



Susan Combs

Texas Comptroller of Public Accounts

Facility Preliminary Energy Assessments and Recommendations

Tarrant Regional Water District

Prepared by: Jacobs Engineering Group Inc.



TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 1

2. FACILITY DESCRIPTIONS 3

3. FACILITY ENERGY PERFORMANCE 4

4. ENERGY ACCOUNTING 5

5. RECOMMENDATIONS 5

6. EMISSION SAVINGS 7

APPENDIX A: UTILITY ANALYSIS DATA

APPENDIX B: ECM INFORMATION

APPENDIX C: ENERGY STAR – PORTFOLIO MANAGER

APPENDIX D: FUNDING AND PROCUREMENT

APPENDIX E: GOVERNMENT LEGISLATION AND STANDARDS

APPENDIX F SERVICE AGREEMENT

1. EXECUTIVE SUMMARY

A Preliminary Energy Assessment (PEA) site visit for the Tarrant Regional Water District was conducted during the month of July 2010 for the purpose of identifying viable Energy Conservation Measures (ECMs). This report documents that investigation.

This service is provided by Jacobs at no cost to the Tarrant Regional Water District by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and local political subdivisions for the purpose of planning, funding, and implementing cost-effective energy conservation measures. The goal is to reduce energy consumption of existing facilities and ultimately reduce regional emissions and facility energy costs.

The following ECMs were investigated and recommended for implementation or further detailed analysis:

ECM 1: Bridgeport Lighting Retrofit: T12 to T8

ECM 2: Bridgeport Thermostat Replacement

ECM 3: Richland Chambers Lighting Retrofit: T12 to T8

ECM 4: Richland Chambers Lighting Retrofit: Metal Halide to T5

ECM 5: Richland Chambers Lighting Retrofit: Incandescent to CFL

ECM 6: Richland Chambers Thermostat Replacement

ECM 7: Cedar Creek Reservoir Lighting Retrofit: T12 to T8

ECM 8: Cedar Creek Reservoir Lighting Retrofit: Metal Halide to T5

ECM 9: Cedar Creek Reservoir: Condenser Replacement

ECM 10: Eagle Mountain Office Lighting Retrofit: T12 to T8

ECM 11: Eagle Mountain Office Lighting Retrofit: Incandescent to LED exit signs

ECM 12: Eagle Mountain Office Lighting Retrofit: Metal Halide to T5

A preliminary energy and cost savings evaluation was conducted on each recommended measure listed above. Descriptions of these measures and a summary of each evaluation are presented in the following sections. An overall summary of the results is presented in Table 4. Each proposed utility evaluation was based on the prevalent utility costs at the time of the audit.

As seen in Table 4, the recommended measures provide for a combined estimated annual savings of \$5,161.75, with an estimated capital requirement of \$22,011.63 thus yielding a composite simple payback period of 4.4 years. Overall, it is estimated that by implementing these measures electric utility consumption in the buildings surveyed can be reduced by 3.6%.

Descriptions and calculations for the recommended measures can be found within this report. A follow-up visit can be scheduled to address questions regarding the report, project financing options, implementation schedules, or any other aspect of this program or its implementation.

SECO is committed to providing whatever assistance is required in planning, funding, and implementing the recommendations of this report. Tarrant Regional Water District is encouraged to direct any questions or concerns to either of the following:

SECO
Stephen Ross
1-800-531-5441, ext 3-1896

Jacobs
Travis Alexander
817-735-7063

Included in the appendix of this report is also a list of websites that can be utilized in learning more about SECO, Senate Bill 12, various funding solutions, energy saving projects, and various state and federal agency services and programs.

2. FACILITY DESCRIPTIONS

Tarrant Regional Water District owns and operates several water pumping stations in Tarrant County. Energy audits were conducted at the following locations: Eagle Mountain Office, Bridgeport Office, Cedar Creek Reservoir, and Richland Chamber Office.

2.1. Eagle Mountain

The Eagle Mountain Office of Tarrant Regional Water District is located at 10201 N. Shore Dr. in Fort Worth. The facility is a 4,773 square feet, one story building that is split into an office portion and a shop area. The building's exterior walls are gravel and concrete cladding, windows are single paned, and the roof is metal standing seam.

The lighting fixtures in the office utilize T12 fluorescent, 3 lamp fixtures and some compact fluorescent lamps, both with magnetic ballasts. The shop uses high bay lights and there are several metal halide exterior lights.

The building's air conditioning consists of a DX unitary system in the office and a window unit located in a garage office. The unitary system is a 10 ton unit. It utilizes gas heating and outputs a constant volume.

There is a gas space heater suspended from the ceiling in the shop area that provides freeze protection.

Hot water is produced by a 30 gallon electric heater.

The building is controlled by a programmable thermostat.

2.2. Bridgeport

The Bridgeport Office of Tarrant Regional Water District is located at 1710 FM 1658 in Bridgeport, TX. The office and garage building is around 900 square feet, but an additional shop and storage building add another 3,000 square feet for a total of 3,900. Both buildings are metal sided with a metal roof. The office has a stone veneer halfway up one wall. Two layers of polyurethane foam were installed in the roof of the office building in 2007. Windows are single pane.

The lights in the office building are 1 and 3 lamp, T12 fluorescent; in the garage they are 4 lamp T12 fixtures. In the shop building, there are 2 or 5 lamp T12s, depending on the section. All have magnetic ballasts.

The office is cooled by a 3 ton DX, split system controlled by a non-programmable thermostat. The garage is conditioned by a 2008 window DX air conditioning unit that is just over 2 tons and a unit heater with a thermostat. In the storage building there is an office with another window A/C unit.

The garage in the main building has a propane space heater suspended from the ceiling. In the auxiliary building there is another propane space heater with a thermostat that is used for freeze protection.

2.3. Cedar Creek Reservoir

The Cedar Creek Reservoir of Tarrant Regional Water District is located at 6613 Ashby Lane in Trinidad, TX. There is a newly built, single story office building that is attached to an older, two story office building. There is a garage attached with a gym, break room, and storage rooms inside. There also was a weld shop / storage building and several parking units.

The new office building has a brick exterior and shingled roof. The other buildings are metal sided with metal, pitched roofs. The new office has double pane windows, but all other buildings' windows are single pane.

The facility used primarily T12 lights with magnetic ballasts and HID lighting.

The new office building is cooled by 2 DX split systems. The air handling units are new. The condensing units are 4 ton 1992 and 2006 units. The old office building and a part of the garage are cooled by three split systems and a window unit (in an individual office in the garage). The three 4 ton condensing units were installed in 2001.

Propane heaters are used to heat the weld shop and garage.

The A/C systems are controlled by both non-programmable and programmable thermostats.

2.4. Richland Chambers

The Richland Chambers Office of Tarrant Regional Water District is located at 140 FM 416 in Streetman, TX. The office is a single story building with a brick veneer and metal roof. The windows are double paned with exterior shading. The garage had metal siding and a metal roof.

Lighting in the office is primarily 2 lamp T12s with magnetic ballasts. There are a few incandescent lamps. The garage uses T12, magnetic ballast lights as well along with several HID high bay lights.

