



Energy Audit Report

Golden Urban Renewal Authority (GURA)

Golden, Colorado

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Table of Contents

- Executive Summary 2
- Site Information 2
 - Gateway Station Parking Garage 2
 - Clear Creek Parking Garage 2
 - Restrooms 3
- Existing Mechanical Summary 3
 - Gateway Station Parking Garage 3
 - Clear Creek Parking Garage 3
 - Restrooms 3
- Existing Lighting Summary 4
 - Gateway Station Parking Garage 4
 - Clear Creek Parking Garage 4
 - Restrooms 4
- Existing Energy Consumption 5
 - Energy Benchmarking 5
 - Estimated Energy Savings and Simple Payback 5
 - ECM Bundles 5
- RFP Language Proposed 8
 - Gateway Station Parking Garage 8
 - Clear Creek Parking Garage 8
 - Restrooms 9
- Appendices: 10
 - Appendix 1 ECM Calculations
 - Appendix 2 ECM Cost Sheets
 - Appendix 3 Thermal Images of Restroom

Executive Summary

Ambient Energy was commissioned to write request for proposal (RFP) language for Golden Urban Renewal Authority (GURA)'s restroom and parking garage properties. The RFP language is based on energy conservation measures (ECMs) that are recommended to bring the energy consumption of Gateway Station Parking Garage, Clear Creek Parking Garage and a restroom down to minimize energy costs. To evaluate the efficiency of the buildings, a site visit and energy audit (similar to an ASHRAE Level 1 audit) were performed on all three buildings. Past utility bills were utilized to assess the energy use for the GURA sites. The systems were investigated and ECMs developed to offer strategies to reduce energy consumption. First costs were estimated for each ECM and a payback period was determined for each one. RFP language was then written around all the ECMs and is included in this report. It is recommended that GURA select which ECMs to utilize based on the financial criteria they deem is appropriate for GURA. Then they can use the RFP language in this report to issue an RFP for the selected ECMs.

The two parking garages both have identical lighting systems and controls. High pressure sodium lamps utilized for covered parking are on year round, 24 hours a day, while the uncovered parking is controlled by photo sensors. The majority of the energy use associated with the two garages is related to the lighting and lighting controls. The Gateway Station Garage has a small mechanical ventilation load that also contributes to energy use. The two control strategies that were identified for reduction of energy in both garages include taking advantage of natural daylight and infrequent occupancy by utilizing photo sensors and occupancy sensors. This allows the garage lights to be turned off unless required.

Similar to the parking garage lighting, the restroom lights are on continuously when the restroom is open. The restroom building has similar lighting control ECMs in addition to envelope improvement ECMs. Infrared thermal imaging was used to detect building air leakage.

The majority of the ECMs for the GURA sites are based around lighting and lighting controls. By operating the sites with lights that turn off when not in use or where ample daylight exists and providing more efficient lights, the buildings EUIs will be reduced, which in turn will reduce the cost of operating the buildings. Additional non-lighting related ECMs included improving the restroom envelope, reducing the T-stat setpoints and improving the water efficiency of the existing lavatory sinks.

Site Information

Gateway Station Parking Garage

1250 Gateway Station (Fig 1.) is 96,096 square feet (SF) parking garage and is located at 1250 Jackson Street in Golden, Colorado. The public parking garage offers free parking 24 hours a day seven days a week and is open year around. The garage was built in 2008 as part of a block renovation project.

Clear Creek Parking Garage

Clear Creek parking garage (Fig 2) is 100,996 SF and is located at 702 12th street in Golden, Colorado. Like the Gateway Station Garage, it too is a public parking garage that offers free parking 24 hours a day 7 days a week and is open year around.



Fig 1: Entry to the Gateway Station Garage Fig 2: Backside of Clear Creek Garage

Restrooms

The restroom is 587 SF and is located next to the Astor House Museum on 12th Street and is available to the public between 9am and 10pm. It includes a male and a female restroom with one stall in the male restroom and two in the female, and a drinking fountain on the exterior. This facility is open year round and offers visitors and residence of Golden a free restroom that is located close to the historic downtown.

