

# **Attachment 5**



## CITY OF BEVERLY HILLS

ENERGY AUDIT REPORT

June 04, 2015



Mr. Chad Lynn  
Assistant Director of Public Works Services  
**City of Beverly Hills**  
345 Foothill Road  
Beverly Hills, CA 90210

Dear Mr. Lynn,

We would like to thank the City for selecting Climatec as the City's energy and environmental partner for this most important project. Climatec began discussions with the City Manager and staff about identifying significant opportunities for energy and water conservation and in April 2014, Climatec started the initial evaluations of the City's energy and water usage. In July 2014, Climatec initiated the detailed audit and completed it in December. In April 2015, Climatec's proposal was presented to City Council.

To date, Climatec has completed the preliminary assessment and the detailed audit, which includes an in-depth investigation of the City' energy using equipment and our recommendations for reducing utility consumption and improving efficiency.

The following detailed energy audit uncovered over \$2.9M in facility infrastructure needs that can be addressed now and with guaranteed savings and performance results.

Some of the key program upgrades or replacement measures that Climatec is recommending include:

- \* Interior & Exterior Lighting Fixtures
- \* Motion Sensor Detection Lighting Controls
- \* Battery Energy Storage Systems
- \* Police Department HVAC Controls
- \* Parking Garage CO Monitoring and Exhaust Fan Controls
- \* La Cienega Tennis Center HVAC Units
- \* Weather Based Smart Irrigation Controls
- \* High Flow Event Flow Sensor / Master Valve System

We sincerely appreciate the support and guidance we received from the City of Beverly Hills staff in the development of this report. Climatec looks forward to receiving final Council approval in July, so that we may begin the implementation of this important conservation project.

Best regards,

Frank Mann  
Senior Account Executive  
Climatec, LLC

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## 1.0 EXECUTIVE SUMMARY

The City of Beverly Hills' stated vision is to implement a guaranteed utility savings program that will significantly reduce annual utility and operating costs, improve comfort in the working environment, and reduce the City's water usage and carbon footprint. The audit is complete and the following is a summary of Climatec's findings.

### PROJECT AT A GLANCE

We are pleased to offer a guaranteed utility savings program that will achieve the following:

- \* Remedy over \$2.9M in facility and site improvement needs
- \* Reduce City water consumption by over 15%
- \* Significantly reduce the City's utility expenditures
- \* Provide staff with the necessary tools to increase efficiency
- \* Establish the City as a leader in environmental stewardship

In addition to annual utility savings of over 1.6 million kilowatt hours (kWh) and 9.6 million gallons of water, the recommendations will generate the following environmental equivalents each year:



Removing **233** cars off the road



Saving **126,544** gallons of gasoline



Preserving **33,356** trees from deforestation

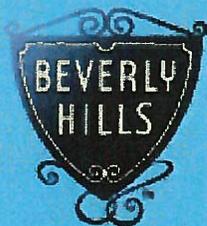


Powering **167** Beverly Hills homes



Providing drinking water for **49,779** people

The remainder of the Executive Summary is a description of Climatec, its methodology, and the financial highlights of the project.



# EXECUTIVE SUMMARY (CONT.)

## CLIMATEC BACKGROUND

Our mission is to change the way municipalities benefit from energy performance contracting. Climatec offers a flexible process to adapt to the City's needs and requirements. We do it right the first time, on-time, and truly own a project so that real savings are achieved on the City's actual utility bills rather than relying solely on a Measurement & Verification (M&V) report. We believe in transparency between what we do and what the customer sees which greatly differentiates Climatec from the industry's standard way of doing business.

Climatec has been in business for over 40 years and employs more than 750 building systems and energy management professionals. We are proud to have ongoing, multiyear business relationships with municipalities throughout California. With significant California-based resources, Climatec has delivered all of our projects on time and on budget. Our technical expertise and industry resources closely align with the recommended improvements the City has agreed upon, making Climatec the perfect energy partner for the City of Beverly Hills.

## THE VALUE PROVIDER

Climatec prides itself on being the value provider. We offer exclusive representation of 55 HVAC & BAS manufacturers, where we act as the wholesale distributor to end users and the contractor community. This translates into faster project implementation and increased savings. Moreover, Climatec is the Southwest's volume leader in mechanical equipment procurement and has extensive lighting experience, installing hundreds of thousands of lighting fixtures each year.

## SAVINGS TRACK RECORD

Climatec is a true pioneer in terms of measurement and verification (M&V) of utility savings. Our highly trained team of M&V specialists take a proactive approach to compile and monitor utility savings compared to a conventional Energy Services Company (ESCO). Climatec measures the utility savings by utilizing bill-to-bill utility analysis from the International Performance Measurement and Verification Protocol (IPMVP). Further continuous measurements are taken throughout the post-retrofit period.

Climatec projects are currently producing over \$250M in life cycle savings for the public sector. Over the last 12 months, Climatec has achieved 122% of our utility savings projections and has never had a utility savings shortfall. Additionally, our customers are drastically reducing CO<sub>2</sub> emissions, saving millions on utility bills, and raising the bar for environmental stewardship.

# 1.1 RECOMMENDED ENERGY CONSERVATION MEASURES

Based on the evaluation of the data collected, the table below illustrates the Phase I recommended energy conservation measures for each of the evaluated sites:

	STREET LIGHTING		SITE LIGHTING			BAS	HVAC		ADDITIONAL ECMs			
	Street Light Design and Engineering	Interior Lighting Upgrades	Exterior LED Lighting Upgrades	Fixture Mounted Occupancy Sensors	LED Parking Structure Upgrades		Install/ Expand Honeywell BAS	New High-Efficiency HVAC Units	CHW Tank Drain & Evaluate	Battery Storage System	Carbon Monitoring System	Weather Based Smart Irrigation Controls
<b>STREET LIGHTING</b>												
Street Lighting / LS-5	✓											
<b>FACILITIES</b>												
City Hall								✓				
Fire Dept. Headquarters		✓										
Fire Station #2		✓		✓								
Library I.T.												
Police Dept.		✓		✓					✓			
Public Works Facility		✓		✓					✓			
<b>PARKING STRUCTURES</b>												
Bedford Parking										✓		
Beverly Dr. North Parking			✓	✓	✓					✓		
Camden Parking			✓	✓	✓					✓		
Crescent North Parking			✓	✓	✓					✓		
Crescent South Parking			✓	✓	✓					✓		
Montage / Gardens Parking			✓	✓	✓					✓		
Santa Monica St. Parking			✓	✓	✓					✓		
Third St. Parking												
<b>PARKS/ MEDIANS</b>												
Antez Mini-Park												
Beverly Gardens Park/Santa Monica Medians			✓								✓	
Burton Way Medians											✓	
Coldwater Canyon Park			✓								✓	
Hansen Mini Park											✓	
La Cienega Park/ Tennis Center			✓								✓	
Maltz Mini-Park			✓								✓	
Oakhurst Mini-Park											✓	
Reeves Mini-Park											✓	
Roxford Mini-Park											✓	
Roxbury Park											✓	
Sunset Medians											✓	
Whittier Medians			✓								✓	
Will Rogers Park											✓	

## 1.2 PHASE I FINANCIAL HIGHLIGHTS

Total Infrastructure Improvements .....	\$2,982,463
First Year Savings .....	\$ 316,566
Five Year Savings.....	\$1,748,932
Ten Year Savings .....	\$3,632,346
Total Savings over Equipment Lifecycle.....	\$5,731,595

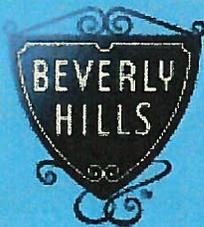
## 2.0 PROJECT OVERVIEW

For the purposes of this report, Climatec gathered utility billings, performed a baseline utility analysis, audited City heating, cooling, ventilation, pumping, irrigation, lighting and temperature control systems, prepared a summary of existing conditions, and developed our savings recommendations. The baseline utility analysis details electric, gas, and water meter data from February 2013-January 2014. Sources of data gathered during the reporting process included:

- \* Monthly electric utility billing data
- \* Public data relating to City sites
- \* Actual field inventory
- \* City staff interviews

Our audit team evaluated 40 sites as well as City-wide lighting systems (street lights, traffic signage, and park lighting) and domestic water well pumping sites. Included in this assessment are the following locations:

