5	0.3	3.0

NOT FOR CONSTRUCTION

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0 10' 20'

SCALE: 1" = 10'

US Army Corps of Engineers Fort Worth District

Symbol	Description	Date	Appr.

Design file: 87AMR-SC-DAM01.dgn
Set ID: BaseD
Size: ANSI D
Plot. date: SEPTEMBER 2007
Designed by: BMW
Drawn by: BMW
Checked by: BMW
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

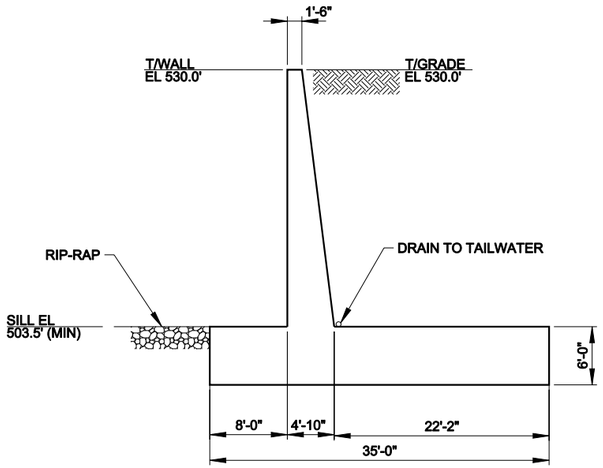
CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
STABILITY ANALYSIS
-

SHEET IDENTIFICATION

SS-17



1 SS-15 SS-18 TRAINING WALL
1/8" = 1'-0"

NOT FOR CONSTRUCTION

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8' 0 8' 16'
1/8" = 1'-0"

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SMA-SC-DIA001.dgn
Set ID.: BwD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BMW
Drawn by: BMW/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

CDM

Freese and Nichols

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK
LEFT TRAINING WALL
DIMENSIONS

SHEET IDENTIFICATION

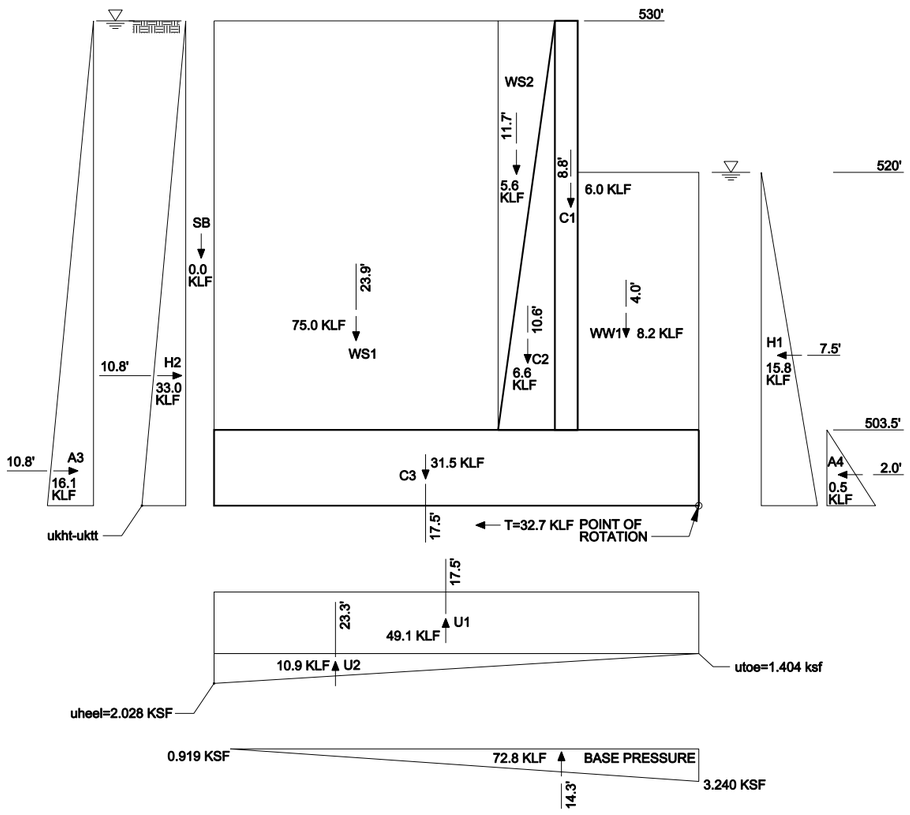
SS-18

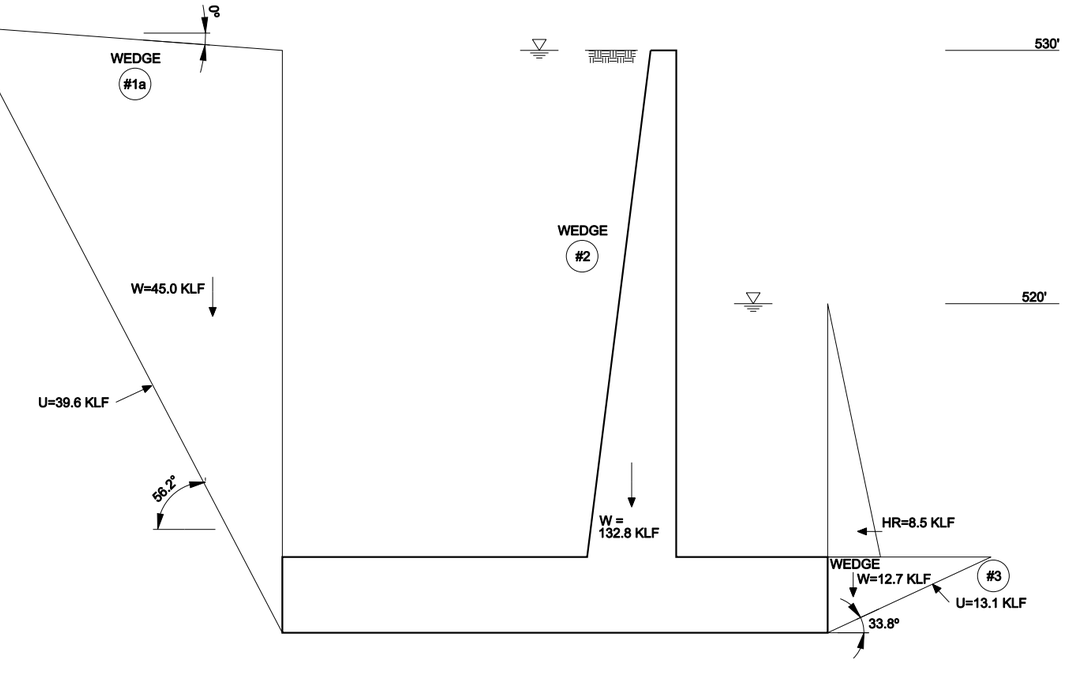
MicroStation V8 User: mmt Office: FWCAD1
Project: N:\at00001_COE_Marine_Creek.dgn
Printer: \\Pdpdrv_XM\PDF_File\PDF-Mono-HalfCut
Plot Scale: 25.00 yards = 1 in.
Date: Oct. 26, 2007 - 08:25:24 AM

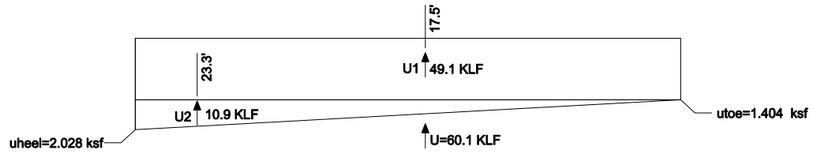
00000-BBord1.dgn
00000-BBord1.dgn

Model: Default

Office:FWCAD1 CDM07244 Date:Oct. 26, 2007 - 08:25:24 AM User:mmt File: N:\at00001_COE_SS-618xx60.dgn







ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

SLIDING STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY

LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	520.0	32.7	0.0	72.8	3.25	100.0	0.919	3.240	13.73
1(b)	523.4	513.4	34.5	0.0	84.4	2.10	100.0	1.544	3.276	13.98
1(c)	516.8	506.8	35.0	0.0	95.9	1.14	100.0	2.205	3.246	14.31
1(d)	510.1	503.5	33.1	0.0	105.5	0.40	100.0	2.806	3.221	14.81
1(e)	503.5	503.5	31.2	0.0	113.1	-0.10	100.0	3.288	3.174	15.14

SLIDING ANALYSIS SUMMARY

LOAD CASE	WATER @ HEEL	WATER @ TOE	DRIVING WEDGE		STRUCTURAL		RESISTING		FS SLIDE
			Φ	C (KSF)	Φ	C (KSF)	Φ	C (KSF)	
1(a)	530.0	520.0	32	0.0	32	0.0	32	0.0	1.51
1(b)	523.4	513.4	32	0.0	32	0.0	32	0.0	1.61
1(c)	516.8	506.8	32	0.0	32	0.0	32	0.0	1.73
1(d)	510.1	503.5	32	0.0	32	0.0	32	0.0	1.89
1(e)	503.5	503.5	32	0.0	32	0.0	32	0.0	2.03

SHEAR AND MOMENT ANALYSIS

LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	24.1	2899	36.7	4164
1(b)	24.7	2654	46.4	5643
1(c)	23.9	2418	56.5	7183
1(d)	22.2	2293	65.2	8547
1(e)	21.5	2274	72.1	9640

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE HEEL RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION 530.0-FT) CASE, WITH RESPECT TO SLIDING, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Appr. | Date | Description | Symbol

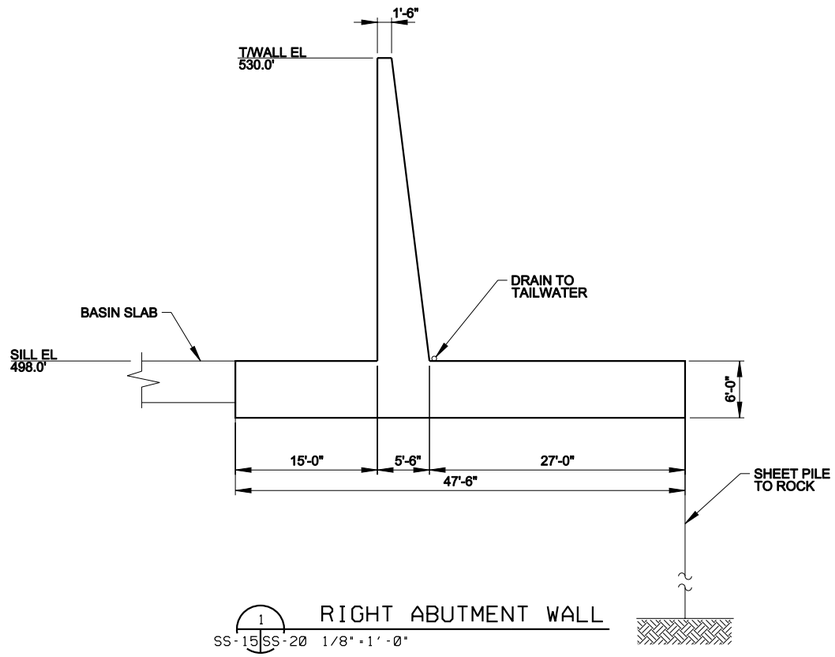
Design file: ST-SM4-SC-DIA001.dgn
Set ID: BatD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

CDM | Freese and Nichols

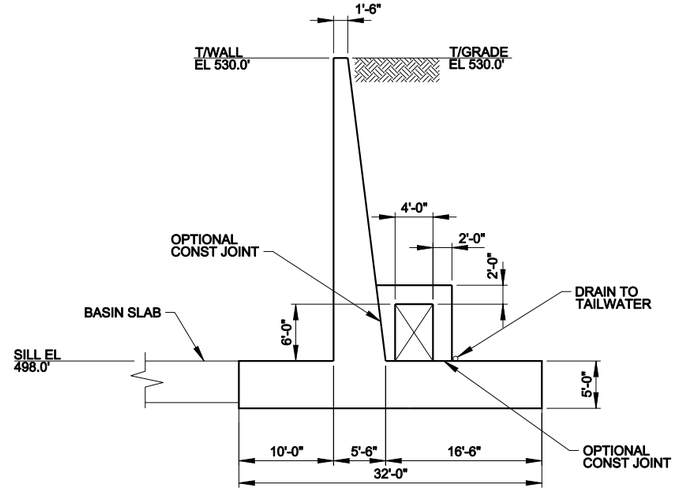
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
LEFT TRAINING WALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-19



1 RIGHT ABUTMENT WALL
SS-15 SS-20 1/8"=1'-0"



2 LEFT ABUTMENT WALL
SS-15 SS-20 1/8"=1'-0"

NOT FOR CONSTRUCTION

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8' 0 8' 16'
1/8"=1'-0"

US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

Design file: ST-SAM-SO-DIAG01.dgn
Set ID: SetID
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/JAW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

CDM

Freese and Nichols

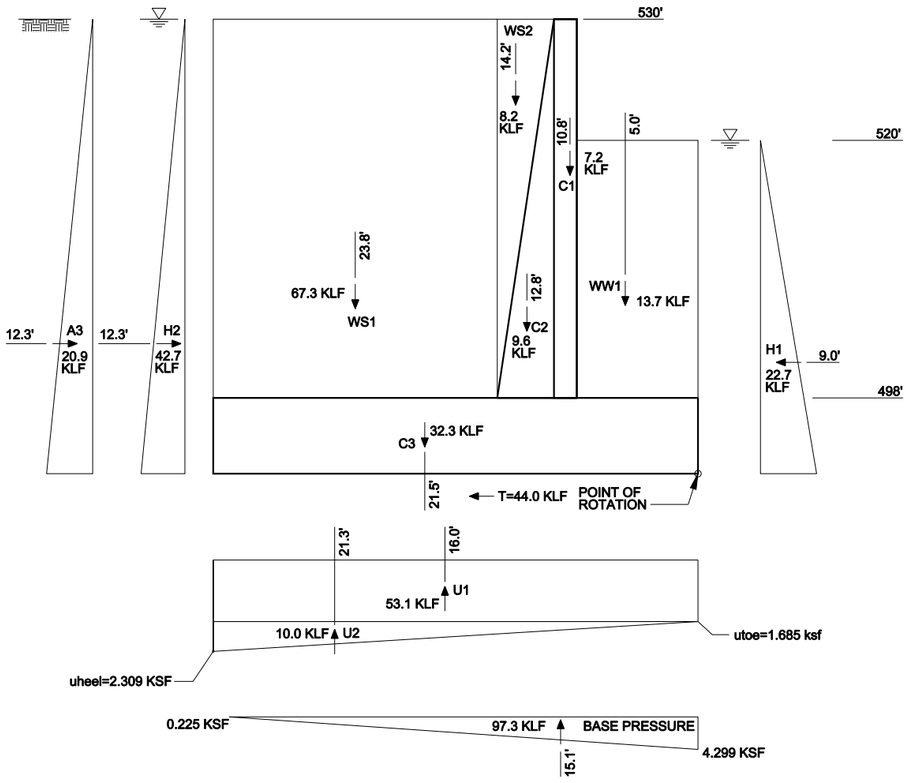
FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK
ABUTMENT WALLS
DIMENSIONS

SHEET IDENTIFICATION

SS-20

MicroStation V8 User: mmt Office: FWCAD1
Config: Standard CDM07244
Plotter: JPredrv_XAMPDF_PlePDF-Mono-Half.pltPlot Scale: 150.000 '/ In.
Plot Date: Oct. 26, 2007 - 08:21:01 AM
00000-BStext1.dgn
00000-BBsht1.dgn
Model: Default

Office:FWCAD1 CDM07244 Date:Oct. 26, 2007 - 08:21:01 AM User:mmt File: N:\st\00001_COE_SS-620\ss62.dgn



ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	530.0	520.0	40.9	0.0	66.1	5.23	100.0	0.040	4.092	5.55
1(b)	522.0	512.0	44.0	0.0	77.5	3.64	100.0	0.767	4.076	5.69
1(c)	514.0	504.0	45.1	0.0	88.9	2.28	100.0	1.592	3.962	5.97
1(d)	506.0	498.0	43.7	0.0	99.4	1.24	100.0	2.388	3.828	6.26
1(e)	498.0	498.0	41.4	0.0	107.8	0.62	100.0	2.977	3.759	6.43

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	32.5	4763	34.6	2202
1(b)	34.3	4543	35.6	2239
1(c)	34.2	4239	36.4	3266
1(d)	32.3	4038	45.5	4305
1(e)	31.3	4005	52.5	5082

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

NOTE:

THE DAM AND BASIN ARE ASSUMED TO BE CAPABLE OF RESISTING THE NET SLIDING FORCE ON THE WALL.

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE HEEL RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION OVER HEEL AT 530.0-FT) CASE, WITH RESPECT TO ROTATION, IS PRESENTED IN GRAPHICAL FORM.

NOT FOR CONSTRUCTION

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US Army Corps of Engineers
Fort Worth District

Appr.	Date	Description	Symbol

CDM

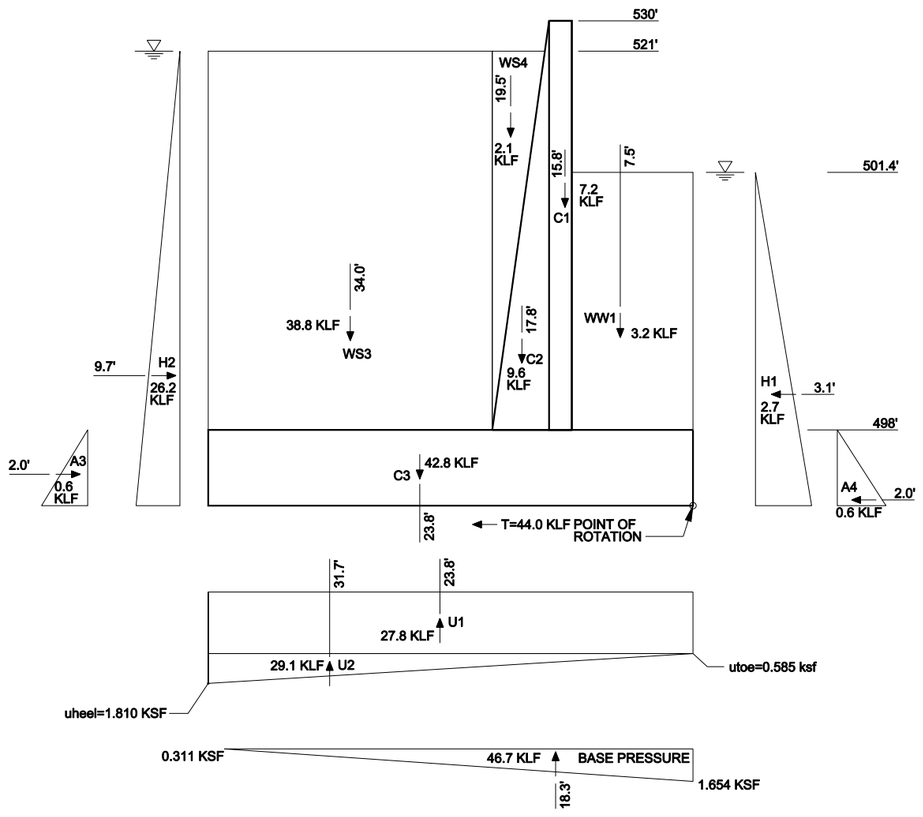
Freese and Nichols

Design file: ST-SAM-SC-DIA001.dgn
Set ID: BatD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWW
Drawn by: BWW/JAB
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
LicenseState: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
LEFT ABUTMENT WALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-21



ROTATIONAL STABILITY ANALYSIS

NOT TO SCALE

ROTATIONAL ANALYSIS SUMMARY										
LOAD CASE	WATER @ HEEL	WATER @ TOE	FX TOTAL (KLF)	FY TOTAL (KLF)	FZ TOTAL (KLF)	e (FT)	BASE IN COMPRESSION (%)	BEARING PRESSURE (KSF)		
								HEEL	TOE	FS
1(a)	521.0	501.4	29.0	0.0	46.7	5.41	100.0	0.311	1.654	3.20

SHEAR AND MOMENT ANALYSIS				
LOAD CASE	WALL		FOOTING	
	VMAX (K/FT)	MMAX (K-IN/FT)	VMAX (K/FT)	MMAX (K-IN/FT)
1(a)	16.2	1514	21.6	2472

LEGEND:

FX = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL X DIRECTION (POSITIVE TOWARD CHANNEL) CONSIDERING ANY UPLIFT EFFECTS BUT WITHOUT SHEAR KEY RESISTANCE.

FY = SUM OF ALL HORIZONTAL FORCES IN THE GLOBAL Y DIRECTION CONSIDERING ANY UPLIFT EFFECTS

FZ = SUM OF ALL VERTICAL FORCES IN THE GLOBAL Z DIRECTION (POSITIVE DOWNWARD) CONSIDERING ANY UPLIFT EFFECTS

e = DISTANCE BETWEEN RESULTANT AND CENTROID OF BASE CONSIDERING ANY UPLIFT EFFECTS

NOTE:

THE DAM AND BASIN ARE ASSUMED TO BE CAPABLE OF RESISTING THE NET SLIDING FORCE ON THE WALL.

DESIGN PARAMETERS:

WATER = 0.0625 KCF
CONCRETE = 0.150 KCF
WIND = NOT CONSIDERED
SEISMIC = NOT CONSIDERED

WALL LOADS DUE TO SOIL:
ABOVE WATER TABLE = 0.065
KSF/FT BELOW WATER TABLE = 0.0325 KSF/FT

LOADING CONDITIONS:

I EXTREME INUNDATION FOLLOWED BY A RAPID DRAW DOWN EVENT. THE HEIGHT OF RETAINED WATER WAS ASSUMED TO BE 10-FT ABOVE THE WATER LEVEL AT THE TOE. THE ANALYSIS WAS RUN FOR A SERIES OF WATER ELEVATIONS OVER THE HEEL RANGING FROM THE TOP OF WALL ELEVATION DOWN TO THE TOP OF FOOTING ELEVATION. ONLY THE MOST CRITICAL (WATER ELEVATION OVER HEEL AT 522.0-FT) CASE, WITH RESPECT TO ROTATION, IS PRESENTED IN GRAPHICAL FORM.

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US Army Corps of Engineers
Fort Worth District

Symbol	Description	Date	Appr.

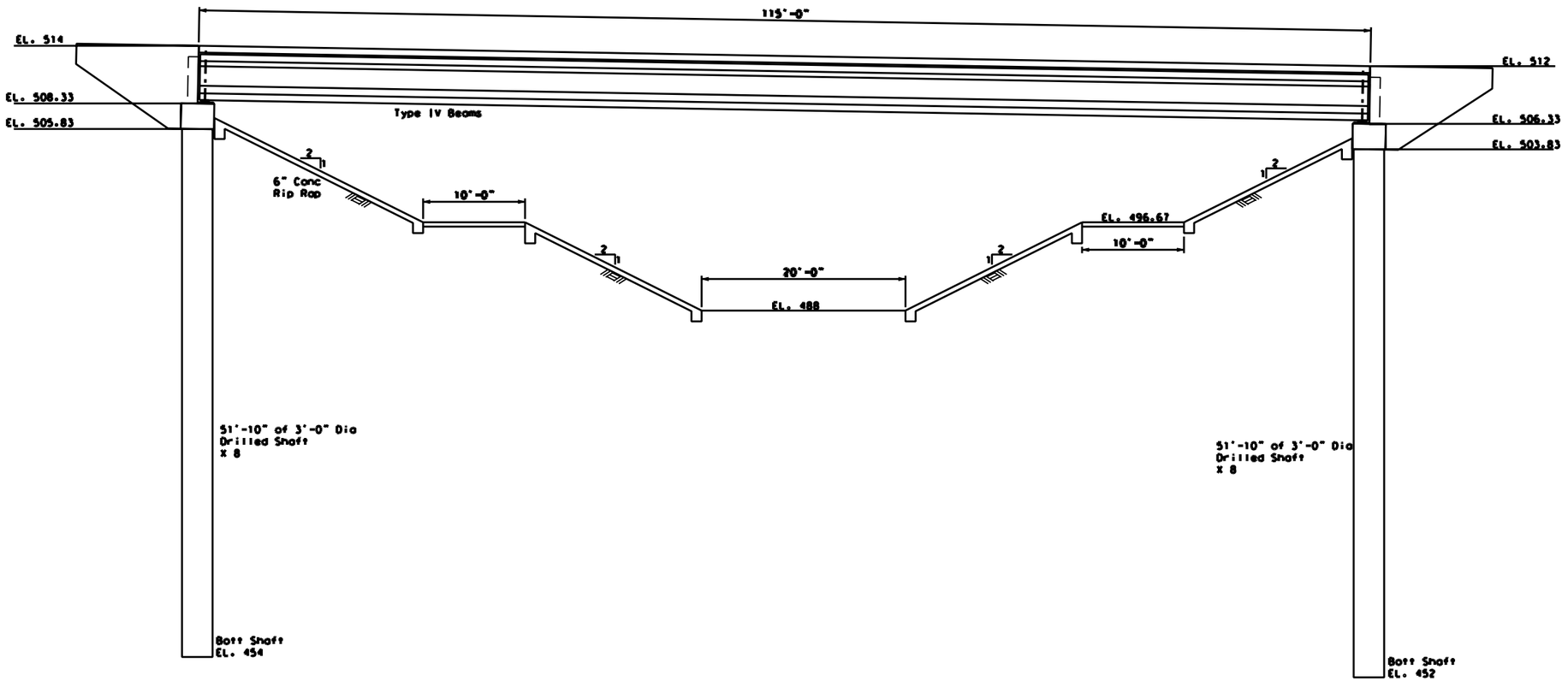
CDM

Design file: BT-SAA-SC-DIAG01.dgn
Set ID: BatD
Size: ANSI D
Plot date: SEPTEMBER 2007
Designed by: BWM
Drawn by: BWM/AW
Checked by:
Responsible P.E.: BRAD B. WATSON
License Number: 80318
License State: TEXAS

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN - SUPPLEMENT
MARINE CREEK DAM
RIGHT ABUTMENT WALL
STABILITY ANALYSIS

SHEET IDENTIFICATION

SS-22



NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

1" = 5'

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

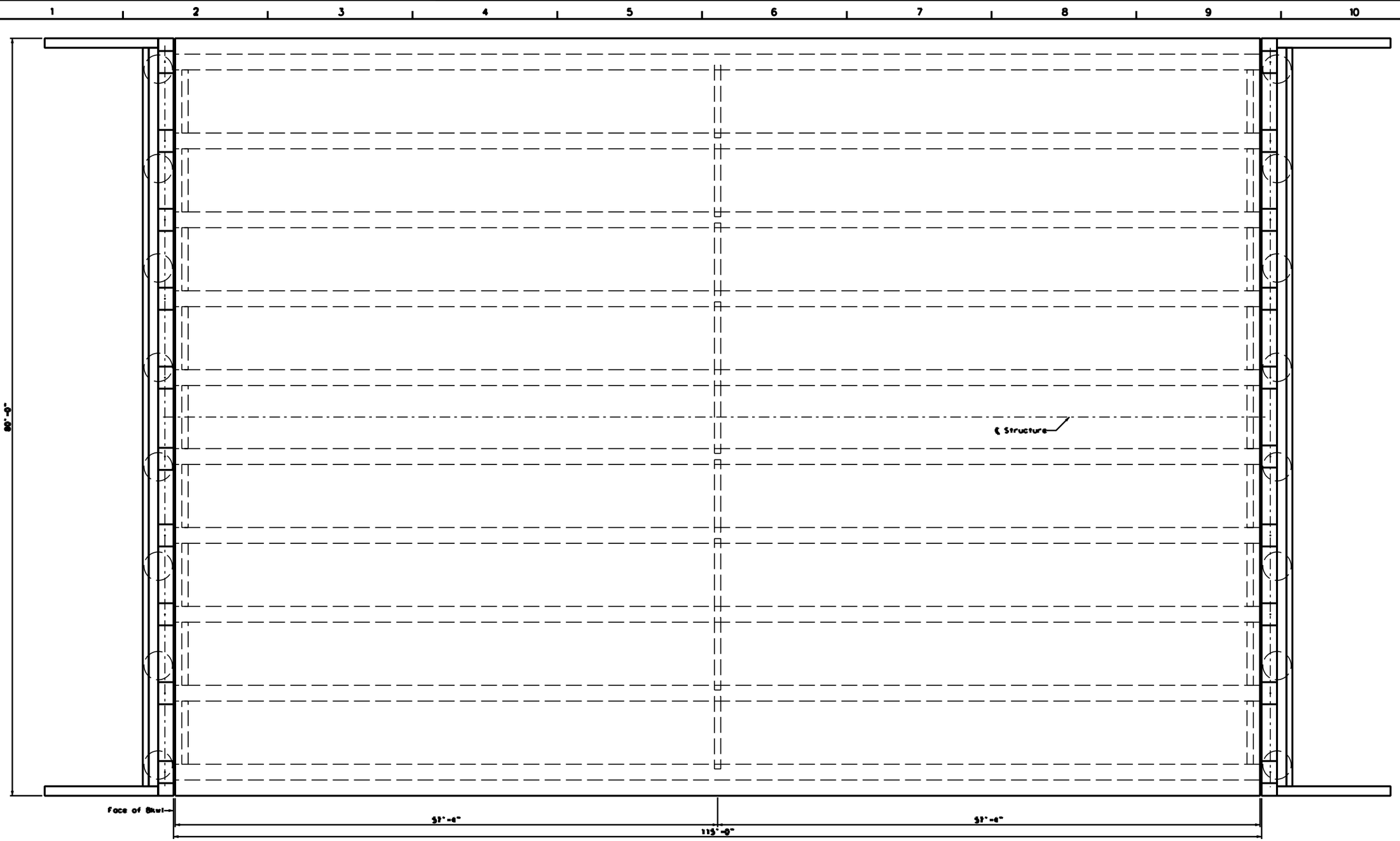
TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

BEACH STREET
ELEVATION

WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

DRAWING NUMBER: RS-01
SHEET NO.: 51 OF

RS-01.dgn 10/29/2007 4:53:14 PM



1" = 4'

NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

SYM	D.O. NO.	ACTION	DATE	DESCRIPTION OF REVISION

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: R. LEY
DRAWN BY: R. LEY
REVIEWED BY: W. SHANER

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

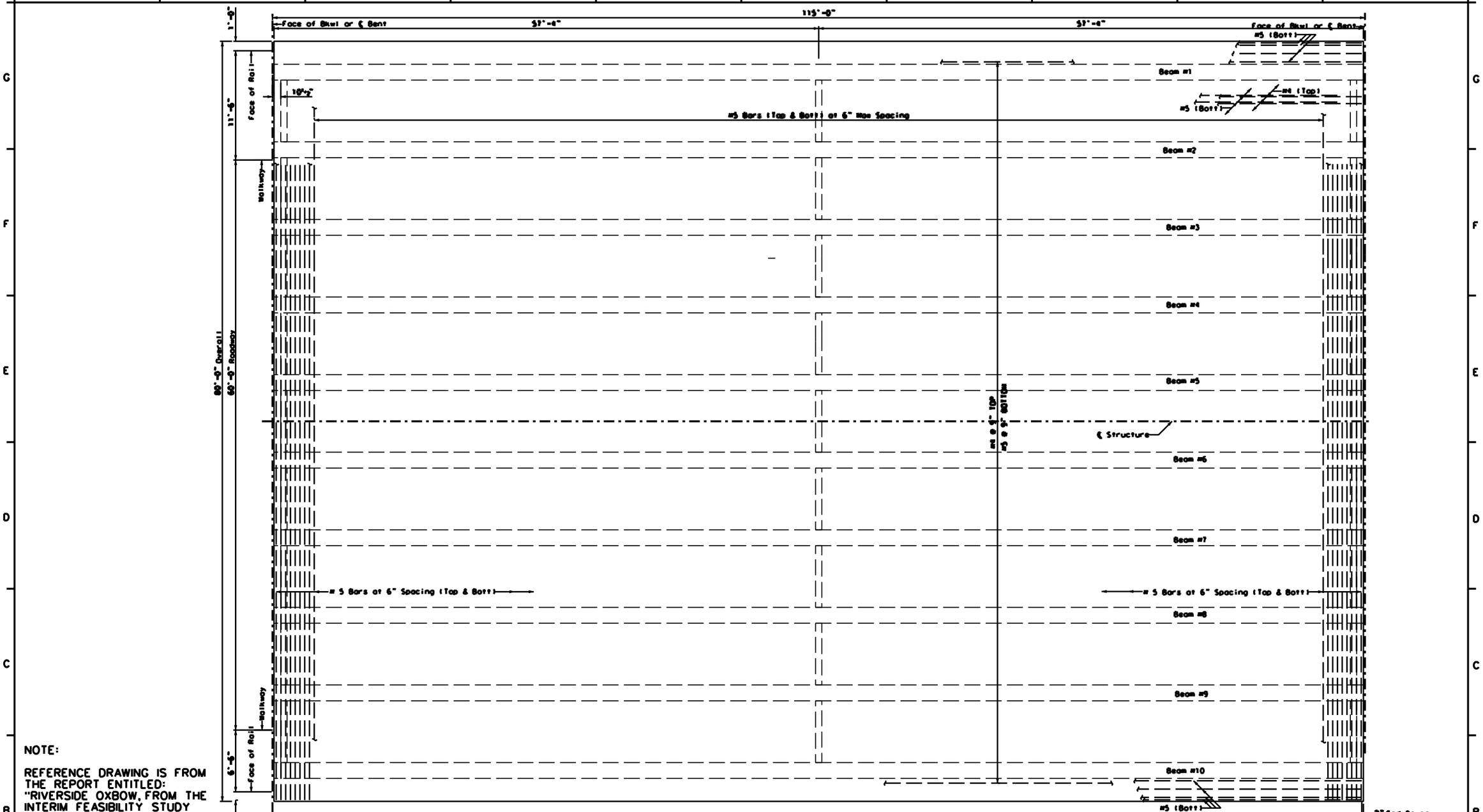
BEACH STREET
PLAN

SUBMITTED BY:
WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

SOL. NO.
DATED:
CONTR. NO.
DRAWING NUMBER RS-02
SHEET NO. 52 OF
PLATE
CONTR. NO.

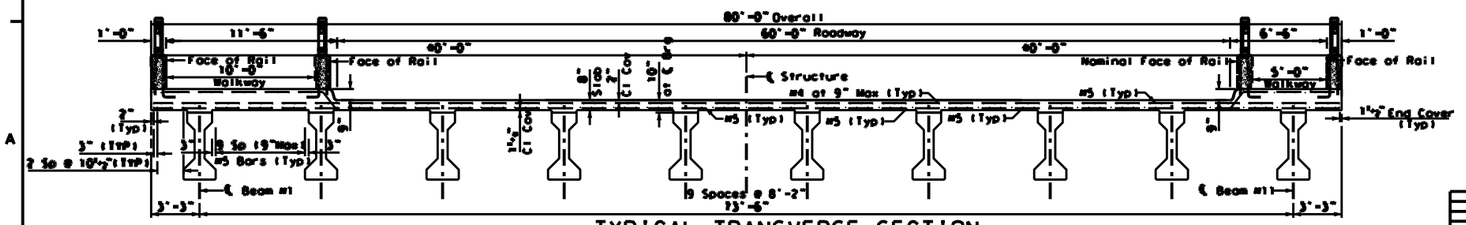
REFERENCE FILE NAME	REFERENCE FILE DESCRIPTION

CADD FILE NAME: plan.dgn



NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED: "RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)" DRAWING IS NOT TO SCALE.



TYPICAL TRANSVERSE SECTION

GENERAL NOTES:

All reinforcing shall be Grade 60.
Concrete strength f'c = 4,000 psi.
Bar laps, where required, shall be as follows:
#4 = 1'-5"
#5 = 1'-9"

1"=4'

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

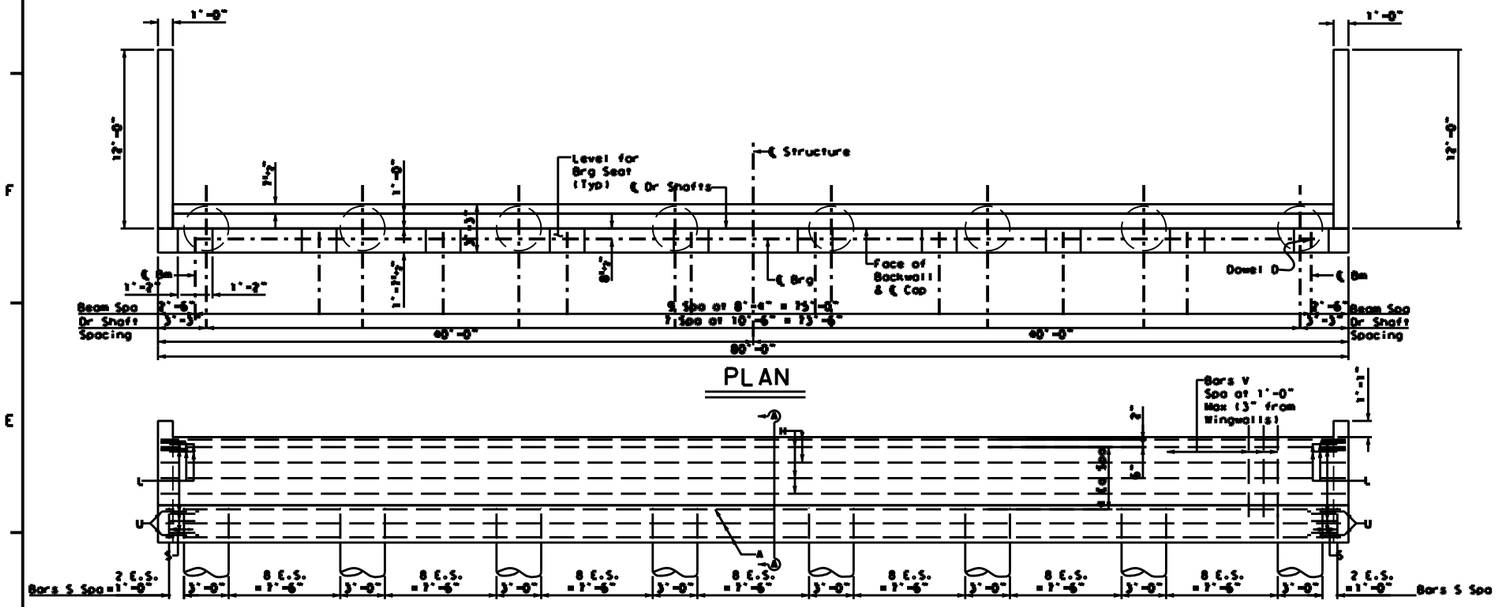
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

BEACH STREET SLAB

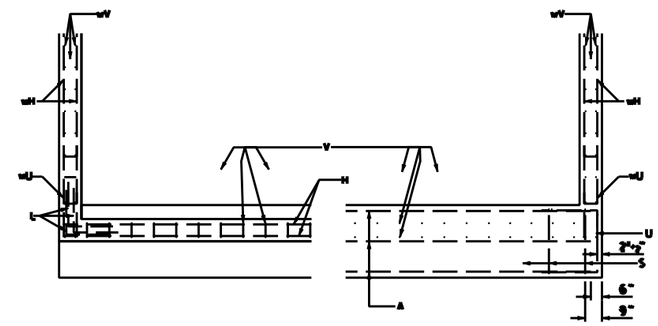
DESIGNED BY: M. LEE
DRAWN BY: M. LEE
CHECKED BY: M. SWANSON
SUBMITTED BY: WILLIAM A. WALLACE, P.E. CHIEF, STRUCTURAL SECTION

SOL. NO.
DATED:
CONTR. NO.
PLATE
DRAWING NUMBER: RS-03
SHEET NO.: 53 OF
CONTR. NO.
CADD FILE NAME: stab.dgn



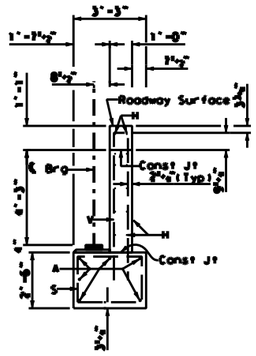
PLAN

ELEVATION

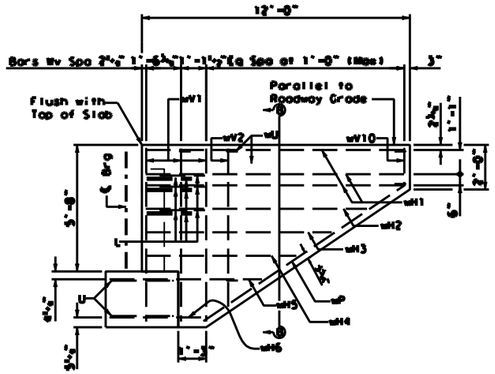


CORNER DETAILS

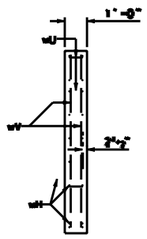
GENERAL NOTES:
Concrete strength f'c = 3,600 psi
All cap and wall reinforcing shall be Grade 60



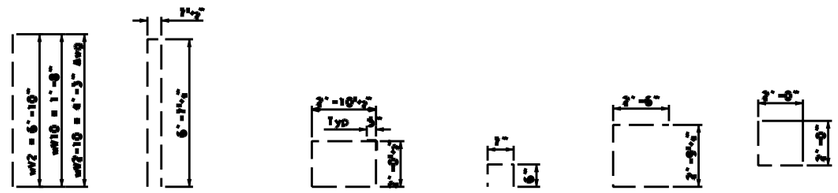
SECTION A-A



WINGWALL ELEVATION



SECTION B-B



NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

SCALE: 1" = 4'

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

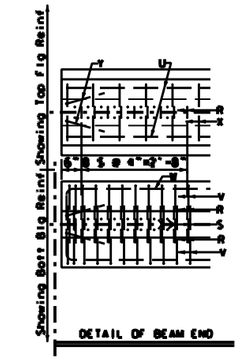
BEACH STREET
ABUTMENT

WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

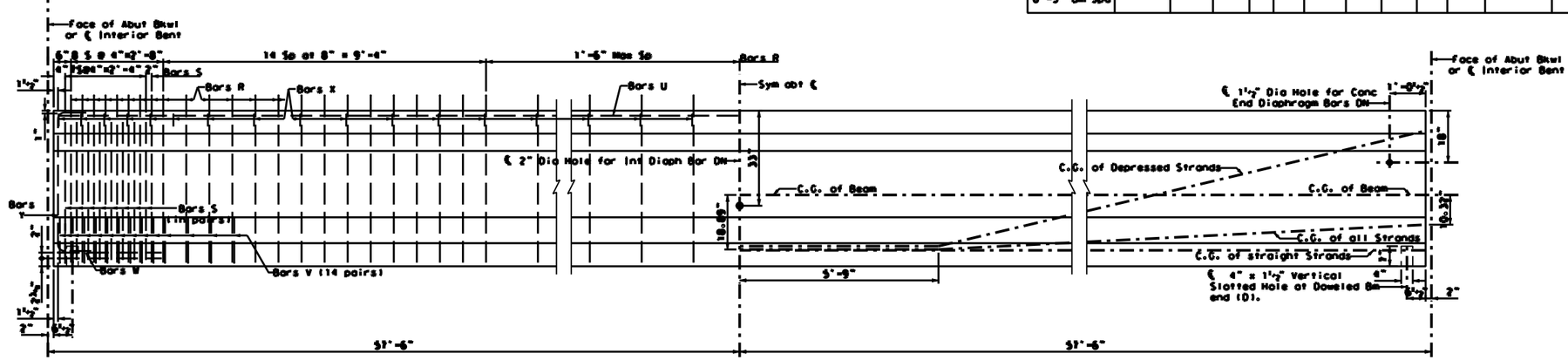
DRAWING NUMBER: RS-04
SHEET NO.: 54 OF

CADD FILE NAME: steel.dgn

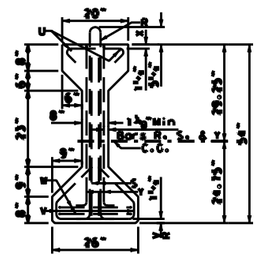
RS-04.dgn 10/29/2007 4:53:48 PM



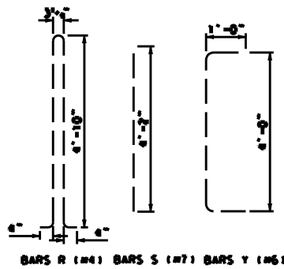
	SPAN LENGTH (ft)	BEAM TYPE		PRESTRESSING STRANDS							CONCRETE	
				TOTAL					DEPRESSED		RELEASE STRGTH f'ci (psi)	MINIMUM 28 DAY COMP STRGTH f'c (psi)
				NO.	SIZE (in)	STRGTH f's (ksi)	"e" ℄ (in)	"e" END (in)	NO.	TO (in)		
Type C Beams 60" Rdwy 8" Slab 8'-3" Bm Spc	115	IV		56	1/2	270K	18.89	10.32	12	52.0	6505	7065

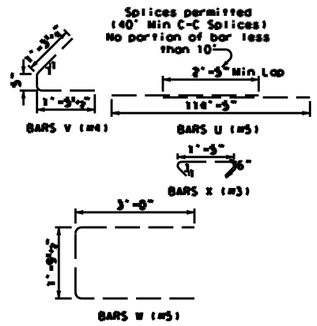


ELEVATION OF BEAM

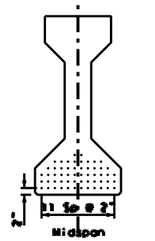


AREA 788.4 in²
I 260,403 in⁴
Wt 821 Lb./LF

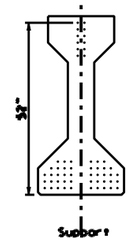




GENERAL NOTES:
Designed in accordance with current AASHTO Standard Specifications.
All concrete shall be Class H. All reinforcing bars shall be Grade 60.
Bottom corners of all beam flanges and outside corners of exterior beam ends shall be chamfered ¾" or rounded to a 1½" radius.
Prestress losses for the designed beam have been calculated for a relative humidity of 60 percent.
Strands for the designed beam shall be ½" 270 ksi low relaxation strands pretensioned to 31.0 k each.



TYPE IV BM



TYPE IV BM

NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

1" = 1½"

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

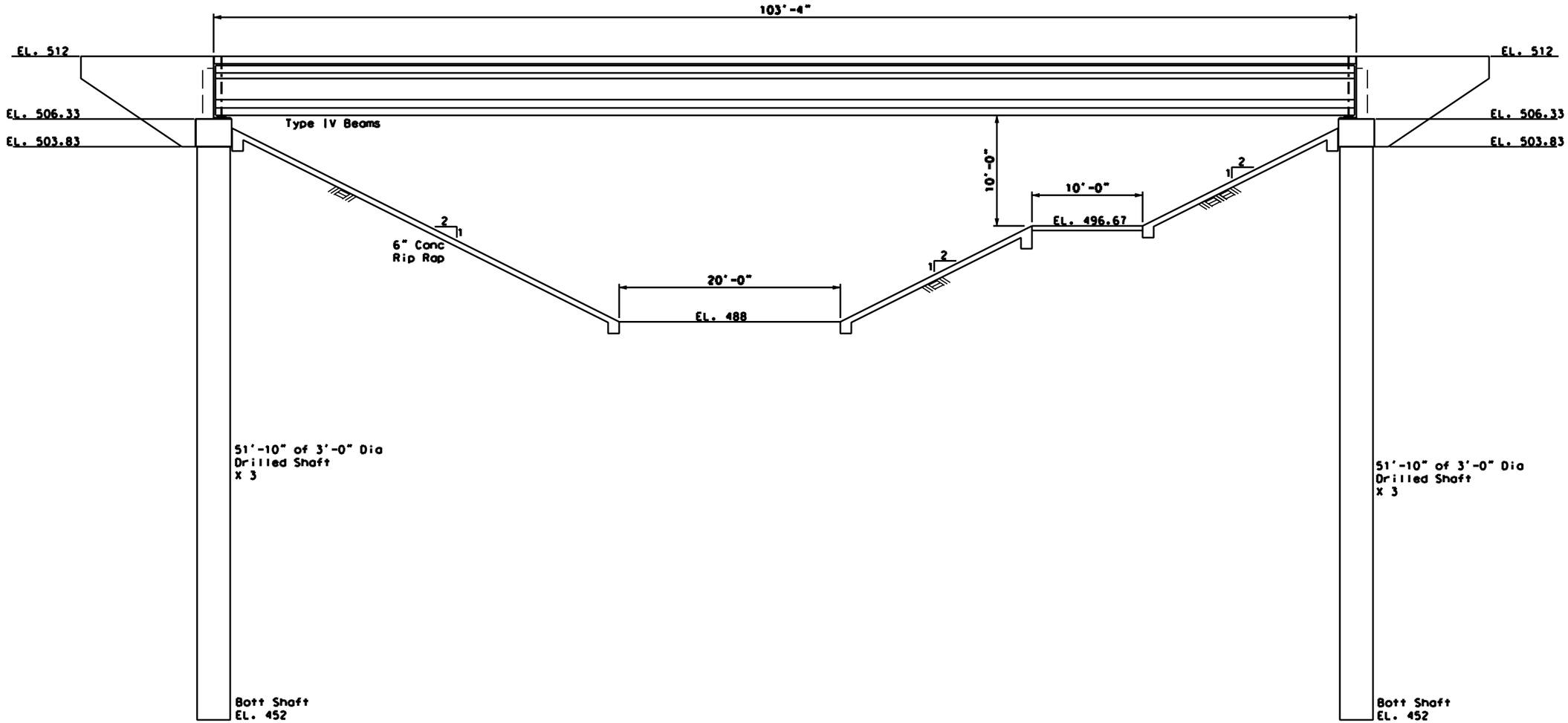
BEACH STREET
I-BEAM

WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

DRAWING NUMBER RS-05
SHEET NO. 55 OF

CADD FILE NAME: beam.dgn

RS-05.dgn 10/29/2007 4:54:02 PM



NOTE:

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"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

1" = 4'

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

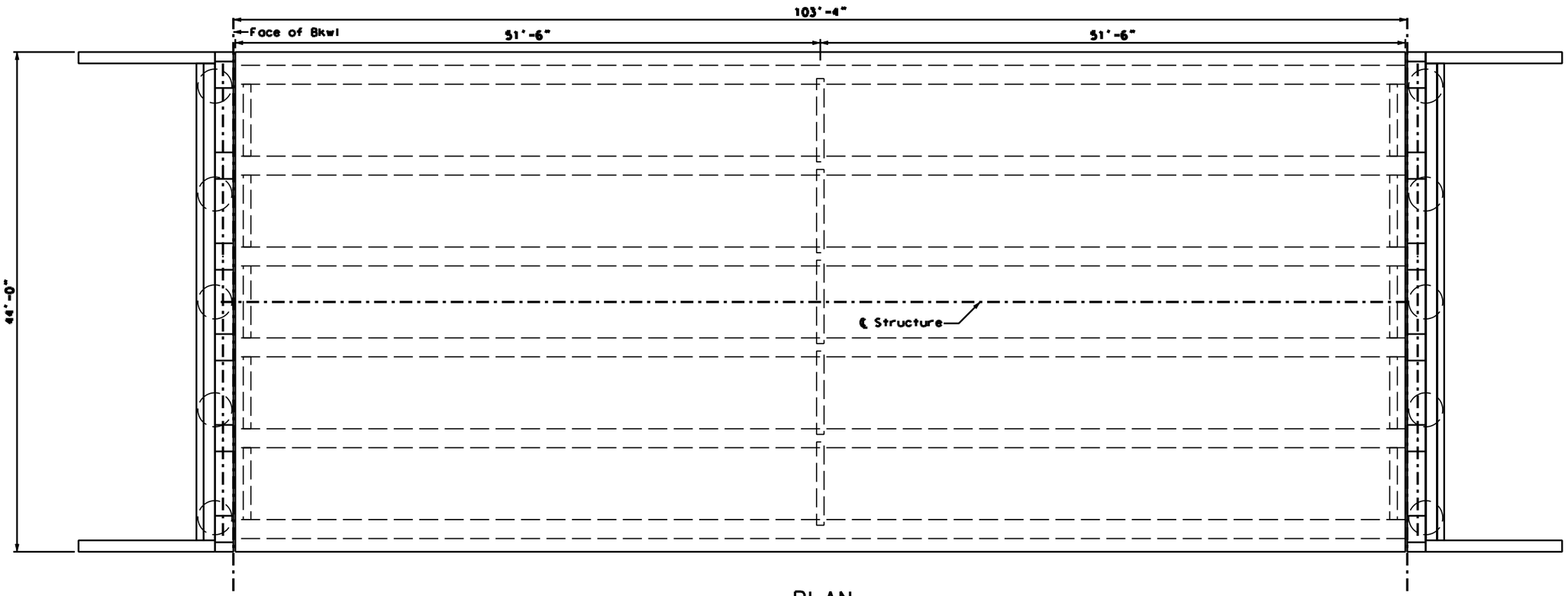
TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

PARK ROAD
ELEVATION

WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

DRAWING NUMBER: RS-06
SHEET NO.: 511 OF

RS-06.dgn 10/29/2007 4:54:13 PM



PLAN

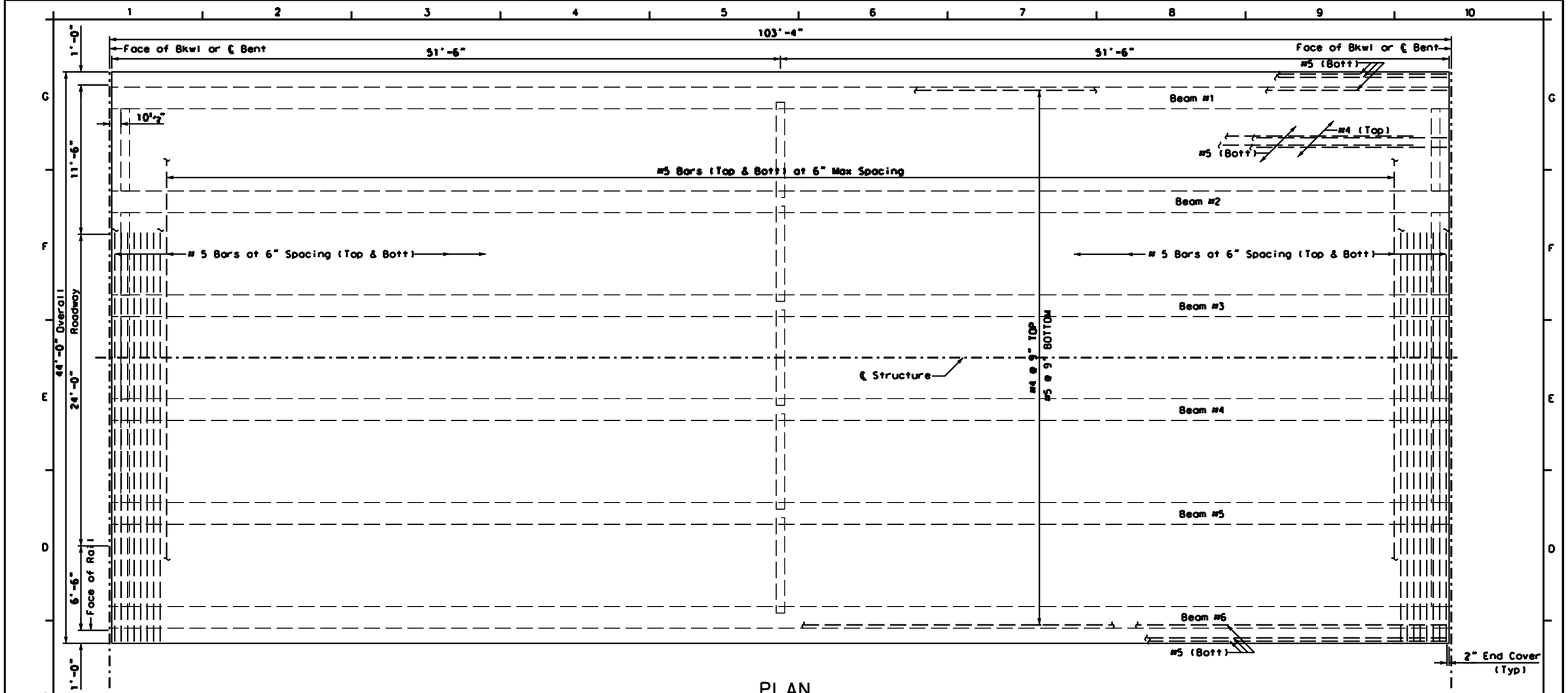
1" = 4'

NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

ENGINEERING DIVISION CIVIL DESIGN BRANCH		U.S. ARMY ENGINEER DISTRICT, FORT WORTH CORPS OF ENGINEERS FORT WORTH, TEXAS	
DESIGNED BY: M. LEE DRAWN BY: M. LEE RECOMMENDED BY: W. SWANSON	TRINITY RIVER BASIN, TEXAS RIVERSIDE OXBOW FORT WORTH, TEXAS PARK ROAD PLAN		
SUBMITTED BY: WILLIAM A. WALLACE, P.E. CHIEF, STRUCTURAL SECTION		SOL. NO. CONTR. NO. DRAWING NUMBER RS-07	DATED: SHEET NO. 512 OF PLATE

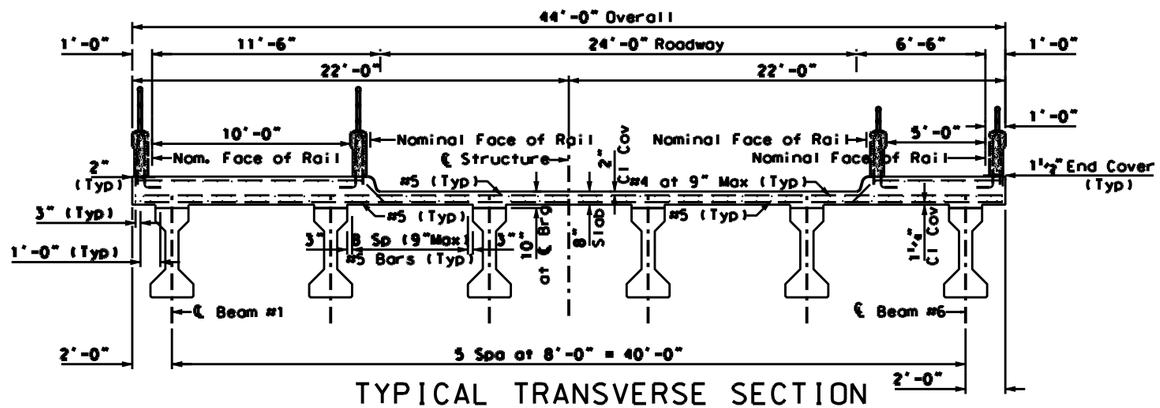
REFERENCE FILE NAME | REFERENCE FILE DESCRIPTION | CADD FILE NAME: plan.dgn



PLAN

NOTE:

REFERENCE DRAWING IS FROM THE REPORT ENTITLED:
"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.



TYPICAL TRANSVERSE SECTION

GENERAL NOTES:

All reinforcing shall be Grade 60.
Concrete strength f'c = 4,000 psi.
Bar laps, where required, shall be as follows:
#4 = 1'-5"
#5 = 1'-9"

1" = 3'

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

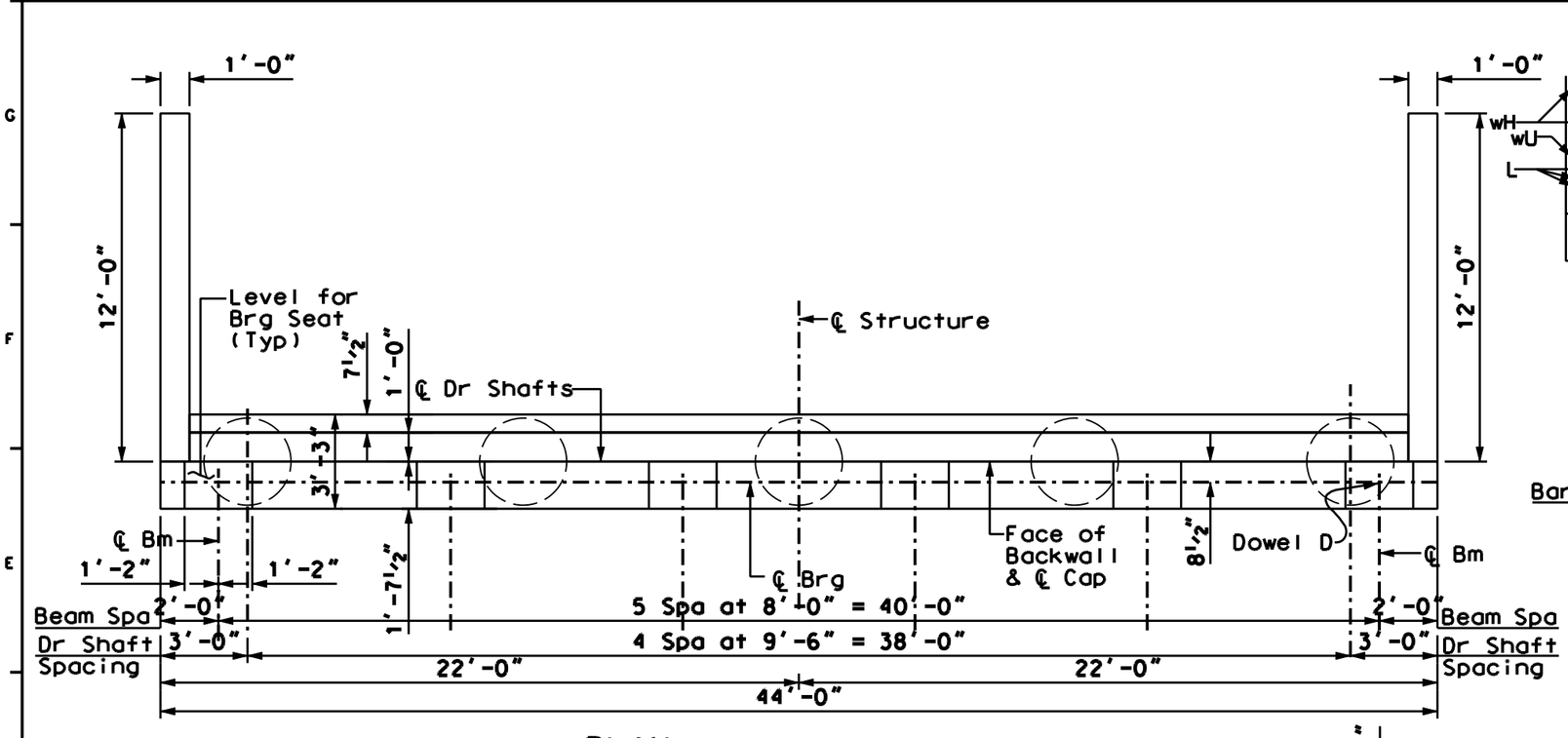
U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

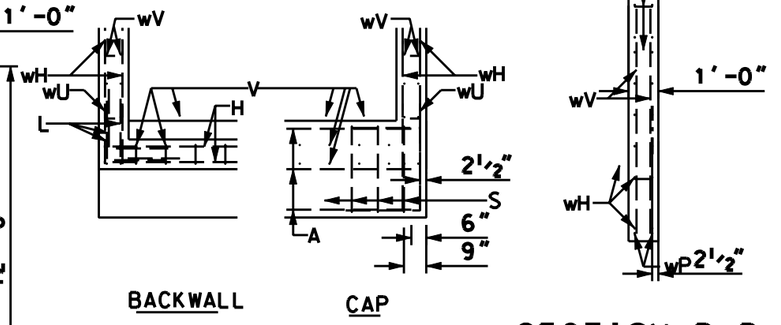
PARK ROAD
SLAB

WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

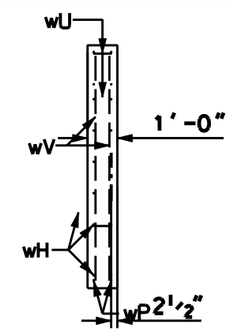
DRAWING NUMBER: RS-08
SHEET NO.: 313 of



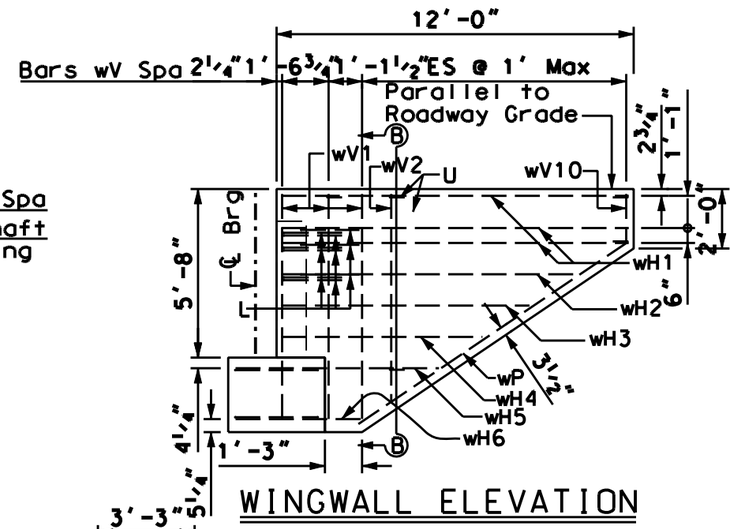
PLAN



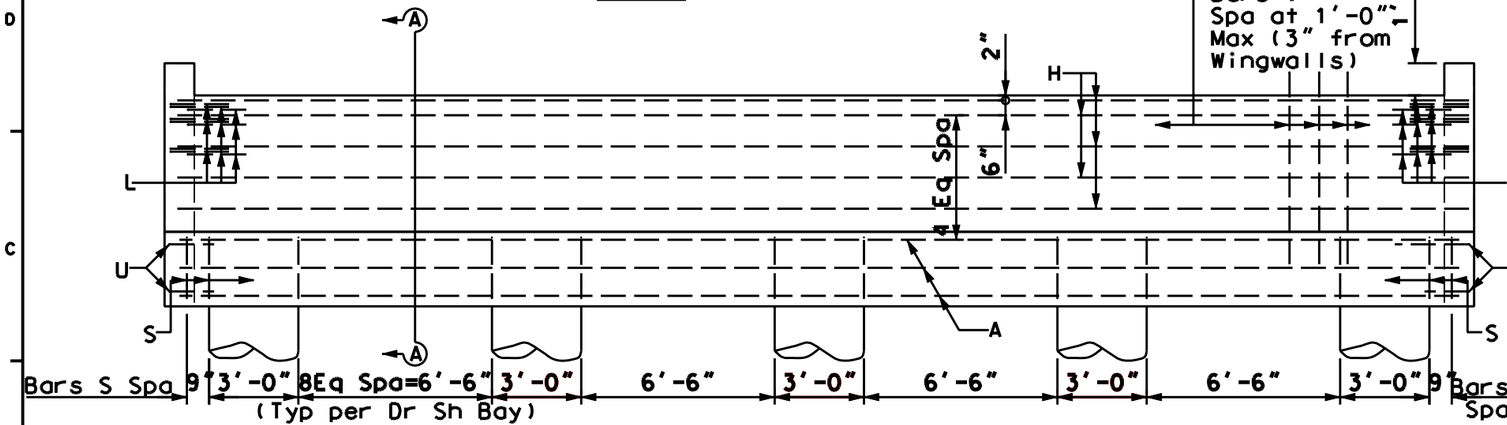
CORNER DETAILS



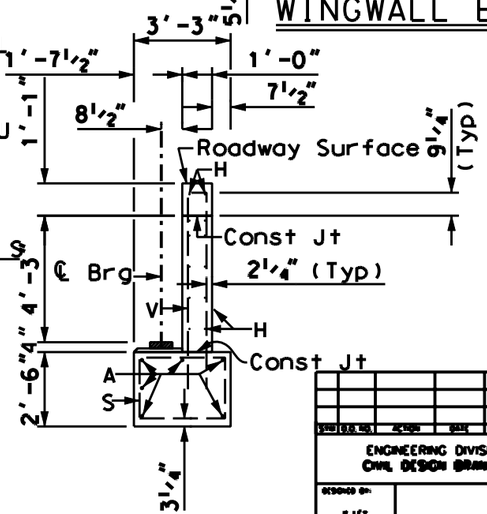
SECTION B-B



WINGWALL ELEVATION

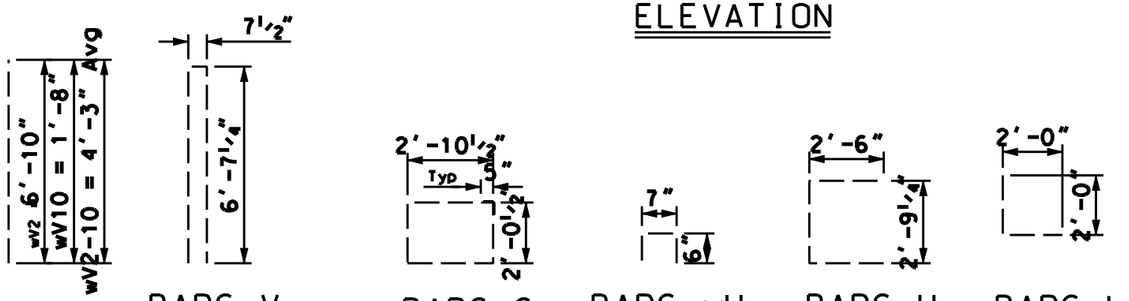


ELEVATION



SECTION A-A

1" = 2'



BARS V BARS S BARS wU BARS U BARS L

NOTE:

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"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: R. LEE
DRAWN BY: R. LEE
CHECKED BY: W. SHIRLEY

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

PARK ROAD
ABUTTMENT
LPP PLAN ONLY

SUBMITTED BY:
WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

SOL. NO.
CONTR. NO.
DRAWING NUMBER RS-09
SHEET NO. 514 OF
PLATE
DATED:

CADD FILE NAME: abut.dgn

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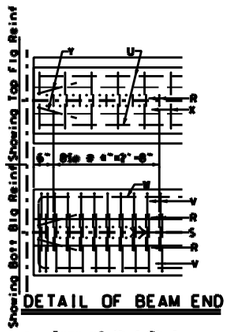
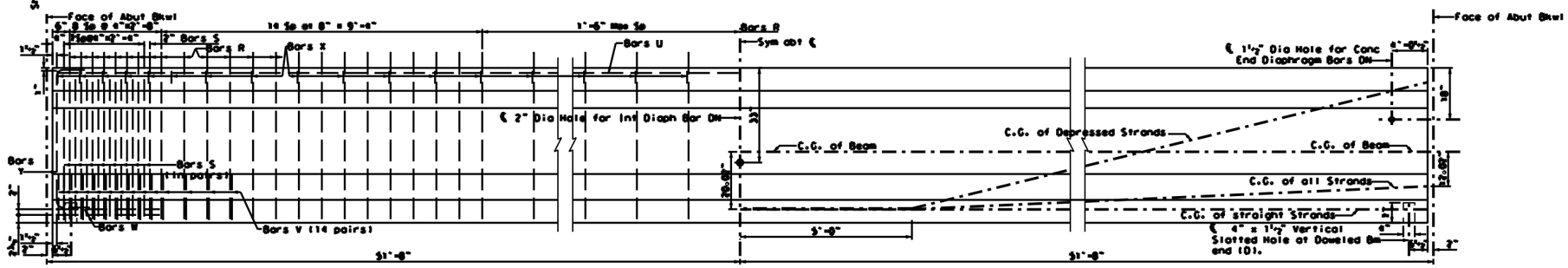
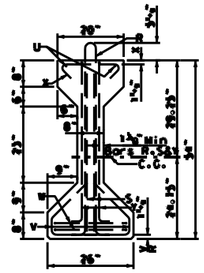


DETAIL OF BEAM END

	SPAN LENGTH (ft)	BEAM TYPE		PRESTRESSING STRANDS							CONCRETE	
				TOTAL					DEPRESSED		RELEASE STRGTH f'ci (psi)	MINIMUM 28 DAY COMP STRGTH f'c (psi)
				NO.	SIZE (in)	STRGTH f's (ksi)	"e" ℄ (in)	"e" END (in)	NO.	TO (in)		
Type IV Beams 30° Rdwy 8" Slab 8'-8" Bm Spa	102	IV		44	½	270K	20.02	12.02	8	52.0	5478	6218



ELEVATION OF BEAM

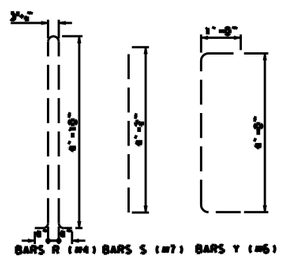


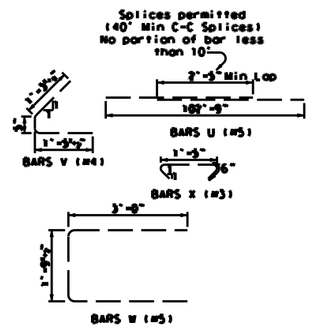
TYPE IV BEAM

AREA 788.4 in.²

I 260,403 in.⁴

Wt 821 LB./LF





GENERAL NOTES:

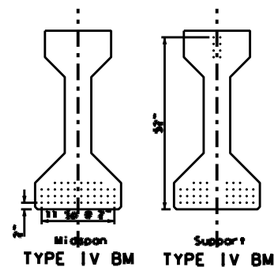
Designed in accordance with current AASHTO Standard Specifications.

