Texas Water Development Board

Del Rio Utilities Commission

DWSRF GREEN PROJECT RESERVE BUSINESS CASE EVALUATION

STATE FISCAL YEAR 2011 INTENDED USE PLAN

PROJECT NUMBER 61580

COMMITMENT DATE: JUNE 18, 2009

DATE OF LOAN CLOSING: JUNE 8, 2011

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.state.tx.us
Phone (512) 463-7847, Fax (512) 475-2053

July 14, 2011

Robert Eads, City Manager
City of Del Rio
109 West Broadway
Del Rio, TX 78840

Re: **SFY 2011 Drinking Water State Revolving Fund**
Green Project Eligibility

Dear Mr. Eads:

The Texas Water Development Board (TWDB) received Green Project Information Worksheets from the City of Del Rio (City) for project #8534 in response to the Drinking Water State Revolving Fund (DWSRF) invitation dated April 5, 2011. The invitation states that the City was invited to apply for funding because its project is listed on the Project Priority List as having green costs greater than or equal to 30% of the total project cost. It requires the City to document that the green components meet the 30% cost threshold to avoid forfeiting eligibility for funding. After reviewing the worksheets, TWDB staff determined the City does meet the 30% green cost threshold based on the following:

- The City's Green Project Information Worksheets requested that $9,645,000 of the City's $10,000,000 Phase I Water Distribution Rehabilitation project be considered eligible for the DWSRF Green Project Reserve (GPR). The green element is described as distribution pipe replacement or rehabilitation to reduce water loss and prevent water main breaks.
- The Environmental Protection Agency's (EPA's) *Green Project Reserve Guidance for Determining Project Eligibility* (TWDB-0161) lists water efficiency projects such as distribution pipe replacement to reduce water loss and prevent water main breaks as business case eligible for the GPR (Part B, Section 2.5-2). Additionally, projects that result from a water efficiency related assessment, such as water audits, leak detection studies, conservation plans, etc. are categorically eligible for the GPR (Part B, Section 2.9).
- Information presented on the Green Project Information Worksheets and its attachments provided sufficient information to confirm the eligibility of the proposed water distribution improvements for the GPR in accordance with TWDB-0161, Part B, Section 2.9.

- Therefore, at this time the TWDB considers project costs associated with distribution system improvements in the amount of $9,645,000 to be categorically eligible for the DWSRF GPR.
- Please note that the City's application for financial assistance must be consistent with the project scope presented on the Green Project Information Worksheets. Inclusion of the green elements within the project will be verified prior to Board commitment.

The TWDB appreciates the City of Del Rio's interest in the DWSRF program. If you have any questions regarding green project eligibility, please feel free to contact John Muras, Project Engineer, by phone at 512-463-1706 or by email at john.muras@twdb.state.tx.us.

Sincerely,

Stacy L. Barna
Director of Program Development
Project Finance Division

SLB:rf

TEXAS WATER DEVELOPMENT BOARD

Green Project Reserve

Green Project Information Worksheets

Drinking Water State Revolving Fund

Intended Use Plan

The Federal Appropriation Law for the current fiscal year Clean Water and Drinking Water State Revolving Fund programs contains the Green Project Reserve (GPR) requirement. The following Green Project Information Worksheets have been developed to assist TWDB Staff in verifying eligibility of potential GPR projects.

TWDB-0163
Revised 12/2/2010

TEXAS WATER DEVELOPMENT BOARD
DRINKING WATER STATE REVOLVING FUND (DWSRF)
GREEN PROJECT INFORMATION WORKSHEETS

PART I – GREEN PROJECT INFORMATION SUMMARY

Check all that apply and complete applicable worksheets:

Categorically Eligible

- ☐ Green Infrastructure $ _____
- ☒ Water Efficiency $ 9,645,000
- ☐ Energy Efficiency $ _____
- ☐ Environmentally Innovative $ _____

Business Case Eligible

- ☐ Green Infrastructure $ _____
- ☐ Water Efficiency $ _____
- ☐ Energy Efficiency $ _____
- ☐ Environmentally Innovative $ _____

Total Requested Green Amount $ 9,645,000

Total Requested Funding Amount $ 10,000,000

Type of Funding Requested:

- ☒ PAD (Planning, Acquisition, Design)
- ☒ C (Construction)

Completed by:

Name: Hector Canales Title: Assistant City Engineer

Signature: [signature] 7/1/2011 Date: _____

TEXAS WATER DEVELOPMENT BOARD
DRINKING WATER STATE REVOLVING FUND (DWSRF)
GREEN PROJECT INFORMATION WORKSHEETS

PART II - CATEGORICALLY ELIGIBLE

Complete this worksheet for projects being considered for the Green Project Reserve (GPR) as categorically eligible. Categorically eligible projects or project components are described in the following sections of the EPA GPR guidance (TWDB-0161):

Green Infrastructure	Part B, Section 1.2
Water Efficiency	Part B, Section 2.2
Energy Efficiency	Part B, Section 3.2
Environmentally Innovative	Part B, Section 4.2

Information provided on this worksheet should be of sufficient detail and should clearly demonstrate that the proposed improvements are consistent with EPA and TWDB GPR guidance for categorically eligible projects. Refer to **Information on Completing Worksheets** for additional information.

Section 1 – General Project Information

Applicant: City of Del Rio PIF #: 8534

Project Name: Del Rio Water Distribution Rehabilitation, Phase I

Contact Name: Hector Canales

Contact Phone and e-mail: (830) 774-8535 & hcanales@cityofdelrio.com

Total Project Cost: $10,000,000 Green Amount: $9,645,000
(Categorically Eligible)

Brief Overall Project Description:
The Del Rio Water Rehabilitation, Phase I Project proposes to replace older and/or failing water distribution lines to alleviate leaking and pressure problems in particular areas of the city. Additionally, water valves & boxes, tie-in tees, hydrants, service line connections and water meters shall be replaced to alleviate problems with leakage and malfunctioning meter readings. The Rehab project will be designed to meet state water standards and to meet current and future water demands.