- Civic Center
- City Hall
- City Hall Annex
- Fire Dept. Headquarters
- Fire Station #1
- Fire Station #3
- Foothill Office Building
- Greystone Mansion
- Library
- Police Department
- Public Works Facility
- Roxbury Park Community Center
- 450 Parking
- Bedford Parking
- Beverly Dr North Parking
- Beverly Dr South Parking
- Camden Parking
- Civic Center Parking
- Crescent North Parking
- Crescent South Parking
- Montage / Gardens Parking
- Rodeo Parking
- Santa Monica 5 Parking
- Third St Parking
- Beverly Gardens Park
- Burton Way Median
- Coldwater Canyon Park
- La Cienega Park
- La Cienega Tennis Center
- Roxbury Park
- Santa Monica Median
- Sunset Median
- Whittier Median
- Will Rodgers Park
- Arnaz Mini Park
- Hamel Mini Park
- Maltz Mini Park
- Oakhurst Mini Park
- Reeves Mini Park
- Rexford Mini Park



# PROJECT OVERVIEW (CONT.)

## ELECTRIC SERVICE

The City receives its electric power from Southern California Edison (SCE). The Utility Analysis that follows shows that the City spends \$2.6 million annually on electrical service with SCE. The largest amount of the electric budget goes to the facilities at the Civic Center, which account for about 25% (\$674k) of the overall annual electricity consumption. The facilities include the City Hall, Fire Department, Library and Police Department. The electrical usage at these sites is mostly from facility lighting, HVAC equipment and process / plug loads. As with most cities, a large amount of the electric budget is for street lighting, which accounts for about 19% (\$483k) of the overall annual electricity. Of this total, \$116k is spent for SCE owned street lights (LS-1) and \$367k is spent for City owned street lights (LS-2 & LS-3). Average cost per unit of electricity (\$/kWh) for the City owned street lights is \$0.08/kWh while the SCE-owned street lights average is significantly higher at \$0.37/kWh. The SCE owned lights include maintenance and capital recovery costs in this rate where the rate for City-owned lights does not. Another large electricity user is the City parking structures, accounting for about 24% (\$613k) of the overall annual spending on electricity. The majority of electrical usage at these sites is from the existing lighting and exhaust systems.

## NATURAL GAS SERVICE

The City receives its natural gas from Southern California Gas Company (SoCal Gas). The Utility Analysis that follows shows that the City spends approximately \$60k annually on natural gas service with SoCal Gas. The largest amount of natural gas budget goes to the facilities at the Civic Center, which account for about 38% (\$23k) of the overall annual usage. The facilities include the City Hall, Fire Department, Library and Police Department. The gas usage at these sites is mostly space heating, either through a gas fired boiler and heating hot water system or a packaged gas/electric system. The average cost per unit of natural gas (\$/therm) is \$0.83/therm.

## WATER SERVICE

The City provides its own water service. The Utility Analysis that follows shows that the City uses more than 89 million gallons (or 119k CCF) of water annually, which equates to approximately \$800k in annual water usage. The majority of water consumed is for irrigation at the parks. The average cost per unit of water (\$/CCF) is \$6.68/CCF.

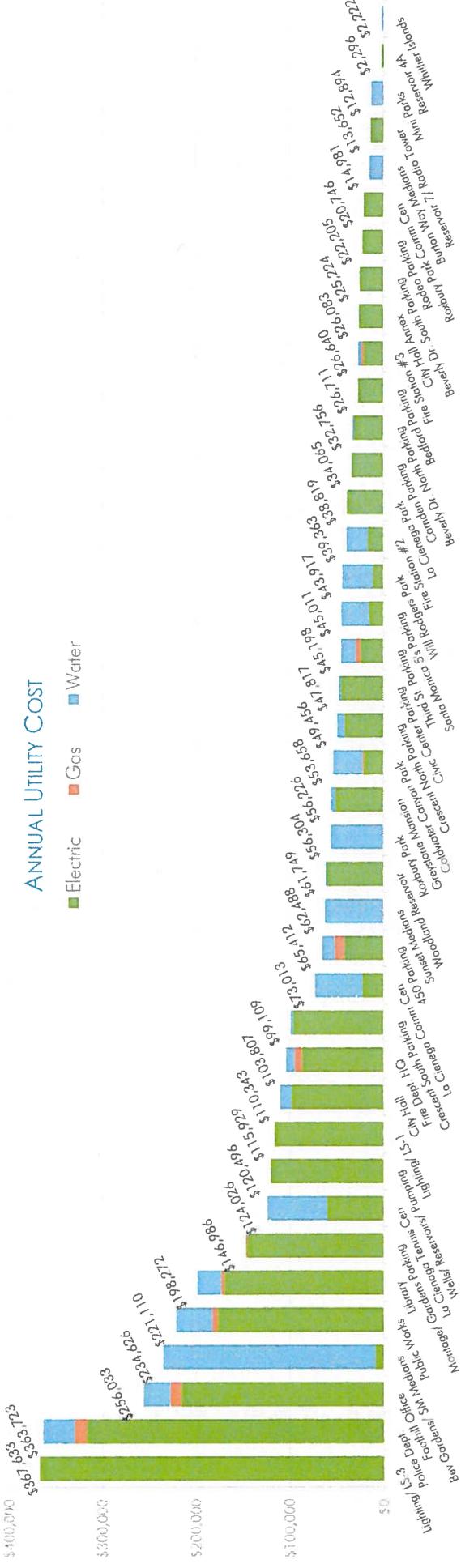
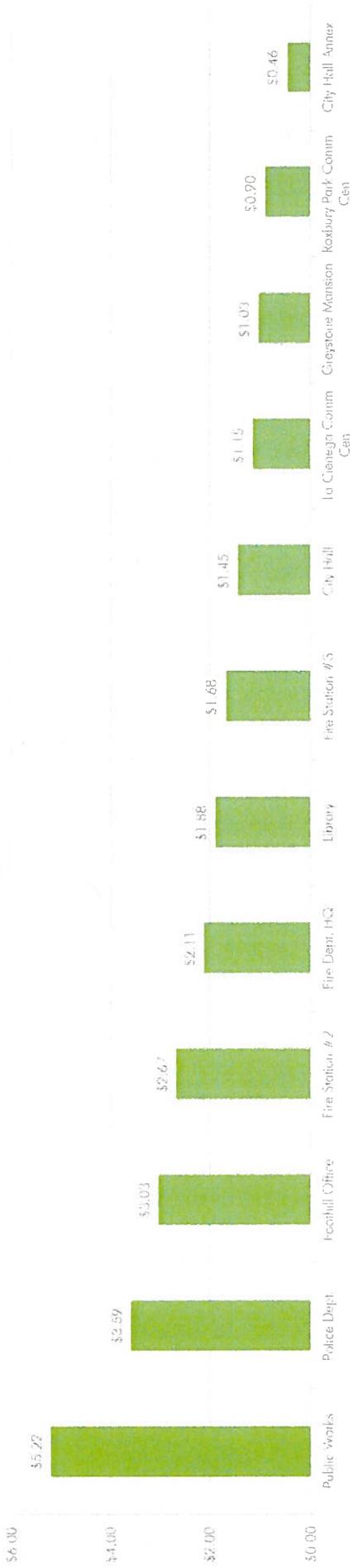
Due to the ongoing state-wide drought, our governor recently issued an executive order requiring urban areas to reduce their water use by 25% and the City of Beverly Hills by 35%. This unfortunate situation has placed a high priority on water conservation strategies and technology in this report.