Existing Mechanical Summary

Gateway Station Parking Garage

The existing mechanical systems for the Gateway Station Parking Garage consist of an Elevator exhaust fan, and two garage exhaust systems controlled by Carbon Monoxide sensors (Fig.4) During non alarmed conditions the smaller of the parking garage exhaust fans runs continuously, providing adequate ventilation for the enclosed basement area of the parking garage. Per International Mechanical Code 2006 (IMC 2006) the required ventilation rate is 0.05 cubic feet per minute per square foot (cfm/SF). If the carbon monoxide sensor goes into alarm state the large exhaust fan (Fig. 3) is energized to flush the carbon monoxide from the space. The larger exhaust fan is required by code to exhaust the space at a rate of not less than 1.5 cfm/sf of enclosed garage space. These fans are appropriately sized based on the IMC 2006. There are also two electric unit heaters present in the fire valve and the elevator mechanical room to prevent the pipes from freezing during the winter months. The unit heaters are 3.3 kW heaters and are meant to maintain the room temperatures at 55 F. The other system that utilizes energy in the garage is the elevator.

Clear Creek Parking Garage

Mechanical Systems for the Clear Creek Garage are composed of unit heaters in the fire valve room to prevent freezing. The unit heaters are 3.3 kW heaters and are meant to maintain the room temperatures at 55 F.

Restrooms

The restroom mechanical systems include two gas-fired radiant heaters one in each restroom with remote thermostats for each radiant heater located on each side of the plumbing chase entry. These thermostats are set between 45-50F. Both heaters provide enough heat to prevent freezing of the piping present in the plumbing chase. Ventilation is provided by a grille in the door and a register in the ceiling. This is a passive system and utilizes heat to provide circulation.



Fig. 3: Garage large exhaust fan



Fig. 4: Garage CO wall sensor

Existing Lighting Summary

Gateway Station Parking Garage

The Gateway Station Garage lighting consists of 150W high pressure sodium lamps. They run continuous and supply lighting from the basement level to the exit on to the roof. The roof is also provided with High pressure Sodium fixtures mounted on light poles that are controlled with on/off with photosensors. To access the levels of the garage, there are two stair wells that are lit with compact fluorescent lamps, 24 hrs a day seven days a week. The exterior parking spaces adjacent to the north wall of the garage are included in the Gateway Station property and are lit with two light posts that have been retrofitted to 38W LED Parking lamps and controlled with on/off with photosensors.

Clear Creek Parking Garage

The Clear Creek Parking Garage also utilizes high pressure sodium lights to provide lighting in the parking areas that operate 24/7 year around. The exterior of the building is decorated with 100W metal halide lamps, which are controlled by a photosensor that is mounted low on the wall of the parking garage, and adjacent to the adjoining business. The photosensor is blocked from tracking the sun when it has crested the garage, and turns the decorative fixtures on in the late afternoon. The stair wells provide lights with the same fixtures utilized to decorate the garage. These lights remain on 24 hours a day, year around.

Restrooms

The lighting in both the male and female restrooms consists of three T-8 dual lamp fixtures mounted along the wall above the plumbing fixtures. The lights are screened and out of site to the restroom occupants providing indirect lighting only. There is additional natural light introduced to the space through skylights during the daylight hours. Other lights include two compact fluorescent (CFL) lights; one in the entry, and the other in the plumbing chase. All of the lights except the restroom entrance lights are controlled with traditional light switches. The entry light is controlled by a photosensor.

Existing Energy Consumption

The existing energy consumption was compiled utilizing the last year of energy bills. The restroom is comprised of both gas and electrical use, while the two parking garages use only electricity. The energy use is represented as an Energy Usage Index in terms of kBtu/sf/yr, to compare energy on a square footage (SF) basis. See Table 1 for EUI and annual cost for the three buildings.

Table 1. Building Utility Performance

Building Utility Performance	Building Area	Energy Costs	Electricity	Electricity	Natural Gas	Natural Gas	Energy Cost Index	Energy Usage Intensity
	sf	\$/yr	kWh	Total \$	Therms	Total \$	\$/sf	kBtu/sf/yr
Gateway Station	96,097	11,849	137,160	137,160	0	0	0.12	4.87
Clear Creek Garage	100,996	10,065	126,920	126,920	0	0	0.10	4.29
Restroom	587	937	1,253	295	452	642	1.60	84.29

Energy Benchmarking

Energy benchmarking utilizes the energy use index (EUI) as a metric to compare other buildings of similar types to each other. This is a valuable tool to compare building energy usage. The building type restrooms were not available in ENERGY STAR so no comparable building was found. ENERGY STAR Target Finder was unable to provide comparison building information, so another source was utilized. When compared to 106 other parking garages in the Energy Information Administration (EIA), Commercial Buildings Energy Consumption and Expenditures document dated 1995, both GURA garages are below 75% of the parking garages surveyed. The EUI range for parking garages were 59 kBtu/sf/yr to 169 kBtu/sf/yr with an average of 125 kBtu/sf/yr.