Two DX split systems cool the office building. The outdoor units were manufactured in 2007 and are approximately 5 tons. The garage also uses a DX split system for cooling. The 2 ton condensing unit was manufactured in 2009. An office in the garage has a 2007, 2 ton unit cooling it. A microwave building on the premise utilizes a 2002 unitary unit.

Four electric heaters are used in the garage. Gas torpedo units heat a shop area.

The shop office has a non-programmable thermostat while the office building has two programmable thermostats.

3. FACILITY ENERGY PERFORMANCE

Based on current utility data, the audited Tarrant County Water District buildings have the following annual electric costs, Energy Use Index (EUI), and Energy Cost Index (ECI):

Energy Cost and Consumption Benchmarks - Tarrant Regional Water District									
Building	Electric			Natural Gas			EUI	ECI	SF
	kWh/Yr	MMBTU/Yr	\$Cost/Yr	MCF/Yr*	MMBTU/Yr*	\$Cost/Yr			
1 RC Office	568,800	1,941	\$70,844.96		0		444	\$16.17	4,368
2 Bridgeport Office	77,303	264	\$8,503.33	512	47	\$1,200.00	80	\$2.49	3,900
3 Cedar Creek Reservoir Office	477,882	1,631	\$52,567.02		0		240	\$7.74	6,790
4 Eagle Mountain	102,648	350	\$11,291.28	265	306	\$2,191.10	138	\$2.82	4,773
	kWh/Yr	MMBTU/Yr	\$Cost/Yr	MCF/Yr	MMBTU/Yr	\$Cost/Yr	kBTU/SF/Yr	\$/SF/Yr	SF
	1,226,633	4,185	\$143,006.59	777	353	\$3,391.10	225	\$7.31	19,831

Table 1 - Current Energy Usage

The Richland Chambers Reservoir Office is the highest consumer of electricity. The meter that serves this facility also serves a small pump station with two 375hp pumps. The Bridgeport location uses propane (gal) instead of natural gas (MCF) A conversion factor of 91,600 BTU/gal is used to calculate MMBTU / Yr. The utility data collected can be found in Appendix A.

The EUI, an estimate of the energy consumption performance, is measured in thousands of BTUs per square foot per year. Likewise, the ECI, an estimate of the energy cost performance, is measured in dollars per square foot per year.

4. ENERGY ACCOUNTING

ENERGY ACCOUNTING DESCRIPTION

Energy is accounted for through monthly utility bills. Richland Chambers Reservoir is provided electricity by Navarro County Electric Cooperative. The energy to the Lake Bridgeport, Cedar Creek Reservoir, and Eagle Mountain Offices is provided by Reliant Energy.

AVERAGE UTILITY RATES

Utility Name	Average Rates
Navarro County Electric Cooperative	\$0.1242 / kWh
Reliant Energy	\$0.11 / kWh

Table 2: Utility Rates

5. RECOMMENDATIONS

MAINTENANCE AND OPERATIONS (M&O)

Maintenance and operations measures that often involve recommended changes in occupant behavior and maintenance practices that effect energy consumption.

Maintenance and Operations (M&O)
Project Description
Replace 1982 water heater at Richland Chambers Office

Table 3: M&O Recommendations

The hot water heater in the Richland Chambers water testing office was installed in 1982 and has not been performing adequately. Management is aware of the issue and a new heater is on a list of improvements to make.

ENERGY CONSERVATION MEASURES (ECMs)

Description of ECMs; Estimated Implementation Cost (\$); Estimated Annual Energy Cost Savings (\$/yr)

ECM	Location	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Simple Payback (years)
ECM 1	Bridgeport	Lighting Retrofit: T12 to T8	\$621.85	1,459	3.9
ECM 2	Bridgeport	Install new programmable thermostat	\$212.44	491	1.4
ECM 3	Richland Chambers	Lighting Retrofit: T12 to T8	\$6,428.05	8,476	6.1
ECM 4	Richland Chambers	Lighting Retrofit: Metal Halide to T5	\$1,389.03	4,993	2.2
ECM 5	Richland Chambers	Lighting Retrofit: Incandescent to CFL	\$82.80	413	1.6
ECM 6	Richland Chambers	Install new programmable thermostat	\$212.44	775	0.7
ECM 7	Cedar Creek Reservoir	Lighting Retrofit: T12 to T8	\$4,228.36	14,537	2.6
ECM 8	Cedar Creek Reservoir	Lighting Retrofit: Metal Halide to T5	\$2,663.66	6,990	3.5
ECM 9	Cedar Creek Reservoir	Condensing Unit Replacement	\$2,567.95	1,410	16.6
ECM 10	Eagle Mountain Office	Lighting Retrofit: T12 to T8	\$2,629.23	3,281	7.3
ECM 11	Eagle Mountain Office	Lighting Retrofit: Incandescent to LED exit signs	\$142.40	543	2.4
ECM 12	Eagle Mountain Office	Lighting Retrofit: Metal Halide to T5	\$833.42	1,664	4.6

Table 4 - Energy Conservation Measures

ECM 1, ECM 3-5, ECM 7, ECM 8, and ECM 10-11 involve changing lighting lamps and fixtures. Retrofitting lights by replacing existing T12 fluorescent light fixtures with new T8 fixtures reduces energy usage through lighting and cooling. Changing from magnetic to electric ballast increases the energy efficiency and therefore lowers cost. The new bulbs themselves also use less wattage. The same is true of the metal halide to high bay fluorescent T5s and incandescent to CFLs.

ECM 2 and ECM 6 suggest that installing programmable thermostats at both the Bridgeport and Richland Chambers Office would assist in energy savings. Each thermostat will be programmed to maintain a fixed temperature during the occupied periods each day. In the evening, the temperature will be maintained higher or lower than during hours of occupancy (depending on whether it is the cooling or heating season, respectively). This will conserve energy and increase the lifespan of the equipment.

ECM 9 involves replacing a 4 ton DX condensing unit with new, more efficient equipment (SEER 14 or higher). The existing unit is 18 years old and has long past reached the end of its useful life. Replacing the unit, which is inefficient by today's standards, will result in reduced electric energy consumption, lower utility bills, and improved maintenance costs (not captured in pay back calculations).

FACILITY IMPROVEMENT MEASURES (FIMs)

Facility Improvement Measures (FIMs)
Project Description
Replace windows on side of office building at Bridgeport Office
Replace single pane windows with double for old office building of Cedar Creek
Add blow in insulation in new office building of Cedar Creek.

Table 5: FIMs

The Bridgeport Office and old building of the Cedar Creek Reservoir Office both have single-pane clear windows. Single-pane clear windows have poor insulating properties and contribute to solar heat gain which increases the cooling load. A recommended FIM is to replace the existing windows with new double-pane windows with low-emissivity (low-e) coating. Double-pane glass will increase the resistance to heat loss/gain and the low-e coating will help block infrared radiation from the sun which adds heat to the space.



Figure 1 - Bridgeport Window

Blow in insulation is being added to the new office building at Cedar Creek in October.