## 2.1 UTILITY ANALYSIS

Site Name	Square Footage	Dollars Electric	kWh	Dollars Gas	Therms	Dollars Water	CCF	Dollars All Utilities	\$/Sq Ft Elec/ Gas
Lighting/ LS-1	-	\$115,929	308,181	-	-	-	-	\$115,929	-
Lighting/ LS-3	-	\$367,633	4,707,743	-	-	-	-	\$367,633	-
City Hall	68,000	\$98,435	811,145	-	-	\$11,908	1,335	\$110,343	\$1.45
City Hall Annex	56,700	\$26,083	200,235	-	-	-	-	\$26,083	\$0.46
Fire Dept. HQ	45,000	\$87,335	671,088	\$7,572	9,191	\$8,900	949	\$103,807	\$2.11
Fire Station #2	6,300	\$16,832	126,509	-	-	\$22,531	3,291	\$39,363	\$2.67
Fire Station #3	14,000	\$21,504	140,910	\$1,998	1,874	\$3,138	446	\$26,640	\$1.68
Foothill Office	75,000	\$216,352	1,454,937	\$11,253	14,259	\$28,427	4,193	\$256,033	\$3.03
Greystone Mansion	50,000	\$51,439	270,019	-	-	\$4,787	124	\$56,226	\$1.03
La Cienega Comm Cen	19,400	\$22,349	134,285	-	-	\$50,663	8,013	\$73,013	\$1.15
Library	92,000	\$170,362	1,450,569	\$2,883	3,218	\$25,027	3,515	\$198,272	\$1.88
Police Dept.	92,000	\$317,784	2,465,282	\$12,642	16,285	\$33,296	4,888	\$363,723	\$3.59
Public Works	35,000	\$177,104	1,306,161	\$5,624	6,635	\$38,381	5,734	\$221,110	\$5.22
Roxbury Park Comm Cen	23,000	\$20,746	80,867	-	-	-	-	\$20,746	\$0.90
450 Parking	-	\$42,316	368,452	\$9,944	12,637	\$13,152	2,072	\$65,412	-
Bedford Parking	-	\$26,711	187,713	-	-	-	-	\$26,711	-
Beverly Dr. North Parking	-	\$31,682	242,520	-	-	\$1,075	104	\$32,756	-
Beverly Dr. South Parking	-	\$25,224	172,182	-	-	-	-	\$25,224	-
Camden Parking	-	\$34,065	225,747	-	-	-	-	\$34,065	-
Civic Center Parking	-	\$45,720	396,382	-	-	\$2,097	104	\$47,817	-
Crescent North Parking	-	\$41,758	332,310	-	-	\$7,698	675	\$49,456	-
Crescent South Parking	-	\$96,373	860,282	-	-	\$2,736	342	\$99,109	-
La Cienega Tennis Cen	-	\$60,985	327,404	-	-	\$63,041	10,031	\$124,026	-
Montage/ Gardens Parking	-	\$145,700	1,132,925	\$1,286	1,135	-	-	\$146,986	-
Rodeo Parking	-	\$22,205	143,104	-	-	-	-	\$22,205	-
Santa Monica 5s Parking	-	\$15,554	96,886	-	-	\$29,457	4,437	\$45,011	-
Third St. Parking	-	\$24,963	197,646	\$4,578	5,222	\$15,657	1,428	\$45,198	-
Beverly Gardens/ Santa Monica Medians	-	\$9,093	56,181	-	-	\$225,533	35,051	\$234,626	-
Coldwater Canyon Park	-	\$20,750	133,263	\$1,544	1,402	\$31,363	4,984	\$53,658	-
La Cienega Park	-	\$38,819	105,793	-	-	-	-	\$38,819	-
Mini Parks	-	\$642	2,298	-	-	\$12,252	1,718	\$12,894	-
Will Rodgers Park	-	\$11,248	73,520	-	-	\$32,670	5,158	\$43,917	-
Wells/ Reservoirs/ Pumping	-	\$120,496	987,515	-	-	-	-	\$120,496	-
Woodland Reservoir	-	\$60,848	497,506	-	-	\$901	-	\$61,749	-
Reservoir 7/ Radio Tower	-	\$13,652	97,237	-	-	-	-	\$13,652	-
Reservoir 4A	-	\$2,296	13,234	-	-	-	-	\$2,296	-
Sunset Medians	-	-	-	-	-	\$62,488	9,773	\$62,488	-
Burton Way Medians	-	-	-	-	-	\$14,981	2,376	\$14,981	-
Roxbury Park	-	-	-	-	-	\$56,304	8,823	\$56,304	-
Whittier Islands	-	-	-	-	-	\$2,222	240	\$2,222	-
<b>Totals</b>	<b>576,400</b>	<b>\$2,600,987</b>	<b>20,778,031</b>	<b>\$59,325</b>	<b>71,858</b>	<b>\$800,687</b>	<b>119,803</b>	<b>\$3,460,999</b>	<b>\$4.62</b>

# UTILITY ANALYSIS (CONT.)

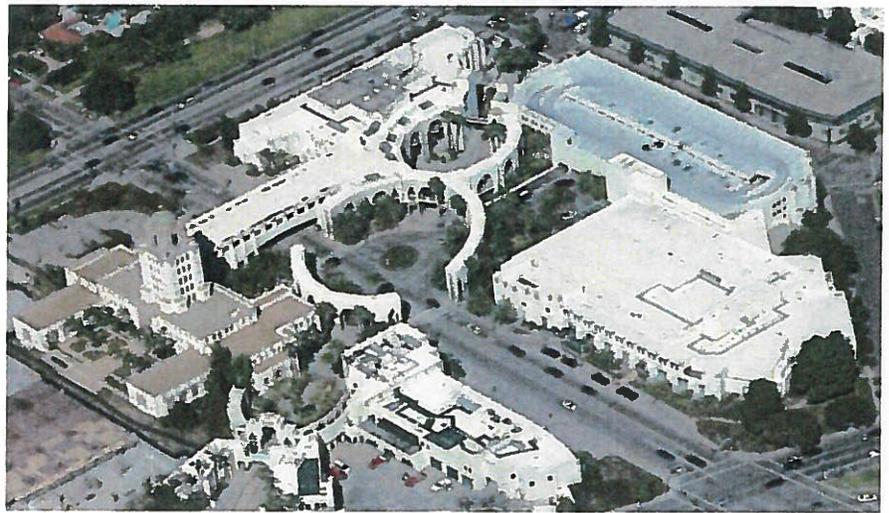
## FACILITIES GAS & ELECTRIC \$/ SQ. FT.



## 2.2 SITE OVERVIEW

### CITY OF BEVERLY HILLS CIVIC CENTER

- 297,000 Sq. Ft.
- 5,398,084 kWh
- 28,694 Therms
- 10,687 CCF Water
- \$776,145 Utility Cost
- \$2.61/Sq. Ft.



#### EXISTING CONDITIONS

The Beverly Hills Civic Center includes the City Hall, Fire Department, Library and Police Department. The building envelopes primarily consist of concrete and metal framed construction with a stucco façade and a built-up roof with a membrane surface. The building envelope is in fair condition. A solar photovoltaic (PV) system was installed on the rooftops in 2011.

Heating, ventilation and air conditioning (HVAC) is provided primarily by a central plant, air handling units (AHUs), fan coils (FCs) and select areas with unitary packaged / split system air conditioning units. The central plant includes (2) chillers, (3) cooling towers and multiple pumps with associated variable speed drives. The chillers have compressors with magnetic bearings and a variable speed permanent magnet motor, providing a highly efficient system. The chillers are controlled to run and fill a chilled water (CHW) storage tank during off peak hours when electricity is the least expensive (nighttime). During occupied hours when electricity is more expensive, the stored CHW is used to cool the buildings without needing to run the chillers, resulting in financial savings. During days with peak loads, it is possible to require using both the CHW from the storage tank and to run the chillers to meet building loads. The CHW storage tank is in poor condition and is currently leaking. The cooling towers are located on the Police Department rooftop. The existing cooling towers are open circuit, counter-flow with forced draft centrifugal fans. The cooling towers are in poor condition and use excessive energy. The City is currently in the process of replacing the existing towers with a more energy efficient solution. Heating is primarily provided by multiple natural gas hot water boilers located at each facility. The chilled water and hot water are supplied to multiple AHUs and FCs throughout the facilities to provide conditioned air to the occupied spaces. The associated pumps and AHUs are equipped with variable speed drives for better control and energy saving strategies.

## CIVIC CENTER (CONT.)

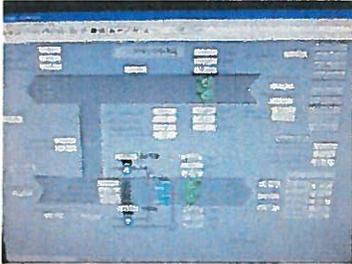
### EXISTING CONDITIONS (CONT.)

HVAC control is provided primarily by a Honeywell SymmetrE Building Automation System (BAS). The system includes scheduling and set point control as well as multiple energy saving sequence of operations. The front end computer for the BAS is located in the maintenance office by the central plant. The Police Station has areas on the first and third floor that are currently using pneumatic systems for HVAC control. The pneumatic system is in poor condition.

Interior lighting consists primarily of standard efficiency 32-watt T8 fluorescent lighting systems along with select compact fluorescent fixtures. The Library has recently retrofitted high efficiency LED lighting systems in select high ceiling fixtures. Interior lighting in most spaces is controlled by manual wall switch and some areas are controlled by occupancy sensors. The exterior lighting consists of building and/or pole mounted high intensity discharge (HID) systems. Exterior lighting is controlled by photocells and/or time clocks.

## CIVIC CENTER (CONT.)

### ECM RECOMMENDATIONS



The existing pneumatic controls were identified as an energy efficiency opportunity to replace with a BAS.