Estimated Energy Savings and Simple Payback

The estimated energy saving and simple payback is to aid GURA in the choice of which ECMs are the best choices to implement. It should be noted that the simple pay back estimate does not include the life costs, or maintenance costs, and that the pricing is an estimate based on rules of thumb, RS means 2010 CostWorks online resources and price quotes supplied by GURA. Energy savings and simple payback for each ECM are included in Table 2.

ECM Bundles

The ECM bundles were derived to aid GURA in choosing lighting fixtures base on energy savings, cost savings and simple payback. The bundles were chosen around two options for garage lighting. Bundle 1 focuses on replacing the existing high pressure sodium lights with more efficient T-5 fluorescent light fixtures. Bundle 2 is similar to Bundle 1, except the replacement would be with LED fixtures instead of T-5 fixtures. By combining the ECMs into the bundles an interaction factor would be seen. A 75% interaction factor was applied to the lighting and day lighting control ECMs to estimate the savings in Table 3 and 4 below.

Table 2. Energy Savings and Simple Payback

Energy Savings and Simple Payback	
ECMs	Energy Savings (kBtu/YR)
Restroom	
Restroom: Add daylight control and occupancy sensor combo unit to Restroom lighting	2,985
Restroom: Caulk and seal exterior envelope,including new door seals.	2,260
Restroom: Change out T-8 32W lamps with 15W lamps	1,640
Restroom: Change out 2.2 GPM aerators with 0.5 GPM Aerators	NA
Restroom: Turn heater down to 40F	6,780
Clear Creek Garage	
Garage: Add daylight controls to parking garage lighting	97,766
Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures	119,352
Garage: Change High Pressure Sodium lighting to LED garage lights, including roof fixtures	92,085
Garage: Relocate photosensor for garage decorative fixtures to an elevated position	19,359
Garage: Change out decorative and Stairwell fixtures on garage exterior to LED lamps	32,962
Gateway Station Garage	
Garage: Add daylight controls to parking garage lighting	143,884
Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures	173,607
Garage: Change High Pressure Sodium lighting to LED garage lights, including roof and side	127,265

Table 3. Bundle 1

Bundle 1		
ECMs	Energy Savings (kBtu/YR)	Energy Savings Cost
Restroom		
Restroom: Add daylight control and occupancy sensor combo unit to Restroom	2,239	\$157
Restroom: Caulk and seal exterior envelope,including new door seals.	2,260	\$27
Restroom: Change out T-8 32W lamps with 15W lamps	1,230	\$86
Restroom: Change out 2.2 GPM aerators with 0.5 GPM Aerators	NA	\$11
Restroom: Turn heater down to 40F	6,780	\$81
Clear Creek Garage		
Garage: Add daylight controls to parking garage lighting	73,325	\$1,719
Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures	89,514	\$2,098
Garage: Relocate photosensor for garage decorative fixtures to an elevated position	19,359	\$454
Gateway Station Garage		
Garage: Add daylight controls to parking garage lighting	107,913	\$2,529
Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures	130,205	\$3,052
Total	432,824	\$10,215

Table 4. Bundle 2

Bundle 2		
ECMs	Energy Savings (kBtu/YR)	Energy Savings Cost
Restroom		
Restroom: Add daylight control and occupancy sensor combo unit to Restroom	2,239	\$157
Restroom: Caulk and seal exterior envelope,including new door seals.	2,260	\$27
Restroom: Change out T-8 32W lamps with 15W lamps	1,230	\$86
Restroom: Change out 2.2 GPM aerators with 0.5 GPM Aerators	NA	\$11
Restroom: Turn heater down to 40F	6,780	\$81
Clear Creek Garage		
Garage: Add daylight controls to parking garage lighting	73,325	\$1,719
Garage: Change High Pressure Sodium lighting to LED garage lights, including roof	69,064	\$1,619
Garage: Relocate photosensor for garage decorative fixtures to an elevated position	19,359	\$454
Garage: Change out decorative and Stairwell fixtures on garage exterior to LED	24,722	\$579
Gateway Station Garage		
Garage: Add daylight controls to parking garage lighting	107,913	\$2,529
Garage: Change High Pressure Sodium lighting to LED garage lights, including roof	95,449	\$2,237
Total	402,340	\$9,501

