# Technical Memorandum ECO-7

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*To:* *Woody Frossard, TRWD*

*From:* *Bob Brashear, CDM*

*Date:* *21-Mar-05*

*Subject:* *Conceptual Aquatic Habitat Mitigation Plan for Marine Creek Impacts*

*Status:* *Final Draft*

## 1.0 Introduction and Background

The Fort Worth Central City Project consists of a bypass channel, levee system and associated improvements to divert flood flows around a segment of the existing Trinity River adjacent to downtown Fort Worth. The proposed bypass channel is approximately 8,400 feet long and approximately 300 feet wide between the top of levees. The bypass channel will be approximately 30 feet below existing grade. **Figure 1** shows the bypass channel and other significant project components.

Water levels in the bypass channel will be controlled by a dam with crest gates. The dam is proposed on the West Fork of the Trinity River just east of the Samuels Avenue bridge and will be designed to maintain normal water level of approximately 525 feet above sea level in the bypass channel and interior area. Flood isolation gates will be incorporated into the levee system to protect the interior area, otherwise known as Trinity Uptown. The gates are located upstream at the confluence of the bypass channel and the Clear Fork (Clear Fork Gate), at the midpoint of the bypass channel and the West Fork confluence (Trinity Point Gate), and downstream at the confluence of the bypass channel and the West Fork (TRWD Gate).

Construction of the bypass channel, dam and isolation gates will create an approximately two-mile segment of the existing West Fork Trinity River as a controlled, quiescent watercourse. A water feature or urban lake, approximately 900 feet long, is proposed for the interior area (Trinity Uptown). The water feature will extend from the bypass channel southeast to the existing West Fork and Clear Fork confluence of the Trinity River.

Two local creeks drain into the Trinity River in the immediate project area and are shown in **Figure 1**. Marine Creek flows from the northwest to the southeast, through the Fort Worth Stockyards, and into the West Fork of the Trinity just above the Samuels Avenue Bridge. Lebow Creek (also identified as Stream WF-4 on flood insurance maps) drains from the north to the south and enters the West Fork of the Trinity River just downstream of the Union Pacific Railroad Bridge and just upstream of the proposed Samuels Avenue Dam.

This technical memorandum details a conceptual approach to mitigating the potential impacts to shallow riffle-pool (SRP) aquatic habitat on the lower reaches of Marine Creek resulting from the implementation of the Fort Worth Central City Project.

# 2.0 Existing Habitat and Assessment

## 2.1 Marine Creek

The proposed water surface of approximately 525 feet above sea level behind Samuels Avenue Dam will create a backwater condition on Marine Creek from its confluence with the West Fork to approximately Exchange Avenue. To assess the impact to habitat from this, a fisheries survey was conducted on Marine Creek between the confluence with the West Fork of the Trinity River and North Main Street in Fort Worth in January 2005, by the U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (USACE). The results of the assessment were included in a draft report from USFWS to USACE (USFWS 2005). Of particular interest were the potential impacts to the SRP complexes that might result from the project.

## 2.2 Lebow Creek (Stream WF-4)

During the preliminary design of the Fort Worth Central City Project, it was determined that creating a backwater condition in Lebow Creek similar to that in Marine Creek would pose flood protection difficulties upstream on the creek would be detrimental to existing SRP aquatic habitat in the lower reaches of the creek, and would not provide any of the benefits associated with inundation (watercraft recreation and transportation). Therefore, the project elected to redirect Lebow Creek around Samuels Avenue Dam, allowing it to discharge downstream of the dam. This, in turn, allows the SRP flow regime that currently within Lebow Creek during normal to low flows to be maintained.

TRWD and consultant staff visited Lebow Creek in February 2005 and conducted a preliminary assessment of the aquatic habitat within the lower reaches of the Creek before it drains into the West Fork of the Trinity River. This preliminary assessment indicates that Lebow Creek may provide a good opportunity to create and enhance habitat associated with SRP complexes commensurate with that found in the lower reaches of Marine Creek.

# 3.0 Conceptual Mitigation Plan

The conceptual mitigation plan for the SRP habitat potentially lost on Marine Creek as the result of inundation, involves improving Lebow Creek with the creation of new SRP habitat and the enhancement of existing SRP habitat. **Figure 2** shows a plan view of the mitigation concept.