#### Controls

- \* Expand the existing Honeywell Building Automation System (BAS) to the areas in the Police Station that are currently using pneumatic systems for HVAC control. The pneumatic control system is outdated and in poor condition. In addition, pneumatic controls require the additional energy of a compressed air system, require frequent maintenance, and have limited control capabilities. Installation of a new open protocol, non-proprietary, networked BAS will provide increased temperature control and scheduling capabilities, allowing for different indoor temperature set points during occupied and unoccupied periods. In addition, the new BAS will reduce the required maintenance, provide future flexibility/capabilities, and display related HVAC information on the existing front end.



The existing CHW tank was identified as an energy efficiency opportunity to repair the leak. Detailed evaluation of the leak is required to determine possible solutions.

#### Mechanical

- \* Drain and evaluate the existing chilled water (CHW) storage tank. The CHW storage tank is in poor condition and leaks between an estimated 500 - 700 gallons of chilled water a day. Not only is the water wasted, but the energy spent to cool the water is also wasted. Due to the inability to determine the cause of the leak, the tank must be drained and the source of the leak must be identified prior to any recommendations on possible solutions. After the tank is drained and evaluated, a report summarizing the findings will be presented to the City to determine the next course of action.

#### Lighting

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems. LED lighting systems provide exceptional light quality, long life and instant start capability. This ECM applies to the Police Department and areas of the Fire Department where operating hours are long enough to create an economically feasible project. Refer to the lighting inventory for equipment specifications and locations.
- \* Retrofit existing interior HID lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Interior HID lighting systems were found in areas of the Police Department. Refer to the lighting inventory for specific locations and applications.

## CIVIC CENTER (CONT.)

### ECM RECOMMENDATIONS (CONT.)



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Install fixture mounted occupancy sensors on appropriate exterior building and/or pole mounted lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

### Miscellaneous



Installing an electric battery storage system was identified as an opportunity to save on electric demand rates.

- \* Install an electric battery storage system capable of providing electrical power storage for peak demand reduction and off-peak charging to maximize utility bill savings. The battery storage system will be installed at the Library and Police Department. Scope includes installation of a ground mounted battery bank(s) and control system, connection to existing electrical infrastructure, all necessary equipment pads, security fencing (if required), and testing of equipment and controls.

## FIRE STATION #2

- 6,300 Sq. Ft.
- 126,509 kWh
- 3,291 CCF Water
- \$39,363 Utility Cost
- \$2.67/Sq. Ft.



### EXISTING CONDITIONS

The building envelope primarily consists of CMU construction with a block façade and a built-up roof with a standing metal seam surface. The building envelope is in fair condition.

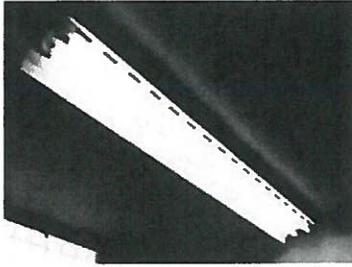
Heating, ventilation and air conditioning (HVAC) is provided primarily by a rooftop package unit, window units and space heaters. The rooftop package unit has been recently replaced and is in excellent condition and the other equipment is in fair condition. HVAC control is provided primarily by a programmable thermostat.

Interior lighting consists primarily of standard efficiency 32-watt T8 fluorescent lighting systems and select areas with low efficiency 59-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and some areas are controlled by occupancy sensors. The exterior lighting consists of building and/or pole mounted high intensity discharge (HID) systems. Exterior lighting is controlled by photocells and/or time clocks.

## FIRE STATION #2 (CONT.)

### ECM RECOMMENDATIONS

#### Lighting

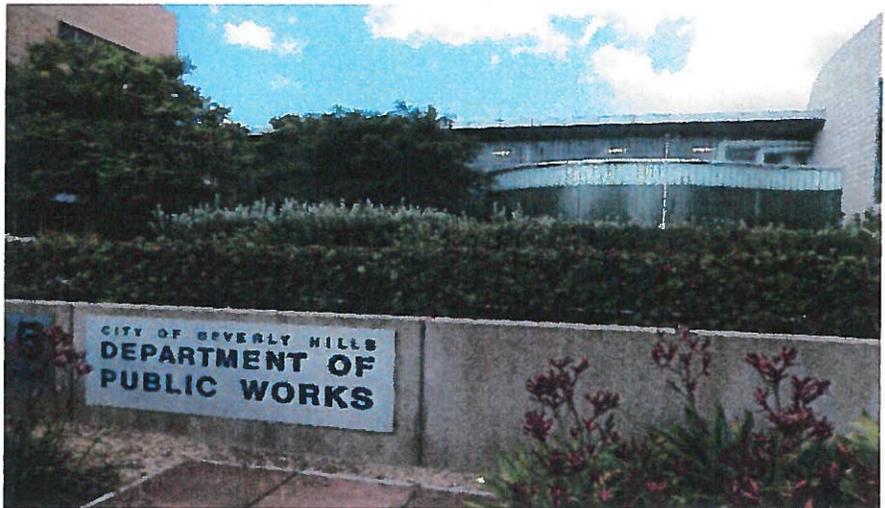


The existing interior T8 fluorescent lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems. LED lighting systems provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for equipment specifications and locations.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Install fixture mounted occupancy sensors on appropriate exterior building and/or pole mounted lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## PUBLIC WORKS FACILITY

- 35,000 Sq. Ft.
- 1,306,161 kWh
- 6,635 Therms
- 5,734 CCF Water
- \$221,110 Utility Cost
- \$5.22/Sq. Ft.



### EXISTING CONDITIONS

The facility was constructed in 2003. The building envelopes primarily consist of concrete and metal framed construction with a stucco façade and a built-up roof with a membrane surface. The building envelope is in good condition.

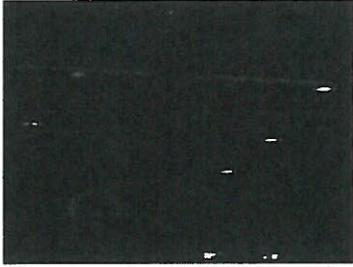
Heating, ventilation and air conditioning (HVAC) is provided primarily by (2) rooftop package variable air volume (VAV) units and (8) fan coil units. Chilled water (CHW) and heating hot water (HHW) are supplied from (2) air cooled chillers and (1) natural gas boiler. HVAC equipment is in fair to good condition. HVAC controls are primarily provided by a building automation system (BAS).

Interior lighting consists primarily of standard efficiency 32-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by occupancy sensors and some areas by manual wall switches. High bay areas inside the vehicle building have high intensity discharge (HID) lighting systems. The exterior lighting consists of building and/or pole mounted HID lighting systems. Exterior lighting is controlled by photocells and/or time clocks.

# PUBLIC WORKS FACILITY (CONT.)

## ECM RECOMMENDATIONS

### Lighting



The existing interior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- \* Retrofit existing interior HID lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Interior HID lighting systems were found in areas of the Police Department. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.

### Miscellaneous

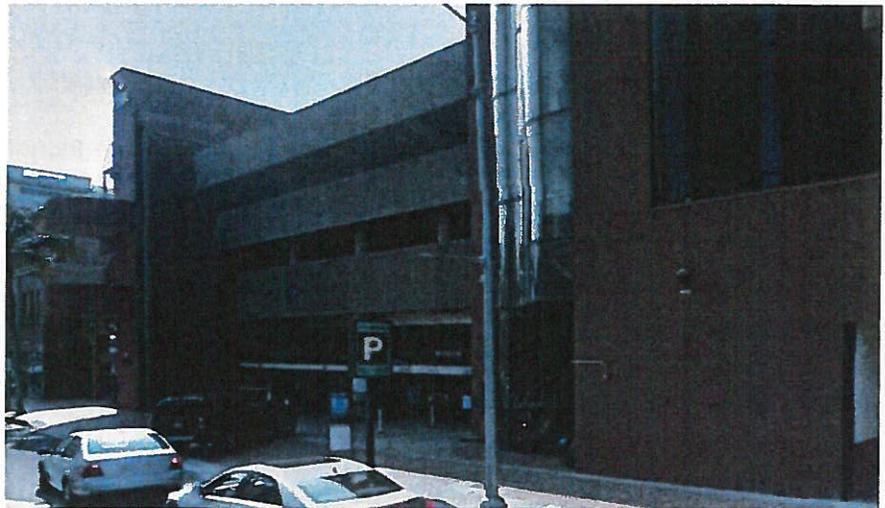


Installing an electric battery storage system was identified as an opportunity to save on electric demand rates.

- \* Install an electric battery storage system capable of providing electrical power storage for peak demand reduction and off-peak charging to maximize utility bill savings. Scope includes installation of a ground mounted battery bank(s) and control system, connection to existing electrical infrastructure, all necessary equipment pads, security fencing (if required), and testing of equipment and controls.