Section 3 - Water Efficiency

Certain water efficiency improvements may be considered categorically eligible for the GPR. Refer to EPA and TWDB GPR guidance for a complete list and description of categorically eligible GPR Projects. A few common types of water efficiency projects that may be considered categorically eligible, such as certain water meter improvements and leak detection are listed below. Complete these sections of the worksheet as applicable. For any other water efficiency improvement being considered for categorical eligibility, complete Section 3.3.

Section 3.1 - Water Meters

Check all that apply:

- ☐ Installation of new water meters in area currently receiving unmetered water service (the following must be provided)
  - ☐ Attach copy of rate structure for area to be metered
- ☐ Replacement of existing broken/malfunctioning meters (the following must be provided)
  - ☐ Accuracy of meters being replaced _____
  - ☐ Attach supporting documentation (meter accuracy tests, etc)
  - ☐ Provide description below of proposed meters to be installed
- ☒ Retrofitting of existing meters (the following must be provided)
  - ☒ Provide description below of reason for meter retrofit
  - ☒ Provide description below of proposed meter system and benefits, including description of features that will result in water loss reduction or promote water conservation

Describe proposed water meter improvements, include reason for project, description of proposed meters and features, resulting benefits, anticipated savings, etc. (attach additional pages if necessary):

The Del Rio Water Distribution Rehabilitation, Phase I Project incorporates installing new water main lines & associated appurtenances along with new service connection lines and replacing the existing water meters with new automatic meter reading (AMR) meters. Adding AMR capabilities to meters is considered categorically eligible for the Green Project Reserve in accordance with Part B, 2.2-4 of TWDB-0161. The replacement of the meters themselves is considered separately as business case eligible in later sections of this document.

The new water meters will be replacing old and malfunctioning meters in older areas of the City. The new AMR meters to be installed shall transmit meter reading data to an electronic receiving device automatically and data is stored on device until can be transmitted to a computer software program that manages data.

This water rehabilitation project will help alleviate leakage problems found within the water distribution system and provide more accurate water reading equipment to document actual water used and accurately account the amount of revenue water the City produces. The new water meters will decrease the amount of non revenue water the City produces and cannot account for due to malfunctioning meters. The new AMR equipment and process will help to properly document water usage, better manage data and process accurate data for billing.

The non revenue water produced by the City that can be attributed to meter malfunction costs the City approx. $5.26 / 1000 gallons. If the City can recover between 50% & 60% of the approx. 832.6 million gallons per year of non revenue water, that could provide an additional $2.2 million of revenue for water that is currently unaccounted for. The Final Report – Water Distribution System Audit provides more information on the meter accuracy tests and on the anticipated savings for replacing old meters.

Green amount associated with water meters: $ (see total page 6)
(Attach detailed cost estimate if necessary)

Section 3.3- Other Water Efficiency Improvements

Complete this section for water efficiency improvements other than those listed above. Provide reference to the applicable sections of the EPA GPR guidance (TWDB-0161) that demonstrate GPR eligibility. Provide a detailed description of the proposed water efficiency improvements of sufficient detail that clearly demonstrates that the proposed improvements are consistent with EPA GPR guidance (TWDB-0161).

Guidance Reference:

2.2-9 Project that result from a water efficiency assessments (such as water leak detection studies) as long as the assessment adhered to the standard industry practices

Detailed description of proposed water efficiency improvements (attach additional pages if necessary):

The 2010 Water Model and Leak Detection Study conducted for the City of Del Rio provided an analysis of the existing water system and demonstrated the problems seen in the current water system. The City of Del Rio confirmed problem areas seen in their water system through the analysis made in the Water Study and then moved towards implementing the recommendations provided from the Study. The findings indeed resulted in proposing improvements made to the current water distribution system in four phases, as separate capital projects.

This first phase, Phase I, is concentrated in the older portions of the city where significant leaks and failures have occurred. The need to improve the water distribution system in this area is a priority to the City of Del Rio due to significant leaks, older and inadequate pipe material and pressure system problems that do not meet state regulatory and safety standards. Improving the water distribution system will additionally solve performance problems seen in other areas of the water system such as wasted treatment expense, wasted power to run components within the water system and constant repair work and costs to maintain inadequate areas.

Green amount associated with water efficiency improvements: $ 9,645,000
(Attach detailed cost estimate if necessary)

TEXAS WATER DEVELOPMENT BOARD
DRINKING WATER STATE REVOLVING FUND (DWSRF)
GREEN PROJECT INFORMATION WORKSHEETS

PART III - BUSINESS CASE ELIGIBLE

Complete this worksheet for projects being considered for the Green Project Reserve (GPR) as business case eligible. Business case eligible projects or project components are described in the following sections of the EPA GPR guidance (TWDB-0161):

Green Infrastructure	Part B, Section 1.4
Water Efficiency	Part B, Section 2.4 and 2.5
Energy Efficiency	Part B, Section 3.4 and 3.5
Environmentally Innovative	Part B, Section 4.4 and 4.5

Information provided on this worksheet should be of sufficient detail and should clearly demonstrate that the proposed improvements are consistent with EPA and TWDB GPR guidance for business case eligible projects. Refer to **Information on Completing Worksheets** for additional information.

