FIM SAVINGS SUMMARY

Annual Electric Consumption: 32,814 kWh

Annual Electric Demand: 539 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Lauderhill Library	Split System	$ 1,903.30	$ 6,168.40	$ -	$ -	$ 8,071.70	$ 109,239.74	13.5

D.27. Library - Main

FACILITY DESCRIPTION

The Main Library is an 8-story, 281,000 square foot building constructed in 1983 and located at 100 S Andrew Ave. The building itself is a County protected architectural landmark. The interior spaces consist of book stacks, reading spaces, archives, small museum exhibits and galleries, offices, meeting rooms, and the Cultural Information Center. These entities, as well as the remaining library space, and their hours of operations are as follows:

Main Library:

Sunday:	closed
Monday:	10AM – 6PM
Tuesday:	12 noon – 8PM
Wednesday:	12 noon – 8PM
Thursday:	10AM – 6PM
Friday:	10AM – 6PM
Saturday:	10AM – 6PM

Observations during Visit:

- Water leaks in the building from concrete planters in patios
- Windows were recently replaced
- Water infiltration issues from fire dampers (largest problem on the 8th floor)



Water Leak Sources

COOLING SYSTEM:

Cooling for the building is provided by a chiller plant consisting of two (2) water-cooled York chillers. Chiller #1 is a two-pass machine of approximately 350 tons with a heat recovery package connected to the condenser barrel. Two 15 HP pumps used to circulate the recovered hot water. Chiller #2 is also a two-pass system without the heat recovery bundle and is approximately a 350 ton machine. Chillers are operated as lead/lag.

Chiller #1

Chiller #2

Chilled-water is distributed via two (2) chilled-water and two (2) condenser water pumps. All have 25 HP motors, 1050 GPM pumps, and each is equipped with a variable frequency drive (VFD).

Chiller Plant Pumps

Plant Observations during Visit:

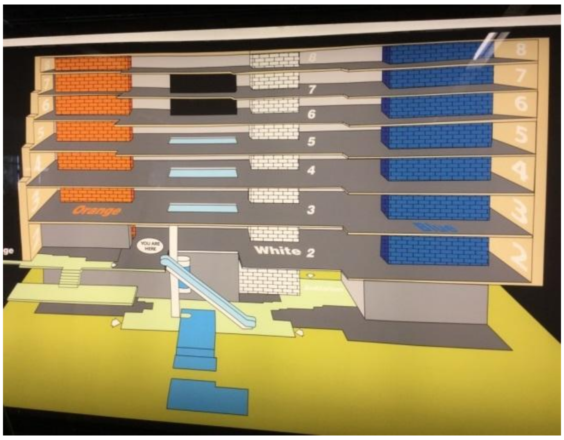
- Chiller #1, CHWP #1 and CWP #1 were running
- Chiller #2 was off (down for repair)
- CHWP #2 and CWP #2 were off and VFD was locked out
- Chilled-water temperature leaving: 45.2F
- Chilled-water temperature returning: 54.6F
- Delta T of: 9.4F
- Condenser water leaving temperature: 89.3F
- Condenser water return temperature: 81.1F
- Amperage: 257, 271, 266; Average of 264.7 Amps
- BTU/Hr: 2633 x 1k (219 tons)
- Calculated chiller efficiency: 0.9 kW/ton

There are two (2) cooling towers for the chiller plant located on the roof. At the time of the visit, one floor was experiencing an overspill of water.

Chiller Plant Cooling Towers

AIR DISTRIBUTION SYSTEM

Chilled-water is distributed to approximately 18 air handling units (AHUs) throughout the building. Typically, each floor has two (2) AHUs; serving each the west and east sides of the building. There are a couple of units that are used for dedicated spaces; such an AHU for the archives section of the 6th floor and a couple of Liebert machines for the data center on the 7th floor. The AHUs on the west side of the building have been recently replaced.



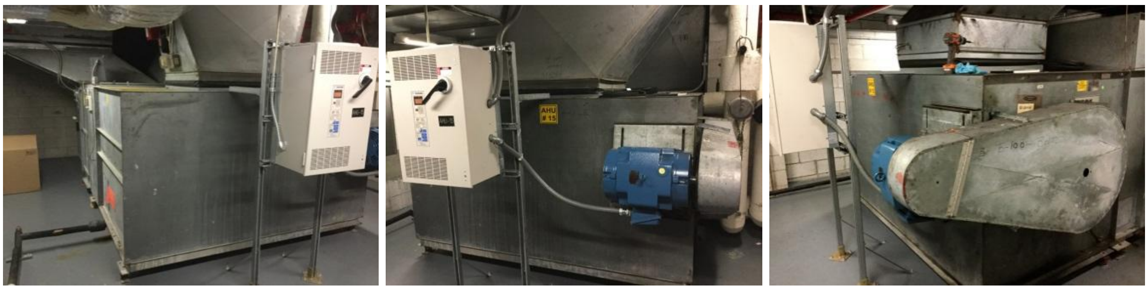
All AHUs are located in mechanical rooms, used as plenums, and are all equipped with VFDs. The units are capable of modulating return and outside air intake via dampers situated within the ductwork.

The layout to the right helps to identify locations of AHUs and areas served. The Orange Wall is considered the west side of the building and the Blue wall the east. Mechanical rooms are situated above each other on each floor along these colored walls.

The air is distributed throughout the building via a variable air volume (VAV) system. It was approximated that half of these VAV boxes are currently reliable. The VAV boxes observed during the site visit appear to utilize electric reheating.

The following table breaks down the AHU equipment information as noted during the audit.

Location / Service Area	AHU	Fan HP	VFD?	Hz
1st Floor East	AHU-1	25	Yes	41
1st Floor West	AHU-2	20	Yes	28
2nd Floor East	AHU-6	40	Yes	24
2nd Floor West	AHU-7	25	Yes	24
3rd Floor East	AHU-4	15	Yes	60
3rd Floor West	AHU-8	40	Yes	24
4th Floor East	AHU-9	30	Yes	24
4th Floor West	AHU-10	40	Yes	37
5th Floor East	AHU-11	30	Yes	24
5th Floor West	AHU-12	40	Yes	44
6th Floor East	AHU-13	30	Yes	45
6th Floor East	AHU-15	25	Yes	45
6th Floor Archives	AHU-6-1		No	-
7th Floor West	AHU-14	40	Yes	35
7th Floor West	AHU-16	40	Yes	40
7th Floor Data Center	Liebert 1		No	-
7th Floor Data Center	Liebert 2		No	-
8th Floor	AHU-17	25	Yes	45
8th Floor East	AHU-19	20	Yes	45
8th Floor West	AHU-18	30	Yes	45



Air Handing Units

Observed Issues:

- Humidity and condensation issues at both entrances
- 8th floor outside the elevators is consistently a warm spot
- AHU 18 – large water build up in the drip pan that spilled over onto the mechanical room floor. Wetvac required once every two (2) weeks

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Main Library												
Chiller	York	YTE1R1C2-CLGS	GLFM 035146	R-123	1995			480	3	387		289.6
				oil pump		0.75		480	3	1.68		1.3
Chiller	York	YTH3B2C3-CKH	CGFM 104882	R-123	1995			480	3	311		232.7
				oil pump		0.75		480	3	1.75		1.3
CWP-1	Century	850017MOJ	E514M2	motor	with VFD	25		480	3	30.5	93.6%	20.9
	Allis-Chalmers	150	821-46281-3-2	pump								
CWP-2	GE	5K284AD205A	TJK4A017E41	motor	with VFD	25		460	3	31.2	89.5%	22.4
	ITT	6100	1-28536-01-1	pump								
CHWP-1	GE	5K284AD205A	PHK3A010E50	motor	with VFD	25		460	3	31.2	89.5%	22.4
	Allis-Chalmers			pump								
CHWP-2	Marathon	MH284TTDR7026		motor	with VFD	25		460	3	32.5	88.5%	21.0
				pump								
Cooling Tower 1												
Cooling Tower 2												
Water Pump	Marathon	ME254TTDR5026AA		motor		15		460	3	19.5	88.5%	12.7
Water Pump	Marathon	ME254TTDR5026AA		motor		15		460	3	19.5	88.5%	12.7
Heat Rec Pump	Baldor	JMM3711T	37M031T96B	motor		10		460	3	11.9	87.5%	8.5
Heat Rec Pump	Baldor			motor		10		460	3	11.9	87.5%	8.5
AHU-1					with VFD	25		460	3	29.2	93.0%	19.8
AHU-2	Trane	MCCB025UA0D0	K09E894C		with VFD	20		460	3	27		18.7
AHU-3												
AHU-4	Trane	MCCB021NOG	K09E90548A		with VFD	15		460	3	21		14.6
AHU-5												
AHU-6					with VFD	40		460	3	46	94.1%	31.9
FCU-6-1	M1-2410				1996			460	3	4.8		3.3
AHU-7 W	Trane	MCCB025UA0D0	K09E90568A		with VFD	25		460	3	34		23.6
AHU-8	Trane	MCCB035N0G0	K09E90541A		with VFD	40		460	3	52		36.0
AHU-9	Trane				with VFD	30		460	3	29		20.1
AHU-10	Trane	MCCB030UA0D0	K09E90585A		with VFD	40		460	3	52		36.0
AHU-11	York				with VFD	30		460	3	37	93.8%	25.6
AHU-12	Trane	MCCB030N0G0	K09E90592A		with VFD	40		460	3	52		36.0
AHU-13	York				with VFD	30		460	3	35.4	94.1%	23.4
AHU-14	Trane	MCCB035N0G0	K09E90606A		with VFD	40		460	3	52		36.0
AHU-15	York				with VFD	25		460	3	29.9	93.6%	19.8
AHU-16	Trane	MCCB035N0G0	K09E90599A		with VFD	40		460	3	52		36.0
AHU-17					with VFD	25		460	3	29.9	93.6%	19.8
AHU-18	Trane	MCCB035UA0D0	K09E90570A		with VFD	30		460	3	40		27.7
AHU-19				with VFD	2002	20		460	3	24.4	91.0%	16.5
Liebert 1	Liebert		C15F2F0162		2015	0.75		460	3	1.8		1.3
Liebert 2	Liebert		C15F2F0154		2015	0.75		460	3	2.5		1.8
Larkin						0.75		460	3	2.4		1.7

LIGHTING SYSTEM

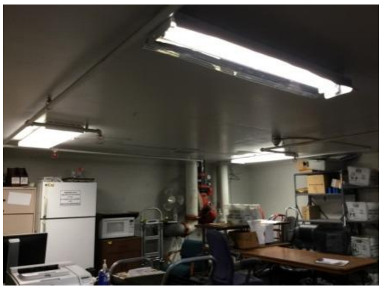
Interior lighting primarily consists of 32 Watt, T8 fluorescent lamps in either 2-lamp 2x4 fixtures or single lamp runners.

Interior Lighting Examples

Exterior Lighting consists of HPS high bays,

Exterior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control. Some observed problems with the lighting system include:



Occupancy Sensor Opportunities

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restroom, the chiller plant and kitchen sinks. The following are example of the types of fixture found within the restroom of the facility:

- 0.5 and 2,2gpm faucets

Some faucets are operated manually while other have been equipped with sensors. All toilets and urinal are operated manually.

Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

The building is equipped with a Siemens building automation system. Any changes to the controls operation is handled from the Government Center. Available trending data was downloaded from the BAU. The following lists the available points being trended:

- Chiller plant
  - supply and return chilled-water temperatures
  - supply and return chilled-water setpoints
  - GPM
  - amperages
- Air Handlers
  - supply and return air temperatures
  - supply and return air setpoints
  - relative humidity
- VAV Terminals
  - Heating options
  - Zone static pressures
  - Zone temperatures

The full point list is far more extensive but eh above listed points provided the most useful data to help develop the usage baseline and identify improvement opportunities.

BROWARD COUNTY FLORIDA

SIEMENS

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the General Service Large Demand Time-of-Use (GSLDT-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

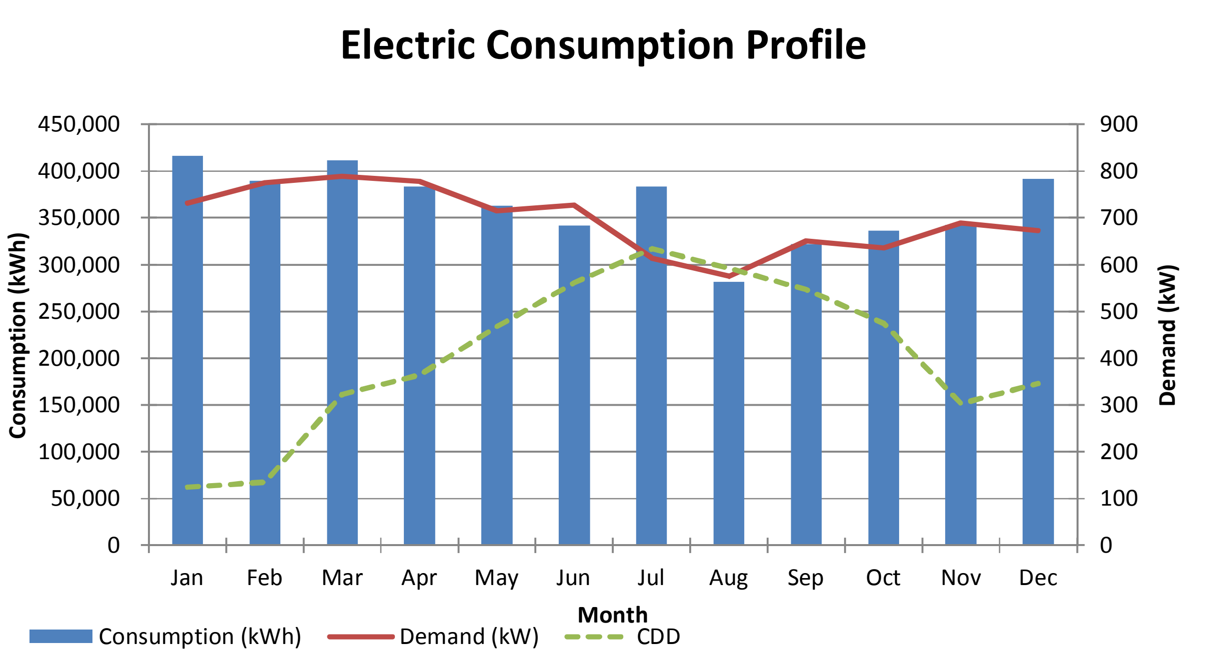
Electric Baseline Summary

Facility	# of Meters	Rate Structure	Year-Round on peak	Year-Round off peak	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Main Library	1	GSLDT-1	$0.06661	$0.04525	$ 13.36	4,363,400	8,354	843

The data in the table above was generated using the following electric billing data.

Meter PV8910D; Account: 72166-40321; Address: 100 S Andrews Ave

Date	Customer Charge	Consumption (kwh) Total Consumption	Consumption (kwh) On Peak	Consumption (kwh) Off Peak	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes Storm Charge	Other Fees/Taxes gross receipts tax	Other Fees/Taxes Franchise Fee	Total Charges
Jun-15	$ 75.00	414,400	*132,785*	*281,615*	$ 20,299	737	$ 9,257	$ 307	$ 724	$ 1,773	$ 30,728
Jul-15	$ 75.00	380,000	*121,762*	*258,238*	$ 18,614	765	$ 9,608	$ 298	$ 703	$ 1,722	$ 29,831
Aug-15	$ 75.00	392,000	*125,607*	*266,393*	$ 19,202	751	$ 9,433	$ 300	$ 708	$ 1,735	$ 30,058
Sep-15	$ 75.00	401,600	*128,683*	*272,917*	$ 19,672	843	$ 10,588	$ 306	$ 722	$ 1,769	$ 30,658
Oct-15	$ 75.00	363,200	*116,379*	*246,821*	$ 17,791	715	$ 8,980	$ 281	$ 663	$ 1,624	$ 28,130
Nov-15	$ 75.00	341,600	*109,458*	*232,142*	$ 16,733	727	$ 9,131	$ 254	$ 598	$ 1,465	$ 25,391
Dec-15	$ 75.00	383,600	*122,916*	*260,684*	$ 18,790	614	$ 7,712	$ 258	$ 608	$ 1,490	$ 25,817
Jan-16	$ 75.00	281,600	*90,232*	*191,368*	$ 13,794	575	$ 7,222	$ 202	$ 477	$ 1,169	$ 20,262
Feb-16	$ 75.00	322,000	*103,177*	*218,823*	$ 15,773	651	$ 8,177	$ 266	$ 627	$ 1,537	$ 26,635
Mar-16	$ 75.00	336,000	*107,663*	*228,337*	$ 16,459	636	$ 7,988	$ 233	$ 550	$ 1,348	$ 23,353
Apr-16	$ 75.00	342,800	*109,842*	*232,958*	$ 16,792	689	$ 8,654	$ 250	$ 590	$ 1,444	$ 25,028
May-16	$ 75.00	392,400	*125,736*	*266,664*	$ 19,221	667	$ 8,378	$ 267	$ 631	$ 1,546	$ 26,780
Jun-16	$ 75.00	418,000	*133,938*	*284,062*	$ 20,475	726	$ 9,119	$ 288	$ 679	$ 1,664	$ 28,833
Jul-16	$ 75.00	398,800	*127,786*	*271,014*	$ 19,535	785	$ 9,860	$ 287	$ 677	$ 1,658	$ 28,735
Aug-16	$ 75.00	431,600	*138,296*	*293,304*	$ 21,142	827	$ 10,387	$ 305	$ 720	$ 1,765	$ 30,577
Sep-16	$ 75.00	365,200	*117,020*	*248,180*	$ 17,889	713	$ 8,955	$ 262	$ 618	$ 1,514	$ 26,230
Oct-16	$ 75.00				$ -		$ -	$ -			
Nov-16	$ 75.00				$ -		$ -	$ -			
Dec-16	$ 75.00				$ -		$ -	$ -			
Jan-17	$ 75.00				$ -		$ -	$ -			
Feb-17	$ 75.00				$ -		$ -	$ -			
Mar-17	$ 75.00				$ -		$ -	$ -			
Apr-17	$ 75.00				$ -		$ -	$ -			
May-17	$ 75.00	391,200	*125,351*	*265,849*	$ 19,163	679	$ 8,528	$ 305	$ 720	$ 1,763	$ 30,554
Yearly Averages		**4,363,400**	**1,398,151**	**2,965,249**	**$ 155,672**	**8,354**	**$ 75,988**	**$ 2,335**	**$ 7,564**	**$ 18,533**	**$ 321,108**



The resulting energy usage profile, illustrated above, for this account is not influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage is closely mirrors the consumption profile indicating a strong building automation presence. The average peak for the 24 month period evaluated occurs in March while the average low occurs in June. It can be determined that building occupancy, events onsite, and public interest governs the energy usage needs of this building.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Main Library	Library	15.53	10.7	14.3	15.6

Overall, this building is operating at the 75th percentile of comparable facilities. Given the age and condition of known equipment onsite, this is a favorable metric value that can be attributed to advanced building automation applications already existing and maintained by the County. Data collected onsite still supports the opportunity and need to equipment efficiency upgrades.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Main Library

Account # 2015412	**Meter #** 114751700-M
Rate	**Address**
Meter Size 4"	**Meter Type** W/S/ST/FL-CT

Date	Consumption (kgal)	Total Charges
Jun-15	410	$ 5,025.96
Jul-15	510	$ 6,049.62
Aug-15	420	$ 5,181.06
Sep-15	430	$ 5,315.48
Oct-15	350	$ 4,304.02
Nov-15	325	$ 4,086.82
Dec-15	300	$ 3,435.22
Jan-16	240	$ 3,087.10
Feb-16	200	
Mar-16	238	$ 3,326.62
Apr-16	290	$ 3,978.22
May-16	285	$ 3,793.60
Jun-16	285	$ 3,804.46
Jul-16	480	$ 6,030.76
Aug-16	310	$ 4,304.02
Sep-16	450	$ 5,835.28
Oct-16	330	$ 4,858.40
Nov-16	793	$ 9,935.19
Dec-16	560	$ 7,050.99
Jan-17	250	$ 3,927.39
Feb-17	225	$ 3,391.59
Mar-17	250	$ 3,733.59
Apr-17	200	$ 3,254.79
May-17	250	$ 3,832.85
TOTALS	**8381**	**$107,543.03**

The average monthly consumption for this account is 349 thousand gallons. The average monthly expenses are $4675.78. The blended dollar per thousand gallons rate is $13.39. This blended rate could be representative of the actual rate being charged to this account but without knowing the breakdown of the fees and charges this cannot be determined.

Main Library

Account #	2015157	**Meter #**	201001004-M
Rate		**Address**	
Meter Size	2"	**Meter Type**	IRR

Date	Consumption (kgal)	Total Charges
Jun-17	25	$ 189.44
Jun-17	32	$ 224.30
May-17	96	$ 590.33
Apr-17	46	$ 288.21
Mar-17	60	$ 392.79
Feb-17	44	$ 305.64
Jan-17	3	$ 73.24
Dec-16	123	$ 696.03
Nov-16	43	$ 285.18
Oct-16	85	$ 242.63
Sep-16	89	
Aug-16	87	$ 534.26
Jul-16	2	$ 42.09
Jun-16	330	$ 3,554.76
May-16	136	
Apr-16	110	$ 879.24
Mar-16	198	$ 1,440.93
Feb-16	110	
Jan-16	180	$ 610.32
Dec-15	130	$ 1,321.80
Nov-15	90	$ 797.07
Oct-15	140	$ 580.44
Sep-15	155	$ 944.17
Aug-15	145	$ 837.52
Jul-15	212	$ 1,526.86
Jun-15	430	$ 3,774.44
TOTALS	**3101**	**$ 20,131.69**

The average monthly consumption for this account is 119 thousand gallons. The average monthly expenses are $875.29. The blended dollar per thousand gallons rate is $7.34. This blended rate could be representative of the actual rate being charged to this account but without knowing the breakdown of the fees and charges this cannot be determined.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Main Library	Lighting - Interior	$ 45,730.15	$ -	$ -	$ 8,014	$ 53,744.15	$ 527,341.86	9.8
Breakage Fee							$ 18,936.34	
PA Cost							$ 1,146.90	
Total		**$ 45,730.15**	**$ -**	**$ -**	**$ 8,014**	**$53,744.15**	**$ 547,425.10**	**10.2**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps

The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures.

In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

LED Replacement for Pin-Based Compact Fluorescent Fixtures

In keeping with the direction to remove fluorescent ballasts, reduce energy use and minimize cost, our design strategy for existing pin-based compact fluorescent lamps is to retrofit the existing fixtures with line voltage pin based LED lamps and remove the existing fluorescent ballasts. In some cases, it is possible to remove two fluorescent lamps and replace them with a single higher powered LED lamp without sacrificing luminaire output and distribution.

LED Replacement for High Intensity Discharge Interior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium provide significant energy reduction opportunities when changing to LED. New types of LED fixtures and retrofit kits can be installed across many existing HID applications not previously available.

Various fixture types utilize HID sources at Broward County. The most common application is high bay or low bay industrial style fixtures. Due to the efficient optical distribution of LED sources in new fixtures, replacing industrial HID fixtures with new LED industrial high bays is the recommended solution, greatly reducing input power, increasing lighting quality and extending the life of the system.

Some fixture types don't lend themselves to replacement from a cost perspective for interior spaces, such as decorative sconces, pendants and some parking garage fixtures. In these cases, the fixtures will be relamped with high output, screw-based LED lamps and the ballasts will be removed.

Emergency Lighting

Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, MN, Main	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	128	128
	Existing T8 Fluorescent - Proposed Retrofit LED	3,771	3,771
	Existing High Intensity Discharge - Proposed Retrofit LED	13	13
	Existing Incandescent - Proposed Relamp LED	76	76
	Existing High Intensity Discharge - Proposed New LED Fixture	10	10
	Existing T12 Fluorescent - Proposed Retrofit LED	9	9
	Existing Compact Fluorescent - Proposed Retrofit LED	158	158
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	8	8
	Existing T8 Fluorescent - Proposed Retrofit LED	6	6
	Existing T5 Fluorescent - Proposed RETROFIT LED	291	291

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 498,835 kWh

Annual Electric Demand: 1,340.64 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Main Library	Lighting - Interior	$ 45,730.15	$ -	$ -	$ 8,014	$ 53,744.15	$ 527,341.86	9.8

D.28. Library - Miramar

FACILITY DESCRIPTION

Miramar Library is a 3-story, 70,000 square foot building constructed in 2008 and located at 2050 Civic Center Pl, Miramar, FL. The first floor of the building is the library, and 2nd and 3rd floors are rented out to Broward County College and Nova University. The 2nd and 3rd floors consist of classrooms, offices, computer labs, and common areas

The library and two colleges have their own operation hours based on occupancy demand.

Library Office Hours

Monday – Wednesday:	10:00AM – 8:00PM
Thursday – Saturday:	10:00AM – 6:00PM
Sunday:	Closed

Observed Issues:

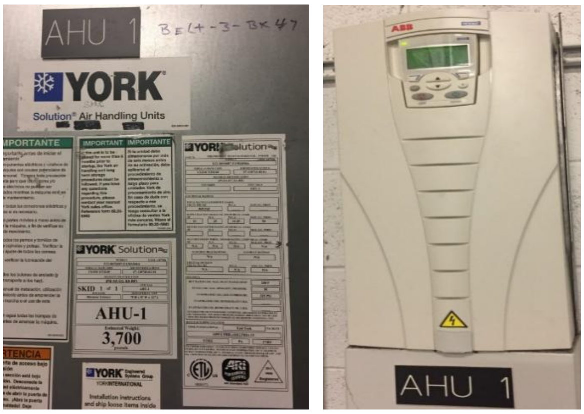
- Lights were on in some individual rooms even though they were not occupied
- The library computers were on although they were not in use
- Some areas on 2nd floor were warm
- An Unoccupied classroom on 3rd floor was 69^{o}F as displayed by the thermostat.
- No occupancy sensors are installed in classrooms, conference rooms and other individual space.

COOLING SYSTEM:

Cooling for the building is provided by 1 Air-cooled 230-Ton R-134a chiller made in 2007 by York. The unit is located at the outside of the building near the loading deck. Design chilled water supply and return temperature is 44/54ºF. The chilled water loop is configured as a variable primary system with a bypass line serving 4 air handling units (AHU). Two 15-HP chilled water pumps with variable frequency drives (VFD) were installed and the two pumps back up each other. Chilled water pump speed is adjusted to maintain the chilled water differential pressure setpoint. Two-way control valves are employed at AHUs.

Chilled Water System

Four AHUs manufactured by York were installed in the building located at 3 mechanical rooms. The total design airflow for the 4 AHUs is 78,000 CFM, The 4 AHUs are equipped with heat pipes for dehumidification, and the leaving design supply air temperature is 58.85ºF. The first floor most area of the library is conditioned by 2 single duct VAV air handling systems, AHU-1 and AHU-2. Both units are located in the same mechanical room on the first floor. There are also 2 split air conditioners to serve Library Material Return and Break Room area. Most space of the second floor is served by AHU-3, and there is also AC-3 serving science laboratory. Third floor is served by AHU-4. AHU-3 and AHU-4 are located in the 2nd floor mechanical room and 3rd floor mechanical room respectively. All 4 AHUs are equipped with 20-HP supply fans and VFDs were manufactured by ABB.



Building HVAC

Design OA intake is 12,300CFM for the entire building. Three dedicated outdoor air supply fans were installed to bring fresh air to 3 mechanical rooms located on each floor. All fresh air fans have VFDs, and modulating OA dampers were installed on the OA ducts. The mechanical rooms are serving as mixed air chambers, and the fresh air and return air is mixed in each mechanical room. Demand controlled ventilation was designed according to drawings, and CO_2 sensors were installed on return and fresh air ducts.

Outside Air for AHU

Variable air volume (VAV) terminal boxes with electric heaters serve each individual zone for temperature and humidity control.

The room temperature overall is comfortable in the building. The 2nd floor temperature is slightly higher compared to the rest 2 floors. The room temperature range is from 69°F to 73°F according to thermostat readings.

The following table provides an equipment inventory for the facility.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Miramar Library												
Chiller	York	YCAV0247SA46V	RKSM02G125	compressor	R-134A			460	3	196		140.5
				compressor	compressor			460	3	160		114.7
				fan				460	3	2.8		2.0
				fan				460	3	2.8		2.0
CHWP-1	Weg	015180T3E254T			with VFD	15		460	3	18.6	93.0%	11.9
CHWP-2	Marathon	DVK254TTFL1402		with VFD	2006	15		460	3	20	91.0%	12.4
AHU-1	York	XTI-069X087-FAMA	CGSM XT0248		with VFD	20		460	3	25		17.9
AHU-2	York	XTI-069X057-FAMA	CGSM XT0249		with VFD	20		460	3	25		17.9
AHU-3	York	XTI-075X093-FAMA	CGSM XT0388		with VFD	20		460	3	25		17.9
AHU-4	York				with VFD	20		460	3	25		17.9
Liebert	Liebert											
AC		MS-A09WA						115	1	0.95		0.1

Observed Issues with the cooling system:

- In unoccupied classrooms on 3rd floor, lights were off, and room temperature was 69ºF.

Examples of Observed Issues

LIGHTING SYSTEM

Interior lighting primarily consists of 50W 2'x2' recessed parabolic fluorescent light fixtures with 2 lamps, 32W T8 2x4 recessed fixtures with 2 or 3 lamps, and 32W CFL lights.

Interior Lighting Examples

Exterior Lighting consists of HPS wall packs

Motion sensors are installed at the main entrance, and some areas are with occupancy sensors. No occupancy sensors are installed in classrooms, conference rooms and other individual space.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility: FIM: Water Conservation

- 0.5 gpm faucets
- 1.0 gpf urinals
- 1.28 gpf toilets


Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

The building is equipped with a Johnson Metasys building automation system. Any changes to the controls operation is handled from the Government Center.

Building Controls

HVAC Occupied Schedule

Unit	Occupied
AHU-1, AHU-2	Monday – Wednesday: 7:00AM – 9:30PM Thursday: 8:30AM – 7:30PM Friday: 8:30AM – 12:00AM Saturday: 4:00AM – 12:00AM Sunday: Entire day
AHU-3	Monday – Thursday: 5:30AM – 10:30PM Friday: 5:30AM – 12:00AM Saturday: 4:00AM – 12:00AM Sunday: entire day
AHU-4	Monday – Friday: 4:30AM – 10:30PM Saturday: 4:30AM – 12:00AM Sunday: Entire day

BROWARD COUNTY FLORIDA

SIEMENS

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the Seasonal Demand Time-of-Use Rider (SDTR-1A) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

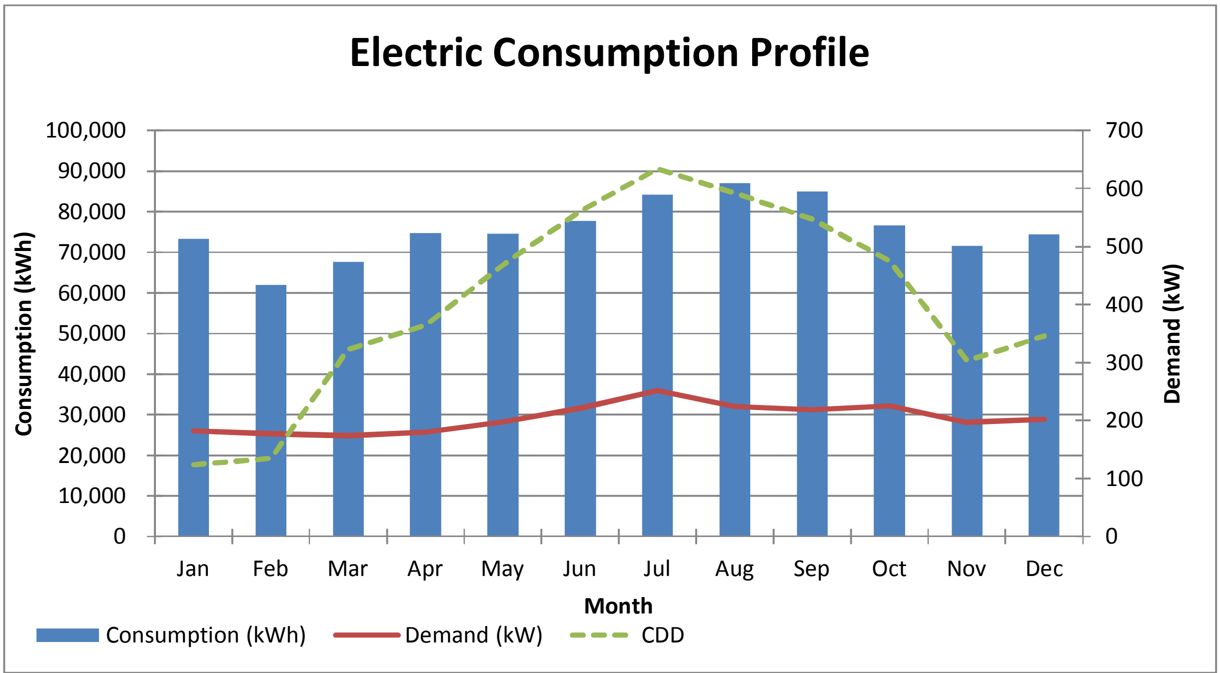
Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
Miramar Library	1	SDTR-1A	$ 0.12886	$ 0.04066	$ 0.05624	$ 10.94	908,820	2,451	286

The data in the table above was generated using the following electric billing data.

Meter MV5690A; Account: 471941112; Address: 2250 CIVIC CENTER PL # LIBRARY

Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes			Total Charges
		Total Consumption	On Peak	Off Peak				Storm Charge	gross receipts tax	Franchise Fee	
Jun-15	$ 25.96	76,320	8,520	67,800	$ 3,283	198	$ 2,400	$ 42	$ 147	$ 1,034	$ 6,933
Jul-15	$ 25.96	75,960	11,040	64,920	$ 3,331	218	$ 2,642	$ 42	$ 155	$ 1,214	$ 7,409
Aug-15	$ 25.96	81,000	11,400	69,600	$ 3,542	198	$ 2,400	$ 45	$ 154	$ 1,251	$ 7,417
Sep-15	$ 25.96	78,240	11,280	66,960	$ 3,428	204	$ 2,472	$ 43	$ 153	$ 1,207	$ 7,330
Oct-15	$ 25.96	72,000	2,520	69,480	$ 2,901	258	$ 3,127	$ 40	$ 156	$ 757	$ 7,006
Nov-15	$ 25.96	72,720	0	72,720	$ 2,930	203	$ 2,460	$ 40	$ 140	$ 837	$ 6,433
Dec-15	$ 25.96	73,680	0	73,680	$ 2,969	181	$ 2,194	$ 41	$ 134	$ 879	$ 6,241
Jan-16	$ 25.96	68,280	0	68,280	$ 3,415	191	$ 1,868	$ 44	$ 137	$ 330	$ 5,820
Feb-16	$ 25.96	60,240	0	60,240	$ 3,013	181	$ 1,770	$ 39	$ 124	$ 299	$ 5,271
Mar-16	$ 25.96	69,360	0	69,360	$ 3,469	176	$ 1,721	$ 45	$ 135	$ 339	$ 5,735
Apr-16	$ 25.96	72,120	0	72,120	$ 3,607	184	$ 1,800	$ 47	$ 140	$ 153	$ 5,772
May-16	$ 25.96	67,560	0	67,560	$ 3,379	197	$ 1,927	$ 44	$ 138	$ 166	$ 5,679
Jun-16	$ 26.97	78,960	8,640	70,320	$ 3,740	245	$ 2,881	$ 73	$ 172	$ 414	$ 7,307
Jul-16	$ 26.97	92,520	12,120	80,400	$ 4,548	286	$ 3,363	$ 85	$ 205	$ 494	$ 8,723
Aug-16	$ 26.97	93,120	13,200	79,920	$ 4,661	251	$ 2,952	$ 86	$ 198	$ 476	$ 8,399
Sep-16	$ 26.97	91,800	11,160	80,640	$ 4,441	233	$ 2,740	$ 84	$ 187	$ 432	$ 7,911
Oct-16	$ 26.97	81,120	2,520	78,600	$ 3,787	192	$ 1,935	$ 75	$ 149	$ 344	$ 6,316
Nov-16	$ 26.97	70,320	0	70,320	$ 3,283	191	$ 1,925	$ 65	$ 136	$ 313	$ 5,749
Dec-16	$ 26.97	75,120	0	75,120	$ 3,507	223	$ 2,248	$ 69	$ 150	$ 346	$ 6,347
Jan-17	$ 25.00	78,480	0	78,480	$ 3,978	173	$ 1,782	$ 63	$ 150	$ 357	$ 6,354
Feb-17	$ 25.00	63,840	0	63,840	$ 3,236	173	$ 1,782	$ 51	$ 130	$ 311	$ 5,535
Mar-17	$ 25.00	66,000	0	66,000	$ 3,495	172	$ 1,772	$ 53	$ 137	$ 329	$ 5,810
Apr-17	$ 25.00	77,400	0	77,400	$ 4,098	176	$ 1,813	$ 62	$ 154	$ 369	$ 6,521
May-17	$ 25.00	81,480	0	81,480	$ 4,314	198	$ 2,039	$ 65	$ 165	$ 397	$ 7,006
Yearly Averages		**908,820**	**46,200**	**862,620**	**$ 43,176**	**2,451**	**$ 27,007**	**$ 670**	**$ 1,822**	**$ 6,524**	**$ 79,512**



The resulting energy usage profile, illustrated above, for this account is influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage also somewhat mirrors the consumption profile. The average peak for the 24 month period evaluated occurs in August while the average low occurs in February; further confirming the influence of outdoor weather conditions on building electric consumption.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Miramar Library	Library	12.98	10.7	14.3	15.6

Overall, this building is operating just above the 25th percentile of comparable facilities. Being a relatively new facility, equipped with new, high efficiency HVAC equipment and building controls, there is very limited opportunities for additional energy savings at this site.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Miramar Library

Account #	40262001-01	**Meter #**	
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Total Charges
Feb-16	$ 8,176.64
Jan-16	$20,161.76
Dec-15	$ 2,107.52
Nov-15	$ 2,279.20
Oct-15	$ 2,413.76
Sep-15	$ 1,813.82
Aug-15	$ 1,567.98
Jul-15	$ 1,677.73
Jun-15	$ 1,805.04
May-15	$ 1,589.93
Apr-15	$ 1,906.01
Mar-15	$ 1,857.72
Feb-15	$ 2,160.63
Jan-15	$ 2,441.59
Dec-14	$ 4,057.11
Nov-14	$ 3,863.95
Oct-14	
Sep-14	$ 1,495.32
Aug-14	$ 1,489.03
Jul-14	$ 1,482.74
Jun-14	$ 1,476.45
May-14	$ 1,476.45
Apr-14	$ 47.59
Mar-14	$ 1,476.45
Feb-14	$ 1,457.58
TOTALS	**$ 70,282.00**

Miramar Library

Account #	40440448-00	**Meter #**	
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Total Charges
Jan-16	$ 707.31
Dec-15	$ 713.01
Nov-15	$ 701.62
Oct-15	$ 262.91
Sep-15	$ 268.84
Aug-15	$ 313.32
Jul-15	$ 242.76
Jun-15	$ 245.70
May-15	$ 253.49
Apr-15	$ 240.31
Mar-15	$ 234.92
Feb-15	$ 248.15
Jan-15	$ 240.31
Dec-14	$ 245.70
Nov-14	$ 245.94
Oct-14	$ 235.38
Sep-14	$ 1,005.83
Aug-14	$ 1,005.83
Jul-14	$ 1,005.83
Jun-14	$ 1,005.83
May-14	$ 1,005.83
Apr-14	$ -
Mar-14	$ 1,005.83
Feb-14	$ -
Jan-14	$ 1,005.83
TOTALS	**$ 12,440.48**

These accounts only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

SIEMENS

The below accounts only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

Miramar Library

Account # 40262001	**Meter #**
Rate	**Address**
Meter Size	**Meter Type**

Date	Total Charges
Jan-16	$ 1,568.52
Dec-15	$ 1,533.17
Nov-15	$ 1,540.24
Oct-15	$ 1,568.52
Sep-15	$ 1,499.12
Aug-15	$ 1,526.56
Jul-15	$ 1,540.28
Jun-15	$ 1,547.14
May-15	$ 1,547.14
Apr-15	$ 1,533.42
Mar-15	$ 1,540.28
Feb-15	$ 1,526.56
Jan-15	$ 1,512.84
Dec-14	$ 1,560.86
Nov-14	$ 1,540.28
Oct-14	$ 1,489.03
Sep-14	
Aug-14	
Jul-14	
Jun-14	
May-14	
Apr-14	
Mar-14	
Feb-14	
Jan-14	
TOTALS	**$ 24,573.96**

Miramar Library

Account # 40440448	**Meter #**
Rate	**Address**
Meter Size	**Meter Type**

Date	Total Charges
Jan-16	$ 1,005.83
Dec-15	$ 1,005.83
Nov-15	$ 1,005.83
Oct-15	$ 1,005.83
Sep-15	$ 1,005.83
Aug-15	$ 1,005.83
Jul-15	$ 1,005.83
Jun-15	$ 1,005.83
May-15	$ 1,005.83
Apr-15	$ 1,005.83
Mar-15	$ 1,005.83
Feb-15	$ 1,022.63
Jan-15	$ 1,005.83
Dec-14	$ 1,005.83
Nov-14	$ 1,005.83
Oct-14	$ 1,005.83
Sep-14	
Aug-14	
Jul-14	
Jun-14	
May-14	
Apr-14	
Mar-14	
Feb-14	
Jan-14	
TOTALS	**$ 16,110.08**

RECOMMENDED IMPROVEMENT MEASURES

All recommended FIMs for this facility have been removed from the final scope by Broward County. Please refer to Section G of this report for documentation of these originally proposed opportunities.

D.29. Library - Pompano Beach Branch

FACILITY DESCRIPTION

Pompano Beach Branch Library was constructed approximately in 2015. It is a 2,000 square foot 1-story new building located at 3250 NE 2nd St, Pompano Beach, FL 33062. The building consists of a lobby and offices. The library hours are the following:

Library Office Hours

Monday, Wednesday: 10:00AM – 8:00PM
The rest of week: 10:00AM – 6:00PM
Sunday: Closed

COOLING SYSTEM:

The cooling is provided by 3 split heat pump A/C units with electric heaters. Those units were made by Lennox around 2015. The refrigerant is R-410a. Programmable touch-screen thermostats were installed.

Examples of Building HVAC Systems

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Pompano Beach Branch Library												
AHU-3		TAA090S4D	5614B06985			2		230	3	7.5		2.7
CU	Lennox	TSA090S4SN1Y	5613A03520	compressor	R-410A			230	3	25	13 SEER	9.0
				fan		0.5		230	1	3		0.6
AHU-2	Lennox	CBX27UH-024-230-6	1614C13147			0.5		208	1	4.1		0.8
CU		13ACX-018-230-18	1914A04194	compressor	R-410A			230	1	9	13 SEER	1.9
				fan		0.1		230	1	0.7		0.1
AHU-1	Lennox	CBX27UH-036-230-6	1614B14502			0.5		208	1	4.1	13 SEER	0.8
CU		13ACX-030-230-17	1914A27414	compressor	R-410A			230	1	14.1		2.9
				fan		0.2		230	1	1.1		0.2

LIGHTING SYSTEM

Interior lighting primarily consists of 32 Watt, T8 fluorescent lamps in 2-lamp 2x4 parabolic fixtures. The occupancy sensors were installed for lighting control.


Interior Lighting Examples

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility: FIM: Water Conservation

- 0.5 gpm faucets
- 1.0 gpf urinals



Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

No web-based building control system was installed. The HVAC equipment is controlled by programmable thermostats set of time of use schedules and setbacks.

UTILITY DATA ANALYSIS - ELECTRIC

The information provided in order to obtain electric usage at this facility relates to a previous location. The new site for the Pompano Beach Branch library has not yet developed enough billing data to generate historical data. Being a relatively new facility, equipped with new, high efficiency HVAC equipment and building controls, there is very limited opportunities for additional energy savings at this site.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Pompano Beach Branch Library

Account #	16219-4336	**Meter #**
Rate		**Address**
Meter Size	2"	**Meter Type**

	11027602	11027601 Irrigation	
Date	**Consumption C1 (kgal)**	**Consumption C2 (kgal)**	**Total Charges**
Jun-17	8	84	$ 772.32
May-17	5	103	$ 915.19
Apr-17	6	111	$ 986.94
Mar-17	6	96	$ 862.14
Feb-17	5	90	$ 807.21
Jan-17	5	102	$ 907.05
Dec-16	5	95	$ 848.81
Nov-16	5	79	$ 717.93
Oct-16	5	96	$ 845.91
Sep-16	5	84	$ 745.31
Aug-16	5	102	$ 895.07
Jul-16	5	63	$ 574.77
Jun-16	5	94	$ 828.51
May-16	6	82	$ 733.68
Apr-16	5	86	$ 761.95
Mar-16	95		
Feb-16	54		$ 795.23
Jan-16	237		$ 487.55
Dec-15	86		$ 733.68
Nov-15	93		$ 717.04
Oct-15	159		$ 775.28
Sep-15	85		$ 700.06
Aug-15	96		$ 784.96
Jul-15	84		$ 685.12
Jun-15	89		$ 730.03
TOTALS	**1159**	**1367**	**$18,611.74**

This account had two sets of consumption data for two meters. There was no information on how the expenses were divided for those two meters. Due to the lack of information for this account, no relevant conclusions can be drawn.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Pompano Beach Branch Library	Lighting - Interior	$ 472.15	$ -	$ -	$ 58	$ 530.15	$ 5,546.18	10.5
Pompano Beach Branch Library	Lighting - Exterior	$ 76.00	$ -	$ -	$ 25	$ 101.00	$ 822.69	8.1
Breakage Fee							$ 340.00	
PA Cost							$ 66.68	
Total		**$ 548.15**	**$ -**	**$ -**	**$ 83**	**$ 631.15**	**$ 6,775.55**	**10.7**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps: The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures: In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

Emergency Lighting: Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, BE, Pompano Beach Branch	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	17	17
	Existing T8 Fluorescent - Proposed Retrofit LED	48	48

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, BE, Pompano Beach Branch	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	11	11
	Existing Compact Fluorescent - Proposed Retrofit LED	5	5

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 4,837 kWh

Annual Electric Demand: 18.24 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Pompano Beach Branch Library	Lighting - Interior	$ 472.15	$ -	$ -	$ 58	$ 530.15	$ 5,546.18	10.5
Pompano Beach Branch Library	Lighting - Exterior	$ 76.00	$ -	$ -	$ 25	$ 101.00	$ 822.69	8.1

D.30. Library - Riverland Branch

FACILITY DESCRIPTION

The Riverland Library was constructed approximately in 1983. It is a 10,000 square foot 1-story building located at 2710 West Davie Blvd, Fort Lauderdale, FL 33312. The building has a main lobby and offices. The library hours are the following:

Library Office Hours

Monday, Thursday:	12:00PM – 8:00PM
Sunday:	Closed
The rest of week:	10:00AM – 6:00PM

Observed Issues:

- Room temperature at lobby was hot, and couldn't feel air movement
- Missing return air grille
- Missing diffuser parts
- Water marks on ceiling tiles from roof water leakage
- Outdated control system and components



Examples of observed issues

COOLING SYSTEM:

The temperature of the library is maintained by 2 rooftop units with electric heaters. It was said one unit is over 10 years old and another was rebuilt recently. The total nominal tonnage is 30Ton.