All concrete shall be Class H. All reinforcing bars shall be Grade 60.

Bottom corners of all beam flanges and outside corners of exterior beam ends shall be chamfered ¾" or rounded to a 1½" radius.

Prestress losses for the designed beam have been calculated for a relative humidity of 60 percent.

Strands for the designed beam shall be ½" 270 ksi low relaxation strands pretensioned to 31.0 k each.



TYPE IV BM TYPE IV BM

NOTE:

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"RIVERSIDE OXBOW, FROM THE INTERIM FEASIBILITY STUDY AND INTEGRATED ENVIRONMENTAL ASSESSMENT (APRIL 2005)"
DRAWING IS NOT TO SCALE.

1" = 1½"

REFERENCE FILE NAME	REFERENCE FILE DESCRIPTION

SYM	D.O. NO.	ACTION	DATE	DESCRIPTION OF REVISION

ENGINEERING DIVISION
CIVIL DESIGN BRANCH

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: R. LEY
DRAWN BY: R. LEY
REVIEWED BY: W. SHANNON

TRINITY RIVER BASIN, TEXAS
RIVERSIDE OXBOW
FORT WORTH, TEXAS

PARK ROAD
I-BEAM

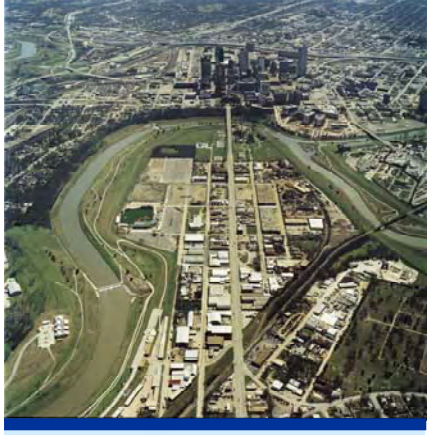
SUBMITTED BY:
WILLIAM A. WALLACE, P.E.
CHIEF, STRUCTURAL SECTION

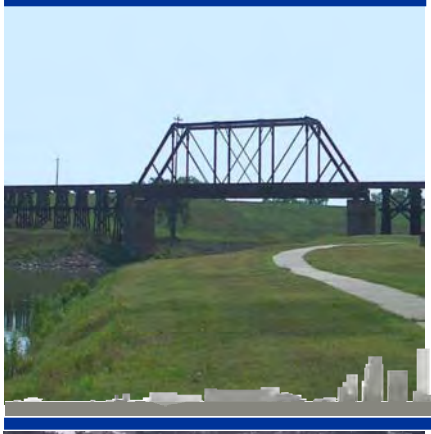
SOL. NO. | DATED:
CONTR. NO. | PLATE
DRAWING NUMBER RS-10 | SHEET NO. 515 OF

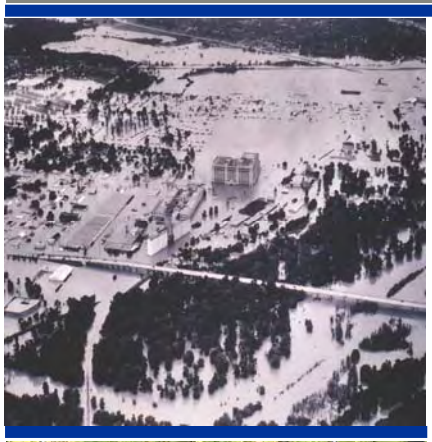
CADD FILE NAME: beam.dgn

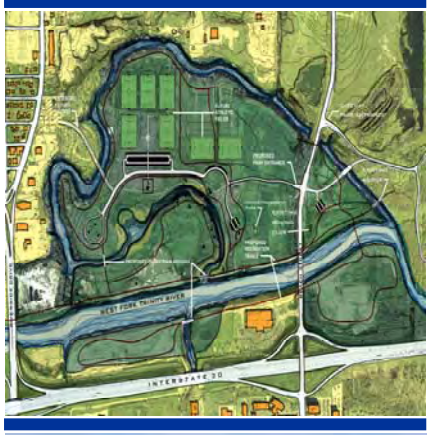
CONTR. NO.

RS-10.dgn 10/29/2007 4:54:59 PM









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Socioeconomics and Environmental Justice

Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix D

March 2008

Appendix D

Socioeconomic and Environmental Justice Assessment
Supplement No. 1 to the
Final Environmental Impact Statement
for the
Central City Project,
Upper Trinity River, Texas

Central City Project - The stated preferred alternative in the authorized Central City FEIS, described as the Community Based Alternative, addressed four objectives; flood protection, ecosystem improvement, urban revitalization, and recreation. The authorized Central City Project would require approximately 5,250 acre-feet of additional valley storage to accommodate flow alterations by the project's configuration. This additional valley storage is identified in the authorized report as being provided primarily by the Riverbend Hydraulic Valley Storage Area and by smaller areas near University Drive, Samuels Avenue, and on I-35 sites just downstream of the dam close to Riverside Park.

Additionally, the Central City FEIS outlines measures to mitigate for losses wetlands, riparian woodlands, and upland woodlands primarily in these hydraulic mitigation sites. Mitigation requirements include development of emergent wetland, establishment of riparian woodland, establishment upland forest, as well as management of existing riparian woodland and upland forest. Mitigation for aquatic impacts to Marine and Lebow Creeks include diverting flows to the mid-reach of Lebow Creek, channel modifications, a gravity flow pipeline from the Samuels Avenue Dam impoundment, and additional mitigation measures for Ham Branch.

One of the controversial aspects of the authorized Central City Project was the issue of the use of private lands for public use and the potential use of eminent domain to acquire needed real estate.

Riverside Oxbow and the Modified Central City Project - The original interim feasibility report and IES identified the National Ecosystem Restoration Plan (NER) as one that "will restore the biological integrity of the wetland and bottomland hardwood communities through a combination of measures directed at either specific habitat types or specific problems within the existing ecosystem." The project consists primarily of reestablishing low flows through the natural channel of the West Fork of the Trinity River featuring a notched control structure in the existing floodway channel to allow flows through the old cutoff oxbow, facilitating restoration of the oxbow's aquatic and riparian woodland complex. Restoration of the cutoff oxbow would include demolition and replacement the existing Beach Street Bridge. Ecosystem restoration features include the creation emergent wetland, open water, and vegetative fringe habitat within the project area. Various hardwood improvement measures would be implemented on existing riparian forest within the floodplain, including a riparian corridor along the West Fork from Riverside Drive to East 1st Street. A buffer zone of grasses and forbs would be established as well as reforestation of disturbed and grassland areas with native trees and shrubs and preservation and habitat improvement measures on native prairie and scrub/shrub floodplain terrace. A variation of this plan, the Locally Preferred Plan, calls for additional features including relocation of the entrance to Gateway Park to include a new access road and bridge over the oxbow channel. Additionally, the local sponsor wanted to include acquisition of a portion of the Tandy zone to restore the native prairie grasslands.

Recreational features include pedestrian and equestrian trails, recreation access points with parking off of Riverside Drive, and west of Beach Street and south of the oxbow channel. Restroom facilities would be provided at each of the access points.

The Modified Central City Project shifts the valley storage and ecosystem restoration from the upstream sites specified in the authorized EIS downstream to the Riverside Oxbow area. Starting with the valley storage requirement of 5,250 acre-feet identified in the authorized Central City Project, an analysis determined that some, but not all, of the valley storage requirement could be met within the Riverside Oxbow area. Other valley storage sites were revisited with the intent of minimizing the acquisition of private land resulting in the identification of 22 sites within the combined study area that could accommodate the valley storage requirements. This list was further refined to one consisting of 17 preferred sites.

The Modified Project lists preferred valley storage sites consisting of the Rockwood Park West site, a 21.6 acre City of Fort Worth-owned site; the Samuels Avenue sites, covering approximately 37.8 acres lying on both the north and south banks of the West Fork; the Riverside Park site, a 13 acre site also owned by the City of Fort Worth; the Ham Branch site, a 500 acre site along US Hwy 287; the Riverside Oxbow sites, consisting of 200 acres; and the Gateway Park sites, which consist of 225 acres.

Study Area Demographics (Existing and Future)

The socioeconomic assessment for the initial Central City EIS found that the project area, as defined in that document, is predominantly Hispanic with several Census blocks displaying populations that are predominantly black. The inclusion of the Riverside Oxbow project does not significantly change the racial and ethnic composition of the study proposed in the Central City EIS. While there is essentially no one living within the actual footprint of the Riverside Oxbow project, the boundary does intersect two Census blocks containing subdivisions that may be potentially impacted due to their proximity. The following is a revision of the Central City study area demographics amended to reflect the addition of the Riverside Oxbow project.

Race and Ethnicity - The following table depicts the racial and ethnic makeup for Tarrant County, the original Central City study area, the Riverside Oxbow area, and the revised study area for the years 2000 and 1990.

Table 1
Racial Composition – County, Original Study Area, Riverside Oxbow Area, and Revised Study Area

	Tarrant County				Original Study Area			
	1990		2000		1990		2000	
Total Population	1,170,103	100.0%	1,446,219	100.0%	36,932	100.0%	38,945	100.0%
Male	578,095	49.4%	713,549	49.3%	19,245	52.1%	20,409	52.4%
Female	592,008	50.6%	732,670	50.7%	17,687	47.9%	18,536	47.6%
Hispanic	133,979	11.5%	285,338	19.7%	18,930	51.3%	23,658	60.7%
White	859,883	73.5%	895,446	61.9%	11,348	30.7%	10,373	26.6%
Black	140,512	12.0%	180,457	12.5%	6,078	16.5%	4,275	11.0%
Asian, Hawaiian, PI	29,175	2.5%	52,303	3.6%	285	0.8%	306	0.8%
American Indian	5,575	0.5%	6,856	0.5%	189	0.5%	171	0.4%
Other	979	0.1%	25,819	1.8%	116	0.3%	162	0.4%

	Riverside Oxbow				Revised Study Area			
	1990		2000		1990		2000	
Total Population	1,602	100.0%	2,053	100.0%	38,534	100.0%	40,998	100.0%
Male	868	54.2%	1,091	53.1%	20,113	52.2%	21,500	52.4%
Female	734	45.8%	962	46.9%	18,421	47.8%	19,498	47.6%
Hispanic	375	23.4%	1,095	53.3%	19,305	50.1%	24,753	60.4%
White	1,123	70.1%	910	44.3%	12,471	32.4%	11,283	27.5%
Black	18	1.1%	11	0.5%	6,096	15.8%	4,286	10.5%
Asian, Hawaiian, PI	56	3.5%	0	0.0%	341	0.9%	306	0.7%
American Indian	30	1.9%	22	1.1%	219	0.6%	193	0.5%
Other	0	0.0%	15	0.7%	116	0.3%	177	0.4%

As was noted in the initial Central City EIS, total population for Tarrant County increased almost 24 percent from 1990 to 2000 while the total population for the original study area increased by five percent. The Riverside Oxbow area increased by 28 percent between 1990 and 2000, giving the new revised study area an increase of 6.4 percent. All ethnic groups saw increases in population in Tarrant County with the Hispanic population having the largest, an increase of 113 percent. The Hispanic population increased almost 25 percent in the original study area and increased almost 200 percent for the Riverside Oxbow area. The revised study area Hispanic population increased by 28.2 percent.

Income Levels - The following charts illustrate the income distribution for County, the original Central City study area, the Riverside Oxbow area, and the revised study area based on household income for the 1990 and 200 censuses. Chart 1 depicts this income distribution for 1990.

Chart 1

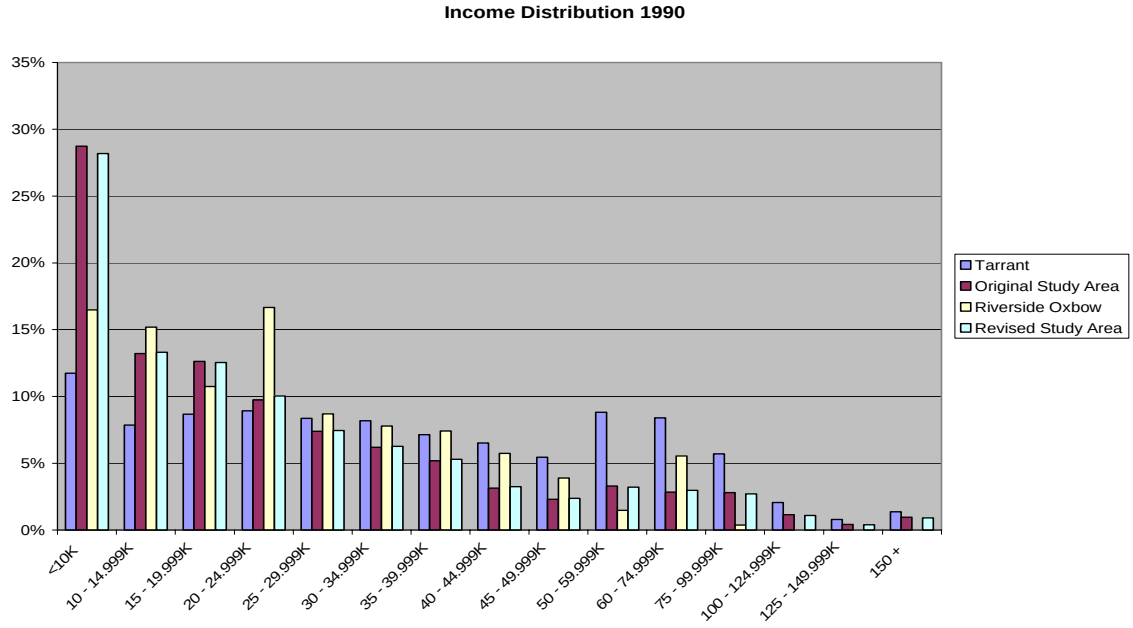
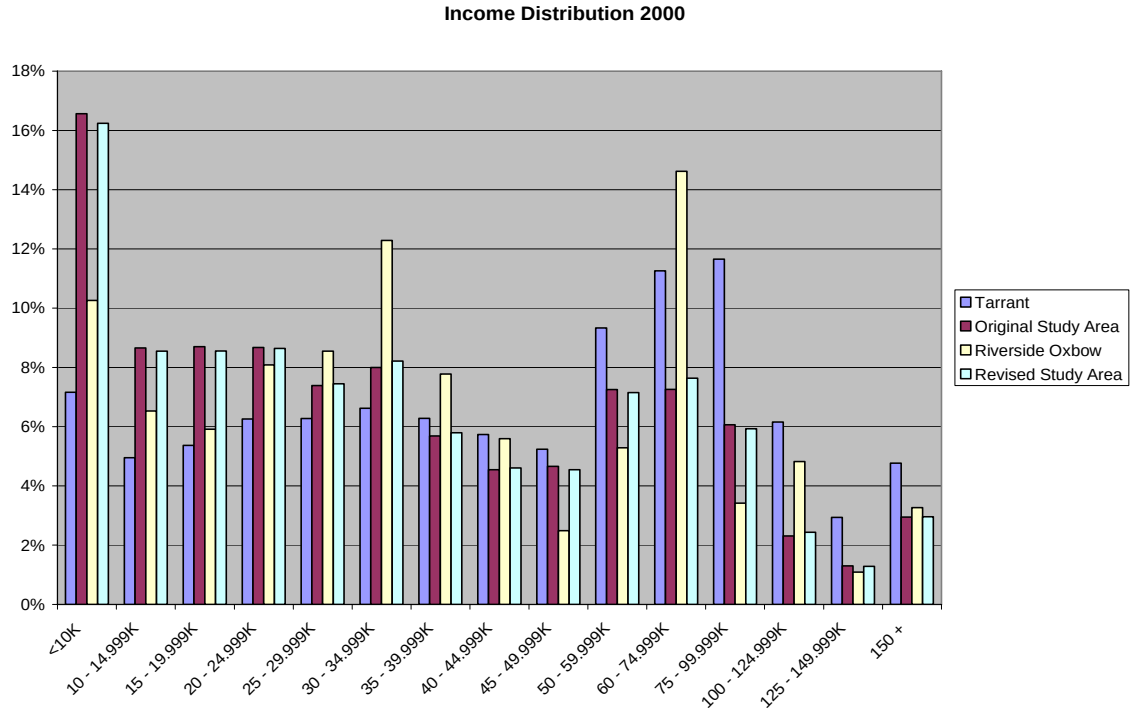


Chart 1 shows a relatively even distribution of income for the county with only 11.7 percent of the households having incomes less than $10,000. Almost 29 percent of the

households in the original study area had incomes less than $10,000 while almost 17 percent of the households in the Riverside Oxbow area had incomes less than $10,000. The revised study area displays income distribution patterns very similar to the original study area. Chart 2 shows the income distribution for the County, the original Central City study area, the Riverside Oxbow area, and the revised study area for 2000.

Chart 2



In 2000, the percentage of households having incomes less than $10,000 decreased to 7.2 percent for Tarrant County and decreased to 16.6 percent for the original study area. The Riverside Oxbow area decreased to 10.3 percent for the percentage below $10,000. Again, the revised study area displays an almost identical pattern as the original study area.

Table 2 displays the number of households, aggregate household income, and average household income for Tarrant County, the original Central City study area, the Riverside Oxbow area, and the revised study area in 1990 and 2000.

Table 2
Household Income – County, Original Study Area, Riverside Oxbow Area, and Revised Study Area

	Tarrant County		Original Study Area	
	1990	**2000**	**1990**	**2000**
Total Households	439,335	534,019	11,539	11,955
Agg. Household Income	17,607,117,254	32,100,894,600	313,840,671	539,184,900
Avg. Household Income	40,077	60,112	27,198	45,101

	Riverside Oxbow		Revised Study Area	
	1990	2000	1990	2000
Total Households	540	643	12,079	12,598
Agg. Household Income	13,289,198	34,720,900	327,129,869	573,905,800
Avg. Household Income	24,610	53,998	27,083	45,555

Average household income for the original study area was 32 percent less than the county in 1990 and 25 percent less than that of the county in 2000. the Riverside Oxbow area was almost 39 percent less than the county in 1990 but the gap shrunk to just over 10 percent in 2000. The patterns for the revised study area are very close to that of the original study area.

Poverty Status - Table 3 describes the poverty status of Tarrant County, the original Central City study area, the Riverside Oxbow area, and the revised study area.

Table 3
Poverty Status – County, Original Study Area, Riverside Oxbow Area, and Revised Study Area

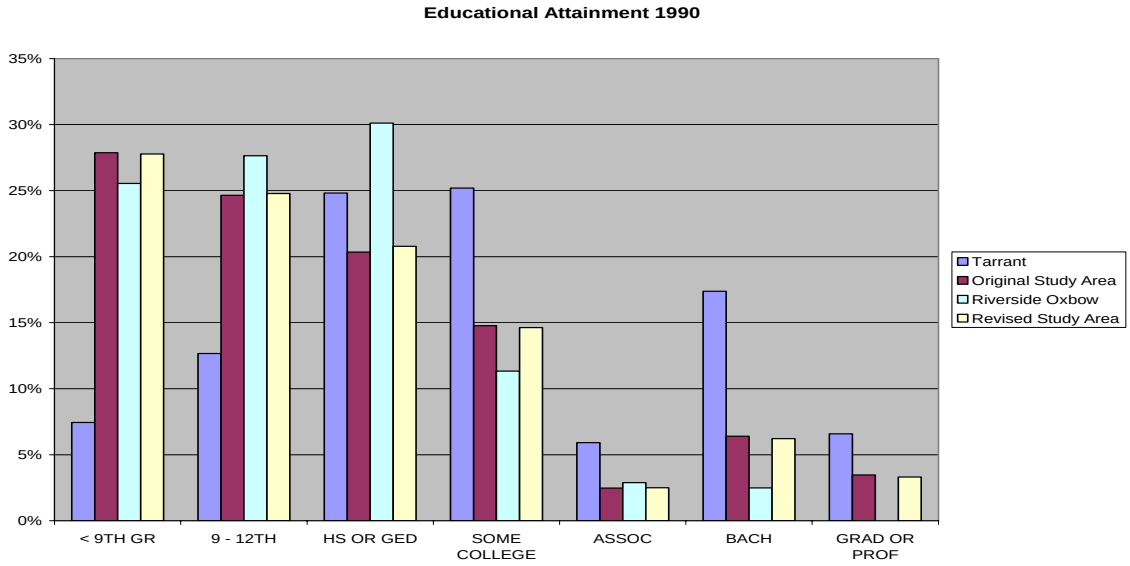
	Tarrant County		Original Study Area	
	1990	2000	1990	2000
Total Population for Poverty Level	1,149,013	1,421,383	33,959	35,737
Total Population Above Poverty Level	1,022,460	1,270,895	23,307	27,715
Total Population Below Poverty Level	126,553	150,488	10,652	8,022
Percent Above Poverty Level	89.0%	89.4%	68.6%	77.6%
Percent Below Poverty Level	11.0%	10.6%	31.4%	22.4%

	Riverside Oxbow		Revised Study Area	
	1990	2000	1990	2000
Total Population for Poverty Level	1,602	2,053	35,561	37,790
Total Population Above Poverty Level	1,280	1,733	24,587	29,448
Total Population Below Poverty Level	322	320	10,974	8,342
Percent Above Poverty Level	79.9%	84.4%	69.1%	77.9%
Percent Below Poverty Level	20.1%	15.6%	30.9%	22.1%

The percentage of the population in Tarrant County living below the poverty level was eleven percent for 1990 and declined slightly to 10.6 percent in 2000. The original study area had 31.4 percent of its population living below the poverty level in 1990 and decreased to 22.4 percent in 2000. The Riverside Oxbow area by contrast, had 20.1 percent of its population living below the poverty level in 1990. The percentage living below the poverty decreased to 15.6 percent in 2000, a larger drop relative to the county. The revised study area is within a percentage point of the original study area in both 1990 and 2000.

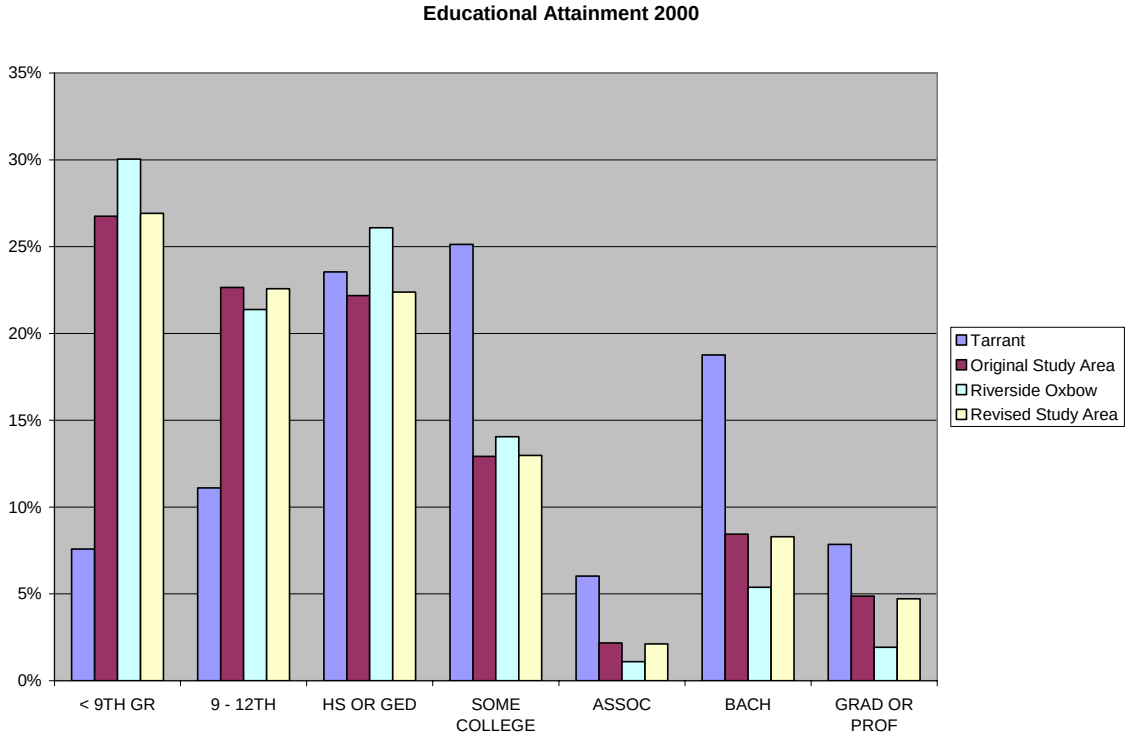
Educational Attainment. Chart 3 depicts educational attainment for Tarrant County, the original Central City study area, the Riverside Oxbow area, and the revised study area for 1990.

Chart 3



In 1990, almost 28 percent of the population of the original study area had less than a ninth grade education of those 25 and over. This compares with only 7.4 percent of the population 25 and over for Tarrant County. Almost 26 percent of the population of the Riverside Oxbow area had less than a ninth grade education in 1990. The Riverside Oxbow area also had substantially lower rates of college attendance than the county as a whole. The revised study area had roughly the same educational pattern as the original study area. Chart 4 depicts educational attainment for 2000.

Chart 4



This chart displays many of the same disparities in educational attainment between Tarrant County, the original study area, the Riverside Oxbow area, and the revised study area. The original and revised study areas did see small percentage reductions in lower levels of educational attainment for 2000 but these were offset by increases in higher levels of educational attainment, particularly attainment of bachelor's degrees as well as professional and graduate degrees. The Riverside Oxbow area did however see increases in the percentage of those with less than a 9th grade education bringing with it reductions in the percentage of those attending and graduating from high school but did see increases in rates of college attendance and increases in the attainment of bachelor's and graduate degrees.

Unemployment - Table 4 displays the unemployment rates in 1990 and 2000 for Tarrant County, the original Central City study area, the Riverside Oxbow area, and the revised study area.

Table 4
Unemployment Rates – County, Original Study Area, Riverside Oxbow Area, and Revised Study Area

	Tarrant County		Original Study Area	
	1990	2000	1990	2000
Male Labor Force	349,640	408,737	8,893	9,488
Employed	329,516	391,793	7,852	8,723
Unemployed	20,124	16,944	1,041	752
Unemployment Rate	5.8%	4.1%	11.7%	7.9%
Female Labor Force	285,758	340,752	5,648	6,280

Employed	269,429	323,594	4,959	5,489
Unemployed	16,329	17,158	689	791
Unemployment Rate	5.7%	5.0%	12.2%	12.6%
Combined Labor Force	635,398	749,489	14,541	15,768
Employed	598,945	715,387	12,811	14,212
Unemployed	36,453	34,102	1,730	1,543
Unemployment Rate	5.7%	4.6%	11.9%	9.8%

	Riverside Oxbow		**Revised Study Area**	
	1990	2000	1990	2000
Male Labor Force	549	480	9,442	9,968
Employed	490	469	8,342	9,192
Unemployed	59	11	1,100	763
Unemployment Rate	10.7%	2.3%	11.7%	7.7%
Female Labor Force	336	273	5,984	6,553
Employed	319	255	5,278	5,744
Unemployed	17	18	706	809
Unemployment Rate	5.1%	6.6%	11.8%	12.3%
Combined Labor Force	885	753	15,426	16,521
Employed	809	724	13,620	14,936
Unemployed	76	29	1,806	1,572
Unemployment Rate	8.6%	3.9%	11.7%	9.5%

The combined unemployment rate for Tarrant County for 1990 stood at 5.7 percent while the same rate for the original study area was 11.9 percent (11.7 percent for the revised study area). The Riverside Oxbow area was 8.6 percent. In 2000, the combined unemployment rate for Tarrant was 4.6 percent, 9.8 percent for the original study area (9.5 for the revised), and 3.9 percent for the Riverside Oxbow area.

Housing Characteristics - The following table describes the average home values, as well as percentage of home ownership, and the percentage of rentals for the County, the original and revised study areas, and the Riverside Oxbow area.

Table 5
Housing Characteristics – County, Original Study Area, Riverside Oxbow Area, and Revised Study Area

	Tarrant County		**Original Study Area**	
	1990	**2000**	**1990**	**2000**
Total Housing Units	491,152	565,830	13,260	12,958
Occupied Housing Units	438,634	533,864	11,622	11,829
Vacant Housing Units	52,518	31,966	1,638	1,129
Owner Occupied	254,897	324,754	5,610	5,669
Renter Occupied	183,737	209,110	6,012	6,160
Agg. Val. For Owner Occ. Units	20,212,397,000	33,328,205,000	315,415,500	469,925,000
Avg. Val. For Owner Occ. Units	79,296	102,626	56,224	82,894
Owner Occupied %	58.1%	60.8%	48.3%	47.9%
Renter Occupied %	41.9%	39.2%	51.7%	52.1%

Vacancy Rate	10.7%	5.6%	12.4%	8.7%

	Riverside Oxbow		Revised Study Area	
	1990	**2000**	**1990**	**2000**
Total Housing Units	653	718	13,913	13,676
Occupied Housing Units	553	665	12,175	12,494
Vacant Housing Units	100	53	1,738	1,182
Owner Occupied	356	417	5,966	6,086
Renter Occupied	197	248	6,209	6,408
Agg. Val. For Owner Occ. Units	11,791,000	39,537,500	327,206,500	509,462,500
Avg. Val. For Owner Occ. Units	33,121	94,814	54,845	83,711
Owner Occupied %	64.4%	62.7%	49.0%	48.7%
Renter Occupied %	35.6%	37.3%	51.0%	51.3%
Vacancy Rate	15.3%	7.4%	12.5%	8.6%

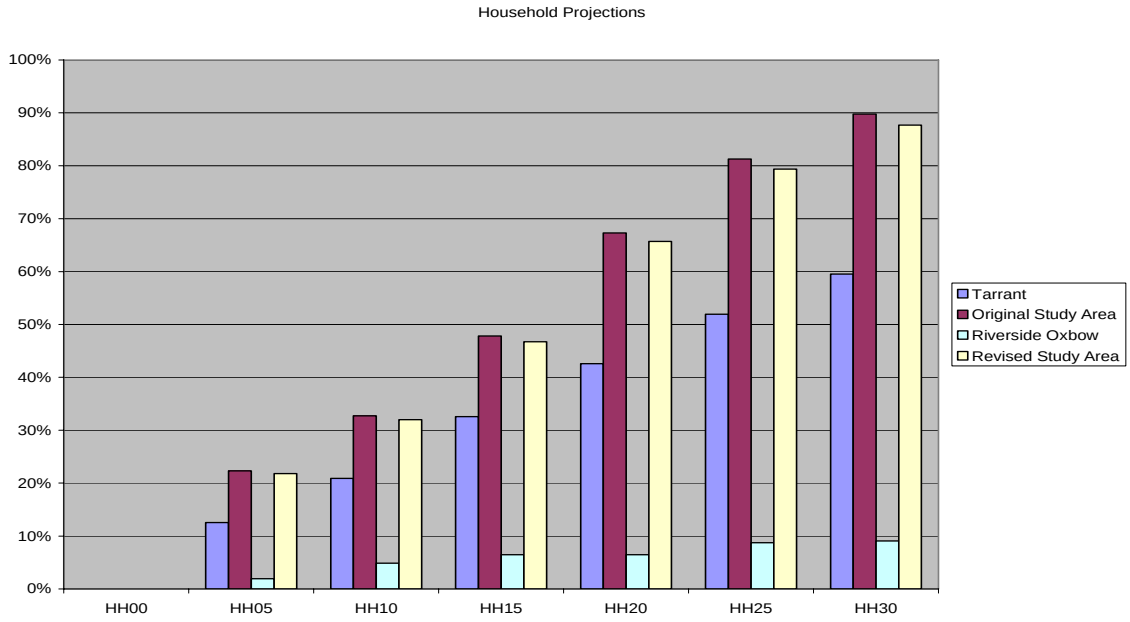
The original and revised study areas have lower home ownership rates than the County. The revised study area sees slightly average values for owner occupied housing compared to the original study area due to slightly higher values for the Riverside Oxbow area.

Projections (Future Without Project Conditions)

The following information is based on the North Central Texas Council of Governments' Demographic Forecast, which provides long-range, small-area household and employment projections for use in intra-regional infrastructure planning and resource allocations in the metropolitan area of North Central Texas. The Demographic Forecast is conducted by NCTCOG's Research and Information Services Department under review and oversight of the Demographic Methodologies Task Force. The Forecast has a 30-year time horizon, with 2000 as the base year and 2030 as the end year. Data applicable for a county level are used for Tarrant County, while data for the project area are disaggregated down to the traffic survey zone for those TSZ's that coincide with the project study area. This information includes projections for the number of households, household population, and employment. Additionally, these projections should be considered as what would occur in the absence of the Trinity River Vision.

Households - Chart 7 depicts the growth rate of households for Tarrant County, the original study area, the Riverside Oxbow area and the revised study area for the period beginning in 2000 and running to 2030.

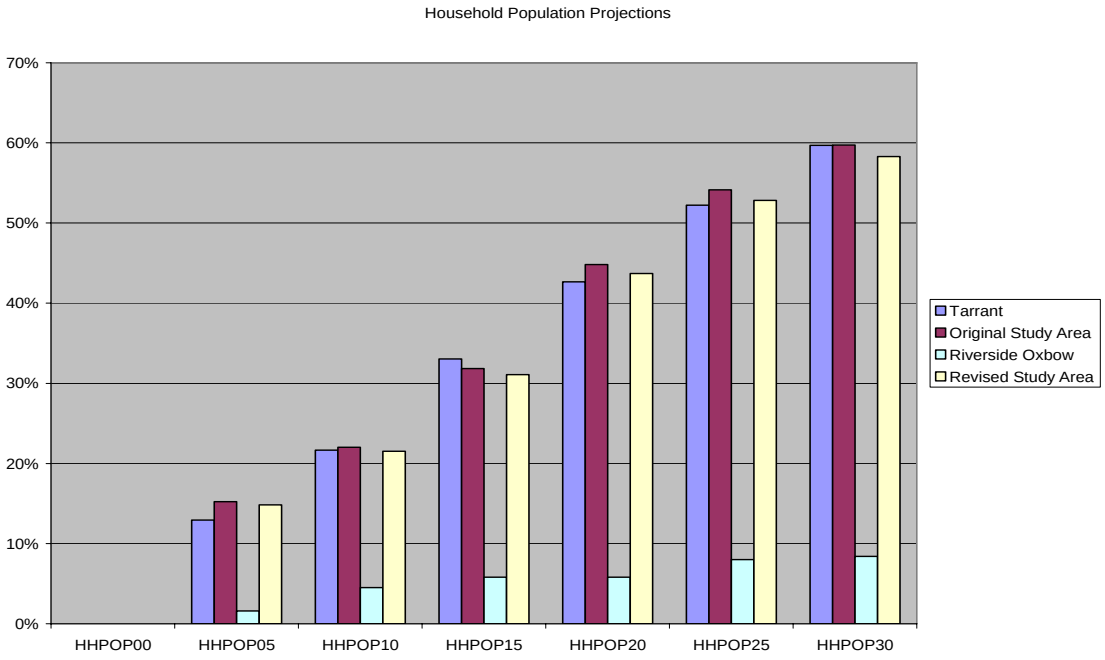
Chart 7



The number of households for Tarrant County is projected to grow by almost 60 percent between 2000 and 2030. By comparison, households for the original study area are expected to grow by almost 90 percent. Households for the Riverside Oxbow area are expected to only increase by nine percent. This relatively low growth rate subsequently drops the growth rate for the revised study area slightly.

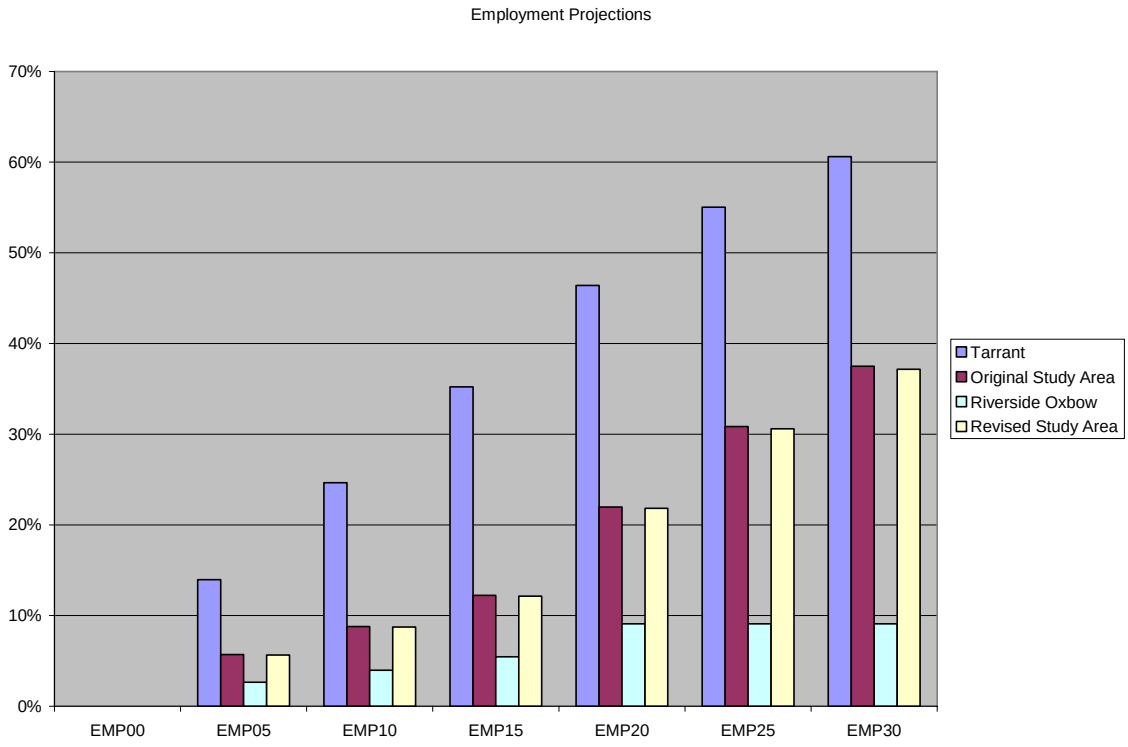
Household Population - Household population for Tarrant County is projected to grow by almost 60 percent. Growth in household population for the original study area is expected to grow at roughly the same rate. Growth in household population for the Riverside Oxbow is expected to only grow by 8.4 percent between 2000 and 2004. again, this low growth rate produces a slightly lower rate for the revised study area. This is depicted in Chart 8.

Chart 8



Employment - Employment for the period from 2000 to 2030 is expected to grow by almost 61 percent for Tarrant County. Employment for the original study area is expected to grow by only 37.5 percent while employment growth is expected to only grow by nine percent for the Riverside Oxbow area. This slow rate again pulls down the employment growth rate for the revised study area slightly. Employment projection rates are displayed in Chart 9.

Chart 9



Riverside Oxbow Land Use

The following table lists the total number of square acres within the Riverside Oxbow area with its associated land use classification based on 2007 Tarrant Appraisal District data. Just over 45 percent of the land within the Riverside Oxbow area is classified as vacant platted. Commercial makes up just over 30 percent and residential comprises less than one percent of the of the total land use for the area. Figure 1 graphically displays these land use patterns.

Table 6
Riverside Oxbow Land Use

Classification	Number of parcels	Square Acres	%
Vacant Platted	33	533.0	45.1%
Commercial/Industrial	26	358.8	30.3%
Acreage	20	198.6	16.8%
Utilities	8	84.6	7.2%
Residential	10	7.5	0.6%
Total	**97**	**1182.4**	**100.0%**

Effected Populations

In accordance with Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations” in assessing the potential impacts to minority populations within the study area, data in Appendix I of the FEIS listed 25 of the 40 2000 Census blocks within the original study area as having minority populations over 50 percent.

Of the 25 Census blocks, 20 contain Hispanic populations of more than 50 percent while the remaining five have African American populations of more than 50 percent. The revise study area adds two Census blocks that intersect the Riverside Oxbow project. The racial composition and median income for these two Census blocks are listed below in Tables 7 and 8. These Census blocks are depicted in Figure 2.

Table 7
Minority Populations of Riverside Oxbow Census Blocks

Census Block	White	Hispanic	Black	Am. Indian	Asian	Haw. or PI	Other	2 or More
1012.01.002	53.6%	43.6%	1.1%	1.0%	0.0%	0.0%	0.0%	0.7%
1012.02.006	35.5%	62.6%	0.0%	1.1%	0.0%	0.0%	0.0%	0.8%

Of the two Census blocks intersecting the Riverside Oxbow project area, 1012.02.006 shows to have a Hispanic population of 62.6 percent. The other Census block shows a Hispanic population of 43.6 percent. There is an issue with Census block however. This Census block extends eastward out of the Riverside Oxbow area ending at East Loop 820. This Census block includes subdivisions outside the Riverside Oxbow area that may be diluting Hispanic populations from subdivisions that may be impacted. We will discuss these subdivisions in more detail when we discus income and housing values.

Table 8 depicts the median income of the two Riverside Oxbow Census blocks.

Table 8
Median Income of Riverside Oxbow Census Blocks

Census Block	Median Household Income	Poverty Threshold for Family of Three	Above (+) / Below (-) Poverty Threshold
1012.01.002	$43,317	$13,290	$30,027
1012.02.006	$29,583	$13,290	$16,293

Neither of the two Census blocks displays populations living at or below the poverty threshold. Again, however, Census block 1012.02.006 includes subdivisions that dilute the median incomes of those subdivisions that may be impacted.

Potentially Impacted Neighborhoods

Housing values for the subdivisions within the two Census blocks intersecting the Riverside Oxbow area, based on 2007 Tarrant Appraisal District values for land and structures, are depicted in Table 9. Of those subdivisions listed below, 17 are identified as being potentially impacted. Figure 3 depicts these neighborhoods and their proximity to the Riverside Oxbow project area.

Table 9
Housing Value for Riverside Oxbow Census Block Subdivisions

Subdivision	Parcels	Total Value	Average Value
Baker, E L Subdivision*	5	$173,600	$34,720
Carver Place*	1	$34,900	$34,900
Davenport, Bert M Subdivision*	10	$589,500	$58,950
Eastview Addition*	8	$289,400	$36,175
Gilmore, G W Addition*	47	$1,815,771	$38,633
Kendall Subdivision*	6	$325,900	$54,317

King Oaks Addition*	66	$4,055,600	$61,448
Lynch, John Survey*	1	$85,700	$85,700
Page Co's East Side Addn*	106	$4,665,867	$44,018
Page's East Side*	12	$564,700	$47,058
Riverside Addition-Ft Worth*	157	$7,380,300	$47,008
Shutter Addition*	34	$1,850,300	$54,421
Tinsley Addition*	1	$120,300	$120,300
Tinsley, Lewis G Survey*	3	$181,017	$60,339
Waller, Benjamin E Survey*	3	$179,700	$59,900
Warren, Alex C Survey*	4	$128,700	$32,175
Woodrose Addition*	27	$2,998,100	$111,041
Akers, John Survey	4	$171,500	$42,875
Enos, Mamie Revision	5	$109,400	$21,880
Garden Of Eden Addition	10	$197,418	$19,742
Jones Court Addition	20	$1,023,000	$51,150
Louis, Joe Addition	7	$106,100	$15,157
Norris, William Survey	1	$54,000	$54,000
Oakview Addition	45	$2,619,100	$58,202
Richland Gardens Addition	1	$153,300	$153,300
River Bend Estates	188	$67,609,780	$359,626
Russell Addition	1	$58,900	$58,900

*Potentially impacted subdivisions

The span of average housing values for the two Census blocks ranges from $15,157 for the Joe Louis Addition to $359,626 for the River Bend Estates subdivision. Among the potentially impacted neighborhoods, the average housing values range from $32,175 for the Alex C. Warren to $120,300 for the Tinsley Addition. A comparison of the average housing values for those residential houses in the two Riverside Oxbow Census Blocks identified as being potentially impacted area are listed in Table 10.

Table 10
Average Housing Value Comparison for Riverside Oxbow Area Residences

Census Blocks	Parcels	Total Value	Average Value
1012.01.002	209	$12,404,955	$59,354
1012.02.006	282	$13,034,400	$46,221

Since the average housing value for those potentially impacted in Census block 1012.01.002 are actually higher, we can reasonably assume that this Census block, like 1012.02.006, does not exhibit a significantly high percentage residents living at or below the poverty level. From a racial and ethnic composition perspective, Census block 1012.01.002 shows a Hispanic population of 43.6 percent. Stated earlier, the population for this Census block is diluted by subdivisions outside the potentially impacted area. Considering the proximity of these potentially impacted subdivisions to those in Census block 1012.02.006, and the relatively high Hispanic population in the Census block overall, it is also a reasonably safe assumption that those potentially impacted subdivisions in 1012.01.002 have a significant population for consideration under EO 12898.

Consideration of Potential Impacts from Construction Activities on Protected Populations

The potential exists for short-term adverse impacts from construction of the Modified Project Alternative to occur to those identified neighborhoods within proximity to the Riverside Oxbow area. According to the Texas Department of Transportation, traffic counts on Beach Street, the major north/south thoroughfare running through these potentially impacted neighborhoods, averaged approximately 15,000 vehicles daily in 2004 between SH-121 and IH-30 and is expected to grow to 26,000 vehicles by 2030. Traffic, namely heavy duty, multiple-axle vehicles associated with construction activities of the Modified Project, could be expected to increase as construction commences during the short-term. Additionally, noise from the associated construction of the Modified Project could also impact these neighborhoods.

Camp Dresser & McKee (CDM) retained Trinity Consultants to assist in the review of potential noise impacts from construction activities and preparation of an emissions analysis for the Modified Central City Project. This analysis would also identify the potential impacts to those identified neighborhoods in the vicinity of the Riverside Oxbow area.

The focus of the air analysis is to identify the potential for increased construction related air emissions as a result of work proposed in the Riverside Oxbow area and to demonstrate that traffic-related emission changes resulting from the proposed project do not result in adverse cumulative impacts as evaluated in relation to the National Ambient Air Quality Standards (NAAQS) and regional air quality planning efforts. The analysis concluded that no long-term adverse air impacts are expected from implementation of the Modified Central City Project and that air quality impacts would mainly consist of airborne particulate matter (PM) generated by earth moving activities and construction traffic on unpaved roads, as well as emissions from construction equipment identified previously in the initial Central City FEIS, all of which should be minimized by Best Management Practices. NOx and VOC emissions are calculated as being less than 100 tons per year.

The focus on the construction impacts is to identify where the proximity and intensity of the work to nearby residential receptors would be greatest. Common temporary noise producers in urban areas include construction noise from heavy equipment operation, building of foundations and structures, earthwork, and trenching and utility installation. The analysis identified that noise impacts could be significantly mitigated by 1) the extended distance between the construction activity and noise receptors, 2) trees and vegetation along the creek bottom area and elsewhere between the construction area and receptors, 3) depressed elevation of the construction area due to the excavation cuts, and 4) the addition of an elevated excavation deposit area southeast of the intersection of North Beach and East 1st Street. Mitigation for hauling activities are identified as 1) ensuring trucks have working muffler systems, 2) managing haul truck speed and acceleration, and 3) limiting haul truck activity to daytime hours.

Environmental and Recreational Impacts

Estimates based on construction activities of the authorized Central City project and the associated residential and commercial development and recurring business will generate $4.3 billion in economic activity and employ almost 42,000 over a 40-year period. While the majority of this anticipated economic activity is expected to directly benefit those parts of the city in close proximity to Trinity Uptown, the beneficial impacts from the Modified Project to be realized by those neighborhoods close to the Riverside Oxbow area will generally come in the form of recreational amenities and improved environmental quality. As noted, the Riverside Oxbow project will reestablish low flows in the natural channel through a control structure restoring the oxbow's aquatic and riparian woodland complex. Other ecosystem restoration features include the creation emergent wetland, open water, and vegetative fringe habitat within the project area.

Recreational features specified in the original Riverside Oxbow interim feasibility report include pedestrian and equestrian trails, recreation access points with parking, and restroom

facilities. The draft concept recreation plan for Gateway Park, done by Gideon Toal depicts the following amenities.

- Soccer and baseball fields
- Mountain bike course
- Amphitheater and river education center
- Dog park
- Hiking and equestrian trails
- Equestrian center
- Skate park
- Boat house with canoe launch
- Picnic/playground areas
- Basketball courts
- Splash park

While all of these amenities may not be realized, this draft concept is intended to demonstrate the ability to develop hydraulic mitigation while providing the required environmental restoration components.

In assessing the balance between the short-term impacts of construction versus the longer-term beneficial impacts of the recreational amenities and environmental restoration features of the Modified Project, depending on the level and amount of amenities, these potentially impacted neighborhoods should benefit significantly from the recreational opportunities and the improved environmental quality afforded by the Modified Project.

Public Meetings

The Notice of Intent for the Supplemental EIS was published in the Federal Register on February 16, 2007. A formal public scoping was not held since measures to address the concerns of those potentially impacted populations within proximity of the Riverside Oxbow project area were conducted during the scoping phase for the initial Riverside Oxbow project report beginning with a series of public meetings held with local citizens and interest groups regarding the future of the Trinity River and its tributaries. As part of the Public Involvement process for the Riverside Oxbow interim feasibility report, two public meetings were held at the local library branch with citizens interested in the river segment that includes the Riverside Oxbow area. Additionally, the Parks and Community Services Department of the City of Fort Worth held a series of public meetings with citizens interested in the update of the Gateway Park Master Plan. Study participants, including USACE, the City of Fort Worth, Tarrant Regional Water District, Streams and Valleys, Inc., US Fish and Wildlife, and the Texas Parks and Wildlife Department, worked to keep residents of the Riverside Oxbow study area apprised of any relevant concerns. Comments from the Riverside Oxbow public meetings are compiled in Appendix J of the Riverside Oxbow, Upper Trinity River Feasibility Study.

Comments of special interest to protected populations close to the Riverside Oxbow area included situating lighting on playing fields so that light pollution is reduced; concerns that future zoning may force some neighborhoods to be connected to trails that may not want to be; the installation of security phones in Gateway Park; creation of overlay districts to protect zoning; and better access to trails.

A Public Meeting was held on January 24, 2008 during the 45-day public comment period and conducted at a location approximately one mile from those identified neighborhoods providing another opportunity for those residing around the Riverside Oxbow area to articulate potential concerns. Approximately 200 attended the meeting with 70 attendees submitting either oral or written comments. Of the seven of the comments expressing opposition to the either the initial or modified project, two attendees were opposed to the cost of the project; another two

thought efforts should be focused on Fossil Creek; another was opposed to the use of eminent domain; and another was concerned about the impacts to Riverside Park. An additional comment expressed conditional support provided that the EIS considered the interaction between the Gateway Park floodplain and the drilling for natural gas occurring within the vicinity of the Riverside Oxbow area. No comments surfaced regarding specific impacts to protected populations during this meeting.

Notice of Availability and Fair Contracting Workshops

Once the Draft Supplemental was completed, both English and Spanish versions of the Notice of Availability were posted on the District's website. Just as had been done with the initial Central City Draft EIS, copies of the Draft Supplemental were also sent to the Fort Worth Hispanic Chamber of Commerce for review and comments as another means of soliciting potential concerns from the Hispanic community. The Hispanic Chamber has also participated, along with representatives of USACE and other federal and local entities in contracting workshops to encourage the participation of potentially protected populations in the fair contracting process.

A Public Notice was mailed to the known interested public of more than 2,000 concurrently with publication of the NOI in the Federal Register. While no neighborhood associations exist within those neighborhoods identified for the Supplemental EIS, included in the mailing lists were representatives of those neighborhood associations surrounding the Riverside Oxbow area as well as the area's City of Fort Worth Parks board member. Comments resulting for the NOI and Public Notice included 11 telephone contacts ranging from individuals seeking to determine whether their property would be affected to inquiries regarding the status of the Study and Supplemental EIS. Five letters were also received, three of which were in regard to either reopening the oxbows, eminent domain, or correcting errors in the original Central City EIS. The other two consisted of correspondence with US Fish and Wildlife and the League of Women Voters.

Assessment of Protected Populations and Potential Impacts

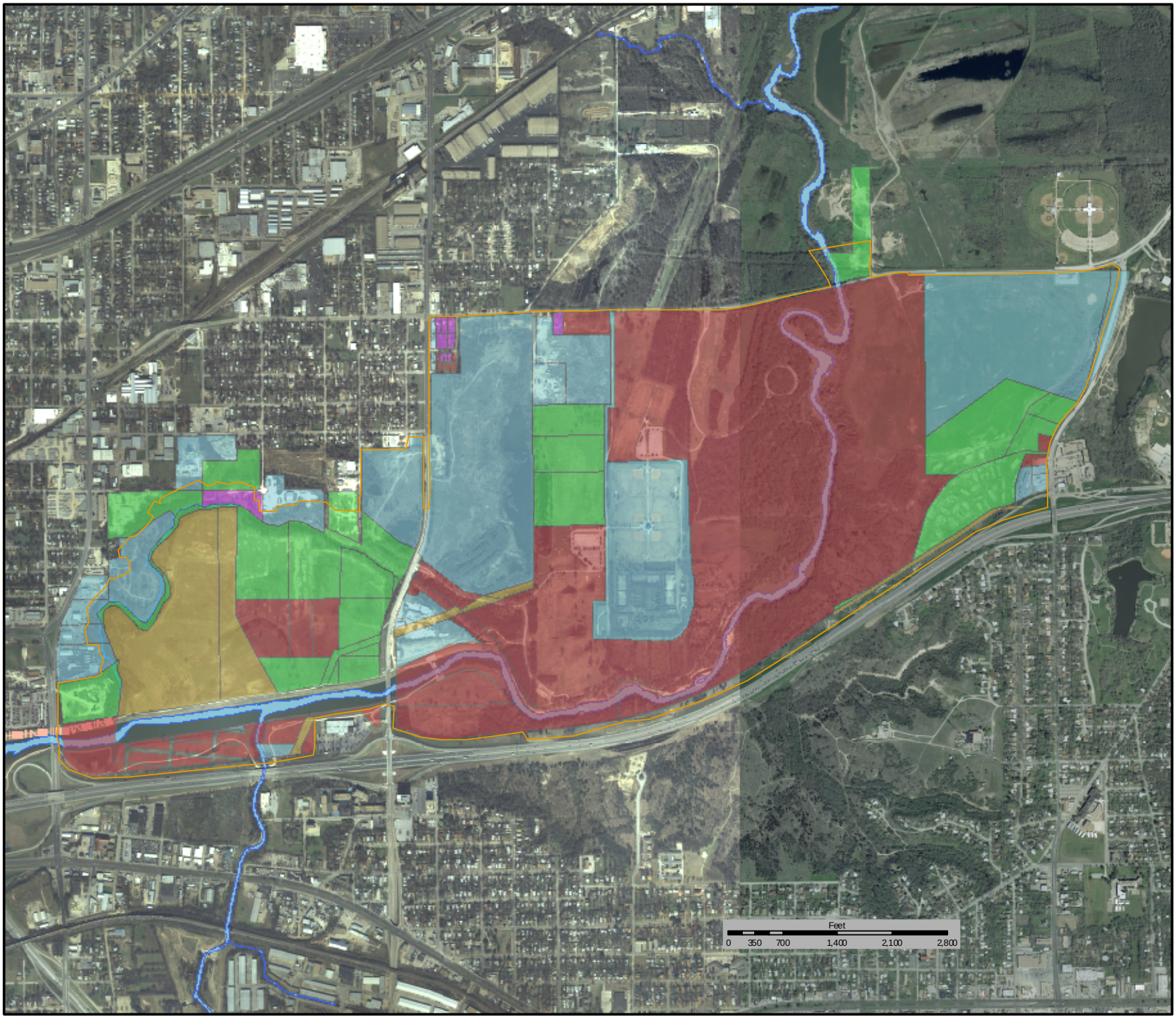
Of the two Census blocks intersecting the Riverside Oxbow project area, one contains a majority Hispanics and the other shows a high percentage of Hispanics but may be diluted by subdivisions containing higher populations of Anglos that are not expected to be impacted. For the purposes of this analysis, both Census blocks are treated as though a majority of Hispanics reside in both. Measures of income, both in terms median income and housing values, for populations of interest within both Census blocks indicate that these potentially protected populations did not warrant consideration on these terms.

Outreach to potentially impacted protected populations began with the scoping activities originating out of the initial Riverside Oxbow report. Continued outreach to all potentially impacted populations included publishing of the Notice of Intent for the Supplemental EIS in the Federal Register, mailing of a Public Notice to the known interested public including surrounding neighborhood associations, coordinating availability of the Draft Supplemental with the Hispanic Chamber of Commerce, and posting both English and Spanish versions of the Notice of Availability on the District's website. The solicitation of comments from potentially impacted populations culminated with a Public Meeting held in very close proximity to those identified neighborhoods.

An analysis was conducted for both the potential noise impacts from construction related activities and emissions for the Modified Central City Project. The analysis determined there would be no long-term adverse air impacts noting that any short-term impacts could be mitigated for by using Best Management Practices. Additionally, the analysis identified a number of activities that would mitigate for any short-term noise producers in the area. Despite these short-term impacts, the Modified Central City Project will provide substantial environmental and

recreational amenities to those identified neighborhoods that, in the long run, should significantly outweigh those activities occurring in the short run.

Figure 1
Central City Project
Land Use for
Riverside Oxbow Area



Legend

- Riverside Oxbow Area
- Streams
- Existing Levees

Land Use Class

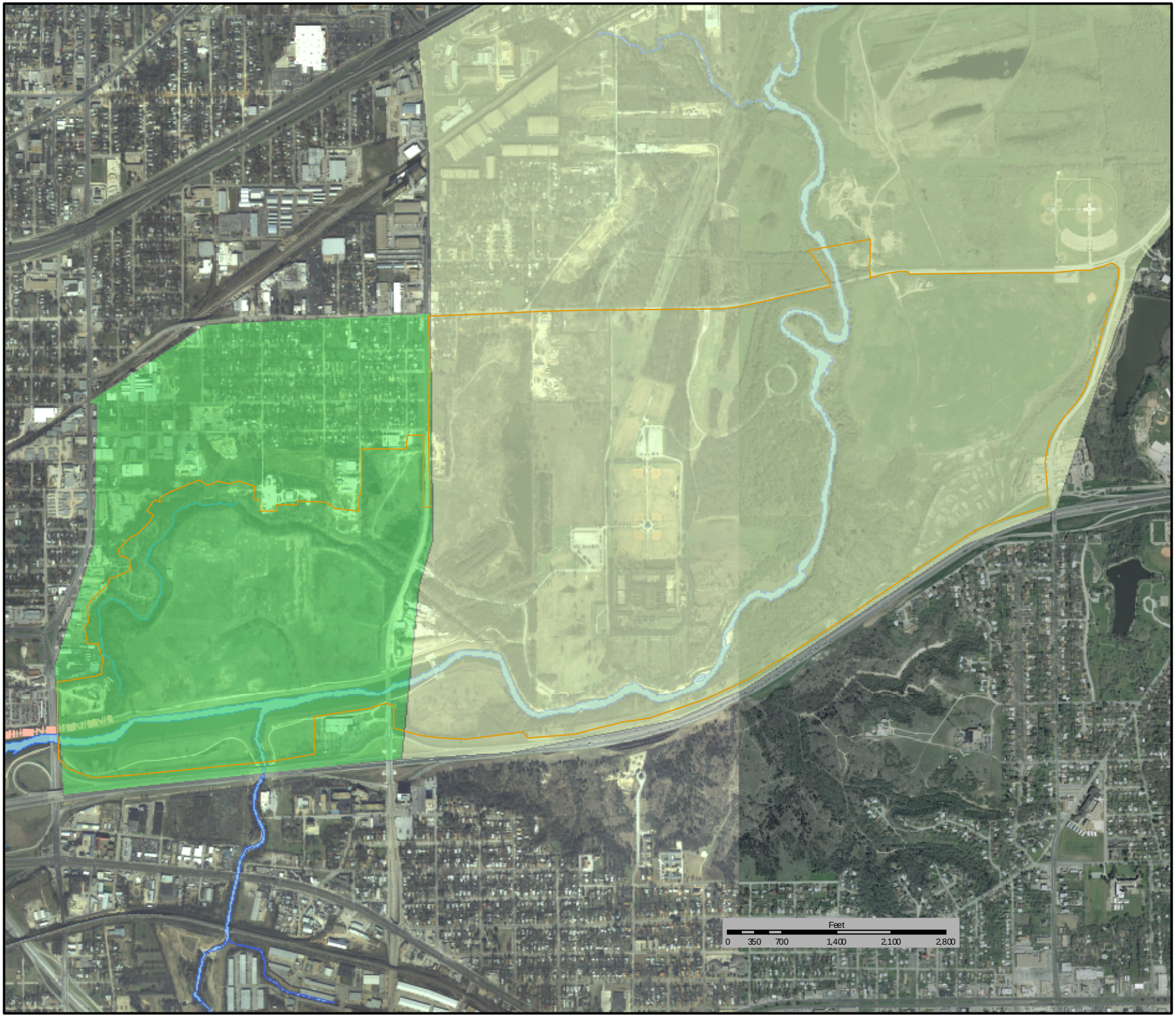
- ACREAGE
- COMMERCIAL/INDUSTRIAL
- RESIDENTIAL
- UTILITIES
- VACANT PLATTED

"

DISCLAIMER - "The U.S. Army Corps of Engineers has provided this data as a representation of the various information gathered from multiple sources utilizing multiple methods. This data should be used only as a representation of the provided information and should not be used for any other purpose. No guarantee is made by the U.S. Army Corps of Engineers regarding the data's accuracy or completeness or its suitability to a particular use."

US Army
Corps of Engineers
Fort Worth District

Figure 2
Central City Project
Census Blocks for Riverside Oxbow Area



Legend

- Riverside Oxbow Area
- Streams
- Existing Levees

Census Block

- 1012.01.002
- 1012.02.006

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Fort Worth District

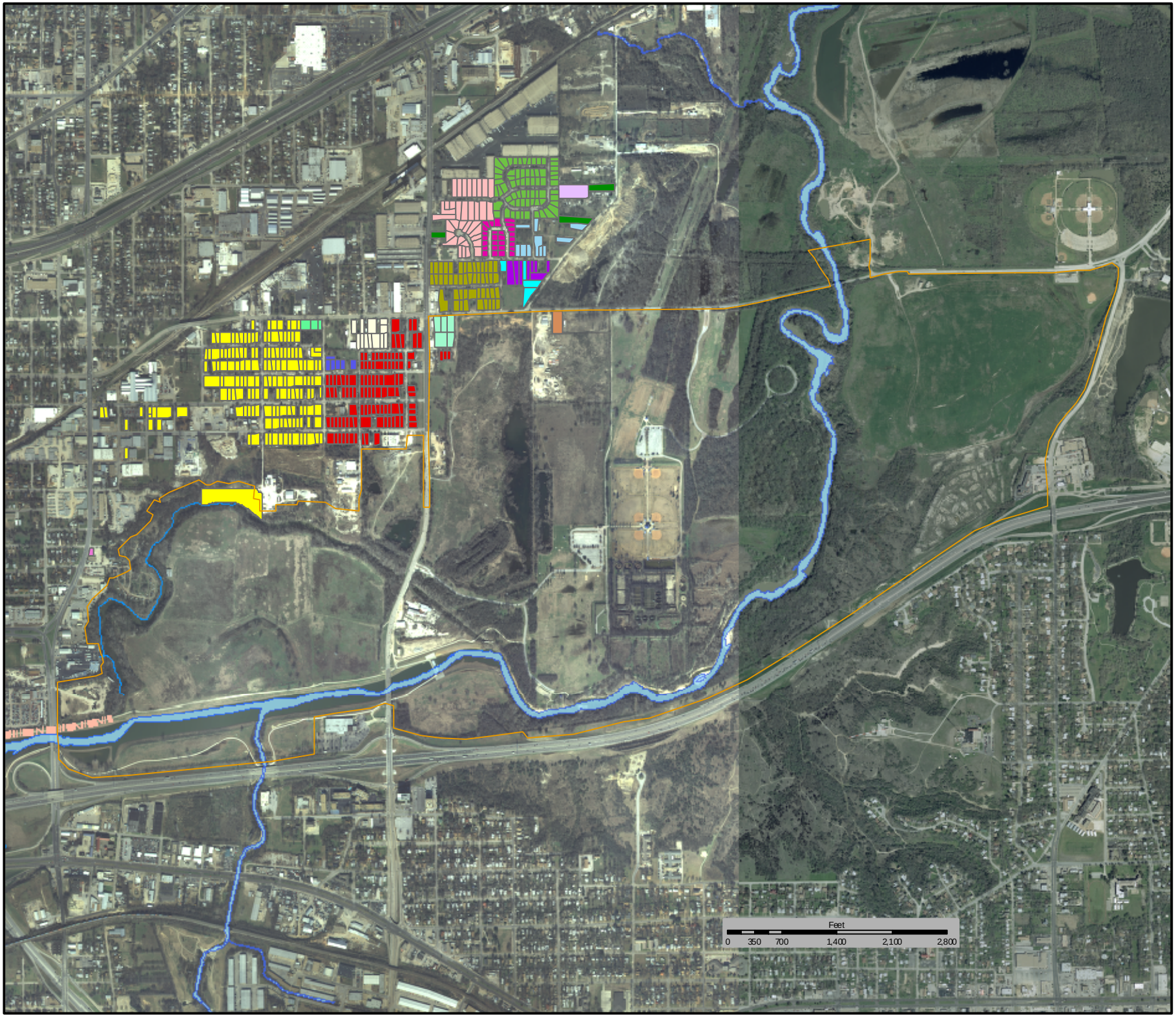

Figure 3
Central City Project
Potentially Impacted Subdivisions for Riverside Oxbow Area

Legend

- Riverside Oxbow Area
- Streams
- Existing Levees

Subdivision

- Baker, E L Subdivision
- Carver Place
- Davenport, Bert M Subdivision
- Eastview Addition
- Gilmore, G W Addition
- Kendall Subdivision
- King Oaks Addition
- Lynch, John Survey
- Page Co's East Side Addn
- Page's East Side
- Riverside Addition-Ft Worth
- Shutter Addition
- Tinsley Addition
- Tinsley, Lewis G Survey
- Waller, Benjamin E Survey
- Warren, Alex C Survey
- Woodrose Addition

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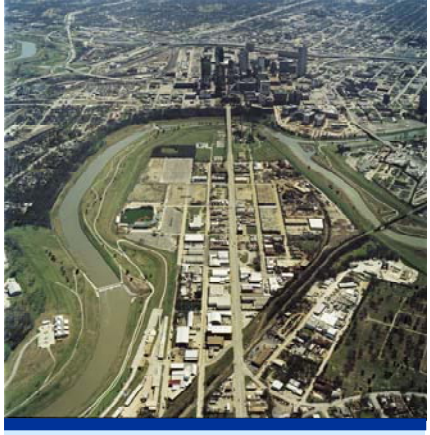
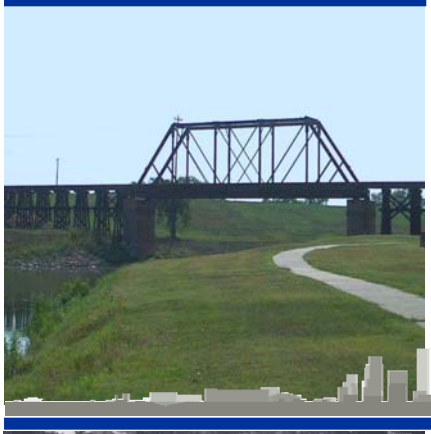
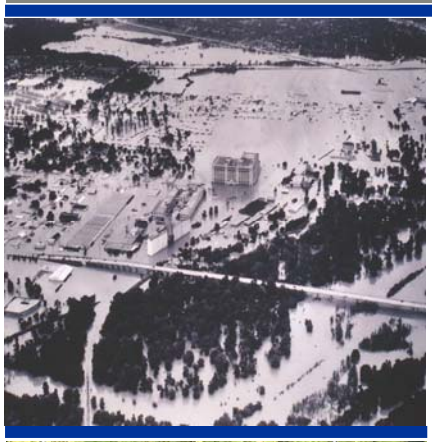
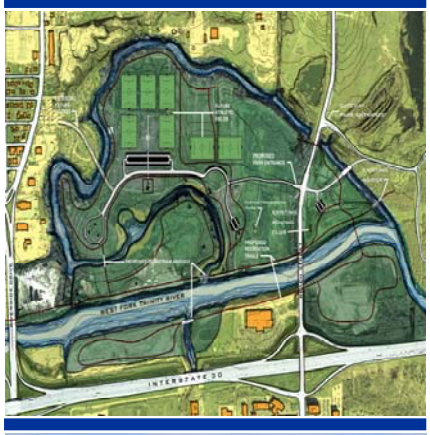
US Army
Corps of Engineers
Fort Worth District









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Habitat Evaluations

Final Supplement No. 1
to the Final Environmental
Impact Statement

Appendix E

March 2008

CDM

TARRANT REGIONAL WATER DISTRICT

Appendix E
Habitat Evaluations

BACKGROUND

Initial project planning for the Authorized Central City Project followed traditional Corps of Engineers plan formulation guidance and resulted in a formulation of a National Ecosystem Restoration Plan and a Flood Damage Reduction plan. A local plan was concurrently developed that emphasized flood damage reduction through relocation of features of the existing federal project. The local plan, as generally described in the April 2003 Trinity River Vision Master plan, was authorized by Congress prior to completion of the Corps project report. That Authorization includes limitations to total and Federal costs and requires determinations of environmental acceptability and technical soundness. Ecosystem improvements were incorporated into the Authorized "Community Based Alternative". Within the Rockwood study reach, two severed oxbows were configured and designed to achieve ecosystem restoration outputs. The largest valley storage site proposed for the Authorized Central City Project is the Riverbend site. A majority of adverse impacts of the Authorized Central City Project to riparian, wetland, and upland forest resources would be the result of increasing the valley storage capacity at the Riverbend site. Extensive riparian woodland and emergent wetland improvements were designed into the Riverbend site, however, much of those improvements are required to mitigate the adverse impacts of site development on significant habitat resources. Habitat mitigation is also required within the Authorized project to compensate for adverse impacts caused by inundation of Marine Creek, diversion of Lebow Creek, and impoundment of riparian resources associated with Samuels Avenue Dam (operational water surface elevation of 525 feet). Aquatic mitigation would be developed at Ham Branch, which surfaces at the eastern bluffs of Fort Worth and flows through Harmon Park to its confluence with the West Fork Trinity River. The total project, as documented within the Upper Trinity River Central City Fort Worth, Texas Final Environmental Impact Statement dated January 2006, with the project's environmental improvements was considered to sufficiently and totally compensate for the project's direct and induced impacts to important aquatic, wetland, riparian and upland forests. The Authorized Central City Project was ultimately administratively determined to be environmentally acceptable.

The Riverside Oxbow ecosystem restoration study resulted in an administratively approved project, which focuses on restoration of an oxbow of the West Fork of the Trinity River that had been severed during channelization of a segment of the West Fork. Key components of the approved Riverside Oxbow Ecosystem Restoration Project include removing an earthen plug at the upper end of the oxbow to connect it to the Trinity River, modification of the Beach Street crossing of the oxbow to remove an existing undersized culvert as well as fill in the oxbow and to construct a replacement span bridge. Structures would be placed in-channel to regulate flow and water depth for habitat quality and maintenance of water surface elevation within the channel. Aquatic habitat would also be improved by providing riparian forest and native grassland vegetative buffers adjacent to the oxbow. Other restoration measures of the approved plan include improving and adding additional acreages of wetlands adjacent to the remnant Sycamore Creek channel and development of two ponded areas within drying beds associated with an abandoned waste water treatment facility. Previously highly disturbed floodplain areas would be restored to native grasslands with riparian forested mottes and the forested floodplain along West Fork would be improved through selectively clearing non-native invading plant species and planting of native hard and soft mast trees. Details of the plan including projected ecosystem restoration and limited recreation benefits along with an analysis of environmental effects are discussed in detail within the Riverside Oxbow, Upper Trinity River, Fort Worth, Texas, Interim Feasibility Report and Integrated Environmental Assessment, dated April 2003. An Addendum to the Report was approved in April 2005, which removed some restoration measures from the project due to the non-essential nature of the restoration measures and their location in the floodplain.

The City of Fort Worth in June 2006 requested that the Corps consider the benefits of modifying the Authorized Central City Project by incorporating features of the Riverside Oxbow Ecosystem Restoration project and including areas within the Riverside Oxbow project as replacement hydraulic mitigation sites. The request listed seven reasons for this proposal including improving fish and wildlife habitat, real estate cost savings, and fewer impacts due to construction within the same time frame. Preliminary evaluation by the Corps of the city's proposal during the summer and early fall of 2006 indicated that such a proposal had merit. In the fall of 2006, Corps of Engineers Headquarters direct the Fort Worth District to initiate more detailed planning level investigation of the City of Fort Worth's proposal. The U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP) as described in their Ecological Services Manual (102 ESM 5) are the basis of the habitat evaluations used for the planning level analysis and the results of the HEP analyses are reported in this Appendix.