RFP Language Proposed

The RFP language describes what is needed to implement the ECMs that have been investigated. This will enable GURA to utilize the information after choosing the ECMs they want to implement. It is recommended the contractor includes a lighting designer for the lighting design and have a registered Electrical Professional Engineer stamp and sign the drawings. Contractors shall also provide submittals for all lighting being considered. The submittals shall include the power (Watts), efficacy (Lumens/Watt) Color Rendering Index (CRI) and the Color Temperature (in Kelvin).

Gateway Station Parking Garage

Add Daylight Controls

Contractor shall provide two photosensors on both the east and west exposures (4 in total per level) for each level of the garage. The photosensors shall be placed near the exposure openings, but not in the path of direct sunlight and shall not be mounted with direct artificial light exposure. The photosensors shall be interlocked with the lights serving the zone they are controlling and shall dim the lights to provide 2 foot candles at 30" above the floor. Note the enclosed basement will not require daylight controls.

Change High Pressure Sodium Lights to T-5 Fluorescent Fixtures

Contractor shall provide dual lamp (28W), T-5 fluorescent fixtures rated to operate down to -15F. The fixtures shall be replace the existing high pressure sodium fixtures, and utilize the existing junction boxes and conduit. The contractor shall verify prior to bid the extent of new wire and breakers needed for the task. The new T-5 fixtures shall be vandal resistant and provided with dimmable ballasts. The contractor shall be responsible for securing and anchoring the fixtures to ensure the fixture do not fall from the ceiling.

Change High Pressure Sodium Lights to LED Garage Lights

Contractor shall provide (80W) LED garage fixtures rated to operate down to -15F. The fixtures shall replace the existing high pressure sodium fixtures, and utilize the existing junction boxes and conduit. The contractor shall verify prior to bid the extent of new wire and breakers needed for the task. The LED garage shall be vandal resistant. The contractor shall be responsible for securing and anchoring the fixtures to ensure the fixture do not fall from the ceiling.

Clear Creek Parking Garage

Add Daylight Controls

Contractor shall provide two photosensors on both the east and west exposures (4 in total per level) for each level of the garage. The photosensors shall be placed near the exposure openings, but not in the path of direct sunlight and shall not be mounted with direct artificial light exposure. The photosensors shall be interlocked with the lights serving the zone they are controlling and shall dim the lights to provide 2 foot candles at 30" above the floor. Note the enclosed basement will not require daylight controls.

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Contacter Shall Relocate Existing Photosensor for the Decorative Fixtures to an Elevated Location

The contactor shall relocate the existing photosensor to the roof area, directly above its current location, south east corner in the stairwell. The photosensor shall not be mounted in direct sunlight but shall detect daylight from all directions.

Retrofit Decorative and Stairwell Fixtures on Garage Exterior to LED Lamps

Contractor shall provide new (30W) LED lighting fixtures to replace the current metal halide decorative fixtures present on the exterior or the building. This shall include replacement of the existing stairwell fixtures.

Restrooms

Add Daylight Control and Occupancy Sensor Combo Unit to Restroom Lighting

Contractor shall provide new occupancy and daylight control sensors and interlock them with the lighting circuits to provide stepped lighting for daylight control, and on/off control depending on occupancy. Note sensors shall be placed to minimize the risk of being vandalized yet optimize both daylighting and occupancy operations.

Caulk and Seal Exterior Envelope, Including New Door Seals

Contractor shall insulate and reapply caulk to all openings in the structure. This shall include replacing door seals on both restroom entrance doors. The door to the plumbing chase shall be refurbished or replaced with a new door.

Change out T-8 32W Lamps with 15W Lamps

Contractor shall replace existing lamps with new 15W, 5000k, T-8 lamps.

Change out 2.2 GPM Aerators with 0.5 GPM Aerators

Contractor shall replace existing aerators with two 0.5 gpm aerators for the restroom lavatory sinks.

Turn Heater Down to 40F

Contractor shall adjust the two remote mounted T-stats in the Plumbing Chase to a temperature of 40 F.