According to mechanical drawings, constant air volume terminal boxes were installed, and it was said they are original.

As shown in the following pictures, old Carrier non-programmable thermostats are still in use, and outdated diffusers were installed in the library. Room temperature was high and hard to feel air movement during the visit.

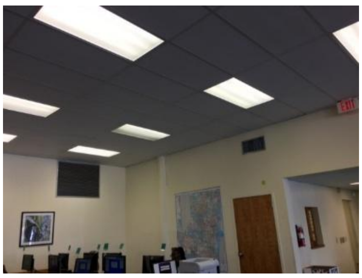
Building HVAC

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Riverland Library												
RTU 1	Carrier	50TFF012–V511	4303G50596	compressor	R-22		10	230	3	15.8	9	4.7
				compressor				230	3	14.7		4.4
				Outdoor fan				230	1	1.4		0.2
				Outdoor fan				230	1	1.4		0.2
				Indoor fan				230	3	5.8		1.7
RTU 2	Carrier	50TJ-024–V5A1YA	4203F59320	compressor	R-22		20	230	3	38	9	11.4
				compressor				230	3	30.1		9.0
				Outdoor fan				230	3	6.6		2.0
				Outdoor fan				230	3	6.6		2.0
				Indoor fan				230	3	2.5		0.7

LIGHTING SYSTEM

Interior lighting primarily consists of T8 fluorescent lamps in 3-lamp 2x4 fixtures.



Interior Lighting Examples

Exterior Lighting consists of recessed flood lights.

Exterior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control. Motion sensors are for security and not connected to lighting and HVAC controls.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 0.5 gpm faucets
- 1.0 gpf urinals

ENVELOPE

There were noticeable water marks on ceiling tiles from roof leakage.

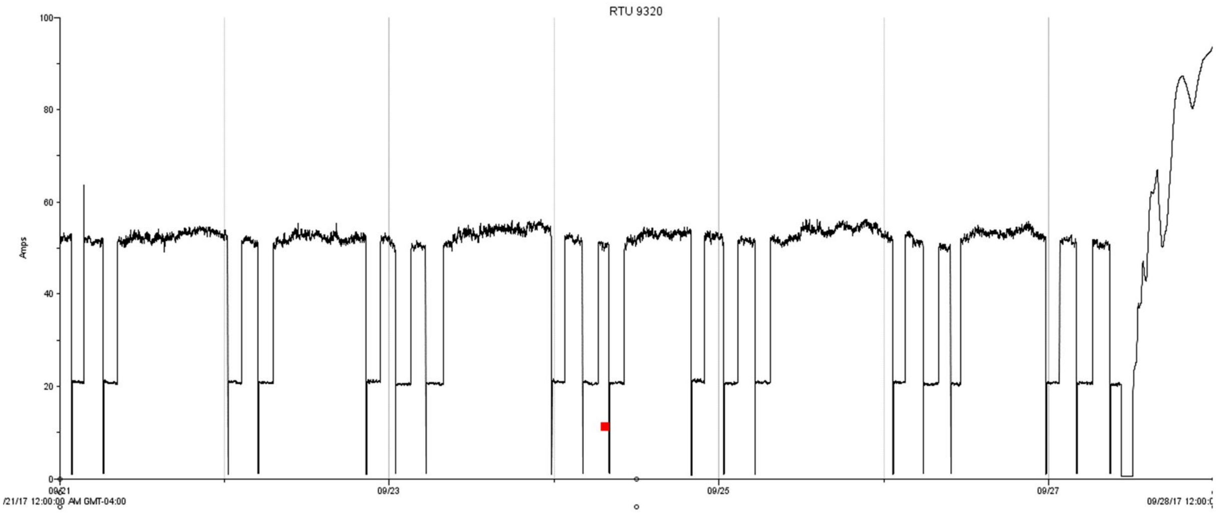
BUILDING CONTROLS SYSTEM

There is no web-based building control system installed in the building. The HVAC system is locally controlled by thermostats together with rooftop unit factory installed controllers.

TRENDING ADAT ANALYSIS

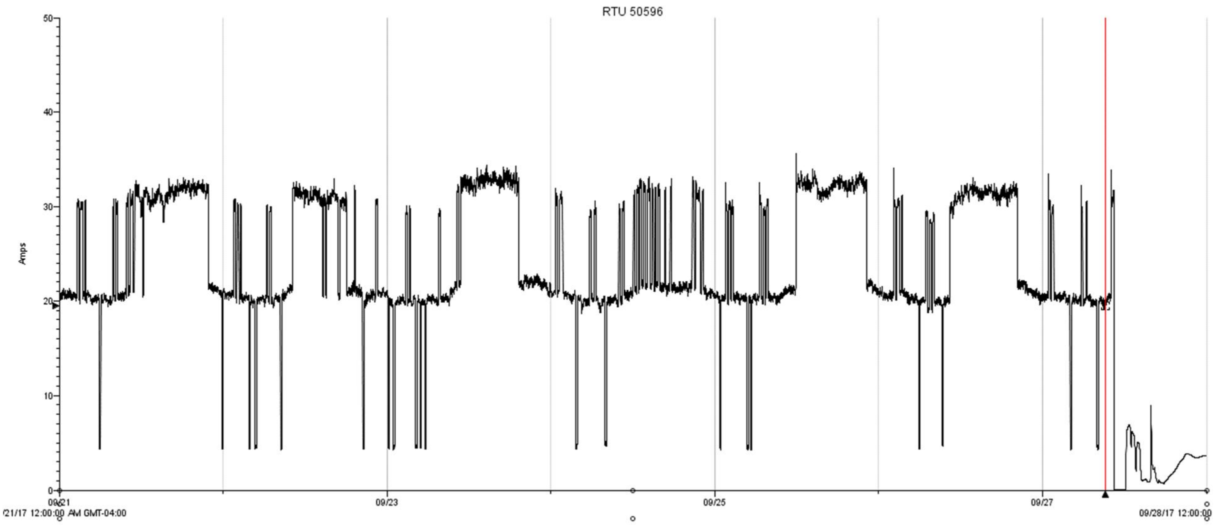
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 20 Ton Condensing Unit



This unit registered an average of 53 amps when two compressors are running and an average of 21 amps when only one compressor was running. The operating hours totaled 31.95 and 120.02 when one and two compressors were running, respectively, during a one week period.

Trending Data – 10 Ton Condensing Unit



This unit registered an average of 31 amps when two compressors are running and an average of 20 amps when only one compressor was running. The operating hours totaled 82.38 and 67.47 when one and two compressors were running, respectively, during a one week period.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the General Service Demand (GSD-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

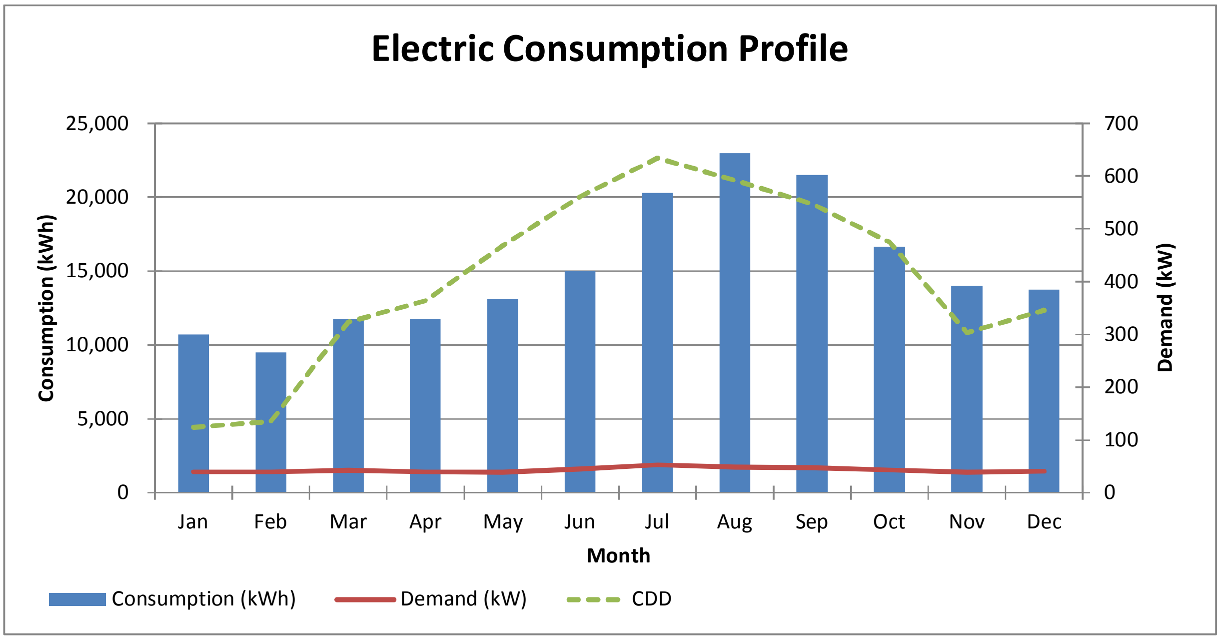
Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Riverland Branch Library	1	GSD-1	$ 0.05809	$ 11.47	180,913	518	59

The data in the table above was generated using the following electric billing data.

Meter KJ42079; Account: 5353044018; Address: 2710 DAVIE BLVD FORT LAUD

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 19.48	15,267	$ 841	42	$ 446	$ 74	$ 1,380
Jul-15	$ 19.48	22,296	$ 1,228	55	$ 584	$ 102	$ 1,933
Aug-15	$ 19.48	27,891	$ 1,537	52	$ 552	$ 111	$ 2,219
Sep-15	$ 19.48	25,246	$ 1,391	59	$ 626	$ 103	$ 2,140
Oct-15	$ 19.48	18,216	$ 1,004	52	$ 552	$ 84	$ 1,659
Nov-15	$ 19.48	14,880	$ 820	43	$ 456	$ 69	$ 1,364
Dec-15	$ 19.48	11,696	$ 593	41	$ 435	$ 113	$ 1,160
Jan-16	$ 19.48	7,721	$ 391	39	$ 394	$ 71	$ 876
Feb-16	$ 19.48	8,079	$ 409	36	$ 364	$ 70	$ 862
Mar-16	$ 19.48	11,046	$ 560	49	$ 495	$ 97	$ 1,171
Apr-16	$ 19.48	11,233	$ 569	42	$ 425	$ 66	$ 1,079
May-16	$ 19.48	12,475	$ 632	41	$ 415	$ 66	$ 1,132
Jun-16	$ 20.24	14,743	$ 702	49	$ 511	$ 108	$ 1,341
Jul-16	$ 20.24	18,248	$ 869	51	$ 531	$ 125	$ 1,545
Aug-16	$ 20.24	18,022	$ 858	45	$ 469	$ 118	$ 1,465
Sep-16	$ 20.24	17,742	$ 845	36	$ 375	$ 105	$ 1,345
Oct-16	$ 20.24	15,073	$ 717	35	$ 365	$ 94	$ 1,196
Nov-16	$ 20.24	13,090	$ 623	35	$ 365	$ 86	$ 1,095
Dec-16	$ 20.24	15,764	$ 750	40	$ 417	$ 102	$ 1,289
Jan-17	$ 25.00	13,720	$ 706	40	$ 424	$ 102	$ 1,257
Feb-17	$ 25.00	10,918	$ 562	43	$ 456	$ 92	$ 1,134
Mar-17	$ 25.00	12,479	$ 670	37	$ 392	$ 97	$ 1,184
Apr-17	$ 25.00	12,266	$ 659	37	$ 392	$ 96	$ 1,172
May-17	$ 25.00	13,714	$ 736	37	$ 392	$ 103	$ 1,256
Yearly Averges		**180,913**	**$ 9,335**	**518**	**$ 5,416**	**$ 1,125**	**$ 16,126**



The resulting energy usage profile, illustrated above, for this account is directly influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage is relatively constant from month to month, indicating a base consumption need. The average peak for the 24 month period evaluated occurs in August while the average low occurs in February; further confirming the influence of outdoor weather conditions on building electric consumption.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Facliy Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Riverland Branch Library	Library	18.09	10.7	14.3	15.6

Overall, this building is operating above the 75th percentile of comparable facilities. This indicates improvement opportunities for both equipment upgrades and building automation.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Riverland Branch Library

Account #	2041452	**Meter #**	201000204
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Total Charges
Feb-16	$ 40.05
Jan-16	$ 17.07
Dec-15	$ 51.54
Nov-15	$ 120.47
Oct-15	$ 0.86
Sep-15	$ 27.19
Aug-15	$ 27.19
Jul-15	$ 27.19
Jun-15	$ 27.19
May-15	$ 27.19
Apr-15	$ 27.19
Mar-15	$ 16.25
Feb-15	$ 27.19
Jan-15	$ 27.19
Dec-14	$ 27.19
Nov-14	$ 16.25
Oct-14	$ 26.70
Sep-14	$ 25.89
Aug-14	$ 15.48
Jul-14	$ 25.89
Jun-14	$ 15.48
May-14	$ 25.89
Apr-14	$ 25.89
Mar-14	$ 14.75
Feb-14	$ 25.89
TOTALS	**$ 709.06**

Riverland Branch Library

Account # 2041453	**Meter #** 200213997
Rate	**Address**
Meter Size	**Meter Type**

Date	Total Charges
Feb-16	$ 40.56
Jan-16	$ 40.56
Dec-15	$ 255.35
Nov-15	$ 279.19
Oct-15	$ 225.75
Sep-15	$ 260.47
Aug-15	$ 156.07
Jul-15	$ 143.02
Jun-15	$ 27.97
May-15	$ 27.97
Apr-15	$ 27.97
Mar-15	$ 86.39
Feb-15	$2,347.36
Jan-15	$ 36.67
Dec-14	$ 41.02
Nov-14	$ 32.32
Oct-14	$ 36.01
Sep-14	$ 43.18
Aug-14	$ 30.76
Jul-14	$ 30.76
Jun-14	$ 34.90
May-14	$ 18.34
Apr-14	$ 36.49
Mar-14	$ (2.55)
Feb-14	$ 105.28
TOTALS	**$4,361.81**

These accounts only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Riverland Branch Library	Lighting - Interior	$ 917.93	$ 605.80	$ -	$ 239	$ 1,762.72	$ 18,472.25	10.5
Riverland Branch Library	Lighting - Exterior	$ 9.49	$ 5.23	$ -	$ 11	$ 25.72	$ 285.60	11.1
Riverland Branch Library	RTU COMBINED	$ 5,199.35	$ 719.15	$ -	$ -	$ 5,918.50	$ 85,497.03	14.4
Breakage Fee							$ 1,700.00	
PA Cost							$ 1,089.33	
Total		**$ 6,126.77**	**$ 1,330.17**	**$ -**	**$ 250**	**$ 7,706.94**	**$ 107,044.21**	**13.9**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps

The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures.

In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures

Our design strategy for the replacement of screw based incandescent and compact fluorescent lamps is to replace them with screw based LED where the application permits. LED has become an attractive replacement option when incandescent fixtures are controlled by dimmers due to its excellent dimming capability.

LED Replacement for Pin-Based Compact Fluorescent Fixtures

In keeping with the direction to remove fluorescent ballasts, reduce energy use and minimize cost, our design strategy for existing pin-based compact fluorescent lamps is to retrofit the existing fixtures with line voltage pin based LED lamps and remove the existing fluorescent ballasts. In some cases, it is possible to remove two fluorescent lamps and replace them with a single higher powered LED lamp without sacrificing luminaire output and distribution.

Emergency Lighting

Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, RV, Riverland Branch	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing T8 Fluorescent - Proposed Retrofit LED	109	109
	Existing Incandescent - Proposed Relamp LED	9	9
	Existing Compact Fluorescent - Proposed Relamp LED	1	1
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	16	16

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, RV, Riverland Branch	Existing Compact Fluorescent - Proposed Relamp LED	10	10

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 15,800 kWh

Annual Electric Demand: 52.44 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Riverland Branch Library	Lighting - Interior	$ 917.93	$ 605.80	$ -	$ 239	$ 1,762.72	$ 18,472.25	10.5
Riverland Branch Library	Lighting - Exterior	$ 9.49	$ 5.23	$ -	$ 11	$ 25.72	$ 285.60	11.1

MECHANICAL

As DX equipment ages and the condition of the equipment deteriorate, the energy efficiency of these units also degrades. In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

Cooling for this building is provided by a total of two (2) roof-top units that have reached the end of their useful lives.

PROJECT SCOPE

This FIM addresses the replacement of two (2) roof top units. The new equipment will be of equal capacity and include, as part of the installation, package new programmable thermostats provided by Siemens. The thermostats will be able to communicated, via their own IP address, to remote BAUs for additional access. The units will be placed on a time of day schedule. The new schedule will command the units to turn on 1.5 hours before the facility opens and 1.5 hours after it closes.

Scope of Work

Building	Equipment	Make	Model	Tons	Existing EER	New EER
Riverland Branch Library	RTU	Carrier	50TFF012--V511	10	9	12.5
Riverland Branch Library	RTU	Carrier	50TJ-024--V5A1YA	20	9	11

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. The detailed calculations are available in the Section H, Appendices. All calculations were based off Trane manufacturer cut-sheets, also provided.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 89,500 kWh

Annual Electric Demand: 62.7 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Riverland Branch Library	RTU COMBINED	$ 5,199.35	$ 719.15	$ -	$ -	$ 5,918.50	$ 85,497.03	14.4

D.31. Library - Tamarac

FACILITY DESCRIPTION

The newest Tamarac Branch Library was constructed approximately in 2003, and was renovated in 2007. It is a 30,000 square foot 1-story building located at 8701 west Commercial Blvd, Tamarac, FL 33351. The building has a main lobby, individual study rooms, a large multipurpose room, a computer lab, and offices. The library hours are the following:

Library Office Hours

Monday – Wednesday:	10:00AM – 8:00PM
Thursday – Saturday:	10:00AM – 6:00PM
Sunday:	Closed

COOLING SYSTEM:

The chilled water is provided by a constant chilled water flow system. The system consists of an air-cooled chiller and 2 constant speed 5-HP chilled water pumps. The old York chiller was replaced in September 2013 by the current Trane air-cooled chiller. The nominal tonnage of the chiller is 100 tons. The refrigerant is R-410a. One of the two pumps is a standby pump. Three-way chilled water DDC control valves were installed at AHUs.

Chilled Water System

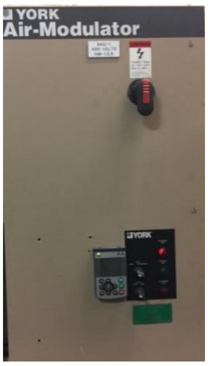
Two single duct air handling systems with VAV terminal boxes are serving the building. There are 2 chilled water VAV air handling units (AHU-1, AHU-2), which are located in the same mechanical room. The 20-horsepower supply fan of each AHU was equipped with a York VFD, Air modular. The VFDs seem 14 years old. The fan speed is controlled to maintain a static pressure setpoint at the main supply duct located in the mechanical room.

A CO_2 sensor exists at the main return air duct in each mechanical room. A two-position OA damper was installed, and the design OA intake is 5500CFM, which is approximately 19% of the total supply airflow.

The fresh air has a dedicated supply air fan installed on the fresh air duct. The fan is equipped with an ABB VFD, but the display was zero Hz although the fan was running. It is suspicious for a faulty VFD.

There are also 2 split air conditioning units dedicatedly serving Library Material Return and Staff Lounge.

According to design drawings, 26 single duct VAV terminal boxes are controlled to maintain zone space temperature set points. Some boxes have electric heaters. The design minimum air flow for boxes without reheat is zero, and approximately 20% for boxes with heaters. No dedicated humidity control systems are installed. The thermostats are with guard covers, and the temperature adjustment is not accessible.



Building HVAC

Observed Issues with the cooling system

- VFDs were no display or faulty display

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Tamarac Branch Library												
Chiller	Trane	CGAM ???F 2J02	U13J38373	compressor				460	3	42		30.1
				compressor				460	3	42		30.1
				compressor				460	3	42		30.1
				compressor				460	3	42		30.1
Pump		M3615T				5		460	3	5.7	87.5%	4.1
AHU-1	York		CCMM 16821D		with VFD	20		460	3	24.8		17.8
AHU-2	York				with VFD	20		460	3	29		20.8

LIGHTING SYSTEM

Interior lighting primarily consists of 32 Watt, T8 fluorescent lamps in 2-lamp 2x4 fixtures. About 20% lights burnt out and are waiting for replacement.

Interior Lighting Examples

Exterior Lighting consists of HPS wall packs. Facility personnel has retrofitted one of these wall packs to compact fluorescent (CFL) lighting.

The building does not make use of occupancy sensors or any other types of lighting control. Motion sensors are for security and not connected to lighting and HVAC controls. The overall building lights can be controlled by the control system.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and kitchen sinks. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.0 gpf urinals

Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

The building is equipped with a Johnson Controls DDC building automation system. Any changes to the controls operation is handled from the Government Center

HVAC Operational Schedule

Unit	Operating	
AHU-1, AHU-2	Monday	7:30AM – 8:15PM
	Tuesday–Wednesday:	8:00AM – 8:15PM
	Thursday:	8:00AM – 6:15PM
	Friday-Sunday	4:00AM – 12:00AM

BROWARD COUNTY FLORIDA

SIEMENS

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the General Service Demand (GSD-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

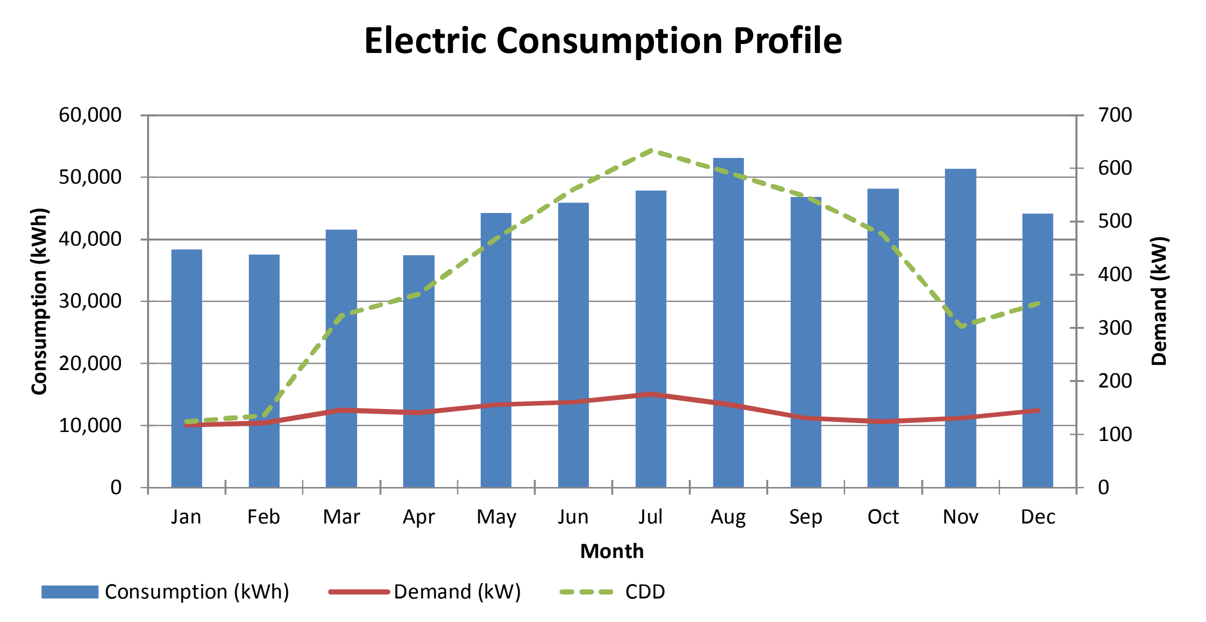
Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Tamarac Library	1	GSD-1	$ 0.05808	$ 11.46	536,580	1,702	191

The data in the table above was generated using the following electric billing data.

Meter KV52540; Account: 7864325506; Address: 8701 W COMMERCIAL BLVD

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 19.48	47,880	$ 2,638	160	$ 1,698	$ 247	$ 4,602
Jul-15	$ 19.48	47,640	$ 2,624	160	$ 1,698	$ 246	$ 4,588
Aug-15	$ 19.48	51,720	$ 2,849	158	$ 1,676	$ 253	$ 4,798
Sep-15	$ 19.48	48,960	$ 2,697	130	$ 1,379	$ 205	$ 4,301
Oct-15	$ 19.48	50,280	$ 2,770	128	$ 1,358	$ 206	$ 4,353
Nov-15	$ 19.48	54,360	$ 2,995	136	$ 1,443	$ 222	$ 4,679
Dec-15	$ 19.48	42,720	$ 2,164	164	$ 1,740	$ 417	$ 4,340
Jan-16	$ 19.48	32,640	$ 1,654	107	$ 1,082	$ 239	$ 2,994
Feb-16	$ 19.48	37,320	$ 1,891	137	$ 1,385	$ 286	$ 3,581
Mar-16	$ 19.48	41,640	$ 2,109	136	$ 1,375	$ 313	$ 3,817
Apr-16	$ 19.48	37,440	$ 1,897	168	$ 1,698	$ 243	$ 3,858
May-16	$ 19.48	44,160	$ 2,237	174	$ 1,759	$ 257	$ 4,273
Jun-16	$ 20.24	43,800	$ 2,085	161	$ 1,678	$ 328	$ 4,111
Jul-16	$ 20.24	48,120	$ 2,291	191	$ 1,990	$ 373	$ 4,674
Aug-16	$ 20.24	54,600	$ 2,599	155	$ 1,615	$ 367	$ 4,601
Sep-16	$ 20.24	44,760	$ 2,131	131	$ 1,365	$ 296	$ 3,812
Oct-16	$ 20.24	46,080	$ 2,193	119	$ 1,240	$ 291	$ 3,744
Nov-16	$ 20.24	48,480	$ 2,308	125	$ 1,303	$ 306	$ 3,936
Dec-16	$ 20.24	45,600	$ 2,171	126	$ 1,313	$ 295	$ 3,799
Jan-17	$ 25.00	44,160	$ 2,272	127	$ 1,346	$ 316	$ 3,959
Feb-17	$ 25.00	37,680	$ 1,939	106	$ 1,124	$ 272	$ 3,360
Mar-17	$ 25.00	41,520	$ 2,230	155	$ 1,643	$ 346	$ 4,244
Apr-17	$ 25.00	37,320	$ 2,004	113	$ 1,198	$ 287	$ 3,514
May-17	$ 25.00	44,280	$ 2,378	137	$ 1,452	$ 342	$ 4,197
Yearly Averages		**536,580**	**$ 27,562**	**1,702**	**$ 17,779**	**$ 3,476**	**$ 49,067**



The resulting energy usage profile, illustrated above, for this account is influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage is relatively constant from month to month, indicating a base consumption need. The average peak for the 24 month period evaluated occurs in August while the average low occurs in February; further confirming the influence of outdoor weather conditions on building electric consumption.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Facility Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Tamarac Library	Library	17.89	10.7	14.3	15.6

Overall, this building is operating above the 75th percentile of comparable facilities. This indicates improvement opportunities in equipment upgrades and building automation. However, the low annual billing costs may negatively affect FIM payback values.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Tamarac Branch Library

Account # 58199-10009868	**Meter #** WT 60340741 04
Rate	**Address**
Meter Size	**Meter Type**

Date	Consumption ()	Total Charges
Mar-17	29	$ 516.12
Feb-17	26	$ 501.80
Jan-17	20	$ 468.03
Dec-16	25	$ 494.64
Nov-16	42	$ 623.52
Oct-16	21	$ 483.12
Sep-16	30	$ 540.61
Aug-16	34	$ 544.76
Jul-16	26	$ 501.80
Jun-16	24	$ 507.65
May-16	29	$ 516.12
Apr-16	29	$ 561.12
Mar-16	33	$ 544.76
Feb-16	24	
Jan-16	21	$ 487.48
Dec-15	19	$ 473.16
Nov-15	21	$ 444.52
Oct-15	21	$ 466.00
Sep-15	21	$ 484.09
Aug-15	22	$ 473.16
Jul-15	21	$ 474.78
Jun-15	20	$ 471.94
May-15	27	$ 508.96
Apr-15	30	$ 575.44
Mar-15	21	$ 497.98
TOTALS	**636**	**$12,161.56**

This account had a mostly complete 24 month data set for water consumption and utility cost. The average monthly consumption is 25 thousand gallons. The average monthly cost is $506.73. The average monthly blended rate in dollars per thousand gallons is $19.92. This blended rate is much higher than the rate being used for savings calculations but any fees and charges to this account are unknown so the rate is not an accurate representation of consumption cost.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Tamarac Library	Lighting - Exterior	$ 1,705.08	$ 939.27	$ -	$ 346	$ 2,990.34	$ 35,482.27	11.9
Breakage Fee							$ 5,100.00	
PA Cost							$ 371.49	
Total		**$ 1,705.08**	**$ 939.27**	**$ -**	**$ 346**	**$ 2,990.34**	**$ 40,953.76**	**13.7**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for High Intensity Discharge Exterior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium n exterior applications provides significant energy reduction opportunities when changing over to LED. For exterior pole mounted applications, often the number of fixtures can be reduce based on the improved photometric and light distribution of the new LED fixtures that wasn't previously available in HID fixtures. All proposed LED fixtures are from recognized manufacturers that have met the required standards for light quality, efficiency and longevity. In our design effort and fixture selection process, consideration is given to the maintenance benefits of the prescribed solution resulting in less future costs to maintain exterior fixtures in difficult to reach applications. The proposed LED fixture replacement has been specified to furnish light levels that are in compliance with recommended light levels and support the existing site condition requirements. Where time clocks or automated lighting controls are not in place, proposed LED building and site lighting will incorporate an integral photocell to maximize energy savings.

In general, the design approach is to replace existing HID luminaires with new LED luminaires of like type, ie: shoeboxes, wallpacks, floodlights. Some fixture types are replaced with new LED fixtures of a different type, ie: recessed canopy lights replaced with low profile LED canopy lights.

Where deemed appropriate in parks and office buildings, integral occupancy sensors have been used on pole mounted shoebox luminaires in parking lots to automatically dim the lighting during hours of inactivity.

Decorative post top luminaires, recessed step lights, and bollards typically use low wattage HID lamps in architectural form factors. Replacement luminaires of this type are relatively high in cost, with relatively low energy savings potential. As a result, the proposed design typically calls for removing the HID lamp and ballast, and installing a new screw based LED lamp.

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, TA, Tamarac	Existing High Intensity Discharge - Proposed New LED Fixture	20	20
	Existing Compact Fluorescent - Proposed Relamp LED	5	5
	Existing Compact Fluorescent - Proposed Retrofit LED	48	48

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 29,357 kWh

Annual Electric Demand: 82.08 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Tamarac Library	Lighting - Exterior	$ 1,705.08	$ 939.27	$ -	$ 346	$ 2,990.34	$ 35,482.27	11.9

D.32. Library - Tyrone Bryant

FACILITY DESCRIPTION

The Tyrone Bryant Library was constructed approximately in 2008. It is a 10,250 square foot 1-story building located at 2230 NW 21 Ave, Fort Lauderdale, FL 33311. The building has a main lobby, individual study rooms, a large multipurpose room, a computer lab, and offices. The library hours are the following:

Library Office Hours

Monday and Thursday:	12:00PM – 6:00PM
Tuesday, Wednesday, Friday:	10:00AM – 6:00PM
Saturday:	10:00AM – 6:00PM
Sunday:	Closed

COOLING SYSTEM:

Cooling for the building is provided by a split DX system consisting of one AHU with two condensing of 15 and 20 tons. The condensing units were manufactured in 2007 and still utilize R-22 refrigerant.

Split DX System

One air handling unit with VAV terminal boxes serves the building; located in a dedicated mechanical room next to the outdoor condensing units. The 15-horsepower supply fan is equipped with An ABB VFD.



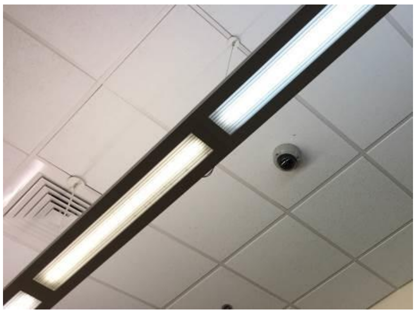
Building HVAC

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Tyrone Bryant Branch Library												
AHU-1	Trane	MCCB030UA	K07G93928		with VFD	15		200	3	48.3		15.1
CU	Trane	TTA240B300FB	7472PG2AD	compressor	R-22		20	230	3	33.7	10	12.1
				compressor	2007			230	3	33.7		12.1
				fan				230	1	6		1.2
				fan				230	1	6		1.2
CU	Trane	TTA180B300FA	7443NMMAD	compressor	R-22		15	230	1	25.1	10	5.2
				compressor	2007			230	1	25.1		5.2
				fan				230	1	3.1		0.6
				fan				230	1	3.1		0.6

LIGHTING SYSTEM

Interior lighting primarily consists of 32 Watt, T8 fluorescent lamps in 1-lamp 2x4 fixtures.

Interior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control. Motion sensors are for security and not connected to lighting and HVAC controls.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and kitchen sinks. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.5 gpf urinals

BUILDING CONTROLS SYSTEM

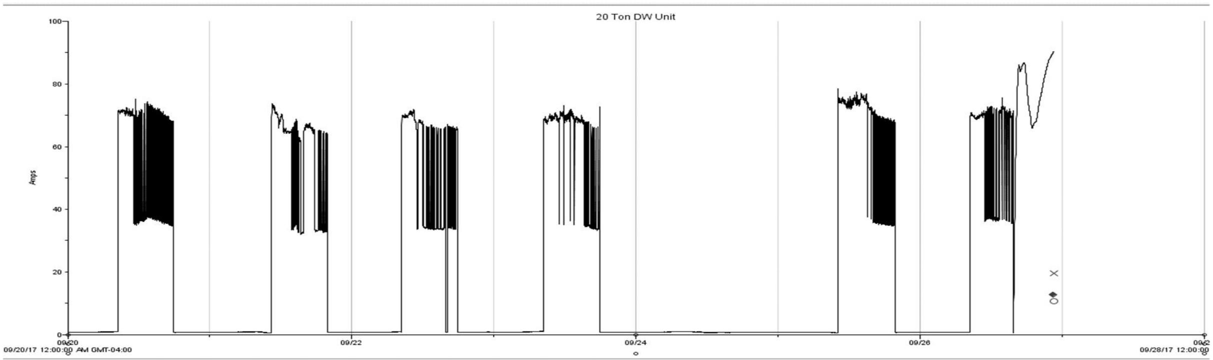
The building is equipped with a Johnson Controls DDC building automation system. Any changes to the controls operation is handled from the Government Center. The spaces around the library do contain CO2 sensors; however, it was not conclusive whether or not they were operational.

Building Controls

TRENDING DATA AQUISITION:

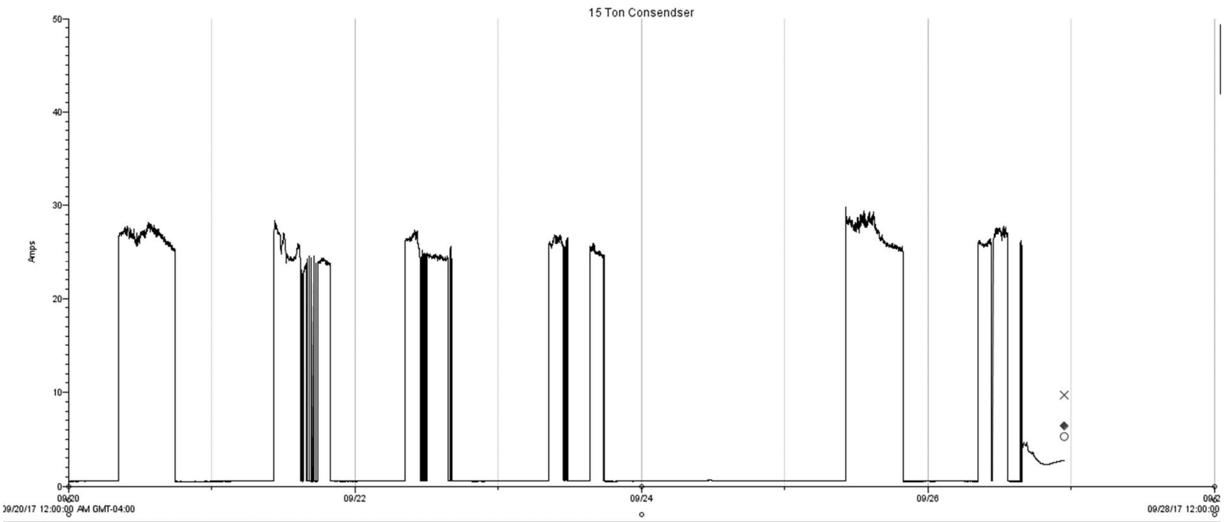
In order to determine the runtime and power draw of onsite HVAC equipment, data loggers were installed to obtain more data than currently available. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 20 Ton Condensing Unit



The unit registered an average of 69.33 amps and was operating for a total 43.4 hours during a one week period

Trending Data – 15 Ton Condensing Unit



The unit registered an average of 26.05 amps and was operating for a total 42.23 hours during a one week period

UTILITY DATA ANALYSIS – ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the General Service Demand (GSD-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

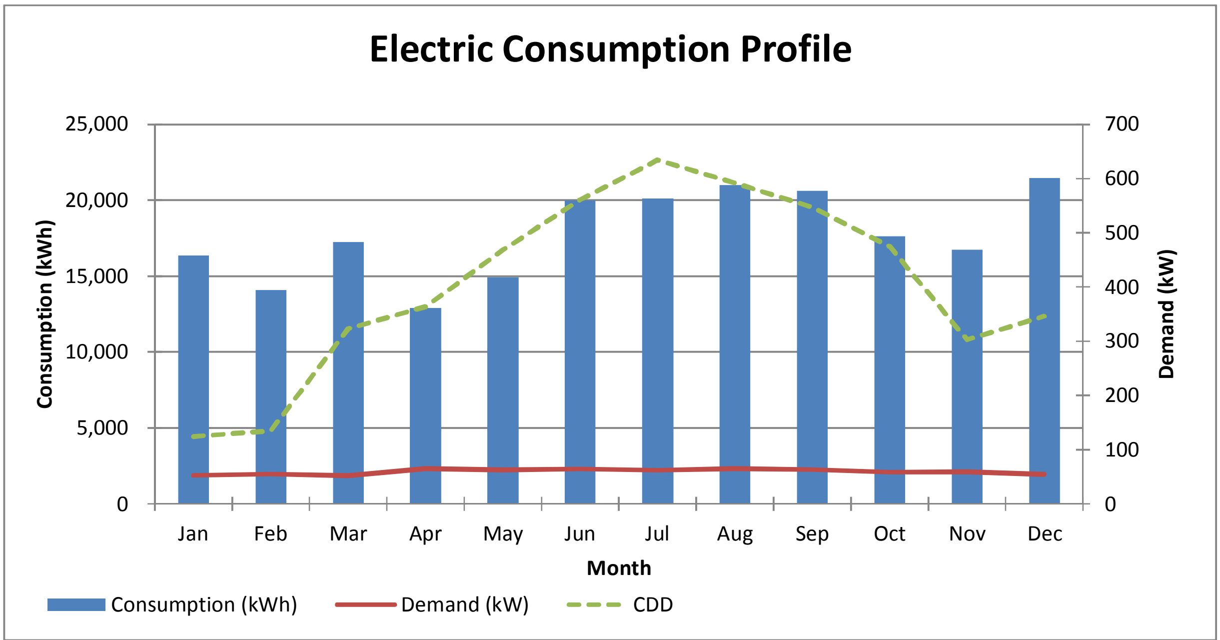
Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Tyrone Bryant Library	1	GSD-1	$ 0.05809	$ 11.47	213,120	712	78

The data in the table above was generated using the following electric billing data.

Meter KU51264; Account: 375767084; Address: 2230 NW 21ST AVE #LIB FORT LAUD

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 19.48	25,200	$ 1,388	56	$ 594	$ 109	$ 2,111
Jul-15	$ 19.48	24,600	$ 1,355	53	$ 562	$ 105	$ 2,042
Aug-15	$ 19.48	24,840	$ 1,368	52	$ 552	$ 104	$ 2,044
Sep-15	$ 19.48	26,760	$ 1,474	52	$ 552	$ 99	$ 2,145
Oct-15	$ 19.48	22,920	$ 1,263	53	$ 562	$ 93	$ 1,938
Nov-15	$ 19.48	21,360	$ 1,177	53	$ 562	$ 90	$ 1,848
Dec-15	$ 19.48	30,360	$ 1,538	54	$ 573	$ 241	$ 2,372
Jan-16	$ 19.48	20,160	$ 1,021	55	$ 556	$ 140	$ 1,737
Feb-16	$ 19.48	16,560	$ 839	54	$ 546	$ 123	$ 1,527
Mar-16	$ 19.48	21,960	$ 1,112	49	$ 495	$ 147	$ 1,775
Apr-16	$ 19.48	12,960	$ 657	73	$ 738	$ 105	$ 1,519
May-16	$ 19.48	14,160	$ 717	66	$ 667	$ 98	$ 1,502
Jun-16	$ 20.24	14,760	$ 703	72	$ 750	$ 129	$ 1,602
Jul-16	$ 20.24	15,600	$ 743	71	$ 740	$ 132	$ 1,634
Aug-16	$ 20.24	17,160	$ 817	78	$ 813	$ 145	$ 1,794
Sep-16	$ 20.24	14,520	$ 691	74	$ 771	$ 127	$ 1,610
Oct-16	$ 20.24	12,360	$ 588	64	$ 667	$ 110	$ 1,385
Nov-16	$ 20.24	12,120	$ 577	65	$ 677	$ 110	$ 1,385
Dec-16	$ 20.24	12,600	$ 600	54	$ 563	$ 102	$ 1,285
Jan-17	$ 25.00	12,600	$ 648	50	$ 530	$ 106	$ 1,309
Feb-17	$ 25.00	11,640	$ 599	56	$ 594	$ 107	$ 1,325
Mar-17	$ 25.00	12,480	$ 670	54	$ 572	$ 113	$ 1,380
Apr-17	$ 25.00	12,840	$ 690	56	$ 594	$ 116	$ 1,425
May-17	$ 25.00	15,720	$ 844	59	$ 625	$ 133	$ 1,628
Yearly Averages		**213,120**	**$ 11,040**	**712**	**$ 7,428**	**$ 1,443**	**$ 20,161**



The resulting energy usage profile, illustrated above, for this account appears to be mostly influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage is relatively constant from month to month, indicating a base consumption need. However, the average peak for the 24 month period evaluated occurs in December while the average low occurs in February. The facility most experience increased activity or events and functions towards the end of the year, increasing visitor traffic, that results in this unexpected peak.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Tyrone Bryant Library	Library	20.79	10.7	14.3	15.6

Overall, this building is operating above the 75th percentile of comparable facilities. This indicates improvement opportunities in equipment upgrades and building automation. However, the low annual billing costs may negatively affect FIM payback values.

UTILITY DATA ANALYSIS – WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Tyrone Bryant Branch Library

Account #	2028503	**Meter #**	200701699
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Total Charges
Feb-16	
Jan-16	$ 637.24
Dec-15	$ 714.58
Nov-15	$ 685.45
Oct-15	$ 599.89
Sep-15	$ 602.40
Aug-15	$ 612.74
Jul-15	$ 668.23
Jun-15	$ 619.85
May-15	$ 595.29
Apr-15	$ 668.20
Mar-15	$ 657.89
Feb-15	$ 605.63
Jan-15	$ 699.13
Dec-14	$ 626.93
Nov-14	$ 605.63
Oct-14	$ 649.29
Sep-14	$ 590.30
Aug-14	$ 579.83
Jul-14	$ 665.85
Jun-14	$ 587.23
May-14	$ 626.53
Apr-14	$ 569.99
Mar-14	$ 583.53
Feb-14	$ 553.38
TOTALS	**$15,005.01**

This account only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Tyrone Bryant Library	Water - Retrofits	$ 64.40	$ -	$ 862.12	$ 83	$ 1,009.24	$ 10,782.87	10.7
Breakage Fee							$ 1,742.50	
PA Cost							$ 112.89	
Total		**$ 64.40**	**$ -**	**$ 862.12**	**$ 83**	**$ 1,009.24**	**$ 12,638.26**	**12.5**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Tank Style Water Closets: Tank style water closets utilize a tank fill valve on top of the bowl which uses gravity to drain large volumes of water into the bowl during evacuation. Pressure assisted tank valves use domestic water pressure to pressurize the tank water allowing for more forceful evacuations with less water volume. Installation of 1.00 gallons per flush (GPF) tank type, pressure assist, ADA style water closet will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

Urinals: High efficiency flush valve and china combinations for urinals can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 0.125 GPF high efficiency urinal systems will replace existing equipment that currently consumes 1.0 to 1.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

SAVINGS

The energy and cost savings were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis section of this Report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

FIM SAVINGS SUMMARY

Annual Water savings: 75,625 gallons

Annual Energy savings: 1,109 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices this Report.