For purposes of this Supplement to the Final Environmental Impact Statement for the Central City Project, the "No Action" alternative is considered to be the separate implementation of the authorized Central City project and the administratively approved Riverside Oxbow project. The habitat outputs of this No Action and the Modified Central City alternatives are based on a common "future without (w/o) project" condition to allow comparison of the two alternatives' outputs. This "future w/o project" condition is the same as that used in the original Central City and Riverside Oxbow studies except in some areas of the Riverside Oxbow project where land use changes necessitated revising the "future w/o" project condition.

HABITAT EVALUATION PROCEDURE

Species models used to determine Habitat Suitability index (HSI) values were developed by the original Central City and Riverside Oxbow study teams. For each of these studies similar species guilds that are representative of each habitat type evaluated was developed and a list of structural features to be determined in the field was compiled. Results of these two independent studies are documented in their respective project reports and environmental documents. During the current study to evaluate the potential to modify the existing authorized Central City project, additional habitat evaluations were conducted solely to address specific sites that were found to not be adequately addressed in the prior studies. For example, additional clarification of a proposed valley storage site within the Gateway East study reach of the Riverside Oxbow approved project required updated information and consequently some additional habitat evaluation was undertaken in that area.

Updated Vegetation Mapping

Analysis of existing vegetation was conducted following methods conducted for the original studies. A primary reason for this level of detail was to assure avoidance of important resources on sites that would not have been affected by the prior valley storage requirements and to establish a similar level of detail for the combined study area. For example, the analysis conducted on the original Riverside Oxbow was based upon spectral analysis and limited ground-truthing to meet funding and time constraints for that study as compared to more detailed analysis with significantly more ground-truthing for the original Central City Study. Existing vegetation mapping for the Riverside Oxbow study was upgraded to match the level of analysis conducted for Central City. In addition, two additional areas that were not included in either of the previous study areas may potentially be affected by fill. One site is located on an existing closed sanitary landfill on the east side of the West Fork of the Trinity River just east of Gateway Park. The other potential fill site is within an old limestone quarry near North Interstate Highway Loop 820 near Meacham International Airport. Vegetation/land use mapping of both these sites was conducted solely for impact assessment as no habitat development would be feasible in these two sites. The vegetation data and mapping outputs for the combined study area are stored electronically and maintained by the Fort Worth District. See Figure E-1 for a map of the vegetation of the entire study area.

Acreages used in calculating Habitat Units (HU's) and Average Annual Habitat Units (AAHUs) were derived through Geographic Information System (GIS) interpretation of recent digital-orthophotography and color IR with field verification of habitat types by biologists with the Corps of Engineers, US Fish and Wildlife Service, and Texas Parks and Wildlife Department from August 2006 through July 2007.

As the majority of the habitat development would come from the Riverside Oxbow area under the modified Central City alternative, most effort was concentrated to assuring that the analysis was based upon sound understanding of the existing and future without a project conditions within this area.

Within the original and revisited Riverside Oxbow study area which totals approximately 1200 acres in size nine study reaches (Figure E-1) was developed to track proposed project impacts and benefits. Table E-1summarizes the conditions found during the current study as it was found that several significant changes in land use had transpired since the original study was completed.

Table E-1
Vegetation Type or Land Use (acres) within Central City and Riverside Oxbow study areas as determined during current study (2006-2007)

	Disturbed	Forbland	Grassland	Grassland Savannah	Riparian Forest	Upland Forest	Shrubland	Water	Emergent Wetland
Central City	1827.6	0.0	2313.8	17.4	314.8	535.4	1.3	299.6	14.9
Riverside Oxbow	172.3	8.6	509.3	16	278	68.3	44.4	84.6	19
Total	1999.9	8.6	2823.1	33.4	592.8	603.7	45.7	384.2	33.9

Projections of the Future “Without Project” Condition

During plan formulation for the authorized Central City and approved Riverside Oxbow projects, “future without project” conditions were projected for points in time over a 50 year period of analysis for the each study reach. Existing acreages of riparian resources were believed to be fairly well protected by existing regulations and public appreciation was believed to be sufficient to prevent substantial loss of acreages of riparian forest. However, habitat quality was projected to decrease at a slightly higher rate over time due to invasion by invasive non-native species such as chinaberry and Chinese privet. Upland forest was projected to lose acreage and habitat quality at a slightly higher rate due to the position of these resources near the outer edges of the floodplain, or outside of the floodplain. Developmental pressures and reduced regulatory control would contribute to upland forest losses. Emergent wetlands, although protected extensively by regulatory controls, are known to be ephemeral in nature, and there is little incentive to maintain existing wetlands that were not established for environmental restoration or environmental mitigation purposes. Therefore, based upon observations of existing wetlands and the ongoing changes that natural forces are causing, it is believed that for the most part existing wetlands will be significantly reduced in acreage and quality during the planning period. These “future w/o project” habitat conditions were annualized and used as a basis for evaluating the impacts and benefits of the Central City and Riverside Oxbow projects as documented in their respective reports.

During this evaluation of modifying the authorized Central City project to incorporate features of the Riverside Oxbow project and to consider areas within Riverside Oxbow as replacement hydraulic mitigation sites “future without project” conditions were revised to include changes that were not anticipated in the original studies. Most significant has been the increased disturbances of riparian and adjacent habitat by natural gas exploration. A fifty-year period of analysis was used to calculate the Average Annual Habitat Units (AAHUs) for the "Future without

Project" condition and for the No Action and Modified Central City alternatives, utilizing the methodology identified in the US Fish and Wildlife Service's 102-ESM-5 guidance. The "Future without Project" assumptions are described in detail in Attachment 1 to this Appendix and "Future w/o project" AAHUs for all study reaches were calculated and are displayed in the attachment to this appendix. These "future without project" AAHUs were the basis for computing the impacts and benefits of the No Action and Modified Central City alternatives.

MODIFIED CENTRAL CITY ALTERNATIVE

A primary objective in formulating the modified Central City alternative is to minimize adverse effects to existing resources and to minimize placement of project features in locations that would decrease the ability to improve resources identified as important for fish and wildlife habitat utilization. Early during the revised study, representatives of the Corps of Engineers, U.S. Fish and Wildlife Service, and Texas Parks and Wildlife Departments identified resources that should be avoided to protect the key aspects of the previously approved Riverside Oxbow project and location of those resources where impacts would not threaten the potential restoration opportunities. Figure 7 showing those important resources within the Riverside Oxbow is incorporated into the Supplemental EIS. As the study progressed and additional valley storage sites were identified for consideration within the entire modified study area, important resources, such as riparian forest and wetlands were identified and recommendations made for avoidance to the extent possible. Figure E-1 shows existing vegetation and land uses determined during this study, including identification of location of the important resources established as habitat types to avoid to the extent practicable during the development of valley storage excavation site locations and physical placement.

Major structural developments associated with the Authorized Central City project would remain unchanged and include the Bypass Channel, the Interior Water Feature, all related flood control gates, all pedestrian and vehicular bridges, and future development by private interests of the Trinity Uptown area. Among the proposed modifications are the relocation of the Samuels Avenue Dam and associated small craft locking facility and Marine Creek Dam, the removal of the primary valley storage at Riverbend, and addition of new valley storage areas along West Fork including the Ham Branch area and Riverside Oxbow and Gateway Park. The negative impacts are less significant because much of the existing riparian, upland forest, and wetland habitat in the Riverbend area will not be impacted and therefore a greater net gain of habitat outputs is possible. A substantial amount of riparian and upland forest habitat will also be developed by utilizing the Riverside Oxbow and Gateway Park valley storage sites for dense forest and wetland development.

Some minor impacts would still result to riparian forest, upland forest and wetland habitat due to excavation, access roads, and other changed project features and are summarized in Table E-2. For example 5.4 acres of riparian habitat within Ham Branch (Site 9) lie within the valley storage area that would be developed by breaching the levee and reconstructing a new levee to the north, but would not be removed by construction. The impacts in Ham Branch to these resources would be negligible as they would only be affected by backwater from extremely rare events. Impacts that required further consideration include the riparian forest impacts from the Riverside Oxbow and Gateway Park sites, upland and shrub land impacts within Gateway Park sites other than site 17, shrub land in the fill sites, and upland forest within the valley storage contingency sites. The minor riparian forest impacts within the Riverside Oxbow and Gateway Park should be more than compensated as a result of the extensive riparian forest that would be developed in that area following excavation for valley storage.

Table E-2
Habitat Impacts due to Changed Features
(Valley Storage and Disposal Sites)

	Riparian Forest		Wetland		Upland Forest		Grassland	
	Acres	AAHU	Acres	AAHU	Acres	AAHU	Acres	AAHU
Primary Valley Storage Site								
2	0.1	0.05	0	0	0	0	20.7	9.23
5a	0	0	0	0	0.5	0.20	17.2	5.96
5c	0	0	0	0	0	0	14.2	4.9
21	0	0	0	0	0.5	0.17	14.0	4.84
9	0	0	0	0	2.2	0.98	66.0	23
3	0	0	0	0	1.0	0.5	3.4	1.63
10	0.2	0.1	0	0	0	0	1.2	0.67
11	0	0	0	0	0	0	9.0	0.71
12,14	1.9	1.13	0.8	0.14	0	0	86.5	49.2
13	0	0	0	0	0	0	2.3	0.18
15	0.6	0.45	0	0	0.2	0.12	16.3	1.52
16,18	4.7	3.52	0	0	10.5	5.35	60.6	5.67
17	0	0	0	0	0.3	0.14	24.9	2.34
21	0	0	0	0	0.5	0.17	14.0	4.84
Subtotal	**7.5**	**5.25**	**0.8**	**0.14**	**15.7**	**7.63**	**350.3**	**114.69**
Disposal Sites								
5b east	0	0	0	0			12.7	4.39
5b west	0	0	0	0	0.09	0.03	13.8	4.77
South of 5c	0	0	0	0	0.5	0.29	7.7	2.66
Near Bypass	0	0	0	0	0.1	0.05	0.6	0.31
Near Meacham	0	0	0	0	3.9	2.3	10.3	0.85
WWTP	0	0	0	0	0.4	0.18	0.2	0.02
1st Street landfill	0	0	0	0	1.85	0.07	74.5	6.12
Subtotal	**0**	**0**	**0**	**0**	**6.84**	**2.92**	**119.8**	**19.12**
Contingency Valley Storage Sites								
1	0	0	0.2	0.04	3.7	2.68	24.2	10.79
6	0	0	0	0	0.4	0.16	15.9	5.51
7	0.2	0.11	0	0	0.1	0.03	22.3	7.72
8	0	0	0	0	0	0	16	5.54
22	0	0	0	0	8.5	4.04	98.2	46.75
Subtotal	**0.2**	**0.11**	**0.2**	**0.04**	**12.7**	**6.91**	**176.6**	**76.31**

Stream Aquatic

Aquatic impacts to Marine Creek would be reduced by the Modified alternative because of less stream length being inundated due to a lower water surface elevation and even though a

short reach of Marine Creek would be excavated. Negative impacts to Lebow Creek would be totally eliminated due to the relocation of Samuels Avenue Dam, precluding the need to fill the lower end of the creek and to relocate the mouth of the stream downstream of the dam. However, the improvements to the stream aquatic habitat proposed to occur within Lebow Creek as part of the Authorized Central City Project would not be achieved because of the relocation of Samuels Avenue Dam upstream of the location previously approved negating the feasibility of providing a continuous low flow near Brennan Avenue . The aquatic mitigation plan presented for the authorized Central City project required aquatic mitigation in Lebow Creek and additional aquatic mitigation within Ham Branch to offset impacts to Marine Creek. The current analysis for the Modified Central City alternative indicates that the Ham Branch aquatic mitigation would be inadequate to compensate for even the reduced impacts to Marine Creek. Subsequently, additional aquatic mitigation is proposed within Sycamore Creek within the Riverside Oxbow area.

Slope from the proposed Trinity River connection, through Sycamore Creek channel and the oxbow to its confluence with the West Fork below Beach Street Dam is only approximately 6 feet, of which only 1 foot would be Sycamore Creek and the remaining 5 feet would be in the Oxbow. A series of rock weirs would be utilized in the oxbow and smaller rock structures would be developed in Sycamore Creek to provide the basis for developing pools, riffles, and runs through the entire system. See Figure 12 of the SEIS for approximate location of those rock weirs. See Figure E-2 for a conceptualized drawing of how the aquatic features would be longitudinally incorporated into Sycamore Creek and into the Riverside Oxbow.

Sycamore Creek would average 10 feet in width at riffle control structures and would have average depth of about 1 foot over its approximate 3,200 foot restored length. Average velocity through the riffle complexes would be about 1 foot per second, which would be beneficial to anticipated darter utilization of the riffles and provide sufficient oxygenation within pools to support a wide variety of high value fisheries.

Stream bank riparian grasses along with preserved specimen burr oak and pecan trees existing along the alignment of the restored Sycamore Creek would provide shading, cover and supplemental food components to the aquatic system. Based upon this concept, which mimics high quality streams within the Central City study area such as lower segments of Marine and Lebow Creek it is anticipated that the Sycamore Creek Channel as restored would ultimately provide at minimal 0.75 acres of high value aquatic habitat. An Index of Biotic Integrity score of 47 was estimated to be appropriate for Sycamore Creek as proposed to be restored. Following the methodology that was utilized in the original Central City EIS, an IBI score would translate into an estimated future with project habitat suitability of 0.85. Since the stream based aquatic habitat would provide fisheries benefits to the entire 3200 feet of restored Sycamore Creek there would be a minimum of 0.64 habitat units established. As flow would be maintained during all times of each year, the seasonally adjusted habitat units and average annual habitat units attributable to stream restoration in Sycamore Creek would also be 0.64.

Stream impacts would be essentially fully mitigated by implementation of the aquatic mitigation plan at the Ham Branch site referenced in the original Central City EIS, and by implementation of restoration of flows through Sycamore cutoff with developed in-channel riffles and pools as a component of the Modified alternative. Table E-3 displays the analysis of stream based aquatic impacts, mitigation improvement analysis. With Sycamore Creek using a conservative estimate of 0.75 acres of stream habitat, the net AAHU after implementation of improvements would result in a net gain of 0.22 AAHUS. This difference is considered to be within the margin of error for this analysis and therefore it can be presumed that the stream aquatic impacts are fully compensated by the implementation of Hams Branch and Sycamore Creek channel improvements. Additional benefits from returning base flows and structural habitat modifications of aquatic habitat of the Riverside Oxbow would be restoration benefits in excess of those determined for the original Riverside Oxbow study. The modified alternative

would provide stream aquatic habitat benefits of 4.8 AAHUS while the no action alternative provided no documented net stream aquatic habitat benefits.

Table E-3
Stream Aquatic Impact, Mitigation and Improvement Analysis
Modified Central City Alternative

	Habitat Units at Sampling Date	Future Without (Seasonally Adjusted)	Future With Project	Future With Project and Stream Mitigation	Gain or (Loss)
	HU	AAHU	AAHU	AAHU	AAHU
Marine creek					
Plunge pool riffle	1.60	0.80	0	0	(0.80)
Waterfall to Exchange	1.12	0.28	0.11	0.11	(0.17)
Lebow Creek					
Confluence area	0.20	0.10	0.10	0.10	0
Upstream reach	0.31	0.16	0.16	0.16	0
Ham Branch	0.25	0.25	0.25	0.8	.55
Sycamore Creek	NA	0.0	0.00	0.64	0.64
Net AAHU Following all Mitigation					.22
Riverside Oxbow	NA	0.0	4.6	4.6	4.6
TOTAL AAHU					**4.82**

Habitat Development

The study of the Modified Central City alternative evaluates a shift of the primary location of habitat development from the previously authorized Riverbend area of the West Fork on the west side of Fort Worth to the Riverside Oxbow and Gateway Park locations on the on the east side of downtown Fort Worth. Two small oxbow restoration components in the Rockwood Park area are proposed for retention into the Modifed Alternative as proposed for the Authorized plan. The primary habitat development features of the approved Riverside Oxbow project including the restoration of West Fork Trinity River flows through the oxbow, improvement of existing riparian forest values, creation and improvement of wetlands, and development of native grassland buffer along the oxbow corridor have been retained. The primary difference between the approved Riverside Oxbow project and the Modified alternative has been to significantly increase the size of area where riparian forest could be developed in both the reaches above and below Beach Street. This increase in riparian forest development was possible due to the relocation of valley storage to the Riverside Oxbow area. Excavation provides the valley storage needed, however, additional hydraulic roughness is required at some sites to balance the hydrology and hydraulics of the study area to minimize adverse downstream hydraulic impacts. The hydraulic model was run and it was determined that the roughness of the existing downstream riparian forest within the Gateway Park East study reach is approximately what should be established for some the valley storage sites. Based upon this analysis, the existing riparian forest was further evaluated to determine the components of the forest that could be incorporated into the excavated valley storage sites to provide the required hydraulic roughness and provide riparian forest habitat benefits.

The Gateway Park East reach of the modified study area has been found to contain areas of high quality riparian woodlands, areas that are severely degraded due to abandoned drying beds, as well as a very narrow riparian corridor comprised of non-mast producing light seeded invader trees and shrubs. According to the Draft Fish and Wildlife Coordination Act Report for the Riverside Oxbow Ecosystem Interim Feasibility Study, two sites were evaluated within the dense riparian forest within the Gateway Park East zone along the West Fork downstream of the abandoned waste water treatment plant and East Fourth Street. These habitat evaluation sites were identified as Sites 002 and 003. Site 002 was generally described as woodland with medium dense understory. Dominant tree species included sugar hackberry, pecan, Chinaberry (non-native), box elder and American elm. Shrub consisted of box elder, privet (non-native) and coralberry. The predominant grass identified was wild rye. Vines and forbs identified in Site 002 included pokeweed, poison ivy, hedge parsley, wild onion, saw greenbrier, giant ragweed, common trumpet-creeper, toothed spurge, stinging nettle and *Viola sp*.

Site 003 was generally described as woodland with open understory dominated by pecan, a hard mast producer. Cedar elm, hackberry, box elder and American elm were also observed. Shrubs and grass found were the same as at site 002. Vines and forbs identified included poison ivy, dead-nettle (also known as henbit a non-native), wild celery, hedge parsley, dandelion, greenbrier and Japanese honeysuckle (non-native).

Some of the data collected at these sites are helpful in describing the character of the forest that would be useful for guiding forest development within the proposed valley storage sites. These data are shown in the Table E-4. Other data collected provides information more specific to habitat quality determinations than providing descriptors of the forest stand.

Table E-4
Structural Riparian Habitat Composition Parameters Estimated at Gateway Park East Corridor
(From USFWS Draft Coordination Act Report for Riverside Oxbow, September 2002)

Parameter	Site 002	Site 003	Forest Average
Percent Tree Canopy Closure	85	70	77.5
Percent Tree Canopy Closure of Mast Producers Greater than 6 inches dbh	10	70	40
Percent Canopy Closure of Deciduous Trees in Stand	85	70	77.5
Average dbh of Overstory Trees (inches)	11	22	16.5
Average Height of Overstory Trees (feet)	40	50	45
Percent Shrub Crown Cover (less than 15 feet in height)	15	40	27.5

While the information in Table E-4 provides a description of the dense forest it does not provide information that could be used to establish roughness coefficients for use in the hydraulic modeling. After further consideration, it was determined that basal area of trees (Table E-5) within this area would be a good parameter to use for establishing the relationship of existing forest density to existing over bank roughness. Future basal area can be projected based upon anticipated tree growth rates within the proposed forest establishment zones at time intervals that would provide forecasting useful for determining both future over bank roughness and habitat suitability values.

Table E-5
Existing Basal Area of Trees and Shrubs Gateway Park East Corridor

	Tree Basal Area in Square ft per acre	Shrubs Basal Area in Square Feet per Acre	Total Square Feet per Acre
Site A	70	5	75
Site B	80	5	85
Site C	90	15	105
Site D	60	5	65
Site E	110	10	120
Average	**82**	**8**	**90**

To develop a tree basal area of 82 square feet per acre within high density riparian forest, it was determined that trees would need to be planted on approximate 8 foot center in the valley storage areas. This is based upon an estimate that under predicted growth conditions in the valley storage excavation areas, one inch diameter trees would grow to approximately five inches in diameter at breast height (dbh) within 15 years. Six hundred (600) trees per acre with 5 inch dbh would provide 82 square feet per acre basal area. In addition, to account for anticipated mortality and to provide habitat variety, it was determined that 100 seedlings and 40 shrubs or vines per acre would be planted within the areas proposed for high density forest development. See Figure 12 of main body of SEIS for locations of the proposed high density forest development within valley storage excavations.

While initial tree planting density within the proposed deeply excavated valley storage areas was determined to provide hydraulic roughness similar to that currently existing in downstream study reaches, the species selected for planting reflect those that would provide optimum fish and wildlife habitat. Additional forest habitat that would be developed in other areas of the Riverside Oxbow include light riparian forest development and scattered riparian forest development. Light riparian development would consist of native grassland with tree, shrub and vine plantings at ten percent of the high density forest. Scattered density forest would consist of tree shrub and vine plantings at five percent of the high density forest plantings. Both light and scattered density forest was evaluated as savannah as defined by the US Fish and Wildlife Services habitat modeling guidelines. Figure 12 indicates areas within Riverside Oxbow that would be developed as savannah or other grasslands. Improvement of existing forest would consist of plantings of trees and shrubs at the density described in the original Riverside Oxbow restoration report.

Trees, shrubs and vines recommended for planting cannot be specifically chosen at this time due to unknown site specific soil quality and moisture conditions; however, the following list provides a number of species by types that would provide future habitat quality within the range of projected values. Some additional soil manipulations including furrowing to provide strips of slightly drier soils may be necessary to establish some of these species. Slopes around the perimeters of the valley storage excavation sites would also provide appropriate areas for habitat development.

Tree plantings should consist of 60 percent hard mast broken down as follows:

40% Oaks	20% Hickories
1. Shumard oak	1. Pecan
2. Burr oak	2. Black walnut
3. Water oak	
4. Overcup oak	
5. Southern red oak	

Soft mast and other hardwoods plantings should be derived from the following groups by percent as indicated:

10% Elms:	10% Other Hardwoods
1. Cedar elm	1. American Holly (Ilex opac)
2. Texas sugarberry	2. Mulberry
	3. Bois d' Arc
	4. Green ash
	5. Boxelder

Shrubs and vines should be selected from the following list and planted at the densities described for each riparian forest and savannah restoration:

1. Native wild plums
2. Yaupon
3. Deciduous holly
4. Sumac
5. Redbud
6. Rough-leafed dogwood
7. Coralberry
8. Common persimmon
9. Swamp privet
10. Hawthorn
11. Buttonbush
12. Trumpet creeper
13. Peppervine
14. Blackberry/dewberry
15. Virginia creeper
16. Carolina snailseed
17. Coral honeysuckle (*Lonicera sempervirens*)

Future With Modified Alternative and Revised Riverside Oxbow Habitat Suitability Determinations for No Action Alternative

Professional judgment by an interagency team was used to estimate forest structural changes over the 50 year period of analysis and to determine future habitat suitability indices for riparian forest development, management of existing forest, wetland development and management and grassland savannah consisting of five percent or ten percent tree canopy or pure native grasslands. It was determined that riparian forests developed on existing floodplain grasslands would develop an ultimate 0.80 habitat suitability by year 50 while riparian forests developed on deeply excavated floodplain lands would generate 0.60 habitat suitability units per acre by year 50. The reduced values anticipated at year 50 for the deeply excavated lands were based upon estimations of tree growth restrictions from slightly increased flooding depths and durations and the difficulties in reclamation of areas where parent soils have been disturbed and removed. Habitat suitability for management of existing forests and wetland developments were similar to projections for similar habitat developments utilized in previous studies within the general Upper Trinity River study area. These future conditions were then annualized over the 50 period of analysis. Planning assumptions over time, acreages of trees managed or developed, wetlands developed and various grassland habitat improvements are contained within Attachment 1 to this appendix.

In order to allow a direct comparison of the Modified Central City alternative with the No Action alternative it was determined that the features outlined within the Riverside Oxbow Project Report and Addendum (2005) as part of the No Action alternative should be reassessed using the same professional judgment used in determining habitat suitability indices for similar habitat measures of the Modified Central City alternative.

With the Modified Central City Alternative, the proposed habitat development within the Riverside Oxbow/Gateway Park study area in the Oxbow North, Oxbow Central, Oxbow South, Gateway Central, Gateway South, Gateway Beach, Gateway Park and Gateway East study reaches consists of :

1. Create or develop 137.6 acres of riparian forest on existing grasslands and excavated valley storage sites
2. Improvement of riparian forest habitat on 263.6 acres
3. Create, develop and improve 52.2 acres of wetlands
4. Develop 76.9 acres of native grassland savannah with 5% to 10 % tree cover
5. Develop native grassland on 10.1 acres
6. Improve habitat quality of 53.3 acres of native riparian grasslands
7. Establish turf grass for stabilization on 124.7 acres

Development of oxbows within the West Fork Rockwood reach and the development and management of riparian forest within the Ham Branch area of the West Fork South study reach

would also be constructed as outlined within the Central City action alternative described within the Final Environmental Impact Statement for the Central City project (2006).

Development of wetland functional values requires that appropriate soils are inundated or saturated with sufficient frequency and duration to encourage growth of aquatic plants that are selected for fish and wildlife habitat utilization. Water for these wetlands will be derived from local sources including the Trinity River to maintain or augment water from local drainage and precipitation runoff. Gateway Beach wetlands would be located in an area that receives significant runoff and is also at a depth near groundwater, therefore minimal supplemental watering would be needed for this site, however for this and the other wetlands, pumping stations will be implemented following a design to allow complete filling of the wetlands within a 30 day time period as needed to best mimic naturally occurring conditions in this ecoregion.

COMPARISON OF OUTPUTS BETWEEN NO ACTION AND MODIFIED ALTERNATIVE

Table E-6 provides a summary of the acres of the habitat types that would be involved within the "No Action" alternative which includes both the authorized Central City project and approved Riverside Oxbow project report conditions.

Table E-7 provides a summary of the acres of habitat types that would be involved with the Modified Alternative action of removing the Riverbend Valley Storage, hydraulic mitigation and habitat development measures and modifying Riverside Oxbow ecosystem restoration features by adding riparian woodlands, improving wetland development and native grassland and grassland savannah development.

Table E-6
Habitat Development Acres considered in the No Action Alternative

Study Reach	No Action Alternative														
	Riparian Acres				Wetland Acres			Upland Acres				Savannah & Grassland Acres			
	P	C	I	S	P	C	S	P	C	I	S	P	C G	C S	S
Clear Fork West	0	0	0	0					-7.29		-7.29		-47.42	0	-47.42
Clear Fork East	0	0	0	0					-1.65		-1.65		-1.01		-1.01
North Main	0	-4.88	0	-4.88					-22.23		-22.23		-138.72		-138.72
West Fork North	0	0	0	0					-3.10		-3.10		-71.20		-71.20
West Fork South	0	1.4*	7.4*	8.8					-3.01		-3.01		-31.45		-31.45
West Fork Riverbend[2]	0	69.86	19.17	-49.98	0	6.22	6.22		4.22	13.30	17.52		-104.38	0	-104.38
West Fork Rockwood[2]															
Central City Subtotal	**0**	**66.38**	**26.57**	**92.25**	**0**	**6.22**	**6.22**	**0**	**-33.06**	**13.30**	**-19.76**	**0**	**-394.19**	**0**	**-394.19**
Oxbow North	18.5	20	20.3	58.80	0	0		0	0	0	0	0	36.4	12	48.40
Oxbow Central	3.1	0	0	3.10	0	12.3	12.3	0	0	0	0	0	0	71.6	71.6
Oxbow South	0	2	7.8	9.80	0			0	0	0	0	0	0.9	14.9	15.8
Gateway Central	0	1.5	9.7	11.20	0			0	0	0	0	0	3.2	12.9	16.1
Gateway South	5.2	13.3	15.7	34.20	0			0	0	0	0	0	1.3	15.6	16.9
Gateway Beach	0	21.6	27.4	49.0	0	10	10	0	0	0	0	0	0	0	0
Gateway Park	0	0	0	0	0			0	0	0	0	0			
Gateway East	0	7	97.1	104.1	0	26.8	26.8	0	0	0	0	0	3.8	3.8	7.60
Riverside Oxbow Subtotal	**26.8**	**65.4**	**178.0**	**270.2**	**0**	**49.1**	**49.1**	0	0	0	0	0	**45.6**	**130.8**	**176.4**
TOTAL	**26.80**	**131.78**	**204.57**	**363.15**	**0**	**55.32**	**55.32**	**0**	**-33.06**	**13.30**	**-19.76**	**0**	**-348.59**	**130.8**	**-217.79**

P = Preserve
I= Improve existing habitat
C= Create or Develop new habitat acreage (-) indicates losses of acres within respective study reach : * Ham Branch Features
S= Subtotal acreage within habitat type
C G = Create or Develop Native Grasslands
C S =Create or Develop Savannah/grasslands

Table E-7
Habitat Development Acres considered in the Modified Alternative

Study Reach	Riparian Forest Acres				Wetland Acres				Upland Forest Acres				Grassland/Savannah Acres					
	Preserve	Create	Improve	Subtotal	Preserve	Create	Improve	Subtotal	Preserve	Create	Improve	Subtotal	Preserve	Create Native	Create Savannah	Turf	Improve Native	Subtotal
Clear Fork West	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-7.4	0.0	0.0	-7.4	-48.1	0.0	0.0	0.0	0.0	-48.1
Clear Fork East	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.7	0.0	0.0	-1.7	-1.0	0.0	0.0	0.0	0.0	-1.0
North Main	-4.9	0.0	0.0	-4.9	0.0	0.0	0.0	0.0	-22.2	0.0	0.0	-22.2	-138.7	0.0	0.0	0.0	0.0	-138.7
West Fork North	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.7	0.0	0.0	-3.7	-99.5	0.0	0.0	0.6	0.0	-98.9
West Fork South	0.0	1.4	7.4	8.8	0.0	0.0	0.0	0.0	-5.7	0.0	0.0	-5.7	-14.4	0.0	0.0	90.8	0.0	76.4
West Fork Riverbend	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Fork Rockwood	-0.1	20.5	0.0	20.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	0.0	0.0	22.5	0.0	24.3
SUBTOTAL	**-5.0**	**21.9**	**7.4**	**24.3**	**0.0**	**0.0**	**0.0**	**0.0**	**-40.7**	**0.0**	**0.0**	**-40.7**	**-299.9**	**0.0**	**0.0**	**113.9**	**0.0**	**-186.0**
Oxbow North	-0.2	24.9	37.9	62.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.2	0.0	0.0	11.3	46.4	56.5
Oxbow Central	-1.9	45.2	2.8	46.1	-0.8	0.0	0.0	-0.8	0.0	0.0	0.0	0.0	-86.5	0.5	21.5	37.2	0.0	-27.3
Oxbow South	0.0	21.7	0.0	21.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-5.7	1.5	0.0	3.3	0.0	-0.9
Gateway Central	-0.1	0.0	2.1	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	16.8		0.0	22.3
Gateway South	-0.6	14.6	24.4	38.4	0.0	0.0	0.0	0.0	-0.2	0.0	0.0	-0.2	-16.3	0.0	0.0	4.5	0.0	-11.8
Gateway Beach	-4.5	31.2	34.6	61.3	0.0	15.0	6.9	21.9	-11.7	0.0	0.0	-11.7	-61.7	8.1	35.9	41.0	6.9	30.2
Gateway Park	-0.2	0.0	55.0	54.8	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	-0.1	41.2	0.0	2.7	27.3	0.0	71.2
Gateway East	0.0	0.0	106.8	106.8	0.0	37.2	0.0	37.2	-0.2	0.0	0.0	-0.2	0.5	0.0	0.0	0.1	0.0	0.6
SUBTOTAL	**-7.5**	**137.6**	**263.6**	**393.7**	**-0.8**	**52.2**	**6.9**	**58.3**	**-12.2**	**0.0**	**0.0**	**-12.2**	**-124.2**	**10.1**	**76.9**	**124.7**	**53.3**	**140.8**
East First Street**									-1.9				-74.5	0.0	0.0	79.1	0.0	4.6
WWTP**									-0.4				0.0	0.0	0.0		0.0	0.0
Meacham Airfield area disposal**									-3.9				-10.3	0.0	0.0	0.0	0.0	-10.3
SUBTOTAL	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**-6.2**			**-6.2**	**-84.8**	**0.0**	**0.0**	**79.1**	**0.0**	**-5.7**
TOTAL	**-12.5**	**159.6**	**271.0**	**418.1**	**-0.8**	**52.2**	**6.9**	**58.3**	**-59.0**	**0.0**	**0.0**	**-59.0**	**-508.9**	**10.1**	**76.9**	**317.7**	**53.3**	**-50.9**

Preserve if positive number, a negative value indicates a loss of habitat acres * Ham Branch Features **Disposal Sites not within identified study reaches
Create or Develop new habitat acreage: For summary information, any losses identified in the preserve column would be subtracted from this column

Acreages provide a means of describing the extent of action proposed with either alternative, however, habitat suitability indices varies widely by the type of habitat measure being proposed. To be consistent with the procedures to develop and display habitat outputs resulting from alternative implementation, and to provide a reasonable means to determine localized project impacts, or benefits, the project alternatives were evaluated using the Habitat Evaluation Procedures as the method to project time weighted values (average annual habitat values). Table E-8 provides a comparative breakout of habitat gains and losses for each habitat type considered between the No Action and Modified Alternatives.

Table E-8
Habitat Outputs (AAHUs) By Study Reach (Outputs are after impacts)

Study Reach	No Action Alternative[1]				Modified Central City Alternative			
	Riparian	Wetland	Upland	Savannah & Grassland	Riparian	Wetland	Upland	Savannah & Grassland
Clear Fork West	0.00	0.00	-10.43	-24.56	0.00	0.00	-10.48	-24.87
Clear Fork East	0.00	0.00	-0.81	-0.38	0.00	0.00	-0.81	-0.39
North Main	-2.87	0.00	-11.09	-71.85	-2.87	0.00	-12.18	-75.90
West Fork North	0.00	0.00	-0.77	-26.89	0.00	0.00	-1.17	-40.50
West Fork South	2.04	0.00	-1.49	-11.88	2.04	0.00	-2.75	-16.65
West Fork Riverbend[2]	44.34	12.47	-8.80	-28.40	0.00	0.00	0.00	0.00
West Fork Rockwood[2]	--	--	--	--	7.15	0.00	0.00	-12.93
Central City Subtotal	**43.51**	**12.47**	**-33.39**	**-163.96**	**6.32**	**0**	**-25.96**	**-169.60**
Oxbow North	20.25	2.68	0.00	27.49	22.14	0.00	0.00	-7.17
Oxbow Central	-1.37	10.26	0.00	25.74	16.39	-0.14	0.00	-38.76
Oxbow South	1.68	0.00	0.00	13.62	9.50	0.00	0.00	-0.10
Gateway Central	7.92	0.00	0.00	13.17	0.96	0.00	0.00	11.03
Gateway South	7.44	0.96	0.00	-0.6	8.24	0.00	-0.12	-2.20
Gateway Beach	12.26	6.40	0.00	-6.45	21.15	16.71	-5.35	28.64
Gateway Park	0.00	0.00	0.00	-7.79	5.31	0.00	-0.23	-5.89
Gateway East	15.15	22.42	0.00	-0.92	19.81	31.21	-0.09	0.87
Riverside Oxbow Subtotal	**63.13**	**42.72**	**0**	**64.26**	**103.5**	**47.78**	**-5.79**	**-15.33**
Gateway Oakland(1st street fill)	0.00	0.00	0.00	0.00	0.00	0.00	-0.07	0.54
Meacham Airfield area fill site	0.00	0.00	0.00	0.00	0.00	0.00	-2.30	-0.85
TOTAL	**106.84**	**55.19**	**-33.39**	**-99.70**	**109.82**	**47.78**	**-34.12**	**-185.23**

(1) From original project reports, Riverside Oxbow Department of Army approved measures reassessed with same over time conditions as Modified Central City alternative
(2) Reaches combined in final Central City EIS

Outputs in Table E-8 are those that remain after impacts have been subtracted from any positive gains attributed to habitat development. The results indicate that the Modified Alternative would provide greater overall riparian forest benefits, but slightly less wetland and upland forest benefits. However, within Riverside Oxbow study reaches the habitat outputs are improved

substantially for riparian forest, and moderately improved for wetlands. The outputs in Table E-8 take into account impacts listed in Table E-2 and impacts attributable to unchanged features within the original Central City study reaches. Therefore the AAHUS documented reflect net project gains by reach and overall study area by alternative. The net gains for riparian and wetlands indicate that these two resource types have been fully compensated in the Modified Central City alternative as was demonstrated for the Original Central City components within the FEIS and for the approved Riverside Oxbow project report. Mitigation for upland forest impacts with the Modified alternative could be accomplished by out of kind riparian forest development benefits.

RISK AND UNCERTAINTY Development of forest on highly disturbed soils is extremely dependent on site preparation and long term operation and management. Studies have been initiated to assist in determining how well tree plantings will survive and grow within the excavated valley storage sites. Habitat Suitability Indices (HSI's) displayed in the attachment were based on the presumption that these studies will indicate that a reasonable growth rate of desirable forest species will occur over the study period. Initial results of groundwater studies on frequency, depth, and duration of surface water flooding indicate that as long as no excavated site slated for riparian forest habitat development has a bottom elevation below 500 ft NGVD, forest habitat development should proceed as estimated, however, if additional refinement of data during future studies indicate otherwise the projected habitat suitability indices may vary. Initial studies also indicate that sedimentation from overbank flooding into the valley storage areas will not present major issues related to growth of planted vegetation.

Sustainability: Riparian forest developed within the valley storage mitigation sites will forever be subject to extremes of moisture due to periodic inundation and possible soil water changes. The project will be designed to drain rapidly to ensure valley storage capability is maintained. Further issues related to fluctuating ground water tables may be identified for future resolution. While initial studies indicate little deposition of sediments will occur, the forest as it matures will shed limbs, leaves and even full trees from disease or wind storm events. Further, without some means to trap and eliminate floatables and other trash that will enter into the depressed areas, there ultimately will be some buildup and loss of valley storage. While unlikely that reclamation of valley storage within the excavated sites will be required within the 50 year planning horizon, it should be recognized that valley storage losses could possibly accumulate to the point that maintenance excavation would be required, and that the subsequent potential to adversely impact the benefits of the forest development could be high. Any future excavation in the valley storage sites would be conducted in order to retain the design level flood protection associated with the existing West Fork channel improvements and Central City Modifications.

MONITORING AND ADAPTIVE MANAGEMENT

The Corps of Engineers along with the local sponsor and resource agencies would develop a complete adaptive management plan prior to development of habitat measures associated with this project. Goals for hydraulic roughness and environmental success will require careful consideration to assure that both objectives are met. Generally for environmental success, an 85 percent survival of all trees planted would be expected over the first three years after planting. However, at minimal, due to the risk and uncertainties specified, additional monitoring parameters would be added to account for introduction of undesirable species such as non-native privets or chinaberry, or high densities of low habitat producing trees such as willows. Prescriptive modifications would be proposed in relation to on-site monitoring results and could include changes in species to promote within the wetlands as well as within the woodlands. Native riparian grassland development was historically managed by naturally occurring fires and mass grazing events, which can not be duplicated within the urban environment. In addition, it is well established that within native grasslands, some species planted may not germinate for several years after planting. Therefore it will be necessary to do yearly evaluations of growth rates and density establishment by species. Selected mowing regimes will be developed based upon need to foster or hinder develop of species as they develop. A secondary but necessary

output of the adaptive management plan would be a complete Operations and Management Plan that the sponsor would utilize following completion of the construction phase of the project and handoff to the sponsor for future maintenance and future Corps of Engineers annual inspections.

The high density riparian forest that would be established in the Riverside Oxbow and Gateway Park portion of the study area is needed for both hydraulic roughness and to meet habitat development objectives. The need to promote tree growth rapidly to provide necessary hydraulic roughness and habitat benefits requires that tree and shrub planting densities will be higher than normally promoted in this ecoregion. As these trees and shrubs develop and mature, periodic inspection of basal area will be required. Adjustments through clearing and cleaning of non natural deposits of trash and floatables will be necessary. Funding for monitoring and long-term management is essential to help assure success on both counts. Because of the necessity to attain hydraulic roughness through dense forest development and to reasonably meet habitat development projections, monitoring will be conducted for a period of 15 years after initial tree planting and one seasons growth has occurred. Monitoring of wetlands will continue for a period of 5 years and stream habitat will continue for a period of 10 years after completion of construction.

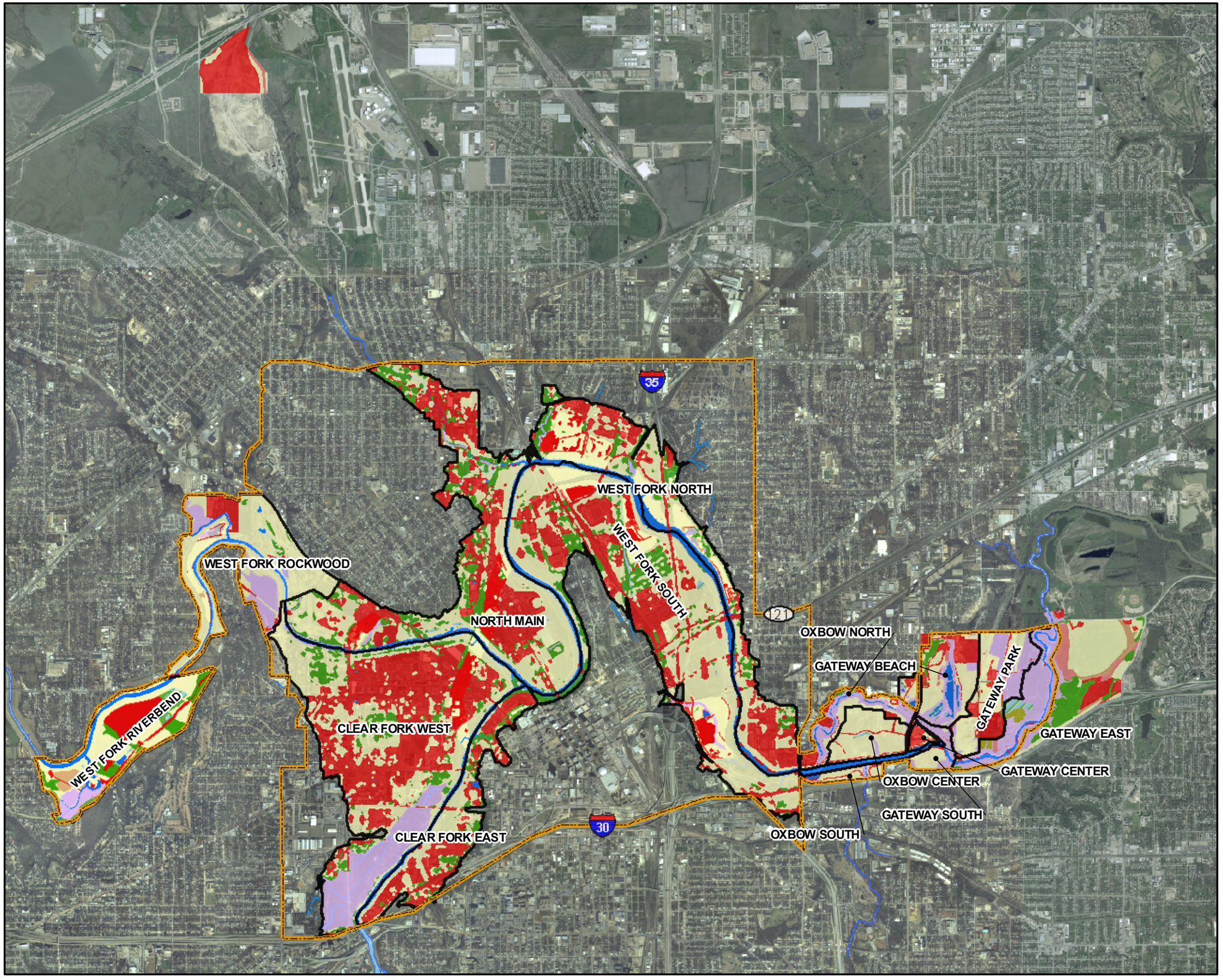
While there is optimism for the success of the proposed reclamation of valley storage excavation sites within the Riverside Oxbow by establishing a high density riparian forest, there is risk that the growth rate may not meet expectations or that local site conditions may not foster the long term survival of vegetation that would be initially planted. To minimize this possibility, additional data will be sought during detailed design to determine best grading plans to promote correct soil moisture and provide for maximum acreages of areas that would be successfully maintained. Once final plans are determined and the project constructed, monitoring will be conducted on an annual basis for tree survival and following any flooding events. Benefits of irrigation types, survival rates by species and by types of plantings, such as bare root, modified root growth, containerized, seedlings versus advanced growth trees will be monitored. Growth rate after planting, including diameter, height and crown spread will be monitored. Natural introductions into the ecosystem of natives and non-native invaders will be monitored. Periodically functionally analysis, including habitat evaluations and hydraulic functions analysis will be conducted.

Should it be determined that adjustments in tree species or methods of planting need to be modified prior to replanting, such adjustments will be made. Should it be determined that the long term site conditions will not promote high density, high value riparian forest habitat, modifications to include changing the restoration to accommodate more ephemeral wetlands, with modified fill zones to promote tree growth will be considered.

Wetland and stream habitat development proposed are based upon designs and strategies that have been previously used successfully within the Upper Trinity River Basin, however, monitoring will be extended and success criteria will be evaluated periodically over 5 and 10 years respectively for these habitat developments. Adaptive management and review of success criteria were also incorporated as elements of the aquatic and wetland mitigation plans submitted to resource agencies. Elements that will be monitored include sediment transport, in-situ riffle-pool-run changes, benthic habitat, fisheries development and use, ecosystem function, wetland plant spread rates, non-desirable wetland plant encroachments and herbivory.

The estimated cost for implementation of the monitoring and adaptive management plan for the riparian forest, wetlands and stream habitat is $1,760,000 which is less than one percent of the $220,000,000 total project cost.

Figure E-1
Existing Vegetation Classes
Modified Central City



Legend

- MODIFIED STUDY AREA
- STUDY REACH BOUNDARIES

EXISTING VEGETATION CLASSES

- DISTURBED
- FORBLAND
- GRASSLAND
- GRASSLAND/SAVANNAH
- RIPARIAN
- SHRUBS
- UPLAND
- WATER
- WETLAND
- RIVERS

N

0 0.375 0.75 1.5 Miles

Aerial Photography Date: January 2005

US Army Corps of Engineers
Fort Worth District

ATTENTION

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As of 8/24/2007

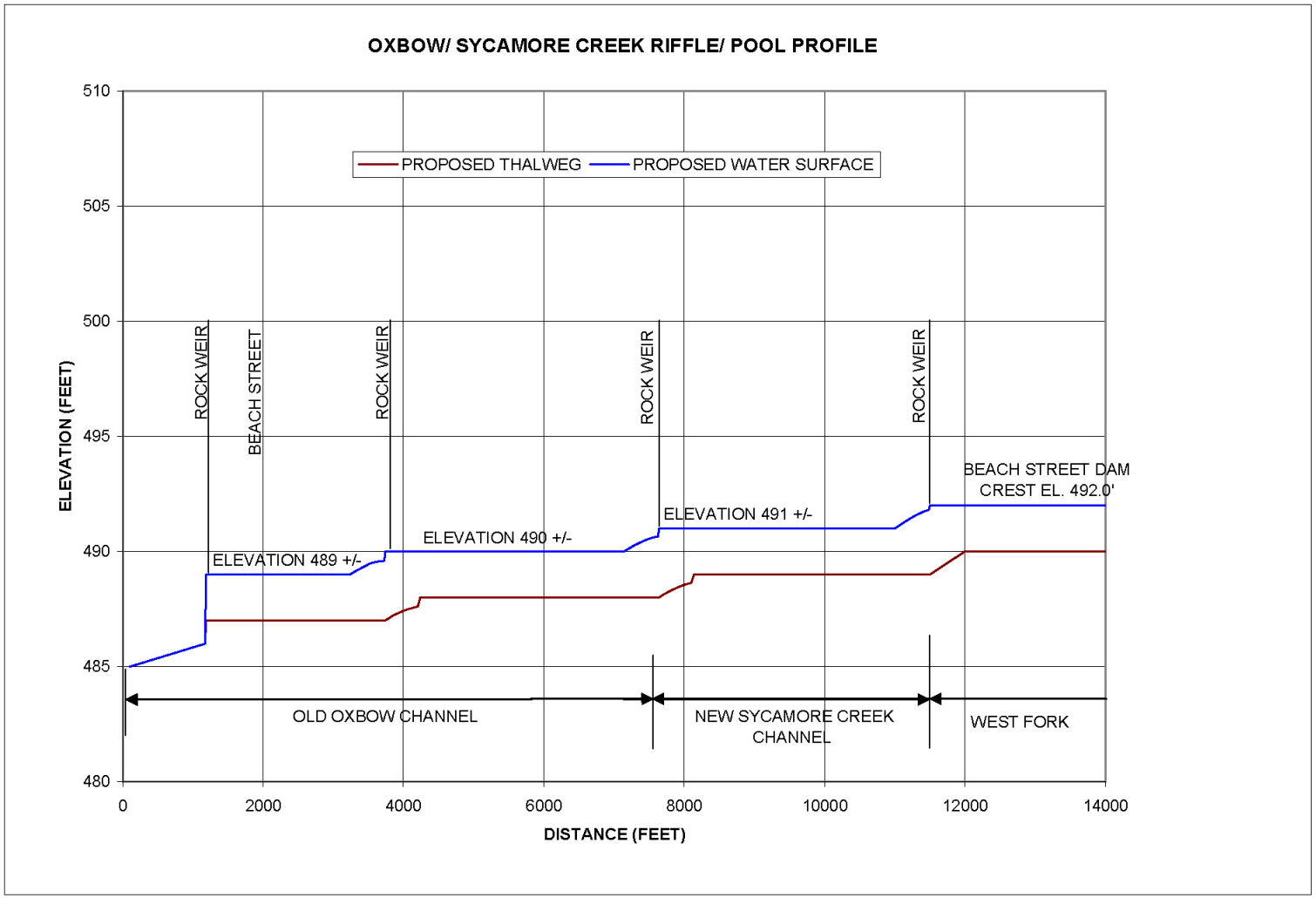
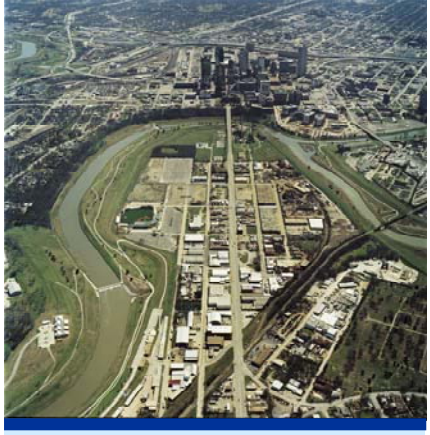
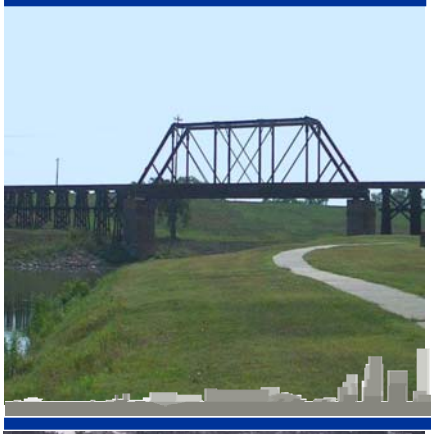
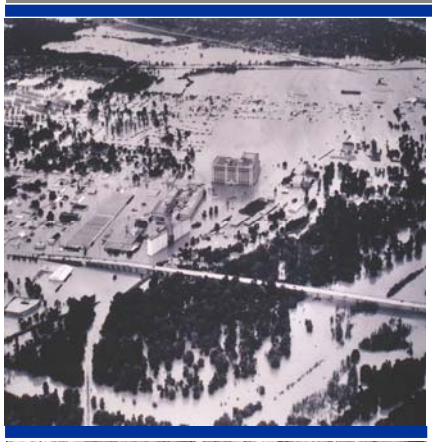


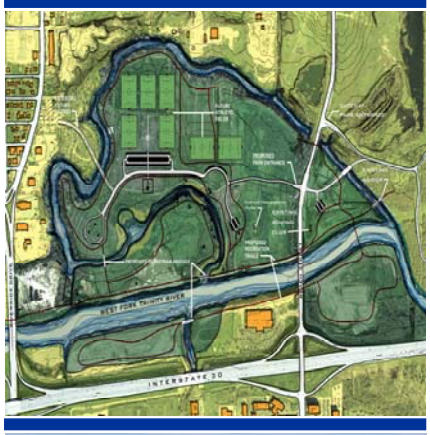
Figure E-2
Proposed Riverside Oxbow-Sycamore Creek Aquatic Habitat Development

US Army Corps of Engineers
Fort Worth District









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Habitat Evaluations

Final Supplement No. 1
to the Final Environmental
Impact Statement

Appendix E - Attachment 1

March 2008

ATTACHMENT 1
to
APPENDIX E

Contents of this Workbook

Tab or Sheet Name	Description of Contents
AAHUs With vs Without Project	Summary of the habitat outputs of the Modified Project Alternative
WO Project AAHUs	Average Annual Habitat Units for the "Without Project" condition
WO Project Assumptions	Assumptions used in projecting the "Without Project" condition
WO Project Calculations	Calculations for the "Without Project" Condition
With Project AAHUs	Average Annual Habitat Units for the "With Modified Project" alternative
With Project Assumptions	Assumptions used in projecting the "With Modified Project" condition
With Project Calculations	Calculations for the "With Modified Project" Condition
RO AAHUs Updated to 2007	AAHUs for the Riverside Oxbow portion of the "No Action" Condition based on 2007 data
With RO Updated, GRASSLANDS	Realculations for Grasslands for the "No Action" Condition using 2007 field data
With RO Updated, WETLANDS	Recalculations for Wetlands for the "No Action" Condition using 2007 field data
With RO Updated, RIPARIAN	Recalculations for Riparian with the "No Action" Condition using 2007 field data
Site 17 With & WO	Average Annual Habitat Units for the "With" and "Without" Project c
Site 17 Assumps	Assumptions used in projecting the "With" and "Without" Project conditions for Site 17
Site 17 Calcs	Calculations for the "With" and "Without" Project conditions for Site 17

WITHOUT PROJECT VERSUS WITH PROJECT CONDITIONS
MODIFIED CENTRAL CITY PROJECT

Values are Average Annual Habitat Units (AAHUs)

	Riparian Woodland			Emergent Wetland			Upland Wooded			Grassland/Savannah		
Study Reach	Without Project	With Modified Project	Change due to Project	Without Project	With Modified Project	Change due to Project	Without Project	With Modified Project	Change due to Project	Without Project	With Modified Project	Change due to Project
Clear Fork West [1]	110.23	110.23	**0.00**	0	0	**0.00**	36.15	36.15	**0**	175.91	175.91	**0**
Clear Fork East [1]	0.00	0	**0.00**	0	0	**0.00**	17.1	17.1	**0**	32.75	32.75	**0**
North Main [1]	7.29	7.29	**0.00**	0.25	0.25	**0.00**	65.45	65.45	**0**	175.38	175.38	**0**
West Fork North [1]	3.94	3.94	**0.00**	0	0	**0.00**	24.53	24.53	**0**	97.51	97.51	**0**
West Fork South	2.10	4.14	**2.04**	0.25	0.25	**0.00**	51.78	51.78	**0**	208.24	205.87	**-2.37**
West Fork Riverbend [2]	13.00	13	**0.00**	1.12	1.12	**0.00**	41.26	41.26	**0**	57.07	57.07	**0**
West Fork Rockwood	37.31	44.48	**7.17**	0	0	**0.00**	3.08	3.08	**0**	122.44	116.49	**-5.95**
Oxbow North	19.31	42.31	**22.99**	0	0	**0.00**	2.29	2.29	**0**	18.01	21.51	**3.50**
Oxbow Central	1.37	17.76	**16.39**	0.14	0.14	**0.00**	0	0	**0**	41.57	41.58	**0.01**
Oxbow South	0.93	10.42	**9.50**	0	0	**0.00**	0	0	**0**	1.23	2.02	**0.79**
Gateway Central	0.70	1.74	**1.04**	0	0	**0.00**	0	0	**0**	0.46	11.11	**10.65**
Gateway South	16.24	25.23	**8.99**	0	0	**0.00**	0.09	0.09	**0**	1.83	0.40	**-1.43**
Gateway Beach	21.29	45.81	**24.52**	2.05	18.77	**16.71**	3.34	3.34	**0**	6.45	40.05	**33.60**
Gateway Park	42.71	48.16	**5.46**	0	0	**0.00**	1.23	1.23	**0**	7.79	11.22	**3.43**
Gateway East	73.71	93.52	**19.81**	0.24	31.45	**31.21**	0.78	0.73	**0**	0.92	0.05	**-0.87**
TOTALS	228.66	468.03	**117.91**	4.05	51.98	**47.92**	103.84	103.80	**0.00**	465.99	507.37	**41.38**

[1] These sites are included in the original Central City Project and no change is proposed with their inclusion in the Modified Project Alternative.

[2] West Fork Riverbend is included in the original Cetral City Project but is not proposed as a primary valley storage site with the Modified Project Alternative

WITHOUT PROJECT HABITAT CONDITIONS
MODIFIED CENTRAL CITY PROJECT

	Riparian Woodland				Emergent Wetland				Upland Woodland				Grassland/Savannah				Total
SITE	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Baseline Acres
Clear Fork West	0.62	188	116.31	**110.23**													
Clear Fork East	0	0	0.00	**0.00**													
North Main	0.62	12	7.69	**7.29**													
West Fork North	0.66	6	4.16	**3.94**													
West Fork Riverbend	0.54	25	13.72	**13.00**													
West Fork South	0.30	7	2.22	**2.10**	0.19	3	0.59	**0.25**	0.19	127	24.11	**51.78**	0.35	650	227.47	**208.24**	787
West Fork Rockwood	0.52	76	37.31	**37.31**	0.00	0	0.00		0.51	7	3.77	**3.08**	0.45	297	133.74	**122.44**	380
Oxbow North	0.70	39	27.16	**19.31**	0.00	0	0.00		0.56	5	2.80	**2.29**	0.76	46	35.26	**18.01**	90
Oxbow Central	0.62	3	1.92	**1.37**	0.19	2	0.30	**0.14**	0.00	0	0.00		0.76	107	81.62	**41.57**	112
Oxbow South	0.62	2	1.30	**0.93**	0.00	0	0.00		0.00	0	0.00		0.10	24	2.41	**1.23**	26
Gateway Central	0.72	1	0.65	**0.70**	0.00	0	0.00		0.00	0	0.00		0.10	6	0.60	**0.46**	7
Gateway South	0.72	21	15.05	**16.24**	0.00	0	0.00		0.19	0	0.04	**0.09**	0.10	21	2.08	**1.83**	42
Gateway Beach	0.72	27	19.73	**21.29**	0.33	7	2.28	**2.05**	0.19	7	1.39	**3.34**	0.10	74	7.35	**6.45**	115
Gateway Park	0.72	55	39.03	**42.71**	0.00	0	0.00		0.19	3	0.51	**1.23**	0.10	87	8.70	**7.79**	145
Gateway East	0.72	92	66.13	**73.71**	0.38	10	3.91	**0.24**	0.33	2	0.53	**0.78**	0.10	6	0.59	**0.92**	110
		323				22				151				1318			1814
Notes:																	
1. Base acres are shown rounded to nearest unit, calculations were based on acres to the nearest one-tenth																	
2. Gateway Park and Gateway East include shrublands added to Riparian																	
3. Gateway East includes forbland in the grasslands analysis																	

WITHOUT PROJECT ASSUMPTIONS
MODIFIED CENTRAL CITY PROJECT

Determination of Baseline Conditions:

Acreages used in calculating Habitat Units (HU's) and Average Annual Habitat Units (AAHU's) were derived through Geographic Information System (GIS) interpretation of recent digital-orthophotography and color IR with field verification of habitat types by biologists with the Corps of Engineers, US Fish and Wildlife Service, and Texas Parks and Wildlife Department from August 2006 through July 2007. Species models used to determine baseline Habitat Suitability index (HSI) values were developed by that same team for the previous Central City and Riverside Oxbow studies.

Without Project Condition Assumptions for the LPP:

A 50 year period of analysis will be used to calculate AAHU's for the "Without Project" condition (and all subesequent "With Project" conditions).

It is assumed that the HSI for Riparian Woodlands within the valley storage sites in the Central City portion of the study area will decrease to 0.975 (i.e., 97.5%) of the baseline value by TY 10 (Target Year 10) and will continue to decrease in HSI value to 0.90 of the existing or baseline value by TY 50. Acreages of Riparian Woodlands in the original Central City study area are assumed to remain constant through the period of analysis. Within the Riverside Oxbow sites it is assumed that both acreages and HSIs will decrease to 0.8 at TY 10 and then rebound to 0.85 of baseline value by TY 50. In the Gateway Park sites, just east of the oxbow sites, it is assumed that both HSIs and acreages will improve to 1.03 and 1.06 of baseline values by TY 10 and TY 50, respectively. HSIs at Site 17 within the Gateway Park area, however, will go to 0.0 at TY 10 due to soils cleanup to be conducted by the City of Fort Worth during that time.

HSI's within Upland Woodlands, which would only be impacted within the original Central City reaches, will decrease in value to 0.95 of the baseline value by TY 10 and to 0.90 at TY50. Acreages of Upland Woodlands those sites containing Upland Woodland will decrease to 0.90 of baseline by TY 10 and to 0.80 by TY50.

Emergent wetlands within sites the original Central City study area sites will decrease in both value and acreage to 0.50 of the baseline values by TY 10 and to 0.0 HSI and 0.0 acreage by TY 50. Emergent wetlands within the Riverside Oxbow reach will decrease to 0.95 of the baseline HSI value by TY 10 and 0.0 for HSI and acreage fy TY 50. Within the Gateway Park reach the HSI will go to 0.93 of its baseline value by TY 10 and to 0.84 of the acreage and baseline value by TY 50.

Grassland and Grassland Savannah habitat types within potential valley storage in the Central City reaches will retain baseline HSI values through the period of analysis. Acreages of grasslands within that reach will decrease to 0.95 of the baseline through TY 10 and then to 0.85 of the baseline acreage by TY 50. Acrages of grasslands at the Riverside Oxbow sites will go to 0.87 of baseline at TY 10 and to 0.29 at TY 50. HSIs of grasslands in the Riverside Oxbow reach will go to 0.90 at TY 10 and to 0.45 at TY 50. remain constant through the period of analysis. Grassland HSI's on sites 10, 12, 14a, and 14b will go to 0.78 of baseline by TY 10 and then to 0.13 of baseline by TY 50. Grassland HSI's on sites within the Gateway Park reach will go to 0.96 of the baseline value through TY 10 and then will decrease to 0.85 of the baseline value by TY 50. HSIs in that reach will not change through TY 10 but will then go to 0.88 of the baseline by TY 50.

No terrestrial habitat value will be assigned to open water and disturbed areas such as roads, gas well pads, debris disposal areas, etc. Acreage declines in woodlands, wetlands, and grasslands will be reflected in comparative increases in acreage of disturbed areas.

Calculations used in these Habitat Evaluations are based upon the US Fish and Wildlife Service's Habitat Evaluation Proceedures (HEP) published in Ecological Services Manual example below:

EXAMPLE AAHU CALCULATIONS (From USFWS's ESM 102)

*Input data in the bolded areas, see formulas by clicking cell

100 year Pro	Target Year	0	1	20	100	Cumulative Hu's	AAHU's
Forest (witho	Year Interval	0	1	19	80		
	HSI	**0.75**	**0.75**	**0.6**	**0.6**		
	ACRES	**1000**	**1000**	**900**	**600**		
	Target Year H	750	750	540	360		
	Interval HU's		750.00	12207.50	36000.00	48957.50	489.58

100 year Pro	Target Year's	0	1	20	100	Cumulative Hu's	AAHU's
Forest (with)	Year Interval	0	1	19	80		
	HSI	**0.75**	**0.7**	**0.2**	**0.2**		
	ACRES	**1000**	**500**	**500**	**500**		
	Target Year H	750	350	100	100		
	Interval HU's		545.83	4275.00	8000.00	12820.83	128.21

Net AAHU C	-361.37

WITHOUT PROJECT AAHU CALCULATIONS

Clear Fork West

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.60	0.56		
	ACRES		187.6	187.6	187.6	187.6		
	Target Year HU's		116.31	116.31	113.40	104.68		
	Interval HU's			116.31	1033.72	4361.70	5511.73	110.23

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		79.1	79.1	71.19	63.28		
	Target Year HU's		44.30	44.30	37.87	31.89		
	Interval HU's			44.30	369.43	1393.85	1807.57	36.15

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.48	0.48	0.48	0.48		
	ACRES		400.3	400.3	380.29	340.26		
	Target Year HU's		192.14	192.14	182.54	163.32		
	Interval HU's			192.14	1686.06	6917.18	8795.39	175.91

Clear Fork East

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.00	0.00		
	ACRES		0	0	0	0		
	Target Year HU's		0.00	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.5	0.5	0.48	0.45		
	ACRES		41.9	41.9	37.71	33.52		
	Target Year HU's		20.95	20.95	17.91	15.08		
	Interval HU's			20.95	174.72	659.23	854.90	17.10

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		102.2	102.2	97.09	86.87		
	Target Year HU's		35.77	35.77	33.98	30.40		
	Interval HU's			35.77	313.88	1287.72	1637.37	32.75

North Main

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.60	0.56		
	ACRES		12.4	12.4	12.4	12.4		
	Target Year HU's		7.69	7.69	7.50	6.92		
	Interval HU's			7.69	68.33	288.30	364.32	7.29

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.3	0.3	0.15	0.00		
	ACRES		2.9	2.9	2.90	0.00		
	Target Year HU's		0.87	0.87	0.44	0.00		
	Interval HU's			0.87	5.87	5.80	12.54	0.25

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		143.2	143.2	128.88	114.56		
	Target Year HU's		80.19	80.19	68.56	57.74		
	Interval HU's			80.19	668.80	2523.37	3272.37	65.45

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.48	0.48	0.48	0.48		
	ACRES		399.1	399.1	379.15	339.24		
	Target Year HU's		191.57	191.57	181.99	162.83		
	Interval HU's			191.57	1681.01	6896.45	8769.03	175.38

West Fork North

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.66	0.66	0.64	0.59		
	ACRES		6.3	6.3	6.3	6.3		
	Target Year HU's		4.16	4.16	4.05	3.74		
	Interval HU's			4.16	36.95	155.93	197.04	3.94

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.00	0.00		
	ACRES		0	0	0.00	0.00		
	Target Year HU's		0.00	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.41	0.41	0.39	0.37		
	ACRES		73.3	73.3	65.97	58.64		
	Target Year HU's		30.05	30.05	25.70	21.64		
	Interval HU's			30.05	250.64	945.67	1226.36	24.53

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		304.3	304.3	289.09	258.66		
	Target Year HU's		106.51	106.51	101.18	90.53		
	Interval HU's			106.51	934.58	3834.18	4875.27	97.51

West Fork South

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.3	0.3	0.29	0.27		
	ACRES		7.4	7.4	7.4	7.4		
	Target Year HU's		2.22	2.22	2.16	2.00		
	Interval HU's			2.22	19.73	83.25	105.20	2.10

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.5	0.5	0.48	0.45		
	ACRES		126.9	126.9	114.21	101.52		
	Target Year HU's		63.45	63.45	54.25	45.68		
	Interval HU's			63.45	529.17	1996.56	2589.18	51.78

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.19	0.19	0.10	0.00		
	ACRES		3.1	3.1	3.10	0.00		
	Target Year HU's		0.59	0.59	0.29	0.00		
	Interval HU's			0.59	3.98	3.93	8.49	0.17

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		649.9	649.9	617.41	552.42		
	Target Year HU's		227.47	227.47	216.09	193.35		
	Interval HU's			227.47	1996.01	8188.74	10412.21	208.24

West Fork Riverbend

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.54	0.54	0.53	0.49		
	ACRES		25.4	25.4	25.4	25.4		
	Target Year HU's		13.72	13.72	13.37	12.34		
	Interval HU's			13.72	121.90	514.35	649.97	13.00

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.44	0.44	0.22	0.00		
	ACRES		8.8	8.8	8.80	0.00		
	Target Year HU's		3.87	3.87	1.94	0.00		
	Interval HU's			3.87	26.14	25.81	55.82	1.12

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.8	0.8	0.76	0.72		
	ACRES		63.2	63.2	56.88	50.56		
	Target Year HU's		50.56	50.56	43.23	36.40		
	Interval HU's			50.56	421.67	1590.95	2063.19	41.26

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		178.1	178.1	169.20	151.39		
	Target Year HU's		62.34	62.34	59.22	52.98		
	Interval HU's			62.34	546.99	2244.06	2853.38	57.07

West Fork Rockwood

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.52	0.52	0.51	0.47		
	ACRES		75.7	75.7	75.7	75.7		
	Target Year HU's		39.36	39.36	38.38	35.43		
	Interval HU's			39.36	349.85	1476.15	1865.36	37.31

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.51	0.51	0.48	0.46		
	ACRES		7.4	7.4	6.66	5.92		
	Target Year HU's		3.77	3.77	3.23	2.72		
	Interval HU's			3.77	31.48	118.76	154.00	3.08

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.45	0.45		
	ACRES		297.2	297.2	282.34	252.62		
	Target Year HU's		133.74	133.74	127.05	113.68		
	Interval HU's			133.74	1173.57	4814.64	6121.95	122.44

Oxbow North

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.7	0.7	0.56	0.60		
	ACRES		38.8	38.8	31.04	32.98		
	Target Year HU's		27.16	27.16	17.38	19.62		
	Interval HU's			27.16	198.81	739.66	965.63	19.31

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		5.00	5.00	4.50	4.00		
	Target Year HU's		2.80	2.80	2.39	2.02		
	Interval HU's			2.80	23.35	88.11	114.26	2.29

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.76	0.76	0.68	0.34		
	ACRES		46.4	46.4	40.37	13.46		
	Target Year HU's		35.26	35.26	27.61	4.60		
	Interval HU's			35.26	282.25	582.91	900.43	18.01

Oxbow Central

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.50	0.53		
	ACRES		3.1	3.1	2.48	2.64		
	Target Year HU's		1.92	1.92	1.23	1.39		
	Interval HU's			1.92	14.07	52.34	68.33	1.37

Emergent Wetland

50 year Project Life	TY	0	1	10	50	Cumulative Hu's	AAHU's

	Year Interval	0	1	9	40		
	HSI	0.19	0.19	0.18	0.00		
	ACRES	1.6	1.6	1.60	0.00		
	Target Year HU's	0.30	0.30	0.29	0.00		
	Interval HU's		0.30	2.67	3.85	6.82	0.14

Grassland/Savannah

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.76	0.76	0.68	0.34		
	ACRES		107.1	107.1	93.18	31.06		
	Target Year HU's		81.40	81.40	63.73	10.62		
	Interval HU's			81.40	651.49	1345.48	2078.37	41.57

Oxbow South

Riparian Woodland

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.50	0.53		
	ACRES		2.1	2.1	1.68	1.79		
	Target Year HU's		1.30	1.30	0.83	0.94		
	Interval HU's			1.30	9.53	35.46	46.29	0.93

Grassland/Savannah

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.09	0.05		
	ACRES		24.1	24.1	20.97	6.99		
	Target Year HU's		2.41	2.41	1.89	0.31		
	Interval HU's			2.41	19.29	39.84	61.54	1.23

Gateway Central

Riparian Woodland

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.74	0.76		
	ACRES		0.9	0.9	0.93	0.95		
	Target Year HU's		0.65	0.65	0.69	0.73		
	Interval HU's			0.65	6.01	28.31	34.96	0.70

Grassland/Savannah

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		5.2	5.2	5.20	4.58		
	Target Year HU's		0.52	0.52	0.50	0.39		
	Interval HU's			0.52	4.59	17.72	22.82	0.46

Gateway South

Riparian Woodland

							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**

	Year Interval	0	1	9	40		
	HSI	0.72	0.72	0.74	0.76		
	ACRES	20.9	20.9	21.53	22.15		
	Target Year HU's	15.05	15.05	15.96	16.91		
	Interval HU's		15.05	139.54	657.36	811.94	16.24

Upland Woodland

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		
HSI		0.56	0.56	0.53	0.50		
ACRES		0.20	0.20	0.18	0.16		
Target Year HU's		0.11	0.11	0.10	0.08		
Interval HU's			0.11	0.93	3.52	4.57	0.09

Grassland/Savannah

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		
HSI		0.1	0.1	0.10	0.09		
ACRES		20.8	20.8	20.80	18.30		
Target Year HU's		2.08	2.08	2.00	1.56		
Interval HU's			2.08	18.35	70.87	91.30	1.83

Gateway Beach

Riparian Woodland

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		
HSI		0.72	0.72	0.74	0.76		
ACRES		27.4	27.4	28.22	29.04		
Target Year HU's		19.73	19.73	20.93	22.17		
Interval HU's			19.73	182.93	861.80	1064.46	21.29

Upland Woodland

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		
HSI		0.56	0.56	0.53	0.50		
ACRES		7.30	7.30	6.57	5.84		
Target Year HU's		4.09	4.09	3.50	2.94		
Interval HU's			4.09	34.09	128.64	166.82	3.34

Emergent Wetland

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		
HSI		0.33	0.33	0.31	0.28		
ACRES		6.9	6.9	6.90	6.90		
Target Year HU's		2.28	2.28	2.12	2.28		
Interval HU's			2.28	19.78	80.61	102.66	2.05

Grassland/Savannah

						Cumulative	
50 year Project Life	TY	0	1	10	50	**Hu's**	**AAHU's**
Year Interval		0	1	9	40		

	HSI		0.1	0.1	0.10	0.09		
	ACRES		73.5	73.5	73.50	64.68		
	Target Year HU's		7.35	7.35	7.06	5.50		
	Interval HU's			7.35	64.83	250.43	322.61	6.45

Gateway Park

Riparian Woodland	Not in site 17							
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.74	0.76		
	ACRES		54.21	54.21	55.84	57.46		
	Target Year HU's		39.03	39.03	41.41	43.86		
	Interval HU's			39.03	361.92	1705.04	2105.99	42.12

Riparian Woodland	In Site 17							
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.4	0.4	0.00	0.00		
	ACRES		0.82	0.82	0.00	0.00		
	Target Year HU's		0.33	0.33	0.00	0.00		
	Interval HU's			0.33	0.98	0.00	1.31	0.03

Emergent Wetland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.00	0.00		
	ACRES		0.04	0.04	0.04	0.03		
	Target Year HU's		0.02	0.02	0.00	0.02		
	Interval HU's			0.02	0.08	0.00	0.10	0.00

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		2.70	2.70	2.43	2.16		
	Target Year HU's		1.51	1.51	1.29	1.09		
	Interval HU's			1.51	12.61	47.58	61.70	1.23

Grassland/Savannah	Not in Site 17							
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		86.7	86.7	86.67	76.27		
	Target Year HU's		8.67	8.67	8.32	6.48		
	Interval HU's			8.67	76.44	295.30	380.41	7.61

Grassland/Savannah	In Site 17							
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
becomes deep water pond	**HSI**		0.1	0.1	0.00	0.00		
or turf grass	**ACRES**		16.1	16.1	16.12	14.19		

	Target Year HU's		1.61	1.61	0.00	0.00		
	Interval HU's			1.61	7.25	0.00	8.87	0.18

Shrubland	Not in Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
tends toward riparian	**HSI**		0.77	0.77	0.79	0.82		
	ACRES		0.7	0.7	0.69	0.71		
	Target Year HU's		0.52	0.54	0.55	0.58		
	Interval HU's			0.53	4.89	22.54	27.95	0.56

Gateway East

Riparian Woodland	Not in Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.74	0.76		
	ACRES		91.85	91.85	94.61	97.36		
	Target Year HU's		66.13	66.13	70.16	74.31		
	Interval HU's			66.13	613.22	2888.91	3568.26	71.37

Riparian Woodland	In Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
becomes turf or	**HSI**		0.39	0.39	0.00	0.00		
deep water	**ACRES**		14.95	14.95	0.00	0.00		
	Target Year HU's		5.83	5.83	0.00	0.00		
	Interval HU's			5.83	17.49	0.00	23.32	0.47

Shrubland	Not in Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
becomes turf or	**HSI**		0.77	0.77	0.79	0.82		
deep water	**ACRES**		1.27	1.27	1.31	1.35		
	Target Year HU's		0.98	0.98	1.04	1.10		
	Interval HU's			0.98	9.07	42.72	52.76	1.06

Shrubland	In Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
becomes turf or	**HSI**		0.77	0.77	0.00	0.00		
deep water	**ACRES**		2.76	14.95	0.00	0.00		
	Target Year HU's		2.13	11.51	0.00	0.00		
	Interval HU's			6.82	34.53	0.00	41.35	0.83

Upland Woodland								
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		1.70	1.70	1.53	1.36		
	Target Year HU's		0.95	0.95	0.81	0.69		

	Interval HU's			0.95	7.94	29.96	38.85	0.78

Emergent Wetland	Not in Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.00	0.00		
adversely affected by	**ACRES**		4.36	4.36	4.36	3.66		
excavation	Target Year HU's		1.96	1.96	0.00	1.65		
	Interval HU's			1.96	8.83	0.00	10.79	0.22

Emergent Wetland	In Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.00	0.00		
becomes deep water	**ACRES**		5.9	0	0.00	0.00		
	Target Year HU's		2.66	0.00	0.00	0.00		
	Interval HU's			1.33	0.00	0.00	1.33	0.03

Grassland/Savannah	Not in Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0	0.10	0.09		
	ACRES		5.9	5.9	5.93	5.22		
	Target Year HU's		0.59	0.00	0.57	0.44		
	Interval HU's			0.30	2.56	20.20	23.06	0.46

Grassland/Savannah	In Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0	0.10	0.09		
Becomes deep water	**ACRES**		0.1	0.0	0.00	0.00		
	Target Year HU's		0.01	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Forbland	In Site 17							
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.66	0.66	0.00	0.00		
Becomes deep water	**ACRES**		8.6	8.6	0.00	0.00		
	Target Year HU's		5.68	5.68	0.00	0.00		
	Interval HU's			5.68	17.03	0.00	22.70	0.45

Site 17

Riparian Woodland								
							Cumulative	
50 year Project Life		TY	0	1	10	50	**Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.39	0.9	0.00	0.00		
	ACRES		16.7	16.7	0.00	0.00		
	Target Year HU's		6.51	15.03	0.00	0.00		

	Interval HU's		10.77	45.09	0.00	55.86	1.12

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		1.60	1.60	1.44	1.28		
	Target Year HU's		0.90	0.90	0.77	0.65		
	Interval HU's			0.90	7.47	28.19	36.56	0.73

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.00	0.00		
	ACRES		8.8	8.8	0.00	0.00		
	Target Year HU's		3.96	3.96	0.00	0.00		
	Interval HU's			3.96	11.88	0.00	15.84	0.32

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.10		
	ACRES		17.2	17.2	42.70	42.70		
	Target Year HU's		1.72	1.72	4.10	4.27		
	Interval HU's			1.72	26.34	167.38	195.44	3.91

WITH PROJECT HABITAT CONDITIONS
MODIFIED CENTRAL CITY PROJECT

	Riparian Woodland				Emergent Wetland				Upland Woodland				Grassland/Savannah				Total
SITE	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Baseline Acres
West Fork South	0.30	1	0.42	**4.14**	0.19	3	0.59	**0.25**	0.19	127	24.11	**51.78**	0.35	650	227.47	**205.87**	781
West Fork Rockwood	0.52	75	39.21	**44.48**	0.00	0	0.00		0.51	7	3.77	**3.08**	0.45	297	133.74	**116.49**	380
Oxbow North	0.70	39	27.16	**42.31**	0.00	0	0.00		0.56	5	2.80	**2.29**	0.76	46	35.26	**21.51**	90
Oxbow Central	0.62	3	1.86	**17.76**	0.19	2	0.30	**0.14**	0.00	0	0.00		0.76	107	81.62	**41.58**	112
Oxbow South	0.62	6	4.00	**10.42**	0.00	0	0.00		0.00	0	0.00		0.10	24	2.41	**2.02**	31
Gateway Central	0.72	2	1.53	**1.74**	0.00	0	0.00		0.00	0	0.00		0.10	6	0.60	**11.11**	8
Gateway South	0.72	24	17.59	**25.23**	0.00	0	0.00		0.56	0.2	0.11	**0.09**	0.10	21	2.08	**0.40**	45
Gateway Beach	0.72	26	18.51	**45.81**	0.33	7	2.28	**18.77**	0.56	7	4.09	**3.34**	0.10	74	7.35	**40.05**	113
Gateway Park	0.72	55	39.60	**48.16**	0.00	0	0.00		0.56	3	1.51	**1.23**	0.10	87	8.70	**11.22**	145
Gateway East	0.72	107	76.90	**93.52**	0.38	10	3.91	**31.45**	0.56	2	0.90	**0.73**	0.10	6	0.59	**0.05**	125
		339				22				151				1318			1830

With Project Assumptions for the LPP
Same assumptions were also used for re-assessment of Riverside Oxbow 2005 project reported habitat measures to reflect current planning conditions

Adverse impacts to significant resource catagories such as riparian woodlands and emergent wetlands will be avoided and minimized to the maximum extent possible by design and configuration of the potential hydraulic valley storage sites. Every effort will be made to utilize only those lower valued or more renewable resource catagories such as grasslands and disturbed areas to achieve the required valley storage and then to restore those excavated sites to the higher resource categories of riparian woodland and emergent wetland.