Appendices:

Appendix 1: ECM Calculations

Restroom: Add daylight control and occupancy sensor combo unit to Restroom lighting

Building Name	Restroom	
Location	Golden, Colorado	
Building Area	587	SF
Building Total Lighting Power	626	W
Daily Lighting Usage	13	Hours
Hours of operation est. after ECM	3	Hours
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	2,456	kWh/yr
Annual Consumption Savings	875	kWh/yr
Annual Cost Savings	209.92	\$

Restroom: Caulk and seal exterior envelope,including new door seals.

Building Name	Restroom	
Location	Golden, Colorado	
Building Area	587	SF
Building Total Gas Input	120,000	Btu/hr
Annual Energy Consumption	452	Therms/yr
Annual Consumption Savings	23	Therms/yr
Annual Cost Savings	27.12	\$

Restroom: Change out T-8 32W lamps with 15W lamps

Building Name	Restroom	
Location	Golden, Colorado	
Building Area	587	SF
Building Total Lighting Power	626	W
Daily Lighting Usage	13	Hours
Proposed Lighting Power	206	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	2,456	kWh/yr
Annual Consumption Savings	480	kWh/yr
Annual Cost Savings	115.31	\$

Restroom: Change out 2.2 GPM aerators with 0.5 GPM Aerators

Building Name	Restroom	
Location	Golden, Colorado	
Building Area	587.00	SF
Building Total faucets	2	#
Existing Aerator	2.2	gpm
Proposed Aerator	0.5	gpm
Assumed operation time	30	min/day
Days per Week	7	Days
Weeks per Year	52	Weeks
Diversity	10	%
Annual Water Consumption	4804.8	gallons/yr
Annual Consumption Savings	3712.8	gallons/yr
Annual Cost Savings	\$16.89	\$

Restroom: Turn heater down to 40F

Building Name	Restroom	
Location	Golden, Colorado	
Building Area	587.00	SF
Existing Heater setpt	50	F
Proposed Setpt	40	F
Annual Energy Consumption	452.0	Therms/yr
Annual Consumption Savings	67.8	Therms/yr
Annual Cost Savings	81.36	\$

Garage: Add daylight controls to parking garage lighting

Building Name	Clear Creek Parking Garage	
Location	Golden, Colorado	
Building Area	100,996	SF
Building Total Lighting Power	9,020	W
Daily Lighting Usage	24	Hours
Proposed Reduction	10	Hours
Days per Week	6	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	70,146	kWh/yr
Annual Consumption Savings	28,645	kWh/yr
Annual Cost Savings	2,291.62	\$

Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures

Building Name	Clear Creek Parking Garage	
Location	Golden, Colorado	
Building Area	100,996	SF
Building Total Lighting Power	9,020	W
Daily Lighting Usage	24	Hours
Proposed Lighting	6,455	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	70,146	kWh/yr
Annual Consumption Savings	26,149	kWh/yr
Annual Cost Savings	2,091.89	\$

Garage: Change High Pressure Sodium lighting to LED garage lights, including roof fixtures

Building Name	Clear Creek Parking Garage	
Location	Golden, Colorado	
Building Area	100,996	SF
Building Total Lighting Power	9,020	W
Daily Lighting Usage	24	Hours
Proposed Lighting	6,360	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	70,146	kWh/yr
Annual Consumption Savings	26,981	kWh/yr
Annual Cost Savings	2,158.46	\$

Garage: Relocate photosensor for garage decorative fixtures to an elevated position

Building Name	Clear Creek Parking Garage	
Location	Golden, Colorado	
Building Area	100,996	SF
Building Total Lighting Power	9,020	W
Daily Lighting Usage (Existing)	15	Hours
Daily Lighting Usage (Proposed)	12	Hours
Proposed Lighting	9,020	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	70,146	kWh/yr
Annual Consumption Savings	5,672	kWh/yr
Annual Cost Savings	453.77	\$

Garage: Change out decorative and Stairwell fixtures on garage exterior to LED lamps

Building Name	Clear Creek Parking Garage	
Location	Golden, Colorado	
Building Area	100,996	SF
Building Total Lighting Power	9,020	W
Daily Lighting Usage	24	Hours
Proposed Lighting	8,160	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	70,146	kWh/yr
Annual Consumption Savings	9,658	kWh/yr
Annual Cost Savings	772.63	\$