Fim Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Tyrone Bryant Library	Water - Retrofits	$ 64.40	$ -	$ 862.12	$ 83	$ 1,009.24	$ 10,782.87	10.7

D.33. Library - Young at Arts

FACILITY DESCRIPTION

Young at Art Museum is a 69,916 square foot 1-story building located at 751 SW 121st Ave, Davie, FL 33325. The Gold LEED certified modern new building opened in May, 2012. The building consists of Broward County Library and museum that features exhibition galleries, preschool, teen play center, classrooms for art activities and education. It also hosts camps, workshops, and parties. The library hours are the following:

Library Office Hours

Monday – Thursday: 10:00AM – 5:00PM
Friday – Sunday: 10:00AM – 6:00PM

COOLING SYSTEM:

Cooling for the building is provided by 1 Air-cooled 157-Ton R-134a chiller made in 2011 by York. The unit is located at the outside of the building. The chilled water loop is configured as a variable primary system with a bypass line at the end of run and a bypass valve was installed at the bypass line. Two 15-HP chilled water pumps with variable frequency drives (VFD) were installed and one of the two pumps is standby pump. Chilled water pump speed is adjusted to maintain the chilled water differential pressure set point at the end of run. Two-way control valves are employed at AHUs.

ONICON flow meter was installed for chilled water flow measurement.

Chilled Water System

HEATING SYSTEM:

One hot water boiler and 2 hot water pumps were installed. Both hot water pumps were equipped with VFDs.

Hot Water System

HVAC SYSTEMS:

There are 3 chilled water VAV air handling units (AHU-1, AHU-2, AHU-3) serving the building. The manufacturer of the 3 units is York. The units, which were located at 3 mechanical rooms, were put into use in 2011. Heat pipes are equipped in each unit for dehumidification, and the leaving design supply air temperature is 58.85ºF. Supply fans of AHUs are with VFDs.

A CO2 sensor exists at the main return air duct in each mechanical room. Outdoor air is mixed with return air at each AHU. There is airflow station on OA intake duct of each unit.

AHU examples

According to control submittal (2009), the VAV boxes have hot water reheat coils, and space has CO2 sensors. There are also constant volume boxes with reheating coils for cultural space, exhibition, workshops, and party rooms (1st floor Area C)

The following table documents nameplate data acquired both onsite and from online Product Data Sheets.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Young at Art Library												
Chiller		YCIV0157VA46VA	2DXM011121	compressor	R-134A		157	460	3	110		78.9
			R-134A	compressor	2001			460	3	110		78.9
			2001	fans (2)				460	3	5.6		4.0
				fans (2)				460	3	5.6		4.0
CHWP-1	Baldor		37Q027S186G1		with VFD	7.5		460	2	9.6	91.0%	4.9
CHWP-2					with VFD							
AHU-2	York	XTI-051X096-FAMA	CDXM XT0134		with VFD	20		460	3	23.5		16.9
AHU-3	York	XTI-072X108-FANA	CDXM XT0135		with VFD	25		460	3	30		21.5
Boiler	Lochinvar											
Water Heater			SE62-119R-045C		119 Gal			240	1			
HWP-1	Motor			motor	with VFD							
Pump	Weinman		T1521377	pump	2011		97					
HWP-2	Motor			motor	with VFD							
Pump	Weinman			pump								

Observed Issues with the cooling system

- Multiple faulty thermostats
- It was reported that there was duct leakage
- On the library side, the multipurpose room didn't have sufficient air movement.

LIGHTING SYSTEM

Interior lighting primarily consists of F32WT8 fluorescent lamps in 2-lamp 2x4 energy efficient recessed fixtures with or without day lighting ballasts, T8 in 2-lamp in suspended linear fixtures, suspended CFL down light, and T5 fluorescent lamps, etc .

Interior Lighting Examples

Exterior Lighting consists of T8 fluorescent lamps, HID exterior up lights, LED walkway and paver lights, LED exterior wall luminaries, etc.

Exterior Lighting Examples

The building has motion and occupancy sensors. The overall building lights can be controlled by the control system.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 0.5 gpm faucets
- 1.0 gpf urinals
- 1.28 gpf toilets

Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

The building is equipped with a Johnson Controls DDC building automation system. Any changes to the controls operation is handled from the Government Center.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the Seasonal Demand Time-of-Use Rider (SDTR-1A) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

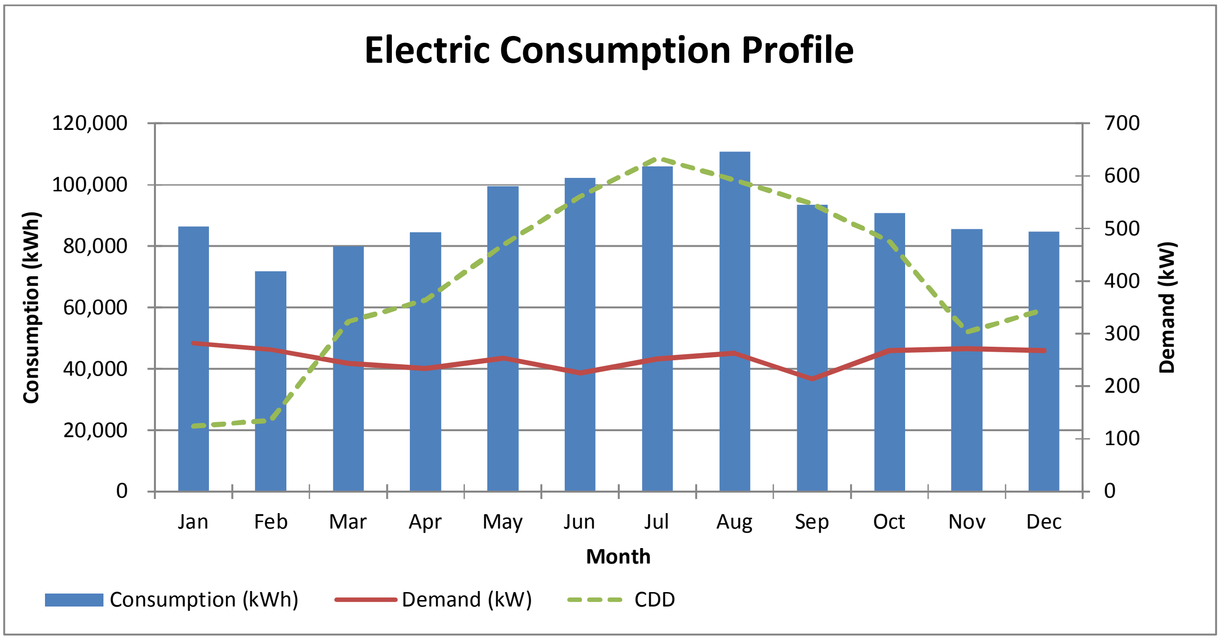
Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
Young at Art Library	1	SDTR-1A	$ 0.12886	$ 0.04066	$ 0.05624	$ 10.94	1,095,660	3,044	289

The data in the table above was generated using the following electric billing data.

Meter MV5747A; Account: 6220951187; Address: 751 SW 121ST AVE DAVIE

Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes			Total Charges
		Total Consumption	On Peak	Off Peak				Storm Charge	gross receipts tax	Franchise Fee	
Jun-15	$ 25.96	99,480	8,760	90,720	$ 4,222	217	$ 2,630	$ 55	$ 177	$ 1,153	$ 8,264
Jul-15	$ 25.96	99,840	13,080	86,760	$ 4,343	263	$ 3,188	$ 55	$ 195	$ 1,483	$ 9,288
Aug-15	$ 25.96	104,160	13,560	90,600	$ 4,528	265	$ 3,212	$ 57	$ 200	$ 1,536	$ 9,560
Sep-15	$ 25.96	88,560	10,800	77,760	$ 3,832	210	$ 2,545	$ 49	$ 165	$ 1,217	$ 7,834
Oct-15	$ 25.96	84,600	2,880	81,720	$ 3,409	264	$ 3,200	$ 47	$ 171	$ 938	$ 7,790
Nov-15	$ 25.96	94,800	0	94,800	$ 3,819	289	$ 3,503	$ 52	$ 189	$ 1,060	$ 8,649
Dec-15	$ 25.96	86,400	0	86,400	$ 3,481	270	$ 3,272	$ 48	$ 175	$ 958	$ 7,959
Jan-16	$ 25.96	82,320	0	82,320	$ 4,117	275	$ 2,690	$ 54	$ 176	$ 424	$ 7,486
Feb-16	$ 25.96	70,680	0	70,680	$ 3,535	263	$ 2,572	$ 46	$ 158	$ 380	$ 6,717
Mar-16	$ 25.96	79,200	0	79,200	$ 3,961	254	$ 2,484	$ 51	$ 167	$ 419	$ 7,108
Apr-16	$ 25.96	80,760	0	80,760	$ 4,039	194	$ 1,897	$ 52	$ 154	$ 160	$ 6,329
May-16	$ 25.96	94,200	0	94,200	$ 4,711	239	$ 2,337	$ 61	$ 183	$ 198	$ 7,516
Jun-16	$ 26.97	104,880	9,240	95,640	$ 4,782	234	$ 2,752	$ 96	$ 196	$ 472	$ 8,325
Jul-16	$ 26.97	112,080	13,800	98,280	$ 5,436	241	$ 2,834	$ 103	$ 215	$ 517	$ 9,133
Aug-16	$ 26.97	117,480	15,240	102,240	$ 5,763	260	$ 3,058	$ 108	$ 229	$ 551	$ 9,736
Sep-16	$ 26.97	98,280	11,760	86,520	$ 4,739	218	$ 2,564	$ 90	$ 190	$ 439	$ 8,048
Oct-16	$ 26.97	97,080	3,000	94,080	$ 4,532	272	$ 2,742	$ 89	$ 189	$ 437	$ 8,016
Nov-16	$ 26.97	76,440	0	76,440	$ 3,568	254	$ 2,560	$ 70	$ 159	$ 369	$ 6,754
Dec-16	$ 26.97	83,040	0	83,040	$ 3,876	265	$ 2,671	$ 76	$ 170	$ 394	$ 7,215
Jan-17	$ 25.00	90,600	0	90,600	$ 4,593	289	$ 2,977	$ 72	$ 196	$ 468	$ 8,331
Feb-17	$ 25.00	72,960	0	72,960	$ 3,698	276	$ 2,843	$ 58	$ 170	$ 405	$ 7,199
Mar-17	$ 25.00	80,760	0	80,760	$ 4,276	233	$ 2,400	$ 65	$ 173	$ 417	$ 7,356
Apr-17	$ 25.00	88,080	0	88,080	$ 4,664	274	$ 2,822	$ 70	$ 194	$ 467	$ 8,242
May-17	$ 25.00	104,640	0	104,640	$ 5,541	268	$ 2,760	$ 84	$ 215	$ 518	$ 9,143
Yearly Averages		**1,095,660**	**51,060**	**1,044,600**	**$ 51,732**	**3,044**	**$33,256**	**$ 805**	**$ 2,204**	**$ 7,690**	**$ 96,000**



The resulting energy usage profile, illustrated above, for this account is influenced by cooling needs throughout the year; as identified by the comparison of monthly consumption to bin weather data's cooling degree days (CDD). Electric demand usage is relatively constant from month to month, indicating a base consumption need. The average peak for the 24 month period evaluated occurs in August while the average low occurs in February; further confirming the influence of outdoor weather conditions on building electric consumption.

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Young at Art Library	Library	17.41	10.7	14.3	15.6

Overall, this building is operating above the 75th percentile of comparable facilities. Given the age and enhanced equipment and building automation systems present in this facility, this higher than expected metric value can only be attributed to the additional capabilities of this site. It cannot only be described as a typical library under CBECs standards.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Young at Art Library

Account #	427311-207648	**Meter #**	60723804&90879373
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Consumption (cubic feet?)	Total Charges
May-17	23	$ 2,714.19
Apr-17	28	$ 2,763.74
Mar-17		$ 2,783.56
Feb-17		$ 2,744.01
Jan-17		$ 2,793.65
Dec-16	23	$ 2,714.19
Nov-16		$ 2,664.64
Oct-16		$ 2,823.20
Sep-16		$ 2,676.58
Aug-16	42	$ 2,790.22
Jul-16		$ 2,960.68
Jun-16	73	$ 3,083.79
May-16		$ 3,045.91
Apr-16		$ 2,989.62
Mar-16	26	$ 2,648.70
Feb-16		
Jan-16		$ 2,619.76
Dec-15		$ 2,591.35
Nov-15		$ 2,619.76
Oct-15		$ 2,667.64
Sep-15		$ 2,645.29
Aug-15		$ 2,698.99
Jul-15		$ 2,698.99
Jun-15		$ 2,494.19
May-15		$ 2,456.29
TOTALS	**215**	**$65,688.94**

This account has consumption data measured in cubic feet. There are a few data points for consumption for the 24 month period but not enough data to draw any relevant conclusions.

RECOMMENDED IMPROVEMENT MEASURES

All measures considered for this facility did not meet the payback requirements of the County.

D.34. Park - CB Smith

FACILITY DESCRIPTION

CB Smith Park is a 12,839,400 square foot park located at 900 North Flamingo Road, Pembroke Pines, FL 33028. This park is Broward County's most diverse park as well as it's most popular. The park features a water park named Paradise Cove, RV campgrounds, a tennis complex, golfing center, batting cages, basketball courts, and other amenities and activities. Park hours are as follows:

Park Office
Mon – Sun: 9AM – 5:30PM

November – March
Park hours: 8AM – 6PM

March – November
Park hours: 8AM-7:30PM

COOLING SYSTEM – PARK OFFICE:

The cooling for the park office is provided by a DX split system that is comprised of two 5 ton Rheem condensing units connected to one Carrier air handler. The system utilizes R-22 refrigerant.

Park Office HVAC

COOLING SYSTEM – CAMPGROUND OFFICE

The cooling for the campground office is provided by a DX split system that utilizes R-22 refrigerant. At the time of the site visit the air handler for this system could not be located.

Campground Office HVAC

COOLING SYSTEM – POOL BUILDING/KITCHEN

The cooling for the pool building and kitchen is provided by a Rheem 10 ton DX split system that utilizes R-410a refrigerant. This building also holds a walk in cooler that is powered by a Trenton refrigeration system that utilizes R404a/R507.

Pool Building Cooling and Refrigeration

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
CB Smith Park												
AHU	Carrier	40RR012540	F997692	fan		2		230	3	6.3		2.3
CU1	Rheem	RAKB-060DAS	7134 M0805 05763	compressor	R-22			460	3	8.6		6.2
				fan		0.33		460	3	1		0.7
CU2	Rheem	RAKB-060DAS	7134 M2604 17920	compressor	R-22			460	3	8.6		6.2
				fan		0.33		460	3	1		0.7
AHU	Rheem	RHGL-120ZL	F021004510	fan		2		208	3	7.5		
CU	Rheem	RAWL-120DAZ	7760f041004345	compressor	R410a		10	460	3	16.7		
				fan		0.33		460	3	1.4		
AHU												
CU	Trenton	TEHA010E6-HT3B-B	170162553T	compressor	R-404a/R-507			208	3	4.9		
				fan		0.0667		208	1	0.5		
CU	Trenton	TEHA030L6-HT3B-B	170162580T	compressor	R-404a/R-507			208	3	11		
				fan		0.1667		208	1	1.1		
AHU												
CU		HABE-F036SD	WHGP141750	compressor	R-22			208	1	13.5		
				fan		0.2		208	1	1.3		
Pool Pump	Baldor	EM4103T	C1301150217	pump		25		230	3	60	93.60%	
Pool Pump	Baldor	EM4104T	C1211280517	pump		30		230	3	76	93.60%	
Pool Pump	Baldor			pump		30		230	3	76	93.60%	
Pool Pump	Baldor			pump		30		230	3	76	93.60%	
Pool Pump	Baldor			pump		30		230	3	76	93.60%	
Vertical Motor	Triclad	5K256DP5012				25		460	3	30		
Vertical Motor	U.S. Electric Motors	S314A				50		230	3	128		
	U.S. Electric Motors					50		230	3	128		
Pool Pump	Weg	03018EP3E286T		pump		30		208	3	75.7	92.40%	
Pool Pump	Baldor	EM4104T		pump		30		230	3	76	93.60%	
Pool Pump	Weg	02018ET3E256JP-W22		pump		20		208	3	53.6	93%	
Pool Pump	Emerson	AR48		pump		75		230	3	172	93%	
Pool Pump	Emerson	AR48		pump		75		230	3	172	94.10%	
Pool Pump	Baldor	M12H013Y141G1		pump		50		208	3	128	94.50%	
Irrigation Pump												
Irrigation Pump	Weg	05036ES3E326JP		pump		50		208	3	114	92.20%	36.1
Irrigation Pump												

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt T8 lighting and compact fluorescent lighting



Interior Lighting Examples

Exterior lighting primarily consists of metal halide lighting, T8 lighting and compact fluorescent lights. The building does not make use of occupancy sensors or any other types of lighting control.

DOMESTIC WATER SYSTEM

Domestic water usage for this park is primarily at the water park, restrooms, and campground hookups and washing machines. The following are examples of the types of fixtures found within the restrooms of the park.

- 0.5 and 2.2 gpm faucets
- 1.5 gpf urinals
- 1.6 and 3.5 gpf toilets
- 2.5 gps showerhead

Sample Restroom Fixtures

Domestic water usage at the pool is mainly make-up water.

Paradise Cove Water Park

Camp grounds water usage is primarily in RV hook ups and pay-to-wash washing machines for camping and RV patrons.

Campground Water Usage Examples

BUILDING CONTROLS SYSTEM

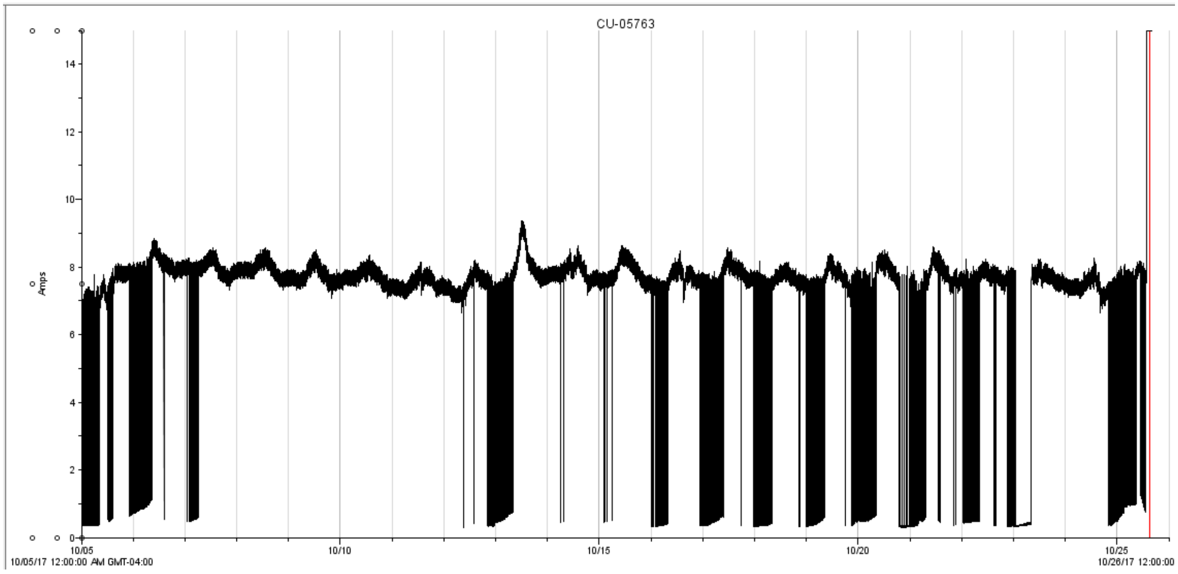
The split DX units are controlled locally via dedicated thermostats.

HVAC Controls Equipment

TRENDING DATA AQUISITION:

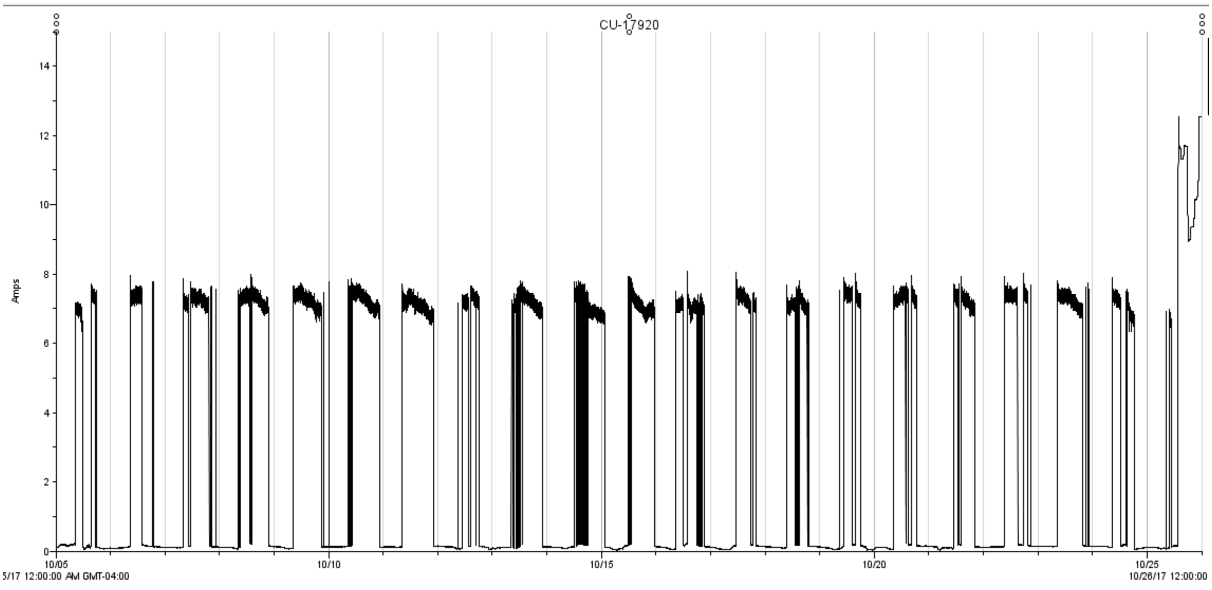
In order to determine the runtime and power draw of onsite HVAC equipment, data loggers were installed to obtain more data than currently available. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 5 Ton Condensing Unit



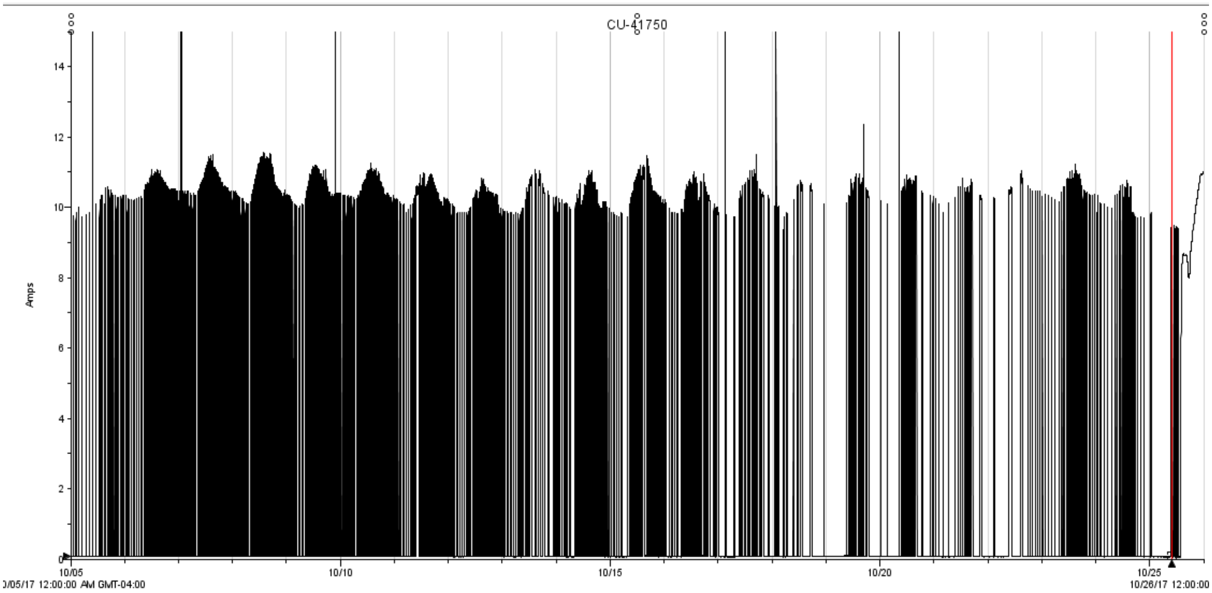
The unit registered an average of 7.75 amps and was operating for a total 136 hours during a one week period

Trending Data – 5 Ton Condensing Unit



The unit registered an average of 7.23 amps and was operating for a total of 64.1 hours during a one week period.

Trending Data – 3 Ton Unit



This unit registered an average of 10.42 amps and was operating for a total of 31 hours during a one week period.

The following table compares the operating hours of each unit with the hours of service for the facility.

Day	Hours of Service	Run Hours
Monday:	9 AM - 5:30 PM	8:30 AM - 9:00 PM
Tuesday:	9 AM - 5:30 PM	9:00 AM - 10:30 PM
Wednesday:	9 AM - 5:30 PM	8:30 AM - 10:00 PM
Thursday:	9 AM - 5:30 PM	8:30 AM - 6:30 PM
Friday:	9 AM - 5:30 PM	8:30 AM - 10:00 PM
Saturday:	9 AM - 5:30 PM	12:00 PM - 2:00 AM
Sunday:	9 AM - 5:30 PM	12:00 PM - 11:30 PM

The unit on the table above is the unit with serial number ending in 17920. Although the unit does turn off for some period at night, it is not running in a scheduled manner. The other two units that were logged run 24 hours a day with normal cycling patterns.

BROWARD COUNTY FLORIDA

SIEMENS

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by seven (7) electric meters; each with their own electric rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		Year-Round		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak	on peak	off peak					
CB Smith Park	Maint Bldg	GSD	-	-	-	-	$ 0.05758	$ 11.53	214,230	1,159	101
	New RV	SDTR-1A	0.128914294	$ 0.04068	-	-	$ 0.05627	$ 10.95	111,330	409	65
	Parking Garage	SDTR-1A	0.129022223	$ 0.04071	-	-	$ 0.05632	$ 10.95	834,030	1,591	170
	Park	SDTR-1A	0.128917664	$ 0.04068	-	-	$ 0.05627	$ 10.95	562,650	1,437	164
	Water Slide	GSTD-1	-	-	$0.08279	$0.04460	-	$ 11.26	1,106,160	3,174	413
	Restroom	GS-1	-	-	-	-	$ 0.10089	-	36,960	-	-
	Tram	GS-1	-	-	-	-	$ 0.10081	-	26,598	-	-

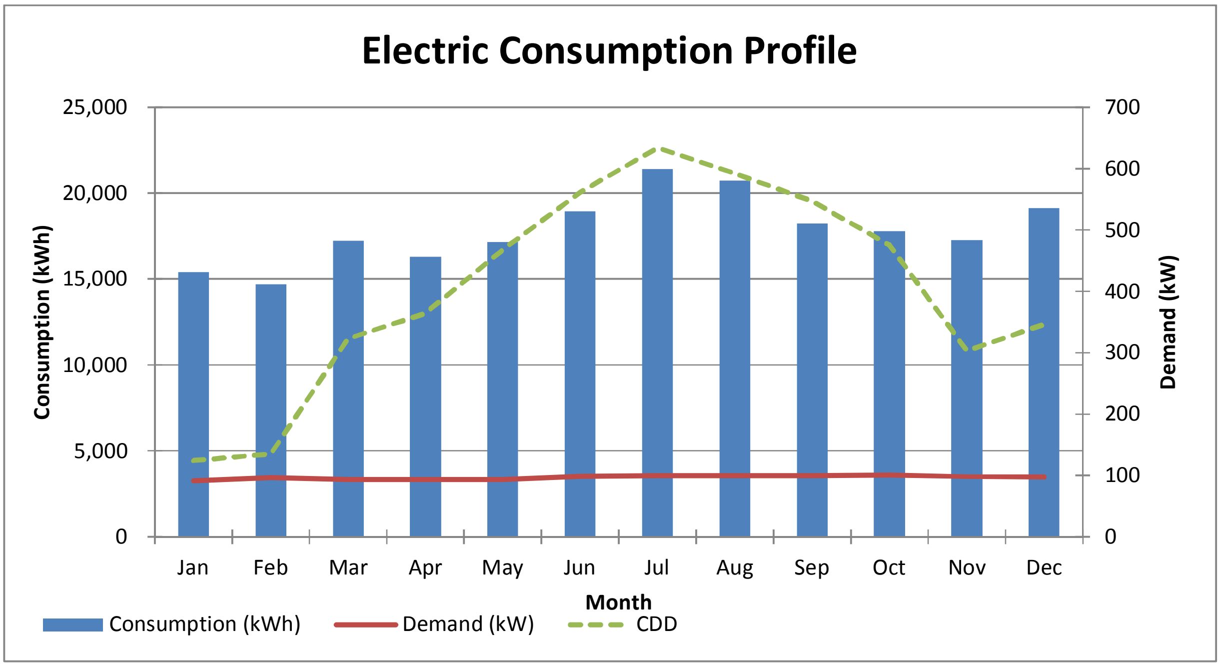
The data in the table above was generated using the following electric billing data.

Meter KV38519; Account: 825312501; Address: 900 NW 124TH AVE # MAINT BLDG

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 19.48	19,440	$ 1,060	100	$ 1,061	$ 144	$ 2,285
Jul-15	$ 19.48	21,960	$ 1,198	99	$ 1,050	$ 152	$ 2,419
Aug-15	$ 19.48	20,880	$ 1,139	101	$ 1,072	$ 151	$ 2,381
Sep-15	$ 19.48	18,480	$ 1,008	101	$ 1,072	$ 138	$ 2,237
Oct-15	$ 19.48	19,200	$ 1,047	100	$ 1,061	$ 139	$ 2,267
Nov-15	$ 19.48	19,140	$ 1,044	101	$ 1,072	$ 141	$ 2,276
Dec-15	$ 19.48	20,700	$ 1,129	99	$ 1,050	$ 143	$ 2,341
Jan-16	$ 19.48	16,140	$ 807	91	$ 920	$ 165	$ 1,911
Feb-16	$ 19.48	15,780	$ 789	98	$ 991	$ 169	$ 1,968
Mar-16	$ 19.48	19,140	$ 957	94	$ 950	$ 187	$ 2,114
Apr-16	$ 19.48	16,680	$ 834	95	$ 960	$ 147	$ 1,961
May-16	$ 19.48	16,800	$ 840	97	$ 981	$ 150	$ 1,990
Jun-16	$ 20.24	18,420	$ 860	97	$ 1,011	$ 184	$ 2,075
Jul-16	$ 20.24	20,880	$ 975	100	$ 1,042	$ 200	$ 2,236
Aug-16	$ 20.24	20,580	$ 961	98	$ 1,021	$ 196	$ 2,198
Sep-16	$ 20.24	18,000	$ 840	98	$ 1,021	$ 180	$ 2,061
Oct-16	$ 20.24	16,380	$ 765	100	$ 1,042	$ 174	$ 2,000
Nov-16	$ 20.24	15,420	$ 720	95	$ 990	$ 164	$ 1,894
Dec-16	$ 20.24	17,580	$ 821	95	$ 990	$ 175	$ 2,006
Jan-17	$ 25.00	14,640	$ 775	91	$ 965	$ 131	$ 1,896
Feb-17	$ 25.00	13,560	$ 718	95	$ 1,007	$ 131	$ 1,881
Mar-17	$ 25.00	15,300	$ 810	92	$ 975	$ 172	$ 1,982
Apr-17	$ 25.00	15,900	$ 842	92	$ 975	$ 175	$ 2,018
May-17	$ 25.00	17,460	$ 925	89	$ 943	$ 181	$ 2,074
AVERAGE TOTALS		**214,230**	**$ 10,931**	**1,159**	**$ 12,111**	**$ 1,944**	**$ 25,236**

BROWARD COUNTY FLORIDA

SIEMENS

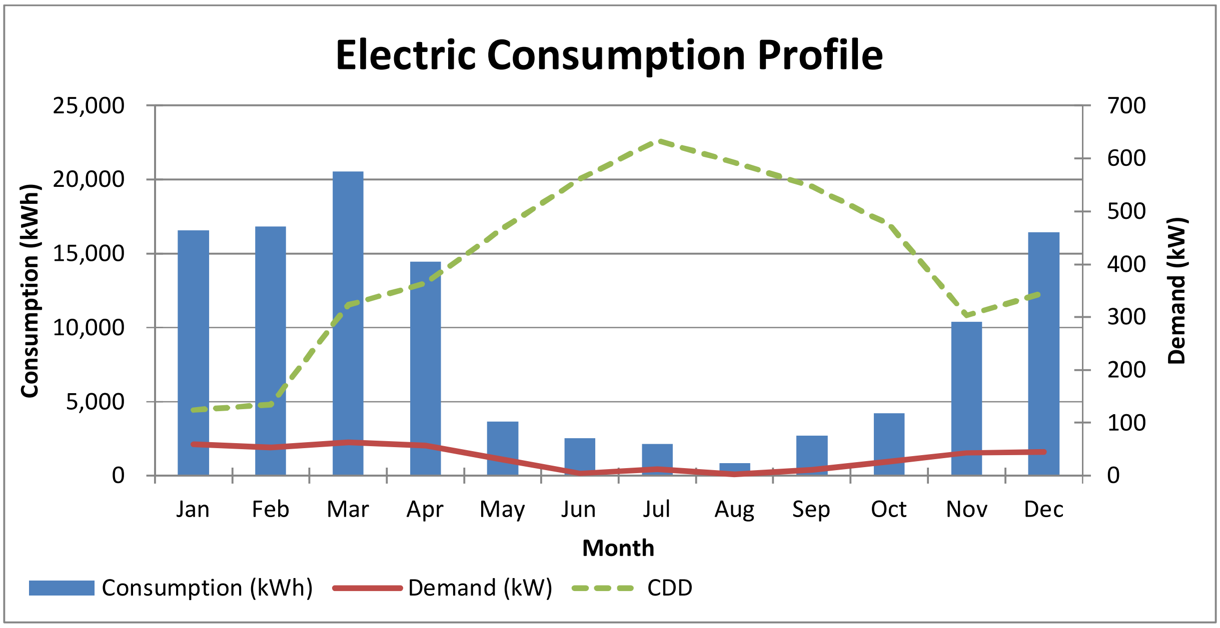


Meter MQ3885A; Account: 283445220; Address: 900 NW 124TH AVE #NEW RV

Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes			Total Charges
		Total Consumption	On Peak	Off Peak				Storm Charge	gross receipts tax 2.56%	Franchise Fee	
Jun-15	$ 25.96	1,080	0	1,080	$ 43.51	2	$ 24	$ 0.59	$ 2.41	$ 7.13	$ 104
Jul-15	$ 25.96	240	60	180	$ 11.14	2	$ 24	$ 0.13	$ 1.57	$ 7.87	$ 71
Aug-15	$ 25.96	600	0	600	$ 24.17	3	$ 36	$ 0.33	$ 2.22	$ 5.67	$ 95
Sep-15	$ 25.96	1,320	60	1,260	$ 54.65	4	$ 48	$ 0.73	$ 3.32	$ 13.04	$ 146
Oct-15	$ 25.96	7,680	60	7,620	$ 309.43	35	$ 424	$ 4.22	$ 19.55	$ 72.78	$ 856
Nov-15	$ 25.96	13,860	0	13,860	$ 558.42	40	$ 485	$ 7.62	$ 27.57	$ 159.72	$ 1,264
Dec-15	$ 25.96	17,340	0	17,340	$ 698.63	47	$ 570	$ 9.54	$ 33.38	$ 203.23	$ 1,540
Jan-16	$ 25.96	14,880	0	14,880	$ 744.15	55	$ 538	$ 9.67	$ 33.73	$ 81.82	$ 1,433
Feb-16	$ 25.96	15,840	0	15,840	$ 792.16	47	$ 460	$ 10.30	$ 32.97	$ 79.99	$ 1,401
Mar-16	$ 25.96	21,780	0	21,780	$ 1,089.22	65	$ 636	$ 14.16	$ 45.18	$ 114.34	$ 1,925
Apr-16	$ 25.96	11,760	0	11,760	$ 588.12	53	$ 518	$ 7.64	$ 29.19	$ 49.15	$ 1,218
May-16	$ 25.96	3,300	0	3,300	$ 165.03	51	$ 499	$ 2.15	$ 17.71	$ 49.45	$ 759
Jun-16	$ 26.97	4,020	60	3,960	$ 158.87	7	$ 82	$ 3.70	$ 6.96	$ 16.88	$ 296
Jul-16	$ 26.97	4,020	240	3,780	$ 173.81	22	$ 259	$ 3.70	$ 11.86	$ 28.77	$ 504
Aug-16	$ 26.97	1,080	120	960	$ 51.31	3	$ 35	$ 0.99	$ 2.93	$ 7.11	$ 125
Sep-16	$ 26.97	4,080	240	3,840	$ 176.11	19	$ 223	$ 3.75	$ 11.01	$ 25.98	$ 467
Oct-16	$ 26.97	720	0	720	$ 33.61	19	$ 192	$ 0.66	$ 6.47	$ 15.57	$ 275
Nov-16	$ 26.97	6,900	0	6,900	$ 322.09	46	$ 464	$ 6.35	$ 20.97	$ 49.59	$ 890
Dec-16	$ 26.97	15,540	0	15,540	$ 725.41	43	$ 433	$ 14.30	$ 30.72	$ 71.63	$ 1,302
Jan-17	$ 25.00	18,300	0	18,300	$ 927.63	64	$ 659	$ 14.64	$ 41.64	$ 100.22	$ 1,768
Feb-17	$ 25.00	17,820	0	17,820	$ 903.30	59	$ 608	$ 14.26	$ 39.69	$ 95.47	$ 1,685
Mar-17	$ 25.00	19,320	0	19,320	$ 1,022.99	61	$ 628	$ 15.46	$ 43.31	$ 105.05	$ 1,840
Apr-17	$ 25.00	17,160	0	17,160	$ 908.62	60	$ 618	$ 13.73	$ 40.07	$ 97.20	$ 1,703
May-17	$ 25.00	4,020	0	4,020	$ 212.86	10	$ 103	$ 3.22	$ 8.81	$ 21.37	$ 374
AVERAGE TOTALS		**111,330**	**420**	**110,910**	**$ 5,347.61**	**409**	**$ 4,283**	**$ 81**	**$ 257**	**$ 740**	**$ 11,021**

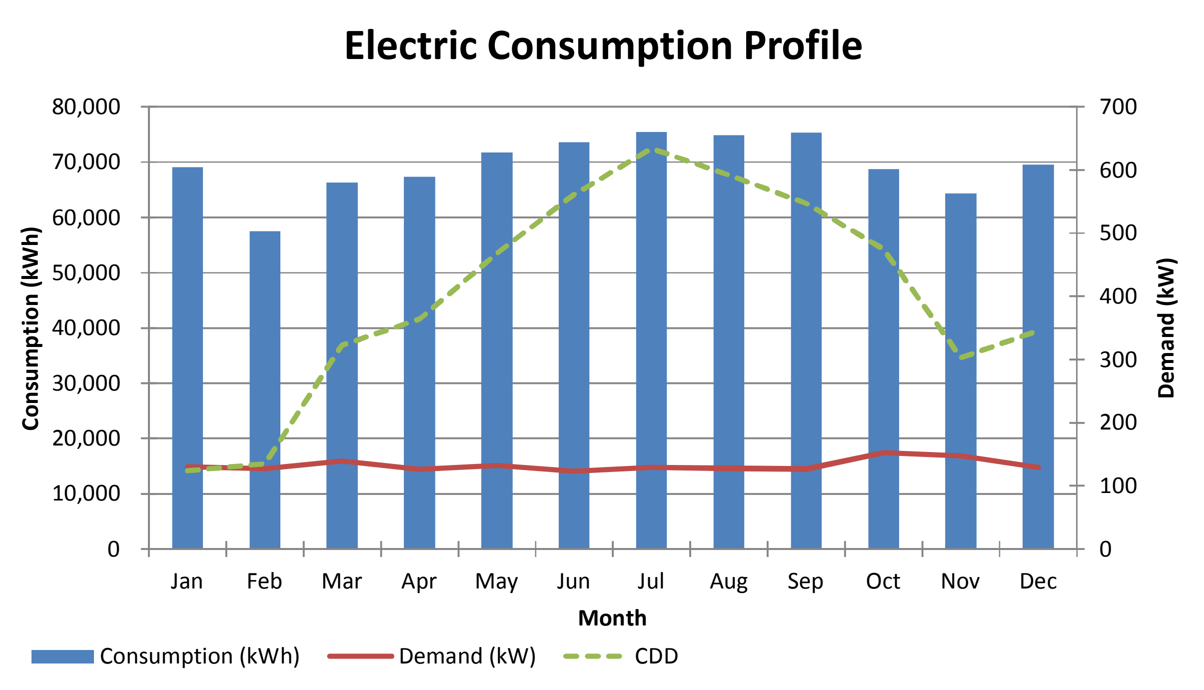
BROWARD COUNTY FLORIDA

SIEMENS



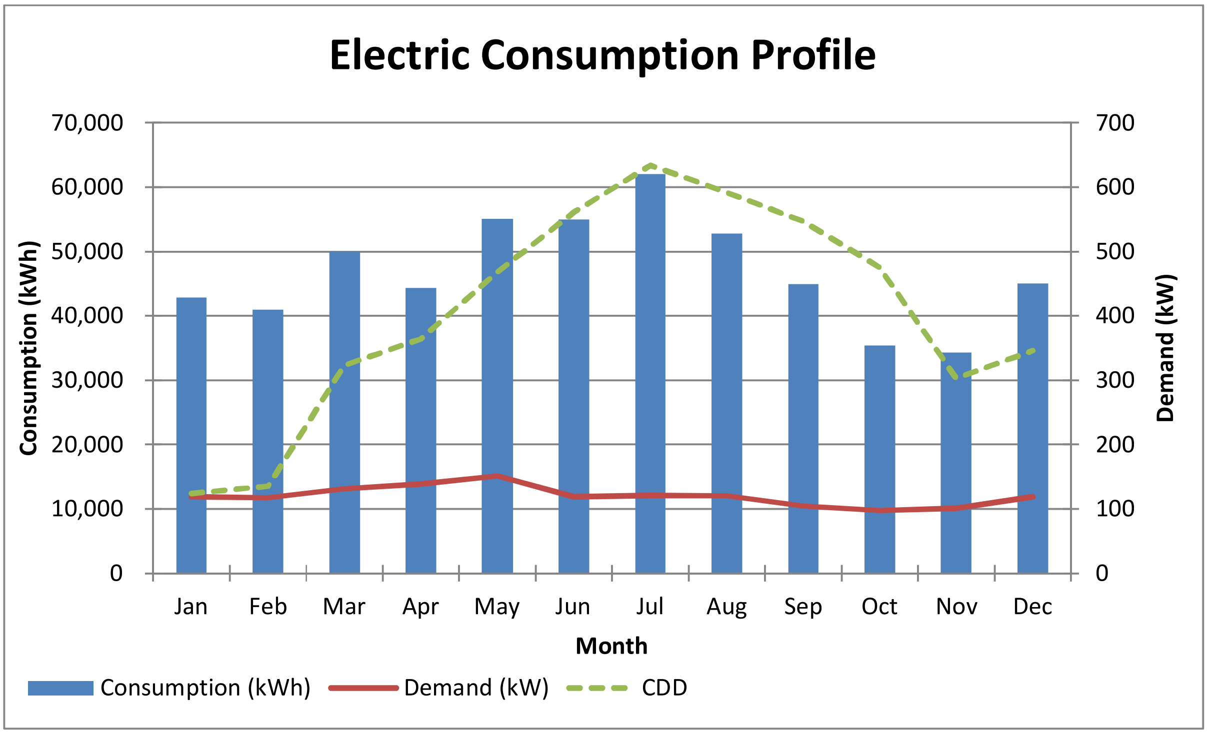
Meter MV3662A; Account: 6102446389; Address: 151 SW 2ND ST # PKNG GARAGE

Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes			Total Charges
		Total Consumption	On Peak	Off Peak				Storm Charge	gross receipts tax 2.56%	Franchise Fee	
Jun-15	$ 25.96	71,760	4,620	67,140	$ 3,004	120	$ 1,454	$ 39	$ 116	$ 699	$ 5,339
Jul-15	$ 25.96	69,840	6,420	63,420	$ 2,971	123	$ 1,491	$ 38	$ 116	$ 819	$ 5,461
Aug-15	$ 25.96	71,100	6,900	64,200	$ 3,033	126	$ 1,527	$ 39	$ 118	$ 860	$ 5,604
Sep-15	$ 25.96	76,740	6,840	69,900	$ 3,259	131	$ 1,588	$ 42	$ 126	$ 857	$ 5,898
Oct-15	$ 25.96	68,100	2,220	65,880	$ 2,744	170	$ 2,060	$ 37	$ 125	$ 814	$ 5,807
Nov-15	$ 25.96	66,360	0	66,360	$ 2,674	134	$ 1,624	$ 36	$ 112	$ 830	$ 5,302
Dec-15	$ 25.96	69,240	0	69,240	$ 2,790	131	$ 1,588	$ 38	$ 114	$ 877	$ 5,433
Jan-16	$ 25.96	66,660	0	66,660	$ 3,334	142	$ 1,389	$ 43	$ 123	$ 298	$ 5,212
Feb-16	$ 25.96	55,920	0	55,920	$ 2,797	133	$ 1,301	$ 36	$ 106	$ 258	$ 4,524
Mar-16	$ 25.96	69,120	0	69,120	$ 3,457	146	$ 1,428	$ 45	$ 127	$ 323	$ 5,405
Apr-16	$ 25.96	66,180	0	66,180	$ 3,310	127	$ 1,242	$ 43	$ 118	$ 104	$ 4,843
May-16	$ 25.96	66,480	0	66,480	$ 3,325	135	$ 1,320	$ 43	$ 121	$ 112	$ 4,946
Jun-16	$ 26.97	75,540	4,320	71,220	$ 3,250	127	$ 1,494	$ 69	$ 124	$ 301	$ 5,265
Jul-16	$ 26.97	80,940	7,020	73,920	$ 3,681	135	$ 1,588	$ 74	$ 137	$ 333	$ 5,841
Aug-16	$ 26.97	78,780	6,840	71,940	$ 3,584	129	$ 1,517	$ 72	$ 133	$ 323	$ 5,656
Sep-16	$ 26.97	73,980	6,420	67,560	$ 3,365	122	$ 1,435	$ 68	$ 125	$ 290	$ 5,310
Oct-16	$ 26.97	69,480	2,340	67,140	$ 3,243	135	$ 1,361	$ 64	$ 120	$ 279	$ 5,094
Nov-16	$ 26.97	62,400	0	62,400	$ 2,913	161	$ 1,623	$ 57	$ 118	$ 278	$ 5,016
Dec-16	$ 26.97	69,780	0	69,780	$ 3,257	128	$ 1,290	$ 64	$ 119	$ 278	$ 5,035
Jan-17	$ 25.00	71,520	0	71,520	$ 3,625	119	$ 1,226	$ 57	$ 126	$ 306	$ 5,365
Feb-17	$ 25.00	59,040	0	59,040	$ 2,993	121	$ 1,246	$ 47	$ 110	$ 267	$ 4,689
Mar-17	$ 25.00	63,540	0	63,540	$ 3,364	132	$ 1,360	$ 51	$ 123	$ 302	$ 5,224
Apr-17	$ 25.00	68,520	0	68,520	$ 3,628	125	$ 1,288	$ 55	$ 128	$ 314	$ 5,437
May-17	$ 25.00	77,040	0	77,040	$ 4,079	129	$ 1,329	$ 62	$ 141	$ 345	$ 5,981
AVERAGE TOTALS		**834,030**	**26,970**	**807,060**	**$ 38,840**	**1,591**	**$ 17,383**	**$ 612**	**$ 1,463**	**$ 5,234**	**$ 63,845**