Section 1 - General Project Information

Applicant: City of Del Rio PIF #: 8534

Project Name: Del Rio Water Distribution Rehabilitation, Phase I

Contact Name: Hector Canales

Contact Phone and e-mail: (830) 774-8535 & hcanales@cityofdelrio.com

Total Project Cost: $10,000,000 Green Amount: $9,645,000
(Business Case Eligible)

Brief Overall Project Description:
The Del Rio Water Rehabilitation, Phase I Project proposes to replace older and/or failing water distribution lines to alleviate leaking and pressure problems in particular areas of the city. Additionally, water valves & boxes, tie-in tees, hydrants, service line connections and water meters shall be replaced to alleviate problems with leakage and malfunctioning meter readings. The Rehab project will be designed to meet state water standards and to meet current and future water demands.

Section 3 - Water Efficiency

Certain water efficiency improvements may be considered business case eligible for the GPR. Refer to EPA and TWDB GPR guidance for a complete list and description of business case eligible GPR Projects. For all water efficiency business case eligible projects Section 3.1 must be completed. A common water efficiency project that may be considered business case eligible is water line replacements to address water loss. For this type of project complete Section 3.2 of the worksheet. For any other water efficiency improvement being considered for business case eligibility, complete Section 3.3.

Section 3.1 - System and Water Loss Information

Section 3.1 is required for all water efficiency business case eligible projects. Attach a copy of most recent Water Audit, if available. Otherwise, complete and attach Water Audit Worksheet or provide water audit data in a similar format. Additional information on water loss and water audits as well as a copy of the Water Audit Worksheet is available at: http://www.twdb.state.tx.us/assistance/conservation/Municipal/Water_Audit/waid.asp

Reference and attach water loss audit and/or any other completed planning or engineering studies:

- ☒ 2010 Water Model and Leak Detection Study
- ☒ Del Rio DWSRF Engineering Feasibility Study
- ☒ Del Rio Final Engineering Report

Section 3.2 - Water Line Replacement

Proposed pipe to be replaced:

Length (LF)	Existing Pipe			Proposed Pipe	
	Material	Age (yr)	Dia. (in)	Dia. (in)	Material
2,189	Copper, Steel, Galv., CI, AC, PVC	40-80	¾ - 4	6 or 8	PVC, C-900
51,045	Copper, Steel, Galv., CI, AC, PVC	40-80	¾ - 4	6 or 8	PVC, C-900
21, 585	Plastic, Galv., CI, AC	40-60	1- 4	6 or 8	PVC, C-900
27,084	Unknown	40-50	¾ - 4	6 or 8	PVC, C-900

Percent of distribution lines being replaced: 8.24%

Number of breaks/leaks/repairs recorded in past 24 months for areas being replaced : approx. 512

Estimated water loss from pipe being replaced (provide calculations on following page): Approx. 31 million gals

Estimated annual water savings (provide calculations on following page): Approx. 20.1 million gals / yr

Estimated annual cost savings (provide calculations on following page): $12,325 / yr.

Provide detailed description of the propose improvements and provide supporting calculations. Description should include a description of the methodology used to select pipes for replacement (attach additional pages if necessary):

The Del Rio Water Distribution Rehabilitation, Phase I Project incorporates the replacement of old and leaking water distributions lines. The Project proposes to replace old, failing lines that have exceeded the life-cycle expectancy for water line pipelines and install new water distribution lines to alleviate problems with water main leaks. This Phase I Project is concentrated in the older parts of the city that contain pipe that has been in use for over 40 years and have the highest number of reported leaks and repairs.

The 2010 Water Model and Leak Detection Study detailed the problems encountered within the Del Rio water distribution system. It also provided the methodology used in making recommendations for designing water pipelines to solve the water distribution problems. Essentially, the Bentley Systems WaterCAD (V8i) software was utilized to analyze the current water distribution system and to analyze the existing water distribution with replacement recommendations. Different scenarios were implemented and analyzed to proceed in providing the best recommendations for water distribution line replacement. The Engineering Feasibility Study details the specific areas of highest to lower priority dependent on the amount of leaks, undersized pipelines and inadequate pressures. The Feasibility Study also provides background information on the specific criteria used for selecting the areas if highest priorities. Please see both attached Studies for more information.

The estimated water loss is attributed to the following calculations:

1. Study found that can estimate water loss from leaks to be an average of 2,000 gals/day for up to 30 days
2. 512 approximate leaks determined for the area specified in this Phase 1 proejct

2000 gpd * 30 days = 60,000 gal / leak
60,000 gal / leak * 512 leaks = 30,720,000 gals
(Please see attached Studies for more detail information).

The annual water savings are as followed:

1. City has an allowable leakage: 1,500 gallon per day per mile
   1,500 gpd / mile * 234 miles (total distribution) = 351,000 gpd
   351,000 gpd * 30 days = 10,530,000 gallons allowable for leakage
2. Approx. leakage = 30.7 million gallons
   30.7 mill gals leakage – 10.5 mill gals allowable = 20.1 million gals in water savings

(Please see attached Studies for more detail information).

The estimated annual cost savings can be attributed to an estimated cost of $0.37/1,000 gals to produce water and the following calculations:

1. Total twelve month production: 3,331 million galls of water
2. 1% of annual production lost through leakage: 33.31 million gallons
3. 33,310,000 gallons *$0.37/1000 gals = $12,325 per year in water production cost savings

(Please see attached Studies for more detail information).