Garage: Add daylight controls to parking garage lighting

Building Name	Gateway Station Parking Garage	
Location	Golden, Colorado	
Building Area	96,097	SF
Building Total Lighting Power	13,044	W
Daily Lighting Usage	24	Hours
Proposed Reduction	10	Hours
Days per Week	6	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	105,505	kWh/yr
Annual Consumption Savings	42,158	kWh/yr
Annual Cost Savings	3,372.60	\$

Garage: Change High Pressure Sodium lighting to T-5 Fluorescent fixtures

Building Name	Gateway Station Parking Garage	
Location	Golden, Colorado	
Building Area	96,097	SF
Building Total Lighting Power	13,044	W
Daily Lighting Usage	24	Hours
Proposed Lighting	7,154	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	105,505	kWh/yr
Annual Consumption Savings	50,866	kWh/yr
Annual Cost Savings	4,069.31	\$

Garage: Change High Pressure Sodium lighting to LED garage lights, including roof and side lot fixtures

Building Name	Gateway Station Parking Garage	
Location	Golden, Colorado	
Building Area	96,097	SF
Building Total Lighting Power	13,044	W
Daily Lighting Usage	24	Hours
Proposed Lighting	8,704	W
Days per Week	7	Days
Weeks per Year	52	Weeks
Annual Energy Consumption	105,505	kWh/yr
Annual Consumption Savings	37,288	kWh/yr
Annual Cost Savings	2,983.07	\$

Appendix 2: ECM Cost Sheets

ECM: Clear Creek Garage Garage: Change High Pressure Sodium lighting to LED garage lights, including roof fixtures	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Lights (LED building, Previous Quote)	NA	0.4	58			\$32,103	\$32,103
Xcel Rebate			58			-\$2,900	-\$2,900
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$29,203
Profit							\$2,920
Travel Expense							\$0
Total Cost							\$32,123
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

ECM: Clear Creek Garage Garage: Relocate photosensor for garage decorative fixtures to an elevated position	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Relocate photosensor	NA	1	1	\$10	\$75		\$85
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
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							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$85
Profit							\$9
Travel Expense							\$0
Total Cost							\$94
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

ECM: Clear Creek Garage Garage: Change out decorative and Stairwell fixtures on garage exterior to LED lamps	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Lights (LED building, Previous Quote)	NA	0.8	32	\$5,120	\$1,920	\$0	\$7,040
Xcel Rebate			32			-\$704	-\$704
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$6,336
Profit							\$634
Travel Expense							\$0
Total Cost							\$6,970
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

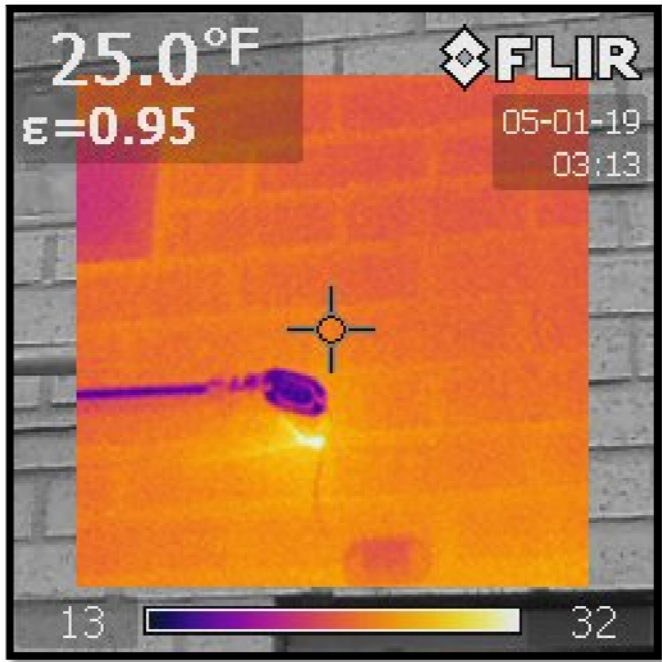
ECM: Gateway Station Garage: Add daylight controls to parking garage lighting	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Lights (Daylighting controls assuming 2 zones per exposure)	NA	2	12	\$6,900	\$7,500		\$14,400
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
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							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$14,400
Profit							\$1,440
Travel Expense							\$0
Total Cost							\$15,840
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

ECM: Gateway Station Garage: Change High Pressure Sodium lighting to T-5 fluorescent fixtures	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Lights (T-5 Garage Lamps)	NA	0.4	58	\$8,700	\$1,740		\$10,440
Xcel Rebate			58			-\$2,900	-\$2,900
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$7,540
Profit							\$754
Travel Expense							\$0
Total Cost							\$8,294
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