Any acreages other than Riparian Woodland within a given reach that are not directly affected by the project's valley storage sites or other project features will retain the same acreage and HSI values as they would have for the Without Project condition.

Differing sets of assumptions will be used for the "with project" condition for restoration of riparian woodlands, emergent wetlands, and stream aquatic habitat that would be directly affected depending upon existing value, location of the site, and management intensity. These assumptions will vary by site as follows.

West Fork South : Riparian woodlands that will be created from the excavated valley storage area will achieve an HSI of 0.25 by TY 10 and 0.8 by TY 50. HSI of existing riparian woodlands will be increased to values of 0.5 and 0.85 by TY 10 and TY 50, respectively. Restoration of 3,568 linear feet of channel, including 900 linear feet of riffle, will result in a gain of 1.52 AAHUs of stream aquatic habitat through the project life.

West Fork Rockwood : For those riparian woodlands that will be created from the excavated valley storage area it is assumed that an HSI of 0.25 will be reached by TY 10 and that the HSI will reach 0.8 by TY 50. Existing Riparian Woodland areas that are not impacted by construction will go to 0.975 of their current HSI at TY 10 through the project life. 5.9 acres of riparian woodland will be impacted begining at TY 1 but will undergo riparian restoration as described above (accounting will be as mitigation). Restoration of aquatic oxbow habitat will encoumpass 5.1 acres of previously severed stream channel begining at TY 1 with AAHUs of 4.3 through the project life.

Oxbow North : (Right descending bank) - Developed riparian woodland will achieve an HSI of 0.25 by TY 10 and 0.8 by TY 50. Improved riparian woodland currently valued at an HSI of 0.7 will increase to 0.8 at TY 10 and to 0.95 at TY 50. Native grassland HSIs will go to 0.5 at TY 1 and to 1.0 by TY 10 through the remainder of the project life. Areas developed as "high density riparian forest" with restored topsoil will achieve an HSI of 0.2 by TY 10 and 0.6 by TY 50. (Left descending bank and additions to both banks) - HSIs for all habitat types in this area will be the same as the right descending bank except that improved riparian woodland currently valued at an HSI of 0.7 will increase to 0.8 at TY 10 and to 0.95 at TY 50. Existing graslands in the Oxbow North Reach of grasslands not directly affected by the project HSIs will go to 0.9 of the baseline by TY 10 and to 0.45 of the baseline by TY 50 and acreages will drop to 0.87 and to 0.29 of baseline during those same intervals.

Oxbow Central : Areas developed as "high density riparian forest" with restored topsoil will achieve an HSI of 0.2 by TY 10 and 0.6 by TY 50. Acreages and HSI's of preserved riparian forest will drop to 0.8 of their baseline values at TY 10 but will rebound to 0.85 of that value by TY 50. Created or developed low density forest (10% or less canopy, i.e., savannah) will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. Native grassland will achieve those same values. Turf grasses will retain an HSI of 0.1 from TY 1 through

affected by the project will go to 0.9 of the baseline by TY 10 and to 0.45 of the baseline by TY 50 and acreages will drop to 0.87 and to 0.29 of existing values at those target years. Restoration of the Sycamore Creek aquatic and riparian system will result in riparian HSI values of 0.4 at TY 1, 0.85 at TY 10 through TY 50 on the 2.78 acres used for that purpose.

Oxbow South : Areas developed as "high density riparian forest" with restored topsoil will achieve an HSI of 0.2 by TY 10 and 0.6 by TY 50. Improved riparian woodland will achieve an HSI of 0.8 by TY 10 and an HSI of 0.9 by TY 50. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life. Native grasslands created as a buffer within the valley storage site will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. HSIs of "preserved" native grasslands not directly affected by the project will go to 0.9 of the baseline by TY 10 and to 0.45 of the baseline by TY 50 and acreages will drop to 0.87 and to 0.29 of existing values at those target years.

Gateway Center : Improved existing riparian woodland will achieve an HSI of 0.8 by TY 10 and an HSI of 0.9 by TY 50. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life. Created or developed low density forest (10% or less canopy, i.e., savannah) will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life. Existing grasslands will be maintained but acreages will be reduced by 0.96 at TY 10 and by 0.85 at TY 50, and HSI will remain constant through TY 10 but will be reduced by 0.88 by TY 50.

Gateway Beach : Improved existing riparian woodland will achieve an HSI of 0.85 by TY 10 and an HSI of 0.95 by TY 50 due to association with developed and improved wetlands. Developed woodlands although on excavated sites will achieve 0.85 hsi by TY 50 due to proximity to wetlands and adjacent riparian forest in this site. Created or developed low density forest (10% or less canopy, i.e., savannah) will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. Developed scattered trees (5% canopy savannah) will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life. Existing grasslands will be maintained but acreages will be reduced by 0.96 at TY 10 and by 0.85 at TY 50, and HSI will remain constant through TY 10 but will be reduced by 0.88 by TY 50.

Gateway South : Areas developed as "high density riparian forest" with restored topsoil will achieve an HSI of 0.2 by TY 10 and 0.6 by TY 50. Improved riparian woodland will achieve an HSI of 0.8 by TY 10 and an HSI of 0.9 by TY 50. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life.

Gateway Park : Existing riparian forest, either inside or outside the project footprint, with no management will result in no additional loss of acreage and will result in increases in HSI by 1.03 at TY 10 and by 1.06 at TY 50. Improved riparian woodland will achieve an HSI of 0.85 by TY 10 and an HSI of 0.95 by TY 50 due to incorporation of extensive emergent wetland complex and adjacent riparian woodland management. Developed scattered trees (5% canopy savannah) will achieve a 0.5 grassland HSI by TY 1 and then 1.0 at TY 10 through the project life. Turf grasses will retain an HSI of 0.1 from TY 1 through the project life. Existing grasslands will be maintained but acreages will be reduced by 0.96 at TY 10 and by 0.85 at TY 50, and HSI will remain constant through TY 10 but will be reduced by 0.88 by TY 50.

Gateway East : Improved riparian woodland will achieve an HSI of 0.85by TY 10 and an HSI of 0.95 by TY 50 due to connection to wetlands and adjacent managed forests.. Existing riparian forest, either inside or outside the project footprint, with no management will result in no additional loss of acreage and will result in increases in HSI by 1.03 at TY 10 and by 1.06 at TY 50.

Site 17 (a subset of Gateway Park and Gateway East) : All excavated areas within Site 17 will be

WITH MODIFIED PROJECT AAHU CALCULATIONS

Clear Fork West

This site was included in the Authorized Central City plan

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.60	0.56		
	ACRES		187.6	187.6	187.6	187.6		
	Target Year HU's		116.31	116.31	113.40	104.68		
	Interval HU's			116.31	1033.72	4361.70	5511.73	110.23

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		79.1	79.1	71.19	63.28		
	Target Year HU's		44.30	44.30	37.87	31.89		
	Interval HU's			44.30	369.43	1393.85	1807.57	36.15

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.48	0.48	0.48	0.48		
	ACRES		400.3	400.3	380.29	340.26		
	Target Year HU's		192.14	192.14	182.54	163.32		
	Interval HU's			192.14	1686.06	6917.18	8795.39	175.91

Clear Fork East

This site was included in the Authorized Central City plan

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.00	0.00		
	ACRES		0	0	0	0		
	Target Year HU's		0.00	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.5	0.5	0.48	0.45		
	ACRES		41.9	41.9	37.71	33.52		
	Target Year HU's		20.95	20.95	17.91	15.08		
	Interval HU's			20.95	174.72	659.23	854.90	17.10

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		102.2	102.2	97.09	86.87		
	Target Year HU's		35.77	35.77	33.98	30.40		
	Interval HU's			35.77	313.88	1287.72	1637.37	32.75

North Main

This site was included in the Authorized Central City plan

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.60	0.56		
	ACRES		12.4	12.4	12.4	12.4		
	Target Year HU's		7.69	7.69	7.50	6.92		
	Interval HU's			7.69	68.33	288.30	364.32	7.29

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.3	0.3	0.15	0.00		
	ACRES		2.9	2.9	2.90	0.00		
	Target Year HU's		0.87	0.87	0.44	0.00		
	Interval HU's			0.87	5.87	5.80	12.54	0.25

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		143.2	143.2	128.88	114.56		
	Target Year HU's		80.19	80.19	68.56	57.74		
	Interval HU's			80.19	668.80	2523.37	3272.37	65.45

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.48	0.48	0.48	0.48		
	ACRES		399.1	399.1	379.15	339.24		
	Target Year HU's		191.57	191.57	181.99	162.83		
	Interval HU's			191.57	1681.01	6896.45	8769.03	175.38

West Fork North

This site was included in the Authorized Central City plan

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.66	0.66	0.64	0.59		
	ACRES		6.3	6.3	6.3	6.3		
	Target Year HU's		4.16	4.16	4.05	3.74		
	Interval HU's			4.16	36.95	155.93	197.04	3.94

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.00	0.00		
	ACRES		0	0	0.00	0.00		
	Target Year HU's		0.00	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.41	0.41	0.39	0.37		
	ACRES		73.3	73.3	65.97	58.64		
	Target Year HU's		30.05	30.05	25.70	21.64		
	Interval HU's			30.05	250.64	945.67	1226.36	24.53

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		304.3	304.3	289.09	258.66		
	Target Year HU's		106.51	106.51	101.18	90.53		
	Interval HU's			106.51	934.58	3834.18	4875.27	97.51

West Fork South (Ham Branch)

This site was included in the Authorized Central City plan

Riparian Woodland (Developed within Ham Branch Valley Storage)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	1.4	1.4	1.4		
	Target Year HU's		0.00	0.00	0.35	1.12		
	Interval HU's			0.00	1.58	29.40	30.98	0.62

Riparian Woodland (Existing within reach)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.3	0.3	0.50	0.85		
	ACRES		7.4	7.4	7.4	7.4		
	Target Year HU's		2.22	2.22	3.70	6.29		
	Interval HU's			2.22	26.64	199.80	228.66	4.57

Upland Woodland

50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.5	0.5	0.48	0.45		
	ACRES		126.9	126.9	114.21	101.52		
	Target Year HU's		63.45	63.45	54.25	45.68		
	Interval HU's			63.45	529.17	1996.56	2589.18	51.78

Emergent Wetland

50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.3	0.3	0.15	0.00		
	ACRES		2.9	2.9	2.90	0.00		
	Target Year HU's		0.87	0.87	0.44	0.00		
	Interval HU's			0.87	5.87	5.80	12.54	0.25

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		649.9	642.4	610.28	546.04		
	Target Year HU's		227.47	224.84	213.60	191.11		
	Interval HU's			226.15	1972.97	8094.24	10293.36	205.87

West Fork Riverbend

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.54	0.54	0.53	0.49		
	ACRES		25.4	25.4	25.4	25.4		
	Target Year HU's		13.72	13.72	13.37	12.34		
	Interval HU's			13.72	121.90	514.35	649.97	13.00

Emergent Wetland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.44	0.44	0.22	0.00		
	ACRES		8.8	8.8	8.80	0.00		
	Target Year HU's		3.87	3.87	1.94	0.00		
	Interval HU's			3.87	26.14	25.81	55.82	1.12

Upland Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.8	0.8	0.76	0.72		
	ACRES		63.2	63.2	56.88	50.56		
	Target Year HU's		50.56	50.56	43.23	36.40		
	Interval HU's			50.56	421.67	1590.95	2063.19	41.26

Grassland/Savannah

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.35	0.35	0.35	0.35		
	ACRES		178.1	178.1	169.20	151.39		
	Target Year HU's		62.34	62.34	59.22	52.98		
	Interval HU's			62.34	546.99	2244.06	2853.38	57.07

West Fork Rockwood

Riparian Woodland

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	20.51	20.51	20.51		
	Target Year HU's		0.00	0.00	5.13	16.41		
	Interval HU's			0.00	23.07	430.71	453.78	9.08

Riparian Woodland (Lost existing riparian woodland)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.52	0.52	0.51	0.51		
	ACRES		5.9	0.00	0.00	0.00		
	Target Year HU's		3.07	0.00	0.00	0.00		
	Interval HU's			1.53	0.00	0.00	1.53	0.03

Riparian Woodland (Existing within reach)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.52	0.52	0.51	0.51		
	ACRES		75.7	75.7	75.70	75.70		
	Target Year HU's		39.36	39.36	38.38	38.38		
	Interval HU's			39.36	349.85	1535.20	1924.41	38.49

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.51	0.51	0.48	0.46		
	ACRES		7.4	7.4	6.66	5.92		
	Target Year HU's		3.77	3.77	3.23	2.72		
	Interval HU's			3.77	31.48	118.76	154.00	3.08

Grassland/Savannah								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.45	0.45	0.45	0.45		
	ACRES		297.2	282.59	268.46	240.20		
	Target Year HU's		133.74	127.17	120.81	108.09		
	Interval HU's			130.45	1115.88	4577.96	5824.29	116.49

Oxbow North

Riparian Woodland (Right bank looking downstream - developed)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	6.77	6.77	6.77		
	Target Year HU's		0.00	0.00	1.69	5.42		
	Interval HU's			0.00	7.62	142.17	149.79	3.00

Riparian Woodland (Right bank looking downstream - Improved within reach)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.7	0.7	0.80	0.92		
	ACRES		1.11	1.11	1.11	1.11		
	Target Year HU's		0.78	0.78	0.89	1.02		
	Interval HU's			0.78	7.49	38.18	46.45	0.93

Riparian Woodland (Right bank - Developed high density on restored deeply disturbed top soils)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.20	0.60		
	ACRES		0	8.55	8.55	8.55		
	Target Year HU's		0.00	0.00	1.71	5.13		
	Interval HU's			0.00	7.70	136.80	144.50	2.89

Riparian Woodland (Left bank - developed)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	9.62	9.62	9.62		
	Target Year HU's		0.00	0.00	2.41	7.70		
	Interval HU's			0.00	10.82	202.02	212.84	4.26

Riparian Woodland (- Improved within reach)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.7	0.7	0.80	0.95		
	ACRES		36.79	36.79	36.79	36.79		
	Target Year HU's		25.75	25.75	29.43	34.95		
	Interval HU's			25.75	248.33	1287.65	1561.74	31.23

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		5.00	5.00	4.50	4.00		
	Target Year HU's		2.80	2.80	2.39	2.02		
	Interval HU's			2.80	23.35	88.11	114.26	2.29

Grassland/Savannah (Existing native grassland)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.76	0.5	1.00	1.00		
	ACRES		46.4	21.46	21.46	21.46		
	Target Year HU's		35.26	10.73	21.46	21.46		
	Interval HU's			21.92	144.86	858.40	1025.17	20.50

Grassland/Savannah (Turf grasses)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.10	0.10		
	ACRES		0	11.31	11.31	11.31		
	Target Year HU's		0.00	0.00	1.13	1.13		
	Interval HU's			0.00	5.09	45.24	50.33	1.01

Oxbow Central

Riparian Woodland (Developed high density on restored deeply disturbed top soils)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.20	0.60		
	ACRES		0	45.2	45.20	45.20		
	Target Year HU's		0.00	0.00	9.04	27.12		
	Interval HU's			0.00	40.68	723.20	763.88	15.28

Riparian Woodland (Preserve Existing)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.50	0.53		
	ACRES		0.61	0.61	0.49	0.52		
	Target Year HU's		0.38	0.38	0.24	0.27		
	Interval HU's			0.38	2.77	10.30	13.45	0.27

Riparian Woodland (Restored Perched Sycamore Creek Channel)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0.4	0.85	0.85		
	ACRES		0	2.78	2.78	2.78		
	Target Year HU's		0.00	1.11	2.36	2.36		
	Interval HU's			0.37	15.64	94.52	110.53	2.21

Emergent Wetland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.19	0.19	0.18	0.00		
	ACRES		1.6	1.6	1.60	0.00		
	Target Year HU's		0.30	0.30	0.29	0.00		
	Interval HU's			0.30	2.67	3.85	6.82	0.14

Grassland/Savannah (Developed low density forest (10%) canopy - Savannah)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	21.49	21.49	21.49		
	Target Year HU's		0.00	10.75	21.49	21.49		
	Interval HU's			3.58	145.06	859.60	1008.24	20.16

Grassland/Savannah (Native Grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	0.46	0.46	0.46		
	Target Year HU's		0.00	0.23	0.46	0.46		
	Interval HU's			0.08	3.11	18.40	21.58	0.43

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0	0.10	0.10		
	ACRES		37.22	0	37.22	37.22		
	Target Year HU's		3.72	0.00	3.72	3.72		
	Interval HU's			1.24	11.17	148.88	161.29	3.23

Oxbow South

Riparian Woodland (Developed high density on restored deeply disturbed top soils)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.20	0.60		
	ACRES		0	15.18	15.18	15.18		
	Target Year HU's		0.00	0.00	3.04	9.11		
	Interval HU's			0.00	13.66	242.88	256.54	5.13

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.80	0.90		
	ACRES		6.45	6.45	6.45	6.45		
	Target Year HU's		4.00	4.00	5.16	5.81		
	Interval HU's			4.00	41.22	219.30	264.51	5.29

Grassland/Savannah (Native Grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	1.54	1.54	1.54		
	Target Year HU's		0.00	0.77	1.54	1.54		
	Interval HU's			0.26	10.40	61.60	72.25	1.45

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.10	0.10		
	ACRES		0	3.28	3.28	3.28		
	Target Year HU's		0.00	0.00	0.33	0.33		
	Interval HU's			0.00	1.48	13.12	14.60	0.29

Grassland/Savannah (Preserve existing grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.09	0.05		
	ACRES		5.56	5.56	4.84	1.61		
	Target Year HU's		0.56	0.56	0.44	0.07		
	Interval HU's			0.56	4.45	9.19	14.20	0.28

Gateway Central

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.62	0.62	0.80	0.90		
	ACRES		2.12	2.12	2.12	2.12		
	Target Year HU's		1.31	1.31	1.70	1.91		
	Interval HU's			1.31	13.55	72.08	86.94	1.74

Grassland/Savannah (Developed low density forest (10%) canopy - Savannah)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	11.32	11.32	11.32		
	Target Year HU's		0.00	5.66	11.32	11.32		
	Interval HU's			1.89	76.41	452.80	531.10	10.62

Grassland/Savannah (Preserve existing grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		5.5	5.5	5.28	4.68		
	Target Year HU's		0.55	0.55	0.53	0.42		
	Interval HU's			0.55	4.85	18.93	24.34	0.49

Gateway South

Riparian Woodland (Developed high density on restored deeply disturbed top soils)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.20	0.60		
	ACRES		0	14.57	14.57	14.57		
	Target Year HU's		0.00	0.00	2.91	8.74		
	Interval HU's			0.00	13.11	233.12	246.23	4.92

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.80	0.90		
	ACRES		24.43	24.43	24.43	24.43		
	Target Year HU's		17.59	17.59	19.54	21.99		
	Interval HU's			17.59	167.10	830.62	1015.31	20.31

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		0.20	0.20	0.18	0.16		
	Target Year HU's		0.11	0.11	0.10	0.08		
	Interval HU's			0.11	0.93	3.52	4.57	0.09

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.10	0.10		
	ACRES		0	4.52	4.52	4.52		
	Target Year HU's		0.00	0.00	0.45	0.45		
	Interval HU's			0.00	2.03	18.08	20.11	0.40

Gateway Beach

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.85	0.95		
	ACRES		25.71	25.71	25.71	25.71		
	Target Year HU's		18.51	18.51	21.85	24.42		
	Interval HU's			18.51	181.64	925.56	1125.71	22.51

Riparian Woodland (Improve riparian forests)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.85	0.95		
	ACRES		8.9	8.9	9.17	9.43		
	Target Year HU's		6.41	6.41	7.79	8.96		
	Interval HU's			6.41	63.85	334.91	405.16	8.10

Riparian Woodland (Developed high density on restored deeply disturbed top soils)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.30	0.85		
	ACRES		0	31.2	31.20	31.20		
	Target Year HU's		0.00	0.00	9.36	26.52		
	Interval HU's			0.00	42.12	717.60	759.72	15.19

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		7.30	7.30	6.57	5.84		
	Target Year HU's		4.09	4.09	3.50	2.94		
	Interval HU's			4.09	34.09	128.64	166.82	3.34

Emergent Wetland (Develop wetlands per restoration plan)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.95	0.95		
	ACRES		0	15	15.00	15.00		
	Target Year HU's		0.00	0.00	14.25	0.00		
	Interval HU's			0.00	64.13	570.00	634.13	12.68

Emergent Wetland(incorporate and mange with developed wetland)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.33	0.33	0.95	0.95		
	ACRES		6.9	6.9	6.90	6.90		
	Target Year HU's		2.28	2.28	6.56	2.28		
	Interval HU's			2.28	39.74	262.20	304.22	6.08

Grassland/Savannah (Developed low density forest (10%) canopy - Savannah)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	27.44	27.44	27.44		
	Target Year HU's		0.00	13.72	27.44	27.44		
	Interval HU's			4.57	185.22	1097.60	1287.39	25.75

Grassland/Savannah (Developed scattered trees (5%) canopy - Savannah)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	8.45	8.45	8.45		
	Target Year HU's		0.00	4.23	8.45	8.45		
	Interval HU's			1.41	57.04	338.00	396.45	7.93

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.10	0.10		
	ACRES		0	41.02	41.02	41.02		
	Target Year HU's		0.00	0.00	4.10	4.10		
	Interval HU's			0.00	18.46	164.08	182.54	3.65

Grassland/Savannah Maintain existing grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		8.09	8.09	7.77	6.88		
	Target Year HU's		0.81	0.81	0.78	0.62		
	Interval HU's			0.81	7.14	27.85	35.80	0.72

Gateway Park

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.85	0.95		
	ACRES		55	55	55.00	55.00		
	Target Year HU's		39.60	39.60	46.75	52.25		
	Interval HU's			39.60	388.58	1980.00	2408.18	48.16

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		2.70	2.70	2.43	2.16		
	Target Year HU's		1.51	1.51	1.29	1.09		
	Interval HU's			1.51	12.61	47.58	61.70	1.23

Grassland/Savannah (Developed scattered trees (5%) canopy - Savannah)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0.5	1.00	1.00		
	ACRES		0	2.71	2.71	2.71		
	Target Year HU's		0.00	1.36	2.71	2.71		
	Interval HU's			0.45	18.29	108.40	127.14	2.54

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.10	0.10		
	ACRES		0	27.27	27.27	27.27		
	Target Year HU's		0.00	0.00	2.73	2.73		
	Interval HU's			0.00	12.27	109.08	121.35	2.43

Grassland/Savannah Maintain existing grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		70.67	70.67	67.84	60.07		
	Target Year HU's		7.07	7.07	6.78	5.41		
	Interval HU's			7.07	62.33	243.29	312.69	6.25

Gateway East

*Some acres and/or HU's by TY are calculated based on WO Project Assumptions

Riparian Woodland (Improved riparian forest)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.72	0.72	0.85	0.95		
	ACRES		106.8	106.8	106.80	106.80		
	Target Year HU's		76.90	76.90	90.78	101.46		
	Interval HU's			76.90	754.54	3844.80	4676.24	93.52

Upland Woodland								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.56	0.56	0.53	0.50		
	ACRES		1.60	1.60	1.44	1.28		
	Target Year HU's		0.90	0.90	0.77	0.65		
	Interval HU's			0.90	7.47	28.19	36.56	0.73

Emergent Wetland Develop wetland complex								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0	0	0.95	0.95		
	ACRES		37.2	37.2	37.20	37.20		
	Target Year HU's		0.00	0.00	35.34	0.00		
	Interval HU's			0.00	159.03	1413.60	1572.63	31.45

Grassland/Savannah (Turf grasses)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0	0.10	0.10		
	ACRES		0.11	0.11	0.11	0.11		
	Target Year HU's		0.01	0.00	0.01	0.01		
	Interval HU's			0.01	0.05	0.44	0.50	0.01

Grassland/Savannah Maintain existing grasslands)								
50 year Project Life		TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	40		
	HSI		0.1	0.1	0.10	0.09		
	ACRES		0.49	0.49	0.47	0.42		
	Target Year HU's		0.05	0.05	0.05	0.04		
	Interval HU's			0.05	0.43	1.69	2.17	0.04

RIVERSIDE OXBOW as part of the "NO ACTION" CONDITION
RE-ASSESSED FOR 2007 CONDITIONS

Values are Average Annual Habitat Units (AAHUs)												
10/23/2007	Riparian Woodland			Emergent Wetland			Upland Wooded			Grassland/Savannah		
Study Reach	Without Project	With Updated RO	Updated RO Outputs	Without Project	With Updated RO	Updated RO Outputs	Without Project	With Updated RO	Updated RO Outputs	Without Project	With Updated RO	Updated RO Outputs
Clear Fork West [1]	110.23	110.23	**0.00**	0	0	**0.00**	36.15	36.15	**0**	175.91	175.91	**0**
Clear Fork East [1]	0.00	0	**0.00**	0	0	**0.00**	17.1	17.1	**0**	32.75	32.75	**0**
North Main [1]	7.29	7.29	**0.00**	0.25	0.25	**0.00**	65.45	65.45	**0**	175.38	175.38	**0**
West Fork North [1]	3.94	3.94	**0.00**	0	0	**0.00**	24.53	24.53	**0**	97.51	97.51	**0**
West Fork South	2.10	4.14	**2.04**	0.25	0.25	**0.00**	51.78	51.78	**0**	208.24	205.87	**-2.37**
West Fork Riverbend [2]	13.00	13	**0.00**	1.12	1.12	**0.00**	41.26	41.26	**0**	57.07	57.07	**0**
West Fork Rockwood	37.31	44.48	**7.17**	0	0	**0.00**	3.08	3.08	**0**	122.44	116.49	**-5.95**
Oxbow North	19.31	39.56	**20.25**	0	2.68	**2.68**	2.29	2.29	**0**	18.01	45.50	**27.49**
Oxbow Central	1.37	0.00	**-1.37**	0.14	10.40	**10.26**	0	0	**0**	41.57	67.30	**25.74**
Oxbow South	0.93	2.61	**1.68**	0	0.00	**0.00**	0	0	**0**	1.23	14.85	**13.62**
Gateway Central	0.70	8.62	**7.92**	0	0	**0.00**	0	0	**0**	0.46	13.63	**13.17**
Gateway South	16.24	23.67	**7.44**	0	0.96	**0.96**	0.09	0.09	**0**	1.83	1.22	**-0.60**
Gateway Beach	21.29	33.55	**12.26**	2.05	8.46	**6.40**	3.34	3.34	**0**	6.45	0.00	**-6.45**
Gateway Park	42.71	42.71	**0.00**	0	0	**0.00**	1.23	1.23	**0**	7.79	0.00	**-7.79**
Gateway East	73.71	88.86	**15.15**	0.24	22.66	**22.42**	0.78	0.73	**0**	0.92	0.00	**-0.92**
TOTALS	228.66	422.66	**72.54**	4.05	46.77	**42.72**	103.84	103.80	**0.00**	465.99	521.93	**55.94**

[1] These sites are included in the Authorized Central City Project and no change is proposed with their inclusion in the Modified Project Alternative.

[2] West Fork Riverbend is included in the Authorized Cetral City Project but is not proposed as a primary valley storage site with the Modified Project Alternative

No Action Alternative
Updated Riverside Oxbow
Grassland and Savannah

Reevaluation of Addendum report based Riverside Oxbow Grassland and Grassland Savannah using 2007 data

Oxbow North

Grassland/Savannah Native Grass Buffer							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	36.4	36.4	36.40	36.40		
	Target Year H	0.00	18.20	36.40	36.40		
	Interval HU's		9.10	245.70	1456.00	1710.80	34.22

Grassland/Savannah (low density forest (10%) canopy- Savannah)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	12	12	12.00	12.00		
	Target Year H	0.00	6.00	12.00	12.00		
	Interval HU's		3.00	81.00	480.00	564.00	11.28

Oxbow Central

Grassland/Savannah (Developed low density forest (10%) canopy - Savannah)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	71.6	71.6	71.60	71.60		
	Target Year H	0.00	35.80	71.60	71.60		
	Interval HU's		17.90	483.30	2864.00	3365.20	67.30

Oxbow South

Grassland/Savannah (Native Grasslands)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	0.9	0.9	0.90	0.90		
	Target Year H	0.00	0.45	0.90	0.90		
	Interval HU's		0.23	6.08	36.00	42.30	0.85

No Action Alternative
Updated Riverside Oxbow
Grassland and Savannah

Grassland/Savannah (low density forest (10%) canopy- Savannah							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	14.9	14.9	14.90	14.90		
	Target Year H	0.00	7.45	14.90	14.90		
	Interval HU's		3.73	100.58	596.00	700.30	14.01

Gateway Central

Grassland/Savannah (Native grass buffer)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	3.2	3.2	3.20	3.20		
	Target Year H	0.00	1.60	3.20	3.20		
	Interval HU's		0.80	21.60	128.00	150.40	3.01

Grassland/Savannah (Developed low density forest (10%) canopy - Savannah)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	0	11.32	11.32	11.32		
	Target Year H	0.00	5.66	11.32	11.32		
	Interval HU's		1.89	76.41	452.80	531.10	10.62

Gateway South

Grassland/Savannah (Native Grass Buffer)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0.5	1.00	1.00		
	ACRES	1.3	1.3	1.30	1.30		
	Target Year H	0.00	0.65	1.30	1.30		
	Interval HU's		0.33	8.78	52.00	61.10	1.22

Gateway Beach No grassland development in SEC Army approved plan for this reach

Gateway Park No grasslands in approved plan for RO 2005 version

Gateway East No grasslands in approved RO within this reach

No Action Alternative
Updated Riverside Oxbow
Emergent Wetlands

Reevaluation of Addendum report based Riverside Emergent Wetlands using 2007 data

Oxbow North

Emergent Wetland (This is actually a pond habitat not wetland)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.45	0.45		
	ACRES	0	6.7	6.70	6.70		
	Target Year H	0.00	0.00	3.02	0.00		
	Interval HU's		0.00	13.57	120.60	134.17	2.68

Oxbow Central

Emergent Wetland (Develop wetlands per restoration plan)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.95	0.95		
	ACRES	0	12.3	12.30	12.30		
	Target Year H	0.00	0.00	11.69	0.00		
	Interval HU's		0.00	52.58	467.40	519.98	10.40

Oxbow South

Emergent Wetland (Develop wetlands per restoration plan)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.95	0.95		
	ACRES	0	0	0.00	0.00		
	Target Year H	0.00	0.00	0.00	0.00		
	Interval HU's		0.00	0.00	0.00	0.00	0.00

Gateway South

Emergent Wetland (Develop wetlands per restoration plan)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.95	0.95		
	ACRES	0	1.13	1.13	1.13		
	Target Year H	0.00	0.00	1.07	0.00		
	Interval HU's		0.00	4.83	42.94	47.77	0.96

No Action Alternative
Updated Riverside Oxbow
Emergent Wetlands

Gateway Beach

Emergent Wetland (Develop wetlands per restoration plan)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.95	0.95		
	ACRES	0	10	10.00	10.00		
	Target Year H	0.00	0.00	9.50	0.00		
	Interval HU's		0.00	42.75	380.00	422.75	8.46

Gateway East

Emergent Wetland (Develop wetlands per restoration plan)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.95	0.95		
	ACRES	0	26.8	26.80	26.80		
	Target Year H	0.00	0.00	25.46	0.00		
	Interval HU's		0.00	114.57	1018.40	1132.97	22.66

No Action Alternative
Updated Riverside Oxbow
Riparian Woodlands

Reevaluation of Addendum report based Riverside Oxbow riparian forest using 2007 data With Project

Oxbow North

Total Acres at TY 50: 39.56

Riparian Woodland (developed)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	20	20	20		
	Target Year HU's		0.00	0.00	5.00	16.00		
	Interval HU's			0.00	22.50	420.00	442.50	8.85

Riparian Woodland (Improved within reach)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.7	0.7	0.80	0.95		
	ACRES		20.33	20.33	20.33	20.33		
	Target Year HU's		14.23	14.23	16.26	19.31		
	Interval HU's			14.23	137.23	711.55	863.01	17.26

Riparian Woodland (preserved)

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0.7	0.7	0.72	0.74		
	ACRES		18.5	18.5	18.50	18.50		
	Target Year HU's		12.95	12.95	13.34	13.73		
	Interval HU's			12.95	118.30	541.31	672.56	13.45

Oxbow Central

Riparian Woodland (Developed) — 0.00

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.00	0.00		
	ACRES		0	0	0.00	0.00		
	Target Year HU's		0.00	0.00	0.00	0.00		
	Interval HU's			0.00	0.00	0.00	0.00	0.00

Oxbow South

Riparian Woodland (Developed) — 2.61

50 year Project Life		TY	0	1	10	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	40		
	HSI		0	0	0.25	0.80		
	ACRES		0	2	2.00	2.00		
	Target Year HU's		0.00	0.00	0.50	1.60		
	Interval HU's			0.00	2.25	42.00	44.25	0.89

No Action Alternative
Updated Riverside Oxbow
Riparian Woodlands

Riparian Woodland (Improved riparian forest)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0.62	0.62	0.80	0.90		
	ACRES	2.1	2.1	2.10	2.10		
	Target Year HU's	1.30	1.30	1.68	1.89		
	Interval HU's		1.30	13.42	71.40	86.12	1.72

Gateway Central

Riparian Woodland (Improved riparian forest)								8.62
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**	
	Year Interval	0	1	9	40			
	HSI	0.62	0.62	0.80	0.90			
	ACRES	9.7	9.7	9.70	9.70			
	Target Year HU's	6.01	6.01	7.76	8.73			
	Interval HU's		6.01	61.98	329.80	397.80	7.96	

Riparian Woodland (developed riparian forest)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.25	0.80		
	ACRES	0	1.5	1.50	1.50		
	Target Year HU's	0.00	0.00	0.38	1.20		
	Interval HU's		0.00	1.69	31.50	33.19	0.66

Gateway South

Riparian Woodland (developed)								23.67
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**	
	Year Interval	0	1	9	40			
	HSI	0	0	0.25	0.80			
	ACRES	0	13.3	13.30	13.30			
	Target Year HU's	0.00	0.00	3.33	10.64			
	Interval HU's		0.00	14.96	279.30	294.26	5.89	

Riparian Woodland (Improved riparian forest)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0.72	0.72	0.85	0.95		
	ACRES	15.7	15.7	15.70	15.70		
	Target Year HU's	11.30	11.30	13.35	14.92		
	Interval HU's		11.30	110.92	565.20	687.42	13.75

No Action Alternative
Updated Riverside Oxbow
Riparian Woodlands

Riparian Woodland (Preserved riparian forest)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0.72	0.72	0.74	0.76		
	ACRES	5.2	5.2	5.36	5.51		
	Target Year HU's	3.74	3.74	3.97	4.21		
	Interval HU's		3.74	34.72	163.55	202.01	4.04

Gateway Beach

Riparian Woodland (Improved riparian forest)								33.55
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**	
	Year Interval	0	1	9	40			
	HSI	0.72	0.72	0.85	0.95			
	ACRES	27.4	27.4	27.40	27.40			
	Target Year HU's	19.73	19.73	23.29	26.03			
	Interval HU's		19.73	193.58	986.40	1199.71	23.99	

Riparian Woodland Forest Development							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.25	0.80		
	ACRES	0	21.6	21.6	21.6		
	Target Year HU's	0.00	0.00	5.40	17.28		
	Interval HU's		0.00	24.30	453.60	477.90	9.56

Gateway Park

Riparian Woodland (Improved riparian forest)								0.00
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**	
	Year Interval	0	1	9	40			
	HSI	0	0	0.00	0.00			
	ACRES	0	0	0.00	0.00			
	Target Year HU's	0.00	0.00	0.00	0.00			
	Interval HU's		0.00	0.00	0.00	0.00	0.00	

Gateway East

*Some acres and/or HU's by TY are calculated based on WO Project Assumptions

Riparian Woodland (Improved riparian forest)								88.86
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**	
	Year Interval	0	1	9	40			
	HSI	0.72	0.72	0.85	0.95			
	ACRES	97.1	106.8	97.10	97.10			
	Target Year HU's	69.91	76.90	82.54	92.25			
	Interval HU's		73.40	719.33	3495.60	4288.34	85.77	

No Action Alternative
Updated Riverside Oxbow
Riparian Woodlands

Riparian Woodland (develop riparian forest)							
50 year Project Life	TY	0	1	10	50	**Cumulative Hu's**	**AAHU's**
	Year Interval	0	1	9	40		
	HSI	0	0	0.25	0.80		
	ACRES	7	7	7.00	7.00		
	Target Year HU's	0.00	0.00	1.75	5.60		
	Interval HU's		0.00	7.88	147.00	154.88	3.10

HABITAT CONDITIONS FOR HYDRAULIC STORAGE SITE 17
MODIFIED CENTRAL CITY PROJECT

WITHOUT PROJECT CONDITIONS

	Riparian Woodland				Shrubland				Forbland				Emergent Wetland					
Lagoon Number	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Total Baseline Acres	Total AAHU's
L1		0	0.00			0	0.00		0.66	2	1.17	**0.61**		0	0.00		2	**0.61**
L2	0.22	1	0.12	**0.01**		0	0.00		0.66	1	0.93	**0.65**		0	0.00		2	**0.66**
L3		0	0.00		0.77	3	2.12	**0.17**		0	0.00	**0.75**		0	0.00		3	**0.92**
L4	0.31	2	0.68	**0.05**		0	0.00			0	0.00	**0.59**		0	0.00		2	**0.64**
L5	0.40	1	0.50	**0.04**		0	0.00			0	0.00	**0.34**		0	0.00		1	**0.38**
L6	0.47	2	0.77	**0.06**		0	0.00			0	0.00	**0.44**		0	0.00		2	**0.50**
L7	0.33	2	0.73	**0.06**		0	0.00			0	0.00	**0.60**		0	0.00		2	**0.66**
L8	0.35	3	1.12	**0.09**		0	0.00		0.65	5	3.50	**5.37**	0.45	9	4.00	**0.32**	17	**5.78**
Levee/Other	0.40	6	2.28	**0.78**		0	0.00			0	0.00	**1.54**		0	0.00		6	**2.32**
Totals	0.38	17	6.19	1.09	0.77	3	2.12	0.17	0.66	9	5.61	10.89	0.45	9	4.00	0.32	37	**12.47**

Note for "Without Project" Condition: Total Baseline HSIs for the "Without Project" conditions are proportioned averages by habitat type. It is assumed that due to the City's clean-up of the Lagoons, all acreages will convert to forbland beginning at TY 10. There are currently about 2 acres of disturberd lands within the baseline study area

WITH MODIFIED CENTRAL CITY PROJECT CONDITIONS

	Riparian Woodland				Shrubland				Forbland				Emergent Wetland					
	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Base HSI	Base Acres	Baseline HU	AAHU	Total Baseline Acres	Total AAHU's
Excavated	0.00	0	0.00		0.00	0.00	0.00		0.05	33	1.66	**0.00**	0.45	33.22	14.95	**24.74**	66	**24.74**
Levee/Other	0.40	6	2.28	**0.18**		0.00	0.00			0	0.00	**1.54**	0.00	0.00	0.00	**0.00**	6	**1.72**
Totals	0.40	6	2.28	0.18		0.00	0.00	0.00	0.05	33	1.66	1.54		33.22	14.95	24.74	72	**26.46**

Note for "With LPP" Condition: The City of Fort Worth's soil remediation is anticipated to be completed by TY 10. the "Without Project" TY 10 conditions are therefore considered to be the baseline values for the "With LPP" condition. See Site 17 AAHU Calculation sheets for details by Target Year.

ASSUMPTIONS FOR SITE 17
MODIFIED CENTRAL CITY PROJECT

A 50 year period of analysis will be used to calculate AAHU's for the "Without Project" condition (and any subesequent "With Project" conditions).

Without Project Condition Assumptions:

Lagoons 1 through 8 within Site 17 will undergo soil clean-up or remediation by the City of Fort Worth for PCBs and/or metals during the next 10 years. Revegetation by the City will consist primarily of establishment of grasses and forbs to stabilize new soils within the remediated areas.

Beginning at Target Year 10 It is assumed that the HSI for all habitat types in the lagoons within Site 17 will begin moving toward the Forbland habitat values with an HSI of 0.05 at TY 10, HSI of 0.5 at TY20, and the full HSI value for forbland of 0.66 by TY 50.

Acreages of all other habitat types (Riparian Woodland, Shrubland, and Emergent Wetland) will be accounted as Forbland habitat beginning at TY 10 and will remain as Forbland acreage through the 50 year period of analysis.

With Project Condition (LLP) Asumptions:

All area excavated for valley storage as part of the LPP within Site 17 will be established as emergnt wetlands. Acreage of established wetlands will remain constant through the period of analysis. HSI values of established wetlands will go to 0.75 at TY 10 and will achieve a value of 1.0 at TY 50.

Site 17 - AAHU Calculations

WITHOUT PROJECT

Lagoon 1

Forbland									
50 year Project Life		TY	0	1	10	20	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	10	30		
	HSI		0.66	0.66	0.05	0.50	0.66		
	ACRES		1.78	1.78	1.78	1.78	1.78		
	Target Year HU's		1.17	1.17	0.09	0.89	1.17		
	Interval HU's			1.17	5.69	4.90	18.96	30.71	0.61

Lagoon 2

Riparian Woodland									
50 year Project Life		TY	0	1	10	20	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	10	30		
	HSI		0.22	0.22	0.00	0.00	0.00		
	ACRES		0.55	0.55	0.00	0.00	0.00		
	Target Year HU's		0.12	0.12	0.00	0.00	0.00		
	Interval HU's			0.12	0.36	0.00	0.00	0.48	0.01
Forbland									
50 year Project Life		TY	0	1	10	20	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	10	30		
	HSI		0.66	0.66	0.05	0.50	0.66		
	ACRES		1.41	1.41	1.96	1.96	1.96		
	Target Year HU's		0.93	0.93	0.10	0.98	1.29		
	Interval HU's			0.93	5.13	5.39	20.87	32.33	0.65

Lagoon 3

Shrubland									
50 year Project Life		TY	0	1	10	20	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	10	30		
	HSI		0.77	0.77	0.00	0.00	0.00		
	ACRES		2.75	2.75	0.00	0.00	0.00		
	Target Year HU's		2.12	2.12	0.00	0.00	0.00		
	Interval HU's			2.12	6.35	0.00	0.00	8.47	0.17
Forbland									
50 year Project Life		TY	0	1	10	20	50	**Cumulative Hu's**	**AAHU's**
	Year Interval		0	1	9	10	30		
	HSI		0.00	0.00	0.05	0.50	0.66		
	ACRES		0.00	0.00	2.75	2.75	2.75		
	Target Year HU's		0.00	0.00	0.14	1.38	1.82		
	Interval HU's			0.00	0.41	7.56	29.29	37.26	0.75

Lagoon 4

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.31	0.31	0.00	0.00	0.00		
	ACRES		2.18	2.18	0.00	0.00	0.00		
	Target Year HU's		0.68	0.68	0.00	0.00	0.00		
	Interval HU's			0.68	2.03	0.00	0.00	2.70	0.05

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0	0	0.05	0.50	0.66		
	ACRES		0	0	2.18	2.18	2.18		
	Target Year HU's		0.00	0.00	0.11	1.09	1.44		
	Interval HU's			0.00	0.33	6.00	23.22	29.54	0.59

Lagoon 5

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.4	0.4	0.00	0.00	0.00		
	ACRES		1.25	1.25	0.00	0.00	0.00		
	Target Year HU's		0.50	0.50	0.00	0.00	0.00		
	Interval HU's			0.50	1.50	0.00	0.00	2.00	0.04

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0	0	0.05	0.50	0.66		
	ACRES		0	0	1.25	1.25	1.25		
	Target Year HU's		0.00	0.00	0.06	0.63	0.83		
	Interval HU's			0.00	0.19	3.44	13.31	16.94	0.34

Lagoon 6

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.47	0.47	0.00	0.00	0.00		
	ACRES		1.63	1.63	0.00	0.00	0.00		
	Target Year HU's		0.77	0.77	0.00	0.00	0.00		
	Interval HU's			0.77	2.30	0.00	0.00	3.06	0.06

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0	0	0.05	0.50	0.66		
	ACRES		0	0	1.63	1.63	1.63		
	Target Year HU's		0.00	0.00	0.08	0.82	1.08		
	Interval HU's			0.00	0.24	4.48	17.36	22.09	0.44

Lagoon 7

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.33	0.33	0.00	0.00	0.00		
	ACRES		2.22	2.22	0.00	0.00	0.00		
	Target Year HU's		0.73	0.73	0.00	0.00	0.00		
	Interval HU's			0.73	2.20	0.00	0.00	2.93	0.06

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.00	0.00	0.05	0.50	0.66		
	ACRES		0.00	0.00	2.22	2.22	2.22		
	Target Year HU's		0.00	0.00	0.11	1.11	1.47		
	Interval HU's			0.00	0.33	6.11	23.64	30.08	0.60

Lagoon 8

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.35	0.35	0.00	0.00	0.00		
	ACRES		3.2	3.2	0.00	0.00	0.00		
	Target Year HU's		1.12	1.12	0.00	0.00	0.00		
	Interval HU's			1.12	3.36	0.00	0.00	4.48	0.09

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.65	0.65	0.05	0.50	0.66		
	ACRES		5.39	5.39	17.48	17.48	17.48		
	Target Year HU's		3.50	3.50	0.87	8.74	11.54		
	Interval HU's			3.50	30.58	48.07	186.16	268.32	5.37

Emergent Wetland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.45	0.45	0.00	0.00	0.00		
	ACRES		8.89	8.89	0.00	0.00	0.00		
	Target Year HU's		4.00	4.00	0.00	0.00	0.00		
	Interval HU's			4.00	12.00	0.00	0.00	16.00	0.32

Levees & Other

Riparian Woodland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.40	0.40	0.00	0.00	0.24		
	ACRES		5.69	5.69	0.00	0.00	12.50		
	Target Year HU's		2.28	2.28	0.00	0.00	3.00		
	Interval HU's			2.28	6.83	0.00	30.00	39.10	0.78

Forbland

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.00	0.00	0.05	0.50	0.66		
	ACRES		0.00	0.00	5.69	5.69	5.69		
	Target Year HU's		0.00	0.00	0.28	2.85	3.76		
	Interval HU's			0.00	0.85	15.65	60.60	77.10	1.54

WITH LOCALLY PREFERRED PROJECT

Emergent Wetland

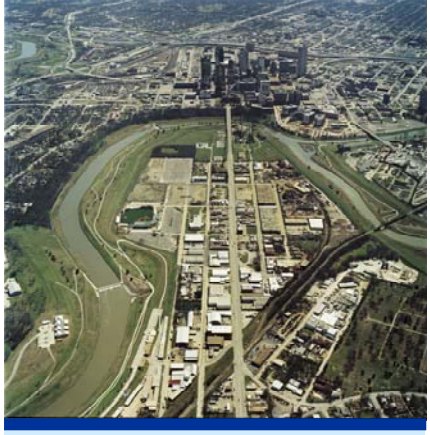
50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.45	0.00	0.75	0.75	1.00		
	ACRES		8.89	33.22	33.22	33.22	33.22		
	Target Year HU's		4.00	0.00	24.92	24.92	33.22		
	Interval HU's			3.83	112.12	249.15	872.03	1237.12	24.74

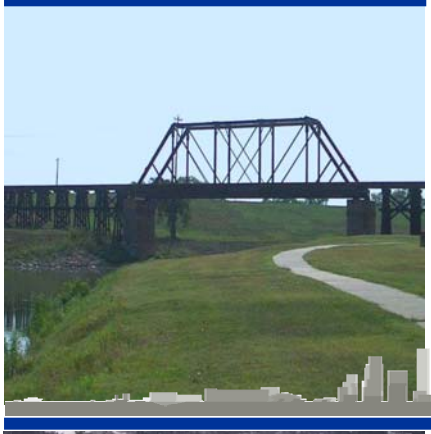
Levees & Other (Riparian Woodland)

50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.40	0.40	0.00	0.00	0.00		
	ACRES		5.69	5.69	0.00	0.00	0.00		
	Target Year HU's		2.28	2.28	0.00	0.00	0.00		
	Interval HU's			2.28	6.83	0.00	0.00	9.10	0.18

Levees & Other (Forbland)

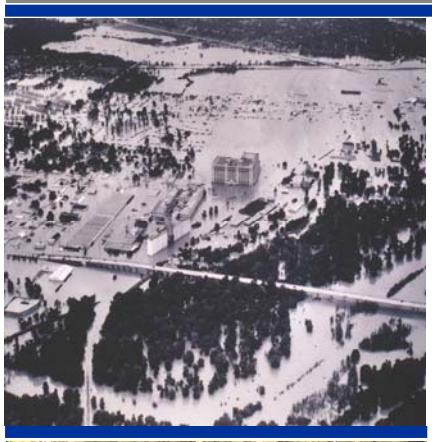
50 year Project Life		TY	0	1	10	20	50	Cumulative Hu's	AAHU's
	Year Interval		0	1	9	10	30		
	HSI		0.00	0.00	0.05	0.50	0.66		
	ACRES		0.00	0.00	5.69	5.69	5.69		
	Target Year HU's		0.00	0.00	0.28	2.85	3.76		
	Interval HU's			0.00	0.85	15.65	60.60	77.10	1.54





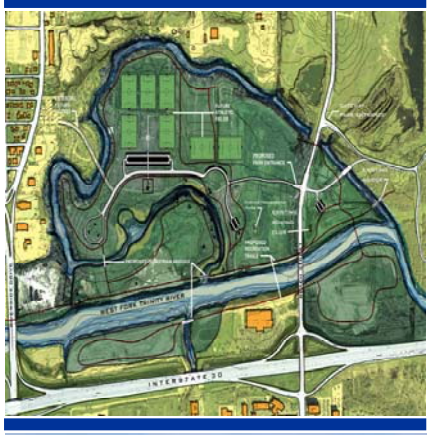
Fort Worth Central City Preliminary Design

404(B)(1) Analysis



Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix F



March 2008

Rendering Image courtesy of CDM

Section 404 (b) (1) Analysis

Fort Worth Central City

Modified Central City Project

1.0 Project Description

1.1 Authority and Purpose

Corps participation in the Central City Project was authorized by Section 116 of the Consolidated Appropriations Act, 2005 which directed the Corps to undertake the Central City project as generally described in the Trinity River Vision Master Plan and authorizes the Corps participation at a total cost not to exceed $220,000,000. Section 116 further establishes that the Corps share of that project will be $110,000,000. The Trinity River Vision Master Plan's goals for the Central City project were: develop the river as an aesthetic and recreational focal point for Central City redevelopment; provide for a higher density of people living, working, playing and learning; orient mixed use development on the river; develop an urban lake; provide higher constant water level; eliminate levees where possible; continue trails through downtown consistent with the overall Trinity River Master Plan; improve water quality and wildlife habitat; and provide linkages to neighborhoods and districts. These goals should be accomplished while restoring the design level of flood protection to the Central City area and improving interior drainage.

Discharge of fill material into "waters of the United States" including wetlands associated with the project require compliance with Section 404 of the Clean Water Act. This Section 404(b) (1) analysis is one step in that compliance. Future project authorizations could change the level of Corps participation; however, if level of participation by the Corps is subsequently increased and it is still within the scope of the Central City project evaluated in this document, no further analysis under Section 404 would be necessary.

1.2 Background

A Final Environmental Impact Statement (FEIS) was completed for the original Central City Project in January 2006 and the Central City Project Report was completed in March 2006. The Record of Decision (ROD) was signed, and the Project Report recommending the Central City Community-Based Alternative was found to be technically sound and environmentally acceptable, by the Assistant Secretary of the Army (ASA (CW)) on 7 April 2006.

By letter dated 22 June 2006, the City of Fort Worth requested that the Corps of Engineers conduct an evaluation to consider the potential benefits of modifying the original Central City Project to incorporate the Riverside Oxbow Ecosystem Restoration Project. The City's request recognized that each of these projects are moving forward as individual projects and that they are located adjacent to one another. The City and the Tarrant Regional Water District, the non-Federal sponsor for these two projects, indicated their opinion that based on their adjacency, there might be merit in merging the two projects. In their letter, the City of Fort Worth identified potential benefits of combining the projects that would not be achieved if they were to continue to proceed as individual projects. In response to the City's letter request, the Fort Worth District Corps of Engineers performed an initial evaluation which suggested that the concept merited detailed study. The result of those detailed evaluations is presented in Supplement No. 1 to the Final EIS for the Central City Project.

Based upon detailed evaluations presented in Supplement No. 1 to the Final EIS for the Central City Project, and prior to public coordination under the National Environmental Policy Act, The Fort Worth District has selected the Modified Central City alternative for recommendation. The major difference between the Modified and

original Central City alternatives is in location of valley storage sites required to accommodate the increased hydraulic efficiency of the bypass channel, a primary component of the Central City Project, relocation of Samuels Avenue Dam, and the incorporation of many features of the Riverside Oxbow Project. The Modified alternative retains the major physical features of the original Central City Project but utilizes existing public lands to a greater extent and minimizes use of private lands to accommodate the valley storage requirement.

1.3 Location and General Description

The Central City project, described as the Community Based Alternative in Chapter 3 of the FEIS as modified by Supplement No.1 to the Final Environmental Impact Statement (SEIS) would be located on the Clear and West Forks of the Trinity River in Fort Worth, Tarrant County Texas. This comprehensive project would incorporate a bypass channel, a levee system, and associated improvements to divert flood flows around a segment of the existing Trinity River adjacent to downtown Fort Worth. The specific components of this modified plan are discussed in Chapter 3 of the SEIS.

The project also includes hydraulic mitigation to comply with valley storage requirements. The hydraulic mitigation would be accomplished at six locations including the Rockwood West, University Drive, downstream sites in the vicinity of Samuels Avenue, Riverside Park, Ham Branch, and Riverside/Gateway Park. An in-channel dam, on the West Fork, just upstream of Marine Creek would impound water to a normal water surface elevation of approximately 525 feet NGVD. A low water dam is proposed on Marine Creek to establish a pool elevation of approximately 516.5 NGVD and lock structure located at the dam will provide water connectivity between pools. In addition, the Riverside/Gateway Park mitigation site would be ecologically restored to re-establish the biological integrity by reconnecting the severed channel and restoring riparian woodlands, emergent wetlands, and native grasslands. Two oxbows within the Rockwood Park area would be reconnected to the West Fork providing improved aquatic habitat to the system. Mitigation for stream habitat losses due to inundation of portions of Marine Creek will be accomplished by stream habitat development within Ham Branch and in the Sycamore Creek Oxbow previously severed from the Trinity River. The components of the Modified Central City Project are shown on **Figure 1**.

1.4 Alternatives Considered

Section 404(b) (1) guidelines of the Clean Water Act requires that "except as provided under section 404(b) (2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." The guidelines consider an alternative practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

The Central City FEIS reviewed and evaluated the following alternatives: No Action Alternative, Principles and Guidelines Based Alternative (P&G alternative), and Community Based Alternative. Within the P&G, and Community Based Alternative, alternative locations, configurations, and size of the bypass channel, valley storage, interior water feature, and isolation gates were analyzed as discussed in Chapter 3 of the FEIS. The Recommended Plan's alignment and location of these specific features within the river corridor was based on technical studies, such as Hydrology and Hydraulic, and Geotechnical Investigations that provided in-depth consideration of logistics and functionality. Combining the Central City Project valley storage requirements and the Riverside Oxbow Project was not evaluated at that time because the Riverside Oxbow Project had been recommended for authorization and the study team believed that authorization was imminent.

Neither the No Action Alternative nor the P&G Alternative fulfilled the overall project purposes and goals of the authorized Central City project as described in the Trinity River Vision Master Plan. Therefore, they are not considered "practicable" alternatives under the 404 (b) (1) guidelines and it was determined that the Community Based Alternative as recommended by the FEIS was the least damaging practicable alternative. This plan

substantially fulfilled the overall project goals described in the Trinity River Vision Master Plan (April 2005).

The Riverside Oxbow Ecosystem Restoration study area encompassed approximately 1060 acres and is located just east of downtown Fort Worth, on the West Fork of the Trinity River. The study area's river reach lies downstream of Riverside Drive (the downstream end of the Fort Worth Floodway project) and extends to a point coinciding with the East 1st Street Bridge crossing of the West Fork. The reach includes the old West Fork channel, which formed an oxbow when the channel was realigned several decades ago, the West Fork and Sycamore Creek confluence, and a low water dam downstream of Beach Street.

Several alternative plans were formulated during the Riverside Oxbow Ecosystem Restoration study that led to the identification of the National Ecosystem Restoration (NER) Plan. In addition a "No Action" alternative and a Locally Preferred Plan (LPP) were carried to the final array of alternatives. The NER plan, as modified by addendum dated April 2005 was approved by the Secretary of Army. The approved plan consists of reestablishing low flows through the old severed West Fork of the Trinity River oxbow including replacing the existing Beach Street Bridge; creation of emergent wetlands, open water, and vegetative fringe habitat; habitat improvement of existing forested tracts, including establishment of a riparian buffer along the West Fork from Riverside Drive to East 1st Street. Additional features of the plan include reforestation of land using a variety of native hard and soft mast trees and shrubs; new park entrance, replacing the Beach Street Bridge, preservation and habitat improvements of native prairie and scrub/shrub uplands (see figure 2 of the SEIS for details of the approved Riverside Oxbow project features).

Additionally, alternatives were evaluated during the evaluation and analysis to merge the Central City Project with features of the Riverside Oxbow Project. This analysis in the SEIS includes the evaluations of the Technical and Environmental acceptability of modifying the Central City Project to incorporate features of the Riverside Oxbow Project in terms of hydraulic efficiency, valley storage, increased opportunity for riparian, aquatic and wetlands restoration, more comprehensive and synergistic development of recreation opportunities and implementation.

The project would result in a loss of floodplain or valley storage due to the fact that the bypass channel is shorter and more efficient than the existing river channel. Without mitigation, as much as 5,250 acre feet of valley storage could be lost. A number of alternative valley storage sites were considered and evaluated to provide hydraulic mitigation as discussed in Chapter 3 of the FEIS. Additional alternatives and sites were further considered and evaluated during this SEIS process. The supplemental evaluation includes a review of environmentally sensitive areas, minimization of adverse impacts and hydraulic suitability. Chapter 3, formulation in the SEIS discusses the evaluation of storage mitigation and explains the rationale for determining the recommended sites. The compensatory mitigation would off-set this potential loss of storage by creating valley storage mitigation sites along the West Fork of the Trinity River upstream of the project area, in the vicinity of Rockwood Park and University Drive, and slightly downstream of the dam in the proximity to Samuels Avenue, Riverside Park and the Riverside/Gateway Park site. These recommended locations were determined to be the least environmentally damaging practicable alternative for hydraulic mitigation. In addition, the Riverside/Gateway Park site also provides the opportunity to develop habitat in an existing floodplain area which includes the original West Fork and Sycamore Creek Oxbow channels. The Corps participation is a subset of the Community Based Alternative and is part of the least environmentally damaging practicable alternative.

A number of alternative locations for the Samuels Avenue Dam were considered and evaluated as discussed in Chapter 3 of the FEIS and in Chapter 3 of the SEIS. A location just downstream of Marine and Lebow Creeks near Samuels Avenue was determined in the Central City FEIS to be necessary in order to meet the goal of raising the Trinity River water level and within Marine Creek to provide a water linkage among neighborhoods, businesses, and cultural amenities of the Central City area. The SEIS re-evaluated this location based upon geotechnical concerns and an effort to reduce impacts to stream and aquatic habitat. The evaluation resulted in a

revised location just upstream of the confluence with Marine Creek. The selected site maintains the pool elevation of 525 NGVD while simplifying the operation of the dam, eliminates the adverse impacts to Lebow Creek, and reduces backwater impacts to Marine Creek.

In association with the proposed new site just upstream of the Marine Creek confluence on the West Fork of the Trinity River and configuration for the Samuels Avenue Dam, a fixed low water dam is proposed on Marine Creek at the confluence with the West Fork of the Trinity River to meet project objectives of navigability and connectivity to the Stockyards area. Several alternatives were evaluated for the Marine Creek low water dam including the use of a gated or fixed structure as well as varying the crest width and height. A fixed structure is recommended on Marine Creek since this alternative is able to meet the design requirements of not increasing existing 100-year water surface elevations on Marine Creek while also minimizing construction, operation, and maintenance costs. The proposed crest elevation of the low water dam is 516.5 NGVD which reduces adverse impacts on Marine Creek upstream from the main river as compared to the elevation of 525 NGVD that would have occurred with implementation of the Samuels Avenue Dam at the location identified within the FEIS.

The Modified Central City Project addresses all of the project objectives contained in the Trinity River Vision Master Plan referenced in the Authorization which satisfy the four overall project purposes, i.e. Flood Damage Reduction, Ecosystem Improvements, Urban Revitalization and Recreation. It provides the design level of protection within the system, and improves the performance of the interior drainage components, reducing the 100-year floodplain in sumps 16W, 24C, 25C, and 26 by 180 acres.

A complete description of the Modified Central City alternative is included in Chapter 3, of the SEIS. Other actions would potentially occur in the future in conjunction with the ultimate development of the Trinity Uptown Features. Some of these activities could impact waters of the United States. These future actions are not being considered during this analysis other than for potential cumulative impacts. Future actions within the area by others would require consideration for compliance with Section 404 of the Clean Water Act at the time they are proposed.

1.5 General Description of Fill Material

The comprehensive Modified Central City project consists of four primary construction areas: the University Drive Hydraulic Mitigation Site; the Bypass Channel Area with associated Interior Water Feature and isolation gates; Samuels Avenue and Marine Creek Dams; and the Hydraulic Mitigation Sites. **Figure 2** denotes the delineation of waters of the United States from the National Hydrographic Dataset products, publication date 2005. Construction of improvements where excavation and or fill are located within the Ordinary High Water Mark (OHWM) of waters of the United States will include the three isolation gates and pedestrian bridges, Samuels Avenue and Marine Creek Dams, ecosystem mitigation and restoration of the West Fork and Sycamore Creek Oxbows, and tie-ins of the Bypass Channel to the existing Trinity River Channel. These locations are shown on **Figure 3**.

An initial geotechnical investigation consisting of a review of existing geotechnical and geologic data and geotechnical exploration was performed to determine general excavation/ fill material characteristics. The fill characteristics within the specific areas identified during the investigation found in general alluvial soils consisting primarily of clay with terraces of sand and gravels overlying generally fresh, unweathered limestone bedrock. The following discussion is applicable to both the overall Modified Central City comprehensive project and the Corps participation unless otherwise noted.

1.5.1 Fill Material Characteristics

A review of existing geologic data for the project area found that the geologic history of the area is complex. During the Triassic and Jurassic periods, withdrawal of the seas from north central Texas along with subsidence of the Gulf Coast Embayment reversed the direction of drainage. The variation of sea levels during the

Cretaceous period generally resulted in multiple layers of geologic deposits. Depositions include members of the Fredericksburg Group which are exposed in the project area and provide the primary geologic formation for construction of the project. This includes the Goodland Limestone, the Kiamichi Formation, the Washita Group, the Duck Creek Formation and the Fort Worth Formation.

Much of the project area is covered with alluvium and terrace materials of Quaternary Age. Bottom-land gravels have formed terraces or benches closer to the stream valleys. These terraces become more distinct as proximity to the current stream channels gets closer. The lowermost terrace is the present floodplain and includes alluvium a few feet above the present stream bed. The alluvial deposits were derived from formations that outcrop within the drainage basin, and range in thickness from a feather-edge to approximately 45 feet. The upland gravels in the area consist of angular gravels, clay and silt. The sand and gravel are mostly poorly sorted fragments of platy limestone. The lower terrace and floodplain deposits consist of rounded gravel, sand and clay. These deposits are generally well sorted and not well cemented.

Preliminary geotechnical investigations have been performed during the initial project Feasibility Studies for both the authorized original Central City and the Riverside/Oxbow Projects. Further investigations will be conducted during the design stage to develop final design parameters and to further define conditions within the combined project area, including the various valley storage mitigation sites, the low water dam at Marine Creek, and an alternate location for the Samuels Avenue Dam and Lock. A discussion of these investigations and results is presented in Appendix B Geotechnical to the SEIS.

The initial geotechnical exploration along the proposed bypass channel and Samuels Avenue Dam site revealed alluvial soils overlying bedrock. The alluvial soils consisted primarily of clay with lenses and layers of sand and gravel and overlying generally unweathered limestone bedrock. This area is within the scope of the Corps participation.