Meter MV3339A; Account: 8260155596; Address: 900 NW 124TH AVE

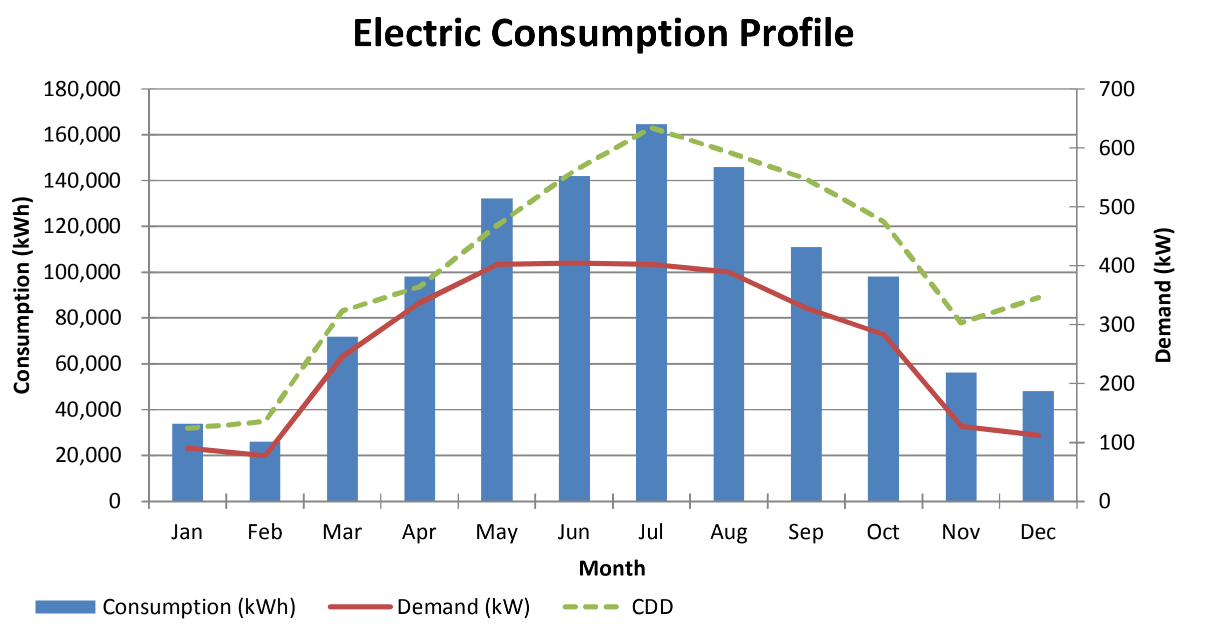
Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes			Total Charges
		Total Consumption	On Peak	Off Peak				Storm Charge	gross receipts tax 2.56%	Franchise Fee	
Jun-15	$ 25.96	47,520	4,320	43,200	$ 2,020	99	$ 1,200	$ 26	$ 84	$ 555	$ 3,911
Jul-15	$ 25.96	56,280	5,460	50,820	$ 2,401	107	$ 1,297	$ 31	$ 96	$ 681	$ 4,532
Aug-15	$ 25.96	46,080	4,920	41,160	$ 1,977	106	$ 1,285	$ 25	$ 85	$ 599	$ 3,996
Sep-15	$ 25.96	38,760	3,900	34,860	$ 1,657	99	$ 1,200	$ 21	$ 74	$ 479	$ 3,457
Oct-15	$ 25.96	32,820	720	32,100	$ 1,322	83	$ 1,006	$ 18	$ 61	$ 389	$ 2,822
Nov-15	$ 25.96	32,760	0	32,760	$ 1,320	91	$ 1,103	$ 18	$ 63	$ 380	$ 2,910
Dec-15	$ 25.96	43,560	0	43,560	$ 1,755	121	$ 1,467	$ 24	$ 84	$ 504	$ 3,860
Jan-16	$ 25.96	41,640	0	41,640	$ 2,082	122	$ 1,193	$ 27	$ 85	$ 207	$ 3,620
Feb-16	$ 25.96	39,840	0	39,840	$ 1,992	104	$ 1,017	$ 26	$ 78	$ 190	$ 3,330
Mar-16	$ 25.96	50,520	0	50,520	$ 2,527	139	$ 1,359	$ 33	$ 101	$ 256	$ 4,302
Apr-16	$ 25.96	36,900	0	36,900	$ 1,845	130	$ 1,271	$ 24	$ 81	$ 115	$ 3,362
May-16	$ 25.96	47,040	0	47,040	$ 2,352	138	$ 1,350	$ 31	$ 96	$ 119	$ 3,974
Jun-16	$ 26.97	62,520	5,280	57,240	$ 2,832	138	$ 1,623	$ 58	$ 116	$ 282	$ 4,937
Jul-16	$ 26.97	67,800	6,180	61,620	$ 3,109	134	$ 1,576	$ 62	$ 122	$ 296	$ 5,192
Aug-16	$ 26.97	59,520	6,540	52,980	$ 2,821	134	$ 1,576	$ 55	$ 115	$ 278	$ 4,872
Sep-16	$ 26.97	51,120	4,740	46,380	$ 2,350	109	$ 1,282	$ 47	$ 95	$ 221	$ 4,022
Oct-16	$ 26.97	37,860	960	36,900	$ 1,767	112	$ 1,129	$ 35	$ 76	$ 177	$ 3,210
Nov-16	$ 26.97	35,880	0	35,880	$ 1,675	111	$ 1,119	$ 33	$ 73	$ 171	$ 3,097
Dec-16	$ 26.97	46,560	0	46,560	$ 2,173	116	$ 1,169	$ 43	$ 87	$ 203	$ 3,703
Jan-17	$ 25.00	43,980	0	43,980	$ 2,229	115	$ 1,185	$ 35	$ 89	$ 214	$ 3,777
Feb-17	$ 25.00	42,060	0	42,060	$ 2,132	130	$ 1,339	$ 34	$ 90	$ 217	$ 3,837
Mar-17	$ 25.00	49,500	0	49,500	$ 2,621	123	$ 1,267	$ 40	$ 101	$ 245	$ 4,299
Apr-17	$ 25.00	51,720	0	51,720	$ 2,739	148	$ 1,524	$ 41	$ 111	$ 269	$ 4,709
May-17	$ 25.00	63,060	0	63,060	$ 3,339	164	$ 1,689	$ 50	$ 131	$ 317	$ 5,551
AVERAGE TOTALS		**562,650**	**21,510**	**541,140**	**$ 26,520**	**1,437**	**$15,612**	**$ 418**	**$ 1,097**	**$ 3,682**	**$ 47,642**



Meter MV55669; Account: 8261151511; Address: 900 NW 124TH AVE # WATER SLIDE

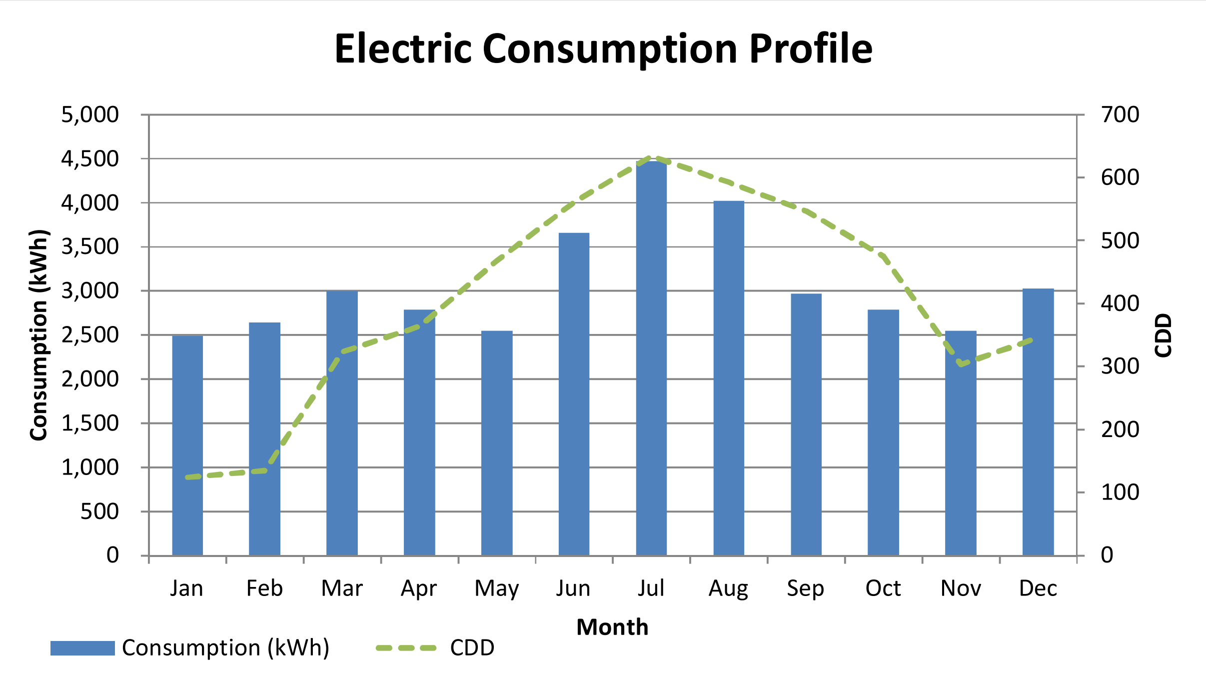
Date	Customer Charge	Consumption (kwh) Total Consumption	On Peak	Off Peak	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes Storm Charge	gross receipts tax 2.56%	Franchise Fee	Total Charges
Jun-15	$ 25.96	133,080	42,804	90,276	$ 7,438	396	$ 4,202	$ 73	$ 301	$ 264	$ 12,304
Jul-15	$ 25.96	158,280	49,109	109,171	$ 8,759	399	$ 4,233	$ 87	$ 336	$ 288	$ 13,729
Aug-15	$ 25.96	142,320	48,850	93,470	$ 8,104	382	$ 4,053	$ 78	$ 314	$ 255	$ 12,830
Sep-15	$ 25.96	105,600	24,720	80,880	$ 5,454	352	$ 3,735	$ 58	$ 237	$ 246	$ 9,756
Oct-15	$ 25.96	100,200	20,160	80,040	$ 5,015	352	$ 3,735	$ 55	$ 226	$ 259	$ 9,316
Nov-15	$ 25.96	75,000	17,400	57,600	$ 3,866	124	$ 1,316	$ 41	$ 134	$ 96	$ 5,479
Dec-15	$ 25.96	69,240	15,360	53,880	$ 3,535	139	$ 1,475	$ 38	$ 130	$ 108	$ 5,312
Jan-16	$ 25.96	43,200	9,840	33,360	$ 2,034	79	$ 799	$ 28	$ 74	$ 179	$ 3,140
Feb-16	$ 25.96	30,240	7,680	22,560	$ 1,460	106	$ 1,072	$ 20	$ 66	$ 160	$ 2,803
Mar-16	$ 25.96	88,560	18,000	70,560	$ 4,070	373	$ 3,771	$ 58	$ 203	$ 511	$ 8,639
Apr-16	$ 25.96	99,960	21,960	78,000	$ 4,669	283	$ 2,861	$ 65	$ 195	$ 267	$ 8,084
May-16	$ 25.96	132,120	35,520	96,600	$ 6,469	402	$ 4,064	$ 86	$ 273	$ 369	$ 11,287
Jun-16	$ 26.97	150,960	44,400	106,560	$ 7,070	413	$ 4,303	$ 139	$ 295	$ 717	$ 12,551
Jul-16	$ 26.97	170,760	51,000	119,760	$ 8,030	406	$ 4,231	$ 157	$ 319	$ 773	$ 13,536
Aug-16	$ 26.97	149,640	49,440	100,200	$ 7,235	396	$ 4,126	$ 138	$ 295	$ 716	$ 12,536
Sep-16	$ 26.97	116,280	23,400	92,880	$ 4,996	304	$ 3,168	$ 107	$ 212	$ 494	$ 9,003
Oct-16	$ 26.97	95,880	21,240	74,640	$ 4,200	214	$ 2,230	$ 88	$ 168	$ 389	$ 7,102
Nov-16	$ 26.97	37,560	7,920	29,640	$ 1,629	131	$ 1,365	$ 35	$ 78	$ 183	$ 3,316
Dec-16	$ 26.97	27,000	5,760	21,240	$ 1,174	86	$ 896	$ 25	$ 54	$ 127	$ 2,303
Jan-17	$ 25.00	24,720	5,760	18,960	$ 1,189	101	$ 1,071	$ 21	$ 59	$ 141	$ 2,506
Feb-17	$ 25.00	21,960	5,280	16,680	$ 1,063	48	$ 509	$ 18	$ 41	$ 98	$ 1,754
Mar-17	$ 25.00	55,080	12,360	42,720	$ 2,757	118	$ 1,251	$ 46	$ 104	$ 251	$ 4,435
Apr-17	$ 25.00	96,240	24,120	72,120	$ 4,908	391	$ 4,145	$ 81	$ 234	$ 564	$ 9,958
May-17	$ 25.00	88,440	20,160	68,280	$ 4,438	353	$ 3,742	$ 74	$ 212	$ 510	$ 9,002
AVERAGE TOTALS		**1,106,160**	**291,122**	**815,039**	**$ 54,781**	**3,174**	**$ 33,175**	**$ 808**	**$ 2,280**	**$ 3,983**	**$ 95,340**

SIEMENS



Meter KV39331; Account: 7850857793; Address: 900 NW 124TH AVE # REST ROOM

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 10.00	3,780	$ 363.71	$ 19.90	$ 394
Jul-15	$ 10.00	4,620	$ 440.98	$ 28.77	$ 480
Aug-15	$ 10.00	4,200	$ 400.89	$ 25.97	$ 437
Sep-15	$ 10.00	2,880	$ 274.90	$ 15.86	$ 301
Oct-15	$ 10.00	3,120	$ 297.80	$ 17.37	$ 325
Nov-15	$ 10.00	2,640	$ 251.99	$ 14.51	$ 277
Dec-15	$ 10.00	3,240	$ 309.26	$ 18.27	$ 338
Jan-16	$ 10.00	2,640	$ 237.15	$ 21.51	$ 269
Feb-16	$ 10.00	2,640	$ 237.15	$ 21.51	$ 269
Mar-16	$ 10.00	3,180	$ 285.66	$ 27.30	$ 323
Apr-16	$ 10.00	2,880	$ 258.71	$ 18.53	$ 287
May-16	$ 10.00	2,760	$ 247.93	$ 17.69	$ 276
Jun-16	$ 10.00	3,540	$ 310.81	$ 30.66	$ 351
Jul-16	$ 10.00	4,320	$ 379.30	$ 37.75	$ 427
Aug-16	$ 10.00	3,840	$ 337.15	$ 33.39	$ 381
Sep-16	$ 10.00	3,060	$ 268.67	$ 25.45	$ 304
Oct-16	$ 10.00	2,460	$ 215.99	$ 20.13	$ 246
Nov-16	$ 10.00	2,460	$ 215.99	$ 20.13	$ 246
Dec-16	$ 10.00	2,820	$ 247.60	$ 23.33	$ 281
Jan-17	$ 10.00	2,340	$ 208.42	$ 21.80	$ 240
Feb-17	$ 10.00	2,640	$ 235.14	$ 24.49	$ 270
Mar-17	$ 10.00	2,820	$ 251.18	$ 35.58	$ 297
Apr-17	$ 10.00	2,700	$ 240.49	$ 34.08	$ 285
May-17	$ 10.00	2,340	$ 208.42	$ 29.67	$ 248
AVERAGE TOTALS		**36,960**	**$ 3,362.64**	**$ 291.83**	**$ 3,774.47**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
CB Smith Park	Recreation	44.36	3.7	7.3	17.6

Overall, this building is operating well above the 75th percentile of comparable facilities. However, this park includes facilities not normally present in parks; such as the water park. A reasonable comparison cannot be made.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

CB Smith Park

Account #	03-297-51816-0015	**Meter #**	
Rate		**Address**	
Meter Size		**Meter Type**	Trash

Date	Total Charges
Mar-17	$ 3,559.74
Feb-17	$ 3,358.62
Jan-17	$ 2,961.49
Dec-16	$ 4,111.66
Nov-16	$ 3,072.54
Oct-16	$ 3,378.59
Sep-16	$ 5,851.04
Aug-16	$ 3,868.59
Jul-16	$ 4,132.68
Jun-16	
May-16	
Apr-16	$ -
Mar-16	$ -
Feb-16	$ -
Jan-16	$ -
Dec-15	$ -
Nov-15	$ -
Oct-15	$ -
Sep-15	$ -
Aug-15	$ -
Jul-15	$ -
Jun-15	$ -
May-15	$ -
Apr-15	$ -
Mar-15	$ -
TOTALS	**$ 34,294.95**

This account only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

SIEMENS

CB Smith Park

Account #	03-301-00030-0011	**Meter #**	0070222366
Rate		**Address**	
Meter Size		**Meter Type**	W/S

Date	Consumption ()	Total Charges
May-17	1707	$ 13,263.21
Apr-17	1707	$ 13,263.21
Mar-17	1128	$ 7,631.53
Feb-17	713	$ 5,738.38
Jan-17	607	$ 7,260.04
Dec-16	510	$ 1,345.63
Nov-16	1032	$ 15,643.55
Oct-16	794	$ 8,315.18
Sep-16	919	$ 12,694.27
Aug-16	1466	$ 15,790.34
Jul-16	1317	
Jun-16	1060	
May-16	1143	$ 9,722.46
Apr-16	1271	$ 12,187.21
Mar-16	875	
Feb-16	438	$ 4,577.16
Jan-16	481	$ 5,398.97
Dec-15	802	$ -
Nov-15	708	CR
Oct-15	781	$ 11,799.60
Sep-15	1010	$ 8,660.85
Aug-15	1430	$ 17,450.38
Jul-15	1371	$ 14,163.78
Jun-15	1259	$ 10,017.68
May-15	1612	$ 9,182.36
TOTALS	**26141**	**$204,105.79**

This account had a mostly complete 24 month data set for water consumption and utility cost. The average monthly consumption is 1046 thousand gallons. The average monthly cost is $9,719.32. The average monthly blended rate in dollars per thousand gallons is $9.30. This blended rate is slightly lower than the rate being used for savings calculations. Typically water rates are structured in tiers and the rate decreases as the consumption increases. Due to the high consumption for this account, the low blended rate could be a result of this tier structure. There was no extra information that could be acquired for this account so no exact determination can be concluded.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS Water	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
CB Smith Park	Split System Replacement	$ 1,012.70	$ 579.50	$ -	0	$ -	$ 1,592.20	$ 35,207.81	22.1
CB Smith Park	Split System Code Compiance	$ -	$ -	$ -	0	$ -	$ -	$ 7,873.79	-
Breakage Fee								$ 7,823.40	
PA Cost								$ 450.15	
Total		**$ 1,012.70**	**$ 579.50**	**$ -**	**$ -**	**$ -**	**$ 1,592.20**	**$ 51,355.15**	**32.3**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

MECHANICAL

As DX equipment ages and the condition of the equipment deteriorate, the energy efficiency of these units also degrades. In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

Cooling for buildings around the park is provided by various split DX units of varying tonnages. The focus of this FIM involved the main office building and the former camp site check-in building.

PROJECT SCOPE

This FIM addresses the replacement of three (3) DX systems. The scope of work includes the replacement of both the condensing unit and air handlers. The new equipment will be of equal capacity and have efficiency ratings of those stated in the following table.

Scope of Work

Building	Equipment	Make	Model	Tons	Existing kW	New kW
CB Smith	Condenser	Rheem	RAKB-060DAS	5	6.88	5.4
CB Smith	Condenser	Rheem	RAKB-060DAS	5	6.88	5.4
CB Smith	Condenser		HABE-F036SD	3	7.8	6.4
CB Smith	AHU	Carrier	40RR012540			
CB Smith	AHU					
CB Smith	AHU					

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. The detailed calculations are available in the Section H, Appendices. All calculations were based off Trane manufacturer cut-sheets, also provided.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 17,280 kWh

Annual Electric Demand: 51.3 kW

FIM Financial Summary

CB Smith Park	Savings kWh	Savings kW	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$1012.70	$579.50				$1,592.20	$35,207.81	22.1

Savings Capital: Capital budget dollars were used in order to improve the payback to the requested limitation values. These dollars represent unused amounts left over from the Capital Project Plan total. Funds were first applied to their respective capital project until the required payback was achieved. All remaining amounts were distributed to FIM opportunites such as the one above.

Code Compliance: Associated with the scope of work summarized above are code compliance issued uncovered by contracted MEPs (mechanical, electrical, and plumbing vendor). This cost was requested to be listed separately. For this facility, the code compliance cost is:

- $7,873.79

The identified issue at CB Smith Park includes changes in outside air requirements as stated by current building code.

D.35. Park - Delevoe

FACILITY DESCRIPTION

Delevoe Park has a one-story, 9,593 square foot building constructed approximately in 1997 and located at 2520 NW 6th St. The building consists of a large multipurpose room, small meeting room/computer lab, and a fitness center. It is the only conditioned building at this park. The park also consists of 2 pavilions, a semi-covered playground, an outdoor basketball court, and an outdoor exercise facility. The operating hours for the entire park are as follows.

Park Hours

Monday – Fridays:	8AM – 9PM
Saturday:	8AM – 6PM
Sunday:	10AM – 6PM

COOLING SYSTEM:

Cooling for the building is provided by four split DX package configuration located on the outside of the building. Three of the units are 6 ton, air-cooled Carrier units that serve three single-zone, 100% return air handling units (AHU). The fourth unit is a 7.5 ton, air-cooled York unit that serves a single-zone, 100% outside air AHU.

Building HVAC

The Carrier equipment is reported to be original to the building; 1996 and 1997 manufacturing dates. The York unit appears to be newer. 2008 manufacturing date

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Delevoe Park												
AHU1	Carrier	40RM-007-B600HC	0397F47740	fan		2.4		208	3	7.3		2.0
CU1	Carrier	38AK-007--V511	0200G00157	compressor	R-22		6	208	3	21.8	9	7.1
				fan				208	1	2.8		0.5
AHU2	Carrier	40RM-007-B600HC	4396F36470	fan		2.4		208	3	7.3		2.0
CU2	Carrier	38AK-007--V511	0200G00154	compressor	R-22		6	208	3	21.8	9	7.1
				fan				208	1	2.8		0.5
AHU3	Carrier	40RM-007-B600HC	4996F42772	fan		2.4		208	3	7.3		2.0
CU3	Carrier	38ARZ007--K501	2509G30115	compressor	R-22		6	208	3	19	11	6.2
				fan				230	1	0.9		0.2
				fan				230	1	0.9		0.2
AHU4	York	LA090C00A6AAA1B	N0H8170650	fan		1.5		208	3	6		1.6
CU4	York	HA090C00A2AAA1A	N0M8454757	compressor	R-22		7.5	208	3	25.6	10.7	8.3
				fan		0.75		208	1	3.03		0.6
				fan		0.75		208	1	3.03		0.6
Irrigation Pump	Baldor	JML4091	36K077H92561	pump		5		230	1	21.5	80%	4.7

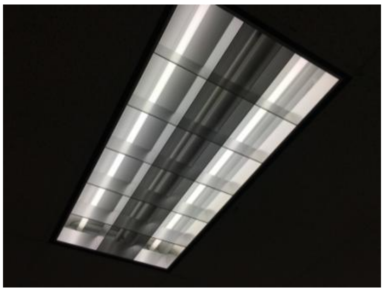
Observed Issues during Visit:

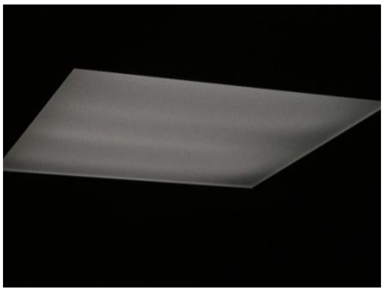
- DX units are 20 years old and use R-22 refrigerant
- Insulation of refrigerant piping is either worn out or non-existent.


Examples of Observed Issues

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt, T8 fluorescent lamps in either 2 or 3-lamp 2x4 fixtures. The building also contains a few U-bend fixtures consisting of 2-lamp T8 fluorescents.





Interior Lighting Examples

Exterior Lighting consists of 250W metal halide and LED parking lot lights.



Exterior Lighting Examples

The facility does use switch/motion sensor devices to control the lighting in the bathrooms.

Motion Sensor in Bathroom

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.0 gpf urinals
- 1.6 and 3.5 GPF toilets

Sample Restroom Fixtures

BUILDING CONTROLS SYSTEM

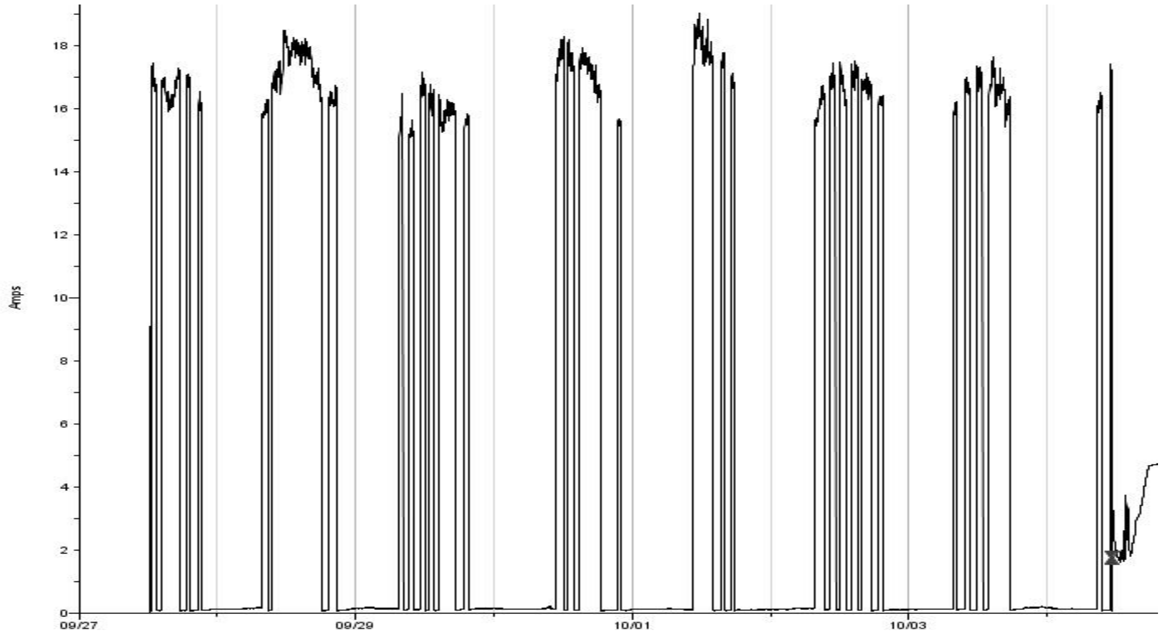
The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat. The basketball court lights are controlled by a timer.

Building Controls

TRENDING DATA ACQUISITION

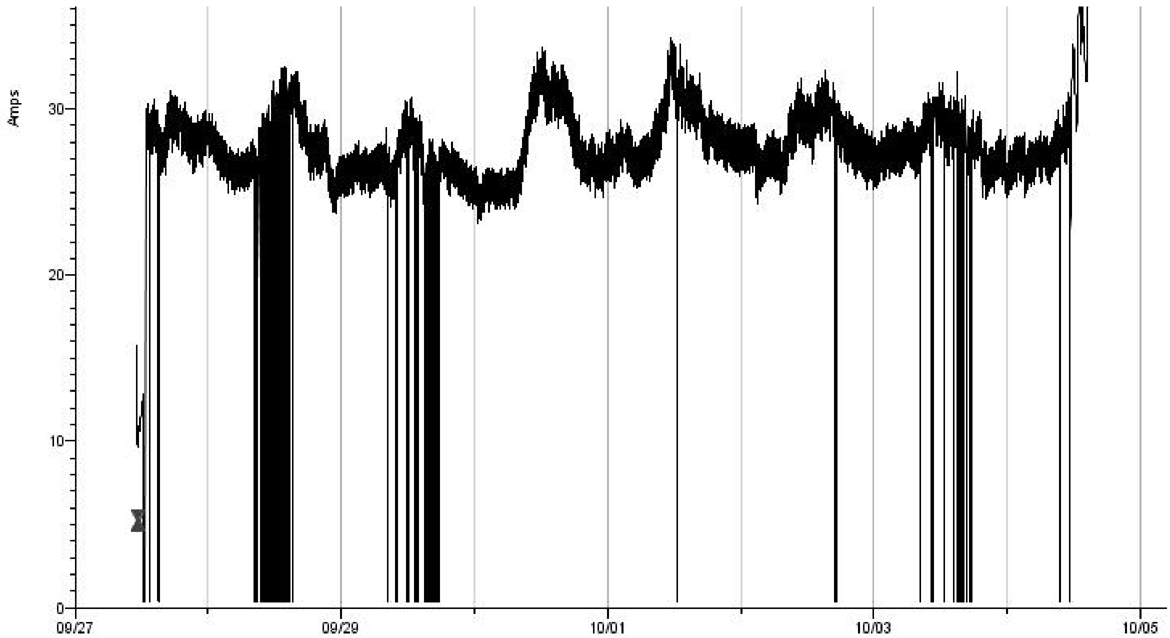
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 6 Ton Condensing Unit – AHU 1



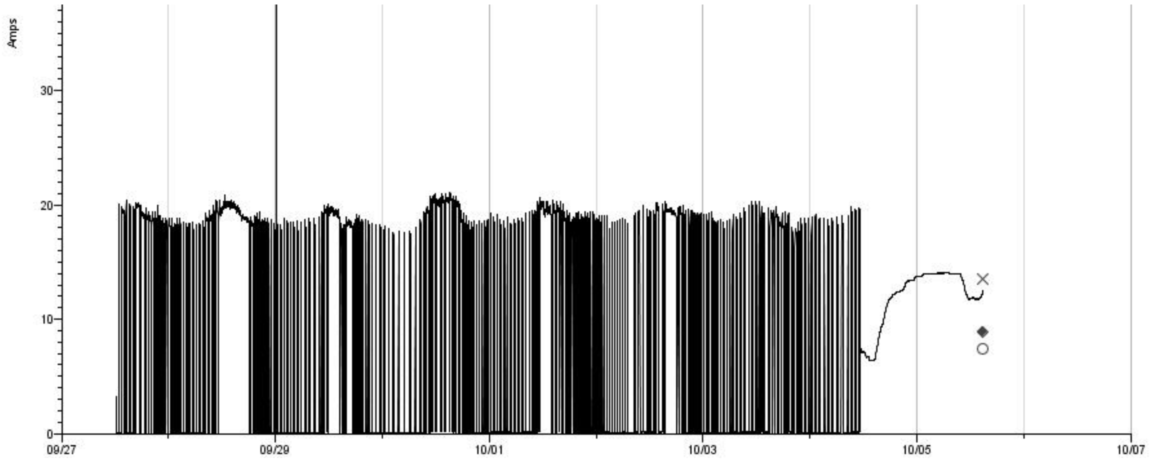
This unit registered a total of 44 hours of operation in the week of data logging with average amperage of 16.84 amps when in operation. Setback controls seem to be in effect for this unit.

Trending Data – 6 Ton Condensing Unit – AHU 2



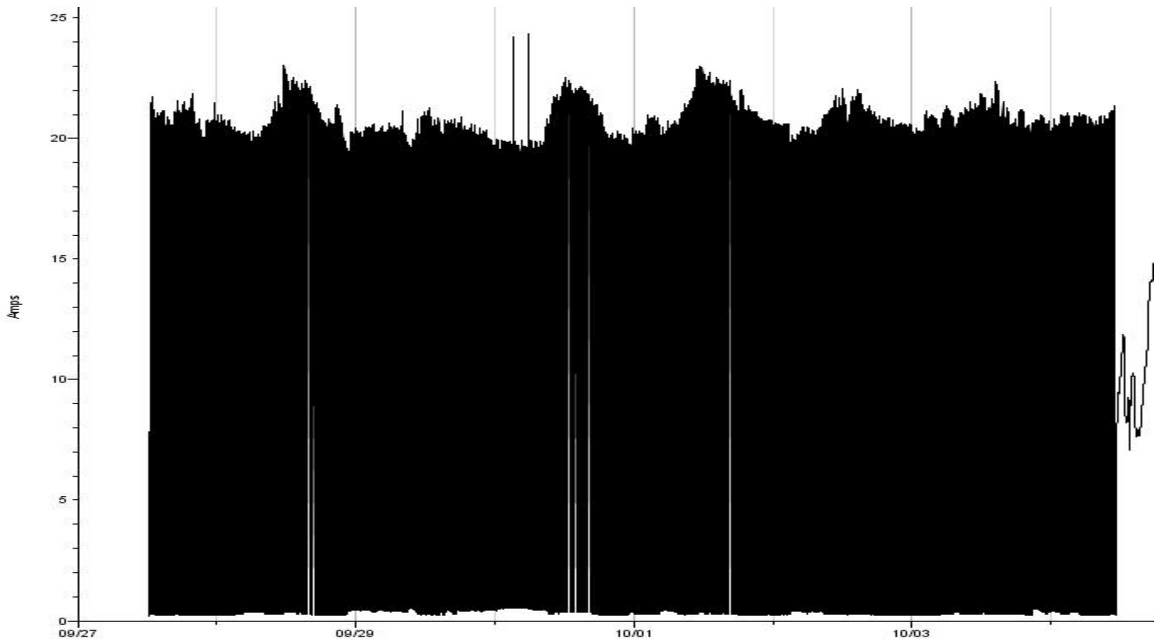
This unit registered continuous operation with no evidence of scheduling through the week of data collection.

Trending Data – 6 Ton Condensing Unit – AHU 3



This unit registered continuous operation with no evidence of scheduling through the week of data collection. Normal patterns of cycling are evident in this unit by the way it consistently turns on and off.

Trending Data – 7.5 Ton Condensing Unit – AHU 4



This unit registered continuous operation with no evidence of scheduling through the week of data collection. Abnormal patterns of cycling are evident in this unit by the way it continuously turns on and off.

The following table compares the operating hours of each unit with the hours of service for the facility.

Day	Hours of Service	Run Hours AHU 1	Run Hours AHU 2	Run Hours AHU 3	Run Hours AHU 4
Monday:	8:00AM - 9:00PM	7:40AM - 7:30PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Tuesday:	8:00AM - 9:00PM	7:40AM - 5:40PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Wednesday:	8:00AM - 9:00PM	8:40AM - Pickup	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Thursday:	8:00AM - 9:00PM	7:30AM 8:40PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Friday:	8:00AM - 9:00PM	7:40AM - 7:30PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Saturday:	8:00AM - 6:00PM	10:40AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Sunday:	10:00AM - 6:00PM	10:30AM - 5:40PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM

Unit 1 starts about 0.5 hours before the park opening on Monday through Friday. The rest of the time the unit schedule does not seem to have a correlation to the building operating hours. Units 2, 3, and 4 are running 24 hours a day

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by two (2) electric meters; each with their own electric rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

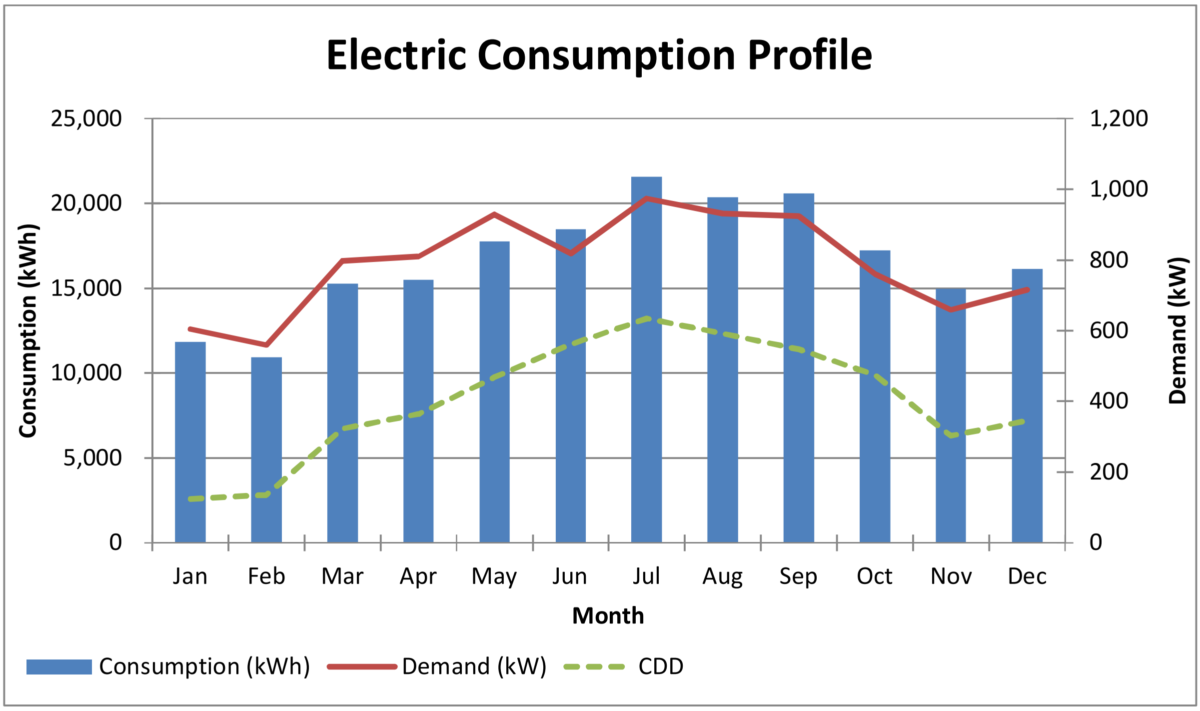
The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
Delevoe Park		GS-1	-	-	$ 0.09874	-	44,695	-	-
		SDTR-1A	0.126104863	$ 0.03979	$ 0.05353	$ 10.71	200,666	447	45

Meter MLL657A; Account: 2188013532; Address: 2520 NW 6TH ST FORT LAUDERDALE

Date	Customer Charge	Consumption (kwh)			Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes		Total Charges
		Total Consumption	On Peak	Off Peak				gross receipts tax 2.56%	Franchise Fee	
Jun-15	$ 25.96	17,263	1,614	15,649	$ 745	40	$ 484.80	$ 32	$ 181	$ 1,468
Jul-15	$ 25.96	20,532	2,235	18,297	$ 893	35	$ 424.20	$ 34	$ 233	$ 1,611
Aug-15	$ 25.96	19,266	2,254	17,012	$ 842	39	$ 472.68	$ 34	$ 232	$ 1,606
Sep-15	$ 25.96	18,428	1,845	16,583	$ 798	34	$ 412.08	$ 32	$ 193	$ 1,461
Oct-15	$ 25.96	17,987	382	17,605	$ 735	42	$ 509.04	$ 33	$ 190	$ 1,492
Nov-15	$ 25.96	15,894	0	15,894	$ 649	42	$ 509.04	$ 30	$ 159	$ 1,374
Dec-15	$ 25.96	15,482	0	15,482	$ 632	36	$ 436.32	$ 28	$ 162	$ 1,285
Jan-16	$ 25.96	10,485	0	10,485	$ 531	25	$ 244.50	$ 21	$ 32	$ 854
Feb-16	$ 25.96	10,106	0	10,106	$ 512	40	$ 391.20	$ 24	$ 37	$ 990
Mar-16	$ 25.96	15,055	0	15,055	$ 763	27	$ 264.06	$ 27	$ 45	$ 1,125
Apr-16	$ 25.96	14,482	0	14,482	$ 734	45	$ 440.10	$ 31	$ 15	$ 1,246
May-16	$ 25.96	16,631	0	16,631	$ 843	41	$ 400.98	$ 32	$ 10	$ 1,312
Jun-16	$ 26.97	19,685	1,458	18,227	$ 893	39	$ 458.64	$ 35	$ 55	$ 1,469
Jul-16	$ 26.97	22,582	2,044	20,538	$ 1,055	40	$ 470.40	$ 40	$ 62	$ 1,654
Aug-16	$ 26.97	21,448	2,157	19,291	$ 1,020	38	$ 446.88	$ 38	$ 60	$ 1,592
Sep-16	$ 26.97	22,749	1,905	20,844	$ 1,050	38	$ 446.88	$ 39	$ 57	$ 1,620
Oct-16	$ 26.97	16,524	340	16,184	$ 787	40	$ 403.20	$ 31	$ 46	$ 1,294
Nov-16	$ 26.97	14,058	0	14,058	$ 669	36	$ 362.88	$ 27	$ 40	$ 1,126
Dec-16	$ 26.97	16,814	0	16,814	$ 800	32	$ 322.56	$ 29	$ 43	$ 1,222
Jan-17	$ 25.00	13,173	0	13,173	$ 678	37	$ 381.10	$ 28	$ 43	$ 1,155
Feb-17	$ 25.00	11,783	0	11,783	$ 607	35	$ 360.50	$ 25	$ 39	$ 1,056
Mar-17	$ 25.00	15,514	0	15,514	$ 834	31	$ 319.30	$ 30	$ 47	$ 1,255
Apr-17	$ 25.00	16,492	0	16,492	$ 886	42	$ 432.60	$ 34	$ 53	$ 1,432
May-17	$ 25.00	18,898	0	18,898	$ 1,016	40	$ 412.00	$ 37	$ 57	$ 1,547
AVERAGE TOTALS		**200,666**	**8,117**	**192,549**	**$ 9,485**	**447**	**$ 4,902.97**	**$ 376**	**$ 1,046**	**$ 16,123**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Delevoe Park	Recreation	25.58	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Delevoe Park

Account #	2041829	**Meter #**	200701417M
Rate		**Address**	
Meter Size	1.5"	**Meter Type**	W/S

Date	Consumption ()	Total Charges
May-17	217	$ 3,183.65
Apr-17	217	$ 3,183.65
Mar-17		$ 1,430.44
Feb-17	143	$ 2,113.78
Jan-17		$ 2,684.76
Dec-16		$ 1,715.51
Nov-16		$ 1,261.56
Oct-16		$ 1,367.76
Sep-16	85	$ 1,239.83
Aug-16		$ 1,009.12
Jul-16		$ 846.27
Jun-16		$ 1,022.69
May-16		$ 520.55
Apr-16		$ 439.12
Mar-16		$ 357.70
Feb-16		$ 289.84
Jan-16		$ 344.13
Dec-15		$ 466.26
Nov-15		$ 405.49
Oct-15		$ (33.63)
Sep-15		$ 469.61
Aug-15		$ 430.87
Jul-15		$ 560.02
Jun-15		$ 611.68
May-15		$ 392.12
TOTALS	**662**	**$26,312.78**

This account has some consumption data during the 24 month period but because there are so few consumption data points, no relevant conclusions can be drawn from these consumption and expense data points.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Delevoe Park	Water - Retrofits	$ 66.55	$ -	$ 1,034.77	$ 62	$ 1,163.59	$ 11,923.20	10.2
Delevoe Park	Split Systems	$ 3,860.80	$ 898.70	$ -	$ -	$ 4,759.50	$ 102,809.13	21.6
Delevoe Park	Split System Code	$ -	$ -	$ -	$ -	$ -	$ 12,891.34	-
Breakage Fee							$ 1,151.61	
PA Cost							$ 1,333.55	
Total		**$ 3,927.35**	**$ 898.70**	**$1,034.77**	**$ 62**	**$ 5,923.09**	**$ 130,108.84**	**22.0**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Flush Valves: Most commercial facilities utilize flush valve water closets. Flush valves are designed to release precise volumes of water when activated. High efficiency flush valves can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 1.28 gallons per flush (GPF) flush valve will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

For those water closets that require a total equipment change, the china will be replaced as well. The High efficiency flush valve and china combination will reduce water flow rates to 1.28 GPF.

Urinals: High efficiency flush valve and china combinations for urinals can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 0.125 GPF high efficiency urinal systems will replace existing equipment that currently consumes 1.0 to 1.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

SAVINGS

The energy and cost savings were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis section of this report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

FIM SAVINGS SUMMARY

Annual Water savings: 90,769 gallons

Annual Energy savings: 876 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Delevoe Park	Water - Retrofits	$ 66.55	$ -	$ 1,034.77	$ 62	$ 1,163.59	$ 11,923.20	10.2

MECHANICAL

As DX equipment ages and the condition of the equipment deteriorate, the energy efficiency of these units also degrades. In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

Cooling for the building is provided by four (4) split DX package configuration located on the outside of the building. Three of the units are 6 ton, air-cooled Carrier units that serve three single-zones, 100% return air handling units (AHU). The fourth unit is a 7.5 ton, air-cooled York unit that serves a single-zone, 100% outside air AHU. The Carrier equipment is reported to be original to the building; 1996 and 1997 manufacturing dates. The York unit appears to be newer; a 2008 manufacturing date.