The principal components of the creation and enhancement of SRP habitat on Lebow Creek include:

- Creation of a net of 1,100 feet of new channel from the existing Lebow Creek channel around the proposed Samuels Avenue Dam. Approximately 1500 feet of new channel for Lebow Creek will be created and approximately 400 feet of the old Lebow Creek channel will be filled in.

- Configuration of the redirected channel to provide both flood conveyance needs and low-flow SRP sequences. If possible, trees should be planted along the new channel to provide canopy for the new channel. This will be dependent on whether floodway hydraulics can accommodate the additional roughness provided by trees which would be determined during final design.

- Addition of approximately 2,000 feet of concrete pipe to gravity flow a few cubic feet per second of water from the impoundment behind Samuels Avenue Dam to a release point on Lebow Creek just below Brennan Avenue (see **Figure 2**). The goal of flow augmentation is to ensure adequate flow into this reach even during extended dry periods to maintain fish habitat. Flow would be controlled for the amount of flow and for the depth of withdrawal from the impoundment. The amount of flow and operating strategies for utilizing the flow would be determined during final design.

The bulk of the cost associated with this conceptual habitat mitigation plan is in the form of redirecting Lebow Creek which has been included as a part of project civil costs. Because the new channel will likely be excavated into rock (much of the existing substrate in the lower reach of Lebow Creek is rock), there will be no additional costs necessary to provide substrate for the new SRP habitat. The additional costs to the project from this proposed habitat mitigation include the pipeline and appurtenances to control and convey water from the impoundment for release into Lebow Creek and tree plantings along the redirected channel to provide canopy. There will be no costs for land acquisition. As **Figure 2** illustrates, the reach of Lebow Creek proposed for mitigation is contained completely within publicly-owned lands.

## 4.0 Recommendations

It is recommended that the conceptual habitat mitigation plan detailed in this technical memorandum be advanced and incorporated into the final design of the Fort Worth Central City Project. It is further recommended that additional evaluation of the habitats and flow regimes of both Marine Creek and Lebow Creek be conducted in summer conditions to better understand the nature of the habitats on both streams during critical periods. These

assessments will provide needed information for design (such as whether flow augmentation is needed and, if so, in what amounts).

In addition to these assessments, the City of Fort Worth will be undertaking a drainage master plan for Lebow Creek in the near future. The Fort Worth Central City Project will need to coordinate with that study to see that the mitigation elements detailed in this memo are included in that plan.

## 5.0 References

USFWS; "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; January 2005

## 6.0 Attachments

### Figures

Figure 1 – Overview of Central City Improvements

Figure 2 - Plan View of Conceptual Habitat Mitigation on Lebow Creek (Stream WF-4)