ECM: Gateway Station Garage: Change High Pressure Sodium lighting to LED garage lights, including roof fixtures	GURA Maint.		\$40	Contractor			\$75
	AMOUNT			COSTS			
Tasks	SF/ LF	HOURS/ UNIT	Qty	Mat	Labor	Mat/ Labor	Total
Lights (LED building, Previous Quote)	NA	0.4	58			\$34,844	\$34,844
Xcel Rebate			58			-\$2,900	-\$2,900
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
							\$0
Total							\$31,944
Profit							\$3,194
Travel Expense							\$0
Total Cost							\$35,138
Notes:							
1. All costs are derived from RS Means and Rule of thumb estimates. Pricing shall be utilized as an estimate only and actual cost shall be verified through bidding process							
2. SF = square foot, LF = Lineal foot							

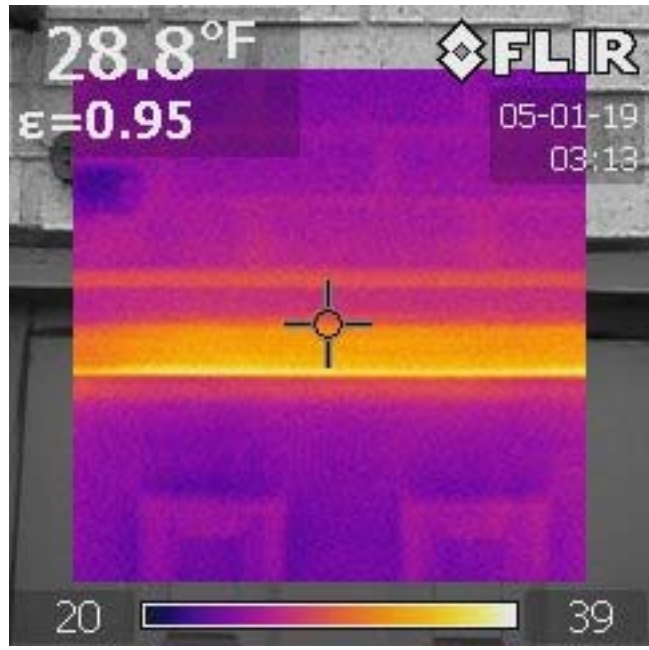
Appendix 3: Thermal Images of Restroom

Location:	Restrooms
Date Images taken:	3/7/2011
Outside Temperature:	Mid 20s



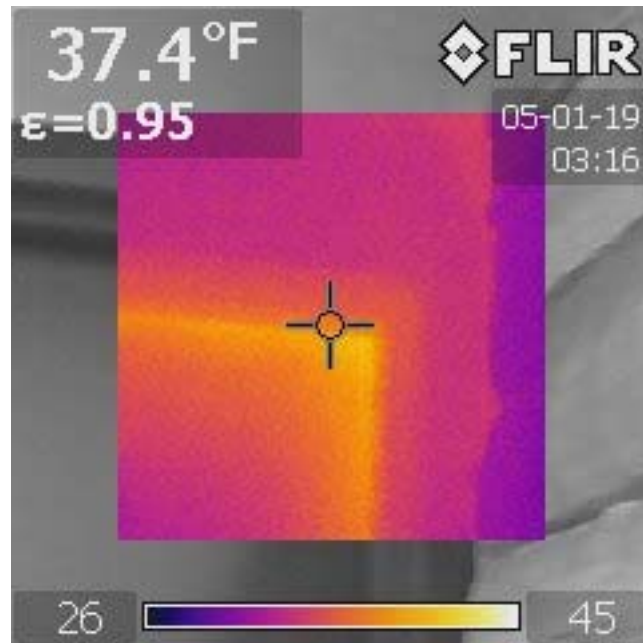
Location: The back wall of the women's side of the restroom, above the plumbing chase door.

Observation: This was an electrical penetration that was not sealed to the outside elements, and the heat loss is evident where the opening in the envelope occurs.



Location: The top side of the Plumbing Chase door.

Observation: The non insulated steel door frame offers an easy path for the heat to travel to the outside of the restrooms. This is a good example of thermal bridging.



Location: This image was taken outside the men's restroom door, at the top of the door.

Observations: The heat is migrating to the cold through the lack of a door seal.