RECOMMENDATIONS SUMMARY

Maintenance and Operations (M&O)
Project Description
Replace 1982 water heater at Richland Chambers Office

Table 6: M&O Summary

ECM	Location	Project Description	Estimated Implementation Cost	Estimated Annual Savings (kWh/yr)	Simple Payback (years)
ECM 1	Bridgeport	Lighting Retrofit: T12 to T8	\$621.85	1,459	3.9
ECM 2	Bridgeport	Install new programmable thermostat	\$212.44	491	1.4
ECM 3	Richland Chambers	Lighting Retrofit: T12 to T8	\$6,428.05	8,476	6.1
ECM 4	Richland Chambers	Lighting Retrofit: Metal Halide to T5	\$1,389.03	4,993	2.2
ECM 5	Richland Chambers	Lighting Retrofit: Incandescent to CFL	\$82.80	413	1.6
ECM 6	Richland Chambers	Install new programmable thermostat	\$212.44	775	0.7
ECM 7	Cedar Creek Reservoir	Lighting Retrofit: T12 to T8	\$4,228.36	14,537	2.6
ECM 8	Cedar Creek Reservoir	Lighting Retrofit: Metal Halide to T5	\$2,663.66	6,990	3.5
ECM 9	Cedar Creek Reservoir	Condensing Unit Replacement	\$2,567.95	1,410	16.6
ECM 10	Eagle Mountain Office	Lighting Retrofit: T12 to T8	\$2,629.23	3,281	7.3
ECM 11	Eagle Mountain Office	Lighting Retrofit: Incandescent to LED exit signs	\$142.40	543	2.4
ECM 12	Eagle Mountain Office	Lighting Retrofit: Metal Halide to T5	\$833.42	1,664	4.6

Table 7: ECM Summary

Facility Improvement Measures (FIMs)
Project Description
Replace windows on side of office building at Bridgeport Office
Replace single pane windows with double for old office building of Cedar Creek
Add blow in insulation in new office building of Cedar Creek.

Table 8: FIM Summary

6. EMISSION SAVINGS

	Annual kWh Reduction	Pollution Prevention Factors			Equivalent to:		
		CO2	NOx	SO2	Annual Number of Cars Taken Off the Road	Annual Number of Acres of Trees Planted	Annual Number of American Homes
		Carbon Dioxide (Pounds)	Nitrogen Oxide (Grams)	Sulphur Dioxide (Grams)	lbs CO2 / 10,000	lbs CO2 / 7,300	kWh / 10,000
Fire Station	12,896	15,295	17,796	28,629	2	2	1
Service Center	13311	15,787	18,369	29,550	2	2	1
The Center	5574	6,611	7,692	12,374	1	1	1
Total	31,781	37,692	43,858	70,554	4	5	3

Table 9: Emission Calculations

With the energy savings shown above, the resulting reduced amount of pollution has been calculated. Making the proposed improvements is equivalent to 3 cars being taken off the road, planting 7 acres of trees, and powering 3 American homes.

APPENDIX A: UTILITY ANALYSIS DATA

The average cost of electricity per kWh was \$0.11 / kWh; this flat rate was used to calculate the Cost.

Richland Chambers Office

Date of Bill	kWh	Cost
Jul-07	34,200	\$4,110.22
Aug-07	45,000	\$5,408.19
Sep-07	36,000	\$4,326.55
Oct-07	43,200	\$5,191.86
Nov-07	32,400	\$3,893.90
Dec-07	46,800	\$5,624.52
Jan-08	54,000	\$6,489.83
Feb-08	75,600	\$9,085.76
Mar-08	61,200	\$7,355.14
Apr-08	50,400	\$6,057.17
May-08	41,400	\$4,975.53
Jun-08	48,600	\$5,840.85
Total	568,800	\$68,359.52

Lake Bridgeport Office

Date of Bill	kWh	Cost
Mar-10	10243	\$1,126.73
Feb-10	10069	\$1,107.59
Jan-10	13129	\$1,444.19
Dec-09	8285	\$911.35
Nov-09	3619	\$398.09
Oct-09	3748	\$412.28
Sep-09	4998	\$549.78
Aug-09	4884	\$537.24
Jul-09	5252	\$577.72
Jun-09	3641	\$400.51
May-09	3421	\$376.31
Apr-09	6014	\$661.54
Total	77,303	\$8,503.33

Cedar Creek Office

Date of Bill	kWh	Cost
Mar-10	41652	\$4,581.72
Feb-10	40896	\$4,498.56
Jan-10	53226	\$5,854.86
Dec-09	34020	\$3,742.20
Nov-09	33354	\$3,668.94
Oct-09	31950	\$3,514.50
Sep-09	45540	\$5,009.40
Aug-09	47250	\$5,197.50
Jul-09	46062	\$5,066.82
Jun-09	36882	\$4,057.02
May-09	29736	\$3,270.96
Apr-09	37314	\$4,104.54
Total	477,882	\$52,567.02

Eagle Mountain Lake Office

Date of Bill	kWh	Cost
Mar-10	78	\$8.58
Feb-10	86	\$9.46
Jan-10	101	\$11.11
Dec-09	101	\$11.11
Nov-09	83	\$9.13
Oct-09	81	\$8.91
Sep-09	357	\$39.27
Aug-09	298	\$32.78
Jul-09	246	\$27.06
Jun-09	71	\$7.81
May-09	76	\$8.36
Apr-09	175	\$19.25
Total	1,753	\$192.83

APPENDIX B: ECM INFORMATION

ECM 1: Lighting Retrofit: T12 - T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:	Bridgeport Office			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 5 lamps/fixture	1	EA	\$44.25	\$ 44	\$50.00	\$ 50	\$94.25
Replace T12 fluorescents with T8s 48" length - 4 lamps/fixture	1	EA	\$41.75	\$41.75	\$32.00	\$32.00	\$73.75
Replace T12 fluorescents with T8s 48" length - 3 lamps/fixture	2	EA	\$39.25	\$ 79	\$27.00	\$ 54	\$132.50
Replace T12 fluorescents with T8s 48" length - 2 lamps/fixture	5	EA	\$37.00	\$ 185	\$23.00	\$ 115	\$300.00
Replace T12 fluorescents with T8s 48" length - 1 lamps/fixture	2	EA	\$24.50	\$ 49	\$20.00	\$ 40	\$89.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$354.25		\$241.00	\$595.25
CONTINGENCIES			15.0%				\$89.29
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			1.5%				\$10.27
TOTAL							\$694.81

Energy 1 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (46W/fixture)	2	EA	10	365	336
T-8 Fluorescents (32W/fixture)	2	EA	10	365	234
Estimated Annual Savings					102

Energy 2 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (86W/fixture)	5	EA	12	365	1,883
T-8 Fluorescents (60W/fixture)	5	EA	12	365	1,314
Estimated Annual Savings					569

Energy 3 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (132W/fixture)	2	EA	12	365	1,156
T-8 Fluorescents (92W/fixture)	2	EA	12	365	806
Estimated Annual Savings					350

Energy 4 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (172W/fixture)	1	EA	10	365	628
T-8 Fluorescents (120W/fixture)	1	EA	10	365	438
Estimated Annual Savings					190

Energy 5 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (218W/fixture)	1	EA	3	365	239
T-8 Fluorescents (152W/fixture)	1	EA	3	365	166
Estimated Annual Savings					72

Total Energy Savings Calculations

Facility Name: TRWD - Bridgeport
 Site Address: 1710 Farm Rd 1658
 ECM Number: 1
 ECM Description: T12 - T8 lighting retrofit

City: Bridgeport
 County: Fairfield
 Building Area: 3,900 SF
 Predominate Use: Office, Shop, Storage

