

# **White Rock & Bachman Dam and Spillway Engineering Design Improvements**

Briefing for  
Quality of Life Committee  
June 26, 2006

# Purpose

This briefing is being provided to inform the Quality of Life Committee of the proposed work to:

- Enable DWU to comply with Texas commission of Environmental Quality (TCEQ) Dam Safety Requirements
- Investigate and analyze current dam and or surrounding structural failures and their cause and design for the construction and/or renovation of primary dam and spillway structures at White Rock and Bachman Lakes
- Seek favorable recommendation for award of engineering services contracts at the June 26, 2006 City Council meeting to:
  - Halff and Associates ~ White Rock Dam & Spillway
  - Kellogg, Brown & Root (KBR) ~ Bachman Dam & Spillway

# Regulatory Compliance

- Texas Commission of Environmental Quality (TCEQ) mandates
  - A five year dam safety inspection cycle for all dams located in the state of Texas
  - The purpose of the inspection is to determine integrity of the dam structures and perform analysis required to ensure compliance with TCEQ standards
  - During the summer of 2003, inspection of all the City owned and operated dams was conducted by Freese & Nichols in conjunction with TCEQ
- TCEQ also requires an updated Emergency Action Plan (EAP)
  - For each of the dams in the State
  - Sealed by a licensed professional engineer
  - Submitted and filed with the state

# White Rock Dam Background

- White Rock Dam is located on White Rock Creek and creates the highly visible recreational area of White Rock Lake
- Primary structures include an uncontrolled concrete broad crested weir, retaining walls and an earthen embankment built in 1911, with additional concrete retaining walls and drop structure built in 1968
- During the large rain event in mid-March 2006, critical damage was incurred by both the north and south retaining walls of the spillway that if left unchecked will further erode and could further fail endangering property down stream from the dam
- On March 22, 2006, TCEQ conducted an inspection of the damaged areas of the dam and spillway
  - Provided the City with documented concerns and recommendations that included retaining an engineer to address the spillway damages
  - Required the City to provide a corrective action plan to address areas of concern

# Failures at White Rock Spillway



Retaining wall sliding failure on south side of the Spillway

Retaining wall shear failure on north side of the Spillway



# White Rock Improvements Professional Services Contract

- Technical approach and scope developed to address the multiple areas of concern
  - Immediate recommendations for emergency repair of the current damage
  - Geotechnical analysis and design for slope stability
  - Hydraulic analysis of lower spillway and its effects on the structures
  - Structural analysis and design
    - Retaining walls
    - Downstream concrete slope protection
    - Drop structure over 30" WW Main
  - Regulatory compliance
  - Construction planning and administration
  - Update to emergency action plan
- Emergency Investigation & Analysis contract amount ~ \$80,070
- Engineering Design contract amount ~ \$834,800
- Estimated construction cost ~ \$4,000,000

# Bachman Dam Background

- Bachman Dam is located on a tributary of the Elm Fork of the Trinity River and created the reservoir known as Bachman Lake
- Primary structures include uncontrolled concrete ogee weir and an earthen embankment built in 1901
- Results of the 2003 inspection identified the critical need for spillway reconstruction and upstream slope stability protection
- Two past episodes of emergency repairs made to the dam and spillway structure, including grouting voids under the concrete weir service spillway
- Most recently, the large rain event in mid-March 2006 caused damage to the service spillway, as shown in the following photograph, that if left unchecked will further erode endangering property down stream from the dam

# Failure at Bachman Dam



Damaged incurred during the storm in mid-March 2006



# Bachman Improvements

## Professional Services Contract

- Technical approach and scope developed to address the multiple areas of concern
  - Recommendations for emergency repair to the current damages
  - Geotechnical analysis and design for slope stability
  - Hydrologic and hydraulic analysis and its effects on the structures
  - Structural analysis and design for new service spillway
  - Regulatory compliance
  - Construction planning and administration
  - Emergency action planning
  - Staff training
- Engineering contract amount ~ \$1,065,772
- Estimated construction cost ~ \$10,000,000

# Schedule

<b>Project</b>	<b>Begin</b>	<b>Complete</b>	<b>Cost</b>
Bachman Design	July 2006	Dec 2007	\$ 1,065,772
Bachman Construction	Feb 2008	March 2009	\$10,000,000
White Rock Design	July 2006	Aug 2007	\$ 914,870
White Rock Construction	Dec 2007	2009	\$ 4,000,000

# **Recommendation**

**Support award of Engineering Services  
Contract on June 28, 2006 to:**

**Halff and Associates ~ White Rock Dam and  
Spillway Improvements (Item 44)  
and**

**Kellogg, Brown and Root ~ Bachman Dam and  
Spillway Improvements (Item 6)**

# Discussion