PROJECT SCOPE

This FIM addresses the replacement of four (4) DX systems. The scope of work includes the replacement of both the condensing unit and air handlers. The new equipment will be of equal capacity and include, as part of the installation, package new programmable thermostats provided by Siemens. The thermostats will be able to communicated, via their own IP address, to remote BAUs for additional access. The units will be placed on a time of day schedule. The new schedule will command the units to turn on 1.5 hours before the facility opens and 1.5 hours after it closes.

Scope of Work

Bldg	Equipment	Make	Model	Tons	Existing EER	New EER
Delevoe Park	AHU	Carrier	40RM-007-B600HC			
Delevoe Park	Condenser	Carrier	38AK-007--V511	6	9	12.5
Delevoe Park	AHU	Carrier	40RM-007-B600HC			
Delevoe Park	Condenser	Carrier	38AK-007--V511	6	9	12.5
Delevoe Park	AHU	Carrier	40RM-007-B600HC			
Delevoe Park	Condenser	Carrier	38ARZ007--K501	6	11	12.5
Delevoe Park	AHU	York	LA090C00A6AAA1B			
Delevoe Park	Condenser	York	HA090C00A2AAA1A	7.5	10.7	11.2

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. The detailed calculations are available in the Section H, Appendices. All calculations were based off Trane manufacturer cut-sheets, also provided.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 67,685 kWh

Annual Electric Demand: 79.8 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Delevoe Park	Split Systems	$ 3,860.80	$ 898.70	$ -	$ -	$ 4,759.50	$ 102,809.13	21.6

Savings Capital: Capital budget dollars were used in order to improve the payback to the requested limitation values. These dollars represent unused amounts left over from the Capital Project Plan total. Funds were first applied to their respective capital project until the required payback was achieved. All remaining amounts were distributed to FIM opportunites such as the one above.

Code Compliance: Associated with the scope of work summarized above are code compliance issued uncovered by contracted MEPs (mechanical, electrical, and plumbing vendor). This cost was requested to be listed separately. For this facility, the code compliance cost is:

- $12,891.34

The identified issue at Delevoe Park includes lack of outside air intakes as required by current building code.

D.36. Park - Everglades Holiday

FACILITY DESCRIPTION

Everglades Holiday Park is a multipurpose facility and grounds that has been in operation for public recreational purposes since 1964 and located at 21940 Griffin Rd, Fort Lauderdale, FL 33332. The park offers air boat rides, boat ramps, fishing, wildlife viewing, food concessions, boat rentals, alligator shows, and campgrounds. There are two buildings on the grounds that are conditioned. The main building consists of a small gift shop, concession area, and offices. The other conditioned building is the campground office that is a single space single wide trailer conditioned by bard units. Access to this building was not possible at the time of the site visit. The operating hours for the entire park are as follows.

Park Hours

7 days a week, 6AM – 10PM

Observed Issues during Visit:

- Some DX units are 10 years old and use R-22 refrigerant
- Indoor air quality issues

Examples of Observed Issues

COOLING SYSTEM:

Cooling for the Main building is provided by three split DX package configuration located on the outside of the building. One of the units is a 5 ton, air-cooled Trane unit that is a single-zone, 100% return air handling unit (AHU). The next unit is a 5 ton, air-cooled Carrier unit that is a single-zone, 100% return AHU. The last unit is a 3.5 ton, air cooled Carries unit that is a single-zone, 100% return AHU.

Main Building HVAC

The cooling for the camp ground office is provided by one packaged DX 2 ton Bard unit.

Camp Grounds Office HVAC

The Trane unit was manufactured in 2014, the Carrier units were manufactured in 2007 & 2008, and the Bard unit was manufactured in 2011

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	**Mfctr**	**Model**	**Serial**	**Description**	**Notes**	**HP**	**Tons/ MBTU**	**V**	**Ph**	**Amps**	**Eff /EER**	**Cal kW**
Everglades Holiday Park												
AHU	Trane	TAM7B0C6CH51SCB	14414M7PAV	fan		1		200	1	5.5		1.0
CU	Trane	4TTB6061B1000AA	14384JWS2F	compressor	R-410a		5	208	1	23.7	12.8	4.4
				fan		0.33		208	1	2.8		0.5
Pump	AMT	T63CXDPT-1885		pond pump 1		2		208	1	10.7		2.0
Pump	Everbuilt	EFLS20-HD	T010902	pond pump 2		2		115		27		0.0
AHU				could not locate								0.0
CU	Payne	PA13NR060	4107X0624	compressor	R-22		5	208	1	25.3	11	4.7
				fan		0.25		208	1	1.4		0.3
AHU				could not locate								0.0
CU	Carrier	24ABS360A300	2108E23960	compressor	R-22		3.5	208	1	25.3	12	4.7
				fan		0.25		208	1	1.2		0.2
Bard Unit	Bard	W24A1	314L112840461-02	compressor	R-410a		2	208	1	12.4		2.3
				fan		0.2		208	1	1.2		0.2
				fan		0.17		208	1	1		0.2

Observed Issues during Visit:

- DX units are 10 years old and use R-22 refrigerant

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt, T8 fluorescent lamps in either 2 or 3-lamp 2x4 fixtures.

Interior Lighting Examples

Exterior Lighting consists of metal halide parking lot lights.

The building does not make use of occupancy sensors or any other types of lighting control.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. The restrooms are found in an individual building in the campground area and a temporary restroom facility outside of the main building. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.0 gpf urinals
- 3.5 gpf toilets

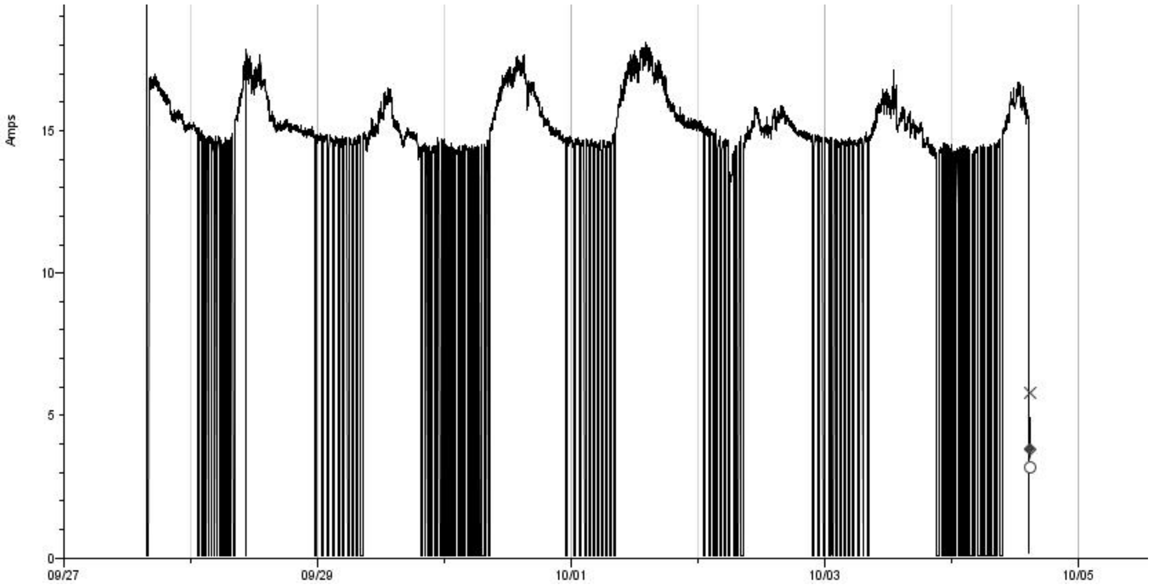
BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.

TRENDING DATA ACQUISITION

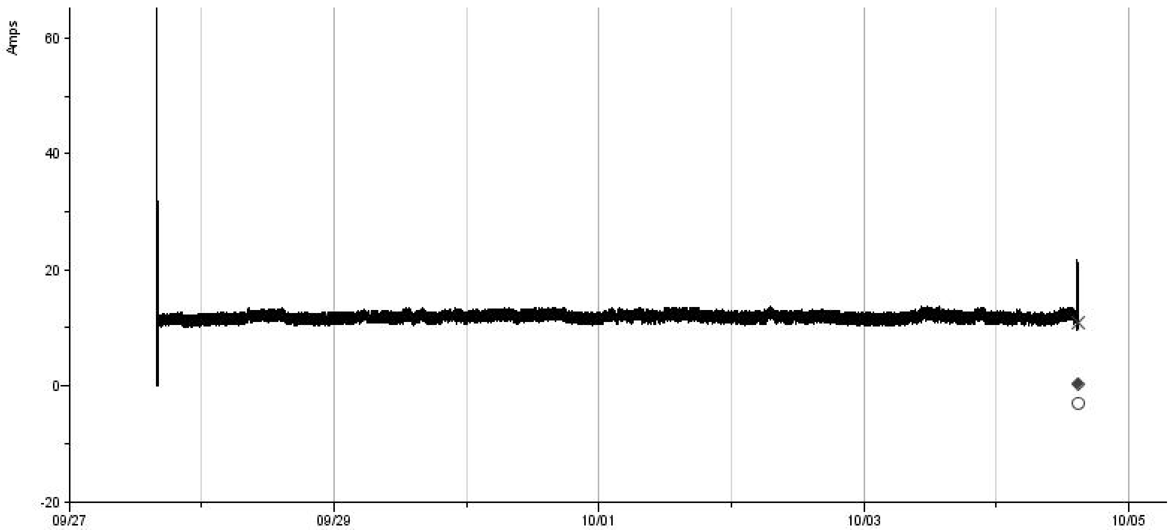
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 5 Ton Condensing Unit – Trane AHU



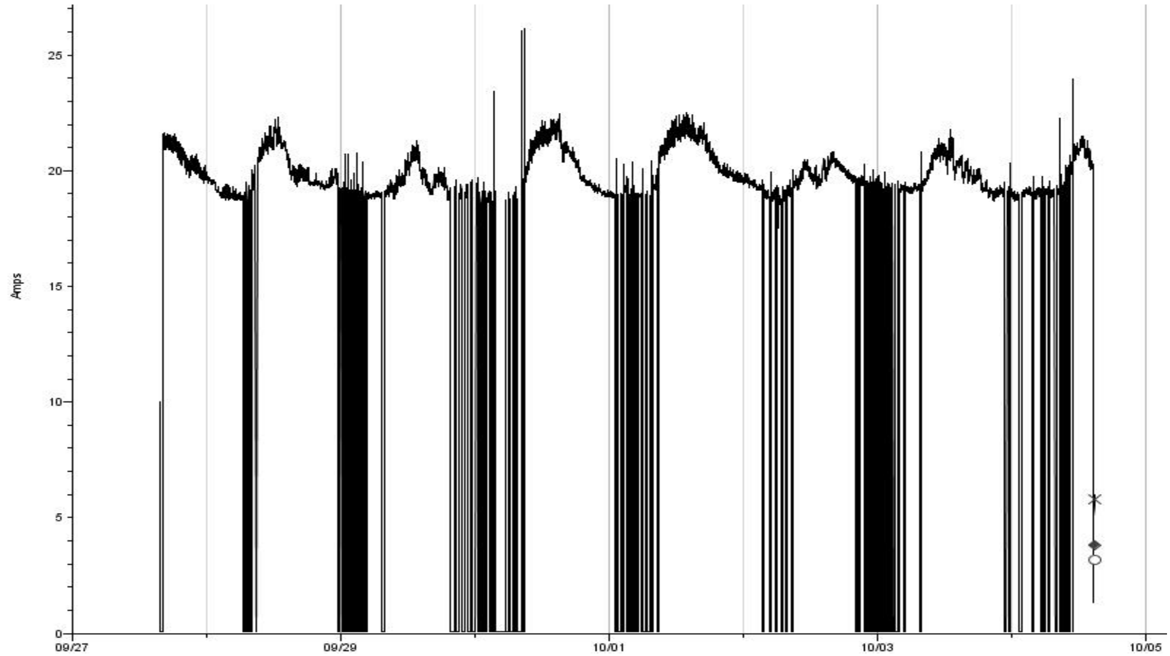
This unit registered an average of 15.32 amps and was operating continuously throughout the data collection period.

Trending Data – 5 Ton Condensing Unit – Payne AHU



This unit registered an average of 11.85 amps and was operating continuously throughout the data collection period.

Trending Data – 3.5 Ton Condensing Unit – Carrier AHU



This unit registered an average of 19.89 amps and was operating continuously throughout the data collection period.

The following table compares the operating hours of each unit with the hours of service for the facility.

Day	Hours of Service	Run Hours Trane Unit	Run Hours Payne Unit	Run Hours Carrier Unit
Monday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Tuesday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Wednesday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Thursday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Friday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Saturday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM
Sunday	6:00AM - 10:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM	12:00AM - 12:00PM

The units are running 24 hours a day with no signs of any type of controls for the week that data was collected.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by four (4) electric meters; each with different electric rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

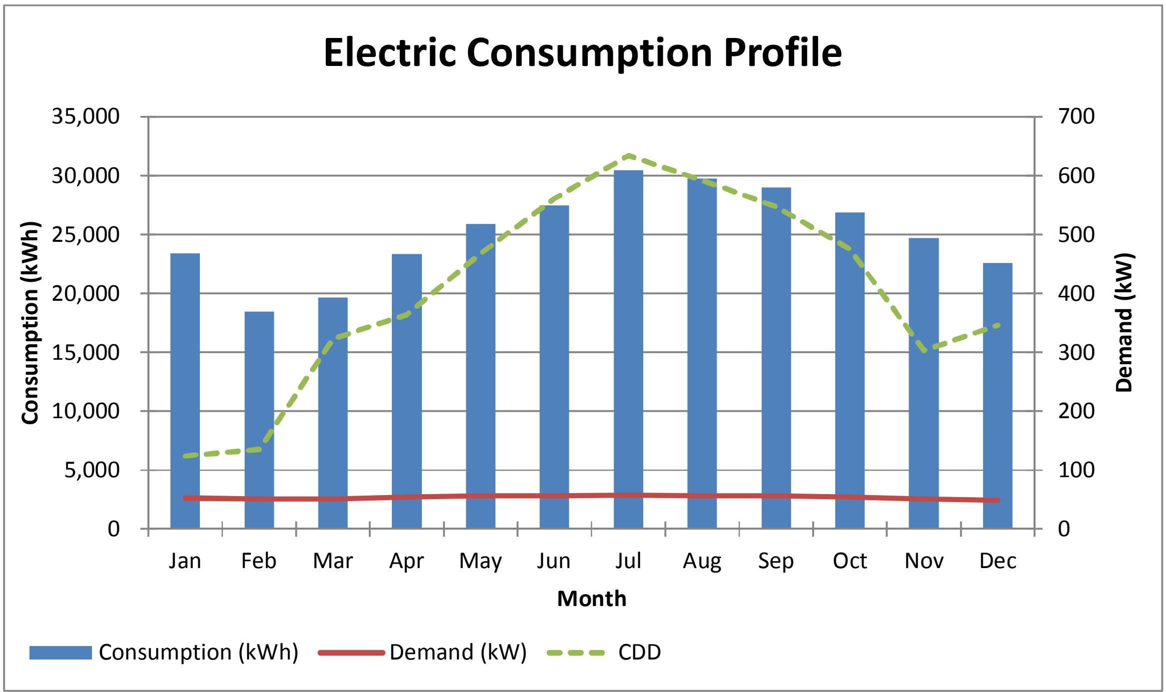
The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Everglades Holiday Park	Trailor	GSD-1	$ 0.05704	$ 11.26	301,507	651	61
		GS-1	$ 0.09896	-	9,085	-	-
	Park	GS-1	$ 0.09898	-	13,209	-	-
	Park 2	GS-1	$ 0.09896	-	19,972	-	-

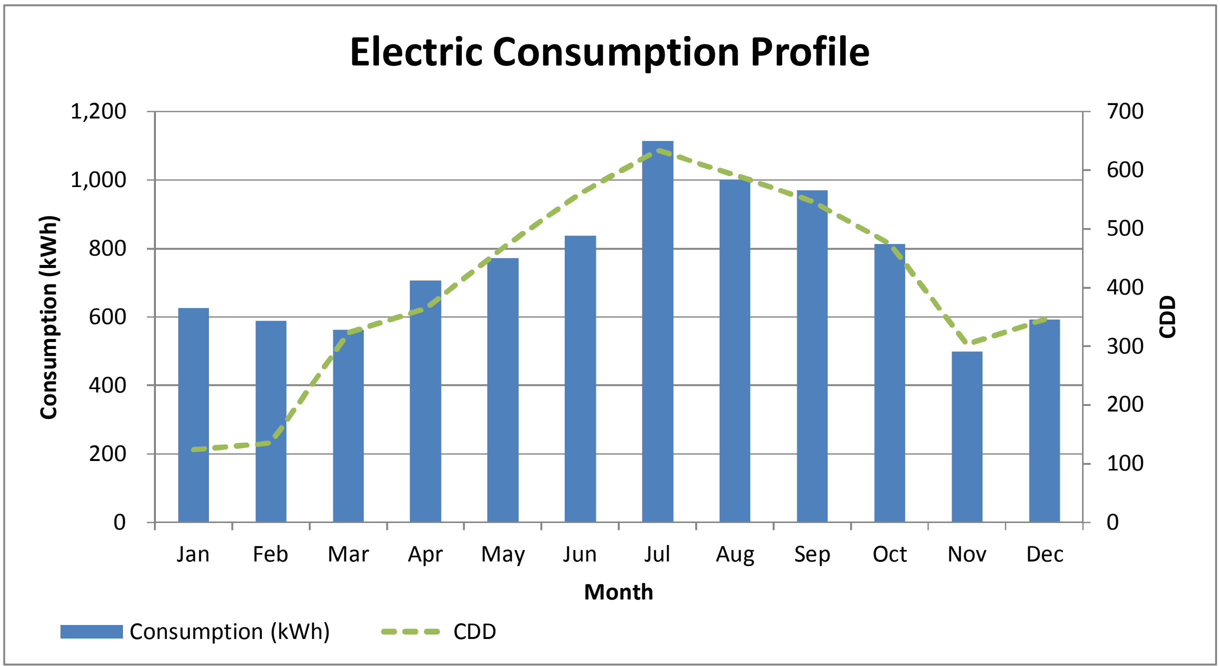
Meter KCJ4312; Account: 2566356529; Address: 21940 GRIFFIN RD # TRAILER

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jul-15	$ 19.48	29,969	$ 1,650.99	60	$ 637	$ 75	$ 2,382
Aug-15	$ 19.48	32,503	$ 1,790.59	60	$ 637	$ 77	$ 2,524
Sep-15	$ 19.48	29,700	$ 1,636.17	61	$ 647	$ 65	$ 2,368
Oct-15	$ 19.48	26,582	$ 1,464.40	58	$ 615	$ 61	$ 2,160
Nov-15	$ 19.48	27,339	$ 1,506.11	56	$ 594	$ 58	$ 2,178
Dec-15	$ 19.48	24,822	$ 1,257.48	53	$ 562	$ 164	$ 2,004
Jan-16	$ 19.48	24,691	$ 1,250.85	54	$ 573	$ 92	$ 1,935
Feb-16	$ 19.48	17,765	$ 899.97	51	$ 516	$ 94	$ 1,529
Mar-16	$ 19.48	18,463	$ 935.34	50	$ 506	$ 100	$ 1,560
Apr-16	$ 19.48	24,303	$ 1,231.19	54	$ 546	$ 56	$ 1,852
May-16	$ 19.48	25,065	$ 1,269.79	54	$ 546	$ 56	$ 1,891
Jun-16	$ 19.48	26,878	$ 1,279.39	55	$ 556	$ 141	$ 1,996
Jul-16	$ 20.24	30,929	$ 1,472.22	55	$ 573	$ 136	$ 2,201
Aug-16	$ 20.24	26,988	$ 1,284.63	54	$ 563	$ 123	$ 1,990
Sep-16	$ 20.24	28,273	$ 1,345.79	53	$ 552	$ 121	$ 2,039
Oct-16	$ 20.24	27,151	$ 1,292.39	51	$ 531	$ 116	$ 1,960
Nov-16	$ 20.24	22,052	$ 1,049.68	47	$ 490	$ 98	$ 1,658
Dec-16	$ 20.24	20,389	$ 970.52	45	$ 469	$ 92	$ 1,552
Jan-17	$ 25.00	22,125	$ 1,138.33	52	$ 542	$ 122	$ 1,827
Feb-17	$ 25.00	19,080	$ 981.67	51	$ 541	$ 101	$ 1,648
Mar-17	$ 25.00	20,863	$ 1,120.34	53	$ 562	$ 112	$ 1,819
Apr-17	$ 25.00	22,344	$ 1,199.87	55	$ 583	$ 119	$ 1,927
May-17	$ 25.00	26,690	$ 1,433.25	60	$ 636	$ 138	$ 2,232
Jun-17	$ 25.00	28,050	$ 1,506.29	59	$ 625	$ 143	$ 2,300
AVERAGE TOTALS		**301,507**	**$ 15,483.63**	**651**	**$ 6,801**	**1,230**	**$ 23,767**



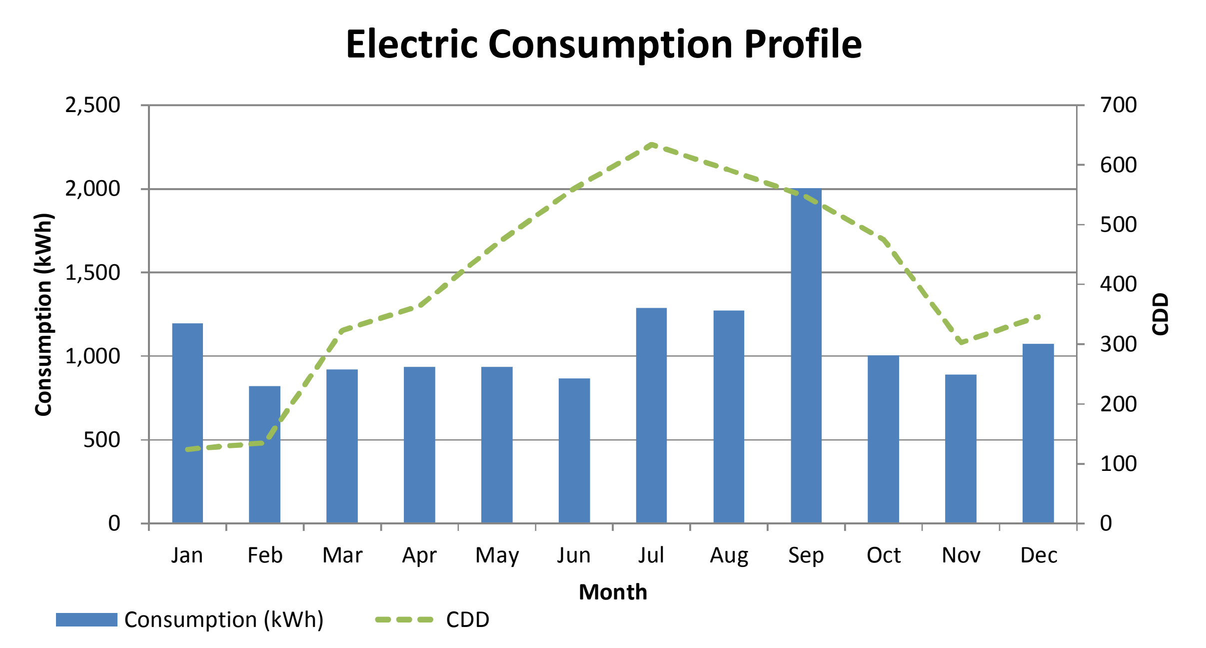
Meter KC78911; Account: 2074304334; Address: 21940 GRIFFIN RD FORT LAUDERDALE

Date	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jul-15	1,104	$ 106.23	$ 4.84	$ 119
Aug-15	1,047	$ 100.74	$ 4.63	$ 113
Sep-15	921	$ 88.62	$ 3.70	$ 100
Oct-15	832	$ 80.06	$ 3.39	$ 91
Nov-15	776	$ 74.67	$ 3.11	$ 85
Dec-15	675	$ 64.95	$ 2.77	$ 75
Jan-16	701	$ 63.61	$ 4.67	$ 76
Feb-16	580	$ 52.63	$ 3.95	$ 64
Mar-16	551	$ 50.00	$ 3.96	$ 61
Apr-16	759	$ 68.87	$ 3.91	$ 80
May-16	819	$ 74.32	$ 4.17	$ 86
Jun-16	884	$ 78.76	$ 5.67	$ 92
Jul-16	1,125	$ 100.23	$ 7.08	$ 115
Aug-16	954	$ 84.99	$ 6.09	$ 99
Sep-16	1,019	$ 90.78	$ 6.20	$ 105
Oct-16	794	$ 70.74	$ 4.94	$ 83
Nov-16	222	$ 19.78	$ 1.73	$ 29
Dec-16	510	$ 45.44	$ 3.35	$ 57
Jan-17	551	$ 49.65	$ 3.92	$ 64
Feb-17	599	$ 53.98	$ 4.18	$ 68
Mar-17	575	$ 53.55	$ 4.18	$ 68
Apr-17	656	$ 61.09	$ 4.68	$ 76
May-17	724	$ 67.43	$ 5.10	$ 83
Jun-17	792	$ 73.86	$ 5.46	$ 89
AVERAGES	**9,085**	**$ 837.47**	**$ 52.86**	**$ 988.49**



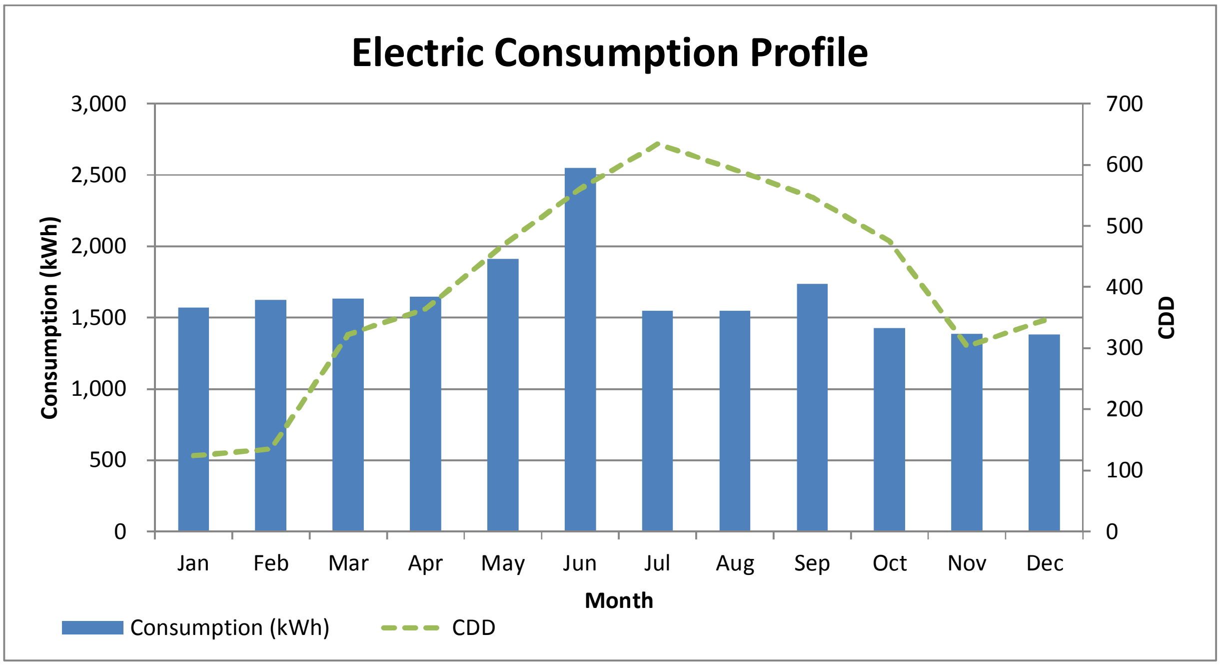
Meter KJ65810; Account: 1516157334; Address: 21940 GRIFFIN RD #EVERGLADES

Date	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jul-15	889	$ 85.54	$ 4.00	$ 97
Aug-15	1,242	$ 119.51	$ 5.38	$ 132
Sep-15	2,712	$ 260.95	$ 9.94	$ 278
Oct-15	715	$ 68.80	$ 2.98	$ 79
Nov-15	824	$ 79.29	$ 3.28	$ 90
Dec-15	1,131	$ 108.82	$ 4.32	$ 121
Jan-16	1,265	$ 114.79	$ 8.01	$ 130
Feb-16	884	$ 80.21	$ 5.76	$ 93
Mar-16	1,168	$ 105.98	$ 7.81	$ 121
Apr-16	1,442	$ 130.85	$ 6.71	$ 145
May-16	1,420	$ 128.85	$ 6.61	$ 143
Jun-16	1,340	$ 119.38	$ 8.35	$ 135
Jul-16	1,685	$ 150.12	$ 10.35	$ 168
Aug-16	1,304	$ 116.17	$ 8.15	$ 132
Sep-16	1,298	$ 115.64	$ 7.76	$ 131
Oct-16	1,295	$ 115.37	$ 7.72	$ 131
Nov-16	950	$ 84.64	$ 5.81	$ 98
Dec-16	1,014	$ 90.34	$ 6.17	$ 104
Jan-17	1,131	$ 101.91	$ 7.35	$ 119
Feb-17	757	$ 68.21	$ 5.10	$ 83
Mar-17	675	$ 62.86	$ 4.81	$ 78
Apr-17	430	$ 40.05	$ 3.30	$ 53
May-17	453	$ 42.19	$ 3.43	$ 56
Jun-17	394	$ 36.74	$ 3.06	$ 50
AVERAGES	**13,209**	**$ 1,213.60**	**$ 73.08**	**$1,384.84**



Meter KJL6224; Account: 4187108339; Address: 21940 GRIFFIN RD #EVRGLDS PRK 2

Date	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jul-15	431	$ 41.47	$ 2.19	$ 51
Aug-15	799	$ 76.88	$ 3.63	$ 88
Sep-15	1,086	$ 104.49	$ 4.28	$ 116
Oct-15	908	$ 87.37	$ 3.66	$ 98
Nov-15	1,011	$ 97.28	$ 3.90	$ 109
Dec-15	1,364	$ 131.24	$ 5.11	$ 144
Jan-16	1,482	$ 134.48	$ 9.32	$ 151
Feb-16	1,593	$ 144.55	$ 9.98	$ 162
Mar-16	1,914	$ 173.68	$ 12.47	$ 194
Apr-16	1,656	$ 150.27	$ 7.60	$ 165
May-16	1,977	$ 179.39	$ 8.90	$ 196
Jun-16	2,218	$ 197.60	$ 13.49	$ 219
Jul-16	2,668	$ 237.69	$ 16.11	$ 262
Aug-16	2,293	$ 204.28	$ 13.94	$ 226
Sep-16	2,391	$ 213.01	$ 13.86	$ 235
Oct-16	1,948	$ 173.55	$ 11.39	$ 193
Nov-16	1,758	$ 156.62	$ 10.32	$ 175
Dec-16	1,404	$ 125.08	$ 8.35	$ 141
Jan-17	1,654	$ 149.04	$ 10.44	$ 169
Feb-17	1,661	$ 149.67	$ 10.41	$ 170
Mar-17	1,357	$ 126.38	$ 8.99	$ 145
Apr-17	1,642	$ 152.92	$ 10.73	$ 174
May-17	1,850	$ 172.29	$ 12.01	$ 194
Jun-17	2,879	$ 268.50	$ 18.13	$ 297
AVERAGES	**19,972**	**$ 1,823.87**	**$ 114.60**	**$2,036.63**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Everglades Holiday Park	Recreation	20.22	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

Water consumption data could not be acquired for this facility

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Everglades Holiday Park	Lighting - Interior	$ 1,518.10	$ -	$ -	$ 212	$ 1,730.10	$ 13,393.86	7.7
Everglades Holiday Park	Water - Retrofits	$ 171.15	$ -	$ 923.58	$ 33	$ 1,128.01	$ 11,167.36	9.9
Everglades Holiday Park	Split System Scheduling	$ 771.40	$ -	$ -	$ -	$ 771.40	$ 8,076.78	10.5
Breakage Fee							$ 1,151.61	
PA Cost							$ 341.50	
Total		**$ 2,460.65**	**$ -**	**$ 923.58**	**$ 245**	**$ 3,629.51**	**$ 34,131.12**	**9.4**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps: The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures: In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

Emergency Lighting: Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
EVERGLADES HOLIDAY PARK	Existing T8 Fluorescent - Proposed Retrofit LED	76	76

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 19,496 kWh

Annual Electric Demand: 39.9 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Everglades Holiday Park	Lighting - Interior	$ 1,518.10	$ -	$ -	$ 212	$ 1,730.10	$ 13,393.86	7.7

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Flush Valves: Most commercial facilities utilize flush valve water closets. Flush valves are designed to release precise volumes of water when activated. High efficiency flush valves can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 1.28 gallons per flush (GPF) flush valve will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

For those water closets that require a total equipment change, the china will be replaced as well. The High efficiency flush valve and china combination will reduce water flow rates to 1.28 GPF.

Urinals: High efficiency flush valve and china combinations for urinals can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 0.125 GPF high efficiency urinal systems will replace existing equipment that currently consumes 1.0 to 1.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

SAVINGS

The energy and cost savings were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis Section of this report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

FIM SAVINGS SUMMARY

Annual Water savings: 120,888 gallons

Annual Energy savings: 1,934 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Everglades Holiday Park	Water - Retrofits	$ 171.15	$ -	$ 923.58	$ 33	$ 1,128.01	$ 11,167.36	9.9

AUTOMATION – SCHEDULES

Standard thermostats control an HVAC unit by measuring the ambient temperature at the thermostat and either turning the unit on if the ambient temperature is above the temperature setpoint or turning the unit off when the ambient temperature reaches the setpoint. Most commercial facilities have set hours of operation where the facility is occupied and there is a need for conditioned space. Outside of hours of operation a facility will usually not have occupancy and won't have a need for air conditioning. Advanced Siemens thermostats allow for the utilization of this fact to translate into energy savings by changing the setpoint temperatures of a building automatically depending on the hours of operation. In addition, these thermostats have the capability to be wirelessly connected to a BAS system for remote monitoring and control.

PROJECT SCOPE

This FIM address the turn-key replacement and installation of two (2) thermostats with scheduling capabilities.

SAVINGS

The energy cost and savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical consumption of the equipment to be controlled by the thermostat was determined. A run time analysis was completed by logging the use of the equipment for a 7 day period. The equipment run time was compared to an optimal run time to meet the needs of that facility. Optimal run times were determined by taking the daily hours of operation of the facility plus 1.5 hours before and after. The difference between the existing run time and the optimal run time are equal to the unnecessary amount of time the unit is running. This time then was multiplied by the electrical consumption for each unit to acquire the calculated energy savings per HVAC unit. Full calculations are provided in Section H, Appendices this Report.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 13,531 kWh

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Everglades Holiday Park	Split System Scheduling	$ 771.40	$ -	$ -	$ -	$ 771.40	$ 8,076.78	10.5

D.37. Park - Franklin

FACILITY DESCRIPTION

Franklin Park is a multipurpose facility that has been in operation as it currently stands since 2000 and located at 2501 Franklin Dr., Fort Lauderdale, FL 33311. The facility is a 6,000-square-foot community center with a kitchen, office space, storage, restrooms, activity rooms, a large meeting room, and a fitness center. This is the only conditioned space in the park. The park also offers two shelters, two covered basketball courts, and a playground. The park has after school programs for the children ages 6 -17 as well as offering summer recreational programs. The operating hours for the entire park are as follows.

Park Hours

Mon – Friday:	8AM – 9PM
Sat – Sun:	10AM – 6PM

Observed Issues during Visit:

- AHU is past its useful life

COOLING SYSTEM:

Cooling for the facility is provided by 5 DX Systems. 4 of the units are packaged DX Carrier roof top units (RTU). Two of the RTUs are 4 ton units and the other two are 5 ton units. The last unit is a split system DX unit consisting of two Thermal Zone condensing units that are 7.5 tons each that feed into one Carrier mixed air handling unit (AHU)

Main Building HVAC

Nameplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Franklin Park												
AHU	Carrier	39TVRNAB--U-CJL-AB	1700F96354	fan								1.0
CU1	Thermal Zone	TZAA-090CA757	F171703307	compressor	R-22		7.5	208	3	22.4	11.18	7.3
				fan		0.33		208	3	2.2		0.7
CU2	Thermal Zone	TZAA-090CA757	F171403303	compressor	R-22		7.5	208	3	22.4	11.18	7.3
				fan		0.33		208	3	2.2		0.7
RTU4	Carrier	50LC0005A0C5A0A0A0	4413C89786	compressor	R-410a		4	208	3	14	13.475	4.5
				fan				208	1	3.5		0.7
				fan				208	1	7.4		1.4
RTU3	Carrier	50LC0006A0C5A0A0A0	4413C89790	compressor	R-410a		5	208	3	16.2	13.35	5.3
				fan				208	1	3.5		0.7
				fan				208	1	7.4		1.4
RTU2	Carrier	50LC0005A0C5A0A0A0	4413C89787	compressor	R-410a		4	208	3	14	13.475	4.5
				fan				208	1	3.5		0.7
				fan				208	1	7.4		1.4
RTU1	Carrier	50LC0006A0C5A0A0A0	4413C89791	compressor	R-410a		5	208	3	16.2	13.35	5.3
				fan				208	1	3.5		0.7
				fan				208	1	7.4		1.4
Irrigation Pump	U.S. Electric Motors	C536A		pump		5		208	3	14.9		4.8

The Carrier RTUs were manufactured in 2013, the Carrier air handler was manufactured in 2000, and the Thermal Zone condensing units were manufactured in 2014.

LIGHTING SYSTEM

Interior lighting primarily consists of LED fixtures.

Exterior Lighting consists of LED wall pack lighting, metal halide parking lot lighting, and metal halide lighting for a covered basketball court.

Exterior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control that could be found.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.0 gpf urinals
- 1.6 gpf toilets

A RainBird irrigation system was found at the site. Based on the size of the area being irrigated, it is estimated that there are around 12 zones and around 120 sprinkler heads.

Onsite Irrigation

BUILDING CONTROLS SYSTEM

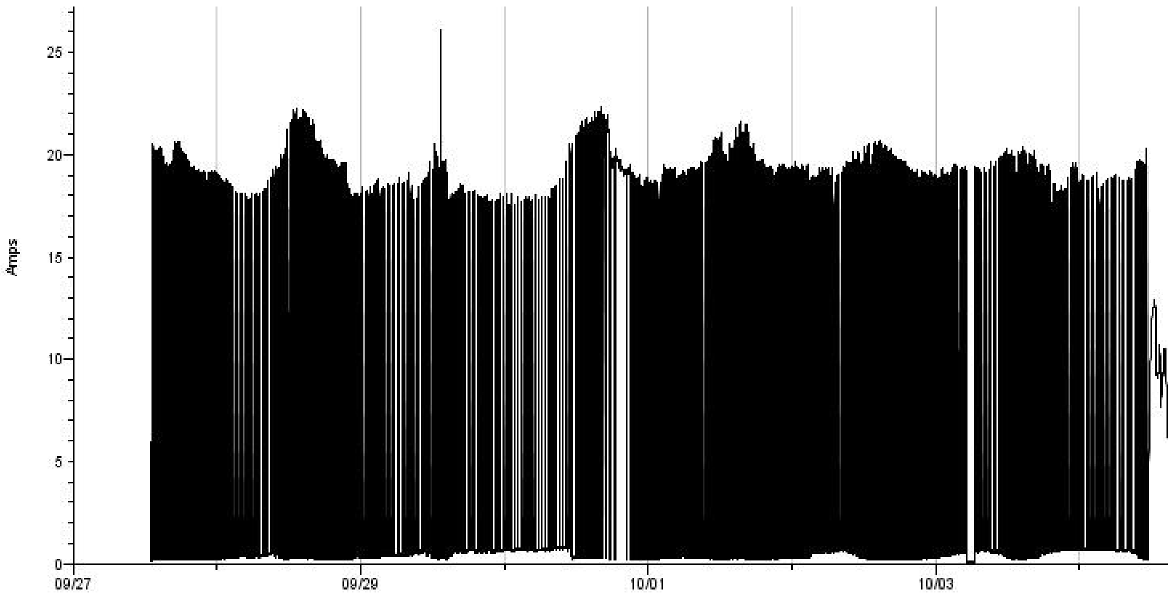
The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat. The basketball court lights are controlled by a manual timer.

Building Controls

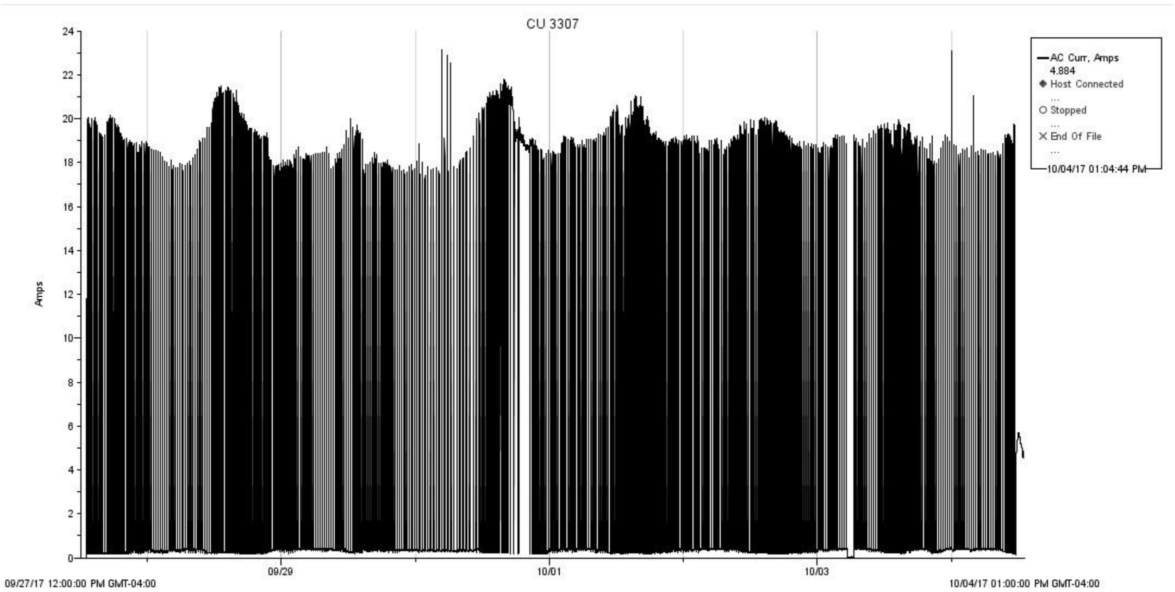
TRENDING DATA ACQUISITION

In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 7.5 Ton Condensing Unit



Trending Data – 7.5 Ton Condensing Unit



The two condensing units above were running continuously and present normal cycling patterns. Both of these condensing units are supplying one Carrier air handler that services a large meeting hall inside the facility. Data was not acquired for the 4 roof top units at this facility as the equipment is from 2013, is in good condition, and utilizes R-410a as its refrigerant so they were not adequate candidates for replacement for higher efficiency units. The following table compares the operating hours of each unit with the hours of service for the facility.

Day	Hours of Service	Run Hours CU 3303	Run Hours CU 3307
Monday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Tuesday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Wednesday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Thursday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Friday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Saturday	10:00AM - 6:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Sunday	10:00AM - 6:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM

The facility has a consistent operating schedule and it is evident by the run hours of these units that there is no schedule controlling the run time of these units.

SIEMENS

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilize the General Service Demand (GSD-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

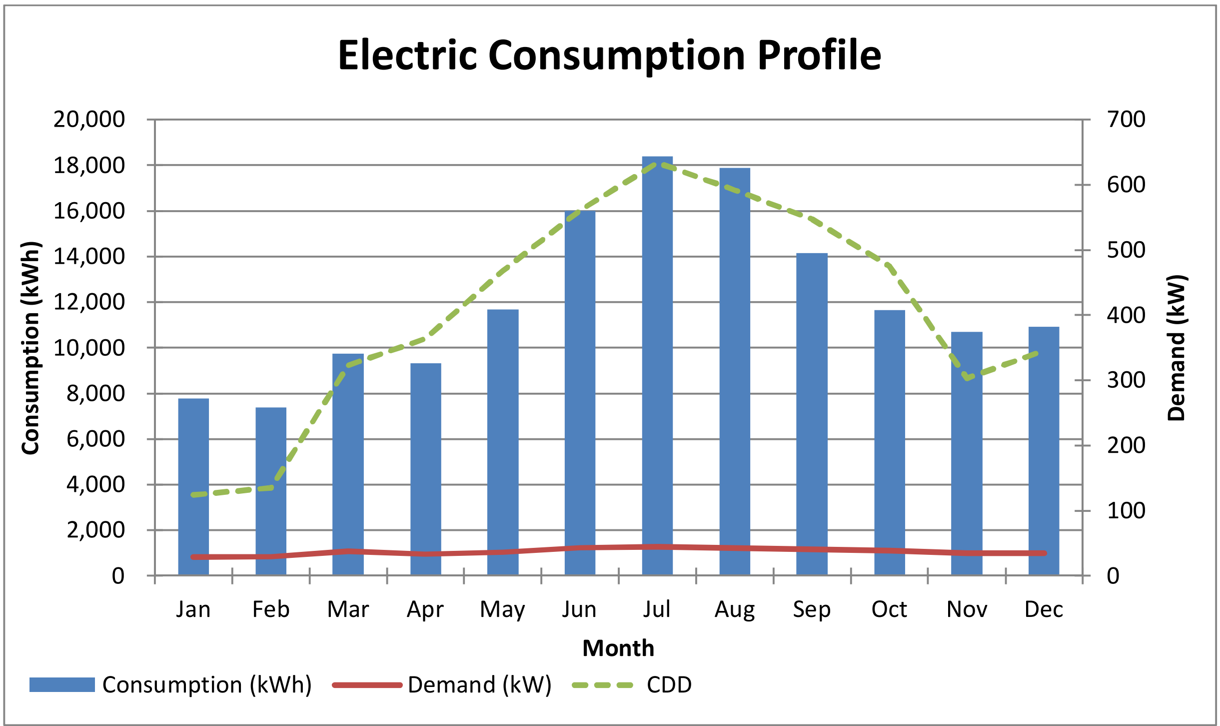
The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Franklin Park	1	GSD-1	$ 0.05701	$ 11.25	145,604	444	47

Meter KLL0911; Account: 3595633078; Address: 2501 FRANKLIN DR FORT LAUDERDALE

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Total Charges
Jun-15	$ 19.48	15,701	$ 865	47	$ 499	$ 1,434
Jul-15	$ 19.48	18,754	$ 865	47	$ 499	$ 1,605
Aug-15	$ 19.48	17,447	$ 1,033	46	$ 488	$ 1,521
Sep-15	$ 19.48	15,199	$ 961	41	$ 435	$ 1,333
Oct-15	$ 19.48	12,876	$ 837	42	$ 446	$ 1,215
Nov-15	$ 19.48	11,624	$ 709	37	$ 393	$ 1,087
Dec-15	$ 19.48	12,170	$ 589	39	$ 414	$ 1,140
Jan-16	$ 19.48	7,872	$ 617	32	$ 340	$ 790
Feb-16	$ 19.48	7,105	$ 399	28	$ 283	$ 706
Mar-16	$ 19.48	10,506	$ 360	40	$ 404	$ 1,021
Apr-16	$ 19.48	9,586	$ 532	33	$ 334	$ 874
May-16	$ 19.48	12,051	$ 486	35	$ 354	$ 1,021
Jun-16	$ 19.48	16,291	$ 574	40	$ 404	$ 1,292
Jul-16	$ 20.24	18,025	$ 775	42	$ 438	$ 1,402
Aug-16	$ 20.24	18,314	$ 858	39	$ 406	$ 1,384
Sep-16	$ 20.24	13,069	$ 872	40	$ 417	$ 1,126
Oct-16	$ 20.24	10,385	$ 622	35	$ 365	$ 935
Nov-16	$ 20.24	9,785	$ 494	32	$ 333	$ 871
Dec-16	$ 20.24	9,685	$ 466	30	$ 313	$ 844
Jan-17	$ 25.00	7,698	$ 498	26	$ 271	$ 742
Feb-17	$ 25.00	7,646	$ 396	31	$ 329	$ 796
Mar-17	$ 25.00	9,002	$ 483	35	$ 371	$ 937
Apr-17	$ 25.00	9,079	$ 488	34	$ 360	$ 930
May-17	$ 25.00	11,338	$ 609	37	$ 392	$ 1,093
AVERAGE TOTALS		**145,604**	**$ 7,694**	**444**	**$ 4,643**	**$ 13,050**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Franklin Park	Recreation	8.81	3.7	7.3	17.6

Overall, this building is operating just above the average percentile of comparable facilities.