Existing T12 lighting in Fire Station could be upgraded to T8 lighting Elec Rate= 0.11

Existing Conditions:	1 lamp	2 lamp in	3 lamp	4 lamp	5 lamp	
	2	5	2	1	1	Number of florescent fixtures in area observed
	46	86	132	172	218	Wattage of fixtures observed in area
	32	60	92	120	152	Wattage of fixtures after retrofit
	3,650	4,380	4,380	3,650	1,095	Annual lighting hours
	0.028	0.130	0.080	0.052	0.066	kW savings due to lighting consumption
	102	569	350	190	72	Annual kWh savings due to lighting consumption
	1.44	1.44	1.44			Assumed kW/ton of cooling
	0.01	0.04	0.02			Peak tons of cooling saved from lighting retrofit
	0.01	0.05	0.03			kW savings due to cooling load reduction
	21	96	59			Annual kWh savings due to cooling load reduction
			0.45			Total Annual kW savings
			1,459			Total Annual kWh savings
			\$161			Total Cost Savings
			\$695			Estimated Cost
			4.3			Simple Payback

ECM 2 - Install Programmable Thermostat

Cost Estimate

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.:	FEWE0701-TRWD		
PROJECT LOCATION:	Richland Chambers Office			ESTIMATOR:	K. Popp		
SUBMITTAL:	PEA Cost Estimates			DATE:	8/4/2010		
SYSTEM DESCRIPTION:	Install Programmable Thermostats			CHECKED BY:	T. Alexander		
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Programmable Thermostat	1	EA	\$49.00	\$ 49	\$133.00	\$ 133	\$182.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$49.00		\$133.00	\$182.00
CONTINGENCIES		15.0%					\$27.30
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$3.14
TOTAL							\$212.44

Energy Savings Calculations

Facility Name: <u>TRWD - Bridgeport</u>	City: <u>Bridgeport</u>
Site Address: <u>1710 Farm Rd 1658</u>	County: <u>Fairfield</u>
ECM Number: <u>2</u>	Building Area: <u>3,900</u> SF
ECM Description: <u>Programmable Thermostats</u>	Predominate Use: <u>Office, Shop</u>

Opportunity: When the space is unoccupied, setpoint temperature can change to reduce heating/cooling load

Assumed U-Values Walls	0.124 Btu/hr-ft ² -F	
Assumed Wall Area	1,200 ft ²	Electric Rate: 0.11
Assumed U-Values Roof	0.064 Btu/hr-ft ² -F	
Assumed Roof Area	900 ft ²	
Heating Season Thermostat Setpoint	70 F	
Heating Season Thermostat Setback	60 F	
Heating Season Setback Hours	1,456 hrs	
Heating Equipment Efficiency	100%	
Cooling Season Thermostat Setpoint	72 F	
Cooling Season Thermostat Setback	85 F	
Cooling Season Setback Hours	1,800 hrs	
Performance of Cooling System	1.22 kW/ton	
Total Envelope UA - Value	206 Btu/hr-F	
Electric Heating Energy Savings	881 kWh/yr	
Electric Heating Cost Reduction	97 \$/yr	
Cooling Energy Savings	491 kWh/yr	
Estimated Electricity Rate	\$0.110 per kWh	
Cooling Cost Savings	54 \$/yr	
Annual Cost Savings	\$151	
Installed cost	\$182	
Simple Payback	1.2 years	

ECM 3: Lighting Retrofit: T12 to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.:	FEWED701-TRWD		
PROJECT LOCATION:	Richland Chambers Office			ESTIMATOR:	K. Popp		
SUBMITTAL:	PEA Cost Estimates			DATE:	8/4/2010		
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY:	T. Alexander		
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 1 lamps/fixture	86	EA	\$24.50	\$ 2,107	\$20.00	\$ 1,720	\$3,827.00
Replace T12 fluorescents with T8s 48" length - 2 lamps/fixture	28	EA	\$37.00	\$ 1,036	\$23.00	\$ 644	\$1,680.00
<p>THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.</p>							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$3,143.00		\$2,364.00	\$5,507.00
CONTINGENCIES			15.0%				\$826.05
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			1.5%				\$95.00
TOTAL							\$6,428.05

Energy 1 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (46W/fixture)	86	EA	10	365	14,439
T-8 Fluorescents (32W/fixture)	86	EA	10	365	10,045
Estimated Annual Savings					4,395

Energy 2 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (86W/fixture)	28	EA	10	365	8,789
T-8 Fluorescents (60W/fixture)	28	EA	10	365	6,132
Estimated Annual Savings					2,657

Total Energy Savings Calculations

Facility Name: Richland Chambers Office
 Site Address: 140 FM 416
 ECM Number: 3
 ECM Description: T12 - T8 lighting retrofit

City: Streetman
 County: Freestone
 Building Area: 4,370 SF
 Predominate Use: Office

Existing T12 lighting in Service Center could be upgraded to T8 lighting

	1 lamp	2 lamp		Elec Rate=	0.1242
Existing Conditions:	86	28	Number of florescent fixtures in area observed		
	46	86	Wattage of fixtures observed in area		
	32	60	Wattage of fixtures after retrofit		
	3,650	3,650	Annual lighting hours		
	1.204	0.728	kW savings due to lighting consumption		
	4395	2657	Annual kWh savings due to lighting consumption		
	1.44	1.44	Assumed kW/ton of cooling		
	0.34	0.21	Peak tons of cooling saved from lighting retrofit		
	0.49	0.30	kW savings due to cooling load reduction		
	887	537	Annual kWh savings due to cooling load reduction		
	2.72		Total Annual kW savings		
	8,476		Total Annual kWh savings		
	\$1,053		Total Cost Savings		8,476
	\$6,428		Estimated Cost		
	6.1		Simple Payback		

ECM 4: Lighting Retrofit Metal Halides to T5s

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWED701-TRWD			
PROJECT LOCATION:	Richland Chambers Office			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace metal halides with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace metal halide with high bay fluorescent T5s	10	EA	\$44.00	\$440.00	\$75.00	\$750.00	\$1,190.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$440.00		\$750.00	\$1,190.00
CONTINGENCIES		15.0%					\$178.50
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$20.53
TOTAL							\$1,389.03

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Metal halide (300W/fixture)	10	EA	18	365	19,710
T-5 Fluorescents (224W/fixture)	10	EA	18	365	14,717
Estimated Annual Savings					4,993

Total Energy Savings Calculations

Facility Name: <u>Richland Chambers Office</u>	City: <u>Streetman</u>
Site Address: <u>140 FM 416</u>	County: <u>Freestone</u>
ECM Number: <u>4</u>	Building Area: <u>4,370</u> SF
ECM Description: <u>Metal halide - T8 lighting retrofit</u>	Predominate Use: <u>Office</u>

Existing metal halide lighting in Service Center could be upgraded to T8 lighting

Existing Conditions:	Metal Halide		Elec Rate= 0.1242
	10	Number of metal halide fixtures in area observed	
	300	Wattage of fixtures observed in area	
	224	Wattage of fixtures after retrofit	
	6,570	Annual lighting hours	
	0.760	kW savings due to lighting consumption	
	4,993	Annual kWh savings due to lighting consumption	
		Assumed kW/ton of cooling	
		Peak tons of cooling saved from lighting retrofit	
		kW savings due to cooling load reduction	
		Annual kWh savings due to cooling load reduction	
	0.76	Total Annual kW savings	
	4,993	Total Annual kWh savings	
	\$620	Total Cost Savings	
	\$1,389	Estimated Cost	
	2.2	Simple Payback	