Green amount associated with water line replacement: $ (see total page 14)
(Attach detailed cost estimate if necessary)

Section 3.3- Other Water Efficiency Improvements

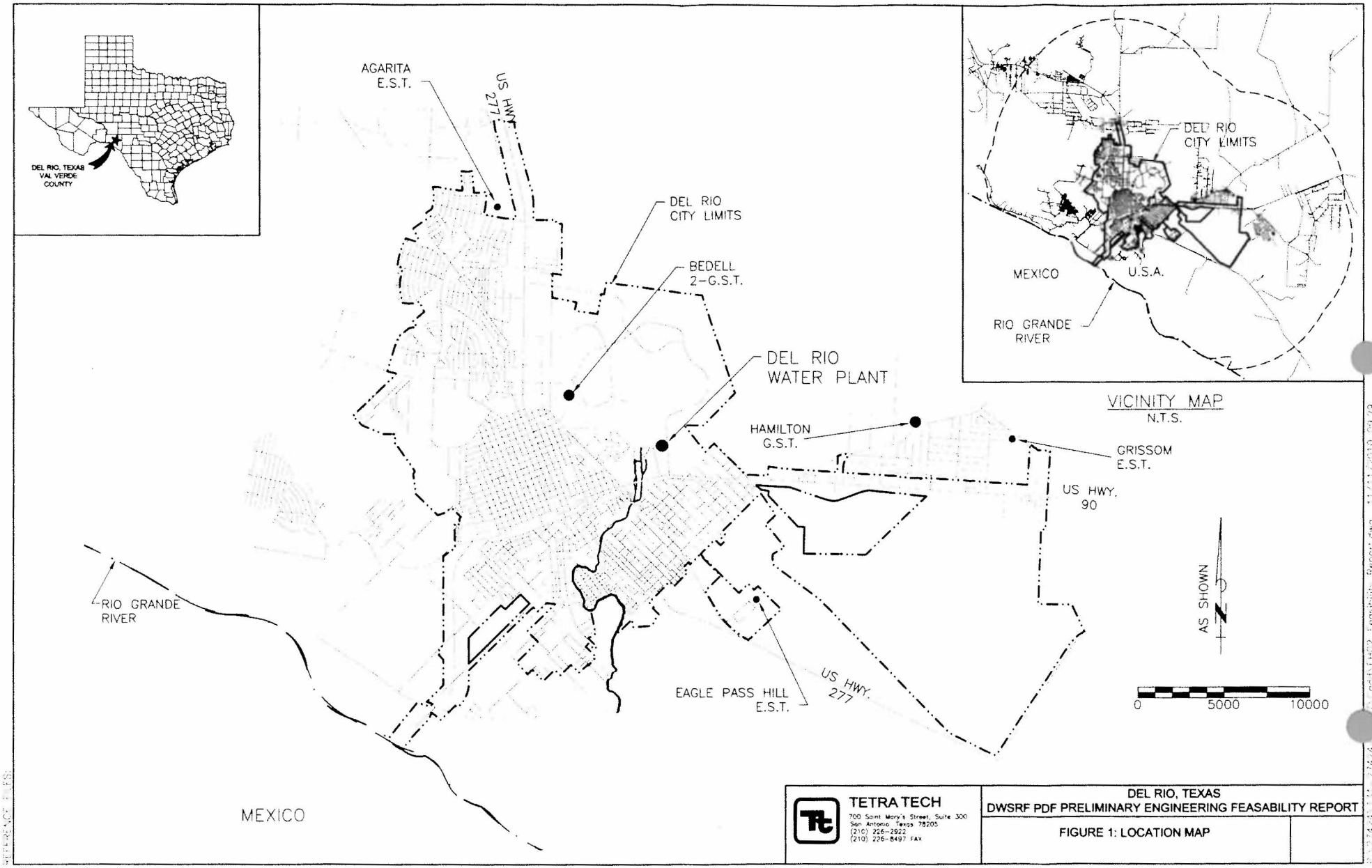
Complete this section for water efficiency improvements other than those listed above. Provide reference to the applicable sections of the EPA GPR guidance (TWDB-0161) that demonstrate GPR eligibility. Provide a detailed description of the proposed water efficiency improvements of sufficient detail that clearly demonstrates that the proposed improvements are consistent with EPA GPR guidance (TWDB-0161).

Guidance Reference:
Part B, 2.5-1 Water meter replacement
Part B, 2.4-3 Efficient water used often has the added benefit of reducing the amount of energy required by a drinking water system, since less water would need to be treated and transported; therefore, there are also energy and financial savings
Part B, 2.4-4 Proper water infrastructure management

Detailed description of proposed water efficiency improvements (attach additional pages if necessary):
Meters:
The new water meters will be replacing old and malfunctioning meters in older areas of the City. The new AMR meters to be installed shall transmit meter reading data to an electronic receiving device automatically and data is stored on device until can be transmitted to a computer software program that manages data. This water rehabilitation project will help alleviate leakage problems found within the water distribution system and provide more accurate water reading equipment to document actual water used and accurately account the amount of revenue water the City produces. The new water meters will decrease the amount of non revenue water the City produces and cannot account for due to malfunctioning meters. The new AMR equipment and process will help to properly document water usage, better manage data and process accurate data for billing. The non revenue water produced by the City that can be attributed to meter malfunction costs the City approx. $5.26 / 1000 gallons. If the City can recover between 50% & 60% of the approx. 832.6 million gallons per year of non revenue water, that could provide an additional $2.2 million of revenue for water that is currently unaccounted for. The Final Report – Water Distribution System Audit provides more information on the meter accuracy tests and on the anticipated savings for replacing old meters.

Other Benefits:
As seen with the Water Model and Leak Detection Study and the Engineering Feasibility Study, the replacement of the old, failing water distribution system will significantly improve the overall distribution and treatment process. Solving the leakage problems would affect other areas in a positive manner. Less leaks in the distribution system consequentially means less water to be treated initially and lowers the total cost for treating and providing potable water. Additionally, less water is transported though the distribution system and associated energy costs could potentially be less. Less stress on water components that convey water through the distribution system means less maintenance and replacement costs for those components. In summary, solving leakage problems and having an efficient water distribution system will provide energy and financial savings to the City of Del Rio.