## BEDFORD PARKING

- 205,000 Sq. Ft.
- 187,713 kWh
- \$26,711 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 205,000 sqft with a height clearance of about 6'5". Hours of operation are Monday through Wednesday 6am to 10pm and Thursday through Saturday 6am to 12am.

Garage ventilation is provided by (4) variable volume exhaust fans with a total power of 85 hp. The ventilation system is currently controlled by an existing carbon monoxide (CO) system that was intended to run the exhaust fans only when required. The equipment is in fair condition, however, the CO control system is outdated and no longer running as originally intended, resulting in excess energy consumption.

Interior and exterior lighting systems have recently been upgraded to high efficiency light emitting diode (LED) fixtures, which are in excellent condition.

## BEDFORD PARKING (CONT.)

### ECM RECOMMENDATIONS

#### Controls

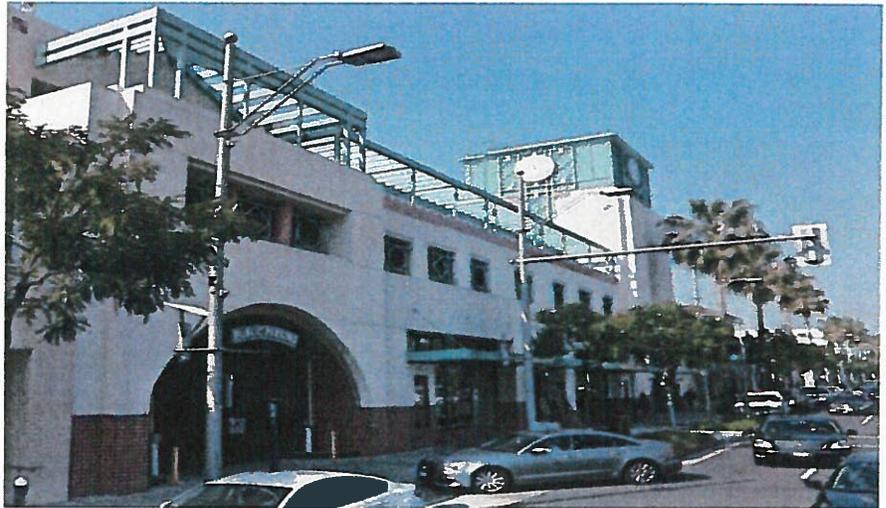


The existing garage ventilation controls were identified as an energy efficiency opportunity to replace with a new CO monitoring system.

- \* Install a new Carbon Monoxide (CO) monitoring and control system. The CO System will continuously measure the carbon monoxide levels in the parking structure and will activate the existing exhaust fans when the CO level reaches the required threshold levels. Scope will include installation and start-up of the new system.

## BEVERLY NORTH PARKING

- 200,000 Sq. Ft.
- 242,520 kWh
- \$31,682 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 200,000 sqft with a height clearance of about 7'0". Hours of operation are Monday through Friday 6am to 12am, Saturday 7am to 12am and Sunday 9am to 11pm.

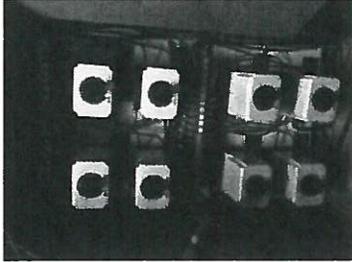
Garage ventilation is provided by (4) constant volume exhaust fans with a total power of 200 hp. The ventilation system is currently controlled by a basic 2 speed control system. The equipment is in fair condition, however, the control system is outdated and no longer running as originally intended, resulting in excess energy consumption.

Interior and exterior lighting systems have recently been upgraded to high efficiency light emitting diode (LED) fixtures, which are in excellent condition.

## BEVERLY NORTH PARKING (CONT.)

### ECM RECOMMENDATIONS

#### Controls



The existing garage ventilation controls were identified as an energy efficiency opportunity to replace with a new CO monitoring system.

- \* Install a new Carbon Monoxide (CO) monitoring and control system. The CO System will continuously measure the carbon monoxide levels in the parking structure and will activate the existing exhaust fans when the CO level reaches the required threshold levels. Scope will include installation and start-up of the new system.

## CAMDEN PARKING

- 154,000 Sq. Ft.
- 225,747 kWh
- \$34,065 Utility Cost



### EXISTING CONDITIONS

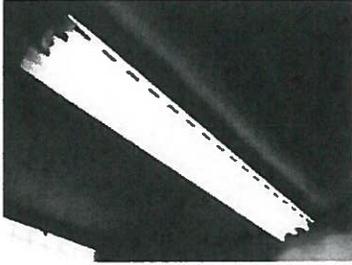
The parking structure area is about 154,000 sqft with a height clearance of about 6'9". Hours of operation are Monday through Tuesday 6am to 12am, Wednesday through Saturday 6am to 2am, and Sunday 8am to 2am.

Garage ventilation is provided by code compliant breezeways and does not require mechanical equipment or controls.

Interior lighting consists primarily of high efficiency LED lighting systems, however multiple areas also have standard efficiency high intensity discharge (HID) lighting systems and standard efficiency 17-watt and 28-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and are on the majority of the time. The exterior lighting consists of building and/or pole mounted HID lighting systems. Exterior lighting is controlled by photocells and/or time clocks.

## CAMDEN PARKING (CONT.)

### ECM RECOMMENDATIONS



The existing interior T8 florescent lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- ✦ Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✦ Retrofit existing interior HID lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✦ Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✦ Install fixture mounted occupancy sensors on appropriate lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## CRESCENT N. PARKING

- 248,000 Sq. Ft.
- 332,310 kWh
- 675 CCF Water
- \$49,456 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 248,000 sqft with a height clearance of about 6'10". Hours of operation are Monday through Friday 6am to 10pm, Saturday 6am to 8pm, and closed Sunday.

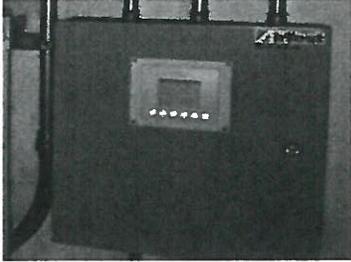
Garage ventilation is provided by (2) constant volume exhaust fans with a total power of 35 hp. The ventilation system is currently controlled by an existing carbon monoxide (CO) system that was intended to run the exhaust fans only when required. The equipment is in fair condition, however, the CO control system is outdated and no longer running as originally intended, resulting in excess energy consumption.

Interior lighting consists primarily of standard efficiency 17-watt and 28-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and are on the majority of the time. The exterior lighting consists of building and/or pole mounted high intensity discharge (HID) systems. Exterior lighting is controlled by photocells and/or time clocks.

## CRESCENT N. PARKING (CONT.)

### ECM RECOMMENDATIONS

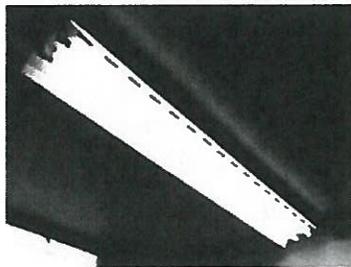
#### Controls



The existing garage ventilation controls were identified as an energy efficiency opportunity to replace with a new CO monitoring system.

- \* Install a new Carbon Monoxide (CO) monitoring and control system. The CO System will continuously measure the carbon monoxide levels in the parking structure and will activate the existing exhaust fans when the CO level reaches the required threshold levels. Scope will include installation and start-up of the new system.

#### Lighting



The existing interior T8 fluorescent lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Install fixture mounted occupancy sensors on appropriate lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## CRESCENT S. PARKING

- 345,000 Sq. Ft.
- 860,282 kWh
- 342 CCF Water
- \$99,109 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 345,000 sqft with a height clearance of about 6'10". Hours of operation are Monday through Sunday 6am to 2am

Garage ventilation is provided by (4) large variable volume exhaust fans with a total power of 425 hp. The ventilation system is currently controlled by an existing carbon monoxide (CO) system that was intended to run the exhaust fans only when required. The equipment is in fair condition, however, the CO control system is outdated and no longer running as originally intended, resulting in excess energy consumption.

Interior lighting consists primarily of standard efficiency 25, 28 and 59-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and are on the majority of the time.

## CRESCENT S. PARKING (CONT.)

### ECM RECOMMENDATIONS

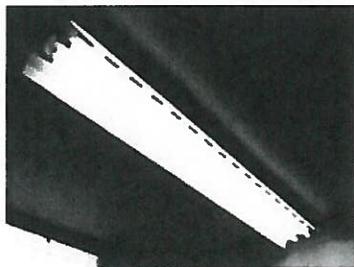
#### Controls



The existing garage ventilation controls were identified as an energy efficiency opportunity to replace with a new CO monitoring system.