ECM 5: Lighting Retrofit Incandescent to CFLs

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:	Richland Chambers			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace Incandescents with CFLs			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Incandescent Lights with CFLs	4	EA	\$10.00	\$40.00	\$8.00	\$32.00	\$72.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$40.00		\$32.00	\$72.00
CONTINGENCIES			15.0%				\$10.80
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			0.0%				\$0.00
TOTAL							\$82.80

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Incandescent Lights (60W apiece)	3	EA	12	365	788
CFL Lights (13W apiece)	3	EA	12	365	171
Estimated Annual Savings					618

Total Energy Savings Calculations

Facility Name: <u>Richland Chambers Office</u>	City: <u>Streetman</u>
Site Address: <u>140 FM 416</u>	County: <u>Freestone</u>
ECM Number: <u>5</u>	Building Area: <u>4,370</u> SF
ECM Description: <u>Incandescent to CFL lighting retrofit</u>	Predominate Use: <u>Office</u>

Existing incandescent lighting in The Center could be upgraded to CFL.

Elec Rate= 0.1242

Existing Conditions:	SF of area observed	
	4	Number of florescent fixtures in area observed
	60	Wattage of fixtures observed in area
	13	Wattage of fixtures after retrofit
	1,460	Annual lighting hours
	0.188	kW savings due to lighting consumption
	274	Annual kWh savings due to lighting consumption
	1.44	Assumed kW/ton of cooling
	0.05	Peak tons of cooling saved from lighting retrofit
	0.08	kW savings due to cooling load reduction
	139	Annual kWh savings due to cooling load reduction
	0.26	Total Annual kW savings
	413	Total Annual kWh savings
	\$51	Total Cost Savings
	\$83	Estimated Cost
	1.6	Simple Payback

ECM 6: Install Programmable Thermostats

Cost Estimate

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:		Tarrant Regional Water District		PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:		Richland Chambers Office		ESTIMATOR: K. Popp			
SUBMITTAL:		PEA Cost Estimates		DATE: 8/4/2010			
SYSTEM DESCRIPTION:		Install Programmable Thermostat		CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Programmable Thermostat	1	EA	\$49.00	\$ 49	\$133.00	\$ 133	\$182.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$49.00		\$133.00	\$182.00
CONTINGENCIES		15.0%					\$27.30
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$3.14
TOTAL							\$212.44

Energy Savings Calculations

Facility Name: Richland Chambers Office
 Site Address: 140 FM 416
 ECM Number: 6
 ECM Description: Programmable Thermostats

City: Streetman
 County: Freestone
 Building Area: 4,370
 Predominate Use: Office, Shop

Opportunity: When the space is unoccupied, setpoint temperature can change to reduce heating/cooling load

Assumed U-Values Walls	0.124 Btu/hr-ft ² -F	
Assumed Wall Area	1,697 ft ²	Electric Rate: 0.1242
Assumed U-Values Roof	0.064 Btu/hr-ft ² -F	
Assumed Roof Area	1,800 ft ²	
Heating Season Thermostat Setpoint	70 F	
Heating Season Thermostat Setback	60 F	
Heating Season Setback Hours	1,456 hrs	
Heating Equipment Efficiency	100%	
Cooling Season Thermostat Setpoint	72 F	
Cooling Season Thermostat Setback	85 F	
Cooling Season Setback Hours	1,800 hrs	
Performance of Cooling System	1.22 kW/ton	
Total Envelope UA - Value	326 Btu/hr-F	
Electric Heating Energy Savings	1,390 kWh/yr	
Electric Heating Cost Reduction	173 \$/yr	
Cooling Energy Savings	775 kWh/yr	
Estimated Electricity Rate	\$0.124 per kWh	
Cooling Cost Savings	96 \$/yr	
Annual Cost Savings	\$269	
Installed cost	\$182	
Simple Payback	0.7 years	

ECM 7: Lighting Retrofit T12 to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.:	FEWE0701-TRWD		
PROJECT LOCATION:	Cedar Creek Reservoir			ESTIMATOR:	K. Popp		
SUBMITTAL:	PEA Cost Estimates			DATE:	8/4/2010		
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY:	T. Alexander		
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 2 lamps/fixture	50	EA	\$37.00	\$1,850.00	\$23.00	\$1,150.00	\$3,000.00
Replace T12 fluorescents with T8s 48" length - 3 lamps/fixture	48	EA	\$39.25	\$1,884.00	\$27.00	\$1,296.00	\$3,180.00
Replace T12 fluorescents with T8s 48" length - 4 lamps/fixture	6	EA	\$41.75	\$250.50	\$32.00	\$192.00	\$442.50
<p>THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.</p>							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$2,134.50		\$1,488.00	\$3,622.50
CONTINGENCIES			15.0%				\$543.38
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			1.5%				\$62.49
TOTAL							\$4,228.36

Energy 2 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (86W/fixture)	50	EA	10	365	15,695
T-8 Fluorescents (60W/fixture)	50	EA	10	365	10,950
Estimated Annual Savings					4,745

Energy 3 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (132W/fixture)	48	EA	10	365	23,126
T-8 Fluorescents (92W/fixture)	48	EA	10	365	16,118
Estimated Annual Savings					7,008

Energy 4 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KHW/YR
T-12 Fluorescents (172W/fixture)	6	EA	10	365	3,767
T-8 Fluorescents (120W/fixture)	6	EA	10	365	2,628
Estimated Annual Savings					1,139

Total Energy Savings Calculations

Facility Name: Cedar Creek Reservoir
 Site Address: 6613 Ashby Lane
 ECM Number: 7
 ECM Description: T12 - T8 lighting retrofit

City: Trinidad
 County: Humboldt
 Building Area: 6,790 SF
 Predominate Use: Office, Work Shop

Sheet 1 of 2

Existing T12 lighting in Service Center could be upgraded to T8 lighting

	2 lamp	3 lamp	4 lamp		Elec Rate=	0.11
Existing Conditions:	50	48	6	Number of florescent fixtures in area observed		
	86	132	172	Wattage of fixtures observed in area		
	60	92	120	Wattage of fixtures after retrofit		
	3,650	3,650	3,650	Annual lighting hours		
	1,300	1,920	0,312	kW savings due to lighting consumption		
	4745	7008	1139	Annual kWh savings due to lighting consumption		
		1.44	1.44	Assumed kW/ton of cooling		
		0.55	0.09	Peak tons of cooling saved from lighting retrofit		
		0.79	0.13	kW savings due to cooling load reduction		
		1,415	230	Annual kWh savings due to cooling load reduction		
		4.45		Total Annual kW savings		
		14,537		Total Annual kWh savings		
		\$1,599		Total Cost Savings		14,537
		\$4,228		Estimated Cost		
		2.6		Simple Payback		