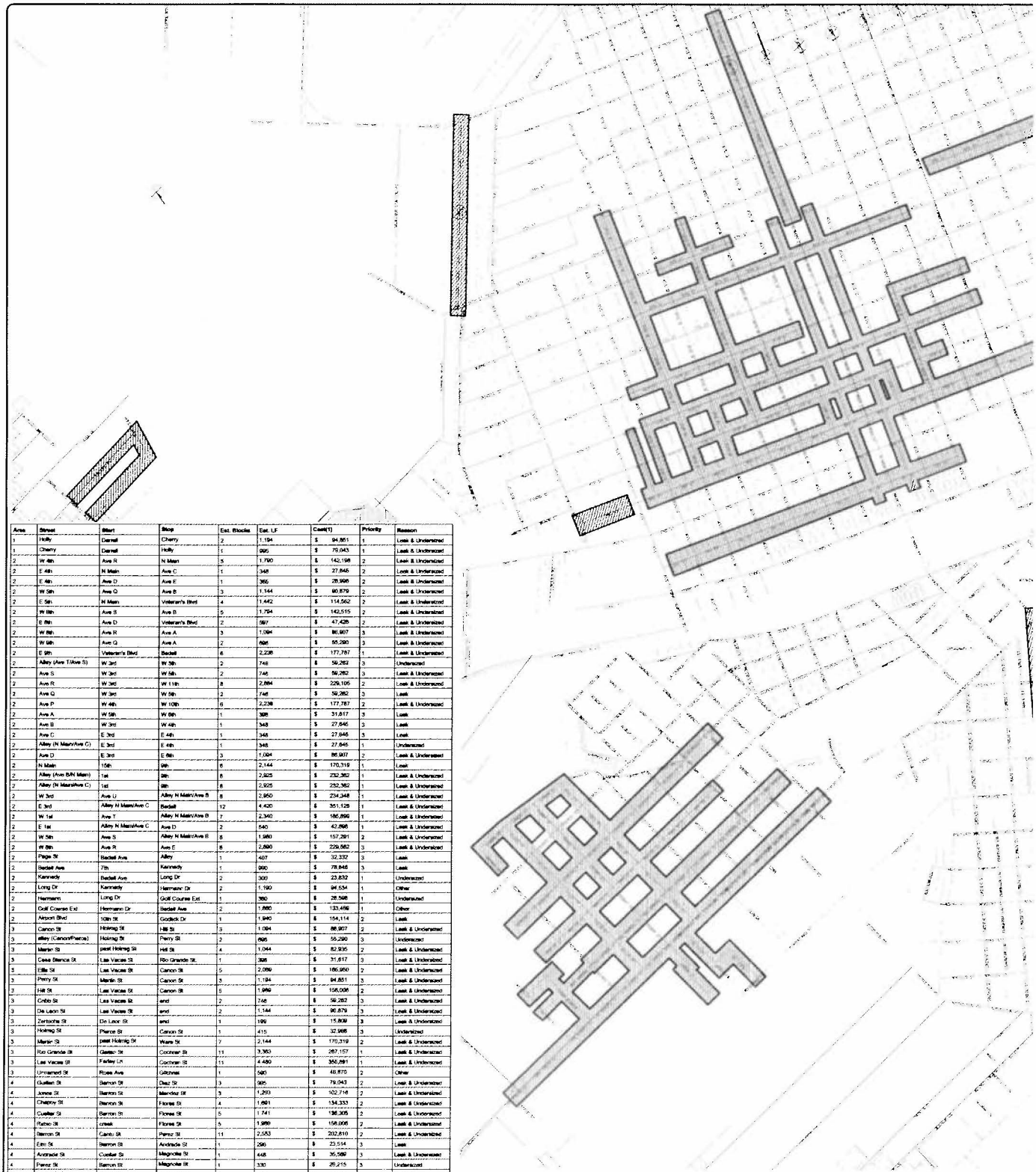
Green amount associated with water efficiency improvements: $ 9,645,000
(Attach detailed cost estimate if necessary)



TETRA TECH
700 Saint Mary's Street, Suite 300
San Antonio, Texas 78205
(210) 226-2922
(210) 226-8497 FAX