- ✦ Install a new Carbon Monoxide (CO) monitoring and control system. The CO System will continuously measure the carbon monoxide levels in the parking structure and will activate the existing exhaust fans when the CO level reaches the required threshold levels. Scope will include installation and start-up of the new system.

#### Lighting

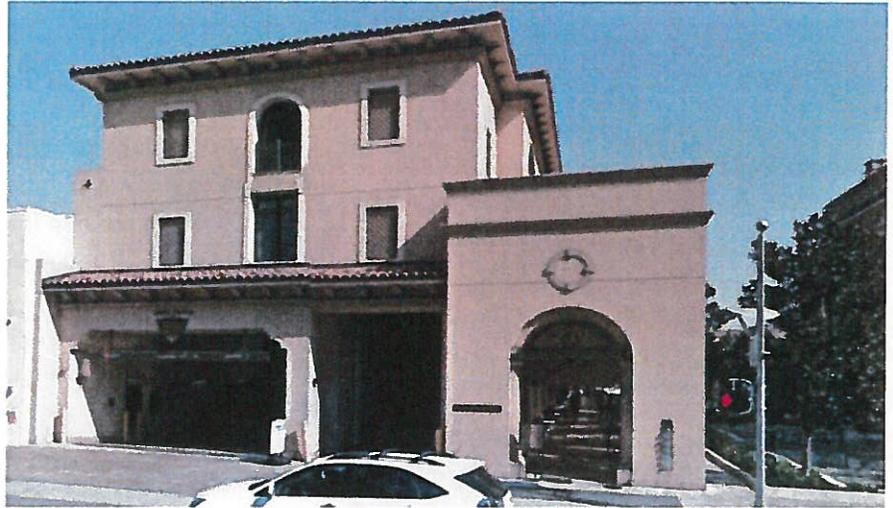


The existing interior T8 fluorescent lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- ✦ Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✦ Install fixture mounted occupancy sensors on appropriate lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## MONTAGE / GARDENS PARKING

- 10,000 Sq. Ft.
- 1,132,925 kWh
- 1,135 Therms
- \$146,986 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 10,000 sqft with a height clearance of about 7'0". Hours of operation are 24 hours daily.

Interior lighting consists primarily of standard efficiency 25, 28 and 59-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and are on the majority of the time.

## MONTAGE / GARDENS (CONT.)

### ECM RECOMMENDATIONS



The existing interior T8 florescent lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- ✧ Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✧ Retrofit existing incandescent lighting with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- ✧ Install fixture mounted occupancy sensors on appropriate lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## SANTA MONICA 5 PARKING

- 88,000 Sq. Ft.
- 96,886 kWh
- 4,437 CCF Water
- \$45,011 Utility Cost



### EXISTING CONDITIONS

The parking structure areas are about 88,000 sqft, with a height clearance of about 6'6". The parking structures are open Monday through Saturday from 8am to 6pm.

Garage ventilation is provided by code compliant breezeways and does not require mechanical equipment or controls.

Interior lighting consists of a combination of standard efficiency 32-watt T8 fluorescent lighting systems and compact fluorescent lights (CFL). Interior lighting in most spaces is controlled by manual wall switch and are on the majority of the time. The exterior lighting consists of a combination of building and/or pole mounted incandescent lights, high intensity discharge (HID) systems, and/or high efficiency LEDs. Exterior lighting is controlled by photocells and/or time clocks.

## SANTA MONICA 5 PARKING (CONT.)

### ECM RECOMMENDATIONS



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Retrofit existing incandescent lighting with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Install fixture mounted occupancy sensors on appropriate lighting fixtures to automatically dim lighting levels during periods of inactivity. The system will automatically return to full brightness when movement is sensed in the area. Refer to the lighting inventory for specific locations and applications.

## THIRD STREET PARKING

- 187,000 Sq. Ft.
- 197,646 kWh
- 5,222 Therms
- 1,428 CCF Water
- \$45,198 Utility Cost



### EXISTING CONDITIONS

The parking structure area is about 187,000 sqft with a height clearance of about 7'0". Hours of operation are 24 hours daily.

Garage ventilation is provided by (2) variable volume exhaust fans with a total power of 30 hp. The ventilation system is currently controlled by an existing carbon monoxide (CO) system that was intended to run the exhaust fans only when required. The equipment is in fair condition, however, the CO control system is outdated and no longer running as originally intended, resulting in excess energy consumption.

Interior and exterior lighting systems have recently been upgraded to high efficiency light emitting diode (LED) fixtures, which are in excellent condition.

## THIRD STREET PARKING (CONT.)

### ECM RECOMMENDATIONS

#### Controls



The existing garage ventilation controls were identified as an energy efficiency opportunity to replace with a new CO monitoring system.

- \* Install a new Carbon Monoxide (CO) monitoring and control system. The CO System will continuously measure the carbon monoxide levels in the parking structure and will activate the existing exhaust fans when the CO level reaches the required threshold levels. Scope will include installation and start-up of the new system.

## BEVERLY GARDENS / SANTA MONICA MEDIAN

- 56,181 kWh
- 35,051 CCF Water
- \$234,626 Utility Cost



### EXISTING CONDITIONS

Beverly Gardens is a linear park that is about 1.9 miles long, stretching from Whittier Dr and Wilshire Blvd to about N Doheny Dr and Santa Monica. This green space includes multiple gardens, landscaping, fountains and a jogging / walking path.

Exterior lighting consists of a combination of building and/or pole mounted high intensity discharge (HID) systems, T8 florescent lighting systems, incandescent lights and compact florescent lights (CFL). Exterior lighting is controlled by a combination of photocells, time clocks and manual switches.

Irrigation throughout the site is managed through (22) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system has the capability to detect and shut down water flow during an unexpected high flow event.

# BEVERLY GARDENS / SANTA MONICA MEDIANS (CONT.)

## ECM RECOMMENDATIONS

### Lighting



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Retrofit existing incandescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.

### Irrigation



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).

## BURTON WAY MEDIANS

- 2,376 CCF Water
- \$14,981 Utility Cost



### EXISTING CONDITIONS

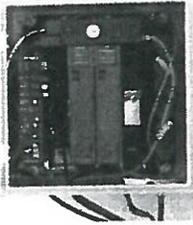
The Burton Way median is about 0.46 miles long, stretching from Burton Way and N Rexford Dr to about Burton and N Oakhurst. This green space includes turf and multiple trees.

Irrigation throughout the site is managed through (1) controller. The existing controller is currently controlled based on a schedule set by City staff. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## BURTON WAY MEDIANS (CONT.)

### ECM RECOMMENDATIONS

#### Irrigation



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## COLDWATER CANYON PARK

- 133,263 kWh
- 1,402 Therms
- 4,984 CCF Water
- \$53,658 Utility Cost



### EXISTING CONDITIONS

Coldwater Canyon Park consist of the Main Park, Bridle Path, and Running Path. This green space includes multiple gardens, landscaping, playground and jogging / walking path.

Exterior lighting consists primarily of standard efficiency high intensity discharge (HID) systems. Exterior lighting is controlled by a combination of photocells, time clocks and manual switches.

Irrigation throughout the site is managed through (4) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## COLDWATER CANYON (CONT.)

### ECM RECOMMENDATIONS



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.

#### Irrigation

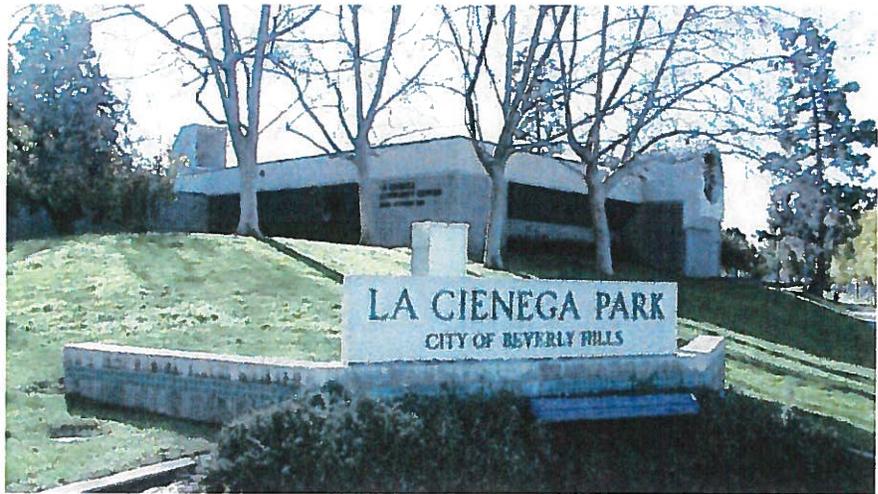
- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

## LA CIENEGA PARK

- 19,400 Sq. Ft.
- 240,078 kWh
- 8,013 CCF Water
- \$111,832 Utility Cost



### EXISTING CONDITIONS

La Cienega Park consists of the La Cienega Community Center, baseball diamonds, soccer fields, jogging track and outdoor exercise equipment.