ECM 8: Lighting Retrofit Metal Halides to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:	Cedar Creek Reservoir			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace metal halides with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace metal halide with high bay fluorescent T5s	14	EA	\$88.00	\$1,232.00	\$75.00	\$1,050.00	\$2,282.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$1,232.00		\$1,050.00	\$2,282.00
CONTINGENCIES			15.0%				\$342.30
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			1.5%				\$39.36
TOTAL							\$2,663.66

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Metal halide (300W/fixture)	14	EA	18	365	27,594
T-5 Fluorescents (224W/fixture)	14	EA	18	365	20,604
Estimated Annual Savings					6,990

Total Energy Savings Calculations

Facility Name: Cedar Creek Reservoir

Site Address: 6613 Ashby Lane

ECM Number: 8

ECM Description: Metal halide - T8 lighting retrofit

City: Trinidad

County: Humboldt

Building Area: 6,790 SF

Predominate Use: Office, Work Shop

Existing metal halide lighting in Service Center could be upgraded to T8 lighting

Elec Rate= 0.11

Existing Conditions: 14 Number of metal halide fixtures in area observed
 300 Wattage of fixtures observed in area
 224 Wattage of fixtures after retrofit

6,570 Annual lighting hours
 1.064 kW savings due to lighting consumption
 6,990 Annual kWh savings due to lighting consumption

Assumed kW/ton of cooling
 Peak tons of cooling saved from lighting retrofit
 kW savings due to cooling load reduction
 Annual kWh savings due to cooling load reduction

1.06 Total Annual kW savings
 6,990 Total Annual kWh savings
 \$769 Total Cost Savings

\$2,664 Estimated Cost

3.5 Simple Payback

ECM 9: Replace Condenser Unit

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	City of Rockwall			PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:	The Center			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 7/28/2010			
SYSTEM DESCRIPTION:	Condenser Replacement			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Condensing Unit	1	EA	\$ 375	\$ 375	\$ 1,825	\$ 1,825	\$ 2,200
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$ -	\$ -
SUBTOTAL			\$ 375		\$ 1,825	\$ 2,200	
CONTINGENCIES		15.0%					\$ 330
DESIGN		0.0%					\$ -
CONSTRUCTION ADMINISTRATION		1.5%					\$ 38
TOTAL							\$ 2,568

Energy Saving Calculations

Facility Name: <u>Cedar Creek Reservoir</u>	City: <u>Trinidad</u>
Site Address: <u>6613 Ashby Lane</u>	County: <u>Humboldt</u>
ECM Number: <u>9</u>	Building Area: <u>6,790</u>
ECM Description: <u>Replace Condensing Unit</u>	Predominate Use: <u>Office, Work Shop</u>

Opportunity: Replace condensing unit with a higher efficiency unit

Elec. Rate= 0.1100

	1	Number of units
	4	Tons per unit
	9.2	Estimated existing EER
	1.30	Estimated existing kW/ton
	14.0	New equipment EER
	0.86	New equipment kW/ton
	788	Estimated equivalent full load hours
Estimated peak kW Savings:	1.8	kW
Total Estimated kWh Savings:	1,410	kWh per year
Cost Savings:	\$155	per year
Estimated Cost:	\$2,568	
Simple Payback:	16.6	years

ECM 10: Lighting Retrofit T12 to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWE0701-TRWD			
PROJECT LOCATION:	Cedar Creek Reservoir			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace T12 with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace T12 fluorescents with T8s 48" length - 3 lamps/fixture	34	EA	\$39.25	\$1,334.50	\$27.00	\$918.00	\$2,252.50
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$1,334.50		\$918.00	\$2,252.50
CONTINGENCIES		15.0%					\$337.88
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$38.86
TOTAL							\$2,629.23

Energy 3 lamp

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
T-12 Fluorescents (114W/fixture)	34	EA	10	365	14,147
T-8 Fluorescents (92W/fixture)	34	EA	10	365	11,417
Estimated Annual Savings					2,730

Total Energy Savings Calculations

Facility Name: Eagle Mountain
 Site Address: 10201 N. Shore Dr.
 ECM Number: 10
 ECM Description: T12 - T8 lighting retrofit

City: Fort Worth
 County: Tarrant
 Building Area: 4,770 SF
 Predominate Use: Office, Shop

Existing T12 lighting in Eagle Mountain Office could be upgraded to T8 lighting

Elec Rate= 0.11

3 lamp

Existing Conditions:

- 34 Number of florescent fixtures in area observed
- 114 Wattage of fixtures observed in area
- 92 Wattage of fixtures after retrofit

3,650 Annual lighting hours

- 0.748 kW savings due to lighting consumption
- 2730 Annual kWh savings due to lighting consumption

1.44 Assumed kW/ton of cooling

- 0.21 Peak tons of cooling saved from lighting retrofit
- 0.31 kW savings due to cooling load reduction
- 551 Annual kWh savings due to cooling load reduction
- 1.05 Total Annual kW savings
- 3,281 Total Annual kWh savings
- \$361 Total Cost Savings

\$2,629 Estimated Cost

7.3 Simple Payback

ECM 11 Lighting Retrofit Exit Lights

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWED701-TRWD			
PROJECT LOCATION:	Eagle Mountain Office			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/6/2010			
SYSTEM DESCRIPTION:	Exit Lights Retrofit			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace Incandescent Exit Signs w/ LED Signs	2	EA	\$24.50	\$49.00	\$36.50	\$73.00	\$122.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)		0.0%				\$0.00	\$0.00
SUBTOTAL				\$49.00		\$73.00	\$122.00
CONTINGENCIES		15.0%					\$18.30
DESIGN		0.0%					\$0.00
CONSTRUCTION ADMINISTRATION		1.5%					\$2.10
TOTAL							\$142.40

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Incandescent Exit Signs (2 x 20W lamps = 40W input)	2	EA	24	365	701
LED Exit Signs (9W input)	2	EA	24	365	158
Estimated Annual Savings					543

Payback Calculations

Facility Name: Eagle Mountain
 Site Address: 10201 N. Shore Dr.
 ECM Number: 11
 ECM Description: Exit Lights Retrofit

City: Fort Worth
 County: Tarrant
 Building Area: 4,770 SF
 Predominate Use: Office, Shop

Existing T12 lighting in Eagle Mountain Office could be upgraded to T8 lighting

Elec Rate= 0.11

Existing Conditions: 2 Number of florescent fixtures in area observed
 40 Wattage of fixtures observed in area
 9 Wattage of fixtures after retrofit
 8,760 Annual lighting hours
 0.062 kW savings due to lighting consumption
 543 Annual kWh savings due to lighting consumption
 1.44 Assumed kW/ton of cooling
 0.02 Peak tons of cooling saved from lighting retrofit
 0.03 kW savings due to cooling load reduction
 46 Annual kWh savings due to cooling load reduction
 0.09 Total Annual kW savings
 589 Total Annual kWh savings
 \$65 Total Cost Savings