DEL RIO, TEXAS
DWSRF PDF PRELIMINARY ENGINEERING FEASABILITY REPORT

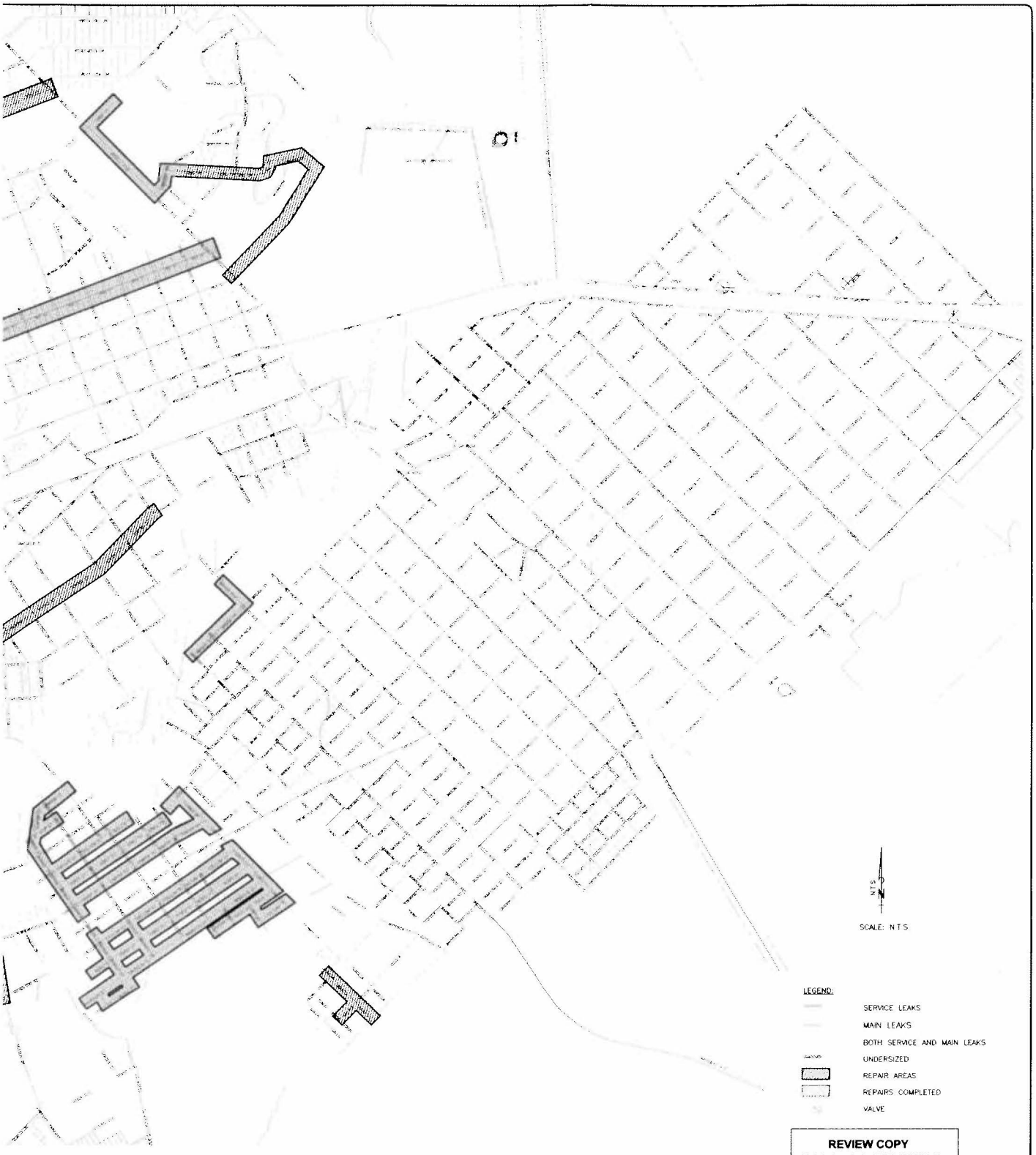
FIGURE 1: LOCATION MAP



Area	Street	Start	Stop	Est. Blocks	Est. LF	Cost(1)	Priority	Reason
1	Holly	Darnell	Cherry	2	1,184	$ 94,851	1	Leak & Undersized
1	Cherry	Darnell	Holly	1	995	$ 79,043	1	Leak & Undersized
2	W 4th	Ave R	N Main	3	1,790	$ 142,198	2	Leak & Undersized
2	E 4th	N Main	Ave C	1	348	$ 27,846	2	Leak & Undersized
2	E 4th	Ave D	Ave E	1	366	$ 28,906	2	Leak & Undersized
2	W 5th	Ave Q	Ave B	3	1,144	$ 90,879	2	Leak & Undersized
2	E 5th	N Main	Veteran's Blvd	4	1,442	$ 114,562	2	Leak & Undersized
2	W 6th	Ave S	Ave B	6	1,794	$ 142,515	2	Leak & Undersized
2	E 6th	Ave D	Veteran's Blvd	2	597	$ 47,426	2	Leak & Undersized
2	W 8th	Ave R	Ave A	3	1,094	$ 86,907	3	Leak & Undersized
2	W 9th	Ave Q	Ave A	2	695	$ 55,200	3	Leak & Undersized
2	E 9th	Veteran's Blvd	Bedell	6	2,235	$ 177,787	1	Leak & Undersized
2	Alley (Ave T/Ave S)	W 3rd	W 5th	2	746	$ 59,262	3	Undersized
2	Ave S	W 3rd	W 5th	2	746	$ 59,262	3	Leak & Undersized
2	Ave R	W 3rd	W 11th	8	2,884	$ 229,105	2	Leak & Undersized
2	Ave Q	W 3rd	W 5th	2	746	$ 59,262	3	Leak
2	Ave P	W 4th	W 10th	6	2,238	$ 177,787	2	Leak & Undersized
2	Ave A	W 5th	W 6th	1	398	$ 31,617	3	Leak
2	Ave B	W 3rd	W 4th	1	348	$ 27,846	3	Leak
2	Ave C	E 3rd	E 4th	1	348	$ 27,846	3	Leak
2	Alley (N Main/Ave C)	E 3rd	E 4th	1	348	$ 27,846	1	Undersized
2	Ave D	E 3rd	E 6th	3	1,094	$ 86,907	2	Leak & Undersized
2	N Main	15th	9th	6	2,144	$ 170,319	1	Leak
2	Alley (Ave B/N Main)	1st	9th	8	2,925	$ 232,362	1	Leak & Undersized
2	Alley (N Main/Ave C)	1st	9th	8	2,925	$ 232,362	1	Leak & Undersized
2	W 3rd	Ave U	Alley N Main/Ave B	8	2,950	$ 234,348	1	Leak & Undersized
2	E 3rd	Alley N Main/Ave C	Bedell	12	4,420	$ 351,128	1	Leak & Undersized
2	W 1st	Ave T	Alley N Main/Ave B	7	2,340	$ 185,899	1	Leak & Undersized
2	E 1st	Alley N Main/Ave C	Ave D	2	540	$ 42,895	1	Leak & Undersized
2	W 5th	Ave S	Alley N Main/Ave B	8	1,980	$ 157,291	2	Leak & Undersized
2	W 8th	Ave R	Ave E	8	2,880	$ 228,862	3	Leak & Undersized
2	Page St	Bedell Ave	Alley	1	407	$ 32,332	3	Leak
2	Bedell Ave	7th	Kennedy	1	990	$ 78,648	3	Leak
2	Kennedy	Bedell Ave	Long Dr	2	300	$ 23,832	1	Undersized
2	Long Dr	Kennedy	Hermann Dr	2	1,190	$ 94,534	1	Other
2	Hermann	Long Dr	Golf Course Ext	1	360	$ 28,598	1	Undersized
2	Golf Course Ext	Hermann Dr	Bedell Ave	2	1,680	$ 133,466	1	Other
2	Airport Blvd	10th St	Goldick Dr	1	1,940	$ 154,114	2	Leak
3	Cannon St	Holring St	Hill St	3	1,094	$ 86,907	2	Leak & Undersized
3	alley (Cannon/Pierce)	Holring St	Perry St	2	695	$ 55,200	3	Undersized
3	Martin St	past Holring St	Hill St	4	1,044	$ 82,935	2	Leak & Undersized