Heating, ventilation and air conditioning (HVAC) is provided primarily by a water source heat pump (WSHP) system that consists of (1) variable speed cooling tower, (1) heating hot water (HHW) boiler, (2) variable HHW pumps and (9) WSHP terminal units. HVAC equipment is in mostly poor to fair condition. HVAC control is provided by a basic direct digital control (DDC) system.

Interior lighting consists primarily of standard efficiency 28-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and some areas are controlled by occupancy sensors. The exterior lighting consists of a combination of building and/or pole mounted high intensity discharge (HID) systems and 28-watt T8 fluorescent lighting systems. Exterior lighting is controlled by a combination of photocells, time clocks and manual switches.

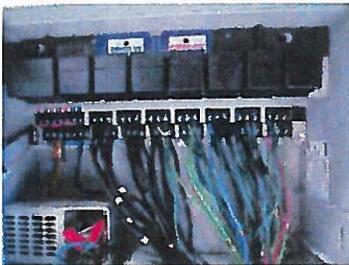
Irrigation throughout the site is managed through (2) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system has the capability to detect and shut down water flow during an unexpected high flow event.

## LA CIENEGA PARK (CONT.)

### ECM RECOMMENDATIONS



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

#### Lighting

- \* Retrofit existing standard efficiency T8 fluorescent lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.

#### Irrigation

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).

## LA CIENEGA TENNIS CENTER

- 327,404 kWh
- 10,031 CCF Water
- \$124,026 Utility Cost



### EXISTING CONDITIONS

La Cienega Tennis Center consists of (16) tennis courts, showers, locker rooms, and interior spaces available for rental.

Heating, ventilation and air conditioning (HVAC) is provided primarily by (9) low efficiency split system heat pumps. HVAC equipment is in mostly poor condition. HVAC control is provided by programmable thermostats located within the space served.

Interior lighting consists primarily of standard efficiency 28-watt T8 fluorescent lighting systems. Interior lighting in most spaces is controlled by manual wall switch and some areas are controlled by occupancy sensors.

Irrigation throughout the site is managed through (2) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## LA CIENEGA TENNIS CENTER (CONT.)

### ECM RECOMMENDATIONS

#### HVAC



The existing HVAC units were identified as an energy efficiency opportunity to replace with new high efficiency units.

- \* Replace (2) 5 ton and (4) 2 ton split system heat pumps with new high efficiency units of similar size and capacity. Scope will include installation of the new units, duct/curb modifications, disconnection/reconnections of the existing electrical lines, condensate connections, control connections, and start-up/testing of the new units. Refer to the replacement mechanical inventory for details on quantities, type and locations.

#### Irrigation



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## ROXBURY PARK

- 8,823 CCF Water
- \$56,304 Utility Cost



### EXISTING CONDITIONS

Roxbury Park is about 11 acres of green space. This site includes picnic areas, playgrounds, tennis courts, lawn bowling, croquet, putting greens, baseball diamond, soccer field, basketball courts and volleyball courts.

Irrigation throughout the site is managed through (2) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system has the capability to detect and shut down water flow during an unexpected high flow event.

## ROXBURY PARK (CONT.)

### ECM RECOMMENDATIONS



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

#### Irrigation

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).

# SUNSET BLVD MEDIAN

- 9,773 CCF Water
- \$62,488 Utility Cost



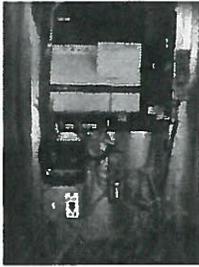
## EXISTING CONDITIONS

The Sunset Blvd median is about 1.8 miles long, stretching from Sunset Blvd and Ladera Dr to about Sunset Blvd and Phyllis St. This green space includes turf and multiple trees.

Irrigation throughout the site is managed through (7) controllers. The existing controllers are currently controlled based on a schedule set by City staff. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## SUNSET MEDIAN (CONT.)

### ECM RECOMMENDATIONS



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

#### Irrigation

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## WHITTIER ISLANDS

- 240 CCF Water
- \$2,222 Utility Cost



### EXISTING CONDITIONS

The Whittier Islands are located at Linden and Whittier, Whittier and Walden, and Tenton, Whittier, and Elevado. This green space includes turf, brush, and multiple trees.

Irrigation throughout the site is managed through (3) controllers. The existing controllers are currently controlled based on a schedule set by City staff. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## WHITTIER ISLANDS (CONT.)

### ECM RECOMMENDATIONS



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

#### Irrigation

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## WILL ROGERS PARK

- 73,520 kWh
- 5,158 CCF Water
- \$43,917 Utility Cost



### EXISTING CONDITIONS

Will Rogers Park is a historical park originally opened in 1915. This green space includes multiple gardens, landscaping and walking path.

Exterior lighting consists of a combination of building and/or pole mounted high intensity discharge (HID) systems and compact florescent lights (CFL). Exterior lighting is controlled by a combination of photocells, time clocks and manual switches.

Irrigation throughout the site is managed through (3) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, the system does not have the capability to detect and shut down water flow during an unexpected high flow event.

## WILL RODGERS PARK (CONT.)

### ECM RECOMMENDATIONS



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- \* Retrofit existing compact fluorescent (CFL) lighting systems with new high efficiency LED lighting systems which will provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.
- \* Replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.



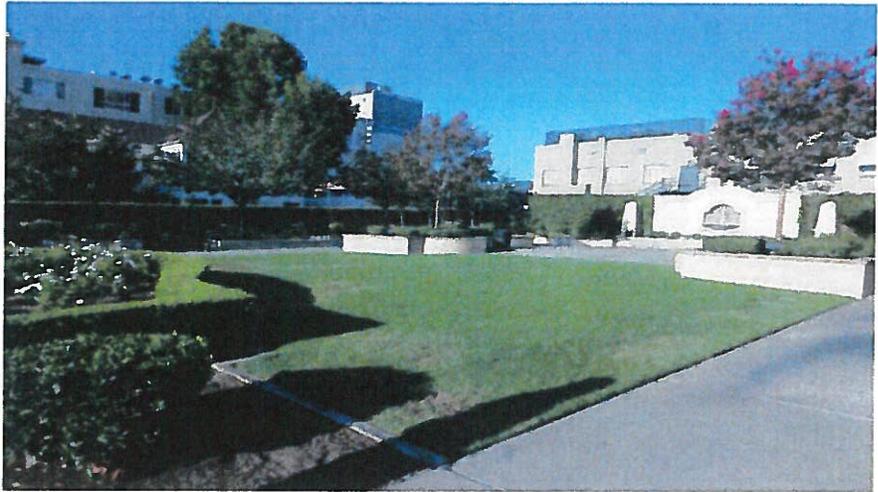
The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

#### Irrigation

- \* Install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).
- \* Install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## MINI PARKS

- 2,298 kWh
- 1,718 CCF Water
- \$12,894 Utility Cost



### EXISTING CONDITIONS

The Mini Parks consist of Arnaz, Hamel, Maltz, Oakhurst, Reeves and Rexford. These green spaces includes multiple gardens, landscaping, art sculptures, playgrounds and fountains.

Exterior lighting consists of a combination of building and/or pole mounted high intensity discharge (HID) systems and compact florescent lights (CFL). Exterior lighting is controlled by a combination of photocells, time clocks and manual switches.

Irrigation throughout the sites is managed through (6) controllers. The existing controllers are currently controlled based on a schedule set by City staff. Some of the existing controllers were initially intended to communicate via a radio frequency, but due to Federal Communication Commission (FCC) issues and existing controllers with limited flexibility, the radio frequency and existing weather station can no longer be utilized. The irrigation system uses potable water because there is no reclaimed water available. In addition, some of the systems have the capability to detect and shut down water flow during an unexpected high flow event, however some do not.

## MINI PARKS (CONT.)

### ECM RECOMMENDATIONS



The existing exterior HID lighting fixtures were identified as an energy efficiency opportunity to replace with LEDs.