BROWARD COUNTY FLORIDA

SIEMENS

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Franklin Park

Account #	**Meter #**
Rate	**Address**
Meter Size	**Meter Type**

		2025883	2025884
Date	**Consumption ()**	**Total Charges**	**Total Charges**
May-17		$ 239.69	$ 168.63
Apr-17		$ 239.69	$ 168.63
Mar-17		$ 239.69	$ 168.63
Feb-17		$ 402.44	$ 134.90
Jan-17		$ 207.13	$ 168.63
Dec-16		$ 571.22	$ 168.63
Nov-16		$ 215.91	$ 129.28
Oct-16		$ 217.59	$ 164.74
Sep-16		$ 274.77	$ 160.60
Aug-16		$ 367.78	$ 160.60
Jul-16		$ 336.77	$ 160.60
Jun-16		$ 228.28	$ 160.60
May-16		$ 228.28	$ 160.60
Apr-16		$ 228.28	$ 160.60
Mar-16		$ 464.03	$ 160.60
Feb-16		$ 259.27	$ 160.60
Jan-16		$ 197.27	$ 160.60
Dec-15		$ 212.77	$ 160.60
Nov-15		$ 228.28	$ 139.19
Oct-15		$ 191.68	$ 156.65
Sep-15		$ 202.60	$ 152.95
Aug-15		$ 305.87	$ 152.95
Jul-15		$ 305.87	$ 152.95
Jun-15		$ 237.36	$ 152.95
May-15		$ 202.60	$ 152.95
TOTALS	**0**	**$ 6,805.12**	**$3,938.66**

This account only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Franklin Park	Lighting - Exterior	$ 2,351.54	$ 1,005.80	$ -	$ 347	$ 3,704.34	$ 75,893.81	20.5
Franklin Park	Water - Retorfits	$ 99.86	$ -	$ 949.75	$ 55	$ 1,104.17	$ 7,692.75	7.0
Franklin Park	Split System Scheduling	$ 1,428.80	$ -	$ -	$ -	$ 1,428.80	$ 2,692.26	1.9
Breakage Fee							$ 1,983.00	
PA Cost							$ 734.66	
Total		**$ 3,880.20**	**$ 1,005.80**	**$ 949.75**	**$ 402**	**$ 6,237.31**	**$ 88,996.48**	**14.3**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement for High Intensity Discharge Exterior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium n exterior applications provides significant energy reduction opportunities when changing over to LED. For exterior pole mounted applications, often the number of fixtures can be reduce based on the improved photometric and light distribution of the new LED fixtures that wasn't previously available in HID fixtures. All proposed LED fixtures are from recognized manufacturers that have met the required standards for light quality, efficiency and longevity. In our design effort and fixture selection process, consideration is given to the maintenance benefits of the prescribed solution resulting in less future costs to maintain exterior fixtures in difficult to reach applications. The proposed LED fixture replacement has been specified to furnish light levels that are in compliance with recommended light levels and support the existing site condition requirements. Where time clocks or automated lighting controls are not in place, proposed LED building and site lighting will incorporate an integral photocell to maximize energy savings.

In general, the design approach is to replace existing HID luminaires with new LED luminaires of like type, ie: shoeboxes, wallpacks, floodlights. Some fixture types are replaced with new LED fixtures of a different type, ie: recessed canopy lights replaced with low profile LED canopy lights.

Where deemed appropriate in parks and office buildings, integral occupancy sensors have been used on pole mounted shoebox luminaires in parking lots to automatically dim the lighting during hours of inactivity.

Decorative post top luminaires, recessed step lights, and bollards typically use low wattage HID lamps in architectural form factors. Replacement luminaires of this type are relatively high in cost, with relatively low energy savings potential. As a result, the proposed design typically calls for removing the HID lamp and ballast, and installing a new screw based LED lamp.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
FRANKLIN PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	22	22
	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	12	12
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture With Sensor	20	20

Exterior Lighting Sensor scope

Building Name	Areas Controlled by sensors
FRANKLIN PARK	2

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 41,247 kWh

Annual Electric Demand: 88.92 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Franklin Park	Lighting - Exterior	$ 2,351.54	$ 1,005.80	$ -	$ 347	$ 3,704.34	$ 75,893.81	20.5

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Flush Valves: Most commercial facilities utilize flush valve water closets. Flush valves are designed to release precise volumes of water when activated. High efficiency flush valves can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 1.28 gallons per flush (GPF) flush valve will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

Urinals: High efficiency flush valve and china combinations for urinals can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 0.125 GPF high efficiency urinal systems will replace existing equipment that currently consumes 1.0 to 1.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

SAVINGS

The energy and cost savings were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis Section of this report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

FIM SAVINGS SUMMARY

Annual Water savings: 83,311 gallons

Annual Energy savings: 1,752 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Franklin Park	Water - Retorfits	$ 99.86	$ -	$ 949.75	$ 55	$ 1,104.17	$ 7,692.75	7.0

AUTOMATION – SCHEDULES

Standard thermostats control an HVAC unit by measuring the ambient temperature at the thermostat and either turning the unit on if the ambient temperature is above the temperature setpoint or turning the unit off when the ambient temperature reaches the setpoint. Most commercial facilities have set hours of operation where the facility is occupied and there is a need for conditioned space. Outside of hours of operation a facility will usually not have occupancy and won't have a need for air conditioning. Advanced Siemens thermostats allow for the utilization of this fact to translate into energy savings by changing the setpoint temperatures of a building automatically depending on the hours of operation. In addition, these thermostats have the capability to be wirelessly connected to a BAS system for remote monitoring and control.

PROJECT SCOPE

This FIM address the turn-key replacement and installation of one (1) thermostat with scheduling capabilities.

SAVINGS

The energy cost and savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical consumption of the equipment to be controlled by the thermostat was determined. A run time analysis was completed by logging the use of the equipment for a 7 day period. The equipment run time was compared to an optimal run time to meet the needs of that facility. Optimal run times were determined by taking the daily hours of operation of the facility plus 1.5 hours before and after. The difference between the existing run time and the optimal run time are equal to the unnecessary amount of time the unit is running. This time then was multiplied by the electrical consumption for each unit to acquire the calculated energy savings per HVAC unit. Full calculations are provided in Section H, Appendices of this Report.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 25,067 kWh

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Franklin Park	Split System Scheduling	$ 1,428.80	$ -	$ -	$ -	$ 1,428.80	$ 2,692.26	1.9

D.38. Park - Lafayette Hart

FACILITY DESCRIPTION

Lafayette Hart Park is a small multipurpose facility and grounds that has been largely remodeled and updated in 2016 and is located at 2851 NW 8th Rd, Fort Lauderdale, FL 33311. The park features a triple wide modular building with meeting room, kitchen area, computer lab, and office. Additional amenities at the park include a basketball court, shelters, playground/play structure, a tennis court, and a racquetball court. The operating hours for the entire park are as follows.

Park Hours

Mon-Fri:	8AM – 6PM
Saturday:	10AM – 6PM
Sunday:	Closed

Observed Issues during Visit:

- No issues were found at this facility as it has gone through recent renovations

COOLING SYSTEM:

Cooling for the Main building is provided by three packaged wall DX Bard units. Each has a 3 ton cooling capacity. The units were manufactured in 2015.

Main Building HVAC

SIEMENS

The following table documents nameplate data acquired both onsite and from online Product Data Sheets.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Lafayette Hart Park												
Bard Unit1	Bard	W36A2-A10XX4XXX	309L153271878-02	compressor	R-410a		3	208	1	15.3	9	2.9
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.1		0.4
Bard Unit2	Bard	W36A2-A10XX4XXX	309L153271878-02	compressor	R-410a		3	208	1	15.3	9	2.9
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.1		0.4
Bard Unit3	Bard	W36A2-A10XX4XXX	309L153271878-02	compressor	R-410a		3	208	1	15.3	9	2.9
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.1		0.4
Irrigation Pump												

LIGHTING SYSTEM

Interior lighting primarily consists of 32 Watt and 60 Watt T8 fluorescent lamps in either 2 or 3-lamp 2x4 fixtures. There are only 33 lamps in this building as the size of the building is only 400 square feet

Exterior Lighting consists of 3 parking lot lights that are metal halide and two pavilion lights with compact fluorescent bulbs. According to the site contact, the basketball court lights that are on site never get used as the park is not open after sunset.

The building does not make use of occupancy sensors or any other types of lighting control.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility:

- 0.5 gpm faucets
- 1.0 gpf urinals
- 3.5 gpf toilets

The irrigation for the park is provided by a Rain Bird system that was installed in 2016, per the site contact. The system utilizes rain sensors.

Irrigation System

BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat. The thermostats do not have any sort of scheduling capabilities.

HVAC Controls Equipment

TRENDING DATA ACQUISITION

Due to the recent renovations at this facility, the equipment found here is in good working concision. Since the equipment is in good condition and the facility has a small conditioned area, there was no need to track the equipment run time.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the General Service (GS-1) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

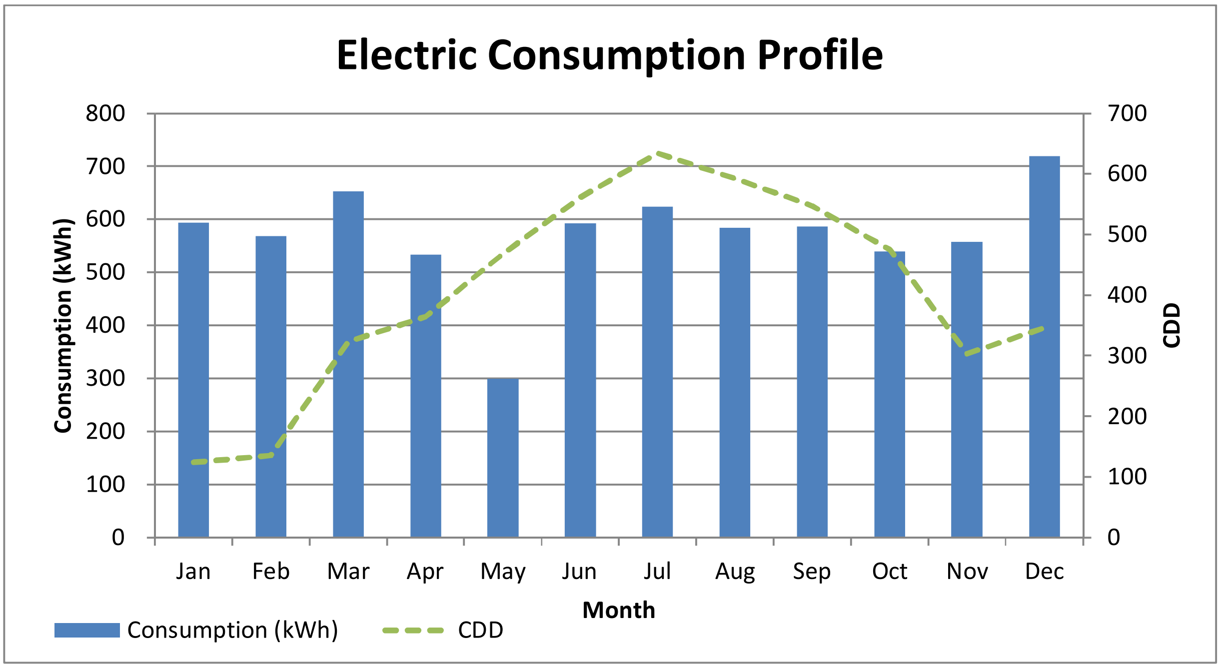
The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Lafayette Hart Park	1	GS-1	$ 0.09892	-	6,850	-	-

Meter AC40011; Account: 1510548330; Address: 2851 NW 8TH RD FORT LAUDERDALE

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 7.46	858	$ 82.56	$ 3.88	$ 94
Jul-15	$ 7.46	945	$ 90.93	$ 4.24	$ 103
Aug-15	$ 7.46	835	$ 80.34	$ 3.79	$ 92
Sep-15	$ 7.46	869	$ 83.62	$ 3.52	$ 95
Oct-15	$ 7.46	785	$ 75.53	$ 3.24	$ 86
Nov-15	$ 7.46	791	$ 76.11	$ 3.18	$ 87
Dec-15	$ 7.46	1,136	$ 109.31	$ 4.33	$ 121
Jan-16	$ 7.46	884	$ 80.21	$ 5.76	$ 93
Feb-16	$ 7.46	852	$ 77.31	$ 5.56	$ 90
Mar-16	$ 7.46	973	$ 88.29	$ 6.58	$ 102
Apr-16	$ 7.46	769	$ 69.78	$ 3.95	$ 81
May-16	$ 7.46	297	$ 26.95	$ 2.02	$ 36
Jun-16	$ 7.75	326	$ 29.04	$ 2.42	$ 39
Jul-16	$ 7.75	302	$ 26.91	$ 2.28	$ 37
Aug-16	$ 7.75	333	$ 29.67	$ 2.46	$ 40
Sep-16	$ 7.75	303	$ 26.99	$ 2.21	$ 37
Oct-16	$ 7.75	294	$ 26.19	$ 2.15	$ 36
Nov-16	$ 7.75	325	$ 28.95	$ 2.32	$ 39
Dec-16	$ 7.75	303	$ 26.99	$ 2.21	$ 37
Jan-17	$ 10.00	303	$ 27.30	$ 2.45	$ 40
Feb-17	$ 10.00	285	$ 25.68	$ 2.34	$ 38
Mar-17	$ 10.00	333	$ 31.01	$ 2.71	$ 44
Apr-17	$ 10.00	296	$ 27.57	$ 2.45	$ 40
May-17	$ 10.00	303	$ 28.26	$ 2.47	$ 41
AVERAGE TOTALS		**6,850**	**$ 637.75**	**$ 39.26**	**$ 774**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Lafayette Hart Park	Recreation	16.79	3.7	7.3	17.6

Overall, this building is operating at the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Lafayette Hart Park

Account #	2042246	**Meter #**	200114403
Rate		**Address**	
Meter Size	1.5"	**Meter Type**	W/S

Date	Consumption ()	Total Charges
May-17	0	$ 90.59
Apr-17	0	$ 90.59
Mar-17	0	$ 90.59
Feb-17	0	$ 90.59
Jan-17	0	$ 90.59
Dec-16	4	$ 147.60
Nov-16	4	$ 135.52
Oct-16	0	$ 89.15
Sep-16	0	$ 86.27
Aug-16	1	$ 99.84
Jul-16	11	$ 235.55
Jun-16	0	$ 86.27
May-16	1	$ 99.84
Apr-16	1	$ 99.84
Mar-16		$ 99.84
Feb-16	0	$ 86.27
Jan-16	1	$ 99.84
Dec-15	1	$ 99.84
Nov-15	0	$ 86.27
Oct-15	1	$ 98.41
Sep-15	0	$ 82.16
Aug-15	2	$ 107.99
Jul-15	5	$ 146.74
Jun-15	3	$ 120.90
May-15	1	$ 95.07
TOTALS	**36**	**$ 2,656.16**

This account has a mostly complete 24 month data set for water consumption and cost. There was no other information provided with this data set but it can be assumed that at 0 consumption, the only cost left is the base charge. Taking into account the possible base charges derived from months were there is 0 consumption, the blended rate in dollars per thousand gallons is $13.72.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Lafayette Hart Park	Lighting - Exterior	$ 166.49	$ -	$ -	$ 29	$ 195.49	$ 4,949.18	25.3
Breakage Fee							$ 48.96	
PA Cost							$ 14.54	
Total		**$ 166.49**	**$ -**	**$ -**	**$ 29**	**$ 195.49**	**$ 5,012.68**	**25.6**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for High Intensity Discharge Exterior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium n exterior applications provides significant energy reduction opportunities when changing over to LED. For exterior pole mounted applications, often the number of fixtures can be reduce based on the improved photometric and light distribution of the new LED fixtures that wasn't previously available in HID fixtures. All proposed LED fixtures are from recognized manufacturers that have met the required standards for light quality, efficiency and longevity. In our design effort and fixture selection process, consideration is given to the maintenance benefits of the prescribed solution resulting in less future costs to maintain exterior fixtures in difficult to reach applications. The proposed LED fixture replacement has been specified to furnish light levels that are in compliance with recommended light levels and support the existing site condition requirements. Where time clocks or automated lighting controls are not in place, proposed LED building and site lighting will incorporate an integral photocell to maximize energy savings.

In general, the design approach is to replace existing HID luminaires with new LED luminaires of like type, ie: shoeboxes, wallpacks, floodlights. Some fixture types are replaced with new LED fixtures of a different type, ie: recessed canopy lights replaced with low profile LED canopy lights.

Where deemed appropriate in parks and office buildings, integral occupancy sensors have been used on pole mounted shoebox luminaires in parking lots to automatically dim the lighting during hours of inactivity.

Decorative post top luminaires, recessed step lights, and bollards typically use low wattage HID lamps in architectural form factors. Replacement luminaires of this type are relatively high in cost, with relatively low energy savings potential. As a result, the proposed design typically calls for removing the HID lamp and ballast, and installing a new screw based LED lamp.

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LAFAYETTE HART PARK	Existing High Intensity Discharge - Proposed Retrofit LED	3	3
	Existing Compact Fluorescent - Proposed Relamp LED	2	2

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 1,683 kWh

Annual Electric Demand: 5.7 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Lafayette Hart Park	Lighting - Exterior	$ 166.49	$ -	$ -	$ 29	$ 195.49	$ 4,949.18	25.3

D.39. Park - Markham

FACILITY DESCRIPTION

Markham Park is a large area of land that hosts a variety of small buildings and facilities for outdoor activities. The park covers roughly 542 acres and has been in operation since 1973. The park is located at 16001 W State Rd 84, Sunrise, FL 33326. The park and its facilities serve for activities and attractions such as an airfield, dog park, boat ramps, campgrounds, disk golf course, observatory, outdoor fitness zone, mountain bike trails, playgrounds, racquetball courts, shelters, and shooting ranges. Because of the variety of activities there are several different sources of utility use such as air conditioning, water heating, campgrounds trailer hook-up, outdoor lighting, pumping for lift stations/irrigation/pool just to name a few. The hours of operation for the different areas of the park are as follows.

Park Hours

November – March:	8AM – 6PM
March – November:	8AM – 7:30PM

Park Office Hours

Mon – Sun:	9AM – 5:30PM

Target Range Hours

Monday:	Closed
Tuesday:	1PM – 9PM
Wednesday:	1PM – 9PM
Thursday:	10AM – 9PM
Friday:	1PM – 5PM (Only September – April)
Saturday:	8AM – 5PM
Sunday:	8AM – 5PM

SIEMENS

COOLING SYSTEM – PARK OFFICE

Cooling for the park office building is provided by two split DX units. The condensing units are Carrier 6 ton units. These units were manufactured in 2007. The air handlers are mixed air Carrier units. It is important to note that these units run on R22 refrigerant. These units were manufactured in 2004.

Park Office HVAC

COOLING SYSTEM – MAINTENANCE BUILDING

The cooling for the maintenance building is provided by one Carrier 7.5 ton packaged DX unit that provides mixed air to the building. The Carrier equipment was manufactured in 2012. The cooling system comes equipped a programmable thermostat for the building.

Maintenance Building HVAC

COOLING SYSTEM – GATEHOUSE

The cooling for the gatehouse is provided by one Carrier 1.5 ton split DX unit that provides 100% return air into the space. The carrier equipment was manufactured in 2008.

COOLING SYSTEM – OBSERVATORY

The cooling for the observatory is provided by wall units. No access to the building was available at the time of the site visit so a survey of the HVAC equipment was taken by what was outside the building.

Observatory HVAC

COOLING SYSTEM – SKEET/TRAP SPORTING CLAYS BUILDING

The cooling for the skeet/trap building is provided by four split DX units providing 100% return air. The first unit is a Goodman 3 ton unit that was manufactured in 2012. The second unit is a Thermal Zone 4 ton unit that was manufactured in 2013. The third unit is a Thermal Zone 4 ton unit that was manufactured in 2014. The last unit is a ICP unit with an assumed tonnage of 4 tons. Product data could not be found for the ICP but the tonnage was derived based on the unit size and the size of the other units at this building. The air handling units corresponding to each split system are located in the attic area of the building. All four units utilize R22 refrigerant. There is no controls system or strategy for the HVAC system of this building.

Skeet/Trap Building HVAC

COOLING SYSTEM – RIFLE/PISTOL RANGE BUILDING

The cooling for the rifle/pistol range building is provided by two split DX units providing 100% return air. The first unit is a Ruud 5 ton unit that was manufactured in 2008. The second unit is an American Standard 4 ton unit that was manufactured in 2006. Both units utilize R22 refrigerant. There is no controls system or strategy for the HVAC system of this building.

Rifle/Pistol Range HVAC

SIEMENS

The following table is a summary of all the relevant mechanical equipment that was found during the site visit and displays all the important data regarding each piece of equipment.

Namplate Data of Mechanical Equipment

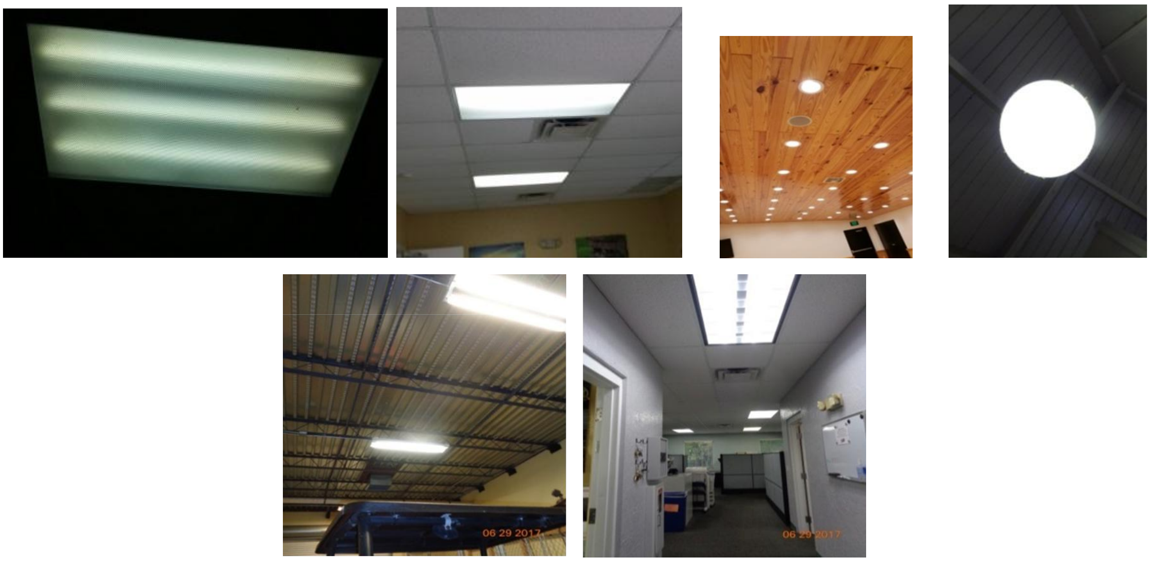
General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Markham Park												
Office AHU1	Carrier	40RM-008--H611HC	1304F23377	fan		2.4		208	3	5.8		1.9
Office CU1	Carrier	38ARZ007--K501--	1404G50042	compressor	R-22			208	3	19.2		6.2
				fan				230	1	0.9		0.2
				fan				230	1	0.9		0.2
Office AHU2	Carrier	40RM-008--H611HC	1304F23375	fan		2.4		208	3	5.8		1.9
Office CU2	Carrier	38ARZ007--K501--	1404G50045	compressor	R-22			208	3	19.2		6.2
				fan				230	1	0.9		0.2
				fan				230	1	0.9		0.2
Maintenance Unit	Carrier	50HC-D08A2B5A0A0A0	3712G10021	compressor	R-410a		7.4	208	3	13.6	12	4.4
				compressor	R-410a			208	3	13.6	12	4.4
				fan				208	1	1.5		0.3
				fan				208	1	1.5		0.3
				fan				208	3	6.9		2.2
Compactor				nameplate unreadable								
Gatehouse AHU				equipment unaccessable								0.0
Gatehouse CU	Carrier	24ABR318A316	0108E11463	meplate unreadable								0.0
Pool Pump	Baldor	JPM2513T	37H295T867G1	pump		15		208	3	41	91%	12.0
Irrigation Pump	Weg	01036ES3E215JM		pump		10		208	3	24.4	87.60%	7.6
Skeet/Trap Building Central AHU	ICP	FEM2X4800A	A071384572	fan	R-22	0.75		208	1	6		1.1
Skeet/Trap Building CU1	Goodman	VSX130361DA	1204711982	compressor	R-410a			208	1	14.1		2.6
				fan		0.25		208	1	1.5		0.3
Skeet/Trap Building East AHU				equipment unaccessable								0.0
Skeet/Trap Building CU2	ICP	M2A348AKA200	E071132428	compressor	R-22			208	1	20.2		3.8
				fan		0.25		208	1	1.2		0.2
Skeet/Trap Building Lobby AHU				nameplate unreadable								0.0
Skeet/Trap Building CU3	Thermal Zone	TZAA-348-2C757	W331421556	compressor	R-22			208	1	19.9		3.7
				fan		0.2		208	1	1.2		0.2
Skeet/Trap Building CU4	Thermal Zone	TZAA-348-2A757	8346W261318228	compressor	R-22			208	1	19.9		3.7
				fan		0.2		208	1	1.2		0.2
Shooting Range AHU1	York	AHR60D3XH21A	W1F2950462	fan		0.75		208	3	3		1.0
Shooting Range CU1	American Standard	2A7A4048B1000AA	6313U831F	compressor	R-22			208	1	21.2		4.0
				fan		0.17		200	1	1.4		
Shooting Range AHU2				equipment unaccessable								0.0
Shooting Range CU2	Ruud	13AJA60A01	7658N410804461	compressor	R-22			208	1	25.3		4.7
				fan		0.2		208	1	1.2		0.2

Observed Issues during Visit:

- DX units use R-22 refrigerant
- High humidity in this building

LIGHTING SYSTEM

There are several types of light fixtures that are used at this park due to the number of facilities that are on site. 55 Watt T8 fixtures in a 2 by 4 arrangement are the most common in the park. There are also 108 Watt T8 lamps, 30 Watt T8 lamps, compact fluorescent bulbs, and a few other miscellaneous types of lights throughout the park buildings.



Interior Lighting Examples

Exterior Lighting consists of wall packs, metal halide parking lot lights, compact fluorescent lamps, and a few other miscellaneous types of lights throughout the park.

Exterior Lighting Examples

Some bathrooms at this park make use of occupancy sensors. Occupancy sensors are also used at the maintenance building of the park.

Occupancy Sensor Examples

DOMESTIC WATER SYSTEM

Domestic water usage is found at the restrooms and the pool. Fixtures and water closets are operated both manually and with sensors. The following are example of the types of fixture found within the restroom of the facility:

- 0.5 gpm faucets
- 1.0 gpf urinals
- Waterless urinals
- 3.5 gpf toilets
- 2.5 gpm shower head

Sample Restroom Fixtures

The pool at this park only gets used for training by the local police department and is closed off to the public. The pool only uses domestic water for make-up water. The exact amount or the rate of domestic water being used for the pool is unknown.

Pool at Markham Park

The irrigation at this park is done by several different irrigation systems throughout the park. Not all of the irrigation systems were identified during the site visit. The water for the irrigation system is sourced from the lake water at the park and the irrigation systems do not use domestic water.

Irrigation System

BUILDING CONTROLS SYSTEM

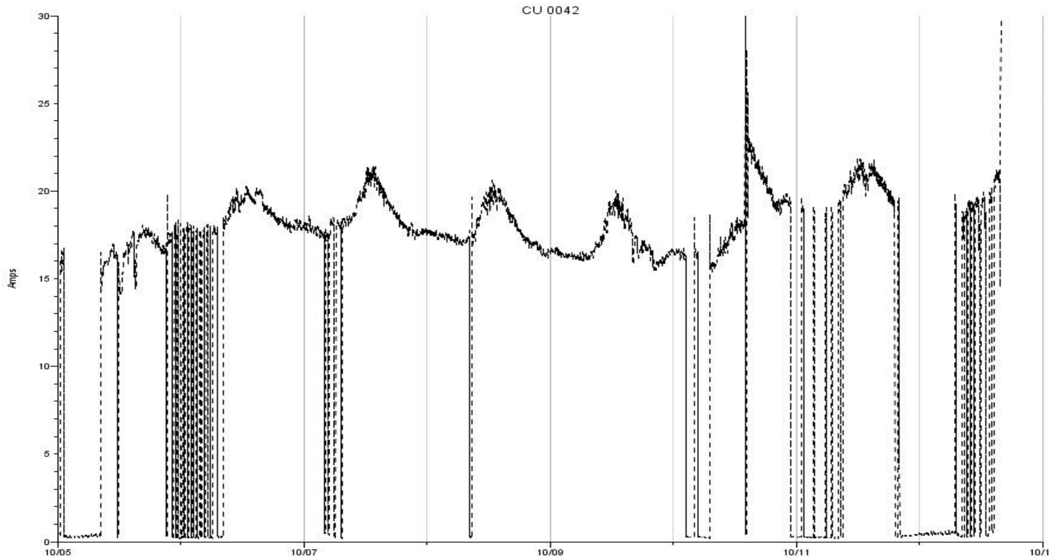
The buildings at the park currently are not equipped with a building automation system. Each zone has a dedicated thermostat.

Building Controls

TRENDING DATA ACQUISITION

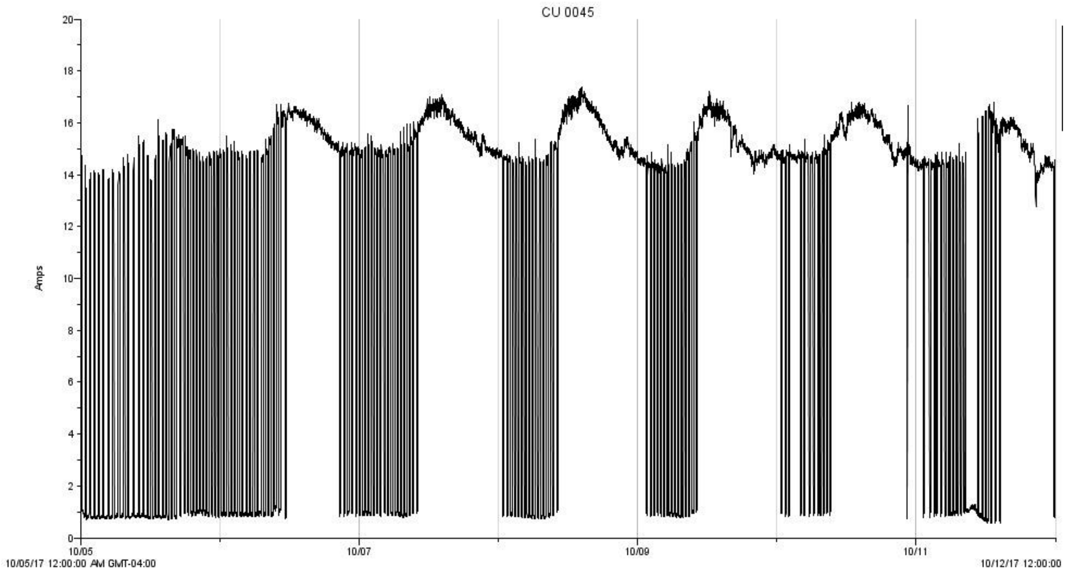
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – Office Condensing Unit 1



This unit registered an average of 18.13 amps and was operating for a total of 135.05 hours during a one week period.

Trending Data – Office Condensing Unit 2



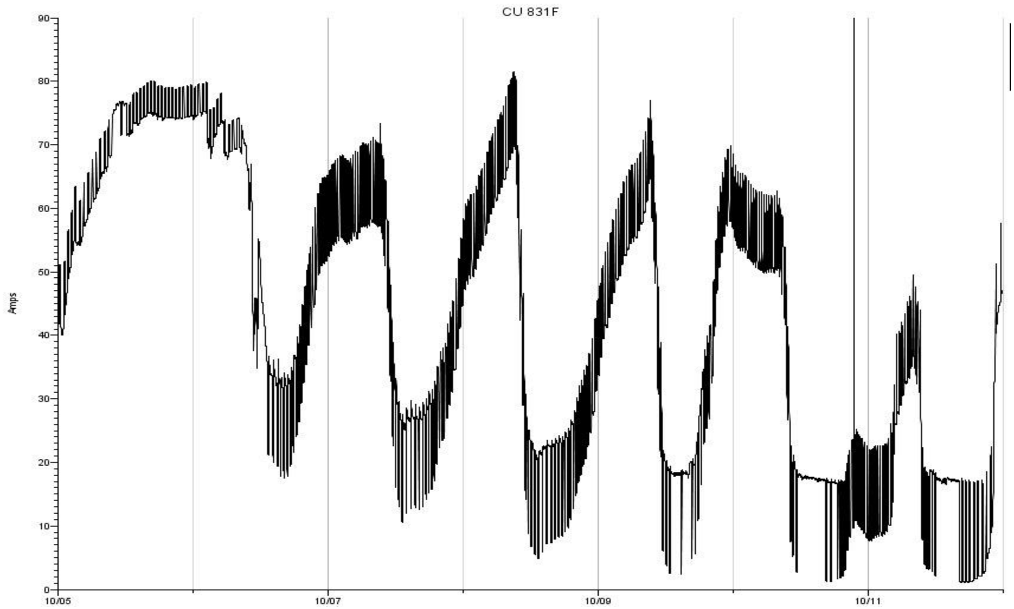
This unit registered an average of 15.31 amps and was operating for a total of 121.25 hours during a one week period.

The following table compares the operating hours of each unit with the hours of service for the park office.

Day	Hours of Service	Run Hours CU 0042	Run Hours CU 0045
Monday	9:00AM - 5:30PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Tuesday	9:00AM - 5:30PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Wednesday	9:00AM - 5:30PM	12:00AM - 8:00PM	12:00AM - 11:59PM
Thursday	9:00AM - 5:30PM	8:30AM - 11:59PM	12:00AM - 11:59PM
Friday	9:00AM - 5:30PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Saturday	9:00AM - 5:30PM	12:00AM - 11:59PM	12:00AM - 11:59PM
Sunday	9:00AM - 5:30PM	12:00AM - 11:59PM	12:00AM - 11:59PM

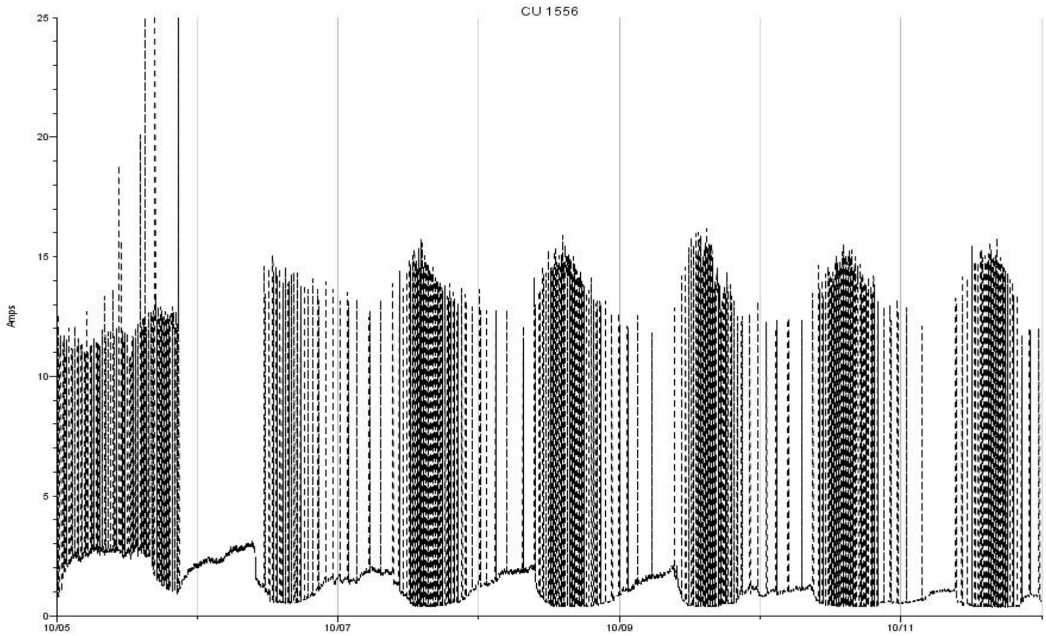
The units are currently running continuously with normal cycling patterns. The units are not following the operation schedule of this building.

Trending Data – Rifle Range/Skeet Trap Buildings Condensing Unit



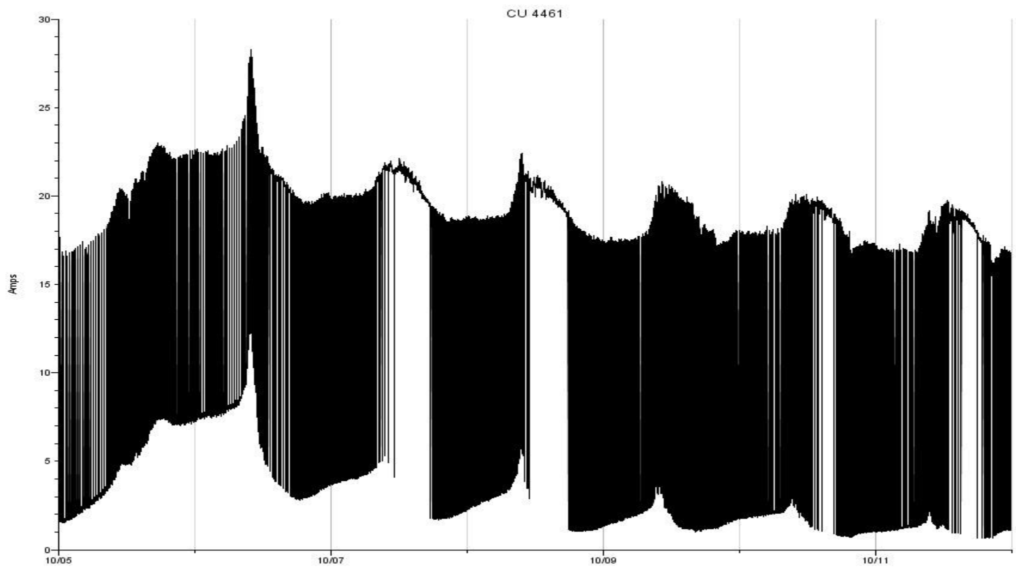
This unit registered an average of 43.06 amps and was operating for a total of 154.95 hours during a one week period. The variance of amperage for this unit suggests that this unit has multiple stages or multiple compressors.

Trending Data – Rifle Range/Skeet Trap Buildings Condensing Unit



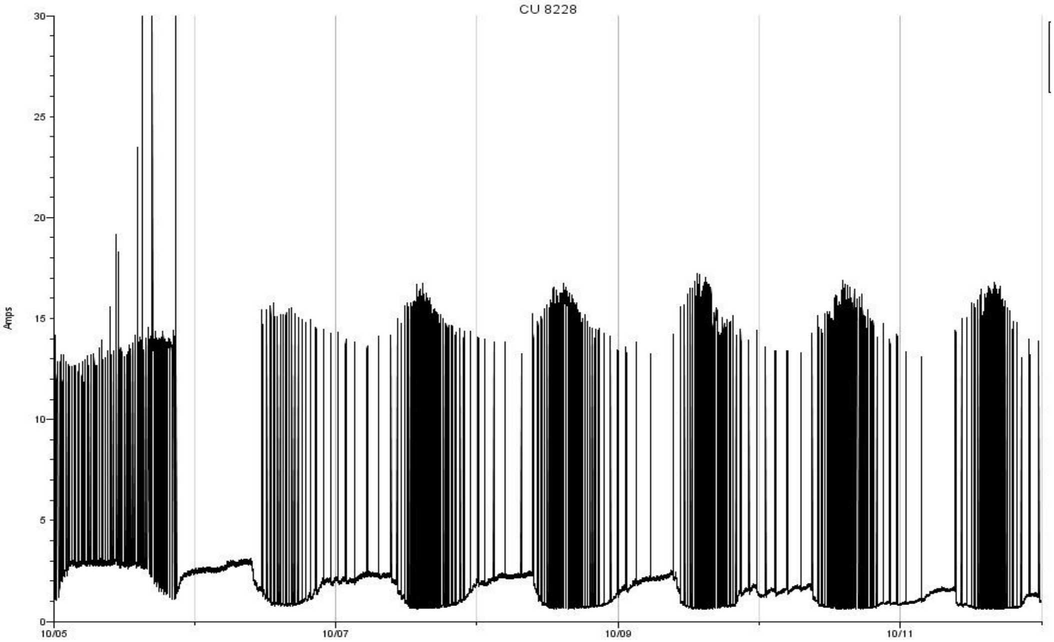
This unit registered an average of 13.48 amps and was operating for a total of 34.25 hours during a one week period.

Trending Data – Rifle Range/Skeet Trap Buildings Condensing Unit



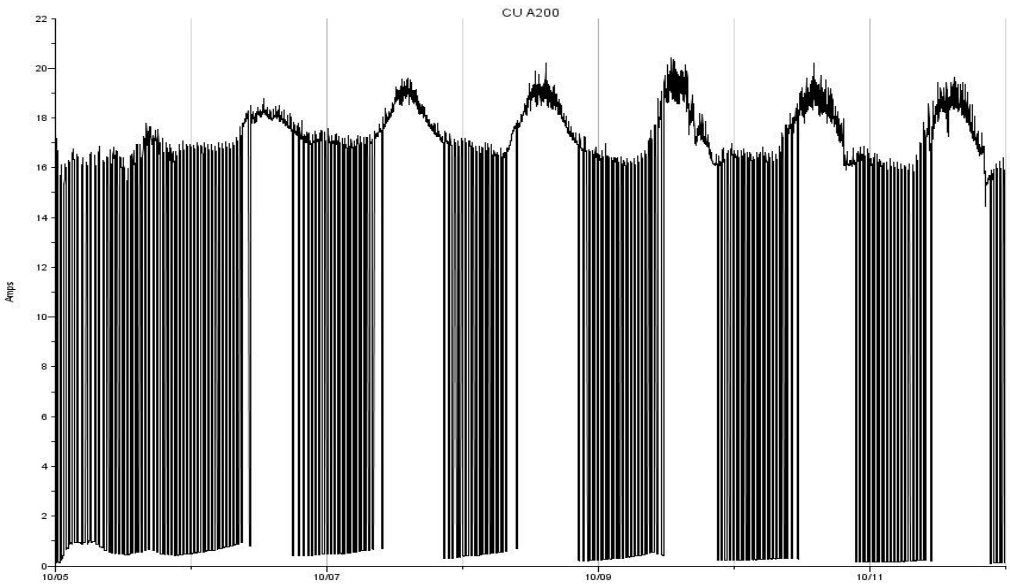
This unit registered an average of 19.30 amps and was operating for a total of 86.30 hours during a one week period.

Trending Data – Rifle Range/Skeet Trap Buildings Condensing Unit



This unit registered an average of 14.73 amps and was operating for a total of 34.25 hours during a one week period.

Trending Data – Rifle Range/Skeet Trap Buildings Condensing Unit



This unit registered an average of 17.43 amps and was operating for a total of 115.77 hours during a one week period.

The following table compares the operating hours of each unit with the hours of service for both the buildings that serve the riffle range and the skeet/trap range.