Figure 3 - Lebow Creek Profile Before and After Improvements

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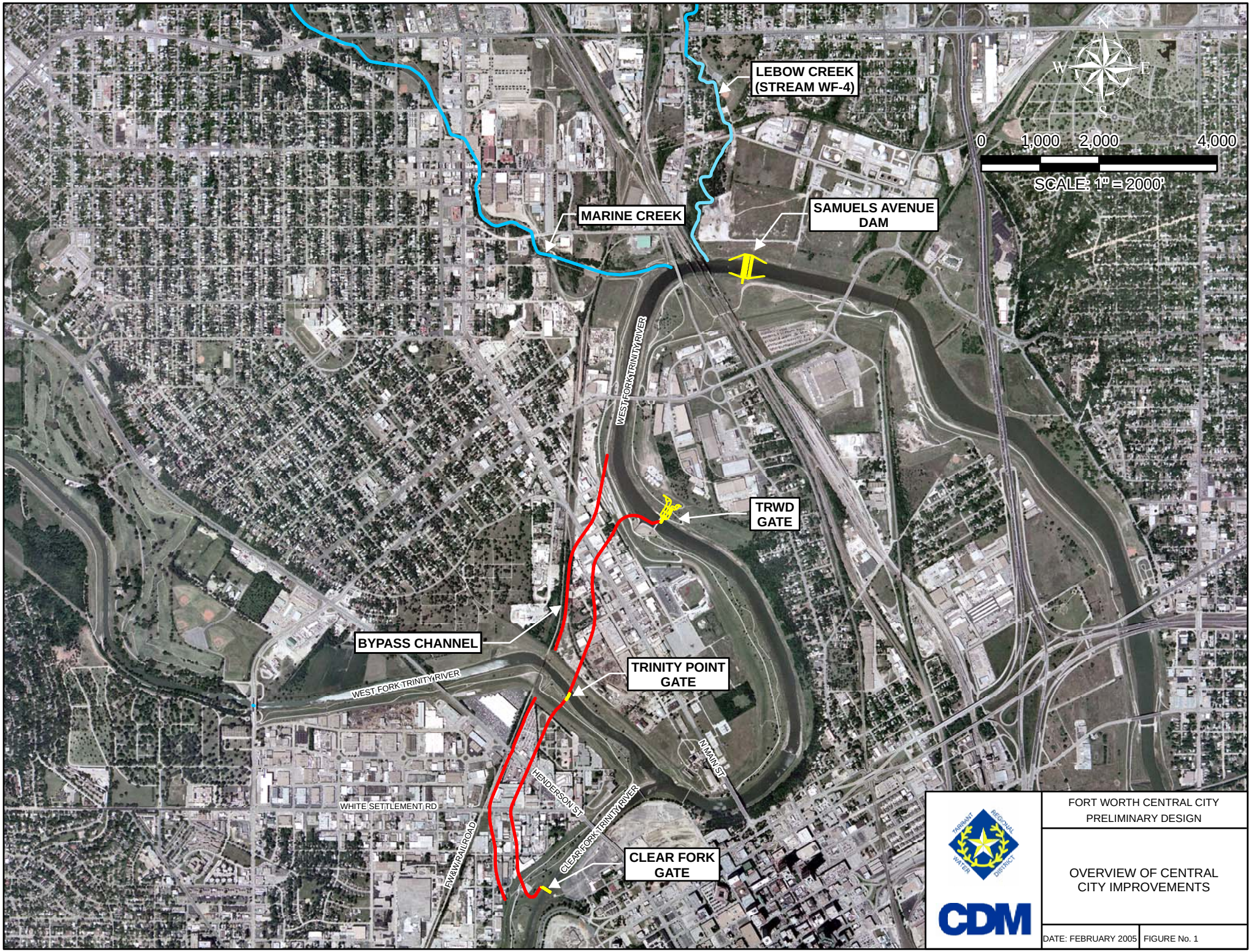
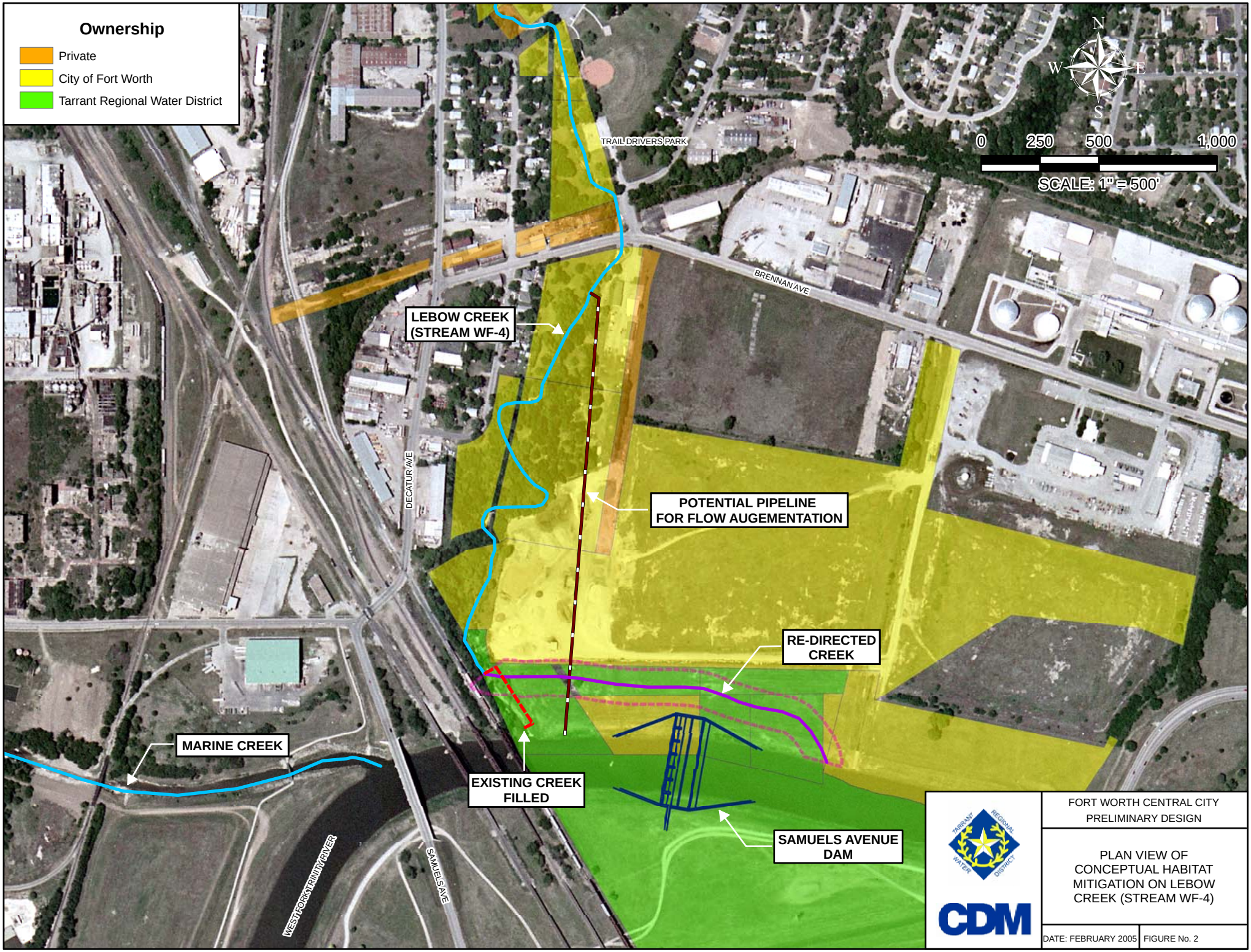