The majority of the clay can be described as having a medium potential for volume change, which is defined as clay with a Plasticity Index ranging from 15 to 28 percent and a Liquid Limit ranging from 35 to 50 percent. The results of permeability tests performed on the clay samples show permeability values are generally low and indicate that the soils are capable of water containment within the proposed bypass channel and levees. The area of the proposed bypass channel is within the scope of the Corps participation.

Seams of sand and gravel overburden soils were found to occur primarily beneath the clay and directly over the limestone bedrock. There was no significant correlation between percent fines, sands, and gravels with depth. Limestone with shale seams was encountered in borings above the proposed lower bypass channel bottom, indicating that some rock excavation would be necessary during construction of the bypass channel, which may then be used as fill elsewhere on the project. The limestone was found to be generally fresh and unweathered, and can be classified as moderately hard. This area is within the scope of the Corps participation level.

Results from site specific geotechnical explorations have not been received from each of the individual valley storage mitigation sites. However, based on previous investigations by the USACE during the Riverside Oxbow Interim Feasibility Study and other studies in the project area, including investigations conducted as part of the closure of the old Riverside Waste Water Treatment Plant; the overburden appears to be clay and claying sands with significant lenses of sand and gravel. The geological deposits in the remaining areas are thought to be similar to that found in the areas investigated. The findings from the initial geotechnical investigations are included in Appendix B of the SEIS.

1.5.2 Fill Classification

Fill operations for the comprehensive Modified Central City Project have been segregated into two classifications based on nature of the operation, proximity of the fill to the existing riverine system and elevation. The nature of each classification is described below and the location of each classification is shown

on **Figure 3** and **Figure 4**. These classifications are applicable to both the overall comprehensive plan and the Corps participation unless otherwise noted.

> ***Cut/Fill within the OHWM***– Material (construction activity) that is placed (occurs) below the Ordinary High Water Mark (OHWM) within the existing riverine sites.
>
> ***Cut/Fill outside the OHWM*** – Material (construction activity) which is placed (occurs) outside of the existing riverine system and OHWM which may have the potential to impact waters of the U.S.

1.5.3 Fill Quantities

Approximately 640,020 cubic yards of material are anticipated to be excavated and/or discharged (filled) as part of the Central City Project within waters of the United States below the OHWM. Of this quantity the estimated fill within the OHWM is approximately 422,605 cubic yards and the estimated excavation quantity is approximately 219,415 cubic yards. The majority of this fill material will form permanent control structures that will be placed within the waterway and the precise amount is dependent on final design.

The material excavated for this project is intended to be used for other project related activities and it is not expected that any excess material from the project would be transported outside of the project area. Contaminated material, if encountered, that is not suitable for placement within the project area would be disposed of at an appropriate licensed landfill facility. Contamination determination is discussed in Section 2.4 of this document.

1.5.4 Source of Fill Material

The fill material for the Modified Central City Project would be generated from excavation activities associated with the project or from the placement of concrete structures within the waterway. Sources would be the same for both the overall comprehensive Modified Central City Plan and the Corps participation. The primary sources of fill material would be from the excavation of the Corps portion of the overall project as follows: construction of the Marine Creek Low Water Dam, Samuels Avenue Dam, the Trinity Point Isolation Gate, the TRWD Isolation Gate and storm water pump station, the Clear Fork Isolation Gate, Interior Water Feature, Ham Branch Mitigation, West Fork (Rockwood) Ecosystem Restoration, Upper Bypass Channel tie-ins to the Clear Fork and West Fork of the Trinity River, the Lower Bypass Channel tie-ins to the West Fork of the Trinity River, Restoration of the old West Fork Riverside Oxbow and Ecosystem Mitigation of the old Sycamore Creek Oxbow.

Preliminary earthwork volume calculations for the currently proposed bypass channel tie-ins, dam construction, new isolation gates and valley storage mitigation sites are summarized in **Table 1**.

Table 1: Approximate Fill/Cut Quantities Within the OHWM.

Description	Fill Cubic Yards	Excavation (Removal) Cubic Yards
Bypass Channel Tie-Ins & Isolation Gates		
Upper Bypass Channel Tie-ins	18,655	10,340
Lower Bypass Channel Tie-ins	0	13,800
Clear Fork Isolation Gate	79,825	1,975
Trinity Point Isolation Gate	22,180	4,620
TRWD Isolation Gate & SWPS	121,900	3,900
Dam Sites		
Samuels Avenue Dam	15,065	22,890
Marine Creek Low Water Dam	4,875	9,485
Marine Creek Channel Improvement	0	1,500
Interior Water Feature		
Interior Water Feature and Pedestrian Bridges	160,105	36,940
Aquatic Mitigation/Restoration Sites		
Rockwood Park Ecosystem Restoration	0	50,000
Ham Branch Aquatic Mitigation	180	5,150
Riverside Oxbow Ecosystem Development	220	13,500
Sycamore Creek Aquatic Ecosystem Development	120	670
Valley Storage Sites		
Rockwood Park West	0	27,100
Samuels Avenue Sites	0	8,540
Riverside Park	0	655
Riverside Oxbow & Beach Street Bridge	0	8,350

1.5.4.1 Bypass Channel Tie-Ins & Isolation Gates

Construction for the Bypass Channel and isolation gates would be done to meet project goals of flood control while providing a catalyst for economic expansion into the area adjacent to downtown Fort Worth and to provide a linkage to the existing Stockyards area. The existing site is primarily urban with a mixture of industrial and commercial sites. Minimal terrestrial or wetland habitat value exists in this area because of the existing level of urban disturbances.

The majority of excavation and fill operations associated with the construction of the Bypass Channel would occur outside of the waters of the United States prior to the full use of the Bypass Channel to convey floodwaters. However, the tie-in of the New Bypass Channel to the existing Clear Fork and West Fork will require excavation within OHWM. This work will include removal of material from the OHWM, overbank and levee section to connect the New Bypass Channel to the main channel. This excavated material will be discharged to upland sites not immediately adjacent to waterways, proper management practices will be used i.e. silt fences, interceptor swales, sediment traps, etc. to prevent and control soil erosion, sedimentation, or discharge of materials to receivable waters.

The three isolation gates will be constructed adjacent to the Bypass Channel on the existing River Channel to provide flood protection during major storm events. Portions of the existing channel will be excavated and concrete gate structures constructed. Precise sequencing of excavation and fill activities, including location and size of temporary coffer dams and sheet pilings, would occur as a part of final design. The structures associated with the three isolation gates will result in approximately 223,905 cubic yards of permanent fill. This portion of the comprehensive plan is part of the Corps participation. Temporary coffer dams or sheet pilings are anticipated near each of the three proposed isolation gates (Clear Fork Gate, Trinity Point Gate, and TRWD Gate). Preliminary estimates anticipate approximately 50,000 cubic yards of temporary fill, from on-site sources, will be required for this purpose. This temporary fill is an impact of the Corps participation.

1.5.4.2 Dam Sites

The Samuels Avenue Dam and Marine Creek Low Water Dam structures located upstream of Samuels Avenue would result in approximately 19,940 cubic yards of permanent material being placed into the West Fork of the Trinity River and Marine Creek and approximately 33,875 cubic yards of excavation and removal. In addition, Samuels Avenue Dam would impound water to an elevation of 525 feet NGVD during normal flow situations. At the Samuels Avenue Dam location, the existing normal water surface elevation (also considered to be the ordinary high water mark) is approximately 500 feet NGVD. Coupled with the development of the bypass channel and the Interior water feature, there would be a combined increase in water surface area of approximately 120 acres at normal flow conditions resulting from the project.

Precise sequencing of excavation and fill activities, including location and size of sheet piling would occur as a part of final design. In addition, deepening of the Marine Creek Channel is required for approximately 160 ft in length just upstream of 23rd Street.

All disturbed sites associated with excavation and discharge of fill materials would be protected during construction by appropriate erosion control practices including silt fences, interceptor swales, sediment traps. Prior to the removal of the erosion control practice all exposed areas would be vegetated or otherwise mechanically stabilized. These impacts are considered within the scope of the Corps participation.

1.5.4.3 Interior Water Feature

This feature is associated with the overall comprehensive plan but the fill would not be included in the Corps participation. As a result of this fill the channel depth within the Interior Water Feature would vary between 10 and 15 feet. The earthwork-related fill associated with the interior water feature of the Modified Central City Plan is necessary to maximize recreational and aesthetic uses of this water feature. Thus the 160,105 cubic yards of permanent fill is reviewed both comprehensively and clarified as impacts of the Corps participation based on the fill associated with the interior water feature and the isolation gates.

1.5.4.4 Aquatic Mitigation and Restoration Sites

Excavation and removal of deposits and sedimentation will be required for the improvement of aquatic habitat at the Rockwood Park, Ham Branch, Riverside Oxbow and Sycamore Creek sites. These areas with exception of Ham Branch, currently have limited connectivity to the main water course; however, care will be taken during the design process to define measures and construction sequence. Approximately 69,320 cubic yards of material and sediments will be removed from these areas. Locations which are dry or have intermittent water supply will be excavated in sequence so that activities within the OHWM are minimized. Temporary bulkheads and dams will be used to isolate excavated areas until major activities are complete.

1.5.4.5 Valley Storage Sites

The sites selected for valley storage are generally overbank areas which are out of the main channel and riverine. These sites will be excavated to provide the additional valley storage required for the 100 yr and SPF flood events. However some grading and earthwork will be required for site drainage on the channel bank near the waterline and within the OHWM. Approximately 44,645 cubic yards of material will be removed from this overbank area within the OHWM. Proper controls and management practices will be used i.e. silt fences, interceptor swales, sediment traps, etc. to prevent and control soil erosion, sedimentation, or discharge of materials to receivable waters while they are being re-vegetated.

1.6 Cut/Fill Outside the OHWM

The Modified Central City Project also includes a number of related construction activities which have the potential to impact receivable waters. These activities include excavation of Valley Storage Sites outside the OHWM but within the 100 year floodplain, raising University Drive out of the 100 year flood elevation, levee

tie-ins to the new channel, overbank excavation, pedestrian bridges, and disposal of excavated materials at upland locations, landfill sites outside of the OHWM, 100 year and SPF limits. These are summarized on **Table 2** and shown on **Figure 4**.

Table 2: Approximate Cut/Fill Quantities Outside the OHWM.

Description	Excavation - Cubic Yards	Disposal - Cubic Yards
Valley Storage Sites		
Rockwood West	120,900	0
Samuels Avenue Sites	858,460	0
Riverside Park	301,345	0
Ham Branch	3,300	19,300
Riverside Oxbow	2,206,825	0
Gateway Park	860,000	0
University Drive		
University Drive	0	130,000
Interior Water Feature		
Interior Water Feature and Pedestrian Bridges	398,145	685
Upland Disposal Sites		
Brennan Avenue Landfill	0	663,000
Abandoned Impound Lot	0	490,000
Abandoned Eastside Landfill	0	1,138,000
Abandoned Eastside WWTP	0	1,515,000
North Gateway	0	426,000
Other Upland	0	17,200
Tie-ins, Gates and Structures		
Upper Bypass Channel Tie-ins	125,000	0
Lower Bypass Channel Tie-ins	77,920	85,925
Clear Fork Isolation Gate	0	117,500
Trinity Point Isolation Gate	12,800	28,775
TRWD Isolation Gate & SWPS	30,985	331,400
Samuels Avenue Dam	78,115	26,780
Marine Creek Low Water Dam	31,685	3,600
Pedestrian & Beach Street Bridges	1,320	955

1.6.1 Valley Storage Mitigation Sites

Valley Storage Mitigation will be provided by excavation of areas adjacent to the river but outside of the OHWM. There are five (5) general locations where Valley Storage Hydraulic Mitigation will occur by excavation. These are described in the SEIS and summarized as follows:

Rockwood Park West is a 23 acre site, publicly owned (City of Fort Worth); within the existing Trinity River floodplain on the southwestern portion of the existing Rockwood Park Golf Course. The site is bounded by the Trinity River on the east and existing federal levee to the west. Currently the site contains several golf course holes which would be eliminated as part of the city's plan to scale down the course. Vegetative cover on the site is primarily grassland with minimal tree coverage. Tree coverage to north and south of the site are to be preserved. The proposed work includes grading the site to gently slope towards the river to a bank elevation approximately 2 ft. above the proposed normal pool. Excavated materials will be transported and disposed of off-site.

The Samuels Avenue sites cover approximately 40 acres of public property within the Trinity River floodplain and are located downstream of the Samuels Avenue Bridge. The sites lie along the north and south banks of the West Fork Trinity River. The sites are bounded by Brennen Avenue to the north, Northside Drive to the east and south, and the Union Pacific Railroad right-of-way to the west. Vegetative cover on the site is primarily grassland. Proposed work includes grading the sites to gently slope towards the river to a bank elevation

approximately 1 ft. above the static water elevation controlled by the 4th Street low water dam. Excavated materials from the sites will be disposed of in the adjacent City impound lot and Brennen Avenue landfills.

The Riverside Park site is a 20 acre, publicly owned (City of Fort Worth) property located on the east bank of the West Fork Trinity within the Trinity River floodplain. The site is located immediately north of E. Belknap street and is bounded by the Oakhurst Scenic Drive on the east. The north side of the site is defined by an area of large old growth trees which are to be preserved. Vegetative cover on the site is mainly mowed grass. Proposed work includes grading the site to elevations ranging approximately between 3 ft. and 9 ft. above the static water level of 501 NGVD. Excavated materials will be transported and disposed of off-site to the landfill sites.

The Riverside Oxbow Sites are located immediately north of Interstate 30 and bounded by Beach Street on the east and Riverside Drive on the west consisting of approximately 200 acres entirely within the existing floodplain. The site is primarily encompassed within the current river channel and the old West Fork River Oxbow; however portions of the site extend to the north for ecosystem restoration purposes. The Riverside Oxbow Valley Storage Site also includes some property on the south bank near Sycamore Creek. Much of the Oxbow area is in tall grass with a number of scattered mature trees, mostly pecan. The old River Oxbow Channel is lined by dense riparian vegetation consisting of mature trees. A secondary Oxbow from Sycamore Creek also runs through the interior of the site. The site will be excavated from the two year flood elevation to just over the five year. Proposed recreational features include soccer fields, basketball courts, splash park and picnic areas.

The Gateway Park sites are located east of the Riverside Oxbow. The approximately 225 acres are bounded by Beach Street on the west, East 1st Street on the north, Trinity River on the east and I-30 to the south. Northeast and eastern portions of the site are characterized by fairly dense and mature riparian woodlands while the central and southern portions of the site are predominantly park and athletic facilities. The northwest portion of the site is largely vacant land with some commercial development along Beach Street. Proposed work includes grading the sites to elevations ranging from 5-year to less than 2-year frequency event flood elevations to maximize Valley Storage benefits. Ecosystem restoration will include riparian woodlands, emergent wetlands, and buffer, and native grassland. Existing woodland vegetation near the Gateway Park drive, along the Trinity River, and northeastern portions of the site would be preserved and enhanced as part of the ecosystem restoration. Portions of the excavated material from this site will need to be disposed of off-site at the abandoned Eastside Landfill. The site also contains an abandoned wastewater treatment plant site which is proposed for disposal of the excavated materials to minimize transport.

In addition five contingency Valley Storage sites have been identified which could be used to supplement the primary Valley Storage sites if it is found that additional valley storage is required. These sites are discussed in Chapter 3 of the SEIS and are located outside of the OHWM. Therefore there would be no change in the fill/cut quantities within the OHWM if any of these contingency sites are required.

1.6.2 University Drive Hydraulic Mitigation Site

University Drive crosses the West Fork and is located upstream and to the west of the proposed bypass channel. The site is an existing roadway with several commercial businesses located to the east. The site is within the 100-yr and SPF floodplain. Minimal habitat exists in this area because of the urban environment. The site is approximately 10 acres of roadway right-of-way. University Drive Mitigation consists of raising the roadway with excavated material within the 100-yr floodplain and is a key component in mitigating the loss of floodplain or valley storage. Site work would include raising the existing roadway profile out of the 100 year floodplain.

Construction of the University Drive embankment would occur outside the OHWM but within the 100-yr and SPF floodplain. Disturbed sites including areas of fill would be protected with appropriate erosion control practices. Prior to the removal of the erosion control practice all exposed areas would be vegetated and

stabilized. This site is within the scope of the Corps participation.

1.6.3 Upland Disposal Sites

The disposal of excavated fill material would be primarily by cut and fill operations using bulk scrapers. Additional materials would be transported by haul truck from the point of excavation to the designated disposal site when scrapers are infeasible or uneconomical based on haul distances. Excavated material would be sorted and handled on site prior to placement in the designated disposal area. Excavated material would be placed in suitable lifts and compacted as required for structural and soil stability design criteria. Excavated materials from the Valley Storage and Ecosystem Restoration Sites will be taken to sites out of the Riverine Environment and out of the 100 year and SPF floodplain limits. The sites include the old Brennen Avenue Landfills, the City's Impoundment Lot, property on the North Gateway site, the old abandoned wastewater treatment facility, and the closed Eastside Landfill. Separate erosion and run-off control plans will be prepared for the various construction contracts specific to each disposal site. The plans will include requirements for buffer zones, sedimentation basins, silt fences and interceptor trenches.

1.6.4 Bypass Channel Tie-Ins, Isolation Gates, and Dams

The tie-in of the new Bypass Channel to the existing Clear Fork and West Fork consisting of levees and high retaining walls, and construction of the isolation gates will occur outside of the OHWM. This excavation and fill operations associated with the construction of the Bypass Channel tie-ins, and isolation gates will include placing suitable fill for new levees and retaining wall outside the OHWM, and to connect the levee and hard edge sections of the new Bypass Channel to the main channel. Excavated material will be used to construct the new levees and as back fill behind the new retaining walls and isolation gate structures. Similarly construction of the Samuels Avenue and Marine Creek Dams will require excavation for the construction of training walls and fills outside of the OHWM. Excess excavated material from these sites, not required for backfill, will be hauled for disposal at one of the designated disposal sites. All disturbed sites would be protected during construction by appropriate erosion control measures i.e. silt fences, interceptor swales, and sediment traps

2.0 Factual Determinations

The factual determinations are applicable to both the overall comprehensive plan and the Corps participation unless noted otherwise.

2.1 Physical Substrate Determinations

2.1.1 Substrate Elevation and Slope

The new Bypass Channel would connect to the existing Clear Fork and West Fork of the Trinity River at the same elevation as existing channel. This area is within the scope of the Corps participation.

2.1.2 Sediment Type

No previous sediment transport studies in the Trinity watershed reaches potentially affected by the Modified Central City Project were found which includes the Corps portion of the Modified Central City Project. The sediments in the project area are anticipated to be similar to that found in the geotechnical investigation performed for the project and other portions of the Trinity floodplain which have been described as alluvium floodplain deposits including indistinct low terrace deposits, gravel, sand, silt, silty clay and organic matter.

2.1.3 Fill Material Movement

Excavated material would be used for subsequent fill operations on the project. Fill material as placed during the Modified Central City Project including the Corps portion of the project would be permanently stabilized to minimize the potential for movement or erosion of these areas. Permanent soil stabilization practice would include slope vegetation with native plantings and in potential high energy area concrete or other armor would

be used to protect the areas and minimize adverse impacts to aquatic and terrestrial habitat.

2.1.4 Physical Effects on Benthos

Temporary effects to benthos would occur during the construction process. Temporary fill in the form of coffer dams or sheet piling would have direct impact on the area of fill and would have additional temporary effect on the areas that would be dewatered prior to construction of the three isolation gates, Samuels Avenue Dam, Marine Creek Dam and the Interior Water Feature. The Interior Water Feature would be enlarged by removal of soil from the uplands adjacent to the Clear Fork and West Fork confluence area. Approximately 35 acres of river channel bottom would be filled with some of the material removed from the adjacent uplands. After completion of the Interior Water Feature, coffer dams would be removed and the area re-flooded. Benthic organisms are known to rapidly recolonize disturbed areas within streams and impoundments. Combined with the bypass channel, about 112 acres of new lentic habitat would be developed including substrate for development of benthic habitat.

As most of the aquatic habitat within the study area is greatly influenced by in-channel dams, primary long-term effects on the stream habitat occurred following placement of the dams. The increased depth of flooding over portions of the study area would not result in significant effect on benthos as productive zones would be re-established along the slope of the channels and within the raised bed of the Interior Water Feature.

Due to the inundation of approximately 2,700 feet of Marine Creek there would be a shift from benthic organism's characteristic of flowing water habitat to those adapted to more lake-like conditions. Fisheries sampling within Marine Creek indicate that important fisheries that rely on benthic organisms associated with shallow riffle/pool sequencing are present.

Both the temporary negative impacts and the potential long term positive impacts are within the scope of the Corps participation of the project.

2.1.5 Other Effects

None.

2.1.6 Actions Taken to Minimize Impacts

Efforts will be made to avoid or preserve valuable aquatic and terrestrial habitat concurrent with achieving the project, flood damage reduction, ecosystem improvement and recreational goals Adverse impacts during construction would be minimized through the implementation of erosion control and storm water pollution prevention measures such as silt fences, temporary and permanent soil stabilization practices, and turbidity barriers. To compensate for unavoidable adverse impacts, an aquatic mitigation plan that incorporates additional aquatic habitat mitigation has been developed in Ham Branch, a tributary to the West Fork Trinity River that crosses the floodplain on the right bank downstream of the existing Trinity Railway Express crossing, and in Sycamore Creek at the Riverside Oxbow site.

2.2 Water Circulation, Fluctuations, and Salinity Determinations

2.2.1 Water Chemistry

The State of Texas biennial inventory indicates historical compliance with standards for all water quality parameters in the stream segments affected by the project. The proposed project which includes the Corps participation is not expected to change this.

The impact of the proposed project on dissolved oxygen (DO), nutrients, biochemical oxygen demand (BOD), and phytoplankton (as measured by chlorophyll a) as functions of stream hydrology and hydraulics, upstream

loadings, in stream kinetics, and environmental conditions (temperature, light levels, and wind speed) was assessed. The United States Environmental Protection Agency (USEPA) Water Quality Analysis Simulation Program (WASP) version 6.0.0.12 (USEPA 2004) was used to perform the majority of the analyses. The result of this modeling indicates no adverse impact to dissolved oxygen below stream standards. Full discussion of the modeling results is included in the SEIS.

2.2.1.1 Salinity

Not applicable.

2.2.1.2 Clarity

There would be a temporary increase in turbidity when the bypass channel and dam structure is opened to the flow of the river; however this should be limited to the initial stabilization period. Coffer dams would be used during construction to minimize erosion around work zones open to flow from the river. Clarity temporary impacts are within the scope of the Corps participation.

2.2.1.3 Color

During all but extreme low flow events there is no concern related to changes in color of water as compared to the existing conditions. During extreme low flow events occurring during warm seasons, the potential for concentrations of algae to increase is possible within the enlarged impounded area. This could increase the potential for the water to be greener that would occur without the project during those conditions. The potential for an increase in algae concentrations is within the scope of the Corps participation.

2.2.1.4 Odor

A slight chance for odor could result if under stratified conditions a release is being made from the bottom layers of the water at Samuels Avenue. Any additional odor problems would be of short duration and are not expected to be a significant problem since similar conditions currently exist at existing low water dams. The potential for temporary odor changes are within the scope of the Corps participation.

2.2.1.5 Taste

No water supply withdrawals exist within the area of influence of this project therefore no taste issues are anticipated.

2.2.1.6 Dissolved Gas Levels

Table 3 contains the associated water quality standards for DO to achieve the high aquatic life designated use associated with the stream segments affected by this project. Modeling results show that DO concentrations within the waterway proposed under the project would be maintained above the State of Texas standard of 5 mg/L and vary little from current conditions. These modeling results show the Corps participation would not cause any significant changes of Dissolved Oxygen concentration levels.

Table 3: Dissolved Oxygen Criteria for Waterways in the Central City Area.

Mean (mg/l)	Minimum (mg/l)	Spring Mean (mg/l)	Spring Minimum (mg/l)
5.0	3.0	5.5	4.5

2.2.1.7 Nutrients and Eutrophication

For the majority of the year, the Clear and West Forks of the Trinity River through downtown Fort Worth are essentially lakes. Low water dams/grade control structures throughout these reaches impound water into

quiescent linear lakes. Measured chlorophyll a concentrations (up to 50 – 90 µg/l) are indicative of possible eutrophication (Chapra 1998) in this system. However, these values are associated with warm, extended low-flow conditions and storm flows quickly "flush" the system. No additional sources of nutrients would be added to the system from this project; therefore, no additional eutrophication is anticipated from proposed changes to the system. These potential impacts are within the scope of the Corps participation because the dam creates the lake impoundments even though the impoundment is not a direct element of the Corps participation.

2.2.2 Current Patterns and Circulation

2.2.2.1 Hydrologic Regime

The West Fork of the Trinity River in downtown Fort Worth is formed by the confluence of the West Fork and the Clear Fork. The West Fork above the Clear Fork confluence drains 2085 square miles while the Clear Fork drains 521 square miles. Major impoundments, including Lake Worth, Eagle Mountain Lake and Lake Bridgeport on the West Fork and Benbrook Lake on the Clear Fork have a profound effect on the flow regime in the downtown area. Within the study area, the lower end of the reach is impounded to elevation 500 feet by the Fourth Street Dam, the next upstream reach is inundated at elevation 505 by TRWD Dam, and Nutt Dam inundates reaches of the Clear Fork and West Fork to elevation 520.

United States Geological Survey (USGS) gauge records are available for the Clear Fork just above the existing confluence and for the West Fork just downstream of the confluence. Only flows recorded since October 1956 were used; thus the effects of Lake Worth and Benbrook Lake are included in the analysis. The mean flow in the West Fork during this period was 423 cubic feet per second (cfs), with an average of 148 cfs contributed by the Clear Fork. The median flows of the West Fork and Clear Fork were 34 cfs and 19 cfs, respectively. These flows are subject to substantial seasonal and year-to-year variability. Mean annual flows on the West Fork have been as low as 25 cfs (recorded in 1978) and as high as 1828 cfs (recorded in 1990). Drought years in the mid-1950s produced even lower flows. The average West Fork flow follows a seasonal pattern that peaks in May and falls to an annual minimum in August. The median mean August flow is 39 cfs and the median minimum daily flow of the year is 3.9 cfs.

The West Fork flow regime would be altered during extreme storm events by the proposed University Drive Hydraulic Mitigation improvement. Under proposed conditions there is no anticipated alteration of the current Clear Fork flow regime above the Clear Fork Gate. Minor flow changes below Clear Fork Gate would occur during normal flows, however, in the event of a major storm event, the Clear Fork Gate closure would reroute flows to the bypass channel. Major changes between 7th Street and Samuels Avenue would occur due to construction of the Bypass Channel and interior water feature. During low flows, water levels would be maintained at approximately 524.3 feet, which would create a pool from Samuels Avenue Dam, upstream on the West Fork above the confluence for a distance of 32,000 ft (6.1 miles) and along the Clear Fork above the confluence for 4,650 ft (0.88 miles).

2.2.2.2 Current Pattern and Flow

The flow supply to the Modified Central City Project area would continue in much the same quantity as under current conditions. After construction of the bypass channel, circulation in the existing system would be altered. However, this is not expected to have a significant effect on water quality. This alteration is within the scope of the Corps participation.

2.2.2.3 Velocity

Under existing conditions, velocity varies from approximately 4.8 feet per second in the vicinity of Fourth Street dam on the West Fork just downstream of the Highway 121 Bridge to 11.7 feet per second at the North Main Street Bridge crossing for the 100 year storm event. As a result of implementation of the project, velocity increases in the 100 year event are generally less than 1.0 feet per second with the exception of the entrance to

the proposed bypass channel and at University Drive Hydraulic Mitigation site where appropriate armoring would be included in facilities design. The velocity changes at the entrance of the proposed bypass channel and at University Drive Hydraulic Mitigation site are within the scope of the Corps participation.

2.2.2.4 Stratification

It is expected that the waterway as proposed would stratify thermally. Stratification has been observed at times in the existing waterway and historical data from these impoundments demonstrate compliance with the DO standard in the epilimnion (as required by the State of Texas). Evaluation of the project conditions indicate that stratification would occur, but to no greater degree that has historically occurred, indicating that the proposed project would meet water quality standards for DO (see Water Quality Impact Assessment in SEIS). The Corps participation would not have any significant negative impacts to the stratification.

2.2.3 Normal Water Level Fluctuations

Minimal fluctuation in water levels is expected under normal flows because the Samuels Avenue Dam would be used to control water levels. However, during extreme storm conditions, water level variations can be expected. Water surface elevations under such conditions are summarized in **Table 4**. Storm event water levels under proposed conditions are generally less than existing conditions. These water level fluctuations during extreme storm conditions would be less than existing conditions due to the Corps participation of this project.

Table 4: Water Surface Elevations at Specified Stations Along the Trinity River.

		Existing Conditions - Water Surface Elevation				
Station	**Approx. Location**	**Median flow**	**Annual average flow**	**2-yr**	**10-yr**	**100-yr**
222998	West Fork at Riverside Dr.	488.4	488.8	506.3	515.0	520.0
237615	West Fork at N. I-35W	500.7	501.3	507.4	516.4	522.9
243471	West Fork at Marine Creek Confluence	500.7	501.3	509.0	517.7	525.1
262599	West Fork at University Dr.	520.1	520.2	528.4	533.1	541.4
		Proposed Conditions - Water Surface Elevation				
Station	**Approx. Location**	**Median flow**	**Annual average flow**	**2-yr**	**10-yr**	**100-yr**
222998	West Fork at Riverside Dr.	488.4	488.8	505.9	514.0	519.6
237615	West Fork at N. I-35W	500.7	501.3	507.1	515.5	522.5
243471	West Fork at Marine Creek Confluence	524.3	524.3	511.6	517.2	525.1
262599	West Fork at University Dr.	524.3	524.4	525.6	530.7	540.2

2.2.4 Salinity Gradients

Not applicable.

2.2.5 Actions to be Taken to Minimize the Impacts

The impact on water quality for the proposed project configuration was analyzed as a part of the preliminary design of the project. The analysis demonstrates that the project would have no significant impact on water quality. Results of this analysis are discussed in detail in the SEIS. The assessment did recognize that because flows during dry periods are slight (approximately 5 cubic feet per second), it may be beneficial to implement practices to manage circulation and water quality and aesthetics in the system. Several options to accomplish

this have been considered and would be further evaluated during final design. These options could be necessary for both the overall comprehensive plan and the Corps participation. Criteria for consideration of these and possible new options would include cost effectiveness and sustainability:

Augmenting flow with other sources. The supply augmentation options discussed in Section 3.0 of the FEIS would provide the benefits of increasing circulation within the system.

Inducing large scale circulation mechanically. Several mechanical means could be used to induce circulation throughout the waterway. Subsurface pumps could be employed to force large volumes of water to move within the channel associated with the system. The proposed storm water pump station for the interior waterway could be configured to accomplish this in addition to its primary function of conveying larger storm flows.

Inducing localized circulation mechanically. Surface aerators (commonly seen as fountains) could induce circulation in localized areas if needed. Pumps could be used to pull water from the waterway and allow it to return to the waterway over cascades or other aesthetic features on a localized basis. This option is outside the scope of the Corps participation.

Provide additional hydraulic structures to direct flow as needed. Hydraulic structures could be configured within the waterway such that low flows are distributed as desired to have complete circulation within the system. These structures, likely subsurface and analogous to grade control structures, would have no effect on the performance of the system in regards to larger flood flows.

2.3 Suspended Particulate/ Turbidity Determinations

2.3.1 Expected Changes at Discharge Sites

There could be temporary increases in suspended particulate and turbidity levels during storm events prior to permanent stabilization. These increases, however, would be of a short duration and tolerable to aquatic organisms downstream. Construction design and phasing have been planned to minimize turbulence and generation of suspended particulates through the use of temporary erosion control measures and soil management plan defining silt fences, interceptor swales, and sediment traps requirements . The temporary increases in suspended particulate and turbidity levels during storm events prior to stabilization are within the scope of the Corps participation at the discharge sites.

2.3.2 Effects on Chemical and Physical Properties of the Water Column

2.3.2.1 Light Penetration

The proposed project would not change the depth to which light penetrates within the water column.

2.3.2.2 Dissolved Oxygen

Water quality models demonstrate that dissolved oxygen concentrations would be changed very little by the proposed project and would remain above the State of Texas standard of 5 mg/L (see Water Quality Impact Assessment in SEIS for more detailed discussion). These changes discussed are impacts that are within the scope of the Corps participation.

2.3.2.3 Toxic Metals and Organics

The Modified Central City Project is contained within two State of Texas River Segments of the Trinity River, Segment 0806 West Fork below Lake Worth and Segment 0829 Clear Fork below Benbrook Lake. The lower one mile of segment 0829 from 7th Street to the confluence with the West Fork and the lower 22 miles of Segment 0806 from the confluence of the Clear Fork have been listed by the State of Texas as not meeting water

quality standards because of high levels of chlordane in fish tissue. This designation lead to the development and implementation of a Total Maximum Daily Load (TMDL) process specific for that waterway and legacy pollutant and is addressed through the TMDL for Legacy Pollutants in Streams and Reservoirs in Fort Worth (TNRCC 2001).

The Texas Commission on Environmental Quality (TCEQ) has prepared an implementation plan; Implementation Plan for Fort Worth Legacy Pollutant TMDLs (TNRCC July 2001) for this TMDL and will continue to monitor chlordane in fish tissue in the Fort Worth area. The TMDL monitoring data showed that chlordane is declining in the environment because improved environmental practices. Recent sampling by the United States Fish and Wildlife Services (USFWS) found that chlordane concentrations in fish tissue have decreased slightly within the project area (USFWS 2004) and does not appear on the 303(d) list. Existing evaluations indicate there is no known reason why the proposed project would increase the likelihood of chlordane in the waterway. In addition, portions of Segment 0806 (lower 22 miles) and Segment 0829 lower mile are listed on the Draft 2006 Texas 303(d) List (June 27, 2007) as Category 5 *does not meet applicable standards for PCB's*. This designation requires the development and implementation of a TMDL. The category is further classified as 5a – *a TMDL is underway, scheduled or will be scheduled.* The target date for the TMDL is 2010.

The project is being structured such that all construction will comply with the TMDL plan set forth by TCEQ which requires appropriate management practices to limit sediment discharge. As a precursor to construction, additional analytical sampling will be done within areas impacted by excavation or fill. The additional analytical sampling that will be done will be in areas that are within the Corps participation. Regional storm water monitoring and an assessment of other permitted discharges in the region indicate that no other toxic metals or organics are expected in the waterway currently or as a result of the proposed project.

2.3.2.4 Pathogens

The lower 22 miles of Segment 0806 West Fork Trinity River below Lake Worth is included on the Draft 2006 Texas 303 (d) list (June 27, 2007) as not meeting applicable standards for bacteria. It is listed as category 5 a, *TMDL is underway, scheduled, or will be scheduled.* The target date for the TMDL on the West Fork Segment is 2009.

In addition, two unclassified water bodies 0806D Marine Creek, a two mile stretch upstream of the confluence with the West Fork and 0806E Sycamore Creek, five mile stretch upstream from the confluence with the West Fork. These are listed as category 5c – *additional data and information to be collected.*

There currently are no municipal wastewater treatment facilities discharging upstream of the immediate project area. As such, bacteria currently contributed to these reaches of the Trinity River come from urban and rural runoff. The changes resulting from the proposed project would not result in any increase in bacteria within the affected waterways. It is anticipated that, over the long-term, the project may even reduce bacterial loads through improved urban runoff management practices and upgraded wastewater collection systems within the project area. TRWD currently monitors waterways associated with the proposed project for bacteria and posts signs in public areas prohibiting contact recreation when bacterial counts exceed State criteria.

2.3.2.5 Aesthetics

As discussed in 2.2.5, several options would be considered in final design to maintain aesthetics including:

- Augmenting flow with other sources;
- Inducing large scale circulation mechanically;

- Inducing localized circulation mechanically; and

- Provide additional hydraulic structures to direct flow as needed.

An adverse impact to water aesthetics in urban areas is floatable material. Typically litter that has washed into drainage ways with storm water runoff, floatable material can aggregate on waterway banks and collect on structures creating unsightly clutters of trash. While the project per se would not cause additional sources of floatables, the increased public use of the area is anticipated to result in the need to further reduce the undesirable effect of floatables within the area. In conjunction with the additional hydraulic assessments associated with final design of the project, studies would investigate how floatable material would interact within the system and provide design strategies to minimize adverse interactions including review of the Corps participation. The local sponsor, TRWD, is already experimenting with strategies to identify sources of floatables to the Trinity basin and how existing movement of these materials can be reduced by capturing and removal through use of netting, booms, etc.

Aesthetics of the water course depend on water appearance, odor, and taste (if a drinking source). The water color and clarity in the general vicinity of the project area is similar to other portions of the Trinity River. It should be noted that the TCEQ report "Draft 2006 Texas Water Quality Inventory" (TCEQ, 2006) documented that algal growth was of "no concern" in a relatively large portion (about 9 of 14 miles) of the Clear Fork below Benbrook Lake (TCEQ Stream Segment 0829) based on chlorophyll *a* water sample test data and that remaining portion of this stream segment was not assessed for algal growth. In the same report, water in the West Fork in an 11-mile reach below Lake Worth was not assessed for algal, but water below this reach (lower 22 miles of TCEQ Stream Segment 0806) was identified as an algal growth "concern" based on chlorophyll - a screening assessment. Based on this information, the existing water in the vicinity of the project area will have probable episodes of algal growth in late spring-summer months. On such occasions, water color may take on a green cast, but significant floating algal mats are not known to occur. Water in the project vicinity is currently not used as a public water supply source and the taste quality of existing area waters is not known. If used as a public water source, it anticipated that the taste quality after water treatment would be similar to treated water from Benbrook Lake and Lake Worth. On the whole, the aesthetic appeal is considered good and similar to the shallow lake fringes of Benbrook Lake and Lake Worth.

Construction activities for the comprehensive Modified Central City Project, including the Corps participation component, will temporarily affect stream turbidity which will hence have temporary adverse effect on stream aesthetics. However, storm water controls, erosion controls, silt fences or hay bales, and onsite best management practices such as siltation pounds, dust control and stabilized construction entrances will be incorporated into the project construction activities such that effects will be minimal and temporary. Algal growth would be a potential aesthetic concern if stream stagnation occurs as result of increased evaporation and low downstream releases. However, the Modified Central City Project is flexible by design and would allow flows through the system to simulate a similar flow-through condition as the existing stream. Further, the maintenance of a good aesthetic appeal of the water course is a primary proponent objective. In addition, other water quality features have been suggested by the proponent to further improve water quality aesthetics beyond the existing conditions.

2.3.2.6 Others as Appropriate

None.

2.3.3 Effects on Biota

There are no anticipated measurable effects to important biota related to water quality changes attributable to the project.

2.3.4 Actions taken to Minimize Impacts

Additional water quality data collection and refinement of water quality and hydraulic modeling tools will be undertaken during the course of project design and implementation in order to guide activities in a manner that minimize impacts to water quality. This includes all features of the Modified Central City Project, including the Corps participation, because they are interdependent and therefore cannot be separated for purposes of water quality and hydraulic modeling. The Project Management Plan for the Modified Central City Project will include review of the design and plans and specifications by appropriate personnel to insure they include actions necessary to minimize impacts to water quality.

2.4 Contamination Determinations

Prior to excavation activities and particularly for the bypass channel or interior water features, Phase II Environmental Site Assessments (ESAs) will be conducted in areas with known or potential soil contamination. The results from the Phase II ESA(s), and any following contaminant delineations that may be required, would be used to determine the proper handling procedures during excavation of the impacted areas. A soil management plan will be developed for areas with soil contamination. The plan would include a description of the nature and extent of the contamination, including figures, with delineation of contamination, volume of expected contaminated material, and soil handling methodologies (screening, segregation, treatment/discharge methods, etc.). The majority of the excavation activities are within the scope of the Corps participation and ESA's will be conducted accordingly.

If contaminated soils that exceed regulatory standards are found during construction, they would be handled and disposed of in accordance with all State and federal regulations that could include (but are not limited to):

- Placement in a Subtitle D landfill;
- Placement in a Subtitle D landfill after on-site treatment; or
- Placement in a Subtitle C hazardous waste landfill/discharge facility.

The appropriate discharge method would be determined by the chemical characteristics of the soil, effectiveness of the method for protecting the environment, regulatory requirements and cost.

Soil handling and discharge would be conducted in accordance with the applicable local, state, and federal laws, regulations, and rules. Coordination with the appropriate regulatory agencies would help guide the soils excavation, remediation, reuse, and discharge efforts during the establishment of the Trinity River bypass channel. These procedures and considerations are incorporated into the plans for executing the Corps participation.

2.5 Aquatic Ecosystem and Organism Determinations

Temporary effects to West Fork and Clear Fork aquatic ecosystem would occur as a result of construction sequencing of the proposed project. Coffer dams and temporary diversions would contribute to short term effects.

Long term effects would be attributable to the permanent structures and the operation of the project. Because the West and Clear Forks through downtown Fort Worth are currently impounded by low water dams, the extension of that impoundment by the construction of Samuels Avenue Dam would not have any substantial effect on biota within the river itself. However, exceptional and high quality aquatic habitat within Marine Creek would be adversely impacted as a result of inundation effects of the Marine Creek Low Water Dam. The effects of significance would be from the loss of riffle pool complexes. Other adverse impacts to wetlands and riparian forest habitat would occur from construction of the project. As identified in the Modified Central City

alternative SEIS, the project would impact only 0.8 acres of wetlands but would only impact 0.14 average annual habitat units (AAHUs) . In addition the comprehensive activities associated with the modified alternative would impact about 12.4 acres of riparian forest having 8.12 AAHUs. These impacts would result in negative responses by fish and wildlife resources of the study area if left unmitigated. These impacts would be caused by the Corps participation specifically the results of the Samuels Avenue Dam operations.

Wetlands and riparian habitat losses would be compensated by the development of ecosystem improvement measures associated with the Riverside Oxbow habitat development, West Fork Rockwood and West Fork South (Ham Branch drainage area) sites. Riparian forest development and management would provide a net gain of 109.8 AAHUs of riparian forest over the 8.12 AAHUs lost as a result of the project. Approximately 58 acres of wetlands would be provided at the Riverside Oxbow sites that would result in the ultimate provision of a net gain of 47.78 AAHUs of wetland values. Monitoring of the ecosystem improvements would be conducted throughout establishment of wetland and woodlands. Adaptive management would be incorporated as necessary to assure success of the environmental mitigation. The wetland and riparian forest development needed to compensate for modified city alternative impacts are within the scope of the Corps participation.

The USFWS has provided Planning Aid Letters, information that was utilized during the planning of this project, and has coordinated with the Corps and local sponsors, and has approved a plan to partially mitigate the impacts caused by inundating exceptional and high quality Marine Creek lentic aquatic habitat through the proposed aquatic improvements at Ham Branch. In addition Sycamore Creek aquatic benefits of the modified plan are being evaluated by resource agencies during review of this document and the Draft SEIS.

Aquatic mitigation at Ham Branch and Sycamore Creeks was found to be necessary to fully compensate aquatic impacts and would be completed following studies to determine a stream configuration that is geomorphically stable based upon hydrology, sediment characteristics and slope. Typical cross-section and plan view of proposed mitigation features are presented in Appendix E to the SEIS. The aquatic mitigation at Ham Branch and Sycamore Creek is within the scope of the Corps participation.

At Ham Branch, development of a riparian forested buffer of 50 foot in width on either side would produce both riparian forest and stream aquatic benefits. Contouring of the channel bank as necessary to provide appropriate interaction between the riparian vegetation and the aquatic environment would be done prior to reforestation. The Riparian plantings would include dense development of shrubs and overhanging grasses near the creek channel. Approximately 305 feet of the existing channel would be relocated to provide adequate width for riparian forest development adjacent to an existing fenced soccer field. Riparian forest would be planted on 7.4 acres and the existing 1.4 acres of riparian forest would be improved to provide a total 8.8 acres along the creek. Pending further investigation, approximately 25 percent of the total length (3,568 feet) of the stream segment would be modified to provide approximately 900 linear feet of rock based riffles at locations to be determined by those additional studies. This riparian reforestation and re-contouring mitigation is within the scope of the Corps participation.

Aquatic habitat benefits on Ham Branch would accrue on 3,568 linear feet of stream channel and should provide up to 0.80 AAHU over the without project conditions. The benefits to mitigating within Ham Branch would extend beyond the creek. It is anticipated that significant benefits to the water quality and fisheries within the West Fork immediately adjacent to the confluence should occur; however, current methods to quantify those benefits are unavailable. In addition, the construction of the riparian corridor adjacent to Ham Branch would provide additional significant forest resources in the lower end of the study area, supporting resource agencies recommendations to provide resources of this type at additional locations within the study area.

Proposed stream habitat improvement within the Riverside Oxbow includes restoring the severed Sycamore Creek Oxbow. The available slope from the proposed connection to the Trinity River, through the Sycamore Creek Oxbow channel and the West Fork Oxbow to its confluence with the main stem of the West Fork below

Beach Street Dam is only approximately 6 feet, of which only approximately 1 foot of fall would be through Sycamore Creek and the remaining would be in the Riverside Oxbow. A series of rock weirs would be utilized in the oxbow and smaller rock structures would be developed in Sycamore Creek to provide the basis for developing pools, riffles, and runs through the entire system. See Figure 12 of the SEIS for the approximate locations of the rock weirs.

Sycamore Creek channel reconstruction would average 10 feet in width at riffle control structures and would have average depth of about 1-2 feet over its approximate 3200 foot restored length. Average velocity through the riffle complexes would be about 1 foot per second at the mean low flow of 10 cfs, which would be beneficial to anticipated darter utilization of the riffles and provide sufficient oxygenation within pools to support a wide variety of high value fisheries.

Stream bank riparian grasses along with preserved specimen burr oak and pecan trees existing along the alignment of the restored Sycamore Creek would provide shading, cover and supplemental food components to the aquatic system. Based upon this concept, which mimics high quality streams within the Central City study area such as lower segments of Marine and Lebow Creek it is anticipated that the Sycamore Creek Channel as restored would ultimately provide at minimal 0.75 acres of high value aquatic habitat. An Index of Biotic Integrity (IBI) score of 47 was estimated to be appropriate for Sycamore Creek as proposed to be restored. Following the methodology that was utilized in the original Central City EIS, an IBI score would translate into an estimated future with project habitat suitability of 0.85. Since the stream based aquatic habitat would provide fisheries benefits to the entire 3200 feet of restored Sycamore Creek there would be a minimum of 0.64 habitat units established. As flow would be maintained during all times of each year, the seasonally adjusted habitat units and average annual habitat units attributable to stream restoration in Sycamore Creek would also be 0.64.

Stream impacts would be fully mitigated by implementation of the aquatic mitigation plan at the Ham Branch site referenced in the original Central City EIS, and by implementation of restoration of flows through Sycamore cutoff with developed in-channel riffles and pools as a component of the Modified alternative. Table E-3 of the SEIS displays the analysis of stream based aquatic impacts, mitigation improvement analysis. With Sycamore Creek using a conservative estimate of 0.75 acres of stream habitat, the net AAHU after implementation of improvements would result in a net gain of 0.22 AAHUs. This difference is considered to be within the margin of error for this analysis and therefore it can be presumed that the stream aquatic impacts are fully compensated by the implementation of Hams Branch and Sycamore Creek channel improvements. Additional benefits from returning base flows and structural habitat modifications of aquatic habitat of the Riverside Oxbow would be restoration benefits in excess of those determined for the original Riverside Oxbow study. The modified alternative would provide stream aquatic habitat benefits of 4.8 AAHUs while the no action alternative provided no documented net stream aquatic habitat benefits.

2.6 Proposed Discharge Site Determinations

Placement of material into waters of the United States would be occur in areas where temporary construction such as coffer dams would allow for care of water and within the footprint of Samuels Avenue Dam, the three isolation gates, and within 35 acres of channel bottom within the identified Internal Water Feature and stabilization of the bypass channel sides and bottom. Most of the identified discharge sites are outside of the ordinary high water mark of the Trinity River system or would be conducted in the “dry”. Alternative locations were evaluated for location of the main structural components as discussed in the body of the EIS. These discharge sites are within the scope of the Corps participation.

2.7 Determination of Cumulative Effects on the Aquatic Ecosystem

Cumulative impacts resulting from the incremental consequences of the comprehensive proposed project when added to other past and reasonably foreseeable future actions were considered in the FEIS. The cumulative effects of the action were viewed in the context of direct and secondary impacts of the comprehensive project

when incrementally added to all known reasonably foreseeable actions within the geographic area. Significant direct impacts to wetlands, riparian woodlands and the stream habitat of Marine Creek were identified during project evaluation. Plans to mitigate those resources have been developed and a cumulative effects analysis was thoroughly discussed in Chapter 4 of the SEIS. Complete plan development would provide for cumulative beneficial impacts to wetlands, riparian woodlands and pending completion of the compensatory plan to mitigate stream aquatic habitat losses, no cumulative effects to the aquatic ecosystem. All proposed mitigation is within the scope of the Corps participation which is a portion of the Modified Central City Project.

2.8 Determination of Secondary Effects on the Aquatic Ecosystem

Secondary impacts are those that are caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. These impacts are induced directly or indirectly by the proposed project. Secondary effects considered in the FEIS included changes in land use; economic vitality; neighborhood character; traffic congestion, with its associated effects on air quality and noise; water quality and aquatic resources and other natural resources. The secondary impacts that are projected to occur were identified and evaluated as part of the comprehensive project and referred to as the "Trinity Uptown Features" within the FEIS. No significant adverse effects to the aquatic ecosystem were found to be attributable to the Trinity Uptown Features which includes all portions of the Corps participation.

3.0 Findings of Compliance for Fort Worth Modified Central City

- No significant adaptations of the guidelines were made relative to this evaluation.

- The No Action and other alternatives analyzed in the Central City FEIS and Riverside Oxbow EA were determined to be not practicable because they do not fully meet the goals and objectives of the Trinity River Vision Master Plan which is the document referenced in the authorization. A number of alternative locations, configurations, and sizes of specific features of the Modified Central City Project were considered taking into account cost, existing technology, and logistics in light of the overall project purposes. The recommended location, configuration, and size of these features are considered the least environmentally damaging practicable alternative.

- Based on discussions with the representatives from the Texas Commission on Environmental Quality (TCEQ), the proposed disposal of materials at locations identified would not violate any applicable State water quality standards. The Corps will continue coordination with TCEQ and no construction affecting waters of the United States will commence until the 401 State Certification has been issued. This certification will be made part of the official record.

- Use of the selected disposal sites will not affect any federally listed threatened or endangered species or their critical habitat.

- The comprehensive Modified Central City Project which includes the Corps participation would not violate terms and conditions of the CDC or Trinity Regional EIS ROD for preventing cumulative impacts to hydrologic resources.

- The proposed disposal will not result in significant adverse effects on human health and welfare, recreational fishing, plankton, fish, shellfish, wildlife or special aquatic sites provided the recommended environmental mitigation and ecosystem improvements are incorporated into the project. If the Corps participation in mitigation were not completed, the proposed discharge could potentially have adverse impacts to human health and welfare, recreational fishing, plankton, fish, shellfish, wildlife and special aquatic sites.

- Appropriate steps to minimize adverse impacts include use of best management practices during construction, working in the stream channel under "dry" conditions to the extent possible and opening the bypass channel during a period of flows that would minimize turbidity development. These steps will be incorporated into all activities of the Corps participation.

- On the basis of the guidelines, the proposed disposal sites for the discharge of dredge material, as specified, comply with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects to the aquatic ecosystem.

In an effort not to piecemeal the impacts of these activities this analysis reviewed the overall comprehensive impacts to ensure cumulative impacts are consider as required by 33 CFR part 1508.25. If the analysis did separate the Corps project from the remaining portions of the Modified Central City Project in general the impact from the fill material would decrease in amount and size of the footprint. This would equate to an overall decrease in adverse impacts but would also not fulfill the overall project purpose and objectives. Additionally many benefits of the public interest factor would not be weighed and balanced as appropriate with connected actions.

4.0 References

Upper Trinity River Central City Final Environmental Impact Statement: USACE January 2006.

Riverside Oxbow, Upper Trinity River Interim Feasibility Report and Integrated Environmental Assessment : USACE Revised April 2005 with Addendum.

CDM [April 2006]: Draft Environmental Impact Statement, Appendix B: Initial Geotechnical Investigation for the Preliminary Design of the Fort Worth Central City Project.

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Fisher, W. L., Director, 1972, "Geologic Atlas of Texas, Dallas Sheet" Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas. 1972.

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TCEQ Draft 2006 Texas 303(d) list (June 27, 2007).

Fort Worth Central City Preliminary Design- Appendix C; Civil/Structural Preliminary Design; Submitted to the USACE, Ft. Worth District; Tarrant Regional Water District; Fort Worth, Texas; January 2005.

Geology of Tarrant County [circa 1919], UT Austin Bulletin No. 1931.

Sellards, et al [1932]. The Geology of Texas., Bureau of Economic Geology, University of Texas Bulletin No. 3232.

USACE [June 1987]. "Special Project Report, Tony's Creek and Marine Creek, Tarrant County, TX".

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S

LEGEND

- BYPASS CHANNEL AND ISOLATION GATES
- ROAD IMPROVEMENTS
- WATER FEATURE
- PEDESTRIAN BRIDGES
- VALLEY STORAGE SITES
- DISPOSAL SITES
- ECOSYSTEM IMPROVEMENT
- AQUATIC HABITAT MITIGATION AREA
- TRINITY UPTOWN AREA

MARINE CREEK LOW WATER DAM
MARINE CREEK
PEDESTRIAN BRIDGE
SAMUELS AVENUE DAM
SAMUELS SITES
SAMUELS AVE
INTERSTATE 35
JACKSBORO HWY
ROCKWOOD PARK - WEST SITE
ROCKWOOD PARK ECOSYSTEM IMPROVEMENT
WEST FORK TRINITY RIVER
TRWD GATE/ PUMP STATION
N MAIN ST BRIDGE
BYPASS CHANNEL
UNIVERSITY DR
PEDESTRIAN BRIDGE
TRINITY POINT GATE
WHITE SETTLEMENT RD BRIDGE
TRINITY UPTOWN AREA
RIVERSIDE PARK SITE
HIGHWAY 121
RIVERSIDE OXBOW/GATEWAY PARK SITES
1ST ST
4TH ST
HAM BRANCH SITE
PEDESTRIAN BRIDGE
HENDERSON ST BRIDGE
MAIN ST
INTERIOR WATER FEATURE
WHITE SETTLEMENT RD BRIDGE
CLEAR FORK GATE
7TH ST
OLD OXBOW SYCAMORE CREEK
BEACH STREET RECONSTRUCTION
PEDESTRIAN BRIDGES
SYCAMORE CREEK
CLEAR FORK TRINITY RIVER
RIVERSIDE DR
BEACH ST

0 2,500 5,000
SCALE IN FEET

CDM

FORT WORTH CENTRAL CITY
SECTION 404(b)(1) ANALYSIS

MODIFIED CENTRAL CITY PROJECT

DATE: MARCH 2008

FIGURE 1

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LEGEND

- NHD WATER FEATURES
- EXISTING VEGETATION CLASS: WETLAND

Note: Water features are based on National Hydrography Dataset products (Publication Date 2005). This figure may not accurately display or represent all of the inclusive waters of the United States of America.

JACKSBORO HWY
MARINE CREEK
LEBOW CREEK
INTERSTATE 35
WEST FORK TRINITY RIVER
SAMUELS AVE
HIGHWAY 121
1ST ST
4TH ST
OLD OXBOW WEST FORK
WEST FORK TRINITY RIVER
UNIVERSITY DR
MAIN ST
HAM BRANCH
OLD OXBOW SYCAMORE CREEK
7TH ST
CLEAR FORK TRINITY RIVER
SYCAMORE CREEK
RIVERSIDE DR
BEACH ST

0 2,500 5,000
SCALE IN FEET

CDM

FORT WORTH CENTRAL CITY
SECTION 404(b)(1)
ANALYSIS

WATERS OF THE U.S. FROM THE NATIONAL HYDROGRAPHY DATASET

DATE: MARCH 2008

FIGURE 2

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LEGEND

- CONSTRUCTION AREAS WITHIN OHWM
- NHD WATER FEATURES
- EXISTING VEGETATION CLASS: WETLAND

Notes:
1. For the purpose of this analysis, the Ordinary High Water Mark (OHWM) is defined as the existing 2-yr water surface elevation by USACE and was used to define impacts within the waters of the U.S. (NHD).

2. Construction areas as shown are for graphical purposes only and may not accurately display or represent all of the area within the ordinary high water mark.

MARINE CREEK CHANNEL IMPROVEMENT
MARINE CREEK LOW WATER DAM
MARINE CREEK
INTERSTATE 35
SAMUELS AVENUE VALLEY STORAGE SITES
JACKSBORO HWY
SAMUELS AVENUE DAM
SAMUELS AVE
WEST FORK TRINITY RIVER
ROCKWOOD PARK - WEST VALLEY STORAGE SITE
ROCKWOOD PARK ECOSYSTEM IMPROVEMENT
LOWER BYPASS CHANNEL TIE-IN
TRWD ISOLATION GATE/ PUMP STATION
RIVERSIDE PARK VALLEY STORAGE SITE
HIGHWAY 121
WEST FORK PEDESTRIAN BRIDGE
LOWER BYPASS CHANNEL TIE-IN
TRINITY POINT ISOLATION GATE
RIVERSIDE OXBOW/GATEWAY PARK SITES
1ST ST
4TH ST
WEST FORK TRINITY RIVER
UNIVERSITY DR
UPPER BYPASS CHANNEL TIE-IN
INTERIOR WATER FEATURE
MAIN ST
UPPER BYPASS CHANNEL TIE-IN
CLEAR FORK ISOLATION GATE
HAM BRANCH AQUATIC MITIGATION SITE
BEACH STREET BRIDGE RECONSTRUCTION
7TH ST
RIVERSIDE OXBOW ECOSYSTEM DEVELOPMENT
SYCAMORE CREEK AQUATIC ECOSYSTEM DEVELOPMENT
CLEAR FORK TRINITY RIVER
SYCAMORE CREEK
RIVERSIDE DR
BEACH ST

0 2,500 5,000
SCALE IN FEET

CDM

FORT WORTH CENTRAL CITY
SECTION 404(b)(1) ANALYSIS

CONSTRUCTION AREAS WITHIN WATERS OF THE U.S.

DATE: MARCH 2008

FIGURE 3

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LEGEND

- PEDESTRIAN BRIDGES
- VALLEY STORAGE CUT SITES
- UPLAND DISPOSAL FILL SITES
- BYPASS CHANNEL TIE-INS
- STRUCTURES

Notes:
1. For the purpose of this analysis, the Ordinary High Water Mark (OHWM) is defined as the existing 2-yr water surface elevation by USACE and was used to define impacts within the waters of the U.S. (NHD).

2. Construction areas as shown are for graphical purposes only and may not accurately display or represent all of the area within the ordinary high water mark.

MARINE CREEK LOW WATER DAM
MARINE CREEK
PEDESTRIAN BRIDGE
SAMUELS AVENUE DAM
SAMUELS SITES
SAMUELS AVE
INTERSTATE 35
JACKSBORO HWY
ROCKWOOD PARK - WEST SITE
WEST FORK TRINITY RIVER
LOWER BYPASS CHANNEL TIE-IN
TRWD ISOLATION GATE/ PUMP STATION
RIVERSIDE PARK SITE
HIGHWAY 121
UNIVERSITY DR
LOWER BYPASS CHANNEL TIE-IN
RIVERSIDE OXBOW/GATEWAY PARK SITES
1ST ST
TRINITY POINT ISOLATION GATE
4TH ST
HAM BRANCH SITE
UNIVERSITY DR
WEST FORK TRINITY RIVER
UPPER BYPASS CHANNEL TIE-IN
INTERIOR WATER FEATURE
MAIN ST
UPPER BYPASS CHANNEL TIE-IN
CLEAR FORK ISOLATION GATE
7TH ST
PEDESTRIAN BRIDGES
SYCAMORE CREEK
CLEAR FORK TRINITY RIVER
RIVERSIDE DR
BEACH ST

0 2,500 5,000
SCALE IN FEET

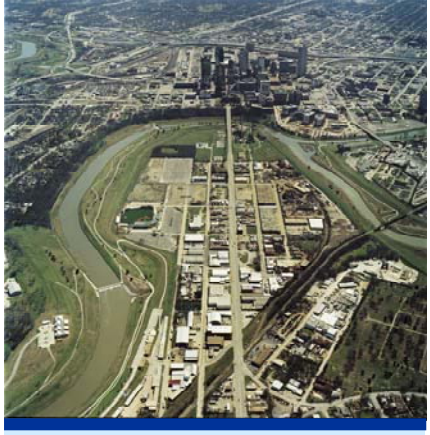
CDM

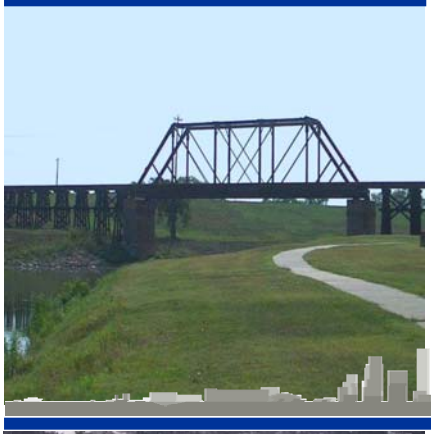
FORT WORTH CENTRAL CITY
SECTION 404(b)(1) ANALYSIS

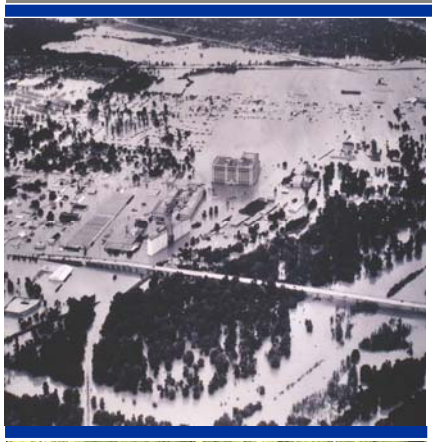
CUT/FILL AREAS OUTSIDE WATERS OF THE U.S.

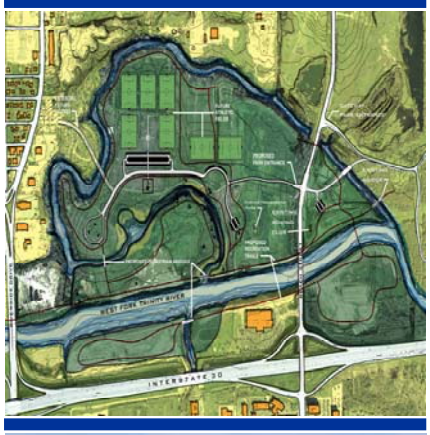
DATE: MARCH 2008

FIGURE 4









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Fish and Wildlife Coordination Act Report

Final Supplement No. 1
to the Final Environmental
Impact Statement

Appendix G

March 2008

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
WinSystems Center Building
711 Stadium Drive, Suite 252
Arlington, Texas 76011

March 6, 2008

Colonel Christopher W. Martin
District Engineer
U.S. Army Corps of Engineers
(Attn: Billy Colbert, CESWF-EV-EE)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Re: Fish and Wildlife Coordination Act Report for the Upper Trinity River Modified Central City Project Fort Worth, Texas

Dear Colonel Martin:

This letter constitutes the U.S. Fish and Wildlife Service's (Service) final report on the Fort Worth District, U.S. Army Corps of Engineers' (Corps) Modified Central City Project in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The purpose of this report is to identify and evaluate anticipated impacts of merging and implementing the proposed changes to the authorized Central City and Riverside Oxbow Projects on fish and wildlife resources within the Trinity River floodplain in Tarrant County, Texas and to recommend conservation and mitigation measures for fish and wildlife resources. Our report has been coordinated with the Texas Parks and Wildlife Department (TPWD) as noted in the enclosed February 26, 2008 letter from Wildlife Habitat Assessment Program Biologist Karen Hardin.

Background

Authority for the Corps' investigations on the Upper Trinity River Basin was provided by the U.S. Senate Committee on Environmental Public Works Resolution dated April 22, 1988. The Corps initiated this study at the request of Tarrant Regional Water District (TRWD) to examine opportunities to reduce flood damage, restore ecosystems, and provide additional and improved recreational opportunities along the West and Clear Forks of the Trinity River and its tributaries within the City of Fort Worth (City). The June 13, 2000 *Programmatic Environmental Impact Statement (PEIS), Upper Trinity River Basin, Trinity River, Texas* identified 90 preliminary potential projects addressing flood damage reduction, ecosystem restoration, and recreation. That year, the Corps initiated the *Upper Trinity River Basin Interim Feasibility Study for the Clear and West Forks of the Trinity River and Tributaries* which included a group of flood control,

ecosystem restoration, and recreation projects that are proposed along the West and Clear Forks of the Trinity River and several tributaries between Benbrook Lake and Highway East Loop 820. Investigations of the project area were conducted by Service personnel in October 2000 and January, February, April, and May 2001. A FWCA planning aid report was completed November 3, 2001 (Hale 2001).

The Riverside Oxbow Ecosystem Restoration and the Central City Multi-Purpose projects are the first two studies being conducted as part of the comprehensive *Upper Trinity River Basin Interim Feasibility Study for the Clear and West Forks of the Trinity River and Tributaries*. The Corps' *Riverside Oxbow Interim Feasibility Report and Integrated Environmental Assessment* was completed in April 2003 and some aspects of the plan have already been implemented.

In December 2004, the U.S. Congress authorized the Corps to undertake the Upper Trinity River Central City project as generally described in the April 2003 *Trinity River Vision Master Plan*, a cooperative initiative between TRWD, Streams and Valleys (a local non-profit parks organization), and the City. The Corps completed the *Upper Trinity River Central City Plan and Environmental Impact Statement* (EIS) in January 2006.

The Service assisted the Corps in assessing both projects which involved attending team meetings, conducting site visits, completing baseline habitat assessments, and evaluating alternative plans. The Service previously submitted the following documents to the Corps identifying the fish and wildlife resources within the project areas, possible project impacts, and recommended ecosystem mitigation and restoration measures.

- **Planning Aid Letter for the Clear and West Forks of the Trinity River Interim Feasibility Study**. November 3, 2001.
- **Final FWCA Report for the Riverside Oxbow Restoration Project**. May 16, 2003.
- **Residual Organochlorine Pesticide Contamination in Fish Collected from the Trinity River within the Proposed Central City Multi-purpose Projects Area**, Tarrant County, Texas. April 2004.
- **Existing Habitat Conditions Planning Aid Report for the Central City Interim Feasibility Study**, Fort Worth, Texas. June 18, 2004.
- **HSIs and Analysis for the Central City Project Extended Area Upstream**. December 2, 2004 memorandum.
- **Baseline Fisheries Survey of Marine Creek within the Proposed Central City Multi-Purpose Project Area**. Tarrant County, Texas, January 2005.
- **Corrections for the HSI Averages contained in the December 2, 2004 memo regarding the Central City Project Extended Area Upstream**. February 1, 2005 Memorandum.
- **Baseline Fisheries Survey of Lebow Creek within the Proposed Central City Multi-Purpose Project Area**. Tarrant County, Texas, April 2005.
- **Baseline Fisheries Survey of Ham Branch.** Tarrant County, Texas, July 20, 2005.
- **Final FWCA Report for the Central City Multi-Purpose Project Study**. October 5, 2005.
- **Gateway Park Old Wastewater Treatment Plant Lagoons Existing Habitat**

Conditions. January 10, 2007.

- **Numerous Emails providing information and comments throughout the planning process.**

In a letter dated June 22, 2006, the City requested that the Corps conduct an evaluation and analysis to consider the potential benefits of merging the Central City and the Riverside Oxbow project areas. The City stated that by merging these projects, there would be greater opportunities for valley storage alternatives and wildlife habitat restoration.

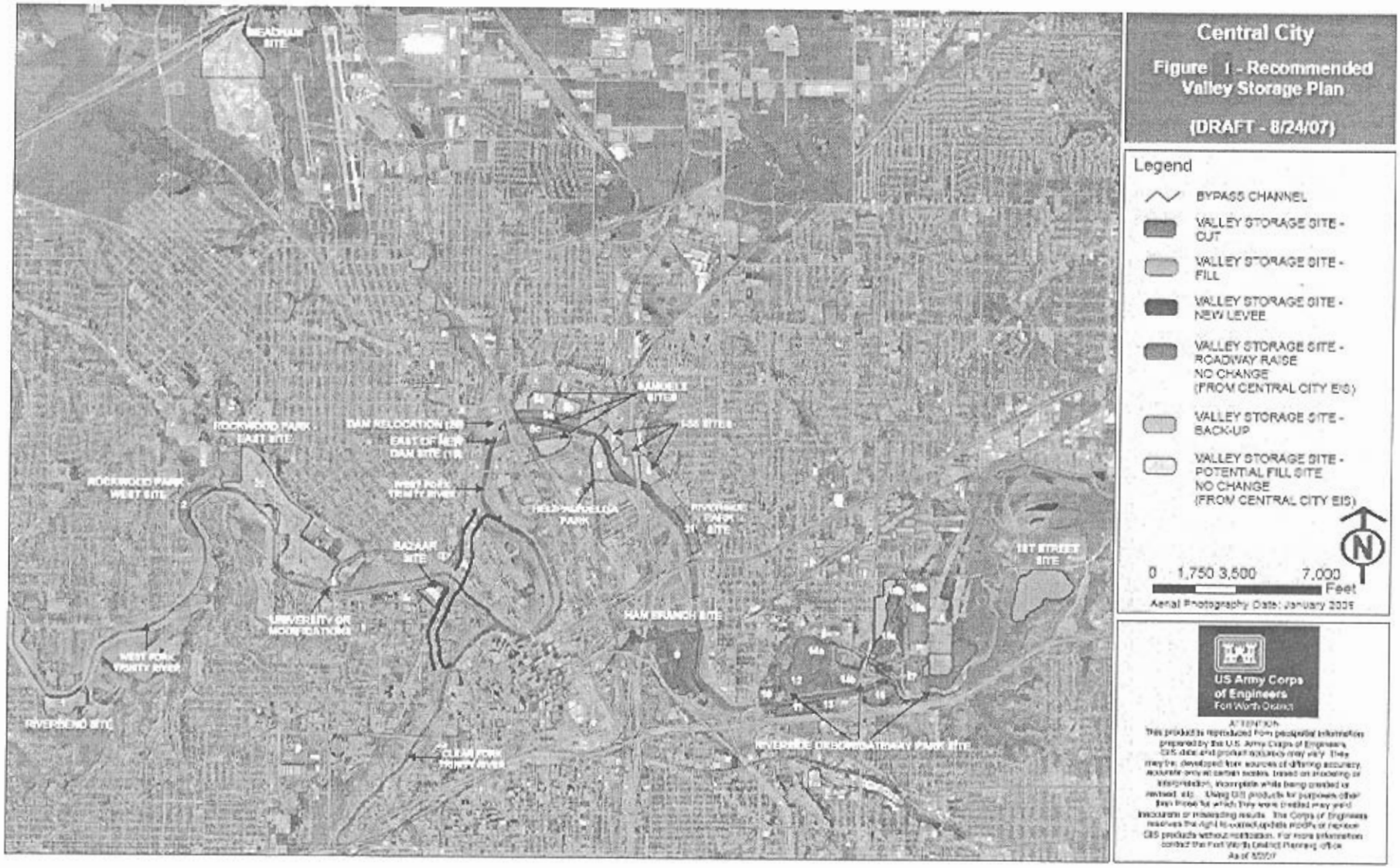
Significant changes in land use and development activities within portions of the Riverside Oxbow and the Central City project areas have occurred since the interim feasibility reports and original National Environmental Policy Act (NEPA) documents were completed, such as the recent gas well drilling near the Riverside Oxbow. These changes required further baseline assessment. The Corps requested that the Service provide additional existing conditions, impact assessments, mitigation requirements, and ecosystem restoration recommendations associated with the proposal to combine the Central City and the Riverside Oxbow projects.

Evaluation Methodology

The Service's *Habitat Evaluation Procedures* (HEP) (USFWS 1980), described in the Service's June 18, 2004 planning aid report (Hale and Giggleman 2004), was used to evaluate the existing terrestrial habitats in the proposed valley storage sites in the same manner as it was in the Central City and Riverside Oxbow projects (Figure 1). The Service conducted additional assessments at the old Waste Water Treatment Plant (WWTP) in Gateway Park (Valley Storage Site 17) because it was determined that the Riverside Oxbow assessment no longer correctly represented the habitat within the drying beds.

No additional aquatics studies were necessary for the proposed modified plan. Fish communities within the proposed project area were assessed by the Service in 2003 and 2005. The results of these assessments can be found in the previous FWCA reports (Hale and Giggleman 2004; Giggleman and Lewis 2005a; Giggleman and Lewis 2005b; Giggleman and Lewis 2005c).