Day	Hours of Service	Run Hours CU 831F	Run Hours CU 1556	Run Hours CU 4461
Monday	Closed	12:00AM - 11:59PM	11:00AM - 9:00PM	12:00AM - 11:59PM
Tuesday	1:00PM - 9:00PM	12:00AM - 11:59PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Wednesday	1:00PM - 9:00PM	12:00AM - 11:59PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Thursday	10:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 9:00PM	12:00AM - 11:59PM
Friday	1:00PM - 5:00PM	12:00AM - 11:59PM	11:30AM - 11:59PM	12:00AM - 11:59PM
Saturday	8:00AM - 5:00PM	12:00AM - 11:59PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Sunday	8:00AM - 5:00PM	12:00AM - 11:59PM	10:30AM - 9:30PM	12:00AM - 11:59PM

Day	Hours of Service	Run Hours CU 8228	Run Hours CU A200
Monday	Closed	11:00AM - 9:00PM	12:00AM - 11:59PM
Tuesday	1:00PM - 9:00PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Wednesday	1:00PM - 9:00PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Thursday	10:00AM - 9:00PM	12:00AM - 9:00PM	12:00AM - 11:59PM
Friday	1:00PM - 5:00PM	11:30AM - 11:59PM	12:00AM - 11:59PM
Saturday	8:00AM - 5:00PM	10:30AM - 10:00PM	12:00AM - 11:59PM
Sunday	8:00AM - 5:00PM	10:30AM - 9:30PM	12:00AM - 11:59PM

The units are currently running continuously with normal cycling patterns. The units are not following the operation schedule of this building. Although the units are running continuously, the weekly run time varies from unit to unit. The unit schedules are hard to narrow down because there is no time when the units are off for an extended period of time. The schedules shown in the tables above are derived from analysis of the run time data.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by 25 electric meters; each of varying electric rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
	Corp Pavilion	GS-1	-	-	$ 0.10071	-	4,837	-	-
	E	GSD-1	-	-	$ 0.05804	$ 11.46	49,572	210	26
	ABC	GSD-1	-	-	$ 0.05806	$ 11.46	192,600	633	71
	Restroom	GS-1	-	-	$ 0.10076	-	2,362	-	-
	Arena Lights	GS-1	-	-	$ 0.10080	-	307	-	-
	Shoot House	GS-1	-	-	$ 0.10080	-	759	-	-
	Dog Park	GS-1	-	-	$ 0.10071	-	3,502	-	-
	Maint Bldg	GS-1	-	-	$ 0.10074	-	47,901	-	-
	Admin Office	GSD-1	-	-	$ 0.05806	$ 11.46	87,872	233	22
	Core IS-RR	GS-1	-	-	$ 0.10076	-	2,790	-	-
		GS-1	-	-	$ 0.10074	-	24,104	-	-
	Air field	GS-1	-	-	$ 0.10073	-	3,900	-	-
Markham		GS-1	-	-	$ 0.10079	-	959	-	-
		SDTR-1A	0.142896488	$ 0.04924	$ 0.05697	$ 12.19	3,762	365	33
		SDTR-1A	0.142896488	$ 0.04924	$ 0.05697	$ 12.19	118,080	674	78
		GSD-1	-	-	$ 0.05805	$ 11.46	71,830	244	30
		GSD-1	-	-	$ 0.05805	$ 11.46	59,804	251	29
		GS-1	-	-	$ 0.10075	-	14,698	-	-
		GSD-1	-	-	$ 0.05806	$ 11.46	57,707	225	27
	Guard House	GS-1	-	-	$ 0.10076	-	5,912	-	-
	Comfort Station	GS-1	-	-	$ 0.10074	-	19,546	-	-
	Comfort Station 2	GS-1	-	-	$ 0.10075	-	15,279	-	-
	South Pump Core	GSD-1	-	-	$ 0.05804	$ 11.46	33,427	60	28
	Food Stand	GSD-1	-	-	$ 0.05807	$ 11.46	140,640	235	26
	North Pump Core	GS-1	-	-	$ 0.10073	-	7,882	-	-

For ease of presentation in this report, all 25 meter and their historical data was combined into the following table. Thus, the table represents the consumption baseline of the entire park as a whole. However, the table above still governs the baseline of individual sites within the park when considering FIMs.

Date	Customer Charges	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jul-15	$ 300.18	78,407	$ 4,766	199	$ 2,191	$ 1,000	$ 8,258
Aug-15	$ 300.18	77,590	$ 4,765	202	$ 2,226	$ 954	$ 8,245
Sep-15	$ 300.18	72,321	$ 4,413	197	$ 2,187	$ 1,115	$ 8,016
Oct-15	$ 300.18	70,447	$ 4,375	229	$ 2,584	$ 1,756	$ 9,015
Nov-15	$ 300.18	78,727	$ 4,814	274	$ 3,069	$ 1,805	$ 9,989
Dec-15	$ 300.18	83,604	$ 4,898	283	$ 3,161	$ 2,088	$ 10,447
Jan-16	$ 300.18	93,005	$ 5,374	303	$ 3,127	$ 1,933	$ 10,734
Feb-16	$ 300.18	78,977	$ 4,578	270	$ 2,696	$ 1,776	$ 9,350
Mar-16	$ 300.18	79,161	$ 4,619	273	$ 2,726	$ 1,840	$ 9,485
Apr-16	$ 300.18	85,510	$ 4,971	301	$ 3,008	$ 1,740	$ 10,020
May-16	$ 300.18	77,827	$ 4,551	272	$ 2,714	$ 1,636	$ 9,201
Jun-16	$ 306.55	86,489	$ 4,680	248	$ 2,588	$ 866	$ 8,441
Jul-16	$ 311.87	92,158	$ 5,125	228	$ 2,451	$ 969	$ 8,857
Aug-16	$ 311.87	79,954	$ 4,447	215	$ 2,310	$ 976	$ 8,046
Sep-16	$ 311.87	84,026	$ 4,683	238	$ 2,595	$ 1,004	$ 8,594
Oct-16	$ 311.87	77,117	$ 4,361	235	$ 2,418	$ 1,858	$ 8,950
Nov-16	$ 324.36	73,107	$ 3,979	285	$ 2,939	$ 1,866	$ 9,108
Dec-16	$ 324.36	77,512	$ 4,224	286	$ 2,947	$ 1,990	$ 9,486
Jan-17	$ 390.00	87,045	$ 4,971	304	$ 3,155	$ 2,172	$ 10,688
Feb-17	$ 390.00	77,714	$ 4,438	284	$ 2,982	$ 1,954	$ 9,763
Mar-17	$ 390.00	78,635	$ 4,697	299	$ 3,139	$ 2,077	$ 10,303
Apr-17	$ 390.00	78,936	$ 4,746	294	$ 3,086	$ 1,991	$ 10,213
May-17	$ 390.00	84,256	$ 5,069	285	$ 2,992	$ 1,968	$ 10,419
Jun-17	$ 390.00	87,525	$ 5,192	251	$ 2,704	$ 970	$ 9,256
AVERAGE TOTALS		**970,025**	**$ 56,369**	**3,128**	**$ 32,998**	**$ 19,152**	**$ 112,441**

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Markham	Recreation	20.60	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Markham Park

Account #	84339-107458	**Meter #**	60378336
Rate		**Address**	
Meter Size		**Meter Type**	W/S//RE/G

Date	Consumption ()	Total Charges
May-17	353	$ 5,021.09
Apr-17	353	$ 5,021.09
Mar-17	308	$ 4,664.24
Feb-17	386	$ 5,282.78
Jan-17	370	$ 5,175.90
Dec-16	263	$ 3,970.59
Nov-16	252	$ 3,883.36
Oct-16	221	$ 3,637.53
Sep-16	197	$ 3,328.27
Aug-16	294	$ 4,062.56
Jul-16	176	$ 3,169.30
Jun-16	217	$ 3,479.67
May-16	183	$ 3,222.29
Apr-16	207	$ 3,423.97
Mar-16	225	$ 3,540.23
Feb-16	362	$ 4,577.32
Jan-16	311	$ 4,201.25
Dec-15	272	$ 3,896.02
Nov-15	260	$ 3,805.18
Oct-15	246	$ 3,709.20
Sep-15	251	$ 3,597.63
Aug-15	230	$ 3,447.27
Jul-15	279	$ 3,808.11
Jun-15	272	$ 3,747.99
May-15	216	$ 3,337.03
TOTALS	**6704**	**$ 99,009.87**

For this account, the average monthly consumption is 268 thousand gallons. The average monthly consumption cost is $3,960.39. The blended rate in dollars per thousand gallons is $14.77. This blended rate is slightly higher than the rate being used for savings calculations.

Markham Park

Account #	84341-107460	**Meter #**	31826643
Rate		**Address**	
Meter Size		**Meter Type**	W/S/ST

Date	Consumption ()	Total Charges
May-17	284	$ 8,444.79
Apr-17	284	$ 8,444.79
Mar-17	246	$ 8,638.78
Feb-17	321	$ 8,612.00
Jan-17	289	$ 8,228.07
Dec-16	202	$ 7,612.15
Nov-16	193	$ 7,428.55
Oct-16	112	$ 6,077.36
Sep-16	68	$ 6,397.93
Aug-16	172	$ 8,518.69
Jul-16	66	$ 6,569.36
Jun-16	163	$ 7,009.58
May-16	59	$ 6,643.47
Apr-16	108	$ 7,166.21
Mar-16	152	$ 5,445.52
Feb-16	305	$ 7,592.17
Jan-16	252	$ 8,710.48
Dec-15	180	$ 7,023.99
Nov-15	181	$ 6,524.83
Oct-15	165	$ 7,163.97
Sep-15	145	$ 6,274.16
Aug-15	125	$ 6,603.52
Jul-15	187	$ 6,685.42
Jun-15	168	$ 7,099.34
May-15	146	$ 6,646.12
TOTALS	**4573**	**$181,561.25**

The average monthly consumption for this account is 183 thousand gallons. The average monthly consumption cost for this account is $7,262.45. The blended rate in dollars per thousand gallons is $39.70. Without having any additional information for this account, it is unknown why this blended rate came out so large. Further analysis would be needed.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Finanical Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS Water	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Markham Park	Lighting - Interior	$ 6,369.75	$ -	$ -	0	$ 1,162	$ 7,531.75	$ 88,909.46	11.8
Markham Park	Split System Scheduling	$ 6,578.75	$ -	$ -	0	$ -	$ 6,578.75	$ 18,845.82	2.9
Breakage Fee								$ 5,651.64	
PA Cost								$ 1,127.68	
Total		**$ 12,948.50**	**$ -**	**$ -**	**0**	**$ 1,162**	**$14,110.50**	**$114,534.59**	**8.1**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps

The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures.

In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

LED Replacement for Pin-Based Compact Fluorescent Fixtures

In keeping with the direction to remove fluorescent ballasts, reduce energy use and minimize cost, our design strategy for existing pin-based compact fluorescent lamps is to retrofit the existing fixtures with line voltage pin based LED lamps and remove the existing fluorescent ballasts. In some cases, it is possible to remove two fluorescent lamps and replace them with a single higher powered LED lamp without sacrificing luminaire output and distribution.

LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures

Our design strategy for the replacement of screw based incandescent and compact fluorescent lamps is to replace them with screw based LED where the application permits. LED has become an attractive replacement option when incandescent fixtures are controlled by dimmers due to its excellent dimming capability.

LED Replacement for High Intensity Discharge Interior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium provide significant energy reduction opportunities when changing to LED. New types of LED fixtures and retrofit kits can be installed across many existing HID applications not previously available.

Various fixture types utilize HID sources at Broward County. The most common application is high bay or low bay industrial style fixtures. Due to the efficient optical distribution of LED sources in new fixtures, replacing industrial HID fixtures with new LED industrial high bays is the recommended solution, greatly reducing input power, increasing lighting quality and extending the life of the system.

Some fixture types don't lend themselves to replacement from a cost perspective for interior spaces, such as decorative sconces, pendants and some parking garage fixtures. In these cases, the fixtures will be relamped with high output, screw-based LED lamps and the ballasts will be removed.

Emergency Lighting

Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
MARKHAM PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	185	185
	Existing T8 Fluorescent - Proposed Retrofit LED	150	150
	Existing T8 Fluorescent - Proposed New LED Fixture	2	2
	Existing Incandescent - Proposed Relamp LED	31	31
	Existing T5 Fluorescent - Proposed New LED Fixture	4	4
	Existing Compact Fluorescent - Proposed Relamp LED	16	16
	Existing T8 Fluorescent - Proposed Retrofit LED Reduce Lamp Qty	23	23
	Existing T12 Fluorescent - Proposed New LED Fixture	40	40
	Existing Exit Sign - Proposed New LED Fixture	4	4
	Existing High Intensity Discharge - Proposed New LED Fixture	4	4
	Existing T12 Fluorescent - Proposed Retrofit LED	42	42
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture With Sensor	24	24

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 75421 kWh

Annual Electric Demand: 192.66 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Markham Park	Lighting - Interior	$ 6,369.75	$ -	$ 1,162	$ 7,531.75	$ 88,909.46	11.8

AUTOMATION – SCHEDULES

Standard thermostats control an HVAC unit by measuring the ambient temperature at the thermostat and either turning the unit on if the ambient temperature is above the temperature setpoint or turning the unit off when the ambient temperature reaches the setpoint. Most commercial facilities have set hours of operation where the facility is occupied and there is a need for conditioned space. Outside of hours of operation a facility will usually not have occupancy and won't have a need for air conditioning. Advanced Siemens thermostats allow for the utilization of this fact to translate into energy savings by changing the setpoint temperatures of a building automatically depending on the hours of operation. In addition, these thermostats have the capability to be wirelessly connected to a BAS system for remote monitoring and control.

PROJECT SCOPE

This FIM address the turn-key replacement and installation of seven (7) thermostats with scheduling capabilities.

SAVINGS

The energy cost and savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical consumption of the equipment to be controlled by the thermostat was determined. A run time analysis was completed by logging the use of the equipment for a 7 day period. The equipment run time was compared to an optimal run time to meet the needs of that facility. Optimal run times were determined by taking the daily hours of operation of the facility plus 1.5 hours before and after. The difference between the existing run time and the optimal run time are equal to the unnecessary amount of time the unit is running. This time then was multiplied by the electrical consumption for each unit to acquire the calculated energy savings per HVAC unit. Full calculations are provided in Section H, Appendices of this Report.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 93,974 kWh

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Markham Park	Split System Scheduling	$ 6,578.75	$ -	$ -	$ 6,578.75	$ 18,845.82	2.9

D.40. Park - Quiet Waters

FACILITY DESCRIPTION

Quiet Waters Park is a large area of land that hosts a variety of small buildings and facilities for outdoor activities. The park covers roughly 431 acres and has been in operation since 1983. The park is located at401 S Powerline Rd, Deerfield Beach, FL 33442. The park and its facilities serve for activities and attractions such as a water park, water skiing, bicycle shop/rentals, campgrounds, basketball courts, biking trails, shelters, and small boat marinas. Because of the variety of activities there are several different sources of utility use such as air conditioning, water heating, campgrounds trailer hook-up, outdoor lighting, pumping for lift stations/irrigation/pool just to name a few. The hours of operation for the different areas of the park are as follows.

Park Hours

November – March:	8AM – 6PM
March – November:	8AM – 7:30PM

Park Office Hours

Mon – Sun:	9AM – 5:30PM

Observed Issues during Visit:

- Some DX units are 10 years old and use R-22 refrigerant

Examples of Observed Issues

COOLING SYSTEM – PARK OFFICE

Cooling for the park office building is provided by one split DX unit. The condensing unit is a Payne 5 ton unit. These units were manufactured in 2014. The air handler is a Payne unit that is 100% return air that was manufactured in 2014. The HVAC system has programmable thermostat controls. There are wall units in the building that get seldom used in the summer to reach comfortable indoor conditions.

Park Office HVAC

COOLING SYSTEM- POOL CONCESSIONS & LIFEGUARD OFFICE

The cooling for the pool concessions building is provided by one Rheem7.5 ton split DX unit t that was manufactured in 2012. The air handler is 100% return air and was manufactured in 2011. The cooling system comes equipped a programmable thermostat for the building. The lifeguard office cooling is provided by one wall unit.

Concessions & Lifeguard Office HVAC

COOLING SYSTEM – MAINTENANCE BUILDING

The cooling for the maintenance building is provided by one Carrier 7.5 ton split DX unit manufactured in 2011, which provides mixed air into the space. The cooling system comes with a programmable thermostat. There are some wall units in certain rooms to aid the building cooling that are seldom used.

Maintenance Building HVAC

COOLING SYSTEM – GATEHOUSE

The cooling for the gatehouse buildings is provided by one Carrier 1.5 ton split system DX and two DX wall units. The carrier equipment was manufactured in 2010. The gatehouse HVAC equipment only gets used on weekends and holidays.

Gatehouse HVAC

COOLING SYSTEM – BIKE SHOP AND SKI RIXEN

The cooling system for the bike shop is provided by one Carrier 7.5 ton split DX system that is 100% return air. The carrier equipment was manufactured in 2001. The cooling system for the Ski Rixen building is a Rheem 3 ton split DX system manufactured in 2012. The air handler of this system was not located at the time of the site visit.

Bike Shop & Sky Rixen HVAC

BROWARD COUNTY FLORIDA

SIEMENS

The following table is a summary of all the relevant mechanical equipment that was found during the site visit and displays all the important data regarding each piece of equipment.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Quietwaters Park												
Admin AHU	Payne	PF4MNA061	1514A82249	fan		0.75		208	1	6		
Admin CU	Payne	PA13NA060-E	3114X73788	compressor	R-410a		5	208	1	22.1	11.18	
				fan		0.25		208	1	1.4		
Irrigation Pump	A.O. Smith	F-391189-61		pump		3		230	3	7.8	82.50%	
Pool Pump	Nidec	FK51		pump		20		208	3	53	93%	
Pool Pump	Baldor	EM4104T		pump		30		230	3	76	93.60%	
Feature Pump	Baldor	EJMM3218T		pump		5		230	3	13.2	90.20%	
Chemical Pump	Gentury	C48J2PA105C5	30715CH	pump		0.75		115	1	13.4		
Chemical Pump	Century	C48J2PA105C1		pump		0.75		115	1	13.4		
Chemical Pump	CentriPro	C48C04A06	23216J2	pump		0.5		115	1	9.8		
Consession AHU	Rheem	RHGL-120ZL	F481102433	fan		2		208	3	7.5		
Consession CU	Rheem	RAWL-090DAZ	7754F241202657	compressor	R-410a		7.5	460	3	12.2	11.2	
				fan		0.33		460	3	1.3		
Maintenance Air Compressor	Baldor	35J826T56801		compressor		5		208	3	13	82.50%	
Irrigation Pump	Baldor			pump		25		230	3	56	90.20%	
Maintenance Air Compressor2	AO Smith	7-C56AB22E29-02		compressor		5		230	1	22		
Maintenance AHU	Carrier			no nameplate								
Maintenance CU	Carrier	38AUZA08A0B6A0A0A0	2411G50055	compressor	R-410a		7.5	460	3	12.2	11.2	
				fan				460	1	0.8		
				fan				460	1	0.8		
Gatehouse AHU				equipment unaccessable								
Gatehouse CU	Carrier	5110E06258	24ABB318A320	compressor	R-410a		1.5	208	1	9	11	
				fan		0.0833		208	1	0.5		
Irrigitaion Pump	Century	PJAA41A01C		pump		7.5		230	3	18	88.50%	
Bike Shop AHU	Carrier	40RM-012--B610HC	5001F27728	fan		2.4		208	3	5.8		
Bike Shop CU	Carrier	38ARZ008--K501	5001G30026	compressor	R-22		7.5	208	3	25.6	11	
				fan				230	1	1.5		
				fan				230	1	1.5		
Irrigation Pump	A.O.Smith	F-391290-62		pump		5		230	3	13	88.50%	
Ski Rixen AHU				equipment unaccessable								
Ski Rixen CU	Rheem	14AJM36A01	7996W461212736	compressor	R-410a		3	208	1	16.7	11.76	
				fan		0.2		208	1	1.9		

Observed Issues during Visit:

- DX units use R-22 refrigerant

LIGHTING SYSTEM

Interior lighting primarily consists of T8 light fixtures throughout the buildings of the park. The wattage of these light fixtures varies. A few LED fixtures were found during the site visit as well.

Interior Lighting Examples

Exterior Lighting consists of metal halide parking lot and street lights and compact fluorescent light fixtures.


Exterior Lighting Examples

The building makes use of occupancy sensors in most of the restroom facilities and the maintenance building.


Occupancy Sensor

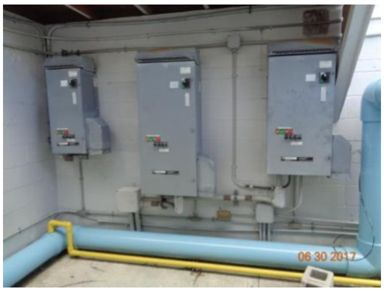
DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and the pool. Fixtures and water closets are operated manually and by occupancy sensors. The following are example of the types of fixture found within the restroom of the facility

- 0.5 gpm and 2.2 gpm faucets
- 1.5 gpf urinals
- 3.5 gpf and 1.6 gpf toilets
- 2.5 gpm showerheads


Sample Restroom Fixtures

The pool at this park is a splash park that is used by the community for recreational purposes. The pool closes for the winter every year. The pool pumps utilize VFDs for maximum efficiency.



Quiet Waters Splash Park

The irrigation system for the park is divided up to multiple pump stations. The irrigation systems utilize a Rain Bird controls system.



Irrigation Systems

BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.


Building Controls

Some of this park's exterior lighting is controlled via time clocks.

Exterior Lighting Controls

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by nine (9) electric meters of varying electric rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
	Park 3	GS-1	-	-	$ 0.09532	-	2,582	-	-
	Park	GS-1	-	-	$ 0.10069	-	511	-	-
	Pavilion	GS-1	-	-	$ 0.10069	-	16,262	-	-
	#2	GS-1	-	-	$ 0.10066	-	3,662	-	-
Quiet Waters	Pool	GSD-1	-	-	$ 0.05804	$ 11.46	128,202	405	44
	Campsite	GSD-1	-	-	$ 0.05801	$ 11.45	26,799	132	57
	Park	SDTR-1A	0.142691154	$ 0.04917	$ 0.05689	$ 12.17	72,152	269	84
	Park	SDTR-1A	0.142607834	$ 0.04914	$ 0.05686	$ 12.17	85,140	490	57
	Park	SDTR-1A	0.142534149	$ 0.04911	$ 0.05683	$ 12.16	259,170	599	58

For ease of presentation in this report, all nine (9) meters and their historical data was combined into the following table. Thus, the table represents the consumption baseline of the entire park as a whole. However, the table above still governs the baseline of individual sites within the park when considering FIMs.

SIEMENS

Date	Customer Charges	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jul-15	$ 146.68	55,943	$ 2,712	119	$ 1,376	$ 614	$ 4,848
Aug-15	$ 146.68	54,009	$ 2,633	118	$ 1,367	$ 606	$ 4,753
Sep-15	$ 146.68	54,480	$ 2,642	113	$ 1,305	$ 552	$ 4,646
Oct-15	$ 146.68	43,700	$ 2,072	160	$ 1,874	$ 442	$ 4,535
Nov-15	$ 146.68	43,205	$ 2,018	140	$ 1,661	$ 425	$ 4,250
Dec-15	$ 146.68	37,918	$ 1,722	127	$ 1,506	$ 431	$ 3,806
Jan-16	$ 146.68	41,710	$ 2,168	132	$ 1,308	$ 304	$ 3,927
Feb-16	$ 146.68	36,031	$ 1,877	159	$ 1,565	$ 313	$ 3,901
Mar-16	$ 146.68	74,800	$ 3,840	262	$ 2,589	$ 590	$ 7,165
Apr-16	$ 146.68	70,983	$ 3,648	275	$ 2,721	$ 425	$ 6,941
May-16	$ 146.68	46,771	$ 2,469	161	$ 1,587	$ 270	$ 4,473
Jun-16	$ 150.87	50,740	$ 2,256	133	$ 1,491	$ 356	$ 4,255
Jul-16	$ 152.39	51,576	$ 2,478	141	$ 1,602	$ 369	$ 4,601
Aug-16	$ 152.39	55,700	$ 2,719	118	$ 1,333	$ 367	$ 4,571
Sep-16	$ 152.39	44,388	$ 2,140	104	$ 1,168	$ 293	$ 3,754
Oct-16	$ 152.39	38,084	$ 1,859	134	$ 1,364	$ 287	$ 3,662
Nov-16	$ 152.39	40,317	$ 2,014	137	$ 1,391	$ 303	$ 3,859
Dec-16	$ 152.39	43,151	$ 2,184	134	$ 1,358	$ 314	$ 4,008
Jan-17	$ 165.00	34,277	$ 1,881	127	$ 1,310	$ 293	$ 3,649
Feb-17	$ 165.00	36,510	$ 1,980	173	$ 1,793	$ 340	$ 4,278
Mar-17	$ 165.00	72,707	$ 4,001	277	$ 2,882	$ 613	$ 7,661
Apr-17	$ 165.00	63,153	$ 3,490	274	$ 2,851	$ 562	$ 7,068
May-17	$ 165.00	46,389	$ 2,593	156	$ 1,620	$ 378	$ 4,756
Jun-17	$ 165.00	52,416	$ 2,715	112	$ 1,250	$ 348	$ 4,478
AVERAGE TOTALS		**594,479**	**$ 30,055**	**1,893**	**$ 20,136**	**$ 4,898**	**$ 56,923**

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Quiet Waters	Recreation	20.77	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Account #	3005518	3005520	3005521	3005522	3005523	3005524
Date	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges
May-17	$ 626.73	$ 664.53	$ 1,222.47	$ 309.80	$ 305.80	$ 295.51
Apr-17	$ 626.73	$ 664.53	$ 1,222.47	$ 309.80	$ 305.80	$ 295.51
Mar-17	$ 634.37	$ 726.05	$ 1,390.13	$ 309.80	$ 267.87	$ 267.87
Feb-17	$ 634.37	$ 771.89	$ 1,950.20	$ 309.80	$ 286.94	$ 275.51
Jan-17	$ 634.37	$ 756.61	$ 1,008.73	$ 321.23	$ 275.51	$ 275.51
Dec-16	$ 626.73	$ 827.17	$ 1,115.69	$ 286.94	$ 267.87	$ 267.87
Nov-16	$ 634.37	$ 672.57	$ 1,008.73	$ 252.59	$ 252.59	$ 252.59
Oct-16	$ 619.55	$ 737.68	$ 1,416.67	$ 267.97	$ 260.62	$ 253.10
Sep-16	$ 704.68	$ 838.20	$ 1,829.58	$ 306.59	$ 289.13	$ 295.43
Aug-16	$ 694.72	$ 879.08	$ 3,050.84	$ 299.11	$ 289.31	$ 281.00
Jul-16	$ 688.28	$ 858.49	$ 1,651.66	$ 299.61	$ 289.49	$ 288.61
Jun-16	$ 726.83	$ 922.15	$ 1,577.89	$ 319.45	$ 296.92	$ 296.47
May-16	$ 694.64	$ 1,072.77	$ 1,972.18	$ 322.48	$ 282.45	$ 289.24
Apr-16	$ 684.93	$ 1,064.80	$ 2,421.78	$ 347.07	$ 311.66	$ 321.87
Mar-16						
Feb-16						
Jan-16						
Dec-15						
Nov-15						
Oct-15						
Sep-15						
Aug-15						
Jul-15						
Jun-15						
May-15						
TOTALS	$9,231.30	$11,456.52	$22,839.02	$4,262.24	$3,981.96	$3,956.09

SIEMENS

Account #	3005525	3005526	3005527	3005528	3005529	3022890
Date	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges
May-17	$ 127.15	$ 129.21	$ 97.34	$ 2,018.84	$ 110.47	$ 195.41
Apr-17	$ 127.15	$ 129.21	$ 97.34	$ 2,018.84	$ 110.47	$ 195.41
Mar-17	$ 119.47	$ 129.16	$ 97.34	$ 1,813.10	$ 104.90	$ 195.27
Feb-17	$ 121.16	$ 127.11	$ 98.42	$ 946.44	$ 104.90	$ 195.13
Jan-17	$ 119.47	$ 134.75	$ 104.90	$ 817.73	$ 104.90	$ 189.57
Dec-16	$ 127.11	$ 134.75	$ 101.12	$ 817.73	$ 108.68	$ 199.57
Nov-16	$ 119.47	$ 134.75	$ 97.34	$ 779.53	$ 101.12	$ 189.57
Oct-16	$ 117.95	$ 140.33	$ 102.09	$ 877.75	$ 105.77	$ 194.49
Sep-16	$ 141.13	$ 149.72	$ 124.38	$ 1,169.89	$ 116.00	$ 208.14
Aug-16	$ 130.46	$ 138.83	$ 175.12	$ 2,483.21	$ 127.50	$ 203.06
Jul-16	$ 137.77	$ 153.56	$ 123.73	$ 2,505.93	$ 162.96	$ 212.93
Jun-16	$ 133.63	$ 149.86	$ 125.94	$ 2,971.09	$ 111.55	$ 207.75
May-16	$ 137.60	$ 160.60	$ 108.55	$ 1,989.79	$ 112.41	$ 202.68
Apr-16	$ 127.02	$ 135.00	$ 105.90	$ 2,287.48		$ 197.74
Mar-16						
Feb-16						
Jan-16						
Dec-15						
Nov-15						
Oct-15						
Sep-15						
Aug-15						
Jul-15						
Jun-15						
May-15						
TOTALS	**$1,786.54**	**$1,946.84**	**$1,559.51**	**$23,497.35**	**$1,481.63**	**$2,786.72**

BROWARD COUNTY FLORIDA

SIEMENS

Account #	3022891	3022892	3022893	3084183	3098573	3113809
Date	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges	Total Charges
May-17	$ 602.86	$ 642.01	$ 22.30	$ 52.50	$ 330.17	$ 584.37
Apr-17	$ 602.86	$ 642.01	$ 22.30	$ 52.50	$ 330.17	$ 584.37
Mar-17	$ 655.85	$ 634.37	$ 21.58	$ 52.50	$ 307.46	$ 458.64
Feb-17	$ 356.87	$ 722.08	$ 21.58	$ 52.50	$ 40.16	$ 172.89
Jan-17	$ 330.41		$ 21.58	$ 52.50	$ 33.92	$ 134.75
Dec-16	$ 330.41	$ 699.22	$ 21.58	$ 52.50	$ 33.92	$ 142.39
Nov-16	$ 330.41	$ 676.36	$ 21.58	$ 44.94	$ 33.92	$ 127.11
Oct-16	$ 330.29	$ 662.30	$ 21.00	$ 51.09	$ 33.02	$ 132.81
Sep-16	$ 383.07	$ 648.82	$ 25.34	$ 50.33	$ 44.68	$ 160.01
Aug-16	$ 373.73	$ 676.37	$ 24.72	$ 56.26	$ 43.59	$ 163.34
Jul-16	$ 374.35	$ 668.98	$ 24.74	$ 53.25	$ 43.82	$ 156.43
Jun-16	$ 399.14	$ 669.63	$ 25.32	$ 79.38	$ 52.89	$ 176.50
May-16	$ 468.25	$ 689.44	$ 24.71	$192.17	$ 63.42	$ 172.20
Apr-16	$ 628.93	$ 598.92	$ 24.10	$ 51.26	$ 352.22	$ 510.63
Mar-16						
Feb-16						
Jan-16						
Dec-15						
Nov-15						
Oct-15						
Sep-15						
Aug-15						
Jul-15						
Jun-15						
May-15						
TOTALS	**$6,167.43**	**$8,630.51**	**$322.43**	**$ 893.68**	**$1,743.36**	**$3,676.44**

There are a multitude of accounts for this facility that only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Quietwaters Park	Lighting - Interior	$ 1,348.05	$ -	$ -	$ 216	$ 1,564.05	$ 13,996.16	8.9
Breakage Fee							$ 1,151.61	
PA Cost							$ 146.53	
Total		**$ 1,348.05**	**$ -**	**$ -**	**$ 216**	**$ 1,564.05**	**$ 15,294.31**	**9.8**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps: The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures: In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

LED Replacement for Pin-Based Compact Fluorescent Fixtures: In keeping with the direction to remove fluorescent ballasts, reduce energy use and minimize cost, our design strategy for existing pin-based compact fluorescent lamps is to retrofit the existing fixtures with line voltage pin based LED lamps and remove the existing fluorescent ballasts. In some cases, it is possible to remove two fluorescent lamps and replace them with a single higher powered LED lamp without sacrificing luminaire output and distribution.

Emergency Lighting: Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
QUIET WATERS PARK	Existing T8 Fluorescent - Proposed Retrofit LED	50	50
	Existing T12 Fluorescent - Proposed Retrofit LED	48	48
	Existing Compact Fluorescent - Proposed Retrofit LED	20	20

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 14,300 kWh

Annual Electric Demand: 51.3 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Quietwaters Park	Lighting - Interior	$ 1,348.05	$ -	$ -	$ 216	$ 1,564.05	$ 13,996.16	8.9

D.41. Park - Roosevelt Garden

FACILITY DESCRIPTION

Lafayette Hart Park is a small multipurpose facility and grounds that has been open since 2007 and is located at 2841 NW 11th St, Fort Lauderdale, FL 33311. The park features a single building with meeting room, kitchen area, computer lab, and office. Additional amenities at the park include a basketball court, shelters, and a playground/play structure. The park is used for public recreational activities and also county sponsored after school and summer programs for children as well as programs for seniors. The operating hours for the entire park are as follows.

<u>Park Hours</u>

Mon-Fri:	8AM – 9PM
Saturday:	8AM – 6PM
Sunday:	10AM – 6PM

COOLING SYSTEM:

Cooling for the Main building is provided by three split DX units. Two of the units are Carrier 4 ton units that utilize R22 refrigerant and are mixed air units. The third unit is an AAON 6 ton unit that utilizes R22 refrigerant.

Main Building HVAC

The following table is a summary of all the relevant mechanical equipment that was found during the site visit and displays all the important data regarding each piece of equipment.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Roosevelt Gardens Park												
AHU1	Aaon			fan								
CU1	Aaon	CA1305	200710-CCCF07870	compressor	R-22		6	230	1	21	12	4.3
				compressor	R-22			230	1	21		4.3
				fan		0.75		230	1	5.4		1.1
AHU2	Carrier	FA4CNC060	4007A82521	fan		0.75		208	1	5.2		1.0
CU2	Carrier	24ABR350A350	3707E24294	compressor	R-22			208	3	25.3		8.2
				fan		0.25		208	1	1.2		0.2
AHU3	Carrier	FA4CNC060	4007A82537	fan		0.75		208	1	5.2		1.0
CU3	Carrier	24ABR360HB0330	0307E13587	compressor	R-22			208	3	25.3		8.2
				fan		0.25		208	1	1.2		0.2

Observed Issues during Visit:

- Cooling system uses R22 refrigerant.
- Lack of controls in the cooling system

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt and 87 Watt, T8 fluorescent lamps in either 2x2 or 2x4 fixtures.

Interior Lighting Examples

Exterior Lighting consists of 210 Watt metal halide parking lot lights and compact florescent flood lights.

Exterior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom of the facility.

- 2.2 gpm faucets
- 1.0 gpf urinals
- 1.6 and 2.5 gpf toilets

Sample Restroom Fixtures

The irrigation system could not be accessed as it was underneath a hard cover protector under lock and key. It could not be determined whether the irrigation system uses domestic water or another water source.

Irrigation System

BUILDING CONTROLS SYSTEM

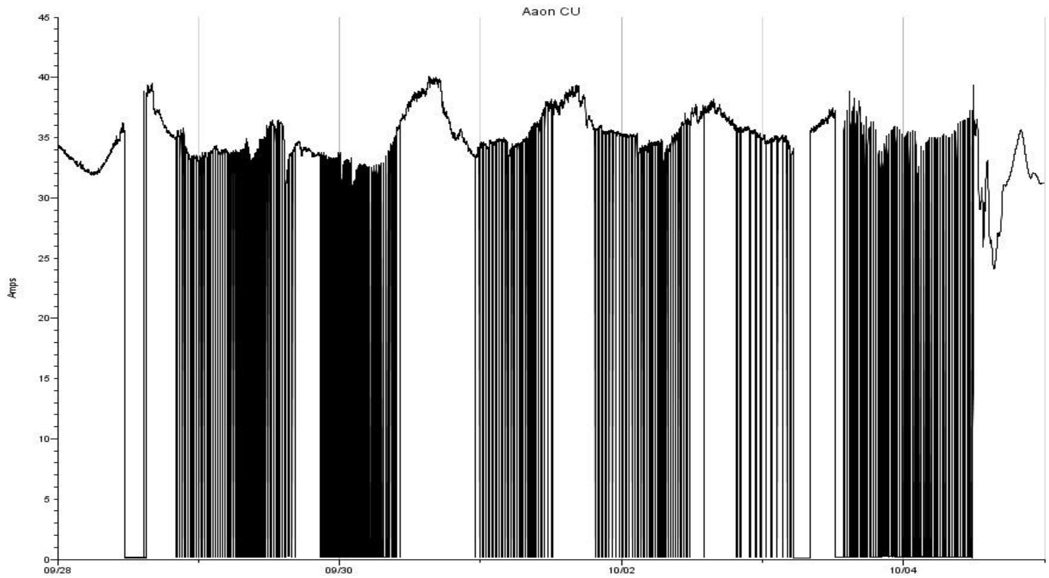
The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.

Building Controls

TRENDING DATA ACQUISITION

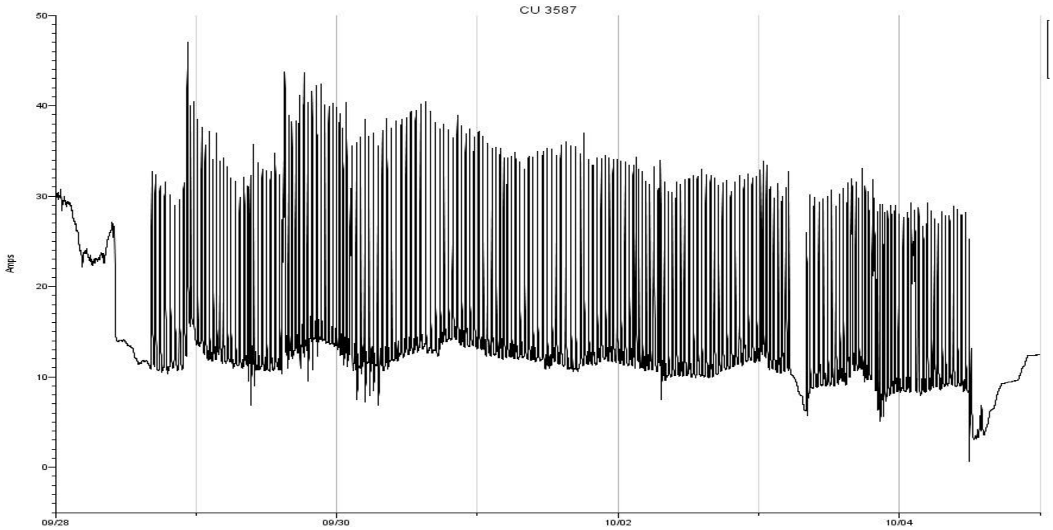
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 6 Ton Aaon Condensing Unit.



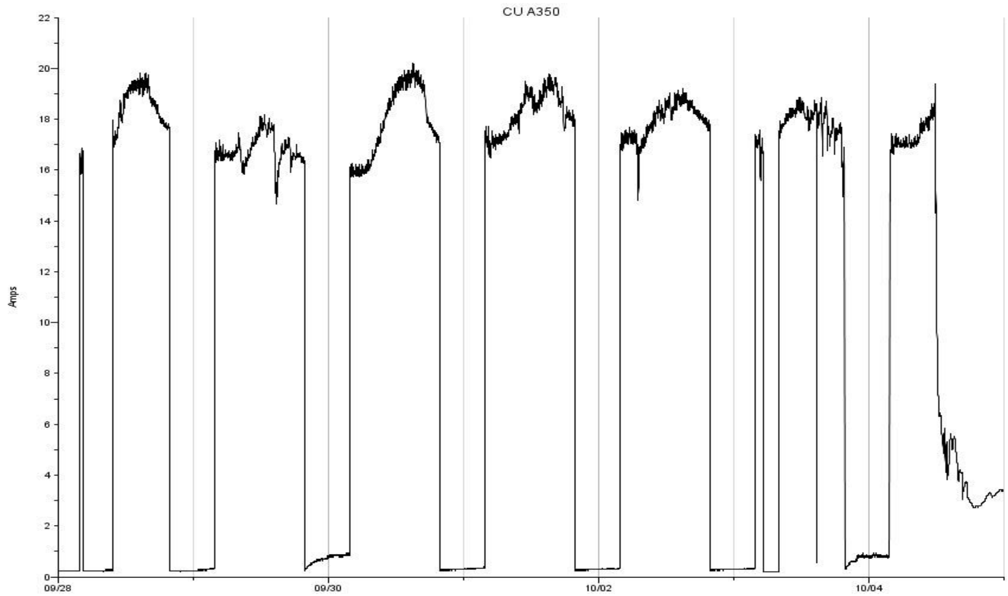
This unit registered an average of 34.93 amps and was operating for a total of 123.48 hours during a one week period.

Trending Data – Carrier Condensing Unit 1.



This unit registered an average of 16.59 amps and was operating for a total of 141.28 hours during a one week period.

Trending Data – Carrier Condensing Unit 2.



This unit registered an average of 17.75 amps and was operating for a total of 96.20 hours during a one week period.

The following table compares the operating hours of each unit with the hours of service for the facility.

Day	Hours of Service	Run Hours Aaon CU	Run Hours CU 3587	Run Hours CU A350
Monday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM
Tuesday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM
Wednesday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM
Thursday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	10:00AM- 8:00PM
Friday	8:00AM - 9:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM
Saturday	8:00AM - 6:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM
Sunday	10:00AM - 6:00PM	12:00AM - 11:59PM	12:00AM - 11:59PM	4:00AM - 8:00PM

The Aaon unit and the Carrier unit with the serial number ending in 3587 are running continuously and show no evidence of being under a schedule control sequence. The Carrier unit with the serial number ending in A350 is turning on around 4 hours before the facility begins operation and turns off 1 hour before the facility closes. Due to the consistent pattern of this unit’s operation it can be assumed that the unit has scheduling capabilities.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by one (1) electric meter. The billing account utilizes the Seasonal Demand Time of Use Rider (SDTR-1A) rate structure. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

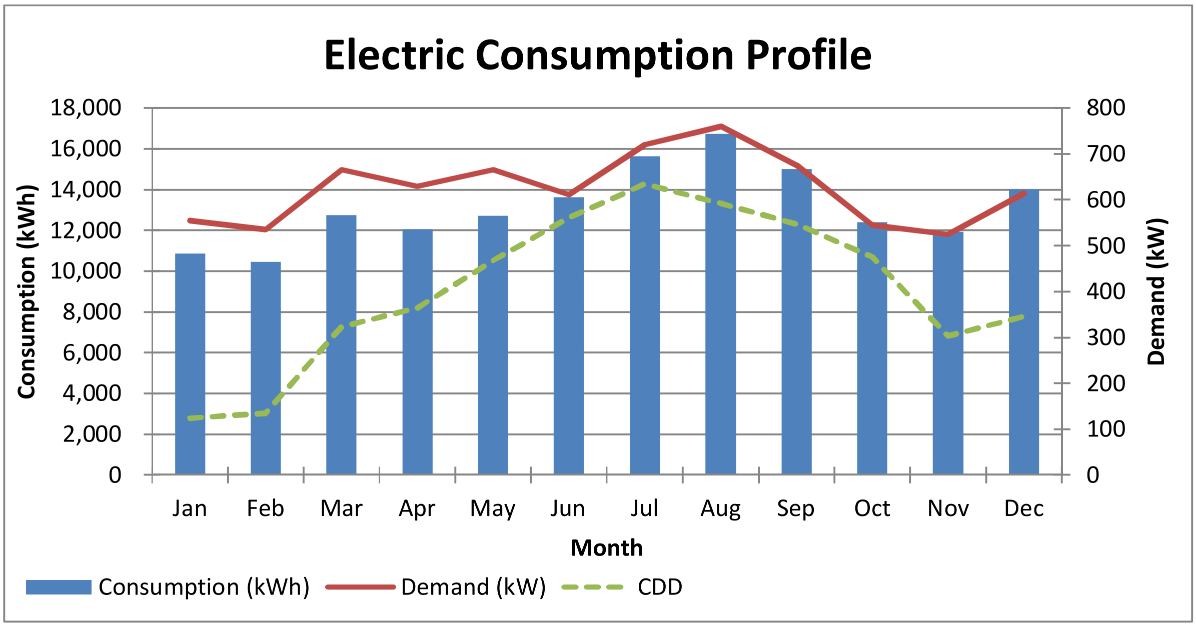
The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept on peak	June - Sept off peak	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Roosevelt Gardens Park		SDTR-1A	0.127063453	$ 0.04075	$ 0.05588	$ 10.71	158,190	400	41

Meter MQ3274A; Account: 2907402123; Address: 2841 NW 11TH ST, FORT LAUDERDALE

Date	Customer Charge	Consumption (kwh) Total Consumption	Consumption (kwh) On Peak	Consumption (kwh) Off Peak	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes gross receipts tax 2.56%	Other Fees/Taxes Franchise Fee	Total Charges
Jun-15	$ 25.96	13,800	1,320	12,480	$ 596	34	$ 412	$ 26.47	$ 147	$ 1,208
Jul-15	$ 25.96	14,280	1,500	12,780	$ 620	29	$ 351	$ 25.53	$ 160	$ 1,183
Aug-15	$ 25.96	15,780	1,500	14,280	$ 681	34	$ 412	$ 28.65	$ 167	$ 1,314
Sep-15	$ 25.96	16,800	1,320	15,480	$ 718	28	$ 339	$ 27.74	$ 151	$ 1,262
Oct-15	$ 25.96	13,320	180	13,140	$ 544	34	$ 412	$ 25.14	$ 137	$ 1,144
Nov-15	$ 25.96	13,020	0	13,020	$ 532	38	$ 461	$ 26.07	$ 125	$ 1,170
Dec-15	$ 25.96	15,780	0	15,780	$ 644	34	$ 412	$ 27.71	$ 170	$ 1,280
Jan-16	$ 25.96	10,140	0	10,140	$ 514	35	$ 342	$ 22.58	$ 35	$ 940
Feb-16	$ 25.96	9,660	0	9,660	$ 489	31	$ 303	$ 20.95	$ 33	$ 872
Mar-16	$ 25.96	12,780	0	12,780	$ 647	29	$ 284	$ 24.50	$ 41	$ 1,023
Apr-16	$ 25.96	12,060	0	12,060	$ 611	34	$ 333	$ 24.82	$ 11	$ 1,005
May-16	$ 25.96	12,000	0	12,000	$ 608	28	$ 274	$ 23.24	$ 6	$ 937
Jun-16	$ 26.97	13,440	1,200	12,240	$ 626	32	$ 376	$ 26.36	$ 41	$ 1,097
Jul-16	$ 26.97	16,980	1,860	15,120	$ 820	34	$ 400	$ 31.92	$ 50	$ 1,329
Aug-16	$ 26.97	17,700	1,740	15,960	$ 838	34	$ 400	$ 32.39	$ 51	$ 1,348
Sep-16	$ 26.97	13,200	1,380	11,820	$ 632	29	$ 341	$ 25.60	$ 38	$ 1,063
Oct-16	$ 26.97	11,460	180	11,280	$ 545	31	$ 312	$ 22.65	$ 33	$ 941
Nov-16	$ 26.97	10,860	0	10,860	$ 517	31	$ 312	$ 21.92	$ 32	$ 911
Dec-16	$ 26.97	12,240	0	12,240	$ 583	32	$ 323	$ 23.86	$ 35	$ 991
Jan-17	$ 25.00	11,580	0	11,580	$ 596	39	$ 402	$ 26.19	$ 40	$ 1,090
Feb-17	$ 25.00	11,280	0	11,280	$ 581	41	$ 422	$ 26.32	$ 40	$ 1,095
Mar-17	$ 25.00	12,720	0	12,720	$ 684	37	$ 381	$ 27.90	$ 43	$ 1,161
Apr-17	$ 25.00	12,060	0	12,060	$ 648	39	$ 402	$ 27.52	$ 42	$ 1,145
May-17	$ 25.00	13,440	0	13,440	$ 722	32	$ 330	$ 27.57	$ 43	$ 1,147
AVERAGE TOTALS		**158,190**	**6,090**	**152,100**	**$ 7,499**	**400**	**$ 4,368**	**$ 311.80**	**$ 836**	**$ 13,327**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Roosevelt Gardens Park	Recreation	28.28	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Roosevelt Gardens Park

Account # 2027814	**Meter #** 200219366
Rate	**Address**
Meter Size 2"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	8	$ 256.71
Apr-17	8	$ 256.71
Mar-17		
Feb-17	14	$ 342.24
Jan-17		
Dec-16	6	$ 228.21
Nov-16		$ 209.18
Oct-16		
Sep-16		$ 285.19
Aug-16		$ 393.77
Jul-16		$ 366.62
Jun-16		$ 271.62
May-16		$ 230.91
Apr-16	11	$ 285.19
Mar-16		$ 339.48
Feb-16		$ 366.62
Jan-16		$ 285.19
Dec-15		$ 258.05
Nov-15		$ 248.97
Oct-15		$ 302.96
Sep-15		$ 232.76
Aug-15		$ 310.25
Jul-15		$ 323.17
Jun-15		$ 219.85
May-15		$ 297.34
TOTALS	**47**	**$ 6,310.99**

This account has very few months of consumption data in the 24 month period. There is cost data for every month of the 24 month period but no relevant conclusions can be drawn from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance is considered as separate items.