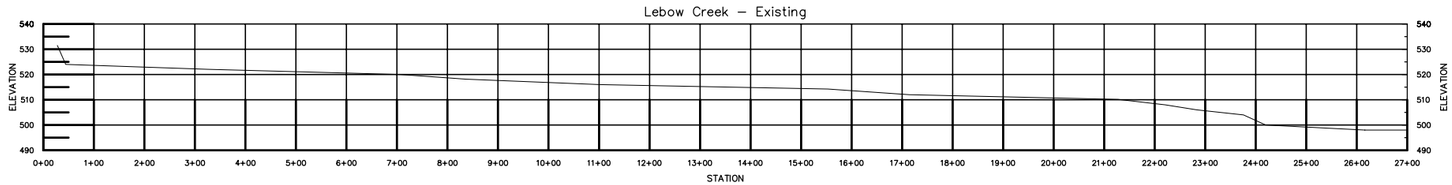

FORT WORTH CENTRAL CITY
PRELIMINARY DESIGN

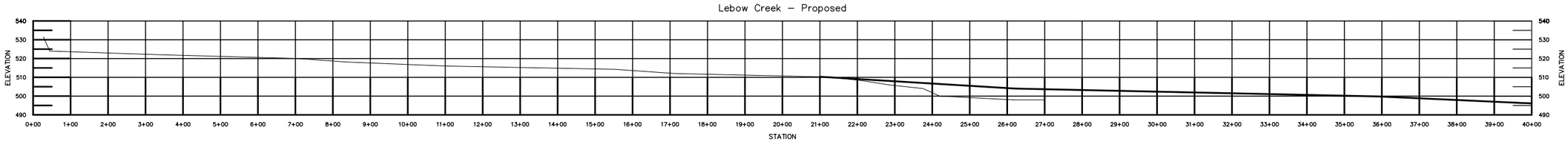
OVERVIEW OF CENTRAL
CITY IMPROVEMENTS

DATE: FEBRUARY 2005

FIGURE No. 1


Ownership
Private
City of Fort Worth
Tarrant Regional Water District
N
W
E
S
0
250
500
1,000
SCALE: 1" = 500'
TRAIL DRIVERS PARK
BRENNAN AVE
LEBOW CREEK (STREAM WF-4)
DECATUR AVE
POTENTIAL PIPELINE FOR FLOW AUGEMENTATION
RE-DIRECTED CREEK
MARINE CREEK
EXISTING CREEK FILLED
SAMUELS AVENUE DAM
WEST FORK TRINITY RIVER
SAMUELS AVE
FORT WORTH CENTRAL CITY PRELIMINARY DESIGN
PLAN VIEW OF CONCEPTUAL HABITAT MITIGATION ON LEBOW CREEK (STREAM WF-4)
DATE: FEBRUARY 2005
FIGURE No. 2

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# LEBOW CREEK PROFILE BEFORE AND AFTER IMPROVEMENTS

DATE: FEBRUARY 2005

FIGURE No. 3