The Service has evaluated this project in accordance with the guidelines and directives contained in its Fish and Wildlife Mitigation Policy (Federal Register 46(15):7644-7663; January 23, 1981). The Mitigation Policy is the basis by which the Service makes recommendations, in order of priority, to avoid, minimize, rectify, reduce or eliminate the loss over time, or compensate for project-related impacts to fish and wildlife resources. Our recommendations are based on the value and relative abundance of the affected habitats to the evaluation species. The Policy includes four Resource Categories (1-4) to provide a consistent value rating for wildlife habitats. Based on the Habitat Suitability Index (HSI) values and Index of Biological Integrity (IBI) evaluations, the Service has designated a Resource Category for each terrestrial and aquatic habitat evaluated in the project area.


Central City
Figure 1 - Recommended Valley Storage Plan
(DRAFT - 8/24/07)
Legend
BYPASS CHANNEL
VALLEY STORAGE SITE - CUT
VALLEY STORAGE SITE - FILL
VALLEY STORAGE SITE - NEW LEVEE
VALLEY STORAGE SITE - ROADWAY RAISE NO CHANGE (FROM CENTRAL CITY EIS)
VALLEY STORAGE SITE - BACK-UP
VALLEY STORAGE SITE - POTENTIAL FILL SITE NO CHANGE (FROM CENTRAL CITY EIS)
N
0 1,750 3,500 7,000
Feet
Aerial Photography Date: January 2005
US Army Corps of Engineers
Fort Worth District
ATTENTION:
This product is reproduced from geospatial information prepared by the U.S. Army Corps of Engineers. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, based on modeling or interpretation, incomplete while being created or revised, etc. Using GIS products for purposes other than those for which they were created may yield inaccurate or misleading results. The Corps of Engineers reserves the right to correct, update, modify or replace GIS products without notification. For more information contact the Fort Worth District Planning office.
As of 8/2007
MEACHAM SITE
RIVERSIDE SITE
ROCKWOOD PARK - EAST SITE
ROCKWOOD PARK - WEST SITE
DAM RELOCATION (2B)
EAST OF NEW DAM SITE (1B)
WEST FORK TRINITY RIVER
SAGAMORE SITE
UNIVERSITY DR MODIFICATIONS
HELEN PAPADELLIS PARK
RIVERSIDE PARK SITE
HAM BRANCH SITE
1ST STREET SITE
RIVERSIDE DR/GATEWAY PARK SITE
CLEAR FORK TRINITY RIVER

Project Alternatives and Proposed Action

The current project proposal contains two alternatives, the "No Action" Alternative which would be the separate implementation of both the 2005 Central City project and the 2003 Riverside Oxbow Ecosystem Restoration project as they are currently approved, and the "Modified Central City Alternative" combining both projects with modifications which would provide greater opportunities for valley storage alternatives and wildlife habitat restoration.

Construction activities associated with both alternatives would result in some loss of all habitats. However, these adverse impacts would be compensated for in each alternative with in-kind and out-of-kind mitigation.

No Action Alternative

The No Action Alternative is implementation of the Central City and the Riverside Oxbow Restoration projects as they are currently approved. The Service's FWCA reports for these two projects contain the descriptions of the approved projects, existing environmental conditions, possible project impacts, and recommended ecosystem mitigation and restoration measures (Hale 2003; Hale and Giggleman 2005).

The April 2003 *Riverside Oxbow Interim Feasibility Report and Integrated Environmental Assessment* describes the ecosystem restoration project located just east of the downtown area on the West Fork of the Trinity River downstream of Riverside Drive and Gateway Park. It consists of habitat restoration on 512.2 acres of floodplain lands, approximately 2 miles of oxbow river channel, 56.5 acres of wetlands, 112 acres of riparian habitat and upland native grassland, and 25,700 feet of compatible mixed surface linear recreational trails. The approved project would restore a water source for the oxbow by removing the earthen plug between the oxbow and the river channel. An in-stream dam has been installed down stream to raise the water level in the old oxbow. The project plans include increasing the width of the riparian woodland corridor to 150 feet. These actions would provide excellent habitat for riparian wildlife species, such as nesting and brood-rearing wood ducks. The old Sycamore Creek remnant and the drying beds of the old WWTP at Gateway Park would be developed into emergent wetlands.

In response to the Secretary of the Army's review of the Riverside Oxbow project, the Corps developed an April 2005 Addendum to the Riverside Oxbow report reducing the proposed property acquisition in the Gateway Park by 79 acres that were proposed to be developed as native grassland and tree mottes and increasing the amount of restored forested wetlands by 20 acres.

The approved Central City project plan, as described in the January 2006 *Upper Trinity River Central City, Fort Worth, Texas* final EIS, includes a flood bypass channel and flood gates to divert flood flow around a segment of the existing Trinity River adjacent to downtown Fort Worth, a dam located downstream of Samuels Avenue to create a small lake extending up the river to approximately Rockwood Park, ecological restoration areas, and 5,250 acre-feet of valley storage mitigation sites. Much of the proposed valley storage would be located in the Riverbend

Park area to compensate for the loss of valley storage associated with the construction of the proposed dam and bypass channel on the Trinity River.

Habitat improvement, restoration, and enhancement included in the approved Central City project would be located in three areas to compensate for project impacts. These include the proposed valley storage mitigation area at Riverbend Park, two old oxbows near Rockwood Park, and Ham Branch in Harmon Park east of the downtown area.

The ecosystem restoration activities planned for the approved Central City Project includes restoration of 15.02 acres of wetlands and 34.5 acres of riparian woodlands; establishment of 42.2 acres of native grasslands, 92.7 acres of riparian woodlands, and 45.5 acres of upland woodlands; enhancement of 13.3 acres of existing upland woodlands; preservation of 74.36 acres of riparian woodland; and reestablishment of 5.08 acres of three historic oxbow stream channels.

A letter from the Corps, dated September 13, 2005, includes an Aquatic Mitigation Plan for restoring aquatic habitat and improving water quality in Ham Branch. The plan includes restructuring 892 linear feet of the stream to be geomorphically stable with a riffle/pool/run aquatic regime, and planting 7.4 acres of riparian woodland to add to the existing 1.4 acres of woodlands to create a 50-foot wide riparian buffer on each side of the stream. An emergent wetland (0.6 acre) and a sediment/litter trap (0.7 acre) would be developed as a means to improve water quality in Ham Branch. These restoration measures would provide a portion of the compensation required for the impacts resulting from the approved project.

The approved Aquatic Mitigation Plan also includes restoration measures along the planned Lebow Creek diversion. These restoration measures are mitigation for the impacts the project would cause to Lebow Creek and partial mitigation for the impacts to Marine Creek. The diversion would be designed to provide comparable riffle/pool/run habitat regimes to those being impacted by the project. Shrubs and overhanging grasses would be planted along the banks for shade and cover. These plants would also provide bank erosion control thereby reducing the amount of sediment in the stream.

Modified Central City Alternative

The proposed Modified Central City Alternative would combine the Central City and the Riverside Oxbow project to increase valley storage, wildlife habitat, and recreational opportunities and reduce the use of eminent domain by minimizing acquisition of private land and increasing the use of public land for valley storage and wildlife habitat restoration (Figure 2). There are three major changes proposed from the approved Central City Project: (1) the location and design of the proposed valley storage sites, (2) location of the Samuels Avenue Dam with a newly proposed lock and channel on the west side of the structure, and (3) addition of the Marine Creek Low Water Dam. All other features of the Modified Project Alternative would remain the same as those contained in the approved Central City and Riverside Oxbow plans.


Central City
Figure 2: Modified Central City Project Alternative
Legend
BYPASS CHANNEL
ROAD IMPROVEMENT
PEDESTRIAN BRIDGE
VALLEY STORAGE SITE
ECOSYSTEM RESTORATION AREA
AQUATIC HABITAT MITIGATION AREA
TRINITY UPTOWN AREA
N
0 1,645 3,290 6,580
Feet
Aerial Photography Date: January 2005
US Army Corps of Engineers
Fort Worth District

The modified plan includes 21 preferred and five contingency valley storage sites proposed along the Trinity River to provide approximately 5,250 acre-feet of flood water storage. The sites, which are located within the floodplain and on City of Fort Worth and TWRD owned property, are located predominantly in habitats of poor quality. Most of these sites would be excavated to acquire more acre-feet of storage. However, after excavation these sites are proposed to be restored into equal or higher quality habitat than their existing condition. Most of the habitat restoration and mitigation would be located in these sites.

The modified plan would minimize acquisition of private lands by relocating the valley storage sites to public lands and concentrating wildlife habitat mitigation in the Riverside Oxbow project area. The modified project proposes to exclude Riverbend Park from the project for habitat mitigation, but includes it as a contingency valley storage site if additional storage is necessary. The modified plan would require compensation for loss of about 18.3 acres of riparian woodlands, 59 acres of upland woodlands, 2.3 acres of aquatic habitat, and less than an acre of emergent wetlands. However, it includes establishing 58 acres of wetlands, restoration of 10.9 acres of stream and oxbow habitat, developing of 137.6 acres of riparian woodland, enhancement of 263.6 acres of existing riparian woodland, development of 87 acres of native grassland/savannah, and enhancement of 53.3 acres of native grasslands. The Modified Central City Alternative would increase riparian woodland habitat by 109 Average Annual Habitat Units (AAHUs) and emergent wetlands by 47.78 AAHUs. The negative impacts to upland woodland habitat would be partially compensated by out-of-kind mitigation using the additional riparian woodlands developed beyond those required to fully compensate for the existing riparian woodlands that would be impacted. The total acreage and AAHUs for existing grassland habitat would decrease because mitigation for the other higher quality habitats is proposed in poor quality grasslands on public lands.

The Modified Central City Alternative proposes to locate the proposed Samuels Avenue Dam to approximately 1,750 feet downstream of Northside Drive on the main stem of the Trinity River, immediately upstream from the confluence of Marine Creek. This new location would eliminate aquatic impacts to Lebow Creek. During normal dry weather the dam will maintain the normal water pool level elevation of 524.3 National Geodetic Vertical Datum (NGVD). The 390-foot wide dam would operate with seven 48-feet wide and 18-feet high gates. The structure would have low flow conduits 4-feet wide by 6 feet high located at the base of three piers. A stilling basin would be located on the north side of the dam to dissipate the hydraulic energy released from the gates. The channel width at the dam site would be 250 feet. On the west side of the dam, a lock and channel would be constructed to connect the river to Marine Creek in order to accommodate small boat traffic. The lock structure would be 40-feet long by 16-feet wide and have a maximum lift of 8.5 feet.

The Service has designated the aquatic habitats within the lower sections of Marine and Lebow Creeks as Resource Category 3. Category 3 habitat is of high to medium value for the evaluation species and is relatively abundant on a national basis. The mitigation planning goal for this category is no net loss of habitat value while minimizing loss of in-kind values. Impacts to these aquatic resources should be avoided, minimized, and/or compensated.

A fixed low water dam would be constructed across the mouth of Marine Creek, approximately 300 feet upstream of the confluence of the main stem of the river, to raise the water level in the creek to allow boat traffic through the lock structure and down Marine Creek. This structure would have a crest elevation of 516.5 NGVD and a crest length of 200 feet. This lower level would reduce the backwater impacts to Marine Creek, but would still inundate the shallow riffle-pool sequences that currently support an exceptional and high valued fish community within the stream, therefore mitigation would be required. Marine Creek channel would be widened by approximately 50 feet and a turnaround basin just upstream from 23rd Street would be constructed. Compacted concrete with rip-rap would be used for bank stabilization where necessary.

Aquatic habitat mitigation for impacts to Marine Creek resulting from construction of the dam, the proposed lock and channel located west of the dam, and the Marine Creek low water dam are still proposed for Ham Branch, but now includes restoration of Sycamore Creek within the Riverside Oxbow area.

Summary and Recommendations

The Service supports the proposed Modified Central City Alternative aquatics mitigation plan that proposes developing additional stream mitigation features in Sycamore Creek and Ham Branch as mitigation for the impacts associated with inundation of Marine Creek. Mitigation would include construction of a series of riffle pool sequences with a stable streambed supported by stable banks and a riparian corridor in both streams. We recommend using natural soft engineering for bank stabilization. The streams should have a sufficient longitudinal profile (slope) to maintain adequate flow regimes. Substrate composition should be similar to the habitat in Marine Creek.

We also support restoring the old remnant of Sycamore Creek between Riverside Oxbow and the river. Providing a reliable water source and restoring the aquatic function of this segment of Sycamore Creek would benefit aquatic species and contribute to the mitigation requirement for the impacts associated with inundating Marine Creek. Habitat restoration benefits would not be fully realized for several years, but the newly planted aquatic vegetation proposed in the mitigation plan would probably be well established within one year.

These mitigation measures would fully compensate for the adverse impacts to the aquatic habitat in Marine Creek caused by the construction of Samuels Avenue dam and the low water dam.

The only federally listed threatened or endangered species known to occur in Tarrant County are the endangered whooping crane (*Grus americana*), and the endangered interior least tern (*Sterna antillarum*). Detailed information on these species is contained in the October 5, 2005 Final FWCA report (Hale 2005). Due to the lack of suitable habitat and the urbanized character of the project area, it is unlikely that either of these federally listed species would utilize any of the study areas. Therefore, no adverse affects to federally listed species are expected to occur with implementation of any of the proposed alternatives.

After reviewing all the information provided by Corps staff and our analysis of the HEP data regarding the proposed changes to the two approved projects in order to combine them, we have determined that the Corps' recommended plan, including our recommendations discussed above, would provide a sufficient amount of habitat restoration and preservation to mitigate for the adverse impacts caused by the various components of implementing the Modified Central City Alternative. The mitigation plan would provide diversity, as well as habitat of sufficient quality and quantity, to benefit a variety of resident and migratory wildlife species. Reforestation and improvement of the riparian corridor would also substantially increase the amount of vital reproductive and migratory neotropical bird habitat, thus furthering the goals and objectives of the North American Waterfowl Management Plan, and the Partners in Flight program.

We appreciate the opportunity to participate in the planning of this project. Please contact Carol Hale at (817) 277-1100 if you have any questions or require additional assistance.

Sincerely,

Thomas J. Cloud, Jr.
Field Supervisor

Enclosure

cc: Jennifer Key, TPWD, Austin, Texas
Executive Director, TPWD, Austin, Texas

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Giggleman, C. and J. Lewis. 2005a. Baseline Fisheries Survey of Marine Creek within the Proposed Central City Multi-Purpose Project Area, Tarrant County, Texas. U.S. Fish and Wildlife Service. Arlington, Texas.

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Giggleman, C. and J. Lewis. 2005c. Baseline Fisheries Survey of Ham Branch, Tarrant County, Texas. U.S. Fish and Wildlife Service. Arlington, Texas.

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Hale C. 2001. Planning Aid Letter for the Upper Trinity River Basin Interim Feasibility Study for the Clear and West Forks of the Trinity River and Tributaries, Tarrant County, Texas. 35 pp. U.S. Fish and Wildlife Service. Arlington, Texas.

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U.S. Fish and Wildlife Service.1980. The habitat evaluation procedures. USDI Fish and Wildlife Service, Ecological Services Manual 102. 124 pp.

TEXAS PARKS & WILDLIFE

February 26, 2008

Thomas J. Cloud, Jr.
U.S. Fish and Wildlife Service
WinSystems Center Building
711 Stadium Drive, Suite 252
Arlington, TX 76011

RE: Draft Supplemental Fish and Wildlife Coordination Act Report for the Fort Worth Central City Project (Tarrant County)

Dear Mr. Cloud

The Texas Parks and Wildlife Department (TPWD) has reviewed the November 20, 2007, Draft Supplemental Fish and Wildlife Coordination Act Report (Report) for the Central City Interim Feasibility Study. The Report has identified and evaluated anticipated impacts on fish and wildlife resources within the Trinity River floodplain in Tarrant County, Texas, that are anticipated as a result of implementing the proposed changes to the authorized Central City Project and merging it with the Riverside Oxbow Project. The Report recommends conservation and mitigation strategies for natural resource protection.

TPWD concurs with the U.S Fish and Wildlife Service's (USFWS) findings presented in the Report. I appreciate the opportunity to review and comment on this project and look forward to working with the USFWS and the U.S. Army Corps of Engineers in the future. Please contact me at (903) 675-4447 if you have any questions.

Sincerely,

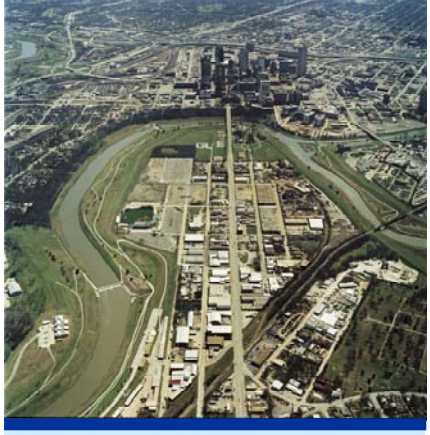
Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

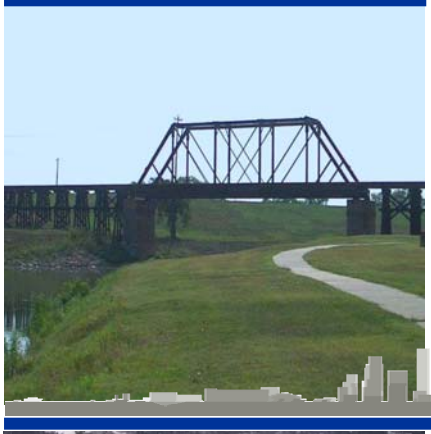
kbh/12900(12329, 11137, 11132, and 11032)

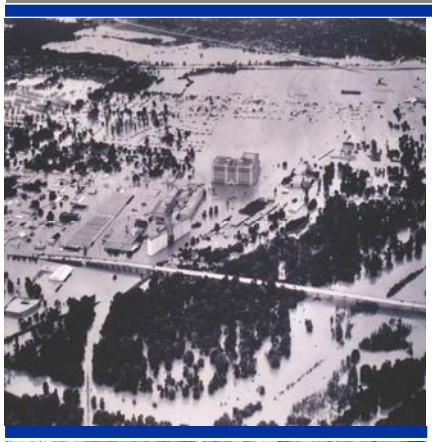
4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512 389 4800

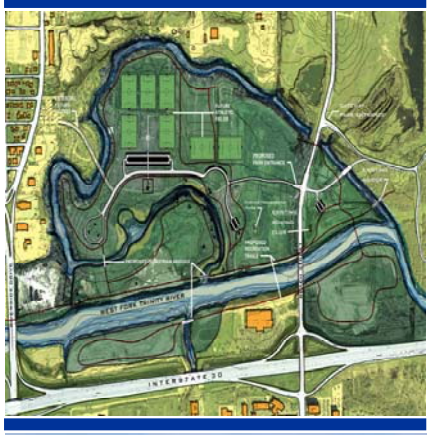
www.tpwd.state.tx.us

To manage and conserve the natural and cultural resources of Texas and to provide hunting, fishing and outdoor recreation opportunities for the use and enjoyment of present and future generations.









Rendering Image courtesy of CDM

Fort Worth Central City Preliminary Design

Public Review and Comments

Final Supplement No. 1 to the Final Environmental Impact Statement

Appendix H

March 2008

ARMY CORPS OF ENGINEERS

SUPPLEMENTAL ENVIRONMENTAL IMPACT

STATEMENT PUBLIC MEETING

JANUARY 24,2008

INN SUITES

2000 BEACH STREET

FORT WORTH, TEXAS

PUBLIC COMMENTS AND PRESENTATION

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(Public comments prior to presentation.)

ROBERT CROWE: I'm Robert Crowe. I'm a member of the Steerling Committee with the Neighborhood Association of South Lake Worth and a member and supporter of the South Lake Worth Alliance. As such, I fully support the objectives of preserving, protecting and enhancing Fort Worth's invaluable and irreplaceable green space and natural habitat area for recreational

use and wildlife sanctuaries. The end. Amen.

SANDRA AND GEORGE EVERETT

(Written statement wrote into record.)

Sandra and George Everett, 4218 Kenwood Court, Fort Worth, 76103. In light of all the activity -- construction, injection well, et cetera -- related to gas well drilling by Chesapeake on land adjacent to Gateway Park at the intersection of Oakland Boulevard and First Street, an environmental impact study of the effects of runoff from this industrial/construction area and interaction with the floodplain in Gateway Park and surrounding area is essential prior to the decision to go forward with the wonderful plans for improving the

Page: 4

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 9:42:44 AM -06'00'

Effects of activities by others, including petroleum exploration in the geographic area have been considered in the cumulative impacts assessment of the SEIS and this site specific activity will be further evaluated for its potential impacts to the proposed project during the processing of the Final Supplemental EIS. Surface water is protected by state and federal laws and any pollution coming from offsite of any well is reported and will be required to be cleaned up.

park.

TOMMY SIMMONS

TOMMY SIMMONS: Tommy Simmons, 2020 Windsor, 76110. And connecting -- One of the most important parts of this is connecting the trail -- the Trinity Trail completely to Arlington. Okay. And then one other thing. I think the -- I have already done a bunch of stuff on this, but the Rowing Club have a rowing dock isolated to itself instead of using the trail. That's what they use to dock.

(Beginning of presentation.)

COLONEL MARTIN: All right. We will get this thing started. I'm Colonel Christopher Martin. I'm the Commander of the Fort Worth Engineering District of the United States Army Corps of Engineers, and I would like to welcome you-all tonight to this public meeting.

This meeting obviously is regarding the proposed modifications to the Central City Project and the supplement to the final Environmental Impact Statement that describes those changes.

If you have not signed in, please make sure that you work your way over to the left there, sign in and that will make sure you get on our mailing list for any further changes. And that's also where you register to make comments here tonight. If you're not on one of those sheets, we won't be able to recognize you unfortunately.

Here's what we hope to cover tonight.

And hopefully you've had a chance to review the displays at the back of the room which describe the changes that we'll address tonight and then discuss them with our staff that's here. They will also be available following the meeting if you have any further questions.

So what we're not going to do tonight is

a question and answer session. We'll have the experts in the back, and they will be able to address your specific questions at the end of the meeting tonight. They're a lot smarter than I am on this stuff, any way.

What I would like to do is introduce some folks from partner agencies that are here tonight, and they are our partners in this project. Starting off first of with Mayor Mike Moncrief. Mayor, thank you, sir, for being here. Eric With from Congressman Michael Burgess's office. Barbara Ragland from Congresswoman Kay Granger's office. Maureen Hagen, Representative from -- hopefully I say this right, Mark Reecey's office. Councilman Danny Scarth, City of Fort Worth District Four.

Councilwoman Kathleen Hicks, City of Fort Worth District Eight. Councilman Joel Burns, City of Fort Worth District Nine. And Vic Henderson, President of Tarrant Regional Water District Board. And Jack Stevens, Tarrant Regional Water District Board Member. Marty Leonard, Tarrant Regional Water District Board Member. And Dale Fisseler, City of Fort Worth City Manager.

So here's what we're going to cover tonight. You see it on the agenda up here. We're going to briefly describe the purpose of the meeting. You

know, what do we hope to accomplish here in this meeting tonight. We'll describe the project modifications from the incorporation of the two projects and some other things that changed. We'll talk a little bit about what our schedule is for this project. Then the opportunities for public comment, you know, why are we here tonight? What are we going to do with the comments that we get out of here? And then an opportunity for you to make other verbal comments.

We are at day 20 in this public comment period, so hopefully now you've had a chance to review the draft supplement to the EIS. So what's the purpose of our meeting then? Well, the National Environmental Policy Act, or NEPA as we call it, requires a 45-day public comment period on a draft Environmental Impact Statement. So we're at day 20 of the 45-day period.

Public comment is required for the Corps to make an informed decision on the project, and this is an effective way for us to receive comments. And we will have the court reporter over here who will be recording our comments throughout the night, and we'll have a transcript of the meeting that will be produced following the meeting here.

For those of you who have had the opportunity to look at this you know this already, we'll

cover the project modifications. And there are three of them.

First of all, it's the change of the location of the primary hydraulic mitigation. Okay. The guys that wrote this -- Let's make this so everybody who are not engineers can understand that. That means where is the floodwater going to be stored.

So we'll talk about that, the change of location of the primary hydraulic mitigation, or where the floodwater storage is going to be. We'll change the location of Sammuels Avenue Dam and the pool level in Marine Creek.

And then the third change is to incorporate the Riverside Oxbow Project features into the Central City Project. So these are the changes that are subject to comment and review during this period. And that's what we're going to focus on here tonight is those changes.

Now, let's cover each of those individually, just to make sure everyone is aware of what we're talking about here. First one we're talking about is the hydraulic mitigation change, relocating the storage of floodwaters, above a one hundred year event flood.

Now, what does that mean, a hundred year

flood? Well, that means that on average you have a

one percent chance of having that kind of flood in any given year. Not that it's going to happen every 100 years or only once in a hundred years, but on any given year, you have a one percent chance of that type of flood occurring.

So what we're doing now is the change relocates the storage of floodwaters above a hundred year event from the Riverbend area in West Fort Worth, and that's what's shown on the map and the crosshatching on the left side there, to the Gateway/Riverside area on the east side of Fort Worth, which is shown in the purple over here.

This change in location does not change downstream flood volumes or water surface elevation, so everybody understands that. No change in downstream flood volumes. The amount of water that comes through downstream is the same before or after these changes, and the water surface elevation does not change either as a result of these changes.

Next slide.

Now, let's talk about the Samuels Avenue Dam changes. The Samuels Avenue Dam was moved from downstream of the Marine Creek mouth to just upstream of Marine Creek due to some geotechnical and environmental

considerations. Our guys originally had it more up here, and now moved it to where it's shown on the yellow area because of some factors that they were able to -- you know, as we got to understand more about them, recognized that it made better sense to move it further

south there.

A lock will allow recreational boat passage between the Trinity River and Marine Creek and a small low head dam on Marine Creek will result in a lower pool elevation in Marine Creek, so we'll have a small damn there. You know, a very low head being the differential in water heights there, so it will be very small there.

And then our third change is the incorporation of the Gateway restoration features and river flows reintroduced through the severed Oxbow and Sycamore Creek so as to restore the river and the Gateway/Riverside Oxbow area back to the way it was. And incorporate planting of trees that will result in a restored ecosystem for the area, so that brings in the Gateway Park area there.

So this is the schedule that we're looking at now. Following this meeting, you should provide any additional comments by the end of the 45-day comment period, which is February 19th. The target

dates for the Final Supplement -- Again, this is just a draft that you have out right now. So the Final Supplement to the EIS should be published in late March to early April. And then following that a complete record of the decision around mid May or the end of May sometime with construction scheduled to begin of the fall of 2008.

So that's a pretty aggressive schedule.

These are target dates however, and if substantive comments are presented during this period, the process could be delayed. The project will seek a Record of Decision; the formal document that presents and explains our final decision on the project. Again, that's scheduled for sometime around mid to end of May.

And then just to make sure that everyone understands the way the Army Corps of Engineers constructs projects or does projects is when they receive an authorization from Congress to do so. In other words, we don't just go out and pick the projects that we want to do. We're specifically directed in a law that says the Army Corps of Engineers will construct this project.

We have that for the Central City Project now, and then rely every year on funding in order for us to make that project go. It's not that we receive a pot

of discretionary money. It is an appropriations bill from the Congress that specifically allocates money to a given project and does not allow us to move money around from project to project.

And I think that's important that everyone understands that, because we are very dependent on what the Congress tells us. You know, where they would like us to serve the Nation's interests.

The opportunities for public comment are as shown here. Verbal comments tonight will be recorded and then the transcript prepared. That's why we have the court reporter over to the right. And then you can

provide written comments tonight on those forms that have been provided over on the side tables there, or you can send written comments by February 19th to the Corps Project Manager whose address is on the handout over there.

And you can e-mail comments, again, by February 19th to the address also listed on the handout. And we will incorporate those into the final EIS as we go through and do our review. And then finally, the draft supplement to the EIS is also available for download on our Fort Worth District website, and we put it up here, so I'll list it www.swf.usace.army.mil. It's www.swf.usace.army.mil.

You can also talk to some of our folks back there and possibly get a CD, if we have some to give out here tonight, that has our supplemental EIS on it.

All right. So how are we going to conduct this meeting tonight? We're going to follow these rules of the road. Limit your comments to three minutes, please. That way every one here will have the opportunity -- everyone who wants to make comments will have the opportunity to do so.

What I will do is I will get a stack of the people who registered to make comments and I will call out, you know, someone to come up, and then I'll say who is on deck. And we use baseball terms -- that's something I know, we use baseball terms, you're on deck.

And you will be ready to go when their time is up.

Please no questions, just because I'm not going to be able to answer the questions tonight, I'm not going to debate things with you. This is your opportunity to give us your comments about the project, so take advantage of that, if you would. But again, try to keep your time to three minutes or less if you can.

And please, then at the end of the meeting, though, feel free to go in the back and talk to our staff about whatever specific questions you have.

And I guarantee you they can answer a lot better than I can any way.

We're going to ask that you don't yield your time to others, if you're registered on the card, you speak. If you're not registered on the card, you don't speak. That's just to be fair, again, to everyone. To give everyone their ample opportunity to make their comments known tonight. So we'll have no yielding of time to others.

And just be respectful of comments, as individuals come forward to allow them to be heard. You know, we're going to take each and every comment. We have to address them, we're required to do that, and address them. And they will be in the back of the final EIS once it's published.

And with that, we're going start here with the comments right about now. Again, three minutes per person. We're going to start first with the Mayor. Sir, if you would come up here, please. Mayor Mike

Moncrief, and you're on the clock. And, Danny Scarth, sir, you're on deck.

MAYOR MONCRIEF: Colonel, thank you. Thank you very much. And if you would, before you -- before you start the -- try again.

Thank you very much, Colonel. And before you start the timer, if I might just tell this audience just a little bit about you and your presence here tonight and your service to this country.

Graduate of West Point, the 101st Airborne, served us in Bosnia, he's an Army Ranger, he also just completed a recent tour of Iraq. Thank you, sir, for your service.

(Applause.)

MAYOR MONCRIEF: I wasn't just trying to butter you up, Colonel. As you know in 2006, the City asked the Corps to study the possibility of combining two federally authorized projects, the Trinity River Vision and the Riverside Oxbow Gateway Park restoration. And we were delighted to hear the Corps agreed that such a union was appropriate.

I'm here tonight to express Fort Worth's continued support for combining these projects. Currently the City lacks sufficient flood protection along the Trinity River corridor, we all know that. The flood control component of the TRV Project will allow us to meet and possibly exceed regional standards for flood protection.

What's more, the modified project also will remove levees allowing our citizens to reconnect with our most valuable natural asset, the Trinity River.

Additionally, the project will provide ecosystem restoration, it will increase recreational opportunities and bring greatly needed economic development to a blighted portion of our City.

Adding the Riverside Oxbow and Gateway Park to the overall Trinity River Project will make a great plan even better, and it just makes good sense given the extensive need for park space within our City. And I'm not sure if you're aware, but Fort Worth is 3,500 acres short of regional park land.

Adding this public property to the Trinity River Vision Plan is a remarkable opportunity to funnel millions of federal dollars into East Fort Worth and reduce our park deficit by more than 500 acres. Plus this plan will allow to us complete and exceed the original Gateway Master Plan and continues, not for it, the list of possibilities is amazing, including an ecosystem restoration with more than 70,000 new trees. Becky, 70,000.

Fifteen miles of trails, an amphitheater, playgrounds, athletic fields and basketball courts, boat launches, a skating park, equestrian trails. The list goes on and on. And there is something for everyone, young and old alike, so I applaud the Corps for taking the time to host this meeting, listen to the needs,

wants, and concerns of those who live here.

And I thank all of you who came out tonight on this cold evening to make your voices heard. Colonel Martin, I urge you and the Corps to take note of what our citizens have to say. We look forward to our continued partnership as we move forward with this historic project. Thank you for the time. I'm delighted to be here with my fellow colleagues. I'm glad to be here with Becky, our former colleague, and to represent this great community. Thank you all.

COLONEL MARTIN: Thank you, Mayor. Councilman Scrath, and then, Councilman Burns, you're on deck.

COUNCILMAN SCRATH: Thank you, Colonel. I appreciate you being here. You know, as -- as I drove over here, we had -- I was plenty early, so I came up East First Street, and as I drove past the old former landfill, I looked over and I imagined soccer fields and baseball fields, a trail along the river there and the bridge. And I can just imagine walking my dog on a trail that -- next to the river where I had never been able to be. And I thought of all of the people that would be able to enjoy that scenery today that they just can't get to.

And I came a little bit farther, and I

went by the fields that are there today, and then turned

the corner and came up Beach Street and imagined the equestrian center and the -- the preservation and restoration of what is just a scar today of what the river was 50 years ago, and 70,000 new trees planted there.

And then from this window, you can look out and see where an amphitheater may be some day, and you can just imagine what that will mean to Fort Worth. And I was just grateful that the Army Corps of Engineers, like Fort Worth, is not afraid to dream big, to look at projects. And I realize that you guys are the experts and the engineers, you have seen projects far larger than ours, but -- but you're not afraid to -- to dream with us of what could be by combining these two projects together.

And -- And certainly there are things we could find as individuals that we might not like in the project, and that part is easy. The difficult part is to -- is to stay the course, to see what can be, and to continue to work on this project, because it will have stumbling blocks.

But we appreciate the work that you've done. We hope that you take to heart the comments of the people here tonight, and we -- we really do look

forward to working together as partners with the -- the Regional Water District, the County, the Corps of Engineers, and the City of Fort Worth to make this a possibility. Thank you for your time.

COLONEL MARTIN: Thanks, Councilman.

Councilman Burns, and then, Barbara Ragland, you're on deck, please.

COUNCILMAN BURNS: My name is Joel Burns, and I represent City Council District Nine, and this probably, I guess, is my first public forum to come talk to anyone at. And it's nice to be here.

In addition to living in and representing District Nine, I also at one point lived in Meadowbrook for 12 years. Gateway Park is near and dear to me because of my -- for many reasons, because of its impact for the entire City, but I also became partial to it during the time that -- that we lived here on the east side of Fort Worth.

They're -- We're going to hear a lot of things tonight about why it's important to -- to look at combining these two important projects. It certainly impacts downtown, which is in District Nine. It impacts practically all of our City. One of those things that I've look at critically, I read the Fort Worth Star-Telegram articles, I've talked with the folks from

the Trinity River Vision Authority, and it truly is a situation where we have an opportunity to combine two projects, the sum of which is greater than the individual parts are. And I really want to look at it from that framework.

I also want to remind everyone here about the economic impact of potential -- the potential impact of this project. We're talking about more than 10,000

residential units coming into the City of Fort Worth in its urban core. We're talking about $2.7 million square feet of office, retail and commercial space. Think about the economic impact that makes on our City, think about the lifting of the property tax burden off the shoulders of existing property taxpayers.

This is the engine by which we will lift those burdens as we continue to have a billion-dollar annual budget, continue to pay for employee salaries, continue to pay for retiree benefits, things like that. We have to bring in these new residences, these new businesses, and this new economic generator in order to continue to shoulder that burden.

The net new tax revenue over 40 years is predicted to be over 1.15 billion dollars in real property tax revenues just to the City of Fort Worth, that doesn't include our other taxing jurisdictions, an

estimated 600 construction workers jobs a year and more than 16,000 permanent jobs to this project.

Please think about this in context of its economic impact to this wonderful City, not just to East Fort Worth, not just District Nine, but to our entire City. Thank you very much for having me here tonight.

COLONEL MARTIN: Barbara Ragland, and Vic Henderson is on deck, please.

BARBARA RAGLAND: Colonel Martin, I have a letter from the Congresswoman that I would like read.

"I'm writing to offer my strong support for the Central City Project, Gateway Park Improvement

Plan. I appreciate your holding the public meeting and regret that I am not able to attend in person.

"I believe it's important for our community to understand the benefits of this project, and welcome the opportunity to express my strong support. As the residents of Fort Worth know, revitalization of Gateway Park on the east side is long overdue. Although the park has some amenities, it also has gravel pits, a landfill, an abandoned sewage treatment center.

"This is certainly not what our citizens want for Gateway and for the City. The Central City Project, Gateway Park Improvement Plan allows

construction to begin this year on improvements to the park including building athletic fields, expanding the trail system, planting thousands of trees, and many other improvements.

"Beyond the esthetic and recreational improvements the project will provide, there are other equally important benefits that are important to note. An estimated 80 percent of the levees in the project are inadequate. The project improves flood protection by replacing these levees. There are also strong ecosystem restoration and environmental clean-up improvements included in the plan.

"In addition, this revitalization will result in an estimated 16,000 jobs and a billion dollar increase in tax base for the schools, roads, and other

community projects. It is important to note that federal tax dollars are being used only for public infrastructure, such as the bypass channel and bridges.

"There has also been a significant investment by private industry in this area. In fact, over a billion dollars of private investment has already broken ground, including Radio Shack, Pier One, Trinity Bluffs, LaGrave Development and Tarrant County Community College. It is clear that the project has already spurred economic development in the surrounding area,

and it's reasonable to expect that this is only the beginning.

"Again, thank you for holding this important meeting. I look forward to continuing to work with all stakeholders to advance this project that will transform our City. Sincerely, Kay Granger, Member of Congress." Thank you.

COLONEL MARTIN: Thank you. Vic Henderson is up, and on deck is Ben Loughry, Fort Worth Chamber of Commerce.

VIC HENDERSON: Colonel Martin, and interested members of the community. I want to thank the United States Army Corps of Engineers for giving me and the rest of the public a chance to comment on combining the Trinity River Vision Plan with the Riverside Oxbow Plan. I believe that the rapport that you have produced creates a great opportunity not just for the east side residents of Fort Worth, but residents of all the surrounding communities.

Gateway Park has long been an underutilized piece of land that has badly needed serious environmental restoration. Your report gives us the necessary tool to not only clean up this land but also create an environmental habitat and recreational facility that my grandkids and their kids will be able

to enjoy.

As president of the Tarrant Regional Water District Board, I want to commend the City of Fort Worth for asking for this study. I believe that Randall Harwood and his staff and the Mayor and City Council have done an excellent job of looking past the bare bones of what needs to be done and have decided to take advantage of an opportunity that this City will never have again.

I also want to say to Saji and his staff at the Army Corps of Engineers, thank you for your hard work. Saji, you did an excellent job. In closing, the Tarrant Regional Water District is excited about this project. We look forward to being a partner in moving this project forward. Thank you.

COLONEL MARTIN: Thank you, sir. Now, Ben Loughry, and Devoyd Jennings is on deck, please, sir.

BEN LOUGHRY: Colonel Martin, my name is Ben Loughry, and I'm representing the Fort Worth Chamber of Commerce. In the interest of time, I won't be redundant on some of the points that have been brought

forward. But I would like to formally state that at the Fort Worth Chamber of Commerce our support is unwavering on the Trinity River Vision.

Adding the Oxbow part of this just incorporates another great area of the east side, and it also gives us an opportunity to increase a connection between the cultural district, the downtown, and east side of Fort Worth. We realize there is going to be a cost increase to it. We also realize it's a much needed flood control project, but the key part of it, it triggers an opportunity for economic revitalization of some areas of this town historically that have been underutilized, commercial and industrial areas.

Our estimates as far as economic impact are -- are substantial. We anticipate that it will add about 10,000 households to the City. We anticipate that it will be close to three million square feet of commercial, educational, office and civic space. The impact over the 50-year period that this will occur from the dollars are about 2.1 billion to the -- to the City.

Overall, it's a critical component to our growth. If we do this, it will ensure our continued recognition as being one of our nations most liveable cities. We ask for your consideration in this, we continue our support for it. And thank you for your time tonight.

COLONEL MARTIN: Thank you. Devoyd Jennings, and Urbin McKeever is on deck.

DEVOYD JENNINGS: Thank you, Colonel Martin, for allowing us to be here this afternoon. I'm going to make it real simple. You know Fort Worth -- As the Mayor says, the Fort Worth way is to share in things that make a real difference. Most of you would not go to a book store and buy just one bookend, would you? When you go to a book store, you're buying bookends, you would want the set. Am I right?

It's just like having the Tarrant County Convention Center without the Omni Hotel. The whole of Fort Worth will enjoy what could happen here, so we want two bookends. We want the west side of Fort Worth to enjoy what it has, and we want the east side of Fort Worth to enjoy what it can have. And that's one reason the Fort Worth Metropolitan Black Chamber supports this project, because it's a holistic approach.

The second thing I would like to say to you is that this project as of to date has one of the highest percentages for MWBE participation. Not only will we -- will we be able to look at an opportunity to be vendors, we will look at the opportunity to help build this project.

To date 44 percent of what has gone out has been part of the MWBE goal. That's very important to us as chambers, especially minority chambers. So

when you get a percentage like this where we could not

only employee people, but create other businesses, it creates a holistic approach well -- well worth while. So on behalf of the Chamber, we support this project and we want two bookends. Thank you.

COLONEL MARTIN: Urbin McKeever, and Elaine Petrus is on deck.

URBIN McKEEVER: Thank you, Colonel. My name is Urbin McKeever, and I'm currently the Chairman of the Board of Streams and Valleys. I'm here tonight to deliver a message of support representing our board.

Our nonprofit organization has worked for 37 years to protect, promote and enhance the environment along the Trinity River in Fort Worth. We would like to thank our local governmental agencies, the City of Fort Worth, the Trinity Regional Water District and Tarrant County for being our partners with us to deliver the facilities that are now enjoyed by all of our citizens.

We take very seriously our role as the community liaison for the river helping to articulate their concerns and endorsements of projects to our government leaders. We also respect our lengthy history of association with Gateway Park. Through the years, we have helped provide local funds many times to improve its recreational amenities.

We strongly believe that this modification to the Central City Project will provide our community and region with recreational enhancements that have been presented tonight in the forum, many of which are focused on the Trinity River.

The Streams and Valleys unanimously supports this draft and will provide community assistance to further its progress. Thank you.

COLONEL MARTIN: Thank you. Elaine Petrus, followed by Connie Rensink. I hope I say your names right. If I don't, please forgive me.

ELAINE PETRUS: Thank you for this hearing. As a former Fort Worth Trinity Water Chair and a member of the Streams and Valleys Committee, I'm very supportive of the proposed plan for the much desired and needed recreational amenities for Gateway Park for our families and children in this community as well as the positive environmental improvements.

As the tree lady, I love the 70,000 trees that are going to be planted. But in addition to this, my observation of Gateway Park over the last 10 or 15 years that I have observed it, is that it floods significantly on a fairly regular basis about every five to ten years. And when I say significantly, I mean that we can't use the park.

And as development continues to occur to the west as it does today in Parker County and far west Fort Worth, both in the Clear Fork and the West Fork, my fear is that if nothing is done that flooding will continue and it will be more frequent, and we won't be able to use the park even as much as we do today.

And it's only with the improvements that are outlined in this project with construction

improvements that Gateway will really be able to use its full potential. I'm really excited about the plans for Gateway Park, and I think it's going to be a wonderful asset for this City for years to come. Thank you.

COLONEL MARTIN: Thank you. Connie Rensink, and Greg Ricks on deck.

CONNIE RENSINK: You did say that right. Hello, I'm Connie Rensink, and I'm the president of the River Trails Homeowner's Association, and our office is in fact to the east of the park. To begin with, I would like to say that Fort Wuff, which is the dog park that is currently in Gateway Park, has caused many of the residents of Fort Worth to venture to our side of town, and sometimes that's not been so true.

We're very excited about the development of the master plan that would benefit the entire City, and it will make this park even more of a destination

for everyone in our town. I have a lot of bicycling enthusiasts in my neighborhood, and they are particularly pleased with the improvement of the trails and we hope for more connections to the Quantum Park behind our neighborhood as well. Thank you.

COLONEL MARTIN: Thank you. Greg Ricks, I think. And then followed by Clyde Picht, P-i-c-h-t, I think.

GREG RICKS: My name is Greg Ricks, I'm the newly elected president of the Woodhaven Neighborhood Association, we're also just east of the park, and we're very excited. We've taken a vote and

we're all in favor of this project. And one of the things that we were talking about is the fact that -- as one of our members said, they went to a seminar one time and somebody encouraged them to do something in your life and with your life that will live beyond you.

And many of us are getting a little older now and we're starting to think about those things. And I know I want to do something that will live beyond me. And this is a pretty small thing as one little individual, but I get to be a part of something that's great. I get to be a part of something that is life changing. I get to be a part of something that will define the City of Fort Worth like Central Park did for

New York, like Forest Park has done for the West Side.

We have a real unique opportunity, folks, to do something that will live beyond us. And the Woodhaven Neighborhood Association and me personally are very much in favor of this.

COLONEL MARTIN: And Clyde Picht.

CLYDE PICHT: Good evening, my name is Clyde Picht and I --

COLONEL MARTIN: Hang on. Jeff Davis, you're on deck. I'm sorry. Go ahead.

CLYDE PICHT: Actually, I wanted to tell you that I am for the Trinity River Vision. I am opposed to the Trinity Uptown portion of this. And I think that this Enviromental Impact Statement is deficient in the fact that it does not adequately

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The intent of the Supplemental EIS is to address proposed modification to the location of the Valley Storage Mitigation, relocation of Samuels Avenue Dam, and to compare habitat development measures at the Gateway park/Riverside area to those identified in the original Central City EIS. The environmental clean up needs were addressed adequately in the original Central City EIS and methods to accomplish clean up is not proposed for modification by the Supplemental EIS. The local sponsor and project partners are prepared to clean up environmental issues but have chosen not to use the brown fields program. The Municipal Setting Designation is merely one tool that will be used to manage groundwater contaminantation. TCEQ has approved the City of Fort Worth's procedures for managing groundwater contaminants.

address the environmental clean-up of the 800 acres of the Trinity Uptown area, that should be treated as a brown field rather than a groundwater issue.

I am disappointed that eminent domain and the threat of eminent domain of this project has already forced the closure of one business. Yesterday Southwest Brass announced they're closing their doors because they have lost so much business because of the eminent threat of this project that they could no longer survive.

I think that the -- the park issue --

Well, let me say first. The cost -- The cost issues are a lot of concern to me and a lot of other people. Based on the cost increases of Trinity -- of Tarrant County College, other construction projects in the area, we know that the cost will escalate much greater than the -- the $80 million that linking Gateway Park to this project will cost.

The Gateway Park issue, though, is very troublesome, because there has been money to improve Gateway Park for many years. The City could have embarked on this a long time ago. And as I recall back at the meeting at the East Side Library sponsored by the Trinity Regional Water District last fall they said that the Gateway Park would flood every five years because of this project.

Well, the flooding issue is the fault of Trinity Uptown and the bypass channel. If there were no bypass channel, then we wouldn't have a flooding issue downstream, and we could go ahead and improve Gateway

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The study underway and the Draft Supplemental EIS under review are being conducted to evaluate a solution to assure that the Central City project does not increase 100 year and SPF water surface elevations within the overall study area which for hydrologic purposes extends well downstream of the Gateway Park area.

Park without tying it to this project. Tying it to this project simply means that as this project is delayed, Gateway Park is delayed a lot longer.

So instead of having started five years ago, we're going to be seeing it done maybe 10, 15 years from now, if at all. I would prefer to see the Corps of

Engineers and the City and the Water District put their effort into saving the homes of people like Layla Caraway whose home is about to slide into Fossil Creek, and take care of the real flooding issues that we have in this area instead of putting money into this Gateway Park and the Uptown Project. Thank you.

COLONEL MARTIN: Thank you. Jeff Davis, and then George Vernon Chiles is on deck.

JEFF DAVIS: My name is Jeff Davis, I used to reside at 725 Putter Drive in Woodhaven, and was proud to live there. It was a wonderful place. I'm here personally, but I'm also representing the Board of Directors of Downtown Fort Worth, Inc., who urges you to consider the Gateway Project favorably as you continue to evaluate the Trinity River Program.

Here is some background on Gateway Park. Thirty years ago, for the first time since 1957, the citizens of Fort Worth passed a bond election that included parks. This was the first single member district council and each council member reached out to their constituency throughout the City to support this bond. With state matching funds, a generous gift of

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As noted by Colonel Martin in the opening discussion, the Central City project has been Congressionally authorized for construction and funding has been provided to conduct detail engineering design. In essence the Corps has been directed to construct Central City pending a finding of environmental acceptability and it being technically feasible. To date the Corps of Engineers has only study authority for Big Fossil Creek and lacks authority to construct projects within the Big Fossil Creek area mentioned.

land from the Amon Carter Foundation and the contribution by the City of the odoriferous sewage treatment plant, the citizens and staff lead by the

planner, the first planner of the City of Fort Worth, the City Council understood that this fabulous corridor had to be preserved as an important urban park.

(Break in meeting.)

JEFF DAVIS: I will continue. Now, we have another moment in time, this plan, its scope, utilitarianism, preservation aspects and economic structure is nothing short of brilliant. I must congratulate the Corps of Engineers. Thank you for being good stewards.

And I have a rhetorical question. Can you do roads as well?

Most cities will never have the opportunity that we have here. My personal support of the project is unqualified enthusiastic, and I have great respect for those that talk about the costs, but this project will serve all the citizens of Fort Worth into the next century and beyond. And I have a letter from the Board of Directors of Downtown Fort Worth, Inc.

COLONEL MARTIN: Thank you. George Vernon Chiles, and then Richard Smith is on deck.

SAJI ALUMMUTTIL: They are checking on that alarm. There is nothing going on that's an emergency right now. I will keep guys posted.

COLONEL MARTIN: Saji is a magic worker.

GEORGE VERNON CHILES: First, I would like to thank the Corps of Engineers for the splendid job they did -- the splendid job they did subsequent to the flood of 1949, which has been brought up by supporters of this project.

My interest in this is somewhat more academic. At that time I was about five years old and lived at 2614 Brook, which is the first -- where the contour of lines start getting closer, they get real close right here where we are, we could look down and see the floodwater on Lancaster, but because we were on the first part of the slope, they didn't reach us.

Now, the Corps of Engineers did such a good job on this that it is uncontroverted that $10 million would take care of all of the flood control, just adding to and repairing the levee the Corps of Engineers patched. So I think that pretty well tells us that what's going on out here is about something besides flood control.

What I think it's about is seeing how much of this 84 million can go right back downtown, and I would like thank the council representative from District Nine for bringing out the aspects of this so I don't have to dwell on it. Money, money, money, development, development, development.

this is going to be -- rival Central Park. Now, it's difficult to believe that grownups talking to other grownups could make the kind of statement I'm going repeat, but when a lot of the same people that are for all of this were for Cabela's moving here, it was actually stated that Cabela's would be as big or bigger a tourist attraction than the Alamo. Serious.

Okay. Cabela's had to give back some of the tiff money they got, because none of their promises worked out. What it amounted to was an interest -- excuse me, a low interest loan from the City of Fort Worth.

Now, Cabela's is doing pretty good. If you want visit some of this tiff money, you can go to their new stores, according to their circular in today's Star-Telegram, in Reno, Nevada; Lacy, Washington; Lost Falls, Idaho. Now the citizens of that place will be in charge of paying for more Cabela's stores. So when people start talking about Central Park, let's just remember what was said about Cabela's and how that turned out.

I believe that as much of this that's going to be run -- much of this 84 million isn't going to be wrung out and taken downtown to Trinity Uptown

like I believe a unicorn is going to come looping up to the front doors of City Hall with a check for the whole 84 million stuck on its horns. This is what this is about. It's money, it's development, that's what this is about.

And I envision when the bourbon starts flowing in the suites, I imagine -- the rhetorical question that I'm going to say or one very close to it, how much revenue is generated by bird watching the tower, nudge, nudge, wink, wink. Thank you.

COLONEL MARTIN: Thank you. Richard Smith, and Libby Willis on deck, please.

RICHARD SMITH: Hi, I'm Richard Smith. I'm an architect working with Race Street Properties. Probably why I'm up here is Race Street Properties were a little nervous about getting up here. And I just wanted you to know that we support this project.

The Race Street Project began eight years ago developing Race Street in what is now the Six Points Urban Village. And eight years ago that was pretty big to walk into that area and look at what was there and try to have a vision of what it might be.

Obviously, one of the reasons we support this is the economic benefit to Fort Worth and the whole east side, and some of the efforts that we're trying

to -- trying to achieve.

At the same time though, we also support the rights of those who don't approve of this project, there may be portions of the projects they may not agree with. Because of that discourse and those other opinions that will probably ultimately make this the best project that you can have. Thank you very much.

COLONEL MARTIN: Thank you. Libby

Willis, and Janice Crandall will follow her.

LIBBY WILLIS: My name is Libby Willis, I am the president of the Oak Hurst Neighborhood Association, and by virtue of that also a delegate to the Riverside Alliance, it is our coalition of nine neighborhood associations in Riverside.

I want to make it clear that I am not representing either organization tonight, because neither organization has really yet had time to study the Corps draft EIS, and we will be doing that within the next few weeks and hopefully make comments on that.

I'm also a student and teacher of history, and I think it's important to just say -- and I think it needs to be clear that we should not forget why we are doing this and considering the questions that we are tonight.

The original plan for the Trinity Uptown

Project put flood storage on the west side, on private property. When those properties owners objected and they had environmental consultants study the impact on their property, they threatened to sue, which could have stopped or substantially slowed the project.

At that point, suddenly it was necessary to figure out where else flood storage might occur. That's when the whole issue to combine these projects, the Gateway Park Master Plan, the Riverside Oxbow Restoration with Trinity Uptown came about. The idea came out of necessity about where in the world to put the flood storage.

It did not come about just because someone suddenly realized it would be great to combine federal projects. If this was such a wonderful project that is being presented to combine these projects, the question remains why wasn't this the plan to begin with?

I think it's just important that we keep those things in mind as we move forward. Specifically, as I have begun to look at the draft EIS, we, I think, in Riverside will have a lot of questions, and because you said no questions, it will be rhetorical, but we have questions, which I'm sure you will be providing the answers to.

We have a wonderful neighborhood park,

Riverside Park, it is scheduled for some flood storage as a result of the reconfiguration of this project, so a few of those rhetorical questions are: Why not excavate other publicly owned land in the 100 year floodplain for this project rather than parkland? Why interfere with an amenity, our neighborhood park, when it is available to the public on a daily basis?

It's also important to note that the City has just spent thousands and thousands of dollars to upgrade the lights and the ball fields in Riverside Park. And the question is: How do we justify spending the taxpayers' money to dig a hole in the park which has just seen major improvements? We'll have to take those out to dig a big hole and start over. The question is: How we can justify that?

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Multiple sites have been evaluated for valley storage mitigation. The modified alternative as shown in the Supplemental EIS provides multipurpose benefits that cannot be accomplished in other areas. For example, the establishment of the dense riparian forest cannot be accomplished within the levee reaches of the river due to hydraulic constraints. The proposed construction at Riverside Park would require exclusion to the public for a short time, but redevelopment of the park will be completed promptly.

Now, the big hole may be a nice hole for excavation, but it's still a hole. And the question remains: How can you justify compromising the Trinity River Greenbelt with this big hole? Proposed improvements, which could come with the big hole could make our neighborhood park a regional park, that may or may not fit with our vision, the neighbors, the property owners, the residential investors, in the area.

And so I think that we need to also consider that as well as the impact of the project on

our beloved Oak Hurst scenic drive and various impacts about how that will affect our whole area. I'm concerned about the lack of public input that has been sought from the residents of Riverside on this, and I think a lot of us want to participate in plans for our neighborhood park, Riverside Park.

And so I hope that these concerns and others that we will bring forward with the flood storage that is proposed and the impact on our neighborhood will be seriously considered and we will find ways to mitigate these.

I want to also note that I did note -- I began reading today online the 102 page draft EIS. I have made a copy of it on disk, and tomorrow I'm going to take it Kinko's and have a copy made -- a hard copy, and I'm going to keep reading until I can read the whole document.

But I do think that it will be important that all of us working together to find answers and

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 10:21:26 AM -06'00'

Riverside Park is a Community park and even with the proposed changes it will remain accessible to the community. The proposed changes would replace the existing facilities with better newer facilities. The greenbelt is not compromised by excavation. The green belt would still remain intact. The proposed grading scheme would make the river more accessible to a diverse range of potential recreational uses originating from Riverside Park. Since the project has not been fully designed or master planned by the City of Fort Worth there are a range of potential opportunities to enhance the park.

solutions in mitigation to these very important questions as this federal project affects us locally, where we live, which in our case is Riverside. Thank you very much.

COLONEL MARTIN: Thank you. Janice Crandall, and Lee D. Smith is on deck. Okay. And then

Mr. Lee D. Smith, please, followed by Mark Presswood. Or if you've written comments on the back of these, these will go into the record also, so some folks did leave comments on the back of them. Okay. Go ahead.

LEE D. SMITH: Thank you, Colonel. I'm Lee Smith, I'm with the Fort Worth Rowing Club. And we're here to speak in favor of combining these projects. With the Fort Worth Rowing Club, we row on the water right out the window, if it was daylight you could see us rowing. We live here, this is our home, and we are really talking about where we live.

Last year we had 1,480 passenger seats in our boats on the river, so we are a user of the river. I'm in favor of this program because it increases the conservation in the Oxbow. I'm in favor of this combination because it increases the use of the river and its shores. But most important, I'm in favor because it is a great idea. Thank you.

COLONEL MARTIN: Thank you. Mark Presswood, and then Layla Caraway is on deck, please.

MARK PRESSWOOD: Colonel, first I've got to tell you that I'm very appreciative of your use of

baseball terms. My name is Mark Presswood and I'm representing the Fort Worth Cats Baseball Team. I'm here today on behalf of the principal owner, Carl Bell.

The effort to clean up the Trinity began 30 years. The river twists and turns from the west central direct, the Riverside Oxbow to our neighbors in the east. We support any and all developments that will enhance the Trinity and make access easier for recreation and enjoyment.

We trust the Corps of Engineers to bring value to this project and make the vision a reality. The Fort Worth Cats have always opened our gates to the river and access to LaGrave Field where people can come enjoy our outdoor venue and the bike and hike trails behind the field.

We're proud to be a pioneer in this effort in the Central District and fully support the funding efforts to the Riverside Oxbow and the enhancements to bringing the Trinity back to the people of Fort Worth. Thank you, sir.

COLONEL MARTIN: Thank you. Layla Caraway, and on deck is Thad Brundrett. Hopefully I said that right. Layla, please.

LAYLA CARAWAY: Yes. I just wanted to address everyone. I find it somewhat embarrassing that our elected officials would pass this project on a bill that was called Foreign Operations Export --

COLONEL MARTIN: Can you pull your mike

in so that -- I'm having a hard time hearing you.

LAYLA CARAWAY: That it was passed on a bill called Foreign Operations Export Financing and Related Projects. It was also -- Funding was approved prior to an Impact Study being done, which from what I understand is a requirement. It's also appalling that this is taking precedent in a county where there has been major flooding this year where there are many left homeless, parks left standing empty because they are not able to be used. They were flooded during the tornado, which was April 13, and a child actually lost her life.

So I'm having a hard time understanding why the Corps studied our area for seven plus years and nothing has been done. You were handed this addition to add to this in June, '06, and we're going to be ready to go by fall. So I'm getting conflicting messages on that as well as on what I hear on flood control, but I hear economic development, one of the councilman adding that 10,000 housing units will be -- will be coming in with this project.

And that makes the question: How many will be taken by eminent domain from the people that are already here and probably don't have the resources to stop it? And as all of you know, when you do building upstream that affects people downstream. The building

and the development is what has partly affected us

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Sequence number: 1
Author: M2PLRBKC
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For clarification, the Big Fossil Creek Study was initiated February 2001 and the studies leading to the construction authorization of Central City began in July 2002. As a point of further clarification as indicated in Colonel Martin's opening address, the Corps of Engineers was directed by Congress to construct the Central City Project in December 2004. The proposed modifications are being addressed at this time for technical feasibility and environmental acceptability. As fellow citizens we share the concern for health and safety and will respond as directed by Congress.

downstream, it's partly what affected the trailer park in Haltom City downstream.

And again, over a hundred people are still homeless seven months later, that family lost their little girl. And all of it could have been prevented with proper flood control measures. So I think instead of spending $519,205,000 on projects, we should spend the money on the -- in the county where it's needed. Thank you.

COLONEL MARTIN: Thank you. Thad Brundrett, and Mark Bielamowicz, I hope I said that right, on deck.

THAD BRUNDRETT: Thank you for allowing me to speak tonight. My name is Thad Brundrett, and I'm a resident of the City of Fort Worth and city executive for Carter Burgess, but I'm here speaking as a board member of the Greater Fort Worth Real Estate Council.

The Greater Fort Worth Real Estate Council represents the commericial real estate profession which comprised to develop within the legal, financial title of engineering, architecture and construction partners. Over 225 local companies and organizations comprise the council membership.

Your favorable consideration of the

Gateway Park Improvement Plan is respectfully requested. We need your favorable consideration so our Oxbow restoration project can be funded again. This project is very important to our City, the east side of our community and Gateway Park.

Our City has long sought improvements to this area and in Gateway Park. Now unlike any time in the past, we really have an opportunity to implement and fund a plan, so we need your partnership.

We need to replace the gravel pits and the old sewage treatment center with new athletic fields, outdoor entertainment and the planned 15-mile trail system. We can accomplish this and much more through our partnership with you.

From our successful partnership, we can expect responsible development on the east side of town. In fact, the east side will experience the renaissance that will benefit the citizens without encroaching on the citizens.

There is strong community support, there is will power in the initial proofs of our project, which will benefit so many. It is time to move forward. We all stand ready to make our partnership the envy of communities throughout the country. But more importantly, our partnership will serve our citizens,

especially those here in East Fort Worth.

On behalf of the Greater Fort Worth Real Estate Council, we encourage you to join us in the productive partnership. Thank you very much for the opportunity to speak.

COLONEL MARTIN: Thank you. Mark Bielamowicz, and looks likes James. That's all it says.

MARK BIELAMOWICZ: I'm Mark Bielamowicz,

I reside in Cedar Hill, Texas. I was the mayor at one time when my counterpart was Cliff Overcash here in Fort Worth, that was 34 years ago. I own property on East Vickery, and I hear -- I find it amazing that everyone thinks that we need to do something to beautify what's already beautiful.

I have, like I said, property on East Vickery Street, and my intent is to revitalize three warehouses that -- that I bought and to move my own business in there. The thing that I find real wrong about this project is that our national debt -- each one of you, Colonel, also, and every one of you in here owe $33,000 on the national debt.

And we talk about young people enjoying the river, but I don't know -- somewhere, somehow we're going have to start addressing the cost of government. And we are not funneling dollars, federal dollars, into

our neighborhood, we're funneling federal debt into our neighborhoods.

Sometimes I wonder why I am so tired, and it's because of working to scratch out and to get past all this debt and government regulation. Now I really understand why Amon Carter used to carry a sack lunch to Fort Worth -- I mean, from Fort Worth to Dallas when he visited Dallas, because this City has so much more character than any place, I think in North Texas, South Texas.

And I have seen wildlife -- I purposely drive through Gateway Park in that area, even when we

had all these torrential rains, I used to park my truck beyond the -- the bridge and watch the water flow under the bridge, you know, just watch the river run.

I think that it's the -- it's a beautiful setting. I didn't know it was in such disgrace or needing special treatment. What -- What is there right now is just magnificently beautiful, and I don't think -- I think the citizens of Fort Worth if they want to do this, they need to vote on it themselves, and myself. If it's voted on, I would have to pay that portion, too.

But to go to the federal government and get 400 million dollars when we already, each citizen,

owes $33,000 plus all the other debt we have created, consumer debt.

And then even when the drug dealers in Italy want to take Euros, and some of the Middle Eastern countries want to take Euros instead of dollars for their money -- I mean, for the oil, we have got to really start questioning how much government we need.

And I hope you-all can think of this and consider that. Thank you.

COLONEL MARTIN: Thank you. James, and on deck is Jason Smith. Okay. Jason Smith. James is not here. Jason Smith are you here?

JAMES COLE: I think that's me.

COLONEL MARTIN: You're James?

JAMES COLE: Yes.

COLONEL MARTIN: Okay. Thanks.

JAMES COLE: I'm James Cole, 341 Nursery Lane. I live and work in Fort Worth. I submitted my comments to the record, but I am going to read the final paragraph to clear some things up. Some cynics have said it may be too costly. Well, the opposite is actually true.

The combined project as now envisioned will assure a long term, high quality of life, environmental quality and a sustainable economy for the

Central City. The project will more than pay for itself. Thank you.

COLONEL MARTIN: Thank you. Jason Smith I believe is gone, right? Not here. And Ross Stephens.

ROSS STEPHENS: I am Ross Stephens with Link our Trail city to city, north, south, east, west, the shortest distances. I would just like everybody here to know that we would like to work together with everyone on linking our trails, trying to link up Arlington, Fort Worth, Haltom City, Richard Hills, North Richland Hills and Grand Prairie.

We're looking at the sidewalks, we're looking at the bicycle routes, we're looking at the off-street trails and utility lines, as well as the river trails. Basically, we want to go north, south, east and west of the lands central section, which is the central section for 16 counties or more and that being hundreds if not thousands of people will be bicycling here.

The north, south cross is Handley Ederville, Bridgewood Drive and Randol Mill Road. The distance in Fort Worth is one to two miles to link up to the other cities. Each city has about a similar or shorter distance to link up, so literally we will have over a hundred miles of trails to hike and bike on.

Which means people can commute to and from work, recreate, and have a great improvement in their life and in the quality of life in Fort Worth. Also, in some of the other cities they have activities that go on once a month, sometimes once a year, sometimes four cities get together to have activities and events. We would also like to see that take place as well.

Council of Governments, North Central Texas Council of Governments also supports the idea of this effort because it means we can cut down on the number of traffic accidents, number of vehicles out there, clean up our air, which helps us live, divying up our federal money for highways and what have you. It's also the cheapest thing we can do to improve the quality of life throughout the region.

And from my side of town, what we also say that they would really like to be able to have access to Gateway Park. They have been waiting decades for that access. And that's part of the reason I got back into this. Any way, we would just like to work with you in linking up our trails. We are very, very

positive in wanting to have them linked up.

Also, we have a volunteer effort where we also build trails. Whatever we can do to get people out

safely as soon as possible, we'll need people from home -- you can get outdoors and use these areas seven days a week. And that is very exiting to a lot of people.

And I have talked to many thousands, over 6,000, so I will give you an idea. That's basically it. Thank you-all.

COLONEL MARTIN: That was our last comment registration form. Does anyone have a form that for some reason we did not get to? If you would like to bring it up here now and make your comment. If not, we'll wrap it up. Any other comments out there? All right.

Well, thank you for coming here. Remember this is day 20 of the 45-day period ending February 19th. Get your comments in by then so we can address them. Thank you for showing up tonight.

(Public meeting concluded at 8:03 p.m.)

STATE OF TEXAS)

COUNTY OF TARRANT)

This is to certify that I, Carolyn H. Gayaldo, Certified Shorthand Reporter, reported in shorthand the proceedings conducted at the time and place set forth in the caption hereof, and that the above and foregoing 54 pages contain a full, true and correct transcription of the Public Hearing.

Witness my hand and seal of office on this the 28th day of January, 2008

_____

Carolyn H. Gayaldo, CSR
Expiration Date 12/09
Allied Court Reporters
Firm Registration No. 287
5208 Airport Freeway, Ste 210
Fort Worth, Texas 76117
(817) 335-5568

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Mayor Mike Moncrief

Representing: FW

Mailing Address: _____

Daytime Telephone: _____

E-mail Address: _____

- ☑ I support the Central City Project – Gateway Park Improvement Plan
  - ☑ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☐ My written comments are on the back of this form
- ☐ I oppose the Central City Project – Gateway Park Improvement Plan
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Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
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COMMENT REGISTRATION FORM

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January 24, 2008

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- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Joel Burns

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Mailing Address:

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- ☑ I **support** the Central City Project -- Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

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January 24, 2008

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- ☑ I support the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

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E-mail Address: blaughry@iwr.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

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E-mail Address: djennings@fwmbcc.org

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

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- [x] I support the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

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January 24, 2008

Name: Elaine Petrus

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E-mail Address: _____

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

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- [x] I support the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

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January 24, 2008

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- ☐ I support the Central City Project – Gateway Park Improvement Plan
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January 24, 2008

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- [x] I support the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Lee D. Smith

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- [x] I support the Central City Project – Gateway Park Improvement Plan
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Mark Presswood

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☑ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Thad Brundrett

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- ☐ I **support** the Gateway Park/Central City Project
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COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: JAMES

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Daytime Telephone: 817.690.0185

E-mail Address: JFOALE@sbcglobal.net

- ☑ I support the Central City Project – Gateway Park Improvement Plan
  - ☑ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☐ My written comments are on the back of this form
- ☐ I oppose the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
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Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jason Smith

Representing: me

Mailing Address: 2257 College Ave FW 76110

Daytime Telephone: 817-721-6058

E-mail Address: supergirl_19@charter.net.

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☑ I wish to present oral comments during the public forum (limit: 3 minutes) maybe
  - ☐ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: ROSS STEPHENS

Representing: LINK OUR TRAILS CITY TO CITY N W + E S

Mailing Address: 4701 THREE RIVER COURT FORT WORTH, TX 76103

Daytime Telephone: 817-429-2610

E-mail Address:

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☒ I wish to present oral comments during the public forum (limit: 3 minutes)
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jack Kendrick

Representing: Streams & Valleys

Mailing Address: 1145 Clara St

Daytime Telephone: 817 / 924-2800

E-mail Address: kendrick_jack@charter.net

- ☑ **I support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Price Hulsey

Representing:

Mailing Address: 5124 West Vickery Blvd, Fort Worth, TX. 76107

Daytime Telephone: 817 - 924-0148

E-mail Address: pricehulsey@fwlsco.com

- ☑ **I support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Robin Fuller

Representing: Fort Worth Rowing Club

Mailing Address: 6116 Hillside Dr Kennedale, TX 76060

Daytime Telephone: 817-829-3387

E-mail Address: robinj530@yahoo.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 3 minutes)
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- [ ] I oppose the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Kathy Lord

Representing: Fort Worth Knows

Mailing Address: 2021 Forest Park Blvd.

Daytime Telephone: 817-207-0428

E-mail Address: kdlord@yahoo.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Justin McWilliams

Representing: Race Street Properties

Mailing Address: 2909 Race Street

Daytime Telephone: 817 - 222 - 2300

E-mail Address: JustinMcWilliams@sbcglobal.net

- ☒ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☒ I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

Page: 72

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/20/2008 2:28:42 PM -06'00'
Reviewers note: No comments were provided on back of this form.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Tim Petrus

Representing:

Mailing Address: 3736 Country Club Circle

Daytime Telephone: (817) 924-8898

E-mail Address: Tim_Petrus@xtoenergy.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Curtis Carley

Representing: Ft Worth Rowing Club

Mailing Address: 8120 Salt River Rd, Ft Worth, 76137

Daytime Telephone: 817-245-6316

E-mail Address: curtiscarley@sbcglobal.net

- ☑ I support the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Kay Smith

Representing: TX Reentry Services, Inc

Mailing Address: 3001 Race ST, Ft Worth, TX 76111

Daytime Telephone: 817. 834. 2833

E-mail Address: KSmith@TXRS.org

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Lyn Rannebarger

Representing: Swanky Shack

Mailing Address: 2815 Race St.

Daytime Telephone: 817-238-3214

E-mail Address: lrannebarger@yahoo.com

- ☒ **I support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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- ☐ **I oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Carolynne Cowell

Representing: Ideal Printers

Mailing Address: 2801 Race St.

Daytime Telephone: 817-834-2856

E-mail Address: idealpri@sbcglobal.net

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: James Conwell

Representing: Neighborhood home owner

Mailing Address: 3824 Kearby St.

Daytime Telephone: 817- 688-6663

E-mail Address:

- [x] **I support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Elizabeth Espino

Representing: Reunion Title

Mailing Address: 3009 Race Street

Daytime Telephone: 817-624-3352

E-mail Address: eespino@reuniontitle.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Craig Campbell

Representing: Dan Campbell Inc

Mailing Address: 3025-29 Race St Fort Worth TX 76111

Daytime Telephone: 817-834-6277

E-mail Address: EZESCTOD at gmail.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: JIM COOK

Representing: FWBC

Mailing Address: 5913 RIVERBEND PLACE FT WORTH, TEXAS 76112

Daytime Telephone: 817-451-7390

E-mail Address:

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Robert Webb

Representing:

Mailing Address: 3409 Monticello Ft Wth

Daytime Telephone: 214- 528-1290

E-mail Address: Rob webby @ sbc global. Net

☑ I support the Central City Project – Gateway Park Improvement Plan

NO ☐ I wish to present oral comments during the public forum (limit: 3 minutes)

☐ My written comments are on the back of this form

☐ I oppose the Central City Project – Gateway Park Improvement Plan

☐ I wish to present oral comments during the public forum (limit: 3 minutes)

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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Estela Ramirez

Representing: Farmers

Mailing Address: 2911 Race St.

Daytime Telephone: 817-881-4200

E-mail Address: eramirez1@farmersagent.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Kristen Laramore

Representing: Fort Worth Rowing Club

Mailing Address: 4109 Locke Ave, F.W. 76107

Daytime Telephone: 817.735.7334

E-mail Address: _____

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Erich Casio

Representing: Fw Rowing Club.