#### Lighting

- \* At Maltz Mini Park, replace existing exterior building and/or pole mounted HID lighting systems with high efficiency LED lighting systems that provide exceptional light quality, long life and instant start capability. Refer to the lighting inventory for specific locations and applications.

#### Irrigation



The existing irrigation controllers were identified as a water efficiency opportunity to replace with a weather based smart control system.

- \* At Arnaz, Hamel, Maltz, Oakhurst, Reeves and Rexford Mini Parks, install a weather based smart irrigation control system. The controllers will have a wide range of communication options, including radio frequency, cellular, Ethernet, dial-up, and hardwired cable. This will allow each station to use the most reliable, cost effective means of communication based on what is available at each individual site. The system will monitor local weather on a daily basis and automatically adjust controller's irrigation schedules based upon plant watering needs and with the ET (Evapo-transpiration rate).

- \* At Oakhurst and Reeves Mini Parks, install a flow sensor / master valve assembly capable of detecting an unexpected high flow event (ruptured pipe) and responding by shutting off the water supply. Scope includes the installation of the flow sensor, interlock to the master valve, typical trenching requirements and start-up/testing of the new system. If any major issues are discovered during the construction phase while uncovering the existing system, the issues will be compiled in a brief report and submitted to the City for further action.

## 2.3 SAVINGS CALCULATION METHODOLOGY

### Energy Savings Calculation Methodology

Climatec utilizes a number of different methods to estimate energy savings for the various energy conservation measures (ECMs) recommended in this report. This includes information gathered in the field, interviews with City personnel, spreadsheet calculations, eQUEST building energy simulation software and other software packages. The following explains the methods used for each type of ECM. Refer to the Technical Appendix for details on the proposed systems.

#### **Controls**

Controls savings, including EMS installations and demand controlled ventilation, were estimated using eQUEST building energy simulation software. Building envelope data and historical utility consumption data along with building hours of operation and HVAC equipment run times were used to create a baseline model, calibrated within 10% of the actual utility baseline. Proposed changes are then programmed into the model which simulates 365 days, 24 hours a day to provide kWh and financial savings values. Refer to the Technical Appendix for details on the proposed systems.

#### **Mechanical**

HVAC unit replacement savings were estimated using eQUEST building energy simulation software. Building envelope data and historical utility consumption data along with building hours of operation and existing HVAC equipment condition, efficiencies and run times were used to create a baseline model, calibrated within 10% of the actual utility baseline. Proposed equipment changes and new efficiencies are then programmed into the model which simulates 365 days, 24 hours a day to provide kWh and financial savings values. Refer to the Technical Appendix for details on the proposed systems.

#### **Lighting**

Site interior and exterior lighting retrofit savings were estimated using inventories gathered in the field, building hours of operation, and proposed fixture types and quantities. This info, along with the utility baseline, were incorporated into a spreadsheet analysis to determine the energy and financial savings. Refer to the Technical Appendix for details on the proposed systems.

#### **Battery Storage**

Electricity demand and utility rate savings for the stationary battery storage systems were accomplished by reviewing the site utility interval data. The stationary batteries have a unique, proprietary software which automatically adjust the discharge of the battery to minimize electrical demand during peak utility periods and maximize utility savings. This analysis was performed by Stem. Refer to the Technical Appendix for details on the proposed systems.

# 3.0 SUPPLEMENTAL DOCUMENTATION

## 3.1 ENVIRONMENTAL BENEFITS

In addition to the financial benefits previously detailed, various environmental benefits are generated with the implementation of this program. The less energy the City uses, the less energy that utilities must produce to meet the demand, which results in reduced pollution in a number of areas. This recommended project will achieve the following utility usage reductions:

**Electricity Reduction: 1,667,817 kWh/yr**

These annual savings will produce the following environmental equivalencies as shown in Table 3-2:

TABLE 3-1: ENVIRONMENTAL BENEFITS

Type of Pollution	Pollutants Reduced (Pounds)
Carbon Dioxide (CO <sub>2</sub> )	2,763,573
Sulfur Dioxide (SO <sub>2</sub> )	1,594
Nitric Oxide (NO)	2,540



233

Cars not driven for one year



126,544

Gallons of gasoline saved in one year



33,356

Trees preserved from deforestation



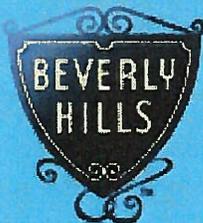
167

Beverly Hills homes powered for a year



49,779

People provided with drinking water



In addition to these environmental savings, the following page includes a more detailed analysis of the associated savings.

TABLE 3-2: DETAILED ENVIRONMENTAL BENEFITS

**City of Beverly Hills** **Environmental Benefits**

Reducing the City's energy usage lowers the amount of energy production required at the source. A great deal of the energy consumed by City facilities is produced by power plants burning fossil fuels. The burning of these fuels contributes to environmental contamination.

According to the United States Environmental Protection Agency (US EPA) and other groups, it can be calculated just how much pollution can be reduced or eliminated based on the amount of energy saved. The chart below summarizes pollutants, health effects and expected reduction in pollution levels based on City savings.

Annual kWh saved through project implementation **1,667,817**

Type Of Pollution	Health Effect	Environmental Effect	Reduction / kWh	Reduction / Therm	Pollutants Reduced
Greenhouse Gases (CO <sub>2</sub> )	Can cause respiratory and other health problems, particularly in children and the elderly	Climate change on a global scale has been attributed to increased emissions of carbon dioxide (CO <sub>2</sub> )	1.657 pounds / kWh	12.5 pounds / therm	<b>2,763,573</b>
					lbs (CO <sub>2</sub> ) reduced
Volatile Organic Compounds (VOC)	Ozone (smog) can cause cancer and other serious health problems	Ozone (smog) affects plant life and causes vegetation damage	0.000061 pounds / kWh	.0005 pounds / therm	<b>102</b>
					lbs (VOX) reduced
Nitrogen Oxide (NO)	Lung damage and respiratory illness	Acid rain has ozone (smog) effects and also causes buildings, statues and monuments to deteriorate	0.001523 pounds / kWh	.014 pounds / therm	<b>2,540</b>
					lbs (NO <sub>x</sub> ) reduced
Carbon Monoxide (CO)	Reduces ability of blood to bring oxygen to body cells and tissues	One of the six "criteria pollutants" the US EPA tracks that significantly reduces environmental quality	0.00041 pounds / kWh	.0019 pounds / therm	<b>684</b>
					lbs (CO) reduced
Sulfur Dioxide (SO <sub>2</sub> )	Respiratory illness, breathing problems and potentially permanent lung damage	Precursor of acid rain, which can damage trees, lakes and soil; aerosols can also reduce visibility	0.000956 pounds / kWh	.0001 pounds / therm	<b>1,594</b>
					lbs (SO <sub>2</sub> ) reduced
Particulates (PM10)	Eye, nose and throat irritation,, lung damage, bronchitis, cancer, early death	Source of haze which reduces visibility. Ashes, smoke, soot and dust can dirty and discolor structures	0.00002 pounds / kWh	.0004 pounds / therm	<b>33</b>
					lbs (PM10) reduced
Mercury (Hg)	Liver, kidney and brain damage; neurological and developmental damage	Accumulates in the food chain	0.003404 milligrams / kWh	0 or negligible pounds / therm	<b>5,677</b>
					Mg of (Hg) reduced

Saving 10,000 kWh is equivalent to the CO <sub>2</sub> sequestered from planting 200 tree seedlings and letting them grow 10 years; taking 1.4 cars off the road for a year; or the energy required to power a typical American home for a year.	The annual environmental benefit of this project is equivalent to planting	<b>33,356</b>	trees / year
	Or removing	<b>233</b>	cars from the road / year
	Or saving enough energy to power	<b>167</b>	typical American homes for a year

## 4.0 TECHNICAL APPENDIX

### 4.1 UTILITY INFORMATION

- a) Utility Baseline Summary

### 4.2 MECHANICAL INVENTORY

- a) Proposed HVAC Replacement Inventory
- b) Proposed HVAC Equipment Data Sheets

### 4.3 LIGHTING INVENTORY AND SAVINGS

- a) Room by Room Lighting Inventory and Savings
- b) Proposed Lighting Equipment Data Sheets

### 4.4 STATIONARY BATTERY STORAGE DATA

- a) Stem Data Sheets

### 4.5 PARKING GARAGE CO SYSTEM DATA

- a) CO Monitoring System Cutsheets

### 4.6 IRRIGATION CONTROLS DATA

- a) Proposed Irrigation System Cutsheets
- b) Proposed Irrigation Controllers Cutsheets