\$142 Estimated Cost

2.2 Simple Payback

ECM 12 Lighting Retrofit Metal Halide to T8

JACOBS COST ESTIMATING ANALYSIS							
PROJECT NAME:	Tarrant Regional Water District			PROJECT NO.: FEWD701-TRWD			
PROJECT LOCATION:	Eagle Mountain Office			ESTIMATOR: K. Popp			
SUBMITTAL:	PEA Cost Estimates			DATE: 8/4/2010			
SYSTEM DESCRIPTION:	Replace metal halides with T8s			CHECKED BY: T. Alexander			
TASK DESCRIPTION	QUANTITY		LABOR		MATERIALS		TOTAL COSTS
	NO/UNIT	UNIT	UNIT PRICE	COST	UNIT PRICE	COST	
Replace metal halide with high bay fluorescent T5s	6	EA	\$44.00	\$264.00	\$75.00	\$450.00	\$714.00
THIS IS A PRELIMINARY COST ESTIMATE WHICH DOES NOT REPRESENT ACTUAL CONSTRUCTION COSTS OR CONTRACTOR BID PRICES. UNIT PRICES FOR MATERIAL AND LABOR COSTS WERE DEVELOPED USING PUBLISHED COST DATA AND OTHER RELIABLE SOURCES. A CONSERVATIVE CONTINGENCY HAS BEEN INCLUDED IN THIS ESTIMATE TO ACCOUNT FOR UNKNOWN FACTORS BUT DESIGN DEVELOPMENT ISSUES, SCOPE CHANGES, AND MARKET CONDITIONS AT THE TIME OF BIDDING MAY AFFECT ACTUAL CONSTRUCTION COSTS.							
TAX (ASSUMES TAX EXEMPT)			0.0%			\$0.00	\$0.00
SUBTOTAL				\$264.00		\$450.00	\$714.00
CONTINGENCIES			15.0%				\$107.10
DESIGN			0.0%				\$0.00
CONSTRUCTION ADMINISTRATION			1.5%				\$12.32
TOTAL							\$833.42

Energy

	QUANTITY		USAGE		ENERGY USE
	NO/UNIT	UNIT	HRS/DAY	DAYS/YR	KWH/YR
Metal halide (300W/fixture)	6	EA	10	365	6,570
T-5 Fluorescents (224W/fixture)	6	EA	10	365	4,906
Estimated Annual Savings					1,664

Total Energy Savings Calculations

Facility Name: Eagle Mountain Office

Site Address: 10201 N. Shore Dr.

ECM Number: 12

ECM Description: Metal halide - T8 lighting retrofit

City: Fort Worth

County: Tarrant

Building Area: 4,770 SF

Predominate Use: Office, Shop

Existing metal halide lighting in Service Center could be upgraded to T8 lighting

Elec Rate= 0.11

Existing Conditions: SF of area observed
 6 Number of metal halide fixtures in area observed
 300 Wattage of fixtures observed in area
 224 Wattage of fixtures after retrofit

3,650 Annual lighting hours
 0.456 kW savings due to lighting consumption
 1,664 Annual kWh savings due to lighting consumption

Assumed kW/ton of cooling
 Peak tons of cooling saved from lighting retrofit
 kW savings due to cooling load reduction
 Annual kWh savings due to cooling load reduction

0.46 Total Annual kW savings
 1,664 Total Annual kWh savings
 \$183 Total Cost Savings

\$833 Estimated Cost

4.6 Simple Payback

APPENDIX C: ENERGY STAR – PORTFOLIO MANAGER

Energy Star is a joint program between the US Environmental Protection Agency (US EPA) and the Department of Energy (US DOE) that promotes the efficient use of energy in multiple industries. One focus of the Energy Star program is on energy efficiency of existing buildings.

Portfolio Manager was created as an industry tool to aid those that work with existing buildings in benchmarking energy performance. Portfolio Manager benchmarking data is based on the Commercial Buildings Energy Consumption Survey administered by the US DOE Energy Information Administration every four years. The survey includes energy use figures from thousands of buildings throughout the United States for various end uses. For a particular building type (e.g. an office building), the building is compared statistically to similar buildings in the survey and assigned a score of 1-100. A score of 50 indicates an average building in terms of energy performance. A score of 1 means that the building is in the lowest 1% of buildings for energy performance and a score of 100, indicates performance in the top 1%.

Energy Star - Portfolio Manager			
Building	Site EUI (kbtu/sf/yr)	Source EUI (kbtu/sf/yr)	Energy Star Rating (1-100)
Eagle Mountain	129.1	298.9	NA
Bridgeport	78.1	232.8	NA

Site Energy Use Intensity (EUI) uses figures of metered electrical kWh or purchased gallons of propane to the building and then converts them to kbtus. This is the same procedure used for calculating EUI earlier in this report. Portfolio Manager also calculates source EUI for easier comparison among different fuel types. Source EUI takes into account energy losses from the original fuel source. For electricity, the original fuel consumption occurs at the power plant where electrical conversion efficiencies are often 30-40% for traditional fossil fuel sources. Portfolio Manager uses a source-site factor (or ratio) to convert site energy to source energy and it uses the same figure for all grid-supplied electricity. The source-site factor for electricity is 3.340. For propane the source-site ratio is 1.01 which is taken into account the average energy used in fuel storage and transport to site. For natural gas, the source-site ratio is 1.047.

For the Eagle Mountain building, the energy types used on site include electricity and natural gas. For Bridgeport, the energy types used on site are electricity and propane. Propane consumption figures were estimated by the facility manager in charge of procurement. The site EUI figures from Portfolio Manager vary slightly from those calculated by Jacobs earlier in the report due to differences in conversion factors and rounding.

Cedar Creek Reservoir and Richland Chambers have significant process loads (e.g. water pumps and blowers) that contribute to their electricity consumption. These two facilities were not benchmarked using Portfolio Manager as additional analysis is required to separate out these loads from the typical building loads. As a result, propane loads from Cedar Creek and Richland Chambers were not compiled.

Both buildings did not receive a score on the 1-100 scale. This is because Portfolio Manager does not benchmark buildings below the 5,000 square foot threshold.

APPENDIX D: FUNDING AND PROCUREMENT

NON-TRADITIONAL FUNDING METHODS

When traditional means of funding projects are not available, non-traditional funding may be desirable in order to implement beneficial projects. Energy and operational cost savings can be used to fund projects such as the ones recommended in this report. A couple of options are available when considering funding projects with cost savings.

The first way would be to secure a low interest loan and fund the projects internally by “fixing” the operational budgets over the term of the loan and use the savings to pay back the loan. Low interest loans are available through the State’s Texas LoanSTAR (Saving Taxes and Resources) Program.

The LoanSTAR Program has served as a national model for state and federal loan programs for energy efficiency retrofits, and is SECO’s most highly visible program. Legislatively mandated to be funded at a minimum of \$95 million at all times, to date the LoanSTAR Program has saved Texas taxpayers over \$250 million through energy efficiency projects, financed for state agencies, institutions of higher education, school districts, and local governments. The program’s revolving loan mechanism allows borrowers to repay loans through the stream-of-cost savings generated by the funded projects. The program will fund energy saving projects with a maximum combined simple payback of 10 years.

The interest rates for the LoanSTAR Program is based on several factors which include money market rates and LoanSTAR administrative cost. Rates are evaluated and set every fiscal year, from 9/01 - 8/31.

In order to qualify for funding from the LoanSTAR Program, a detailed energy audit or energy assessment report (EAR) must be completed for the facility/department by a licensed professional engineer in the State of Texas. The purpose of the EAR is to validate the savings estimated in this PEA, through a very detailed approach, as well as confirm the scope of work required for each project.