Mailing Address: 4713 Ivanhoe Dr Fw TX 76132

Daytime Telephone: 817-909-7838

E-mail Address: ecasio@alliedhome.net.com

☒ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: LOFTIN WITCHER

Representing: STREAMS & VALLEYS

Mailing Address: 3985 W. VICKERY 76107

Daytime Telephone: 817/269-1144

E-mail Address: L.WITCHER@CHARTER.NET

- [x] I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Sarah Williams

Representing:

Mailing Address: 5312 Northcrest Road, Fort Worth TX 76107

Daytime Telephone: 817-926-9216

E-mail Address: sdjw1@aol.com

☒ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Fort Worth Hispanic Chamber of Commerce

Representing: Rosa Navajar

Mailing Address: 1327 N. Main St

Daytime Telephone: 817.625.5411

E-mail Address: rosa.navajar@fwhcc.org

- ☑ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

Page: 88

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/20/2008 2:31:14 PM -06'00'
Reviewers note: No comments were provided on the back of this form.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: JIM BECKMAN

Representing: SELF

Mailing Address: 316 W. 6TH ST. FT. WORTH 76107

Daytime Telephone: 817-885-7808

E-mail Address: jim.b.@kprop.com

- [x] I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Martha Granger

Representing: Granger Group

Mailing Address: 715 Jones #201 Ft Worth TX 76102

Daytime Telephone: ~~817 885~~

E-mail Address: marthamgranger@yahoo.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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- ☐ ~~I oppose the Central City Project – Gateway Park Improvement Plan~~
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Holly Cocanower

Representing:

Mailing Address: 3114 westcliff Rd W. Fw TX 76109

Daytime Telephone: 8179212298

E-mail Address: rdoorholly@aol.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Rob Cochnar

Representing: HGC Residential Development

Mailing Address: 3114 Westcliff Dr W Fw TX 76109

Daytime Telephone: 817-923-6-5172

E-mail Address: robc@hgcdevelopment.com.

☒ I **support** the Central City Project – Gateway Park Improvement Plan

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☐ I **oppose** the Central City Project – Gateway Park Improvement Plan

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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Nina Hutton

Representing:

Mailing Address: 3604 Suffolk Dr Ft Worth TX 76109

Daytime Telephone: 817-885-2274

E-mail Address:

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Linda Rutherford

Representing:

Mailing Address: 2011 Arborcrest Dr. Arlington, TX 76012

Daytime Telephone:

E-mail Address:

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 3 minutes)
  - [ ] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jim Rutherford

Representing:

Mailing Address: 825 Sunset Oaks

Daytime Telephone: 817-703-9951

E-mail Address: JimRutherford1221@Yahoo

- [x] **I support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Tommy Simmons

Representing: F/W Rowing Club

Mailing Address: 2020 Windsor

Daytime Telephone: 817 280 2132

E-mail Address: anawrist@hotmail

- [x] I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Julie Kleberg

Representing: Self + family use / Stream Valley

Mailing Address: 104 Hazelwood Dr. 76107

Daytime Telephone:

E-mail Address:

- ☐ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Gwen Perez

Representing: Fort Worth Rowing Club.

Mailing Address: 2938 54th Ave

Daytime Telephone: 817-921-0509

E-mail Address: ggp@frese.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jerry Miller

Representing: FW Zoning Commission

Mailing Address: 4125 Mitty Ridge TX 76137

Daytime Telephone: 817 485 2268

E-mail Address: Jeremil@aol.com

- ☑ I **support** the Central City Project
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jim Rutherford

Representing: Rutherford Property Co.

Mailing Address: 6731 Bridge St #123

Daytime Telephone: 817 - 703 - 9951

E-mail Address: Jimrutherford1221@yahoo.com

- [x] I **support** the Central City Project
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: George Vernon Chiles

Representing:

Mailing Address: 2800 Jennings Fort Worth Texas

Daytime Telephone: None

E-mail Address: None

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: LIBBY WILLIS

Representing:

Mailing Address: 2300 PRIMROSE FW 76111

Daytime Telephone: 817/838-8140

E-mail Address: libby59@sbcglobal.net

- ☐ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: MARK Bielawiecz

Representing: MYSELF

Mailing Address: 417 McKinley CEDAR HILL TX

Daytime Telephone: 972 978 7480

E-mail Address:

- ☐ I support the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Layla Caraway

Representing:

Mailing Address: 5764 Fenway Ct 76137

Daytime Telephone: 817-307-1374

E-mail Address:

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

COMMENT REGISTRATION FORM

Fort Worth Central City Project

January 24, 2008

Name: Clyde Picht

Representing: Citizens of Fort Worth

Mailing Address: 5016 Miranda Lane Ft Worth 76123

Daytime Telephone: 817 294 0396

E-mail Address: cpicht@landslifeclyde.com

- ☐ I support the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102

E-mail: Saji Alummuttil@usace.army.mil

US Army Corps of Engineers
Fort Worth District

How are we doing? Please tell us!

Your comments/suggestions are important to us. Please share your thoughts by completing this card and dropping it in the mail, or send us an E-mail to *Public.Affairs@swf02.usace.army.mil*
Although the personal information requested below is optional, we will need it if you wish a response. Thank you!

Project/Subject:

Comments:

I fully support the Trinity Uptown Project and proposed expansion to include the Dixon/Gateway Park area as a property owner.

(Optional)
Name: Lewis Wall
Address: 301 Commerce, Suite 1500, Ft Worth TX 76102
Phone and/or E-mail Address: lwall@bwwlaw.com
Organization:

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Eric Fox

Representing: myself

Mailing Address: 3513 Overton Park Drive East, Fort Worth, Texas 76109

Daytime Telephone: 817-319-0132

E-mail Address: eric.v.fox@lmco.com

X I **support** the Gateway Park/Central City Project
- ❑ I wish to present oral comments during the public forum (limit: 2 minutes)
- ❑ My written comments are on the back of this form

❑ I **oppose** the Gateway Park/Central City Project
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E-mail: Saji.Alummuttil@usace.army.mil

US Army Corps of Engineers
Fort Worth District

How are we doing? Please tell us!

Your comments/suggestions are important to us. Please share your thoughts by completing this card and dropping it in the mail, or send us an E-mail to *Public.Affairs@swf02.usace.army.mil*
Although the personal information requested below is optional, we will need it if you wish a response. Thank you!

Project/Subject: Gateway Park/Trinity system Project

Comments: As it appears I am in support of this project

(Optional)
Name: Tim LaPoint
Address: 1109 Samuels Ave
Phone and/or E-mail Address: tim.lapoint@tccd.edu
Organization:

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Connie Rensink

Representing: River Trails HOA

Mailing Address: P.O. Box 185014 Fw TX 76181

Daytime Telephone: 817-360-1500

E-mail Address: Conniesteve@charter.net

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

Connie Rensink
River Trails HOA

We are excited to see the further development of this park. We are particularly interest in trails to connect Gateway to Quannah park.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Sandra + George Everett

Representing: ourselves – residents

Mailing Address: 4218 Kenwood Ct. Fort Worth TX 76103

Daytime Telephone: 817-535-2699

E-mail Address: georgeeverett@sbcglobal.net

- ☐ I support the Central City Project – Gateway Park Improvement Plan
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Conditional

See comment/question on reverse.

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E-mail: Saji.Alummuttil@usace.army.mil

Sandra and George Everett
Residents

In light of all the activity - construction, injectionwell, etc. — related to gas well drilling by Chesapeake on land adjacent to Gateway Park[1] at the intersection of Oakland Blvd and First St, an environmental impact study of the effects of runoff from this industrial/construction area and interaction with the flood plain in Gateway Park & surrounding area is essential prior to the decision to go forward with the wonderful plans for improving the park.

Page: 112

Sequence number: 1
Author: USACE
Subject: Note
Date: 2/25/2008 10:55:43 AM -06'00'

This site is downstream of Gateway Park and is not expected to detrimentally impact project features located in Gateway Park. The cumulative impacts of oil and gas exploration have been included within the Draft Supplemental EIS and this site specific information will be considered during the preparation of the Final Supplement.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Debbie L. Sheffield

Representing: _____

Mailing Address: 6628 Brookshire TR NRH TX 76182

Daytime Telephone: _____

E-mail Address: _____

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

How and why would you, the Corps, even consider re-routing a river when Big Fossil Creek has had to be "studied" for more than a decade

Page: 114

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 10:59:21 AM -06'00'

The Corps of Engineers has been directed by Congressional authorization to implement the Trinity River Vision master plan which includes the bypass channel provided it is technically sound and environmentally acceptable.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Patricia Kuehn

Representing: White Lake Hills neighborhood

Mailing Address: PO Box 100224, Fort Worth, TX 76185

Daytime Telephone: 817-898-0231

E-mail Address: patkuehn@hotmail.com

- [x] **I support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

Has any thought been given to incorporating White Lake, on the east side of Oakland between I-30 and 1st St, into the Gateway Park project or into the FW Park system? It would seem to be in an ideal location to continue the park system trails and amenities.

Page: 116

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:48:23 PM -06'00'

The current City of Fort Worth Gateway Park Master plan does not include White Lake. The current plans do not include expanding Gateway Park beyond the current master plan boundaries.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: JACK KUEHN

Representing: SELF

Mailing Address: PO BOX 100224, FTW, TX 76185

Daytime Telephone: 817 878 0231

E-mail Address: JACKKUEHN@HOTMAIL.COM

- ☐ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

1

CAN WHITE LAKE BE INCLUDED IN THE OVERALL PLAN?
IF NOT, WHY?

THANKS

Page: 118

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:49:19 PM -06'00'

White Lake was not considered for incorporation into the project plan due to its physical separation from the Gateway Park area. Habitat development and recreational opportunities of the Gateway Park area had been demonstrated in prior evaluations.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Janice Crandall

Representing: ~~28~~ Fort Worth Rowing Club

Mailing Address: 2816 N. Creekwood Dr., Grapevine, Tx 76051

Daytime Telephone: 972-998-3600

E-mail Address: Crandall.wayne.janice@verizon.net

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E-mail: Saji Alumnuttil@usace.army.mil

I row on the Trinity River and support this project. I believe the proposed changes will be good for the environment, economy & city of Fort Worth.

Page: 120

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 4:57:15 PM -06'00'
Thank you for your comment on the benefits of the project proposal.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jill Gurtatowski

Representing: Fort Worth Rowing Club

Mailing Address: 4029 Eldridge St FW 76107

Daytime Telephone: 682-885-4968

E-mail Address: jgurt@Sbcglobal.net

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E-mail: Saji Alummuttil@usace.army.mil

We (Fort Worth Rowing Club) support the Central City Project Gateway Park and look forward to be an active partner in this endeavour.

Page: 122

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 4:58:07 PM -06'00'
Your support for the recreational features of the project is noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: DAVID LIVINGS

Representing: SELF (FWRC)

Mailing Address: 2120 WILSON DRIVE

Daytime Telephone: 817 265 3664

E-mail Address: _____

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E-mail: Saji.Alummuttil@usace.army.mil

ENTHUSIASTIC ABOUT PLAN. !

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Wanda Conklin

Representing:

Mailing Address: 1755 Markel Fort Worth 76103

Daytime Telephone: 817-536-6993

E-mail Address: donandwanda@charter.net

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji Alummuttil@usace.army.mil

Good Project. Implemation a bit iffy -
Good luck

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: DONALD BOREN

Representing: WEST MEADOWBROOK N.A.

Mailing Address: 1755 MARTEL AVE FW 76103

Daytime Telephone: 817-451-6276

E-mail Address: KK5029 SBCGLOBAL.NET

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
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E-mail: Saji.Alummuttil@usace.army.mil

This project has the potential to change Gateway Park into a "Fort Worth Gem"

I am excited about our ability to leverage our dollars.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: MARK HILL

Representing:

Mailing Address: 4405 DUNWICK LANE, FORT WORTH, TX 76109

Daytime Telephone: (817) 923-7273

E-mail Address: mah1121@hotmail.com

- ☑ I **support** the Gateway Park/Central City Project
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E-mail: Saji.Alummuttil@usace.army.mil

As our community enjoys the benefits of the Barnett Shale as well as deal with challenges to our infrastructure the production of this resource presents, it is imperative that this generation continue to execute on projects beneficial to our cultural and natural environment. The Gateway Park Improvement Plan, while creating new and expanded recreational opportunities for our long neglected east side, positively impacts and restores an ecosystem long in need for address. Generations to come, if here today, would unequivocally speak loudly in favor of the Plan. As stewards for those yet unborn, we should do likewise.

Page: 130

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:04:08 PM -06'00'
Your comment on the benefits of the proposed project to the Gateway Park area are noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Alan Ray

Representing: Ft Worth Rowing Club

Mailing Address: 3004 Handley Dr

Daytime Telephone: 817 496 4752

E-mail Address: _____

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☐ My written comments are on the back of this form

Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

1

I support the Central City - Gateway Park Improvement Plan. It is a truly visionary plan and I look forward to assisting in any way + authorizing this wonderful park system

Page: 132

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:04:39 PM -06'00'
Your support for the project is noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: ROBERT CROW

Representing: NEIGHBORHOOD ASSOCIATION ON SOUTH LAKE WORTH

Mailing Address: 3916 BLUE HERON COURT, FT WORTH 76108

Daytime Telephone: 817-367-6595

E-mail Address: _____

☒ I **support** the Central City Project – Gateway Park Improvement Plan
- ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
- ☒ My written comments are on the back of this form

☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
- ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
- ☐ My written comments are on the back of this form

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Written comments may also be submitted as follows:

Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

- I AM ROBERT CROW, A MEMBER OF THE STEERING COMMITTEE FOR THE NEIGHBORHOOD ASSOCIATION ON SOUTH LAKE WORTH AND A MEMBER AND SUPPORT OF THE LAKE WORTH ALLIANCE.
- AS SUCH I FULLY SUPPORT THE OBJECTIVES OF PRESERVING, PROTECTING AND ENHANCING FORT WORTH'S INVALUABLE AND IRREPLACEABLE GREENSPACE AND NATURAL HABITAT AREAS FOR RECREATIONAL USE AND WILDLIFE SANCTUARIES

1

Page: 134

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:05:35 PM -06'00'
Thank your for your comment supporting the project objectives.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Linda Wise

Representing: Race Street Barber Shop

Mailing Address: 2921 Race Street

Daytime Telephone: 817-239-8866

E-mail Address: linda_wise22@sbcglobal.net

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

I think improvements to Gateway Park will help our area!

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: NINA PETTY

Representing: INNOVATIVE DEVELOPERS INC

Mailing Address: 930 West 1st Street 76102

Daytime Telephone: 817 564 3591 817 335 4500 ext 110

E-mail Address: ninapetty@idi-tx.com

- ☐ I **support** the Gateway Park/Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☒ My written comments are on the back of this form
- ☐ I **oppose** the Gateway Park/Central City Project
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

This project is extremely important to our entire community and particularly east ~~Fort~~ Worth. It will provide important downstream storage and in addition will provide park facilities and recreational areas for our city.

My company, Innovative Developers Inc. and I personally, support the expansion of Gateway Park. I am very supportive of the Trinity River Vision and the Gateway Park plan is an important component of this program.

Nina B. Potty

Page: 138

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:06:45 PM -06'00'
Thank you for supporting the multipurpose objectives of the project.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Aimee Casey

Representing: Neighborhood Home Owner

Mailing Address: 3713 Eastridge Drive

Daytime Telephone: 817.296.4592

E-mail Address: aimee7casey@yahoo.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

1

great for improvement of the community and the living conditions in the neighborhood

Page: 140

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:07:44 PM -06'00'
Your support for the project features and benefits are noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Daniel Milburn

Representing: Fort Worth Bicycling Association

Mailing Address: 3550 Crawford Pl. So. Ftworth, TX 76132

Daytime Telephone: 817-926-2950

E-mail Address: dmilburn@sbcglobal.net

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 3 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

How can this project not be a win/win situation, where we have a plan that provides both a green space with beauty and recreation facilities with a wide variety of activities and a fabulous attraction for our city.

Page: 142

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:08:20 PM -06'00'
Your support for the project is noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jay Aitchard

Representing: _____

Mailing Address: 4055 International Plaza #600 Fort Worth, TX 76109

Daytime Telephone: _____

E-mail Address: _____

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

Let's get moving!

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Salvador Espino

Representing: Fort Worth City Council - District 2

Mailing Address: 1000 Throckmorton, Ft. Worth, TX 76102

Daytime Telephone: 817-392-8802

E-mail Address: Sal.espino@fortworthgov.org

- [x] I **support** the Central City Project -- Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

The Central City project is further enhanced w.[1] the addition of the Gateway Improvement Plan. It's a great project for the entire City of Fort Worth.

Page: 146

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:09:57 PM -06'00'

Thank you for your comment on the aspects of linking Gateway Park to the Central City project.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Theresa Schmidt

Representing: Fort Worth Rowing Club

Mailing Address: 5904 Montford Dr., Colleyville, TX 76034

Daytime Telephone: 817-442-0017

E-mail Address: TschmidT61@tx.rr.com

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

We feel that ~~that~~ this project will be a great investment to our families and communities, something that can be enjoyed by everyone. It would also be beneficial for beautiful, historic Fort Worth to have a Trinity River project that mirrors Dallas & San Antonio.

Page: 148

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:11:09 PM -06'00'
Thank you for your comment on the benefits of the proposed project to the community.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: BRIDGET GUERRE

Representing: FWRC

Mailing Address: 2406 LAKEPOINT DR KELLER TX 76248

Daytime Telephone: 817 673 7823

E-mail Address: bpguerre2@sbcglobal.net

- [x] I support the Central City Project -- Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [x] My written comments are on the back of this form
- [ ] I oppose the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

This is a great opportunity to advance outdoor water + land activities for Tamarac City.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Stephen Crawford

Representing:

Mailing Address: 741 NW Hillery St. Burleson, TX 76028

Daytime Telephone: 817-455-6677

E-mail Address: crawfishsbc@gmail.com

- [x] I **support** the Central City Project -- Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 3 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project -- Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

Valley Storage

1. Hydraulically, the project as presented in the new draft EIS lowers water surface elevations from existing conditions, thus reducing valley storage volume available (if no valley storage mitigation is provided)
2. The study presents multiple sites that will be used to maintain (or increase) valley storage after the project is constructed, with contingency sites available, too.
3. The draft EIS states that Microstation InRoads was used to calculate valley storage in the Gateway Park area. The rest of the project uses HEC-RAS to calculate valley storage.
4. My questions:
   - Does the project team feel that HEC-RAS is the most accurate way to determine valley storage for existing and post-project conditions or would a CAD or GIS analysis be more accurate? 1
   - Does the valley storage analysis and comparison for both 100-year and SPF conditions represent "site-specific" locations or the entire width of the floodplain along the project limits? 2

- Stephen Crawford

submitting this as a citizen on

Page: 152

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 3/10/2008 4:05:39 PM

The project team feels that the use of HEC-RAS for the computation of valley storage is an acceptable method for the determination and comparison of valley storage within the floodway for existing and post project conditions. The majority of the study analysis is within the Fort Worth Floodway, which is an engineered, uniform system with consistent geometry represented in the detailed HEC-RAS model and thereby be used to confidently compute valley storage. Areas outside floodway were determined using CAD and felt to be the most accurate method for calculating storage for areas not represented within the floodway model.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 3/10/2008 4:06:11 PM

Determination of valley storage impacts of the proposed project is based on impacts to the 100-year and SPF valley storage within the entire study area, using the full width of the foodplain.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Ann Kovich

Representing:

Mailing Address: 6417 Garland

Daytime Telephone: 817-698-6718

E-mail Address: ann.kovich@charter.net

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 3 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

I support the Gateway Park/Oahow Restoration project to be added to the Central City Project.

Page: 154

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:42:36 PM -06'00'
Thank you for your support for the Central City project proposed modification.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Tom Struhs

Representing: Trinity Bluff Development, Ltd.

Mailing Address: 2801 Bledsoe St FW Tx. 76107

Daytime Telephone: 817 318-8000

E-mail Address: tstruhs@swbell.net

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 3 minutes)
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

- We are very supportive of this plan. The eastern segment of the river in Fort Worth really needs the attention. The community and land owners in this area have suffered the problems of an uncontrolled drainage problem from the days of the settlers. Finally a plan has emerged that can solve these problems and also provide an amenity that can benefit the entire area.

The plan is inclusionary in that it benefits a wide spectrum of the community and including less fortunate areas of this City that have heretofore felt ignored in a lot of ways.

This expansion of TRV should be a must

1/24/08

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jennifer Cross

Representing: _____

Mailing Address: 8416 Blue Heron Ct.

Daytime Telephone: 817-367-6543

E-mail Address: _____

- ☑ **I support** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ My written comments are on the back of this form
- ☐ **I oppose** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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Written comments may also be submitted as follows:

Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

This is a project that should be funded immediately to preserve and protect the future of our children and families

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Jerry L. Barton

Representing: my self

Mailing Address: 3512 Stone Creek Ln. S. FW., TX. 76137

Daytime Telephone: 817-875-2636

E-mail Address: jerrybarton@jerrybarton.Com

- ☑ I **support** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

Seldom does a city
have such an
opportunity as the
Trinity River Vision to
enhance the city.

Jerry L. Barton

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Tobi Jacobs

Representing: District 7

Mailing Address: 2165 Yosemite Ct 76112-3925

Daytime Telephone: 817 457 9160 817 972-1(c)

E-mail Address: tobijo sheglobal.net

- ☑ **I support** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ My written comments are on the back of this form
- ☐ **I oppose** the Central City Project
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form

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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

I am in support of this preliminary plan. Absolute guarantees on "immaculate" biological preservation, repair, and improvement are essential components of this project. In this preliminary plan they appear. I am absolutely thrilled to observe these components now and look forward to the presentation of their final draft.

Page: 162

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:30:13 AM -06'00'

Execution of the proposed project incorporates monitoring and adaptive management to provide the habitat development described.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: STEPHEN DARROW

Representing: AIA FORT WORTH

Mailing Address: 300 COLLEGE AVE FT. WORTH 76104

Daytime Telephone: 817 570 2000

E-mail Address: sdarrow@dmsarch.com

- [x] I support the Gateway Park/Central City Project
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [x] My written comments are on the back of this form
- [ ] I oppose the Gateway Park/Central City Project
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
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Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102

DURING MY YEAR AS PRESIDENT OF AIA FORT WORTH, I WAS ABLE TO DRAMATICALLY INCREASE MY UNDERSTANDING OF THE CHALLENGES THAT FACE NORTH TEXAS. THIS PROJECT IS ABLE TO HAVE A NUMBER OF POSITIVE IMPACTS ON THOSE CHALLENGES WITH VIRTUALLY NO NEGATIVES. AS A REPRESENTATIVE OF THE ARCHITECTURE COMMUNITY, I CAN WHOLE-HEARTEDLY SUPPORT GATE WAY PARK.

Page: 164

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:49:04 PM -06'00'
Thank you for your comment on the benefits of the proposed project modifications.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: ROBERT CROW

Representing: SELF

Mailing Address: 8416 BLUE HERON COURT

Daytime Telephone: 817-367-6543

E-mail Address: _____

- [X] I support the Central City Project
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [X] My written comments are on the back of this form
- [ ] I oppose the Central City Project
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

The Central City Park Project
is the single most important project
for now and the years to come.

Robert E. Cramer

Page: 166

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:51:13 PM -06'00'
Your comment on the proposed project modification benefits is noted.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Betsy + Tom Price

Representing:

Mailing Address: 3908 Summercrest 76109

Daytime Telephone: 817-929-8683

E-mail Address: taxgal3216@sbcglobal.net

- ☒ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☒ My written comments are on the back of this form
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

This project is a win-win for the City of Ft. Worth, Tarrant County and the Corps.

We cycle thru Gateway Regularly and it will be great to see it expanded and enlarged allowing great public usage at all levels.

In growing community we must provide PARKS for future generation and healthy living!

Page: 168

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:31:21 AM -06'00'
Thank you for your comment.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Adelaide Leavens

Representing:

Mailing Address: 3839 South Hills Circle, FTW TX 76109

Daytime Telephone: 817.926.0006

E-mail Address: adleavens@charter.net

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
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- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

As an avid runner, I am very supportive of this project because the new trails (both hard & soft surface) will add a new environment/destination. The added miles of trail will be a unique experience with wooded, shady paths and closer proximity to creeks and the river.

Page: 170

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:31:48 AM -06'00'
Thank you for your comment.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: ERMA JOHNSON HADLEY

Representing:

Mailing Address: 2362 FAETT COURT

Daytime Telephone: 817/515-5242

E-mail Address: ERMAHADLEY@IHOS.US

- [x] I **support** the Central City Project – Gateway Park Improvement Plan
  - [ ] I wish to present oral comments during the public forum (limit: 2 minutes)
  - [x] My written comments are on the back of this form
- [ ] I **oppose** the Central City Project – Gateway Park Improvement Plan
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Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

I am very supportive of the Gateway Park Improvement Plan. I have attended sessions where the plan has been presented and explained in detail. Perhaps the biggest impact - long term - for our city is the environmental clean up segment of the plan.

The recreational facilities that will become available to the public will be a welcomed addition to our community, especially the Southeast sector of the City where recreational facilities are at a minimum. The environmental clean up is icing on the cake. Tom Hartley

Page: 172

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:32:09 AM -06'00'
Thank you for your comment.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Crystal Marra

Representing: N/A

Mailing Address: 3209 Donnelly Circle #107, Fort Worth, TX 76107

Daytime Telephone: (817) 884-4303

E-mail Address: —

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ My written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form

Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

I Strongly support the Gateway Park Improvement plan – it will make a better Fort Worth!

– Crystal R. Mata

Page: 174

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:32:17 AM -06'00'
Thank you for your comment.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Eddie Patton

Representing:

Mailing Address: 2137A Mistletoe Ave ~~Fort Worth~~ TX 76110

Daytime Telephone: 817-347-4014

E-mail Address: eddierpatton@yahoo.com

- ☑ I **support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☑ ~~My~~ written comments are on the back of this form
- ☐ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form

Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

I am supportive of the entire project and its long term enhancement and benefit for the City of Fort Worth and the area. I am especially interested the expansion and development of the trail system and the link up with the ~~exist~~ existing Trinity Trails System.

Page: 176

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:32:43 AM -06'00'
Thank you for your comment.

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: Patti Cox

Representing: Mayfest, Inc.

Mailing Address: 255 Bailey Avenue, Fort Worth, TX 76107

Daytime Telephone: (817) 332-1055 x201

E-mail Address: patti.cox@mayfest.org

- ☑ **I support** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form
- ☐ **I oppose** the Central City Project – Gateway Park Improvement Plan
  - ☐ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ☐ My written comments are on the back of this form

Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil CESWF-PER-P, P.O. Box 17300, Fort Worth TX 76102
E-mail: Saji Alummuttil@usace.army.mil

The organizations involved in the planning of the Gateway Park Improvement Plan have done an excellent job in identifying the need for this project. The City of Fort Worth needs to support this plan as it will benefit tremendously in the expansion + improvement of our greenbelt.

Alummuttil, Saji J SWF

Subject: FW:

From: Nancy/Geoff Sipple [mailto:gsipple@verizon.net]
Sent: Monday, January 01, 2007 8:51 AM
To: Alummuttil, Saji J SWF
Subject:

I support the inclusion of the Riverside Oxbow in the Trinity Uptown project.

Geoffrey Sipple

Page: 179

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:32:56 AM -06'00'
Thank you for your comment.

Alummuttil, Saji J SWF

Subject: FW: Comment on draft supplement to the Final Environmental Impact Statement for the Upper Trinity River, Central City Project, Fort Worth, Texas.

-----Original Message-----
From: Jason [mailto:supergirl_1@charter.net]
Sent: Monday, February 04, 2008 11:16 AM
To: Alummuttil, Saji J SWF
Subject: Re: Comment on draft supplement to the Final Environmental Impact Statement for the Upper Trinity River, Central City Project, Fort Worth, Texas.

Mr. Alummulttil,

I have previously forwarded an e-mail expressing my concerns about gas drilling in Gateway Park as part of the Final Envioronmental Impact Statement. 1 I still have those concerns. I alsos have objections about how the funds of the Trinity River Vision are being spent, espercially for a multi million dollar PR contract that was awared to a political consultant.

I like the expansion of Fort Woof Dog Park. I also like that the proposed increase in flooding/water storage does not appear to impact the current and future sites off the dog park. 2 When implementing this plan, you should be careful to design the dog park and horse trails in a way that is compatible with these two different kinds of animals.

Thanks,

Jason C.N. Smith
2257 College Ave
Fort Worth, TX 76110

Page: 180

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:51:55 PM -06'00'

There are existing well pads located in the Riverside Oxbow area but they are outside of current park boundaries. The Gateway Master Plan takes into consideration the existing well sites. Sufficient buffering is to occur between park and neighborhood land uses and a proposed drill site. The City of Fort Worth Ordinance number 16986-06-2006 provides the guidelines for minimum distance requirements from public parks.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:37:50 AM -06'00'

These considerations will be addressed during detail design of the Gateway Park..

Alummuttil, Saji J SWF

Subject: FW: Comment on draft supplement to the Final Environmental Impact Statement for the Upper Trinity River, Central City Project, Fort Worth, Texas.

-----Original Message-----
From: Jason [mailto:jasons@artbrender.com]
Sent: Thursday, January 10, 2008 10:18 AM
To: Alummuttil, Saji J SWF
Subject: Re: Comment on draft supplement to the Final Environmental Impact Statement for the Upper Trinity River, Central City Project, Fort Worth, Texas.

Mr. Alummuttil,

I would just like to hear from the Corp about what its study says about the impact on Fort Woof Dog Ppark in Gateway Park. Do you think I could meet with someone from the Corp for 10-15 minutes to discuss this issue.

Thanks,

Jason Smith

Alummuttil, Saji J SWF wrote:

>Mr. Smith
>
>Thank you for your email.
>
>The Corps of Engineers has not worked with the City of Fort Worth on planning
>and implementing the Woof Dog Park. I have copied Randle Harwood to this
>message. He would be manager that can best answer your questions
>regarding this park.
>
>Thank you
>
>Saji
>
>-----Original Message-----
>From: Jason [mailto:jasons@artbrender.com]
>Sent: Wednesday, January 09, 2008 1:30 PM
>To: Alummuttil, Saji J SWF; Jasona and Jessica
>Subject: Re: Comment on draft supplement to the Final Environmental
>Impact Statement for the Upper Trinity River, Central City Project,
>Fort Worth, Texas.
>
>Mr. Alummuttil,
>
>Do you have time to meet with me in the next 10 days for 15 minutes. I
>would like you to explain to me the impact of te proposed plan on Fort
>Woof Dog Park located in Gateway Park.
>
>Please call me to schedule a meeting at 817-721-6056.
>
>Thanks,
>
>Jason C.N. Smith
>

Page: 181

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:55:41 PM -06'00'

The considerations about Fort Woof will be further defined during detailed design of the Gateway Park. The local sponsors have proposed to increase the size of this park during detailed design.

>Alummuttil, Saji J SWF wrote:
>
>
>
>>Mr. Jason Smith
>>Thank you for your comment regarding the Supplement Environmental
>>Impact Statement. This email is to confirm that we are receipt of your
>>comment and will it will be considered as we complete our final
>>version of the supplement.
>>Saji Alummuttil
>>
>>----------
>>--
>>*From:* Jasona and Jessica [mailto:supergirl_1@charter.net]
>>*Sent:* Sunday, January 06, 2008 1:48 PM
>>*To:* Alummuttil, Saji J SWF
>>*Cc:* 'Jason Smith'; 'Jasona and Jessica'
>>*Subject:* RE: Comment on draft supplement to the Final Environmental
>>Impact Statement for the Upper Trinity River, Central City Project,
>>Fort Worth, Texas.
>>
>>**Mr. Saji Alummuttil**
>>CESWF-EC-D
>>U.S. Army Corps of Engineers
>>Fort Worth District
>>P.O. Box 17300-0300
>>819 Taylor Street
>>Fort Worth TX, 76102-0300
>>Phone: 817-886-1764
>>
>>Dear Mr. Alummuttil,
>>
>>Please let this serve as my comment on the draft supplement to the
>>Final Environmental Impact Statement for the Upper Trinity River,
>>Central City Project, Fort Worth, Texas. I have serious concerns about
>>the impact of existing and planned gas well operations in and around
>>the Oxbow and Gateway Park that threaten the safe use of recreational
>>facilities by Fort Worth families. This is especially worrisome
>>because, according to media accounts, the Tarrant Water Board proposes
>>to help pay for these changes with revenues from its gas well leases.
>>
>>Natural gas well operations have greatly increased due to the
>>exploration of the Barnett Shale. While revenues from gas well
>>operations are helpful to the local economy, such gas well operations
>>pose safety risks to families near such operations. In 2007, a gas
>>well worker was killed by an explosion at a gas well in Forest Hill.
>>There are many other instances in which gas wells have injured or
>>killed others and disrupted major activities.
>>
>>The Tarrant Water Board recently granted a waiver for a high impact
>>gas well near a park in owns with the City of Fort Worth, the Trinity
>>Trail System, near where University South crosses the Trinity River.
>>Apparently the Tarrant Water Board does not see dangers and nuisances
>>posed by gas well operations only 200 feet from a park area used by
>>tens of thousands of Fort Worth residents. I fear that the Tarrant
>>Water Board will fail to protect park users in this area just as they
>>failed to protect park users on the Trinity Trails, especially because
>>it hopes to realize more gas revenue to help pay for the Trinity River
>>Vision.
>>
>>There are gas well operations that appear to be in the Ox Bow or at
>>least very close to it. Check out
>>http://thecaravanofdreams.blogspot.com/2007/12/what-was-that-fire-in-s

Page: 182

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:52:54 PM -06'00'

There are existing well pads located in the Riverside Oxbow area but they are outside of current park boundaries. The Gateway Master Plan takes into consideration the existing well sites. Sufficient buffering is to occur between park and neighborhood land uses and a proposed drill site.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:54:14 PM -06'00'

City rules (Ordinance 16986-06-2006) preclude it from occurring within current public parks and that sufficient buffering occurs between park and neighborhood land uses and a proposed drill site.

>>ky.html I fear that the Tarrant Water Board's effort to bring
>>recreational improvements to the Ox Bow and Gateway will be threatened
>>by the dangers to families posed by near by gas well operations.
>>
>>Such gas well operations also could pose a threat to the wet lands and
>>water areas proposed around the Ox Bow. I fear that such operations
>>will adversely affect the drinking water in Fort Worth.
>>
>>No gas well operations should be allowed within a half a mile of the
>>Oxbow and Gateway Park in order to protect the users of any
>>recreational facilities, hopefully in industrial areas or other areas
>>like airports.
>>
>>Thank you for taking the time to read this and hopefully you will take
>>action to protect Fort Worth families from the nuisances and dangers
>>posed by gas drilling activities in and near the Ox Bow.
>>
>>Sincerely,
>>
>>Jason C.N. Smith
>>
>>2257 College Ave
>>
>>Fort Worth, TX 76110
>>
>>817-924-5539
>>
>>
>>
>
>
>
>
>

Page: 183

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:43:03 AM -06'00'

Effects of activities by others, including petroleum exploration in the geographic area have been considered in the cumulative impacts assessment of the SEIS and this site specific activity will be further evaluated for its potential impacts to the proposed project during the processing of the Final Supplemental EIS. Surface water is protected by state and federal laws and any pollution coming from offsite of any well is reported and will be required to be cleaned up.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:56:34 PM -06'00'

Comment is acknowledged but is outside of the jurisdiction of the Corps of Engineers. The City of Fort Worth gas drilling ordinance (Ordinance 16986-06-2006) covers these activities related to gas extraction.

Alummuttil, Saji J SWF

Subject: FW: Comments for 1/24/08 public forum
Attachments: Comment Registration Form.doc

From: Daniel.C.Villegas@wellsfargo.com [mailto:Daniel.C.Villegas@wellsfargo.com]
Sent: Wednesday, January 23, 2008 2:14 PM
To: Alummuttil, Saji J SWF
Cc: rosa.navejar@fwhcc.org; JDGranger@trinityrivervision.org
Subject: Re: Comments for 1/24/08 public forum

Saji,

I have attached my comments **in support** of the Gateway Park Improvement Plan. I hope they will be included in the public forum being held tomorrow evening. If you have any questions for me, please call me at 817-937-9535.

Sincerely,
Dan Villegas
Past Chairman, Fort Worth Hispanic Chamber of Commerce
<<Comment Registration Form.doc>>

Dan Villegas, Vice President
Sr. Business Relationship Manager
Wells Fargo Business Banking
2315 N. Main Street, Floor 1
Fort Worth, TX 76164-8573
817-624-5007 phone 817-624-5040 fax
email: Daniel.C.Villegas@wellsfargo.com

COMMENT REGISTRATION FORM

Fort Worth Central City Project
January 24, 2008

Name: ____Dan Villegas_____

Representing: __Fort Worth Hispanic Chamber of Commerce_____

Mailing Address: _2315 N. Main St., Fort Worth, TX 76164_____

Daytime Telephone: __817-937-9535_____

E-mail Address:
__dcvconsulting@yahoo.com_____

- ✓ I **support** the Central City Project – Gateway Park Improvement Plan
  - ❑ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ✓ My written comments are on the back of this form
- ❑ I **oppose** the Central City Project – Gateway Park Improvement Plan
  - ❑ I wish to present oral comments during the public forum (limit: 2 minutes)
  - ❑ My written comments are on the back of this form

Please note that all comments are given equal consideration, whether in person or in writing.
Written comments may also be submitted as follows:

Mail: Saji Alummuttil, CESWF-EC-D, P.O. Box 17300, Fort Worth, TX 76102
E-mail: Saji.Alummuttil@usace.army.mil

Comments:
My name is Dan Villegas, and I am the Immediate Past Chairman of the Fort Worth Hispanic Chamber of Commerce. I am writing to you today in support of the Gateway Park Improvement Plan which will compliment the Trinity Uptown project. The planned improvements to Gateway Park will really add to the natural landscape of our city and will be yet another enhancement to the quality of life that we enjoy here in Fort Worth, TX. Gateway Park is an underutilized resource in our community and these plans will give it new life and will provide additional flood control to protect our citizens.

As a Chamber of Commerce, we support projects that stimulate economic development and provide business opportunities for our membership. The Hispanic business community in Fort Worth is ready to work on this project We will continue working with the Trinity River Vision Authority to see that local companies are given the first opportunity to participate in this project.

I support Gateway Park Improvement Plan as it not only enhances the quality of life in Fort Worth, but it also provides business opportunities for the membership of the Fort Worth Hispanic Chamber of Commerce. The Gateway Park Improvement Plan is another "win-win" proposition for Fort Worth. I thank the U.S. Army Corp of Engineers for holding this forum and for their work on this project thus far. I also encourage them to continue moving this project forward as we are ready to make it happen.

Cc: Rosa Navejar (Fort Worth Hispanic Chamber of Commerce)
J. D. Granger (Trinity River Vision Authority)

Page: 185

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:47:32 AM -06'00'
Thank you for your comment.

Alummuttil, Saji J SWF

Subject: FW: Comments to the draft supplement to the EIS

Attachments: Lehrer-Brey, Catrine.vcf; January 24 Uptown Statement.doc

---

From: Lehrer-Brey, Catrine [mailto:CLehrer-Brey@gideontoal.com]
Sent: Friday, January 25, 2008 11:44 AM
To: Alummuttil, Saji J SWF
Cc: SCate@trinityrivervision.org
Subject: Comments to the draft supplement to the EIS

Hello Saji,

Attached are written comments for the draft supplement to the EIS. These are submitted on behalf of James Toal as presented at the public meeting last night.

Thanks!

Catrine Lehrer-Brey

gideon toal

500 West Seventh Street Suite 1400
Fort Worth, TX 76102
Tel 817.335.4991
Fax 817.877.1861
www.gideontoal.com

January 24, 2008
Statement from James Toal
Extending the Central City Project to Include Gateway Park

I commend the United States Army Corps of Engineers, the Tarrant Regional Water District, City of Fort Worth, the Streams and Valleys Committee, and the other partners for their comprehensive approach to flood control, environmental restoration, recreation, and economic development of our central city. Shifting much of the ecosystem restoration and recreation improvements to the Gateway Park area is the final element that assures that all residents of our City will greatly benefit from the Trinity River Vision.

I've been working in the profession of open space and recreation planning, city planning, and urban redevelopment for over 30 years. I know of no other project in North America that combines these things in such a positive way for the benefit of so many people.

Some cynics have said it may be too costly. Well, the opposite is actually true. The combined project, as now envisioned, will assure a long term high quality of life, environmental quality, and a sustainable economy for the central city. This means the project will more than pay for itself in a short time.

We cannot afford not to do this project. And, we have to do it now.

Thank you,

James Toal
341 Nursery Lane (76114) (home)
500 West 7th Street (76102) (work) (Gideon Toal)
Fort Worth, Texas
817-335-4991

Page: 187

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/20/2008 4:49:48 PM -06'00'
Thank you for your comments on the multipurpose benefits of the proposed project modifications to the community.

Fort Worth CHAMBER 125 ANNIVERSARY

FORT WORTH CHAMBER OF COMMERCE
777 TAYLOR STREET, SUITE 900 ★ FORT WORTH, TEXAS 76102-4997
817-336-2491 ★ FAX 817-877-4034 ★ WWW.FORTWORTHCHAMBER.COM

January 24, 2008

Saji Alummuttil
USACE CESWF-EC-D
PO Box 17300
Fort Worth, TX 76120

Dear Mr. Alummuttil,

The Fort Worth Chamber of Commerce wishes to confirm unwavering support of the Trinity River Vision. We fully endorse enhancing the boundaries of Trinity Uptown. This would include incorporating approximately 1,000 acres that are currently designated as the Riverside Oxbow restoration project and/or the Gateway Park expansion. We realize that an increase in cost is associated with the proposed expansion. The Chamber feels that this unique enhancement is critical to the economic development of the area.

The Trinity Uptown plan is a much needed flood control project which would trigger the revitalization of an aging commercial and industrial area adjacent to downtown. It is designed to be a critical neighborhood link between downtown, the Cultural District, the Stockyards, and now a vital recreation area, Gateway Park.

This project has the potential to attract over 10,000 households and an additional 3,000,000 sq. ft. of commercial, educational, office, and civic space. Moreover, it will add in excess of $2.1 billion dollars to the city of Fort Worth's local property tax base over the estimated 50 year build-out period.

The Trinity River Vision, with the Gateway Park component, is critical to Fort Worth's future. It will insure our continued recognition as being one of our nation's most livable cities.

Your consideration of the Fort Worth Chamber's position on this important matter is greatly appreciated.

Sincerely,

Brian Barnard
Chairman

Ben Loughry
Vice Chairman

Bill Thornton
President & CEO

Page: 188

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:48:09 AM -06'00'
Thank you for your comment.

January 24, 2008

Saji Alummuttil
CESWF-EC-D
P.O. Box 17300
Fort Worth, TX 76102

Dear Mr. Alummuttil:

At today's Downtown Fort Worth, Inc. board meeting, unanimous support was given to the Gateway Park expansion of the Fort Worth Central City project. This project is not only an important and ecologically sound downstream valley storage solution; it represents an opportunity for citizens of the entire region to accelerate enjoyment of Gateway Park.

Recreational and park facilities are needed in this part of the city, and we fully endorse this project as a means of fulfilling those needs, as well as the technical requirements of the Trinity River Vision.

As you know, Downtown Fort Worth, Inc. is on record as supporting the Trinity River Vision. We believe it is a model for how the Corps of Engineers and cities can address flood control while at the same time leveraging natural assets, restoring ecologically sensitive wetlands and creating an economic base for funding these objectives. The Gateway Park component is another example of how important community priorities that have been talked about for decades can be addressed through cooperation and visionary leadership.

We urge you to consider the Gateway project favorably as you continue to evaluate the Trinity River program.

Sincerely,

Andrew M. Taft, President
Downtown Fort Worth, Inc.

Randy Gideon, Chairman
Downtown Fort Worth, Inc.

777 Taylor Street, Suite 100 Fort Worth, Texas 76102-4908 (817) 870-1692 Fax (817) 335-3113 www.dfwi.org

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/20/2008 12:43:43 PM -06'00'
Thank you for your comments on the benefits of the proposed project modification to the community.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:55:50 PM -06'00'
Thank you for your comments on the benefits to the community of providing valley storage in a manner conducive to providing additional multipurpose benefits.

FORT WORTH CATS BASEBALL CLUB
Member of the Central Baseball League

Stadium: 817.226.CATS Fax: 817.534.4620
Team Store: 817.735.4832 Fax: 817.735.8709
Website: www.fwcats.com

Corp of Engineering
Public Hearing
January 24, 2008
Re: Riverside Oxbow

To Whom It May Concern:

The effort to cleanup the Trinity began 30 years ago. The river twists and turns from the west through the Central District, the Riverside Oxbow, and to our eastern neighbor.

We support any and all developments that will enhance the Trinity and make access easier for recreation and enjoyment. We trust the Corp of Engineers to bring value to this project and make the vision a reality.

The Fort Worth Cats have always opened our gates to the river and access from LaGrave Field where people can come enjoy our outdoor venue and the bike and hike trails behind the field.

We are proud to be a pioneer in this effort in the Central District and fully support the funding efforts for the Riverside Oxbow and any enhancements to bring the Trinity back to the people of Fort Worth.

Sincerely,

Carl Bell
President Fort Worth Cats Baseball Club
BLG Development, LLC

Team Store/Mailing Address: 5800 Camp Bowie, Suite 126, Fort Worth, TX 76107
Stadium Address: 301 NE 6th Street, Fort Worth, TX 76106

Page: 190

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/5/2008 5:56:40 PM -06'00'
Thank you for your comments noting the benefits of the proposed project modification to the community.

KAY GRANGER
12TH DISTRICT, TEXAS

VICE CHAIR,
REPUBLICAN CONFERENCE

REPUBLICAN POLICY COMMITTEE

APPROPRIATIONS COMMITTEE

Congress of the United States
House of Representatives

WASHINGTON OFFICE:
440 CANNON HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
(202) 225-5071
FAX: (202) 225-5683

DISTRICT OFFICE:
SUITE 407
1701 RIVER RUN ROAD
FORT WORTH, TX 76107
(817) 338-0909
FAX: (817) 335-5852
www.house.gov/granger
texas.granger@mail.house.gov

January 23, 2008

Mr. Saji Alummuttil
USACE, CESWF-EC-D
P.O. Box 17300
Fort Worth, TX 76102

Dear Mr. Alummuttil:

I am writing to offer my strong support for the Central City Project – Gateway Park Improvement Plan. I appreciate your holding the Public Meeting, and regret that I will not be able to attend in person. I believe it is important for our community to understand the benefits of this project, and I welcome the opportunity to express my strong support.

As the residents of Fort Worth know, revitalization of Gateway Park on the East Side is long overdue. Although the park has some amenities, it also has gravel pits, a landfill, and an abandoned sewage treatment center. This is certainly not what our citizens want for a "gateway" for the city. The Central City Project – Gateway Park Improvement Plan allows construction to begin this year on improvements to the park, including building athletic fields, expanding the trail system, planting thousands of trees, and many other improvements.

Beyond the aesthetic and recreational improvements the Project will provide, there are other equally important benefits that are important to note. An estimated 80 percent of levees in the project area are inadequate. The Project improves flood protection by replacing those levees. There are also strong ecosystem restoration and environmental cleanup improvements included in the plan. In addition, this revitalization will result in an estimated 16,000 jobs, and a $1 billion increase in tax base for schools, roads, and other community priorities.

It is important to note that federal tax dollars are being used only for public infrastructure, such as the bypass channel and bridges. There has also been a significant investment by private industries in the area; in fact, over a billion dollars of private investment has already broken ground, including Radio Shack, Pier 1, Trinity Bluffs, LaGrave Development, and Tarrant Community College (TCC). It is clear that the Project has already spurred economic development in the surrounding area, and it is reasonable to expect that this is only the beginning.

Again, thank you for holding this important meeting. I look forward to continuing to work with all of the stakeholders to advance this project that will transform our city.

Sincerely,

Kay Granger

Kay Granger
Member of Congress

MICHAEL C. BURGESS, M.D.
26TH DISTRICT, TEXAS

WASHINGTON OFFICE:
1224 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515
(202) 225-7772
www.house.gov/burgess

Congress of the United States
House of Representatives
Washington, DC 20515-4326

COMMITTEE:
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CONSUMER PROTECTION

VICE-CHAIRMAN:
HOUSE REPUBLICAN
POLICY COMMITTEE

January 23, 2008

Mr. Saji Alummuttil
USACE, CESWF-EC-D
P.O. Box 17300
Fort Worth, TX 76102

Dear Mr. Alummuttil:

I write in support of the U.S. Army Corps of Engineers Draft Supplement for the Central City Project, Upper Trinity River, Texas. As you know, I represent East and Southeast Fort Worth in the U.S. House of Representatives. In the past, residents in this community have expressed their concerns that the original plan to contain occasional flooding in the Riverside Oxbow area of the Trinity River on the west edge of Gateway Park could put homes and lives at risk during periodic flooding and discourage future economic growth. After numerous conversations with the Army Corps of Engineers and local residents, I believe that the amended plan will address many of the concerns previously expressed about the Central City Project. However, I believe that the Army Corps of Engineers must continue to demonstrate through ongoing hydrologic studies that the changes proposed in this amended in the plan will indeed ensure the protection of life and property.

By joining the Uptown project with ecosystem restoration in the Oxbow area, as well as developing the recreational facilities in Gateway Park, the flood risk north of the Oxbow I understand will be mitigated. Representing the largest planned urban park improvement in the country, I believe this project, while spurring development on the North side of Fort Worth, will equally benefit economically depressed East and Southeast Fort Worth.

Because the original plan would have taken at least 40 years to complete and did not adequately address basic safety issues, I am pleased the amended plan takes this into account and would also bring these improvements to a conclusion within 10 years. The added recreational and ecosystem improvements will be a source of pride for the neighborhoods in this area and truly become a community asset. I commend the Army Corps of Engineers for their exhaustive study of this project and I am confident that the Corps will maintain a dialogue with the communities affected throughout all phases of this project. I thank you for your consideration.

Sincerely,

Michael C. Burgess
Member of Congress

☐ DISTRICT OFFICE:
1660 SOUTH STEMMONS FREEWAY
SUITE 230
LEWISVILLE, TX 75067
(972) 434-9700

☐ DISTRICT OFFICE:
1100 CIRCLE DRIVE
SUITE 200
FORT WORTH, TX 76119
(817) 531-8454

Streams and Valleys, Inc.

January 31, 2008

Mr. Saji Alummuttil
U.S. Army Corps of Engineers
Fort Worth District
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Alummittil,

On behalf of the board of Streams and Valleys, Inc. We applaud the U.S. Army Corps of Engineers for considering the Riverside Oxbow as a valley storage site for the Central City Project. The positive impact of the resulting parkland is immeasurable in terms of improved quality of life for both the citizens of Fort Worth and the entire North Texas region. It is accompanied by a funding strategy that lessens the burden locally and expedites the construction of improvements by decades.

Upon reviewing the Draft Supplemental No. 1to the Final Environmental Impact Statement (DSEIS), I submit the following comments for your review and consideration:

- **Chapter 1-2; Purpose and Need** – The Trinity River Vision (TRV) Master Plan covers 88 miles of stream corridor including the West and Clear Forks of the Trinity River in addition to three tributaries: Marine Creek, Mary's Creek and Sycamore Creek. The text states "8 miles" and does not reference the tributaries.
- **Chapter 2-4; Wildlife** – It is our privilege to note that Easter Bluebirds are now regularly spotted along the Clear Fork of the Trinity River. This species was not noted.
- **Chapter 3-15; Marine Creek Low Water Dam** – As stated in the TRV Master Plan, improving navigability of the river corridor for non-motorized boats (kayaks, canoes, rafts, etc.) is a key objective. The lock system for the Samuels Avenue Dam will provide this however, the description of the Marine Creek Dam requires no such accommodation. We ask that this dam's design incorporate a chute as well

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:06:49 PM -06'00'
Thank you for providing information on recently identified bird species utilizing the Upper Trinity River Basin.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 11:52:46 AM -06'00'
Comment is acknowledged and will be reviewed in detailed design of the Marine Creek Low Water Dam. Portage around this low water dam will be provided if the north bank of Marine Creek can be designed to accommodate this feature and will allow safe use. In addition, the opportunity for including a chute in this dam will be reviewed and incorporated if the hydraulic and structural design will allow and can be accommodated in a safe manner.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:05:55 PM -06'00'
The relationship between the Central City study and the TRV Master plan will be clarified in the Final SEIS.

Streams and Valleys, Inc.

portage capabilities around this dam along one bank for a connection to the West Fork during low flow periods.

- **Chapter 4-15; Recreation** – In listing Gateway Park's current recreational facilities, the Fort Worth Rowing Club headquarters was omitted. As an amenity of the park since 2003, the Rowing Club has added an athletic and elegant presence to our river corridor. Each fall the club participates in the Trinity Trash Bash in preparation for the Steerhead Regatta which involves 75 participants from across the metroplex. Additionally, the club provides monthly introductory lessons to interested individuals. Established on the Trinity River in the mid-80's, with a club membership nearing 100 and nearly $50,000 invested in clubhouse improvements, it is of critical importance that the FSEIS note its presence. It is of even greater importance that participating sponsors provide for replacement of the improvements to ensure future operations despite impacts from excavation of fill activities.

In closing, please contact me or our Executive Director, Adelaide Leavens at 817-926-0006 or adelaide@streamsandvalleys.org with any questions. Thank you in advance for your thoughtful consideration.

Sincerely,

Urbin McKeever
Chairman
817-420-5071

Page: 194

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:02:34 PM -06'00'

The Fort Worth Rowing Club headquarters was recognized in the assessment of the facilities but was not specifically identified in the DSEIS. The FSEIS will be revised to identify it as an existing structure within Gateway Park.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:02:58 PM -06'00'

It was determined that this structure would be replaced or accommodated during detailed design of the Valley Storage excavation in the vicinity of the existing structure. The cost identified in the SEIS for implementation of the Modified Central City Project includes the replacement of this structure as well as dock facilities on the Trinity River.

OAKHURST NEIGHBORHOOD ASSOCIATION
P.O. BOX 7430
FORT WORTH, TEXAS 76111

February 12, 2008

U.S. Army Corps of Engineers
Fort Worth District
ATTN: CESWF-EC-D (Mr. Saji Alummuttil)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Mr. Alummuttil,

The following are the comments of the Executive Committee of the Oakhurst Neighborhood Association on behalf of the organization on the "Draft Supplement No. 1 to the Final Environment Impact Statement for the Central City Project, Upper Trinity River, Texas."

Our organization declines to endorse the flood st[3]ge plan as proposed in the Modified Central City alternative which includes flood storage in Riverside Park because we do not have enough information about the project. We endorse the proposal to exclude flood storage in Riverside Park and put flood storage proposed for Riverside Park on publicly owned land other than park land.

The following are specific comments and questions on the draft supplement:

1. Our organization was never notified th[2]ur neighborhood was within the boundaries of the study area of the draft supplement. The draft says 2,000 letters were mailed by the Corps of Engineers in June 2007 notifying interested parties of the intent to complete the study. We did not receive such a letter and were therefore unaware of any proposals to include Riverside Park in the proposed flood storage plan until after the draft supplement was released in January 2008.

2. The draft supplement does not take int[1]ccount the aesthetic, historic, and cultural significance of Oakhurst Scenic Drive, part of which is immediately adjacent to Riverside Park and the proposed flood storage area. Oakhurst Scenic Drive, from Belknap on the south to Watauga Road on the north, was constructed as a park by the Works Progress Administration Project with Tarrant County in 1936. It was designed by S. Herbert Hare, a partner in the nationally known Kansas City landscape architecture firm Hare and Hare.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 3/10/2008 4:06:48 PM
Oakhurst Scenic Drive will be added to the Area of Potential Effect and discussion effects to this road will be included in the FSEIS.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:01:21 PM -06'00'
We apologize that you were not aware of proposed modifications to the Central City project prior to receiving the notice of availability. Although we strive to provide a Notice of Intent through the U.S. Postal Service to all known interested parties, we occasionally omit some like yourself with interest in the project. However, the notice of intent to prepare this Supplemental EIS was published in the Federal Register in February 2007 on the Corps of Engineers web page and there was a news release announcing the study was underway and requested interested citizen scoping input. The release of the Draft Supplemental EIS was conducted in the same manner of the NOI and we are pleased that you have received the information regarding the proposal to allow you to provide your concerns through written comment .

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:01:19 PM -06'00'
Comment is noted. Many options for flood storage were evaluated during the planning process for the original EIS and during development of this Supplemental EIS. This site was favored because of its low impact to existing environmental resources, publicly owned land, and economic cost.

Oakhurst Scenic Drive has been listed as a scenic corridor by the City of Fort Worth for more than 15 years. It is an important historic, cultural, recreational, and aesthetic resource to the citizens of Oakhurst and all citizens of Riverside and Fort Worth.

The draft supplement does not take into account the impact of flood storage in Riverside Park – either preparing for it or maintaining it – on Oakhurst Scenic Drive. We find this to be a deficiency of the document.

3. The proposal for flood storage in Riverside Park does not take into account the desire of residential property owners in Oakhurst and elsewhere in Riverside to have a Riverside Park master plan process which would take into consideration opportunities to make the park a neighborhood rather than a regional park serving several neighborhoods. The proposed flood storage plan also does not take into account new opportunities to develop the park as a pedestrian destination closely linked to the new Six Points Urban Village and to other Riverside neighborhoods.

4. We are aware of the Texas Department of Transportation's plans to double the existing capacity on Interstate 35, immediately adjacent to Riverside Park and Oakhurst. What impact would flood storage in Riverside Park (and other nearby contingency flood storage sites) have on I-35 expansion? The draft supplement does not take into account the impact of its proposal for Riverside Park flood storage on TXDOT's plans.

5. There may be now or may in the future be gas drilling under Riverside Park. The draft supplement does not take into account the impact of the proposal for Riverside Park flood storage on current or future gas drilling in or near the park or vice versa.

6. The draft supplement does not take into account the impact of proposed flood storage for Riverside Park on the nearby East Belknap Street Bridge, a historic resource identified in the Historic Resources Survey for Tarrant County, Texas and also eligible for listing in the National Register of Historic Places.

7. Specific questions on the proposed flood storage in Riverside Park include:

   - How deep is the proposed excavation cut in Riverside Park?
   - How often is flooding expected in Riverside Park?
   - How long will the park be unavailable to citizens for use during flooding?
   - How long will Oakhurst Scenic Drive be closed to citizens while the sanitary sewer line, the storm water box and the power lines are moved to prepare Riverside Park for flood storage?

8. The draft supplement is by its own admission a "planning level" document. Detailed design is yet to be completed for the proposed flood storage plan for the

Page: 196

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:55:28 PM -06'00'

a. Proposed excavation depths are shown in Appendix C- Volume II and indicate a maximum cut of approximately 20-25 ft from the existing ground surface, see Appendix C- Volume II, Sheet CG-10 and CG-11.
b. Flooding frequency varies widely across the park. The existing park has a 10-yr to 25-yr reoccurrence interval. Under the proposed project, portions of the park would be lowered to allow flood storage on a 2-yr to 5-yr reoccurrence interval, flooding frequencies would not change in other areas within the park . To clarify a 2-yr reoccurrence interval would mean that the excavated areas on average would be inundated once every 2years. As an example, this could mean these areas would be inundated twice in one year and not again for another four years.
c. The duration in which portions of the park would be unavailable during flooding is highly variable and impossible to predict with certainty in the future. A USGS stream gauge does not exist within the Riverside Park river reach. Some general conclusions however can be drawn based on historical flows at USGS gauging stations at Nutt Dam and Beach Street. A historical examination of a 30 year period of record (1977-2007) found the 2-yr reoccurrence interval was exceeded 11 times under mean flow for a total of 48 days or on average 1.6 days per year. It is important to note that in the case of Riverside Park portions of the park would still be available to citizens under these 2-yr reoccurrence events.
d. The relocation of storm sewer, sanitary sewer, and power lines will necessitate some temporary street closures. These closures would be minor with the most significant impact during relocation of the sanitary sewer. The exact sequencing of work will be determined in detailed design and that information will be communicated to the neighborhood associations that have expressed a desire to be kept up to date on design and engineering changes. Efforts will be made during subsequent design efforts to minimize traffic impacts.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:58:16 PM -06'00'

The size and location of Riverside Park preclude it from being a neighborhood park by classification. The City currently classifies the park as a Community Park. Community Parks are close to home parks designed to service the recreation needs of 18,000-36,000 or approximately 6 neighborhoods. Riverside Park also serves as a trailhead on the Trinity River Trail system which will not be altered by the proposed plan. The proposed plan does not preclude the further development or alternative development of the park as a pedestrian destination linked to the adjacent neighborhoods and neighborhood commercial areas. As presently planned the proposed project includes the relocation of existing parking facilities and connection to the recreational trail to be adjacent to Race Street thereby providing a better linkage to the Six Points Urban Village and Riverside neighborhoods. The City has committed to a Master Plan process to determine the recreational facilities within the park. The neighborhoods that are served by the park are not all opposed to the proposed plan. The Scenic Bluff Neighborhood, the neighborhood adjacent to Riverside Park, has endorsed the plan.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:44:53 PM -06'00'

The bridge is a historic resource that spans an active floodway and the floodway width is not affected near the bridge. Therefore, there is no physical or visual effect on the bridge by the proposed undertaking as the bridge continues to serve its historic purpose of spanning a floodway. No adverse effects due to the haul routes are anticipated to the resource. Reference Appendix C- Volume II, Sheet CG-10 for proposed grading work.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:41:36 PM -06'00'

The proposed flood storage improvements in Riverside Park are not adjacent to I-35 and will not be impacted by TxDOT plans for the I-35 corridor; see Appendix C- Volume II, Sheet CG-10. The contingency sites if required would be coordinated with TxDOT and

Comments from page 196 continued on next page

Oakhurst Scenic Drive has been listed as a scenic corridor by the City of Fort Worth for more than 15 years. It is an important historic, cultural, recreational, and aesthetic resource to the citizens of Oakhurst and all citizens of Riverside and Fort Worth.

The draft supplement does not take into account the impact of flood storage in Riverside Park – either preparing for it or maintaining it – on Oakhurst Scenic Drive. We find this to be a deficiency of the document.

3. The proposal for flood storage in Riverside Park does not take into account the desire of residential property owners in Oakhurst and elsewhere in Riverside to have a Riverside Park master plan produced which would take into consideration opportunities to make the park a neighborhood rather than a regional park serving several neighborhoods. The proposed flood storage plan also does not take into account new opportunities to develop the park as a pedestrian destination closely linked to the new Six Points Urban Village and to other Riverside neighborhoods.

4. We are aware of the Texas Department of Transportation's plans to double the existing capacity on Interstate 35, immediately adjacent to Riverside Park and Oakhurst. What impact would flood storage in Riverside Park (and other nearby contingency flood storage sites) have on I-35 expansion? The draft supplement does not take into account the impact of its proposal for Riverside Park flood storage on TXDOT's plans.

5. There may be now or may in the future be gas drilling under Riverside Park. The draft supplement does not take into account the impact of the proposal for Riverside Park flood storage on current or future gas drilling in or near the park or vice versa.

6. The draft supplement does not take into account the impact of proposed flood storage for Riverside Park on the nearby East Belknap Street Bridge, a historic resource identified in the Historic Resources Survey for Tarrant County, Texas and also eligible for listing in the National Register of Historic Places.

7. Specific questions on the proposed flood storage in Riverside Park include:

   - How deep is the proposed excavation cut in Riverside Park?
   - How often is flooding expected in Riverside Park?
   - How long will the park be unavailable to citizens for use during flooding?
   - How long will Oakhurst Scenic Drive be closed to citizens while the sanitary sewer line, the storm water box and the power lines are moved to prepare Riverside Park for flood storage?

8. The draft supplement is by its own admission a "planning level" document. Detailed design is yet to be completed for the proposed flood storage plan for the

configured in a manner that will not impact I-35 expansion.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:39:35 PM -06'00'

The use of Riverside Park as Valley Storage requires relocation of impacted infrastructure and temporary disturbance of existing recreational amenities. Excavation work as proposed avoids areas of existing woodlands within the park and along Oakhurst Scenic Drive. The City of Fort Worth is responsible for the current maintenance of the park and will continue in this role under the proposed project. As the overall footprint of the park will not be altered increased maintenance costs on an annual basis will not be greatly affected. As is the case with other City parks and Riverside Park, which are within the floodway, maintenance costs as a result of flood events will be handled from contingency funds as required as they are not an annual event. Oakhurst Scenic Drive would be repaired as necessary to a standard consistent with the needs and desires of the community.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 12:42:41 PM -06'00'

At this time a surface drill site has not been identified but City rules preclude it from occurring on the park site and that sufficient buffering occur between park and neighborhood land uses and a proposed drill site.

Modified Central City Alternative. It seems possible that detailed design will yield changes to the plan for Riverside Park flood storage just as more detailed studies revealed that the proposed Samuels Avenue dam needed modifications. How are we to know what the import could be of potential design changes in flood storage for Riverside Park?

9. The Modified Central City Alternative was formulated with the specific goal of assembling flood storage area not on private land and that is the justification for identifying public land for the flood storage plan.

-- However, why is it not just as feasible to excavate other publicly owned land in the 100 year flood plain for this project rather than use park land, particularly Riverside Park?

- Why interfere with an amenity – Riverside's neighborhood park – which is available to the public on a daily basis?
- The City of Fort Worth has recently spent many thousands of dollars to upgrade the lights and the ball field in Riverside Park. Other dollars have gone into creating the trail near the park. The proposal for Riverside Park flood storage proposes that these features be removed and then put back. How can we justify spending taxpayer money for such major expenditures when we have just spent money on these items?
- How can we justify compromising the Trinity River green belt with major excavation in Riverside Park?
- The Modified Central City Alternative would create 187 acre-feet of flood storage in Riverside Park. This represents 3.4% of the total amount of needed flood storage for the whole plan. Land for this relatively small amount of flood storage relative to the whole plan could surely be found on public land outside the park rather than compromise the park land.

We appreciate the opportunity to comment on the draft supplement to the FEIS on the Central City Project, Upper Trinity River, Texas. We look forward to receiving your response to our comments.

Sincerely,

Libby Willis

Elizabeth B. Willis
President

Page: 197

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 1:08:27 PM -06'00'

The justification for considering options that would require initial damage to and replacement of these facilities is that it would assist in the integration of substantial multipurpose project benefits including flood damage reduction, ecosystem improvements overall recreational opportunities and it enables the economic revitalization of the Trinity Uptown Area and Gateway Park. Some estimates of economic benefits to the community – 1.6 Billion (2005 dollars) are estimated for the entire City. Increases in taxable value of a now slow growth area will change from 129 Million to 1.3 Billion over the build out period. Furthermore as detailed design is advanced efforts can be made to reuse/ recycle existing park features to reduce overall project expenditures.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 1:05:44 PM -06'00'

Many options for valley storage have been evaluated during the planning process for the original EIS and during development of this Supplemental EIS. Through this process the most advantageous sites in terms of availability, environmental impact, constructibility, cost, storage benefit, and land ownership were determined. This site was favored because of its low impact to existing environmental resources, public ownership, availability, cost, and storage benefit.

Riverside Park is a Community park and even with the proposed changes it will remain accessible to the community. The proposed changes would replace the existing facilities with better newer facilities. The greenbelt is not compromised by excavation. The green belt would still remain in tact. In fact the proposed grading scheme would make the river more accessible to a diverse range of potential recreational uses originating from Riverside Park. It could also serve to help reduce overcrowding and overuse of the park by allowing more natural features to evolve. Since the project has not been fully designed or master planned by the City of Fort Worth there are a range of potential opportunities to enhance the park.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 2:59:14 PM -06'00'

Over 40 valley storage sites were evaluated, as shown on Figure 6 in the supplement, as part of the planning process for the original EIS and during development of this Supplemental EIS. Through this process the most advantageous sites in terms of availability, environmental impact, constructability, cost, storage benefit, and land ownership were determined. This site was favored because of its low impact to existing environmental resources, public ownership, availability, cost, and storage benefit.

Riverside Park is a Community park and even with the proposed changes it will remain accessible to the community. The proposed changes would replace the existing facilities with better newer facilities. The greenbelt is not compromised by excavation. The green belt would still remain in tact. In fact the proposed grading scheme would make the river more accessible to a diverse range of potential recreational uses originating from Riverside Park. It could also serve to help reduce overcrowding and overuse of the park by allowing more natural features to evolve. Since the project has not been fully designed or master planned by the City of Fort Worth, there are a range of potential opportunities to enhance the park.

February 19, 2008

U.S. Army Corps of Engineers
Fort Worth District
Attn: Project Manager, Mr. Saji Alummuttil
CESWF-EC-D
P.O. Box 17300
Fort Worth, Texas 76102-0300

Re: Draft Supplement No.1 to the Final EIS for Central City

Regardless of the expensive marketing efforts and political spin put forth to justify changing the boundaries of the Trinity Uptown Project yet again, the truth is still evident. This truth is that placing the mitigation area below and outside the Trinity Uptown area proves that the by-pass channel proposal is inadequate to serve its flood control function. Why is valley storage volume needed below the project location? The use of Gateway Park seems to be nothing more than a stop-gap measure meant to prevent flood water from inundating downstream cities that you are not allowed by law to flood. Your Project is suppose to handle its own water flow problems AND not raise the down stream flows or velocities. It seems that your project can do neither and needs a downstream park to provide relief. 1 4

It is obvious that since the Gateway Park area was not in the original study area, that it IS an afterthought and nothing more than a late band-aid for a project that has created hydraulic problems with its design. Problems that were big enough that you needed to enlarge the project area to the west to try and solve the hydraulic problems in the Riverbend area. When Riverbend proved too expensive to solve your problems, you selected another location, again outside the project area, to accommodate the flood waters that could not be handled by the original project design of shortening of the river channel and its capacity to carry a standard project flood. 2

The CEO's written statement in the December 21, 2007 notification letter of a Draft Supplement No. 1 to the Final DSEIS for Central City project on the Upper Trinity River in Fort Worth stated, "Alternatives considered include the No Action Plan, which assumes that each project would proceed separately as currently approved, and a modified Central City Project alternative." How can this be a true statement when it has been reported that the current Central City Project – Trinity Uptown needs mitigation and a replacement area for its lost of valley storage. Without Riverbend - without Gateway Park, how could the COE allow the Central City Project to "proceed separately" without mitigation some where? Without a designated valley storage replacement area, there would seem to be no Central City project. 3

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:04:59 PM -06'00'

The by-pass channel provides necessary level of flood protection within the Trinity Uptown area however hydraulic mitigation can occur upstream or downstream of by-pass channel to meet the criteria contained in the 1988 Record of Decision on the Trinity Regional Environmental Impact Statement . The Supplemental EIS compares utilizing the Riverbend area to the Gateway Park as the primary location to provide the necessary mitigation.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 3/10/2008 4:07:22 PM

During plan formulation for the original Central City project, the Gateway Park area had been studied for ecosystem restoration and a report submitted and approved by the Secretary of Army for recommendation for authorization. That project authorization has not occurred and the concept that the Gateway Park and Riverside Oxbow area could be incorporated into the project to provide a similar or larger level of environmental benefits, and required hydraulic mitigation on a reasonable time scale evolved from additional study and review. The Supplemental EIS was conducted to evaluate that potential.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 3:25:09 PM -06'00'

The no action plan included the authorized Central City and Assistant Secretary of Army, Civil Works approved Riverside Oxbow projects. The Central City and Riverside Oxbow projects could proceed separately with their respective identified mitigation areas. Riverside Oxbow could proceed subsequent to Congressional authorization.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/21/2008 6:27:10 PM -06'00'

The complete project accomplishes this objective.

February 19, 2008

U.S. Army Corps of Engineers
Fort Worth District
Attn: Project Manager, Mr. Saji Alummuttil

Re: Draft Supplement No.1 to the Final EIS for Central City
Page –2-

Gateway Park has had several Master Plans but failed to secure the political will to implement them until now when Downtown Ft. Worth now needs this land in order to try to solve the hydraulic work. Gateway Park should be improved on its own as it was promised and not have to spent its funds to shore up Trinity Uptown's hydraulic problems.

Why is the COE resisting accepting the failure of the current Trinity Uptown design? Isn't it time to take another look at improving the existing levees and solving the uptown development proposals with more creative design that incorporates the existing levees and avoid creating new hydraulic problems? A group of citizens made a suggestion for such an approach, what is the harm in considering a workable hydraulic solution within the project area as you are suppose to do?

It is unfortunate that politics seems to get in the way currently of sound engineering practices and scientific, intellectual thinking. Thank you in advance for your consideration.

Judith Crowder
2112 College Ave.
FTW, TX 76110

Page: 199

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 3:32:59 PM -06'00'

The Corps of Engineers has been authorized to construct the Central City project contingent upon finding the project as developed by the local sponsors to be environmentally acceptable and technically feasible. The engineering studies conducted to date have been for that purpose. The original Central City and Modified Central City projects are required to meet the Corridor Development Certificate (CDC) and 1988 Record of Decision which established a set of common permit criteria and procedures for development within the Upper Trinity River Corridor. The previous Central City project and Modified Central City project as defined in the Supplement to the FEIS meet the CDC requirements. Hence, if the modified project is not carried forward the original project can be implemented as previously authorized and approved by the 2006 ROD received for the Central City project.