3	Casa Blanca St	Las Vacas St	Rio Grande St	1	398	$ 31,617	3	Leak & Undersized
3	Ella St	Las Vacas St	Cannon St	5	2,089	$ 165,950	2	Leak & Undersized
3	Perry St	Martin St	Cannon St	3	1,194	$ 94,851	3	Leak & Undersized
3	Hill St	Las Vacas St	Cannon St	5	1,989	$ 158,006	2	Leak & Undersized
3	Cobb St	Las Vacas St	end	2	746	$ 59,262	3	Leak & Undersized
3	De Leon St	Las Vacas St	end	2	1,144	$ 90,879	3	Leak & Undersized
3	Zertuche St	De Leon St	end	1	199	$ 15,809	3	Leak & Undersized
3	Holring St	Pierce St	Carson St	1	415	$ 32,968	3	Undersized
3	Martin St	past Holring St	Ware St	7	2,144	$ 170,319	2	Leak & Undersized
3	Rio Grande St	Garden St	Cochran St	11	3,353	$ 267,157	1	Leak & Undersized
3	Las Vacas St	Fairley Ln	Cochran St	11	4,480	$ 356,691	1	Leak & Undersized
3	Unnamed St	Rose Ave	Gilchrist	1	590	$ 46,870	2	Other
4	Guillen St	Barron St	Diaz St	3	995	$ 79,043	2	Leak & Undersized
4	Jones St	Barron St	Mendez St	5	1,293	$ 102,716	2	Leak & Undersized
4	Chaplin St	Barron St	Flores St	4	1,691	$ 134,333	2	Leak & Undersized
4	Cuellar St	Barron St	Flores St	5	1,741	$ 138,305	2	Leak & Undersized
4	Rabe St	creek	Flores St	5	1,989	$ 158,006	2	Leak & Undersized
4	Barron St	Cantu St	Perez St	11	2,553	$ 202,810	2	Leak & Undersized
4	Elm St	Barron St	Andrade St	1	298	$ 23,514	3	Leak
4	Andrade St	Cuellar St	Magnolia St	1	448	$ 35,580	3	Leak & Undersized
4	Perez St	Barron St	Magnolia St	1	330	$ 26,215	3	Undersized
4	Magnolia St	Perez St	Magnolia St	1	143	$ 11,360	3	Undersized
4	Yucca St	Diaz St	Flores St	3	760	$ 60,374	3	Leak
4	Live Oak St	Flores St	Cedar St	1	318	$ 25,262	3	Leak
4	Cedar St	Live Oak St	Yucca St	1	183	$ 14,536	3	Leak
4	Esquivel St	Flores St	end	1	172	$ 13,664	3	Undersized
4	Flores St	Esquivel St	Magnolia St	4	1,393	$ 110,660	2	Leak & Undersized
4	Magnolia	River St	Flores St	5	2,260	$ 179,534	1	Leak & Undersized
4	Pecan St	Nicholson Rd	Garfield St	6	4,235	$ 336,425	1	Leak & Undersized
4	Soring St	Pecan St	Flores St	6	2,470	$ 196,217	1	Leak & Undersized
4	Gillis Ave	River	Bridge St	1	389	$ 30,902	2	Other
4	Bridge St	Barrera Ave	Gillis Ave	2	759	$ 60,309	3	Other
4	Rueda St	Juarista St	Simon St	1	235	$ 18,668	3	Undersized
4	Juarista St	Primo	Barrera Ave	2	780	$ 60,374	3	Other

Subtotals					
Area	Est. Blocks	Est. LF	Cost		
1	3	2,189	$ 173,894		
2	136	51,386	$ 4,082,024		
3	56	21,586	$ 1,714,731		
4	71	25,423	$ 2,019,801		
Valves	NA	NA	$ 188,040		
Total	268	100,582 (19.0mi)	$ 8,178,270		

(1) Costs per $78.44 per LF, based on example block rehabilitation from 2018 Water Model & Leak Detection Report (Figure 14). This average includes new pipe, valves, service connections, a hydrant, and pavement repair.