To assure the borrower that projects are constructed according to the EAR and LoanSTAR technical guidelines, SECO performs design specification review and on-site construction monitoring at 50% and 100% complete.

Another non-traditional solution to funding these projects is to secure the services of a performance contractor. Performance contractors can finance projects in the same manner as the LoanSTAR program by using energy and operational savings as funding for the projects. Performance contractors can package projects with paybacks up to 20 years and pull from a large variety of financial resources for low-interest funding (including the LoanSTAR Program). For more information on this subject feel free to visit the SECO website or call Jacobs at the number shown on the front cover of this PEA.

APPENDIX E: GOVERNMENT LEGISLATION AND STANDARDS

Energy Efficiency Programs in Political Subdivisions

Senate Bill 12

An Act relating to programs for the enhancement of air quality, including energy efficiency standards in state purchasing and energy consumption.

House Bill 3693

An Act relating to energy demand, energy load, energy efficiency initiatives, energy programs, and energy performance measures.

HB 3693 and SB 12 Rules

The State Energy Conservation Office (SECO) has published rules on House Bill (HB) 3693 and Senate Bill (SB) 12 for persons who have an interest in the adoption of energy codes to have an opportunity to comment on newly published editions of the International Energy Conservation Code and the International Residential Code. The code manuals can be purchased at the **International Code Council** web site.

BACKGROUND

In 2001, the 77th Texas Legislature passed **Senate Bill 5 (SB5)**, also known as the Texas Emissions Reduction Plan, to amend the Texas Health and Safety Code. The legislation required ambitious, fundamental changes in energy use to help the state comply with federal Clean Air Act standards. It applied to all political subdivisions within 38 designated counties, later expanded to **41 counties**.

In 2007, the 80th Texas Legislature passed **Senate Bill 12 (SB 12)** which among other things extended the timeline set in SB 5 for emission reductions. Where SB 5 required political subdivisions to reduce their electrical consumption by five percent (5%) for five years beginning January 1, 2002, the SB 12 legislation requires that such entities establish a goal to make the five percent (5%) reductions each year for six years, effective September 1, 2007.

SB 12 amended the Health and Safety Code Section 388.005, in part, by requiring affected political subdivisions to: implement all cost-effective energy-efficiency measures, establish a goal to reduce electricity consumption by 5 percent each year for 6 years, and report efforts and progress annually to the State Energy Conservation Office (SECO). The report details the efforts being undertaken by SECO to provide assistance and information to affected entities, as well as the progress and efforts made by political subdivisions in meeting the energy efficiency mandates of SB 5/SB 12.

Meeting Your Energy Efficiency Goals

In terms of energy efficiency, the biggest step is requiring new buildings to meet the state's energy performance standards. These standards call for better weather stripping, more efficient air conditioners, stricter insulation guidelines, switches to turn off water heaters, tighter building envelopes and energy-efficient windows for new buildings. Under the new law, municipalities and counties can continue to make local amendments to the state energy codes as long as they are not less stringent than the statewide standard.

Source: <http://www.seco.cpa.state.tx.us/sb5compliance.htm>

USEFUL WEBSITES:

A. DATABASE OF STATE INCENTIVES FOR RENEWABLE ENERGY

www.dsireusa.org

DSIRE provides information on state, local, utility, and selected federal incentives that promote renewable energy.

B. OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

www.eere.energy.gov

EERE is a resource site containing hundreds of web sites and thousands of online documents regarding energy efficiency and renewable energy. Also included are direct links to the Department of Energy offices and programs.

C. PUBLIC UTILITIES COMMISSION

www.puc.state.tx.us/electric/projects/25309/25309.cfm

This link provides a source of information for the Energy Efficiency Grant Program. This includes the Program Application and Guidelines as well as a list of eligible counties and utilities.

D. REBUILD AMERICA

www.rebuild.org

Rebuild America is a program under the Office of Energy Efficiency and Renewable Energy that focuses on energy efficiency solutions as community solutions. The site provides community partnerships ideas, tools, resources, and energy-smart technologies for help in fulfilling locally designed efficient energy solutions. Categories included are building renovation, new construction, renewable technologies, green building, city lighting, alternatively fueled vehicles, downtown revitalization, and more.

E. STATE ENERGY CONSERVATION OFFICE

<http://www.seco.cpa.state.tx.us>

The Texas State Energy Conservation Office provides information about various programs that are offered and how they may be implemented. SECO's programs focus on energy cost and consumption at the institutional, industrial, transportation, and residential levels.

F. TEXAS GENERAL LAND OFFICE

www.glo.state.tx.us

The primary mission of the General Land Office (GLO) is the management of state lands and mineral right properties. GLO manages an oil and natural gas program and a state electric power program. These programs provide gas and electricity to state agencies and public school districts at a discounted cost. The proceeds from the programs help to fund the state's Permanent School Fund.

APPENDIX F SERVICE AGREEMENT



Local Governments and Municipalities

Preliminary Energy Assessment Service Agreement

Investing in our communities through improved energy efficiency in public buildings is a win-win opportunity for our communities and the state. Energy-efficient buildings reduce energy costs, increase available capital, spur economic growth, and improve working and living environments. The Preliminary Energy Assessment Service provides a viable strategy to achieve these goals.

Description of the Service

The State Energy Conservation Office (SECO) will analyze electric, gas and other utility data and work with TARRANT REGIONAL WATER DISTRICT hereinafter referred to as Partner, to identify energy cost-savings potential. To achieve this potential, SECO and Partner have agreed to work together to complete an energy assessment of mutually selected facilities.

SECO agrees to provide this service at no cost to the Partner with the understanding that the Partner is ready and willing to consider implementing the energy savings recommendations.

Principles of the Agreement

Specific responsibilities of the Partner and SECO in this agreement are listed below.

- ✓ Partner will select a contact person to work with SECO and its designated contractor to establish an Energy Policy and set realistic energy efficiency goals.
- ✓ SECO's contractor will go on site to provide walk through assessments of selected facilities. SECO will provide a report which identifies no cost/low cost recommendations, Capital Retrofit Projects, and potential sources of funding. Portions of this report may be posted on the SECO website.
- ✓ Partner will schedule a time for SECO's contractor to make a presentation of the assessment findings key decision makers.

Acceptance of Agreement

This agreement should be signed by your organization's chief executive officer or other upper management staff.

Signature: David H Marshall
 Name (Mr./Ms./Dr.): DAVID H. MARSHALL
 Organization: TARRANT Regional Water District
 Street Address: 800 E. NORTHVIEW DR
 Mailing Address: P.O. Box 4508
FORT WORTH, TX 76164

Date: 4/8/09
 Title: DIRECTOR OF ENGINEERING SERVICES
 Phone: 817-335-2491
 Fax: 817-625-9112
 E-Mail: DAVID.MARSHALL@TRWD.COM
 County: TARRANT

Contact Information:

Name (Mr./Ms./Dr.): Laura Blaylock
 Phone: 817-335-2491
 E-Mail: LAURA.BLAYLOCK@TRWD.COM

Title: Hydrologist
 Fax: 817-625-9112
 County: TARRANT

Please sign and mail or fax to: Theresa Sifuentes, Local Governments and Municipalities Program Administrator, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774. Phone: 512-463-1896. Fax 512-475-2569.

S/13/10 SRV
4/8/09
Jacob