BOWEN PROPERTIES

Established in 1925

RECEIVED 15:51 pm
FEB 19 2008

February 19, 2008

Mr. Saji Alummuttil
Project Manager
CESWF-EC-D
US Army Corps of Engineers
Fort Worth District
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Sir,

This letter is to provide the comments of Bowen Properties on the Draft Supplement No. 1 to the Final Environmental Impact Statement Upper Trinity River Central City Fort Worth Texas ("DSEIS") dated December 21, 2007.

Bowen Properties consists of ten common law trusts and five LLC's, which own land as tenants in common inherited from the estate of the late R.C. Bowen.

Included in the sites owned by Bowen Properties are a number of tracts of vacant land east of Downtown Fort Worth. In particular Bowen Properties is the owner of sites numbered 10, 16a, 16b and 18b in Figure 9 of the DSEIS.

We have reviewed the DSEIS and find it to be lacking in two major respects: First, the environmental, social and economic impacts of moving the valley flood water storage required by the Fort Worth Trinity River project from the West side of Downtown Fort Worth to the East side of Downtown have not been identified and evaluated adequately or completely. Second, alternatives to the recommended revised plan have not adequately been identified and evaluated adequately or completely.

Bowen Properties has a long history of ownership on the Eastside. During the 1940's, 1950's and 1960's Bowen Properties tracts along Beach Street (including sites 16a and 16b) were operated as gravel pits. Shortly after the death of Ramah Bowen, R.C. Bowen's widow, in 1970, the City of Fort Worth approached Bowen Properties to request the end of gravel mining along Beach Street and the adoption of reclamation plan. We worked with the City and the US Army Corps of Engineers to develop a reclamation plan; and a plan was approved and implemented voluntarily pursuant to a Section 404 permit issued by the Corps (City fill permitting requirements came much later).

PO Box 1715
Fort Worth, TX 76101-1715

Telephone: 817-336-8590
Fax: 817-336-0177

Page: 200

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:33:29 PM -06'00'

We disagree with this conclusion. Direct, indirect and cumulative impacts of the project including environmental, social and economic impacts have been considered. Two alternatives were identified in the Supplemental EIS and were addressed.

Under the Section 404 permit, Bowen properties brought in between 700,000 and 800,000 yards of clean fill to reclaim the frontage area along both sides of Beach Street by filling to a level above what was then the 100 year flood plane elevation. In accordance with the 404 permit and reclamation plan, we created wetland areas and small lakes both east and west of Beach Street. Starting in the mid 1970's, this reclamation took about twenty-five years to complete. The Corps was active in supervision for the whole time with participation from the City Parks Department in later years after a significant portion of Bowen Properties acreage was incorporated into Gateway Park.

During the whole time of the reclamation project Bowen Properties paid taxes on the land and was diligent in creating what was contemplated by all parties to be (1) a large reclaimed area above the flood plain which would provide the City and it's citizens with tax base and commercial development location together with (2) wetlands and lakes to mitigate the filling of the old gravel pits and to provide buffer between the development areas and Gateway Park. George Frost, the youngest grandchild of R.C. Bowen, managed Bowen Properties and was primarily responsible for this reclamation and wildlife habitat project until his untimely death in April 2003.

As things stand now, the wetlands and the lakes created by Bowen Properties provide exceptional habitat teeming with a wide variety of plant and wild life. We believe that these lakes are these only place between Fort Worth and Dallas where Sand Hill Cranes winter-over. The Supplemental proposal to move valley storage from West to East will overturn and undo Bowen Properties generation long reclamation effort and potentially eliminate both the public and private benefits which were and worked for and paid for by Bowen Properties for such a long period of time in reliance on the Section 404 Permit and reclamation plan.

With this history of Bowen Properties on the Fort Worth East Side in mind, we now turn to some, but not all, of the details of the failures of the DSEIS described more generally above:

A. Failure of the DSEIS to Evaluate Impacts

1. There is no adequate analysis or description of the adequacy of the flood protection and floodwater storage provided in the DSEIS. Doesn't moving the floodwater storage downstream leave upstream areas unprotected? How much floodwater storage is required? Where? How have these requirements been derived?

2. The analysis of the impact of the DSEIS in specific areas is inadequate in a number of respects. Apparently the plan will require massive excavation and removal of soil in the Oxbow and East of Beach Street areas. There is no analysis of the costs or impacts of this excavation in terms of noise, dust, truck traffic, dollars and disruption of wetlands and habitat.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/26/2008 11:30:20 AM -06'00'

Technical studies for air, General Conformity Analysis, Fort Worth Central City, Riverside Oxbow/ Gateway Park Site (10/4/2007) and noise, Noise Impacts Review for the Modified Fort Worth Central City, Riverside/ Gateway Area (10/8/2007) were prepared by Trinity Consultants, are available. These studies investigated noise, dust, air quality parameters, traffic routing and effects of excavation on existing and proposed future environmental conditions. No significant effects to air quality would occur and noise and traffic levels would be minimized due to the distance from housing and other receptors. Detailed analysis of impacts on wetlands and other habitats was given priority and were thoroughly documented in the SEIS. The Riverside Oxbow Gateway Park area, as you have noted contains existing valuable resources and a Feasibility Report completed in 2005 has shown that these values could be substantially improved through careful management. Results indicate that riparian woodlands and wetlands would be improved through implementation of the Modified Alternative.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 3:39:58 PM -06'00'

The Supplemental EIS indicates the valley storage needed and how the primary and contingent sites were identified and evaluated. Subsequent modeling has shown that the storage identified is adequate and that upstream areas are not adversely impacted by the project. Adequacy and analysis of the flood protection and floodwater storage are provided in Technical Appendix A - Hydrology and Hydraulics of the DSEIS. The project is required to meet the requirements of the Corridor Development Certificate (CDC) process.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/21/2008 2:27:53 PM -06'00'

The Corps of Engineers along with Texas Parks and Wildlife Department and the US Fish and Wildlife Service has conducted studies over several years within the Riverside Oxbow and Gateway Park areas to determine existing and future without a project habitat conditions. The same three agencies also developed early in the planning process site specific information that was utilized to avoid significant environmental resources like the higher quality resources you have identified. Subsequently the plans for valley storage and environmental improvements were combined to provide higher quality fish and wildlife habitat than would occur without the project or even with the project proposed in the Secretary of the Army approved plan for Riverside Oxbow Restoration. This plan as indicated takes advantage of the efforts previously done by Bowen Properties and provides additional future habitat benefits that would be maintained by public resources.

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3. There is no identification of soil disposal locations or analysis of the impact of the soil dumping on such locations.

4. There is no evaluation of the specific adverse impacts of the excavation and construction program on the wetlands and lakes created by Bowen Properties pursuant to the reclamation plan and Section 404 Permit described above.

5. There is no discussion or evaluation of the loss of commercial locations and tax base along Beach Street to the local community and the City.

6. Environmental justice issues are not considered adequately. As distinct from the West Side, residents on the East side near the planned excavation and storage sites are to a significant extent African American, Hispanic and Asian in ethnicity. The modified plan contemplates replacing valley storage on the West with upscale development. On the East side the residents will lose commercial development (jobs and possibly shopping) along Beach Street in parcels 16a and 16b, and a potential site for a local community organic garden in parcel 18b. In exchange they will get an Equestrian trail and wooded habitat. Clearly there are environmental justice issues yet to be considered.

7. There is a hazardous waste site in the study area yet to be evaluated. Site 18a covers the location of what used to be a water filled gravel pit known as the Frying Pan Lake. During the 1970's and early 1980's when Bowen Properties was reclaiming it's tracts with clean fill pursuant to a supervised 404 Permit, Frying Pan Lake was filled to a level above the flood plain as an uncontrolled, unregulated and unpermitted industrial waste disposal site. Closure pursuant to RCRA closure regulations is required, but has not been done. Frying Pan Lake is a large site with a significant potential for releasing hazardous substances into the environment during a flood. No consideration has been given in the DSEIS to the existence of this waste site in the study much less compliance with RCRA.

B. Failure to Consider Alternatives:

1. The DSEIS lacks any overall evaluation of the original plan, which locates most of the valley storage on the West side in comparison to the modified plan which moves valley storage to the East. The basic rational for the change, as stated in the DSEIS, is that the owner of the Riverbend Ecosystem Storage Site on the West has development plans (and implicitly has the political and economical clout to push the valley storage downstream). Nowhere in the DSEIS is there a coherent and factual comparison of the two alternatives from an environmental, flood control, cost and social and economic cost/benefit point of view.

2. It is not at all clear from the DSEIS that all potential alternative storage sites have been considered. Thus, there may be no basis for asserting a valid

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 3:51:21 PM -06'00'
Disposal sites are identified and their impacts discussed within Appendix F of the Draft Supplemental EIS and the impacts on land vegetation and habitat are included within impact analysis within Chapter 4- Environmental Consequences. Figure 10 of the SEIS also indicates the areas where fill will be placed (Valley Storage Site-Fill and Valley Storage Site-Potential Fill Site).

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:28:32 PM -06'00'
Within the bounds of the project authorization, practical valley storage sites were identified and assessed in chapter 3 of the draft SEIS. Tables 3-1 through 3-4 present the process that was followed in determining the sites that were ultimately recommended in the Modified Alternative as primary or contingency sites.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:14:00 PM -06'00'
The original plan is a component of the no action alternative and is sufficiently evaluated. All these factors other than cost/benefit were addressed in Chapter 4 and presented in table 2 of the SEIS. The Central City project was authorized without a requirement for a federal economic cost/benefit ratio but provides strict limitations on the total federal involvement in the project.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:15:33 PM -06'00'
The intent of the Supplemental EIS was to develop and evaluate an additional alternative to provide valley storage mitigation other than what was approved by the 2006 Record of Decision for the original Central City Project and to re-evaluate the approved location of the Samuels Avenue Dam. During development of the supplement, multiple valley storage sites and differing relocations for the dam were screened. The Modified Central City Alternative compared the aspects of the the proposal that differed from the original EIS and compared the impacts and benefits not only of that project but to the aspects of the Riverside Oxbow Restoration project.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:01:43 PM -06'00'
Additional discussion and clarification of project impacts on environmental justice issues has been provided in the SEIS and appendix D.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/21/2008 6:44:04 PM -06'00'
Contaminant conditions within Valley Storage Site 18a have not been investigated to date. Three geotechnical borings were drilled approximately 400 feet west of this site. No environmental sampling was done in Site 18a because prior to the public meeting as confirmed by the subsequent receipt of this letter, we were unaware that an illegal industrial disposal may exist at this site. Prior to excavation of the site we will conduct environmental investigations to validate the concerns raised in your letter. If contamination is identified the Corps will insure that this site is appropriately addressed under applicable federal and state law.

Sequence number: 7
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 3:52:50 PM -06'00'
The Corps of Engineers has coordinated with the U.S. Fish and Wildlife Service to document and evaluate impacts to the wetlands noted. Our evaluation indicates that the project would provide positive benefits to the wetlands within the study reach identified as Gateway Beach in the SDEIS and is disclosed within Chapter 4 and within Appendix E.

Sequence number: 8
Author: M2PLRBKC

Comments from page 202 continued on next page

3. There is no identification of soil disposal locations or analysis of the impact of the soil dumping on such locations.

4. There is no evaluation of the specific adverse impacts of the excavation and construction program on the wetlands and lakes created by Bowen Properties pursuant to the reclamation plan and Section 404 Permit described above.

5. There is no discussion or evaluation of the loss of commercial locations and tax base along Beach Street to the local community and the City.

6. Environmental justice issues are not considered adequately. As distinct from the West Side, residents on the East side near the planned excavation and storage sites are to a significant extent African American, Hispanic and Asian in ethnicity. The modified plan contemplates replacing valley storage on the West with upscale development. On the East side the residents will lose commercial development (jobs and possibly shopping) along Beach Street in parcels 16a and 16b, and a potential site for a local community organic garden in parcel 18b. In exchange they will get an Equestrian trail and wooded habitat. Clearly there are environmental justice issues yet to be considered.

7. There is a hazardous waste site in the study area yet to be evaluated. Site 18a covers the location of what used to be a water filled gravel pit known as the Frying Pan Lake. During the 1970's and early 1980's when Bowen Properties was reclaiming it's tracts with clean fill pursuant to a supervised 404 Permit, Frying Pan Lake was filled to a level above the flood plain as an uncontrolled, unregulated and unpermitted industrial waste disposal site. Closure pursuant to RCRA closure regulations is required, but has not been done. Frying Pan Lake is a large site with a significant potential for releasing hazardous substances into the environment during a flood. No consideration has been given in the DSEIS to the existence of this waste site in the study much less compliance with RCRA.

B. Failure to Consider Alternatives:

1. The DSEIS lacks any overall evaluation of the original plan, which locates most of the valley storage on the West side in comparison to the modified plan which moves valley storage to the East. The basic rational for the change, as stated in the DSEIS, is that the owner of the Riverbend Ecosystem Storage Site on the West has development plans (and implicitly has the political and economical clout to push the valley storage downstream). Nowhere in the DSEIS is there a coherent and factual comparison of the two alternatives from an environmental, flood control, cost, and social and economic cost/benefit point of view.

2. It is not at all clear from the DSEIS that all potential alternative storage sites have been considered. Thus, there may be no basis for asserting a valid

Subject: Sticky Note
Date: 2/29/2008 3:03:21 PM -06'00'

As early as 2004, City of Fort Worth identified in its Gateway Park Master Plan the proposal to incorporate these sites into the existing park. As such the economic changes along Beach Street would have occurred with or without the Modified Central City alternative.

public purpose in taking private property such as sites 16a and 16b for valley storage of floodwater.

3. There has been no consideration in the DSEIS of alternatives which would preserve the city tax base represented in parcels like 16a and 16b together with uses of these tracts which would be of more benefit to the local community.

In conclusion, the DSEIS needs to be reworked so that it provides a workable basis for evaluating the merits, fairness, and advisability of moving valley storage from the upper-class West side neighborhood to the diverse East side neighborhood in order to facilitate development by a private owner on the West side.

Sincerely yours,

Edmund B. Frost, Trustee
For Bowen Properties

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 3:04:23 PM -06'00'

The Central City project provides the stimulus to preserve and to increase the city tax base. Parcels within sites 16a and 16b are a part of the Gateway Park Master Plan and have been intended by the City of Fort Worth to become a part of the park. As such no change to the City tax base than was previously planned by the City master plan will result from the alternative presented in the DSEIS.

DeAnn McKinley
6728 Fortune Road
Fort Worth, Texas 76116

U.S. Army Corps of Engineers
Fort Worth District
ATTN: CESWF-EC-D
Mr. Saji Alummuttil
P.O. Box 17300
Fort Worth, Texas 76102-0300

Affected Jurisdiction: Upper Trinity Basin, Trinity River, Texas

Re: Response to the Final EIS for Central City Project

The Trinity Uptown project has been expanded. Gateway Park now has to solve the flood control and problems that has been created by the New Flood Control Project –Trinity Uptown. I thought part of the criteria of a project design would have been to solve any problems within the project area and not create new ones outside the area.

These major design problems seem to be multiplying as the project area is expanded. The concerns for flooding in Gateway Park seem to be coming from the NEW By-Pass Flood Control Project. Doesn't this seem strange?

The Gateway Park should be able to be improved without having to take on the hydraulic problems of Trinity Uptown. It seems that Gateway Park is having to be redesigned in order for it to bear the burden of Trinity Uptown's inadequate valley storage problem and still may be flooded.

I had heard that the COE is waiting on results of flood design studies that have not been concluded to date. The COE said that the project area may change again – once the results from various studies have been finished. I have also heard that the project (Trinity Uptown) is on track and going forward. But, I have not heard when these problems under study will or will not be completed. When would the COE approve a request from the City of Fort Worth to expand the project to Gateway Park when studies had not been completed? Why does the Riverside Oxbow Restoration Project have to be delayed and expanded just to preserve the Trinity Uptown design for economic development while inadequately addressing flood control in it's area?

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:56:24 PM -06'00'

From a Federal and local sponsor perspective, the Modified Central City alternative will accelerate features and additional restoration values of the original Riverside Oxbow Restoration project. Both the with or without project condition alternatives adequately address flood control requirements established in the 1988 Record of Decision and Corridor Development Certificate criteria.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:48:53 PM -06'00'

The Corps of Engineers has completed adequate flood design studies to determine environmentally acceptability and technical sufficiency of the Modified Central City project alternative. The original Central City and Modified Central City projects are required to meet the Corridor Development Certificate (CDC) and 1988 Record of Decision which established a set of common permit criteria and procedures for development within the Upper Trinity River Corridor. The previous Central City project and Modified Central City project as defined in the Supplement to the FEIS meet the CDC requirements. Hence, if the modified project is not carried forward the original project can be implemented as previously authorized and approved by the 2006 ROD received for the Central City project. As part of on-going design efforts as part of the authorized Central City project additional engineering studies will be conducted to complete the detailed design.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:38:12 PM -06'00'

The Gateway Park area was only considered after the City of Fort Worth formally requested the Corps of Engineers to explore the concept of combining the original Fort Worth Central City project with the previously authorized Riverside Oxbow Ecosystem Restoration project is contained within the Upper Trinity River Study Area.

It is illegal to flood to your neighbor. Why should downtown Fort Worth flood Gateway Park to avoid flooding Arlington? Why should downtown Fort Worth's economic development (Trinity Uptown) be allowed to compromise the full use and enjoyment of Gateway Park's improvements? It may not be as illegal as flooding your neighbor (Arlington), but it does not make it right.

I don't understand spending money to make a flood – I don't understand why people would not be respectful of other areas of Fort Worth. Evidently, a few want to spend OUR Federal, State and City Tax dollars (which are in the MILLIONS) to build a poorly design project which will flood another area downstream rather than revisiting the design of Trinity Uptown in order to solve its problems within the project area.

DeAnn McKinley
6728 Fortune Road
Fort Worth Texas 76116

☆ RIVERSIDE ALLIANCE ☆

Bonnie Brae N.A. *Carter Riverside N.A. *Gateway N.A. * Highcrest N.A. *Oakhurst N.A. Scenic Bluff N.A. *Springdale N.A. *Sylvan Heights West N.A. *United Riverside N.A.

February 8, 2008

U.S. Army Corps of Engineers
Fort Worth District
ATTN: CESWF-EC-D (Mr. Saji Alummuttil)
P.O. Box 17300
Fort Worth, Texas 76102-0300

Dear Mr. Alummuttil,

On February 7, 2008 the delegates to the Riverside Alliance voted to convey to our position on the proposed flood storage in Riverside Park as proposed in the "Draft Supplement No. 1 to the Final Environmental Impact Statement for the Central City Project, Upper Trinity River, Texas."

The Alliance position is as follows on proposed flood storage in Riverside Park:

Our organization declines to endorse the flood storage plan as proposed in the Modified Central City Alternative which includes flood storage in Riverside Park because we do not currently have enough information about the project. We support using City of Fort Worth gas lease bonus monies for Riverside Park to fund a Riverside Park Master Plan.

The following are specific comments and questions on the draft supplement:

1. The draft supplement does not take into account the aesthetic, historic, and cultural significance of Oakhurst Scenic Drive, part of which is immediately adjacent to Riverside Park and the proposed flood storage area. Oakhurst Scenic Drive, from Belknap on the south to Watauga Road on the north, was constructed as a park by the Works Progress Administration Project with Tarrant County in 1936. It was designed by S. Herbert Hare, a partner in the nationally known Kansas City landscape architecture firm Hare and Hare.

   Oakhurst Scenic Drive has been listed as a scenic corridor by the City of Fort Worth for more than 15 years. It is an important historic, cultural, recreational, and aesthetic resource to the citizens of Oakhurst and all citizens of Riverside and Fort Worth.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:17:33 PM -06'00'

Comment is noted. Many options for flood storage were evaluated during the planning process for the original EIS and during development of this Supplemental EIS. This site was favored because of its low impact to existing environmental resources, publicly owned land, and economic cost.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:20:08 PM -06'00'

Oakhurst Scenic Drive will be added to the Area of Potential Effect and discussion effects to this road will be included in the FSEIS.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 10:38:20 AM -06'00'

City of Fort Worth is a sponsor of the Central City project and has endorsed use of Riverside Park as a Valley Storage Site. According to the City the proposed plan of reconstruction of the site will provide amenities that equal or exceed recreational and environmental features of the existing park area including facilitating use of the Trinity River.

The draft supplement does not take into account the impact of flood storage in Riverside Park – either preparing for it or maintaining it – on Oakhurst Scenic Drive. We find this to be a deficiency of the document.

2. The proposal for flood storage in Riverside Park does not take into account the desire of residential property owners in Riverside to have a Riverside Park master plan produced which would take into consideration opportunities to make the park a neighborhood rather than a regional park serving several neighborhoods. The proposed flood storage plan also does not take into account new opportunities to develop the park as a pedestrian destination closely linked to the new Six Points Urban Village and to other Riverside neighborhoods.

3. We are aware of the Texas Department of Transportation's plans to double the existing capacity on Interstate 35, immediately adjacent to Riverside Park and the Scenic Bluff and Oakhurst neighborhoods. What impact would flood storage in Riverside Park (and other nearby contingency flood storage sites) have on I-35 expansion? The draft supplement does not take into account the impact of its proposal for Riverside Park flood storage on TXDOT's plans.

4. There may be now or may in the future be gas drilling under Riverside Park. The draft supplement does not take into account the impact of the proposal for Riverside Park flood storage on current or future gas drilling in or near the park or vice versa.

5. The draft supplement does not take into account the impact of proposed flood storage for Riverside Park on the nearby East Belknap Street Bridge, a historic resource identified in the Historic Resources Survey for Tarrant County, Texas and also eligible for listing in the National Register of Historic Places.

We appreciate the opportunity to comment on the draft supplement to the FEIS on the Central City Project, Upper Trinity River, Texas. We look forward to receiving your response to our comments.

Sincerely,

Sarah Walker
Moderator

cc: Sal Espino, City Council member, District 2, Fort Worth City Council
Danny Scarth, City Council member, District 4, Fort Worth City Council
Kathleen Hicks, Mayor Pro Tem, District 8, Fort Worth City Council
Mayor Mike Moncrief, City of Fort Worth
City Council members, City of Fort Worth
U.S. Rep. Michael Burgess, District 26
U.S. Rep. Kay Granger, District 12

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:21:15 PM -06'00'

The use of Riverside Park as Valley Storage requires relocation of impacted infrastructure and temporary disturbance of existing recreational amenities. Excavation work as proposed avoids areas of existing woodlands within the park and along Oakhurst Scenic Drive. The City of Fort Worth is responsible for the current maintenance of the park and will continue in this role under the proposed project. As the overall footprint of the park will not be altered increased maintenance costs on an annual basis will not be greatly affected. As is the case with other City parks and Riverside Park, which are within the floodway, maintenance costs as a result of flood events will be handled from contingency funds as required as they are not an annual event. Oakhurst Scenic Drive would be repaired as necessary to a standard consistent with the needs and desires of the community.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:24:19 PM -06'00'

The bridge is a historic resource that spans an active floodway and the floodway width is not affected near the bridge. Therefore, there is no physical or visual effect on the bridge by the proposed undertaking as the bridge continues to serve its historic purpose of spanning a floodway. No adverse effects due to the haul routes are anticipated to the resource. Reference Appendix C- Volume II, Sheet CG-10 for proposed grading work.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:23:38 PM -06'00'

At this time a surface drill site has not been identified but City rules preclude it from occurring on the park site and that sufficient buffering occur between park and neighborhood land uses and a proposed drill site.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 4:22:58 PM -06'00'

The proposed flood storage improvements in Riverside Park are not adjacent to I-35 and will not be impacted by TxDOT plans for the I-35 corridor; see Appendix C- Volume II, Sheet CG-10. The contingency sites if required would be coordinated with TxDOT and configured in a manner that will not impact I-35 expansion.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 3:18:19 PM -06'00'

The size and location of Riverside Park preclude it from being a neighborhood park by classification. The City currently classifies the park as a Community Park. Community Parks are close to home parks designed to service the recreation needs of 18,000-36,000 or approximately 6 neighborhoods. Riverside Park also serves as a trailhead on the Trinity River Trail system which will not be altered by the proposed plan. The proposed plan does not preclude the further development or alternative development of the park as a pedestrian destination linked to the adjacent neighborhoods and neighborhood commercial areas. As presently planned the proposed project includes the relocation of existing parking facilities and connection to the recreational trail to be adjacent to Race Street thereby providing a better linkage to the Six Points Urban Village and Riverside neighborhoods. The City has committed to a Master Plan process to determine the recreational facilities within the park. The neighborhoods that are served by the park are not all opposed to the proposed plan. The Scenic Bluff Neighborhood, adjacent to Riverside Park, has endorsed the plan.

February 8, 2008

Saji Alummuttil
U.S. Army Corps of Engineers
Attn: CESWF-EC-D
P.O. Box 17300
Fort Worth, TX 76102-0300

RE: Draft Supplement No. 1 to Final Environmental Impact Statement for the Upper Trinity River Central City Project (Tarrant County)

Dear Mr. Alummuttil:

The U.S. Army Corps of Engineers (USACE) has conducted a Draft Supplement No. 1 to the previously approved Final Environmental Impact Statement (DSEIS) for the Upper Trinity River Central City Project. The DSEIS has been provided to address a proposed alternative that would integrate the Central City Project with the Riverside Oxbow Ecosystem Restoration Project, two separate projects along the West Fork Trinity River in Tarrant County. The integrated project would be called the Modified Central City Alternative and would involve 1) providing valley storage, as required to mitigate for hydraulic impacts of the Central City Project, within the downstream Riverside Oxbow area rather than at the originally proposed upstream Riverbend site, 2) relocating the approved Samuels Avenue dam on the West Fork Trinity River from its original location downstream of Marine and Lebow Creeks to a location upstream of both creeks, 3) constructing a low water dam in the southern portions of Marine Creek, and 4) creating a boat channel and lock structure between the Trinity River impoundment and Marine Creek to allow for boat access between the two systems.

The Texas Parks and Wildlife Department (TPWD) offers the following comments and recommendations regarding the Modified Central City Alternative:

Valley Storage Sites

Figure 7 shows Essential Restoration Lands bounded along the old river oxbow and Figures 8 and 9 indicate potential valley storage sites, specifically Site ID 10 and 14a, within the Riverside Oxbow area that would avoid the Essential Restoration Lands. Figure 10, on the other hand, indicates Recommended Valley

4200 SMITH SCHOOL ROAD
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512.389.4800
www.tpwd.state.tx.us

Storage – Cut locations for Site ID 10 and 14a that are not of similar size as those identified in Figures 8 and 9 and thus encroach on the Essential Restoration Lands. The Central City Habitat Development Plan for the Riverside Oxbow Area, Figure 12, shows a reduced amount of restored buffer along the Oxbow than was originally proposed in the Approved Riverside Oxbow Ecosystem Restoration Project, Figure 2. The new plan h "turf grass" planting proposed in the Essential Restoration Land area along oxbo

> Comment. The proposed "turf grass" plantings that encroach on the Essential Restoration Lands should be changed to native tallgrass plantings or riparian woodlands.

> Comment. The proposed native grassl habitats of the Essential Restoration Lands should include tallgrass species that are not continually mowed. A mowing plan should be established that reduces mowing to every 3 years or when woody encroachment is evident. Some woody species within the native prairies may need individual plant applications of herbicide because mowing some woody species only creates multiple stem re-sprouting.

Over time, valley storage basins can accumulate sediment that settle out when flood waters enter the basins. Chapter 4 page 14 provided a short paragraph on the potential for approximately 3.5 inches of sediment to occur over a 30 year period. The DSEIS indicated that this amount of sediment would not have a detrimental effect on the proposed habitat developments within the excavated areas.

The DSEIS did not clearly indicate if the amount of sediment accumulation would affect the volume of valley storage that is needed, and whether any potential sediment dredging would be needed to account for valley storage losses. If dredging ever becomes necessary, those basins planted with riparian woodland vegetation would be impacted. The riparian areas would then need to be replanted. In order to prevent having to clear riparian vegetation for dredging, the USACE should consider planting early succession vegetation communities in those basins rather than later succession woodland communities. Incorporating an emergent wetland community within the basins would make reclamation following dredging more feasible.

> Comment. The potential need for sediment removal to meet valley storage requirements and associated habitat mitigation impacts should be addressed in the DSEIS.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:24:16 PM -06'00'

Sedimentation transport studies conducted indicate that sedimentation within the valley storage areas will not be a significant impact to valley storage and therefore will not need to be removed. The threat to the perpetuation of riparian forests within these areas during the 50-yr study period was evaluated. The Corps and local sponsor acknowledged that there was some risk and consequently estimated future riparian values than if done on non-excavated areas. In addition, a long term monitoring and adaptive management program will be utilized to adapt to conditions that may affect future benefits.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:11:45 PM -06'00'

Turf grass plantings have been proposed in areas of forecasted high pedestrian use or other factors that preclude the use of native tallgrasses. During subsequent detailed design, each site will be further evaluated and if turf grasses areas can be replaced or reduced with native tallgrass, that action will be implemented.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:24:26 PM -06'00'

An Operations and Maintenance Manual for all ecosystem improvements will be developed during detailed plans and specifications prior to completion of construction. The sponsor will be responsible for O&M. This information will be useful in consideration of species to use and development of that plan.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:05:31 PM -06'00'

The original Riverside Oxbow project report findings were utilized along with recent field investigations and review of existing imagery to determine environmentally sensitive areas for establishing boundaries on the figure to promote a planning objective of minimizing impacts to existing high quality resources and those high quality resources that would be established should Riverside Oxbow Project ever be authorized for construction (essential restoration lands). As you have noted all impacts could not be avoided, however through planning discussions between hydraulic, civil and environmental planners, the impacts were minimized to the extent possible within the accuracy of information available.

Habitat Development Plan at Riverside Oxbow Area

The native grasses proposed within the **Savannah** habitats for the Central City Habitat Development Plan were not clearly described in the DSEIS.

> Recommendation. The herbaceous vegetation planted for the Savannah habitats should consist of native grass and forbs species that create a diverse community. As described above, these areas should be protected from continual mowing.

There has been a dramatic increase in water demand across North Texas, thus water conservation is essential to this area. Native vegetation is adapted to the soil and climate of the area and usually requires less maintenance and watering than introduced species. The disease tolerance of native vegetation provides longevity to the landscape without high cost. Native landscapes provide an enjoyable outdoor space for the public while also benefiting wildlife such as birds and butterflies.

> Recommendation. To enhance the value of the proposed **"turf grass"** planting areas to both wildlife and the public and to reduce irrigation use, the native turf grass, buffalograss (*Buchloe dactyloides*) should be planted.

Thank you for consideration of these recommendations. Please contact me at (903) 675-4447 if you have any questions.

Sincerely,

Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

kbh/12900(12329, 11137, 11132, and 11032)

Page: 210

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 12:34:28 PM -06'00'

The intent is to establish the savannahs utilizing species that would provide the results recommended. Fish and Wildlife Service has provided some recommendations and further coordination with state, local and federal resources agencies and groups will be conducted to determine the appropriate species mix on a site by site basis during detailed plans and specifications development.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 12:35:36 PM -06'00'

To the extent possible buffalograss will be utilized for the reasons mentioned.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
P.O. Box 26567 (MC-9)
Albuquerque, New Mexico 87125-6567

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

ER 08/51
File 9043.1

February 14, 2008

Saji Alummuttil, Project Manager
U.S. Army Corps of Engineers
Fort Worth District, CESWF-EC-D
P.O. Box 17300
Fort Worth, Texas 76102-0300

Subject: Review of the Draft Supplement No. 1 to the Final Environmental Impact Statement (DSEIS), for Upper Trinity River Central City, Fort Worth, Texas

Dear Mr. Alummuttil:

The U.S. Department of the Interior has reviewed the subject DSEIS and has the following comments. Since 2001, the U.S. Army Corps of Engineers has been evaluating various alternatives for flood damage reduction, mitigation, and reestablishment of fish and wildlife habitats, recreational opportunities, and other allied projects along the West and Clear Forks of the Upper Trinity River and its tributaries in Tarrant County, Texas. These studies are being conducted at the request of the non-federal sponsor, Tarrant Regional Water District (TRWD), and under the Corps' June 2000 Upper Trinity River Basin Study authority.

The Riverside Oxbow Ecosystem Restoration and the Central City Multi-Purpose projects were the first two studies being conducted as part of the comprehensive Clear Fork and West Fork of the Trinity River Interim Feasibility Study. The Corps' Riverside Oxbow Report and Integrated Environmental Assessment were completed in April 2003 and some aspects of the plan have already been implemented. In December 2004, the United States Congress authorized the Corps to undertake the Central City project as generally described in the April 2003 Trinity River Vision Master Plan, a cooperative initiative between the TRWD, Streams and Valleys (a local non-profit parks organization), and the City of Fort Worth (City). The Upper Trinity River Central City plan and Environmental Impact Statement were completed in January 2006.

The Central City Project Plan, as described in the January 2006 EIS, includes a flood bypass channel and floodgates to divert flood flow around a segment of the existing Trinity River adjacent to downtown Fort Worth. In addition, project plans consist of a dam located downstream of Samuels Avenue to create a small lake extending up the river to approximately Rockwood Park, ecological restoration areas, and 5,250 acre-feet of valley storage mitigation sites. Much of the proposed valley storage was to be located in the Riverbend Park area to compensate for the loss of valley storage associated with the construction of the proposed dam and bypass channel on the Trinity River. Habitat improvement, restoration, and enhancement were also planned for the Riverbend Park area to compensate for project impacts.

The April 2003 Riverside Oxbow Interim Feasibility Report and Integrated Environmental Assessment contains plans for the Riverside Oxbow ecosystem restoration project located just east of the downtown area on the West Fork of the Trinity River downstream of Riverside Drive. It consists of habitat restoration on 512.2 acres of floodplain lands, approximately 2 miles of oxbow river channel, 56.5 acres of wetlands, 112 acres of riparian habitat and upland native grassland, and 25,700 feet of compatible mixed surface linear recreational trails.

The U.S. Fish and Wildlife Service assisted the Corps in assessing both projects. That involved attending team meetings, conducting site visits, completing baseline habitat assessments, and evaluating alternative plans.

On June 22, 2006, the City requested that the Corps conduct an evaluation and analysis to consider the potential benefits of merging the Central City and the Riverside Oxbow project areas. Significant changes in land use and development activities within the project areas have occurred since the National Environmental Policy Act documents were completed, such as the recent gas well drilling near the Riverside Oxbow.

The current study proposal contains two alternatives. The "No Action" Alternative would be the separate implementation of both the Central City and the Riverside Oxbow Ecosystem Restoration projects as they are currently approved and the Modified Central City Alternative would combine both projects. The modified project proposes the major attributes contained in the original plan, such as the bypass channel, isolation gates, the Samuels Avenue Dam, valley storage mitigation, and wildlife habitat mitigation. The Samuels Avenue Dam location is proposed to be relocated upstream of Marine Creek. The modified plan would minimize acquisition of private lands by locating the valley storage sites on public lands and concentrating wildlife habitat mitigation in the Riverside Oxbow project area. Aquatic habitat mitigation for impacts to Marine Creek resulting from construction of the dam, the proposed lock and channel located west of the dam, and the Marine Creek low water dam are still proposed for Ham Branch, but now includes restoration of Sycamore Creek within the Riverside Oxbow area. The modified project proposes to exclude Riverbend Park from the project for habitat mitigation but includes it as a contingency valley storage site if additional storage is necessary. The modified plan would require compensation for loss of about 18.3 acres of riparian woodlands, 59 acres of upland woodlands, 2.3 acres of aquatic habitat, and less than an acre of emergent wetlands. However, it includes establishing 58 acres of wetlands, restoration of 10.9 acres of stream and oxbow habitat, developing of 137.6 acres of riparian woodland, enhancement of 263.6 acres of existing riparian woodland, development of 87 acres of native grassland/savannah, and enhancement of 53.3 acres of native grasslands.

The FWS's Fish and Wildlife Coordination Act (FWCA) reports for the Central City and the Riverside Oxbow Ecosystem Restoration projects contain our assessment of the existing environmental conditions of the project area and habitat restoration recommendations for the "No Action" alternative. The information contained in these reports and most of our recommendations have been incorporated into the Modified Central City alternative.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:27:23 PM -06'00'

US Fish and Wildlife Service provided valuable and much appreciated technical assistance during the formulation of the Central City and Riverside Oxbow Projects and Modified Central City Alternative.

General Comments

Samuels Avenue Dam and Marine Creek Low Water Dam

The fisheries survey conducted by the FWS in 2005 on Marine Creek demonstrated that the shallow riffle-pool sequences currently support an exceptional and high valued fish community. The FWS has designated the aquatic habitats within Marine Creek as Resource Category 3. Category 3 habitat is of high to medium value for the evaluation species and is relatively abundant on a national basis. The mitigation goal for this category is no net loss of habitat value while minimizing loss of in-kind values. Impacts to these aquatic resources should be avoided, minimized, and/or compensated.

The FWS expressed concerns in our October 5, 2005, Central City FWCA report that the aquatic habitat in these reaches would be totally lost due to inundation caused by the proposed Samuels Avenue Dam included in the proposed Community Based Alternative in the 2006 Central City Multi-Purpose project. The Modified Central City Alternative proposes to relocate the Samuels Avenue Dam to approximately 1,750 feet downstream of Northside Drive on the main stem of the Trinity River, immediately upstream from the confluence of Marine Creek. This new location would eliminate impacts to Lebow Creek. During normal dry weather, the dam will maintain the normal water-pool level elevation of 524.3 National Geodetic Vertical Datum (NGVD). The pool level of 516.5 NGVD within proposed channel and lock structure that would connect the Trinity River with Marine Creek and the fixed low water dam proposed on Marine Creek, approximately 300 feet upstream of the confluence with the main stem of the river, is much lower than the original project pool level. This lower level would reduce the backwater impacts to Marine Creek, but would still result in the inundation of shallow riffle and run fishery habitat. Therefore, mitigation would be required.

Aquatic Mitigation Plan

The FWS supports the proposed Modified Central City Alternative aquatics mitigation plan that proposes developing additional stream mitigation features in Sycamore Creek and Ham Branch. This mitigation would include construction of a series of riffle pool sequences with a stable streambed supported by stable banks and a riparian corridor in both streams. The streams should have a sufficient longitudinal profile (slope) to maintain adequate flow regimes. Substrate composition should be similar to the habitat in Marine Creek. These mitigation measures would fully compensate for the adverse impacts to the aquatic habitat in Marine Creek caused by the construction of Samuels Avenue dam and the low water dam.

We support restoring the old remnant of Sycamore Creek between Riverside Oxbow and the river. Providing a reliable water source and restoring the aquatic function of this segment of Sycamore Creek would benefit aquatic species and contribute to the mitigation requirement for the impacts associated with inundating Marine Creek. Habitat restoration benefits would not be fully realized for several years, but the newly planted aquatic vegetation proposed in the mitigation plan would probably be well established within 1 year. Habitat values for ducks, wading birds, and fish would still be low until woody debris and overhangs required for good wood duck, green heron, and raccoon habitat are established and the invertebrate numbers increase. Food availability would be greatly improved by the 10^{th} year, but the woody debris and overhangs for perching and shelter would still be lacking. By the 50^{th} year, it is assumed that

woody debris and overhangs would be available along the edge of the wetland, yielding optimum habitat for all the wetland indicator species.

The proposed valley storage site located in Harmon Field Park contains the proposed Ham Branch restoration project area. Ham Branch is also being proposed for aquatic habitat restoration to mitigate for impacts to the aquatic environments associated with inundation of Marine Creek due to the proposed Samuels Avenue dam. The FWS supports the proposed aquatic and riparian habitat restoration of Ham Branch.

Specific Comments

Valley Storage Sites

Site 1: This site is located within Riverbend Park that receives a significant level of seasonal public use. Our October 5, 2005, report contained information regarding the high quality of habitat located within this area. The park contains a diversity of habitats; grasslands, riparian woodlands, upland woodlands, and wetlands. The upland woodlands contain the highest overall wildlife habitat values that were measured in the project area. We recommend that this area not be considered for excavation for valley storage, but as possible habitat mitigation if additional habitat mitigation is necessary.

Site 5a: Appendix E, page 6, states, "Negative impacts to Lebow Creek would be totally eliminated…" Figure CG-06 in Appendix C, Volume II indicates that the lower east bank of Lebow Creek would be excavated as part of the proposed valley storage Site 5a. The DSEIS does not address this impact. We recommend that excavation of Lebow Creek be avoided and the boundary of the proposed valley storage Site 5a be located further east as to not cause adverse impacts to the creek.

Site 8: This site located within Riverside Park contains grasslands, riparian woodlands, and upland woodlands. The project area receives a significant level of seasonal public use. All the habitats in this project area have great potential for improvement; however, this area currently has a high habitat value per acre. The existing small stream at the south end with its narrow riparian woodland corridor on each bank and a stand of mature pecans are important to local mast producers. With a change in the management of the ground cover, this site could become high quality riparian habitat. We recommend moving Site 8 further south.

Site 9: This site is the location of the proposed Ham Branch restoration project, which was selected for environmental mitigation to compensate for impacts to the aquatic environments associated with inundation of Marine Creek. The FWS looks forward to assisting the Corps in the habitat restoration planning of Ham Branch.

Sites 12 and 14a: Proposed valley storage sites 12 and 14b appear to encroach into the bottomland hardwood riparian corridor along the Riverside Oxbow, removing mature trees and shrubs. The purpose of the approved Riverside Oxbow habitat restoration project is to restore the riparian forest within the Riverside Oxbow area and Gateway Park. Figure 7 depicts the "essential restoration lands" that were recommended by FWS, Corps, and state biologists that are known to contain quality riparian bottomland hardwood habitat. Bottomland hardwood habitat is becoming more scarce within Texas, especially within urban areas. The narrow bottomland hardwood habitat corridor within the Riverside Oxbow area is predominately composed of

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:32:44 PM -06'00'
The portion of overall Site 8 (figure 10) that would be used as a contingency site is on private lands adjacent to IH-35. It was formerly used as a farmland and has mixed vegetation regrowth, mostly forbland and early successional grassland and shrubs. Moving site 8 further south would put it into the forested area or into a primary valley storage site (Site 21). Site 21 avoids impacts to the stream and forested areas of Riverside Park.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 1:54:46 PM -06'00'
The scale of the referenced drawing results in the appearance that excavation would occur down into Lebow Creek. Lebow Creek is deeply incised at the confluence and the excavation depth would not extend into the channel. Only the upper most part of the bank which is currently vegetated by seasonal growth of non-native forbs, would be disturbed. Appropriate controls will be utilized during construction to manage storm water runoff from the disturbed soils.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:32:57 PM -06'00'
The Corps will continue its coordination with the FWS as plans and specifications continue on Ham Branch.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:29:59 PM -06'00'
The area of proposed for valley storage if utilized as a contingency site would impact upland savannah primarily. No priorities have been established for use of contingency sites, however, should one or more of the sites be needed the design will be modified to the extent possible to minimize impacts to any high quality resources. While the Modified Central City Alternative as proposed would provide adequate mitigation should this site need to be ultimately impacted, revegetation of the impacted area would be necessary and to the extent possible, tree plantings and native grasslands would be utilized.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 12:45:22 PM -06'00'
Support for the aquatic mitigation and restoration at Ham Branch and Sycamore Creek and Riverside Oxbow is appreciated.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:34:47 PM -06'00'
The original Riverside Oxbow project report findings were utilized along with recent field investigations and review of existing imagery to determine environmentally sensitive areas for establishing boundaries on Figure 7 to promote a planning objective of minimizing impacts to existing high quality resources and those high quality resources that would have been established should Riverside Oxbow Restoration Project be authorized for construction (essential restoration lands). As you have noted all impacts could not be avoided, however through planning discussions between hydraulic, civil and environmental planners, the impacts were minimized to the extent possible within the accuracy of information available.

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mature pecan, oaks, and elms. It provides food, cover, nesting habitat, and living space for forest dependent species. Large trees are important as nesting habitat for the fox squirrel (*Sciurus niger*) and red-tailed hawk (*Buteo jamaicensis*) and important escape cover for raccoons (*Procyon lotor*) and migratory birds. Brush piles and snags provide necessary food, cover, and shelter for small mammals and birds. Riparian forest habitats are essential in maintaining biodiversity and providing important wildlife travel corridors.

The proposed plan includes planting trees and shrubs to establish more riparian woodlands in this area, but it would take years for the trees to mature and the habitat to become quality bottomland-hardwood habitat. We recommend that trees within the riparian corridor be preserved as much as possible and that they be protected from excavation, construction, and erosion damage. Excavation for the proposed valley storage sites 12 and 14b should be relocated outside the designated "environmental sensitive area."

The project plans indicate that excavation would occur around the existing mature pecan trees along the Sycamore Creek remnant. Excavating around a tree to preserve it will not assure its survival if the roots are damaged or the moisture in the soil is changed due to such activities. Excavation around the trees along the Sycamore Creek remnant should not be closer to the tree trunks than the distance between the trunk and drip line plus 25 percent of the same distance to maintain their health. Any exposed roots should be reburied.

Site 16a and 18a: The wetlands located between valley storage sites 16a and 18a were included in the environmentally sensitive areas designated by the interagency biologist team. The FWS is concerned that the excavation of proposed valley storage sites 16a and 18a may adversely alter the hydrology of these wetlands. Drainage from the surrounding land contributes to the water level in these wetlands. We recommend that the Final Supplemental to the Final EIS include an analysis of how the proposed excavation sites will affect the emergent wetlands within the project area and how these wetlands will be maintained.

The proposed project (Figures 13 and 14) includes 7,600 feet of wood mulch equestrian trail of which portions appear to be located along the banks of the wetlands in Gateway Park. Trampling by horses generally causes compaction of leaf litter and soil much greater than by hikers. Nutrient enrichment from horse manure and urine is also a likely factor that could favor invasion of weedy species along horse trails. Horse manure may contain viable seeds of exotic species. We recommend that the equestrian trail be located at least 30 feet from the shoreline of wetlands and other water bodies. We recommend that monitoring for and removal of horse manure and exotic plants continue as standard park maintenance.

Chapter 3, Marine Creek Low Water Dam, Page 15, second paragraph - The DSEIS states that bank stabilization would be accomplished through the use of compacted concrete with rip-rap at the turnaround basin just upstream of 23rd Street. Hard bank protection could reflect wave energy against other unprotected soft banks. We recommend using more natural, soft engineering for bank stabilization.

Chapter 4, page 20, Habitat Outputs - The DSEIS states that grassland types included in the plans are turf grasses, managed (mowed) grasses for stabilization on channel and levee slopes, and planted, managed, and improved native grasslands. We recommend planting native Buffalo grass, *Buchloe dactyloides*, in the parks and on the levees, instead of Bermuda grass.

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Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:10:14 PM -06'00'
Subsequent detailed plans and specifications will include evaluations to reduce the amount of encroachment into the environmentally sensitive areas identified per the Department's recommendation.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:12:47 PM -06'00'
Existing design provides for bulkheads and other structures outside of the drip line of these valuable mature trees to provide protection against soil erosion and groundwater losses. As these trees provide valuable support to the entire Sycamore Creek aquatic habitat development, precautions recommended will be utilized to the extent practicable.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:45:15 PM -06'00'
Wetlands within this site will be modified slightly by the project, however the intent is to provide an increase in size of the wetlands by contouring non-forested areas to provide a more gradual slope, placement of some fill in deeper waters, and proactively plant the wetland with native wetland plants to maximize habitat value gain and reduce invasion by non-native or less desirable native wetland plants. The excavations on either side will not shunt water away from the wetland areas and should not negatively impact the existing or proposed improved wetlands values.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:48:20 PM -06'00'
We also prefer soft treatments where practicable, however Marine Creek carries significant flood flows at times from a large drainage area of North Fort Worth. In addition as small recreational/commercial water taxi type boat traffic will be accommodated in the future, some hard bank may be needed. This recommendation for utilizing softer banks where possible will be carried forward for further consideration during detail plans and specifications development.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:39:31 PM -06'00'
We concur and agree that riparian forest habitat is essential to maintaining important wildlife habitat. Valley storage sites within the proposed Modified Central City Alternative in the Riverside Oxbow area allow for greater development of riparian forest within this area.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:46:51 PM -06'00'
Concur, this recommendation will be carried further into plans and specifications. The trails will be located a sufficient distance from sensitive areas to minimize disturbance to wildlife utilizing the areas. The other reasons mentioned are also valid with regard to maintaining a sufficient distance between visitors and the wildlife habitat.

Sequence number: 7
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:26:49 PM -06'00'
Buffalo grass will be utilized where site and use conditions are conducive.

Table 4-1, page 4-13 - The figures do not reflect the figures in the first table in Attachment 1 to Appendix E titled, "Without Project Versus With Project Conditions Modified Central City Project."

First Table in Attachment 1 to Appendix E, Without Project Versus With Project Conditions Modified Central City Project - The figures in the table under the Upland Forest column are incorrect. They appear to be off one line down.

Appendix E, page 10 - These habitat development and improvement acres do not match the ones given on page 4-18.

Summary

After reviewing information provided in the DSEIS, we have determined that the Corps' recommended plan, if the recommendations discussed above are included, would sufficiently mitigate the adverse impacts resulting from implementation of the modified project alternative. The mitigation plan would provide for habitat diversity, quality, and quantity, benefiting a variety of resident and migratory wildlife species. It would not adversely affect any threatened and endangered species. Reforestation and improvement of the riparian corridor would substantially increase the amount of vital reproductive and neotropical bird habitat, thus, furthering the goals and objectives of the North American Waterfowl Management Plan and the Partners in Flight program. For these reasons, we support implementation of the proposed Modified Central City Alternative.

Thank you for allowing us to comment on the DSEIS. If you have any questions or comments, please contact Ms. Carol Hale, FWS Ecological Services Field Office, Arlington, Texas, at 817-277-1100.

Sincerely,

Stephen R. Spencer
Regional Environmental Officer

Page: 216

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:51:12 PM -06'00'
Concur, an error in formatting occurred during preparation of the draft report for printing to CD, however the correct version with non-shifted lines was used during writing of the technical appendix and Draft SEIS. This error has been corrected.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:39:44 PM -06'00'
The acreages shown on page 4-18 are composite numbers from the entire Central City project, whereas the acreages identified on Appendix E, page 10 are limited to those areas preserved, improved, or developed solely with the Riverside Oxbow-Gateway Park study reaches.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:55:19 PM -06'00'
To the extent practicable the Services recommendations have been adopted and future efforts will be coordinated with the Service and other resource agencies to minimize adverse impacts to key resources. The proposed habitat development plans will provide substantially more wetlands, riparian woodlands and stream habitat than unavoidably impacted by the project.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:32:45 PM -06'00'
The numbers in Attachment 1 do not reflect additional residual impacts caused by Central City project implementation that are included in Table 4-1. Some impacts attributable to the project occur in areas outside of the areas that we analyzed in attachment 1, but were added to Table 4-1 from the original Central City EIS data.

January 25, 2008

Mr. Saji Alummuttil, Project Manager
CESWF-EC-D
U.S. Army Corps of Engineers, Fort Worth District
P.O. Box 17300
Fort Worth, Texas 76102-0300

Re: U.S. Army Corps of Engineers, Joint Public Notice
Upper Trinity River Central City Project

Dear Mr. Alummuttil:

This is in response to the December 21, 2007 letter from William Fickel, Jr. concerning the referenced project. Our findings indicate that as a participant in the National Flood Insurance Program (NFIP), the City of Fort Worth has review responsibility and approval authority for projects within the City. Since a change is the water surface elevation is anticipated, a Letter of Map Revision may be needed.

Please note that as of September 1, 2007, the Texas Water Development Board became the State Coordinating Agency for the National Flood Insurance Program. Please send all future correspondence to:

Texas Water Development Board
Water Resources Planning Division
P. O. Box 13231
Austin, Texas 78711-3231

Thank you for bringing this matter to our attention. If you have any additional questions, please contact me at (512) 463-4350.

Sincerely,

Rachel Andrews, EIT, CFM
Assistant NFIP State Coordinator

Page: 217

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:56:49 PM -06'00'

Corps and local sponsor will coordinate with the City of Fort Worth in developing and submitting a Letter of Map Revision as the design and implementation of the modifications progresses.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

February 19, 2008

William Fickel, Jr.
Chief, Planning, Environmental, and
Regulatory Division
Department of the Army
Corps of Engineers
Fort Worth District
P.O. Box 17300
Fort Worth, TX 76102-0300

Dear Mr. Fickel:

We have reviewed the Draft Supplement No. 1 to the Final Environmental Statement, for the Upper Trinity River Central City, Fort Worth, Texas. EPA reviewed the Final EIS on February 21, 2006, and had no further comments or objections to the proposed action. EPA has no additional comments to offer on the supplemental document.

Thank you for this opportunity to comment.

Respectfully yours,

Michael Jansky, P.E.
Regional EIS Coordinator.

Page: 218

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 2:44:10 PM -06'00'
Thank you for reviewing and commenting on the project modification proposal.

League of Women Voters of Tarrant County
3212 Collinsworth Street, Fort Worth, TX 76107
Phone: 817-348-VOTE (8683) FAX: 817-348-8683
Email : lwvtarrantcounty@sbcglobal.net
Web Site: www.lwvtarrantcounty.org

February 18, 2008

Mr. Saji Alummuttil
CESWF-EC-D
U.S. Army Corps of Engineers
Fort Worth District
P.O. Box 17300-0300
819 Taylor Street
Fort Worth, TX 76102-0300

Subject: Comments and Questions concerning the Draft Supplement No. 1 to Final EIS for the Central City Project, Upper Trinity River, Texas

- According to the EIS, the Trinity Uptown Project was funded under Section 116 of Public Law 108-447. The Federal share was capped at $110 million. It is our understanding that the funds were authorized, but only $10 million has been appropriated. Since the project was not included in the 2008 fiscal year Water Resources Development Act, what is the process for appropriating the remaining $100 million that has been authorized?
- The Old Water treatment plant off Beach will be used for storing excavation material. What types of materials are expected to be stored? How will the area be screened from surrounding land uses? What measures will be taken to ensure that pollutants from the excavation materials do not flow into the Trinity River.
- We are concerned about the loss of approximately 26 acres of scarce Upland Woodland. This type of forest takes a long time to develop. We are unsatisfied with the vague plans to plant trees elsewhere.
- If this revised project is superior to the original plan to store water on the West side of downtown Fort Worth, why wasn't this plan put forth first?
- The contemplated Waterfront Drive along the base of the bluff is unnecessary and would decrease park acreage and detract from the potential local serenity of the water's edge.
- Under water quality, what is the anticipated impact of the project on the aquatic vegetation and marine composition in the Trinity River?
- How will the river flow changes, which might increase erosion or river bottom disturbance, be mitigated so they don't negatively impact the amenities of the project?
- How is the project going to be maintained during inevitable dry periods without taking water from other necessary uses? The problem with ground water usage is that the ground water in the project area is said to be polluted.
- Page 4-3, second paragraph talks about operational strategies. We recommend solar powered pumps to jet water into the air thereby increasing the dissolved oxygen improving water quality.
- The second bullet in Chapter 4-4 talks about increasing impervious surfaces usage. We know that impervious surfaces quicken water run off. Why not strive for use of water permeable surfaces that would greatly ease the run off condition
- This project seems to greatly increase the surface area of the water. This increase produces greater quantities of evaporated water. This water vapor will increase humidity during very hot days thus exacerbating the comfort index, and making the outside usage of the various amenities far less desirable.

Page: 219

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 9:59:00 AM -06'00'
Materials that will be excavated include clays, sands, gravels and silts. At this point in time we do not expect any excavated materials to be contaminated. If any are found during subsequent investigations, the materials will be managed in accordance with State and federal requirements. During construction erosion control measures will be implemented to prevent migration of excavated materials offsite. After construction, the site surface will be stabilized against erosion with turf or other hard surfaces.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:27:01 PM -06'00'
Depending on the planned land use the proposed landscaping will incorporate native plantings which require less water to maintain. Reparian woodlands would be sufficiently established so that long term irrigation will not be required. The use of ground water in not envisioned.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:09:42 PM -06'00'
Water quality changes (mostly associated with dissolve oxygen and sedimentation) are not anticipated to significantly affect aquatic flora and fauna composition. Water quality impacts are discussed in Chapter 4-11 and 4-12.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:00:45 PM -06'00'
The plans to mitigate upland forest include first minimization of impacts, and compensation for unavoidable impacts. Upland resources have been identified as a resource category by the USFWS that may be mitigated in kind or out of kind. As this project deals with floodplains, a decision has been made to compensate for upland losses primarily through development of riparian forest. The plan has been coordinated with the USFWS and the Texas Parks and Wildlife Department.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:05:19 PM -06'00'
When the Central City original EIS was being prepared, the Riverside Oxbow Ecosystem Restoration Project had been approved and was awaiting authorization for implementation. The City of Fort Worth asked that the area be considered with expectations that it could result in expediting the restoration and provide the valley storage at the same location. After evaluation of the Modified Central City alternative is was determined to the be technical sound and environmentally acceptable.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:33:11 PM -06'00'
The modified project as proposed does not significantly increase the water surface area in the Riverside Oxbow/ Gateway Park area.

Sequence number: 7
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 9:40:51 AM -06'00'
Recommendation noted. Applicable energy saving devices will be incorporated into water quality enhancement features.

Sequence number: 8
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 5:58:59 PM -06'00'

Comments from page 219 continued on next page

League of Women Voters of Tarrant County
3212 Collinsworth Street, Fort Worth, TX 76107
Phone: 817-348-VOTE (8683) FAX: 817-348-8683
Email : lwvtarrantcounty@sbcglobal.net
Web Site: www.lwvtarrantcounty.org

February 18, 2008

Mr. Saji Alummuttil
CESWF-EC-D
U.S. Army Corps of Engineers
Fort Worth District
P.O. Box 17300-0300
819 Taylor Street
Fort Worth, TX 76102-0300

Subject: Comments and Questions concerning the Draft Supplement No. 1 to Final EIS for the Central City Project, Upper Trinity River, Texas

- According to the EIS, the Trinity Uptown Project was funded by Section 116 of Public Law 108-447. The Federal share was capped at $110 million. It is our understanding that the funds were authorized, but only $10 million has been appropriated. Since the project was not included in the 2008 fiscal year Water Resources Development Act, what is the process for appropriating the remaining $100 million that has been authorized?
- The Old Water treatment plant off Beach will be used for storing excavation material. What types of materials are expected to be stored? How will the area be screened from surrounding land uses? What measures will be taken to ensure that pollutants from the excavation materials do not flow into the Trinity River.
- We are concerned about the loss of approximately 26 acres of scarce Upland Woodland. This type of forest takes a long time to develop. We are unsatisfied with the vague plans to plant trees elsewhere.
- If this revised project is superior to the original plan to store water on the West side of downtown Fort Worth, why wasn't this plan put forth first? 10
- The contemplated Waterfront Drive along the base of the bluff is unnecessary and would decrease park acreage and detract from the potential local serenity of the water's edge.
- Under water quality, what is the anticipated impact of the project on the aquatic vegetation and marine composition in the Trinity River? 9
- How will the river flow changes, which might increase erosion or river bottom disturbance, be mitigated so they don't negatively impact the amenities of the project?
- How is the project going to be maintained during inevitable dry periods without taking water from other necessary uses? The problem with ground water usage is that the ground water in the project area is said to be polluted.
- Page 4-3, second paragraph talks about operational strategies. We recommend solar powered pumps to jet water into the air thereby increasing the dissolved oxygen improving water quality.
- The second bullet in Chapter 4-4 talks about increased impervious surfaces usage. We know that impervious surfaces quicken water run off. Why not strive for use of water permeable surfaces that would greatly ease the run off condition
- This project seems to greatly increase the surface area of the water. This increase produces greater quantities of evaporated water. This water vapor will increase humidity during very hot days thus exacerbating the comfort index, and making the outside usage of the various amenities far less desirable.

Money is appropriated for civil works projects by the Congress through future appropriation bills.

Sequence number: 9
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:17:49 PM -06'00'

Flow velocities were reviewed during development of the project alternative to ensure that velocities were maintained within an acceptable range. Hydraulic modeling has shown no significant increase in velocities.

During detailed design erosion concerns will be controlled similar to existing conditions through harden channel bottom surfaces and in-channel energy dissipation structures.

Sequence number: 10
Author: M2ED9SJP
Subject: Note
Date: 2/25/2008 6:16:35 PM -06'00'

Waterfront Drive was discussed and analyzed in the original Central City EIS and is not within the scope of the Supplemental EIS.

- The plan should mention the existing and planned gas wells in the area and any associated land uses.
- Water Storage needs – 5,250 acres (p 42-53) Water storage will require at least seasonal flooding in parts of Rockwood Park, Harman Park Riverside Park, Oxbow area, and Gateway Park. In Gateway Park the critical features will be above only the two year flood level. Recreational uses in Gateway Park will be flood compatible (p. 66). The Oxbow area will be reduced in elevation by about 10-14 feet. Other storage areas may also be needed. How many park usage days per year will be lost in each park as a result of the new flooding caused by the subject project. Other water storage issues are as follows:
    - Chapter 3-6 addresses Valley Storage sites. The Riverside Oxbow in the table potentially includes seven separate storage areas and the Riverside Gateway North potentially includes four sites. This is vague and really needs to be discussed as an example of the Table 3-1 intent.
    - Chapter 3-7 last paragraph states in the last sentence that: "the Water District plans to acquire all properties which may not be included in the potential valley storage sites, but which are essential to the purpose of the approved Riverside Oxbow project." Is this an eminent domain solution or is it a negotiated solution for acquiring the particular property.
    - In Chapter 3-9 it appears that the identified sites would "marginally" meet the 5,250 acre-feet valley storage requirement. Problem almost solved, it seems. Then it states that storage values could not be achieved without significant modification to the sites. How severe is the disturbance and what is the proposed solution?
    - Last paragraph of 3-9 presents a Recommended Valley Storage Plan. It sounds good.

Thank you for the opportunity to comment on this plan.

Sincerely,

Dolores Ruhs

Dolores Ruhs, President
League of Women Voters of Tarrant County

Page: 220

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:46:10 PM -06'00'

Chapter 3 page 9 is a continuation of the discussion on plan formulation which led to the development of the recommended plan as later discussed and presented in Table 3-4 and Figure 10. The proposed solution was to reconfigure several of the previously presented sites, add several additional sites 5c, 13, and 18b and provide additional contingency sites in the event additional storage was required during detailed design.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:42:05 PM -06'00'

The statement on Chapter 3 page 7 was not intended as the method of acquiring property but rather that the local sponsor (TRWD) supported the implementation of the full context of the original Riverside Oxbow Ecosystem Restoration Plan and not solely the portions that were going to be required for valley storage proposes.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:21:04 PM -06'00'

The effects of existing and future gas wells and distribution system were considered, primarily in the habitat appendix and within the cumulative impact assessment.

Sequence number: 4
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:44:18 PM -06'00'

Chapter 3 page 6 is supported by Figure 6 and table 3-1 is intended to describe the process in which the team formulated the recommended plan as presented on Figure 10 and Table 3-4. The text adequately describes the early formulation process.

Sequence number: 5
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/25/2008 6:38:30 PM -06'00'

The duration in which portions of the mentioned parks would be unavailable during flooding is highly variable and impossible to predict with certainty in the future. Some general conclusions however can be drawn based on historical flows at USGS gauging stations at Nutt Dam and Beach Street. A historical examination of a 30 year period of record (1977-2007) found the 2-yr reoccurrence interval was exceeded 11 times under mean flow for a total of 48 days or on average 1.6 days per year.

Sequence number: 6
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/22/2008 5:21:40 PM -06'00'

Thank you for supporting the Recommended plan.

TEXAS HISTORICAL COMMISSION
The State Agency for Historic Preservation

RICK PERRY, GOVERNOR
JOHN L. NAU, III, CHAIRMAN
F. LAWERENCE OAKS, EXECUTIVE DIRECTOR

EC

January 24, 2008

William Fickel, Jr.
Chief, Planning, Environmental and Regulatory Division
CESWF-EV-EC
Dept. of the Army
Ft. Worth District, Corps of Engineers
P.O. Box 17300
Fort Worth, Texas 76102-0300

Attention: Saji Alummuttil

Re: Review under Section 106 of the National Historic Preservation Act
Upper Trinity River, Central City, Fort Worth, Texas
Draft Supplement No.1 to the Final Environmental impact Statement
(COE-FWD)

Dear Mr. Fickel:

Thank you for allowing us to review the draft supplement referenced above. This letter serves as comment on the document from the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission.

The review staff, led by Bill Martin, has completed its review. We believe that this supplement requires reworking. Please note that the only mention of cultural resources occurs on page 2-8. There is no discussion of the potential for adverse effects on cultural resources under any or the alternatives discussed in Chapter 4. Please add a discussion of cultural resources for each alternative.

Thank you for your cooperation in this federal review process, and for your efforts to preserve the irreplaceable heritage of Texas. **If we may be of further assistance, please contact Bill Martin at 512/463-5867.**

Sincerely,

for
F. Lawerence Oaks, State Historic Preservation Officer

RECEIVED 28 Jan 2008

FLO/wam

P.O. BOX 12276 • AUSTIN, TX 78711-2276 • 512/463-6100 • FAX 512/475-4872 • TDD 1-800/735-2989
www.thc.state.tx.us

Page: 221

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/28/2008 11:30:10 AM -06'00'

The document has been modified to include the discussion of potential impacts to resources for each alternative and other information requested.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

February 28, 2008

Mr. William Fickel, Jr., Chief
Planning, Environmental, and Regulatory Division
U.S. Army Corps of Engineers
Regulatory Branch CESWF-EV-R
P.O. Box 17300
Fort Worth, Texas 76102-0300

Re: Central City Project, Upper Trinity River-SEIS

Dear Mr. Fickel:

As described in your letter dated December 21, 2007 the proposed draft Supplement to the Final Environmental Impact Statement (SEIS) includes modifications to the Central City Project. The Central City project was finalized in January 2006 and a Record of Decision was signed on April 7, 2006. The project included construction of a flood bypass channel and flood gates to divert flood flows around a segment of the Trinity River channel adjacent to downtown Fort Worth; Samuels Avenue Dam to create an interior water feature; with the hydraulic and habitat mitigation and habitat improvement areas principally located within the Riverbend area adjacent to the West Fork of the Trinity River in west Fort Worth. In the Final EIS, Samuels Avenue Dam would be located downstream of Samuels Avenue on the West Fork and would raise the normal water surface elevation of the West Fork and Marine Creek to 524.5 feet mean sea level. This would create a lake extending up the West Fork to approximately Rockwood Park and up Marine Creek to the Stockyard area. The project initially required creation of about 5,250 acre-feet of valley storage to compensate for the loss of valley storage caused by the bypass channel's increased hydraulic capacity during flood events. Stream habitat mitigation was provided by modification of stream flows and provision of additional stream habitat within Lebow Creek and by development of riparian vegetation and riffle pool sequences within Ham Branch.

By letter dated June 22, 2006, the City of Fort Worth requested that the Corps conduct an evaluation of the potential benefits of modifying the Central City Project to incorporate the Riverside Oxbow Restoration Project (RORP) area to accommodate valley storage requirements. The Riverside Oxbow Restoration Project is located just east of downtown Fort Worth on the West Fork of the Trinity River. The RORP consists of reconnecting the old river channel of the West Fork; replacement of the Beach Street bridge; creation of emergent wetlands, open water, and vegetative fringe habitat; habitat improvement on existing forest tracts including establishment of a riparian m

buffer along the West Fork from Riverside Drive to East 1st Street; and various other ecosystem restoration and recreation features. An Interim Feasibility Report with Integrated Environmental Assessment (and Finding of No Significant Impact) with Addendum dated April 2005 were previously approved by the Corps.

The SEIS proposes two alternatives. The No Action Plan, which assumes that each project would proceed separately as currently approved, and a modified Central City Project alternative. The Central City alternative would integrate features of the RORP and include areas within the project area for valley storage mitigation in lieu of the Riverbend valley storage site which would have required substantial mitigation.

These modifications include the relocation of the Samuels Avenue dam upstream of the Marine Creek confluence, a low water dam on lower Marine Creek and lock system to connect the Trinity River to Marine Creek, the original proposed upstream diversion channel in the vicinity of the Clear Fork confluence area, addition of excavation areas for valley storage in upstream and downstream areas, new fill placement areas, and removal of proposed work in the vicinity of the Lebow Creek confluence area.

In addition to the information contained in the SEIS, the following information is needed for review of the proposed project. Responses to this letter may raise other questions that will need to be addressed before a water quality certification determination can be made.

1. Please have the applicant provide additional details including diagrams of the design, and monitoring and success criteria regarding the Ham Branch mitigation site. Please have the applicant explain in detail the effects of the levee modifications on the Ham Branch mitigation site and whether, if any, changes to hydroperiod or hydrology will affect the mitigation.

2. Please have the applicant describe the mechanism of ingress and egress of fish into Ham Branch and Marine Creek with the respective barriers of a weir and low water dam. While the proposed project is designed to directly impact Marine Creek, the TCEQ encourages the applicant to further evaluate designs of the low water dam to facilitate the movement of aquatic life between Marine Creek and the Trinity River, and therefore minimize the direct impact from the dam.

3. In Chapter 3 of the SEIS: Alternatives, there is a discussion in the determination of the relocation of the Samuel Avenue Dam. In one paragraph, there is an expressed concern that moving the dam immediately upstream of the confluence with Marine Creek may cause scouring at the Samuel Avenue bridge. Is scouring still a concern regarding the ultimate location of the dam or is there some other data that indicated it would not be a problem? If scouring will be an issue, how will it be addressed?

Page: 223

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 3:52:23 PM -06'00'

Additional detailed information developed since May 2006 will be provided to TCEQ including success criteria developed with assistance from USFWS and our ERDC. ERDC submitted a report in August 2006 that included additional diagrams.

The levee modifications adjacent to Ham Branch would result in infrequent minor alterations to the Ham Branch floodplain. This area currently serves as a interior drainage area for the Fort Worth levee system and floods much more frequently that would occur from use of the area as valley storage. The Corps does not believe that the hydroperiod or hydrology changes will negatively impact the proposed mitigation.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 5:14:27 PM -06'00'

The issue was considered during initial plans to utilize the Ham Branch floodplain for developing valley storage. For the valley storage to be effective, the area must receive floodwaters from the West Fork but at a rate that doesn't cause scouring or induce damages to existing transportation elements nearby. As design continues, additional investigation of providing a less restrictive fisheries passage through the existing levee and flood gate will be evaluated.

While relocation of the dam removed the impact to aquatic movement on Lebow Creek it is acknowledged that movement is restricted on Marine Creek. Further evaluations to facilitate aquatic life movement between Marine Creek and West Fork Trinity will be conducted.

Sequence number: 3
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 4:57:32 PM -06'00'

A physical model study of the Samuels Avenue Dam and Marine Creek Low Water Dam have been recommended as part of the final design to fully evaluate scour concerns (see Appendix C- pg. 1-28, 2nd para). Scour is a concern but the placement and orientation of the dam was specifically set in manner to lessen this concern. Precast concrete slope protection has been shown on the conceptual plans to protect the banks from scour. Should a scour concern be determined beneath the existing bridge a similar application would be proposed. All effort will be made to minimize hardening of the embankments.

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4. Please have the applicant provide additional details on the design of the riffle/pool complexes using rock weirs and how their placement will be determined regarding the Sycamore Creek and Riverside Oxbow mitigation sites.

5. The TCEQ recommends the use of the TCEQ's biological methods including the Index of Biological Integrity (available at: http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-416/index.html) as the success criteria endpoint for all stream mitigation efforts.

If you require additional information or further assistance, please contact Ms. Lili Lytle, Water Quality Assessment Section, Water Quality Division (MC-150), at (512) 239-4596.

Sincerely,

Beth Seaton

for L'Oreal W. Stepney, P.E., Director
Water Quality Division

LWS/LL/jp

cc: Mr. Woody Frossard, Tarrant Regional Water District, 800 East Northside Drive, Fort Worth, Texas 76102

Page: 224

Sequence number: 1
Author: M2PLRBKC
Subject: Sticky Note
Date: 3/3/2008 4:46:37 PM -06'00'

Placement and final design will be accomplished as studies progress. Sufficient control will need to be established to alleviate adverse effects to elevation of the mainstem impoundment caused by the Beach Street Dam. It is currently estimated that about 10 cubic feet per second will be diverted through the re-established Sycamore Creek and the initial riffle design has been made to provide a minimum one foot depth flow of water over a minimal 10 foot - wide cross section. Final length and substrate components of the riffles/rock weirs will be accomplished along with placement based upon final H&H investigations, refined survey data and locations and design of other project features. Removal of the Beach Street crossing culvert and relocation of the primary park entrance will also influence final riffle design.

Sequence number: 2
Author: M2PLRBKC
Subject: Sticky Note
Date: 2/29/2008 4:06:58 PM -06'00'

Thank you for this information. We intend to use known habitat requirements of several fish species to design riffle-pool sequences and will utilize Index of Biological Integrity to assess effectiveness of the system. We have proposed to utilize a ten year monitoring and adaptive management program to provide an effective means to respond to habitat development requirements.