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NOT INTENDED FOR CONSTRUCTION

ENGINEER: JAIME R. KYPUROS, JR
P.E. SERIAL No. 93790
DATE: OCT. 2010

TETRA TECH, INC., F-3024

TETRA TECH
www.tetratech.com
700 N. St. Mary's, Suite 300
San Antonio, Texas 78205
Phone: (210) 226-2622 Fax: (210) 226-8497

MARK	DATE	DESCRIPTION	BY

Client: CITY OF DEL RIO
Proj. Loc.: DEL RIO, VAL VERDE COUNTY, TEXAS

DISTRIBUTION REHAB PHASE I
MAP 3: DISTRIBUTION REPAIR AREAS

Project No.:
Designed By:
Drawn By:
Checked By:

WATER MODEL & LEAK DETECTION STUDY
FINAL REPORT

March 2010

Prepared for:

North American Development Bank
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(210) 231-8000

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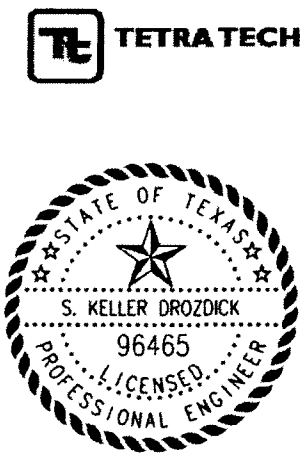
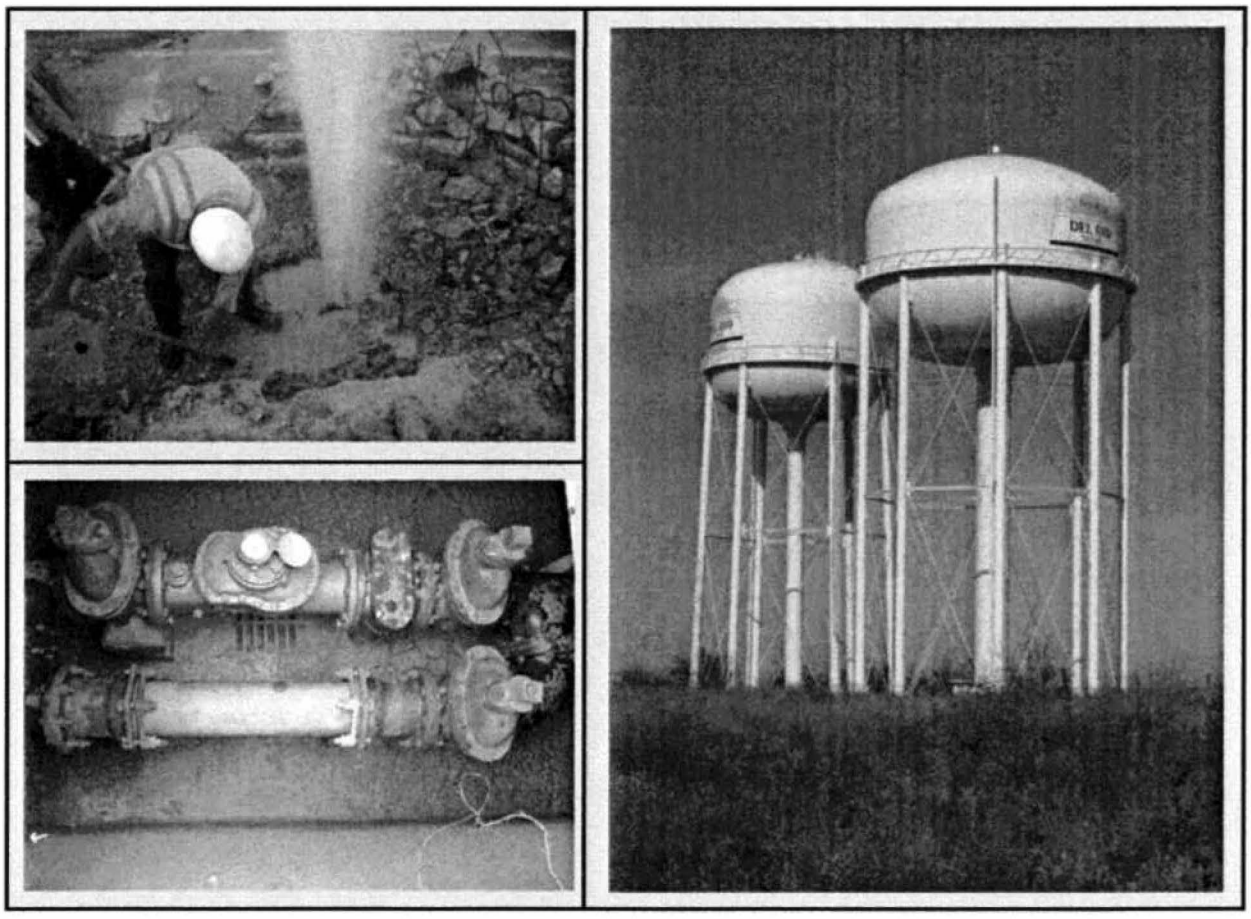


FINAL REPORT

WATER DISTRIBUTION SYSTEM AUDIT

CITY OF DEL RIO, TEXAS
LEAK DETECTION AND WATER MODEL STUDY

October 2009



JBS ASSOCIATES

Houston, Texas

DRINKING WATER STATE REVOLVING FUND ENGINEERING FEASIBILITY REPORT

May 2011

Prepared for:

Texas Water Development Board
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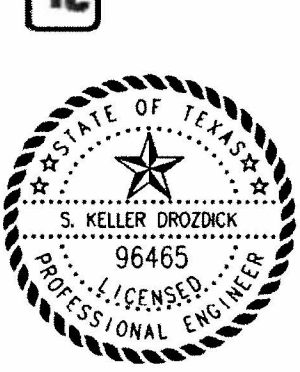

City of Del Rio
Del Rio, Texas

Engineering Design Report

Water Distribution Design and Construction Standards

December 2010

TETRA TECH

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