Building Level Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Roosevelt Gardens Park	Water - Retrofits	$ 83.73	$ -	$ 765.33	$ 45	$ 893.80	$ 7,102.19	7.9
Roosevelt Gardens Park	Split Systems	$ 3,991.90	$ 1,885.75	$ -	$ -	$ 5,877.65	$ 71,833.19	12.2
Breakage Fee							$ 671.28	
PA Cost							$ 824.59	
Total		**$ 4,075.63**	**$ 1,885.75**	**$ 765.33**	**$ 45**	**$ 6,771.45**	**$ 80,431.25**	**11.9**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Flush Valves: Most commercial facilities utilize flush valve water closets. Flush valves are designed to release precise volumes of water when activated. High efficiency flush valves can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 1.28 gallons per flush (GPF) flush valve will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

Urinals: High efficiency flush valve and china combinations for urinals can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 0.125 GPF high efficiency urinal systems will replace existing equipment that currently consumes 1.0 to 1.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

SAVINGS

The energy and cost savings were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis Section of this Report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

FIM SAVINGS SUMMARY

Annual Water savings: 67,135 gallons

Annual Energy savings: 1,499 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Roosevelt Gardens Park	Water - Retrofits	$ 83.73	$ -	$ 765.33	$ 45	$ 893.80	$ 7,102.19	7.9

MECHANICAL

As DX equipment ages and the condition of the equipment deteriorate, the energy efficiency of these units also degrades. In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

Cooling for the Main building is provided by three split DX units. Two of the units are Carrier 4 ton units that utilize R22 refrigerant and are mixed air units. The third unit is an AAON 6 ton unit that utilizes R22 refrigerant.

PROJECT SCOPE

This FIM addresses the replacement three (3) DX systems. The scope of work includes the replacement of both the condensing unit and air handlers. The new equipment will be of equal capacity and include, as part of the installation, package new programmable thermostats provided by Siemens. The thermostats will be able to communicated, via their own IP address, to remote BAUs for additional access. The units will be placed on a time of day schedule. The new schedule will command the units to turn on 1.5 hours before the facility opens and 1.5 hours after it closes.

Scope of Work

Building	Equipment	Make	Model	Tons	Existing kW	New kW
Roosevelt Park	AHU	Aaon				
Roosevelt Park	Condenser	Aaon	CA1305	6	9.77	4.9
Roosevelt Park	AHU	Carrier	FA4CNC060			
Roosevelt Park	Condenser	Carrier	24ABR350A350	4	6.16	3.6
Roosevelt Park	AHU	Carrier	FA4CNC060			
Roosevelt Park	Condenser	Carrier	24ABR360HB0330	4	6.48	3.8

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. The detailed calculations are available in the Section H, Appendices. All calculations were based off Trane manufacturer cut-sheets, also provided.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 61,204 kWh

Annual Electric Demand: 175.75 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Roosevelt Gardens Park	Split Systems	$ 3,991.90	$ 1,885.75	$ -	$ -	$ 5,877.65	$ 71,833.19	12.2

D.42. Park - Sunview

FACILITY DESCRIPTION

Sunview park is a sports complex with several athletic fields used for multiple sports. The park is a 20.8 acre site that has been used as a center of athletic and recreational activity for the community since 1963. The park is located at 1500 SW 42nd Ave, Fort Lauderdale, FL 33317. The park contains four baseball/softball fields, a basketball court, and a multipurpose field used for soccer, football, rugby, and other sports. The only conditioned building at the park was destroyed by a fire in 2010 and has been replaced with the current modular building.

Occupancy Hours

Mon – Fri: 9AM – 9PM
Saturday: 9AM – 6PM
Sunday: 10AM – 6PM

COOLING SYSTEM:

The cooling for the Sunview park modular building is provided by three Bard packaged DX wall units with 3 tons of capacity each. The units were manufactured in 2007. It is important to note that the units use R22 refrigerant.

HVAC Equipment

The table below summarizes the important technical information found for the mechanical equipment at this facility.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information					
EQUIPMENT	**Mfctr**	**Model**	**Serial**	**Description**	**Notes**	**HP**	**Tons/ MBTU**	**V**	**Ph**	**Amps**	**Eff /EER**	**Cal kW**
Sunview Park												
Irrigation Pump	Marathon Electric	5vb215ttdw7022aa		pump		15		208	3	42	86.50%	13.6
Irrigation Pump	US Motors	C55CXJZE-4760CAT		pump		1		208	1	13		2.4
Irrigation Pump	US Electrical Motors	e683auiou227r004f		pump		15		230	3	37	89.50%	13.3
Fan	Dayton	XXMTKZ6804		fan	orage roo	0.25		115	1	4.5		0.5
Bard Unit1	Bard	WA372-A10XX4XXX		compressor	R-22		3	208	1	16.5	9.2	3.1
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.2		0.4
Bard Unit2	Bard	WA372-A10XX4XXX		compressor	R-22		3	208	1	16.5	9.2	3.1
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.2		0.4
Bard Unit3	Bard	WA372-A10XX4XXX		compressor	R-22		3	208	1	16.5	9.2	3.1
				fan		0.2		208	1	1.5		0.3
				fan		0.33		208	1	2.2		0.4

Observed Issues during Visit:

- Cooling system uses R22 refrigerant.

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt and 114 Watt T8 fluorescent lamps and 30 Watt compact florescent lamps.

Exterior Lighting consists of metal halide parking lot lighting and sports field lighting.

The building does not make use of occupancy sensors or any other types of lighting control.

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and irrigation. Fixtures and water closets are all operated manually. The following are example of the types of fixture found within the restroom buildings of the facility:

- 2.2 gpm faucets
- Waterless urinals
- 1.6 gpf toilets

Restroom Facility

The irrigation system at this park is divided into two systems. An exact count of zones and sprinkler heads is unknown. The systems utilize a Rain Bird irrigation control system. No access to the Rain Bird system could be gained at the time.

Irrigation System

BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by eight (8) electric meters with different electric rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	Year-Round		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
Sunview Park	Restroom	GS-1	-	-	$ 0.09896	-	3,093	-	-
	Basketball Lights	GS-1	-	-	$ 0.09897	-	15,723	-	-
		OS-2 Sports Field	-	-	$ 0.13107	-	8,680	-	-
	F2	GS-1	-	-	$ 0.09899	-	2,179	-	-
	F4	GS-1	-	-	$ 0.09896	-	3,962	-	-
		OS-2 Sports Field	-	-	$ 0.13106	-	56,324	-	-
	Trail	GS-1	-	-	$ 0.09896	-	44,499	-	-
	Pump	SDTR-1B	$0.13394	$0.04828	-	$ 11.95	362	32	26

For ease of presentation in this report, all nine (9) meters and their historical data was combined into the following table. Thus, the table represents the consumption baseline of the entire park as a whole. However, the table above still governs the baseline of individual sites within the park when considering FIMs.

SIEMENS

Date	Customer Charges	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jul-15	$ 286.16	10,117	$ 971	0	$ -	$ 134	$ 1,392
Aug-15	$ 286.16	10,727	$ 1,030	5	$ 60.60	$ 145	$ 1,521
Sep-15	$ 286.16	12,825	$ 1,231	0	$ -	$ 166	$ 1,684
Oct-15	$ 286.16	10,394	$ 999	0	$ -	$ 134	$ 1,419
Nov-15	$ 286.16	11,936	$ 1,148	0	$ -	$ 160	$ 1,595
Dec-15	$ 286.16	11,176	$ 1,075	0	$ -	$ 149	$ 1,511
Jan-16	$ 286.16	11,368	$ 1,103	14	$ 169.68	$ 60	$ 1,619
Feb-16	$ 286.16	7,971	$ 753	0	$ -	$ 65	$ 1,104
Mar-16	$ 286.16	9,235	$ 900	4	$ 39.12	$ 81	$ 1,306
Apr-16	$ 286.16	11,163	$ 1,099	26	$ 254.28	$ 108	$ 1,747
May-16	$ 286.16	11,172	$ 1,100	0	$ -	$ 83	$ 1,468
Jun-16	$ 297.32	11,215	$ 1,072	0	$ -	$ 90	$ 1,459
Jul-16	$ 297.32	12,945	$ 1,235	0	$ -	$ 101	$ 1,633
Aug-16	$ 297.32	14,434	$ 1,375	0	$ -	$ 110	$ 1,782
Sep-16	$ 297.32	14,554	$ 1,399	0	$ -	$ 102	$ 1,799
Oct-16	$ 297.32	12,238	$ 1,187	0	$ -	$ 89	$ 1,574
Nov-16	$ 297.32	14,279	$ 1,414	4	$ 40.32	$ 104	$ 1,856
Dec-16	$ 297.32	11,961	$ 1,189	0	$ -	$ 88	$ 1,575
Jan-17	$ 325.00	6,604	$ 638	0	$ -	$ 63	$ 1,026
Feb-17	$ 325.00	5,853	$ 576	0	$ -	$ 59	$ 960
Mar-17	$ 325.00	10,979	$ 1,222	10	$ 103.00	$ 110	$ 1,760
Apr-17	$ 325.00	12,297	$ 1,381	0	$ -	$ 114	$ 1,820
May-17	$ 325.00	12,863	$ 1,424	0	$ -	$ 117	$ 1,866
Jun-17	$ 325.00	11,335	$ 1,215	0	$ -	$ 100	$ 1,641
AVERAGE TOTALS		**134,821**	**$ 13,368**	**32**	**$ 333.50**	**$ 1,266**	**$ 18,558**

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Sunview Park	Recreation	33.84	3.7	7.3	17.6

Overall, this building is operating above the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Sunview Park

Account #	3062113	**Meter #**	1552649
Rate		**Address**	
Meter Size		**Meter Type**	

Date	Consumption ()	Total Charges
May-17	6	$ 6,594.01
Apr-17	6	$ 6,594.01
Mar-17	64	$ 7,256.95
Feb-17	14	$ 6,685.45
Jan-17		$ 6,578.73
Dec-16		$ 6,594.01
Nov-16	5	$ 6,586.37
Oct-16	8	$ 6,524.07
Sep-16		
Aug-16	7	$ 7,007.25
Jul-16		$ 7,192.13
Jun-16		$ 6,995.02
May-16		$ 6,999.61
Apr-16		$ 6,886.67
Mar-16		
Feb-16		
Jan-16		
Dec-15		
Nov-15		
Oct-15		
Sep-15		
Aug-15		
Jul-15		
Jun-15		
May-15		
TOTALS	**110**	**$88,494.28**

This account does not have enough water consumption or cost data to draw any relevant conclusions from this data.

RECOMMENDED IMPROVEMENT MEASURES

This section addresses the Facility Improvement Measures (FIMs) recommended for implementation at this facility. Each solution is presented with a brief description of the intended scope, savings calculation method, guaranteed savings in units of energy, and the individual FIM's financial analysis with payback. As requested, the following improvements costs are listed separately and do not directly affect a FIM's payback:

- Development Costs
- Measurement & Verification (performance assurance)
- Code compliance issues uncovered that directly relates to the constructability of a specific measure

BUILDING LEVEL SUMMARY

The following table summarized the complete list of FIMs recommended for this facility. The summation at the bottom of the table represents the total costs and savings of all FIMs only. As stated, the fixed costs associated with in with development, performance assurance, and code compliance are considered as separate items.

Building Level Finanical Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Sunview Park	Lighting - Interior	$ 1,516.20	$ -	$ -	$ 223	$ 1,739.20	$ 14,885.35	8.6
Sunview Park	Lighting - Exterior	$ 2,195.45	$ -	$ -	$ 143	$ 2,338.45	$ 36,457.79	15.6
Sunview Park	Water - COMBINED	$ 36.65	$ -	$ 9,442.08	$ 730	$ 10,209.21	$ 57,729.10	5.7
Breakage Fee							$ 478.08	
PA Cost							$ 1,064.12	
Total		**$ 3,748.30**	**$ -**	**$9,442.08**	**$ 1,096**	**$14,286.86**	**$ 110,614.44**	**7.7**

SAVINGS CALCULATION METHODOLOGY

FIMs were developed using spreadsheet models and engineering calculations. Energy using equipment was measured to determine power consumption, kW. Extensive data logging of equipment was also used to determine energy consumption, kWh. Savings calculations are provided as in Section H, Appendices.

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

LED Replacement of Linear Lamps

The design strategy is to specify and standardize on the same type of linear LED T8 and T5 lamps types throughout the buildings to be included in this project. We select a non-proprietary proven LED tube that will provide the greatest performance and energy savings of any of the lighting systems considered. The proposed LED Linear tubes are a premium high lumen, extended life with best in class warranty.

The predominant LED lamp we have selected for this project is an UL Type B LED linear type. The UL Type B lamp a direct wire lamp that doesn't require an external ballast or driver. The existing T-8 or T5 ballast will be removed from the fixture and disposed of. New lamp sockets approved for direct wire LED lamps will also be installed on the feed ends to ensure problem free installation and reduce future maintenance. This LED retrofit strategy will allow us to maintain recommended light levels while providing a reduction in energy usage in all linear lamp fixtures and still standardize on lamp types. All fixtures retrofitted will be dry wiped to remove dust and particulate matter to improve fixture lumen efficiency.

Fixture types associated with these lamps are surface or recessed linear fixtures.

In the case of existing 2'x2' troffers, a different approach is used. There is less flexibility in lamp wattage when dealing with U-shaped lamps, and installing linear lamp kits can be a challenge due to variation in fixture construction. Additionally, in many cases, it is possible to reduce light output if the fixture can be made more efficient. To provide consistency of components and reduce energy use, we have proposed installing 2x2 volumetric style retrofit door kits with dedicated LED boards and drivers.

LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures

Our design strategy for the replacement of screw based incandescent and compact fluorescent lamps is to replace them with screw based LED where the application permits. LED has become an attractive replacement option when incandescent fixtures are controlled by dimmers due to its excellent dimming capability.

LED Replacement for Pin-Based Compact Fluorescent Fixtures

In keeping with the direction to remove fluorescent ballasts, reduce energy use and minimize cost, our design strategy for existing pin-based compact fluorescent lamps is to retrofit the existing fixtures with line voltage pin based LED lamps and remove the existing fluorescent ballasts. In some cases, it is possible to remove two fluorescent lamps and replace them with a single higher powered LED lamp without sacrificing luminaire output and distribution.

Emergency Lighting

Backup power for emergency lighting is currently supplied by various means, including generator backup (emergency lights at full output), integral battery backup ballasts (fluorescent fixtures at reduced output), and unit inverter emergency lights. Of those approaches, the scenarios with existing battery backup ballasts in fluorescent fixtures require replacement of the battery ballasts because they are not compatible with the UL Type B LED lamps. In those cases, a standalone EM kit with a dedicated emergency battery, LED driver, and LED board will be installed in the fixture. This kit will remain off until there is a power outage, at which point the LED board will illuminate.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
SUNVIEW PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	2	2
	Existing T8 Fluorescent - Proposed Retrofit LED	62	62
	Existing Incandescent - Proposed Relamp LED	27	27
	Existing T12 Fluorescent - Proposed Retrofit LED	1	1
	Existing Compact Fluorescent - Proposed Retrofit LED	16	16

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for High Intensity Discharge Exterior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium n exterior applications provides significant energy reduction opportunities when changing over to LED. For exterior pole mounted applications, often the number of fixtures can be reduce based on the improved photometric and light distribution of the new LED fixtures that wasn't previously available in HID fixtures. All proposed LED fixtures are from recognized manufacturers that have met the required standards for light quality, efficiency and longevity. In our design effort and fixture selection process, consideration is given to the maintenance benefits of the prescribed solution resulting in less future costs to maintain exterior fixtures in difficult to reach applications. The proposed LED fixture replacement has been specified to furnish light levels that are in compliance with recommended light levels and support the existing site condition requirements. Where time clocks or automated lighting controls are not in place, proposed LED building and site lighting will incorporate an integral photocell to maximize energy savings.

In general, the design approach is to replace existing HID luminaires with new LED luminaires of like type, ie: shoeboxes, wallpacks, floodlights. Some fixture types are replaced with new LED fixtures of a different type, ie: recessed canopy lights replaced with low profile LED canopy lights.

Where deemed appropriate in parks and office buildings, integral occupancy sensors have been used on pole mounted shoebox luminaires in parking lots to automatically dim the lighting during hours of inactivity.

Decorative post top luminaires, recessed step lights, and bollards typically use low wattage HID lamps in architectural form factors. Replacement luminaires of this type are relatively high in cost, with relatively low energy savings potential. As a result, the proposed design typically calls for removing the HID lamp and ballast, and installing a new screw based LED lamp.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
SUNVIEW PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	50	50
	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	2	2
	Existing High Intensity Discharge - Proposed New LED Fixture	15	15

Exterior Lighting Sensor Scope

Building Name	Areas Controlled by sensors
SUNVIEW PARK	1

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 37,145 kWh

Annual Electric Demand: 116.28 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Sunview Park	Lighting - Interior	$ 1,516.20	$ -	$ -	$ 223	$ 1,739.20	$ 14,885.35	8.6
Sunview Park	Lighting - Exterior	$ 2,195.45	$ -	$ -	$ 143	$ 2,338.45	$ 36,457.79	15.6

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

Tank Style Water Closets: Tank style water closets utilize a tank fill valve on top of the bowl which uses gravity to drain large volumes of water into the bowl during evacuation. Pressure assisted tank valves use domestic water pressure to pressurize the tank water allowing for more forceful evacuations with less water volume. Installation of 1.00 gallons per flush (GPF) tank type, pressure assist, ADA style water closet will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

Flush Valves: Most commercial facilities utilize flush valve water closets. Flush valves are designed to release precise volumes of water when activated. High efficiency flush valves can enable a facility to greatly reduce its water consumption by reducing flush valve flow rates and the amount of water required for evacuation. Installation of 1.28 gallons per flush (GPF) flush valve will replace existing equipment that currently consumes 1.6 to 3.5 GPF.

Bathroom Faucets/Aerators: Most faucets utilize aerators to restrict the volume of water at the mouth of a faucet and to generate a more comfortable flow. High efficiency aerators can greatly reduce flow rates from faucets and create a comfortable flow for hand washing and cleaning. Restricting faucet flow rates enables a facility to conserve water and reduce energy usage associated with heating water. Faucets without the threading necessary to accept an aerator can be replaced with threaded faucets. Installation of 0.5 GPM aerator or faucet retrofit will replace existing equipment that currently consumes 2.2 GPM.

Ice Machine Heat Exchanger: With a refrigeration heat exchanger system installed, cold discharge water from an ice machine or refrigeration unit is exposed to incoming domestic water in a reservoir. This heat exchange can cool incoming water by more than 16%. This drop in temperature improves the efficiency of the ice machine by more than 18%. This creates energy savings by reducing the cooling load and cycle time of the ice machine or refrigeration unit.

Smart Irrigation System: This system links daily with a climate center that compiles 8 million data points daily to calculate and deliver site-specific, local weather data accurate down to one square kilometer to each controller. This central control system enables all features of each controller to be controlled and monitored by the irrigation manager from a remote location. Savings are achieved by receiving or collecting data daily to calculate the ET rates (evapotranspiration rates) of the controller's microclimate. ET calculations incorporate various climate parameters (wind, sunlight, temperature, and precipitation) to determine the base water demand of the irrigation system. This enables the system to create a water efficient daily irrigation schedule to water as conservatively as possible.

SAVINGS

The energy and cost savings for water retrofits were developed using spreadsheet modeling. Based on site interviews, facility type, square footage, and standard factors for allocation of business in square foot per person and visitors per day the total population and occupancy days for this facility were determined. Total water closet, urinal, faucet and shower use figures were determined for the facility using standard factors for equipment use based on industry research and case studies coupled together with the total population of the facility and the occupancy days. The current water usage minus the proposed water usage leads to the total water savings in gallons.

The savings value take the water savings and multiply them by the rate detailed in the Utility Data Analysis Section of this report. Energy savings were only taken in the form of hot water savings for any equipment that utilize hot water.

Deferred maintenance savings were considered and calculated by a percentage of reduction in replacement cost for any new fixtures that will be installed. These savings are referred to as Savings O&M on the financial summary table below.

Ice machine heat exchanger savings were calculated with a spreadsheet model by taking the energy consumption of the existing ice machine and subtracting the proposed energy consumption with the heat exchanger. Current energy consumption was calculated using nameplate data on the existing ice machine.

Irrigation water savings were calculated with a spreadsheet model by taking the water consumption of the existing irrigation system and subtracting the proposed energy consumption with the more efficient irrigation system. Because there was no water billing data available for the irrigation system, standard values for irrigation consumption for this facility's irrigation area were used

FIM SAVINGS SUMMARY

Annual Water savings: 1,9067,07 gallons

Annual Energy savings: 339 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Sunview Park	Water -	$ 36.65	$ -	$ 9,442.08	$ 730	$ 10,209.21	$ 57,729.10	5.7

D.43. Park - Tradewinds

FACILITY DESCRIPTION

Tradewinds Park is a large area of land that hosts a variety of small buildings and facilities for outdoor activities. The park covers roughly 625 acres and has been in operation since 1977. The park is located at 3600 W Sample Rd, Coconut Creek, FL 33073. The park and its facilities serve for activities and attractions such as stables, picnic shelters, Butterfly World, model steam train rides, athletic fields, and museum. Because of the variety of activities there are several different sources of utility use such as air conditioning, water heating, sports lighting, outdoor lighting, pumping for lift stations/irrigation just to name a few. It is important to note that this park houses two businesses, Butterfly World and Equine-Assisted Therapies of South Florida, which are independently owned and were not a part of this study because these businesses do not have their utilities paid by Broward County. The hours of operation for the different areas of the park are as follows.

Park Hours

November – March:	8AM – 6PM
March – November:	8AM – 7:30PM

Park Office Hours

Mon – Sun:	9AM – 5:30PM

General Store Hours

Weekends and Select Holidays:	8:30AM – 3:30PM

Steam Train Ride Hours

Third weekend of each month:	10AM – 4PM

Soccer and Softball Field Hours

Mon - Fri:	8AM – 10PM
Sat – Sun:	8AM – 6PM
Sat – Sun (Daylight Savings Time):	8AM – 7:30PM

Cricket Field Hours

Daily:	9AM – 6PM
Daily (Daylight Savings Time):	9AM – 7:30PM

COOLING SYSTEM – PARK OFFICE

Cooling for the park office building is provided by two split DX unit. The condensing units are Carrier 3 ton and 10 ton units. These units were manufactured in 2012 and 2011, respectively. The air handlers are Carrier units that provide mixed air and were manufactured in 2012. The HVAC system has programmable thermostat controls.

Park Office HVAC

COOLING SYSTEM- POOL CONCESSIONS & LIFEGUARD OFFICE

The cooling for the pool concessions building is provided by one Rheem7.5 ton split DX unit t that was manufactured in 2012. The air handler is 100% return air and was manufactured in 2011. The cooling system comes equipped a programmable thermostat for the building. The lifeguard office cooling is provided by one wall unit.

Concessions & Lifeguard Office HVAC

COOLING SYSTEM – MAINTENANCE BUILDING

The cooling for the maintenance building is provided by one Carrier 7.5 ton split DX unit, manufactured in 2011, that provides mixed air into the space. The cooling system comes with a programmable thermostat. There are some wall units in certain rooms to aid the building cooling that are seldom used.

Maintenance Building HVAC

SIEMENS

COOLING SYSTEM – GATEHOUSE

There are two sets of gatehouses as the park has two entrances. The cooling for the south gatehouse buildings is provided by one Carrier 1.5 ton split system DX and two DX wall units. The carrier equipment was manufactured in 2010. The gatehouse HVAC equipment only gets used on weekends and holidays.

Gatehouse HVAC

The table below summarizes the mechanical equipment inventory for this facility.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Tradewinds Park												
Welcome Center AHU1	Carrier	40RUAA12A2A6A0A0A0	4012U45819	fan		2.4		208	3	6.9		2.2
Welcome Center CU1	Carrier	38AUZA12A0B6A0A0A0	3011G50075	compressor	R-410a		10	460	3	16.7	11.5	12.0
				fan				460	1	0.8		0.3
				fan				460	1	0.8		0.3
Welcome Center AHU2	Carrier	FX4DNF037	4812A81986	fan		0.5		208	1	4.1		0.8
Welcome Center CU2	Carrier	24ABB336A610	1812E03173	compressor	R-410a		3	460	3	5.6	11	4.0
				fan		0.25		460	1	0.7		0.3
South Gatehouse AHU				equipment unaccessable								
South Gatehouse CU	Carrier	24ABB318A320	4610E02106	compressor	R-410a			208	1	9		1.7
				fan		0.0833		208	1	0.5		0.1
South Irrigation Pump1	Weg	1016246916		pump		50		230	3	112	93%	39.7
South Irrigation Pump2	Weg	1017167198		pump		50		230	3	112	93%	39.7
South Jokey Pump	Echtop	GA3ALTF215JM2BD10		pump		10		230		22.8	89.40%	
South Compactor	Hydrolec	HYD-D-750-4-1A		induction motor		10		230	3		92.50%	0.0
Maintenance AHU1	Trane	4TEC3F60B1000AA	10276P7A1V	fan		1		200	1	7.6		1.4
Maintenance CU1	Trane	4TTB3060D1000AA	10353N0M2F	compressor	R-410a		5	208	1	26.8	11.18	5.0
				fan		0.2		200	1	1		0.2
Maintenance AHU2	Trane	4TEC3F60B1000AA	10276P671V	fan		1		200	1	7.6		1.4
Maintenance CU2	Trane	4TTB3060D1000AA	10353N812F	compressor	R-410a		5	208	1	26.8	11.18	5.0
				fan		0.2		200	1	1		0.2
Sandblaster Compressor	Champion	7-850003--.1-JJ	159106M	compressor		25		200	3	72	87.50%	21.3
Admin AHU				equipment unaccessable								
Admin CU		RAND-036-JAZ		nameplate unreadable			3					
Admin Ductless System	Carrier	38MGQC18---3	2016V10066	compresser	R-410a			208	1	10		1.9
				fan		0.16		208	1	0.74		0.1
				fan				208	1			0.0
Stable AHU				equipment unaccessable								0.0
Stable CU	Weather King	14AJM49A01	8254W411003342	compressor	R-410a		4	208	1	19.9	12	3.7
				fan		0.33		208	1	1.9		0.4
Museum AHU	Ruud	UBHK-21J11SFC	TM460207480	fan		0.5		208	1	5		0.9
Museum CU	Ruud	UAMB-036JBZ	6316M420203041	compresor	R-22			208	1	16		3.0
				fan		0.33		208	1	2		0.4

Observed Issues during Visit:

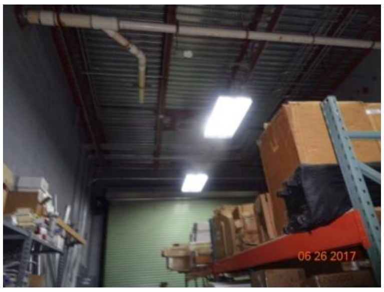
- Some DX units are 10 years old and use R-22 refrigerant

Examples of Observed Issues

LIGHTING SYSTEM

Interior lighting primarily consists of 60 Watt, T8 fluorescent lamps in the restroom buildings and maintenance building and LED lighting in the park office building.





Interior Lighting Examples

Exterior Lighting consists of LED street and parking lot lighting, PL32 light fixtures at the restroom buildings, T8 lighting at the pavilions, and metal halide lighting at the equestrian area.



Exterior Lighting Examples

There are occupancy sensors that are used throughout the park in the restroom buildings, office buildings, and maintenance building.

Lighting Sensor Examples

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and irrigation. Fixtures and water closets are operated manually and via motion sensors. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.5 gpf urinals
- Waterless urinals
- 3.5 toilets

There are two irrigation systems that are used at this park. This park is divided into a north section and a south section by a main road. The irrigation system is split the same way. The irrigation system uses water from the lake by the park.

Irrigation System

BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.

Building Controls

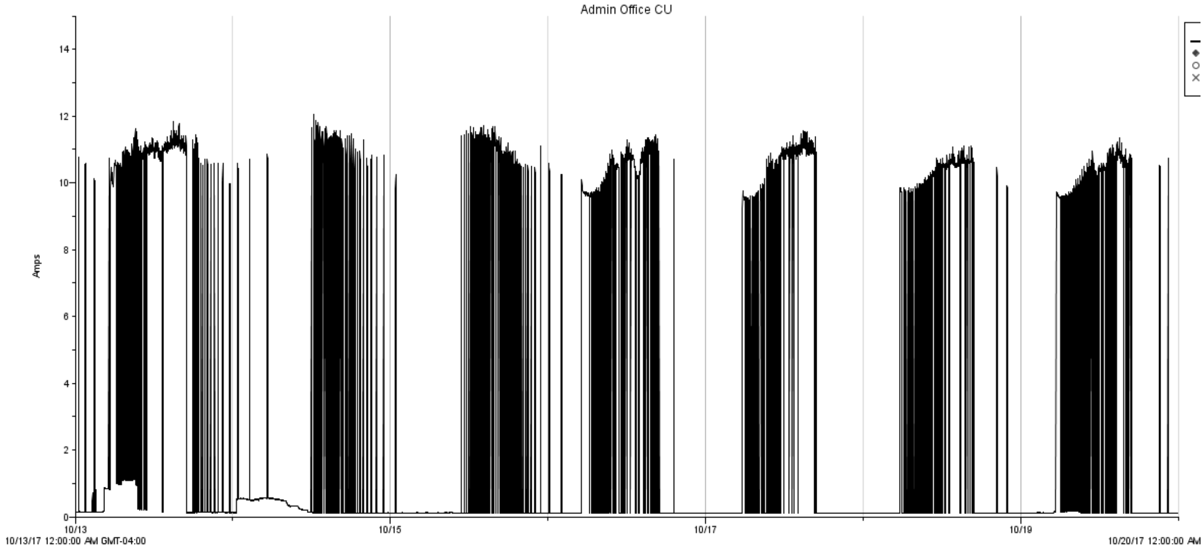
Some of the exterior lighting of the buildings at this park is controlled via time clock.


Exterior Lighting Controls

TRENDING DATA ACQUISITION

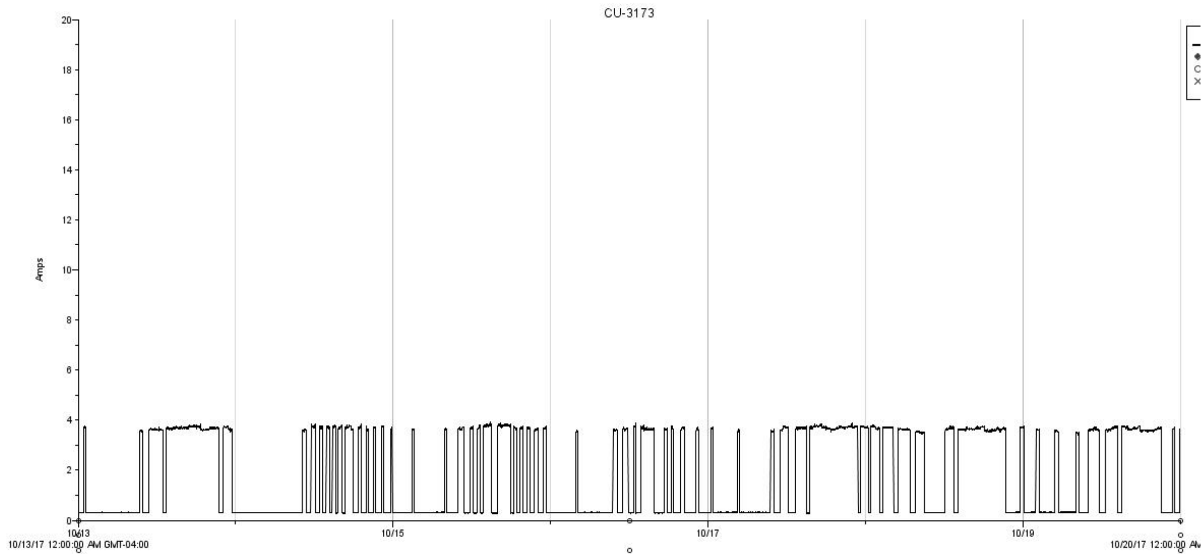
In order to determine the runtime operation of each unit, data loggers were installed to monitor amperage and/or supply air temperature. This data was trended for a minimum of seven (7) days in order to capture a typical week. The following graphs illustrate the resulting data from this logging session.

Trending Data – 3 Ton Condensing Unit



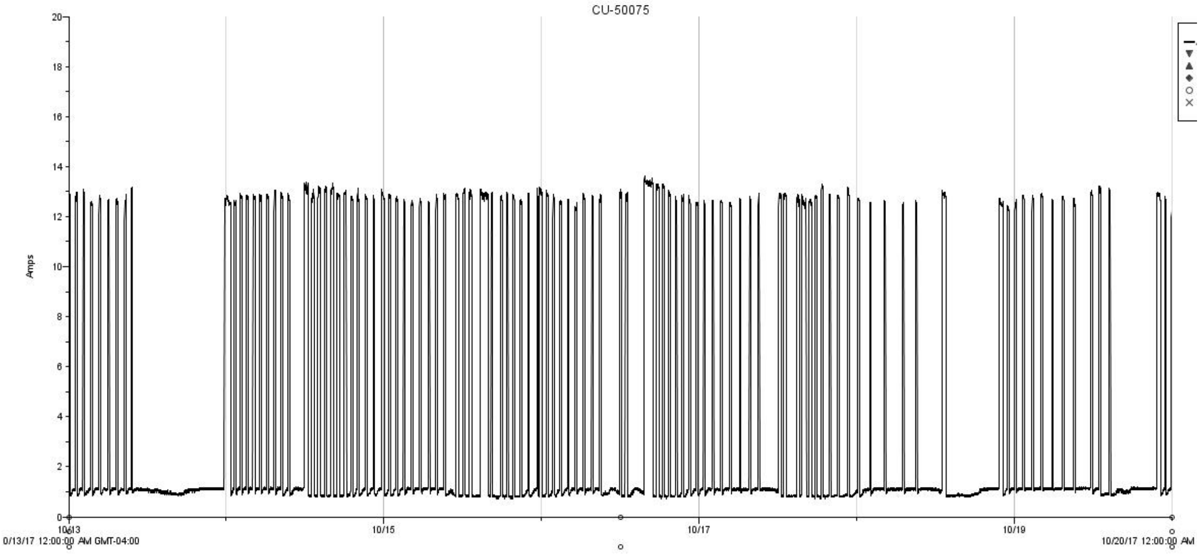
This unit registered an average of 10.82 amps and was operating for a total of 42.95 hours during a one week period.

Trending Data – 3 Ton Condensing Unit



This unit registered an average of 3.67 amps and was operating for a total of 72.5 hours during a one week period.

Trending Data – 10 Ton Condensing Unit



This unit registered an average of 12.77 amps and was operating for a total of 36.87 hours during a one week period.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by 22 electric meters with different electric rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

Electric Baseline Summary

Facility	# of Meters	Rate Structure	June - Sept		$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
			on peak	off peak					
Trade Winds	Restroom 2	GS-1	-	-	$ 0.10068	-	2,717	-	-
	South Corp Pavilion	GS-1	-	-	$ 0.10068	-	4,335	-	-
	Stables	GS-1	-	-	$ 0.10068	-	60,976	-	-
	North Maintenance	GSD-1	-	-	$ 0.05803	$ 11.46	95,701	-	-
	Boat Restroom	GS-1	-	-	$ 0.10068	-	21,429	-	-
	Softball	SDTR-1A	0.129757172	$ 0.04161	$ 0.05706	$ 10.93	120,794	2,624	351
	Soccer	SDTR-1A	0.129756272	$ 0.04161	$ 0.05706	$ 10.93	99,789	1,147	156
	Pump	GS-1	-	-	$ 0.10080	-	7	-	-
	Trail Restrooms	GS-1	-	-	$ 0.10069	-	14,867	-	-
	North Maintenance	GSD-1	-	-	$ 0.05803	-	95,701	-	-
	Lights S2	GSD-1	-	-	$ 0.05799	$ 11.45	9,058	98	34
	Park	GS-1	-	-	$ 0.10074	-	4,678	-	-
	Gen Str	GS-1	-	-	$ 0.10068	-	21,550	-	-
	Maintenance	GS-1	-	-	$ 0.10073	-	2,569	-	-
		GS-1	-	-	$ 0.10069	-	19,096	-	-
	Barn	GS-1	-	-	$ 0.10069	-	25,590	-	-
	Picnic	GS-1	-	-	$ 0.10068	-	5,534	-	-
	Booth 1	GS-1	-	-	$ 0.10069	-	14,444	-	-
	Youth Camp	GS-1	-	-	$ 0.10070	-	12,298	-	-
	Irrigation	SDTR-1A	0.129759006	$ 0.04161	$ 0.05706	$ 10.93	71,113	491	75
	Restroom ABC	GS-1	-	-	$ 0.10069	-	5,080	-	-
	Booth 2	SDTR-1A	0.129750942	$ 0.04161	$ 0.05706	$ 10.93	25,856	209	75

For ease of presentation in this report, all 22 meters and their historical data was combined into the following table. Thus, the table represents the consumption baseline of the entire park as a whole. However, the table above still governs the baseline of individual sites within the park when considering FIMs.

Date	Customer Charges	Consumption (kwh)	Consumption Charge	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 274.18	55,637	$ 3,625	83	$ 924	$ 314	$ 5,138
Jul-15	$ 274.18	59,665	$ 597	89	$ 994	$ 3,716	$ 5,582
Aug-15	$ 274.18	67,210	$ 726	89	$ 991	$ 3,952	$ 5,943
Sep-15	$ 274.18	67,223	$ 747	86	$ 958	$ 3,947	$ 5,926
Oct-15	$ 274.18	62,359	$ 680	539	$ 6,451	$ 3,302	$ 10,707
Nov-15	$ 274.18	73,145	$ 707	640	$ 7,633	$ 3,927	$ 12,541
Dec-15	$ 274.18	76,484	$ 635	625	$ 7,447	$ 4,140	$ 12,496
Jan-16	$ 293.62	65,040	$ 507	638	$ 6,307	$ 4,366	$ 11,474
Feb-16	$ 293.62	41,223	$ 239	560	$ 5,487	$ 2,969	$ 8,989
Mar-16	$ 293.62	56,796	$ 261	548	$ 5,370	$ 3,969	$ 9,894
Apr-16	$ 293.62	46,461	$ 318	549	$ 5,380	$ 3,513	$ 9,504
May-16	$ 293.62	52,289	$ 338	596	$ 5,842	$ 3,847	$ 10,320
Jun-16	$ 302.01	55,441	$ 418	76	$ 818	$ 3,327	$ 4,866
Jul-16	$ 284.85	68,018	$ 458	87	$ 959	$ 4,072	$ 5,774
Aug-16	$ 284.85	63,957	$ 458	85	$ 935	$ 3,747	$ 5,425
Sep-16	$ 284.85	58,375	$ 422	78	$ 853	$ 3,551	$ 5,111
Oct-16	$ 284.85	61,654	$ 390	586	$ 5,923	$ 4,118	$ 10,715
Nov-16	$ 284.85	63,935	$ 349	685	$ 6,930	$ 4,255	$ 11,818
Dec-16	$ 284.85	81,793	$ 349	702	$ 7,102	$ 5,284	$ 13,020
Jan-17	$ 325.00	68,606	$ 385	697	$ 7,189	$ 4,843	$ 12,742
Feb-17	$ 325.00	46,828	$ 368	436	$ 4,505	$ 3,231	$ 8,429
Mar-17	$ 325.00	54,301	$ 412	604	$ 6,236	$ 3,982	$ 10,955
Apr-17	$ 325.00	59,011	$ 479	599	$ 6,185	$ 4,251	$ 11,240
May-17	$ 325.00	60,904	$ 495	588	$ 6,071	$ 4,366	$ 11,258
AVERAGE TOTALS		**733,178**	**$ 7,182**	**5,133**	**$ 53,745**	**$ 45,495**	**$ 109,933**

The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Trade Winds	Recreation	17.17	3.7	7.3	17.6

Overall, this building is operating at the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

The following table(s) summarizes the water consumption data that was available for this facility.

Tradewinds Park

Account # 000266-01	**Meter #**
Rate	**Address**
Meter Size 3"	**Meter Type** W

Date	Consumption ()	Total Charges
May-17	0	$ 243.55
Apr-17	0	$ 243.55
Mar-17	1	$ 257.64
Feb-17	0	$ 251.86
Jan-17	0	$ 251.86
Dec-16	0	$ 251.86
Nov-16	3	$ 269.20
Oct-16	0	$ 251.86
Sep-16	2	$ 263.42
Aug-16	2	$ 263.42
Jul-16	5	$ 280.76
Jun-16	0	$ 251.86
May-16	0	$ 251.86
Apr-16	0	$ 244.66
Mar-16	0	$ 239.87
Feb-16	0	$ 239.87
Jan-16	0	$ 239.87
Dec-15	0	$ 239.87
Nov-15	1	$ 245.37
Oct-15	1	$ 245.37
Sep-15	0	$ 239.87
Aug-15	0	$ 239.87
Jul-15	0	$ 239.87
Jun-15	0	$ 239.87
May-15	0	$ 239.87
TOTALS	**15**	**$ 6,226.93**

For this account there is very low consumption throughout the 24 month period. Without taking into account the base charge per month, the average monthly blended rate in dollars per thousand gallons is $5.74.

Tradewinds Park

Account # 001700-00	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	4	$ 99.68
Apr-17	4	$ 99.68
Mar-17	4	$ 102.99
Feb-17	5	$ 108.77
Jan-17	3	$ 97.21
Dec-16	3	$ 97.21
Nov-16	4	$ 102.99
Oct-16	3	$ 97.21
Sep-16	4	$ 102.99
Aug-16	4	$ 102.99
Jul-16	5	$ 108.77
Jun-16	3	$ 97.21
May-16	4	$ 102.99
Apr-16	3	$ 94.42
Mar-16	3	$ 92.57
Feb-16	5	$ 103.57
Jan-16	8	$ 120.07
Dec-15	6	$ 109.07
Nov-15	7	$ 114.57
Oct-15	8	$ 120.07
Sep-15	8	$ 120.07
Aug-15	6	$ 109.07
Jul-15	6	$ 109.07
Jun-15	6	$ 109.07
May-15	6	$ 109.07
TOTALS	**122**	**$ 2,631.38**

The average monthly consumption in for this account is 5 thousand gallons. The average monthly consumption cost is $105.26. The blended rate is $21.57 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 001722-01	**Meter #**
Rate	**Address**
Meter Size 1"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	8	$ 84.34
Apr-17	8	$ 84.34
Mar-17	8	$ 87.03
Feb-17	0	$ 40.79
Jan-17	0	$ 40.79
Dec-16	0	$ 40.79
Nov-16	0	$ 40.79
Oct-16	0	$ 40.79
Sep-16	0	$ 40.79
Aug-16	0	$ 40.79
Jul-16	0	$ 40.79
Jun-16	1	$ 46.57
May-16	0	$ 40.79
Apr-16	0	$ 39.63
Mar-16	0	$ 38.85
Feb-16	1	$ 44.35
Jan-16	0	$ 38.85
Dec-15	0	$ 38.85
Nov-15	0	$ 38.85
Oct-15	0	$ 38.85
Sep-15	0	$ 38.85
Aug-15	0	$ 38.85
Jul-15	0	$ 38.85
Jun-15	0	$ 38.85
May-15	1	$ 44.35
TOTALS	**27**	**$ 1,147.37**

The average monthly consumption in for this account is 1 thousand gallons. The average monthly consumption cost is $45.89. The blended rate is $42.50 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 001754-00	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	3	$ 94.07
Apr-17	3	$ 94.07
Mar-17	2	$ 91.43
Feb-17	1	$ 85.65
Jan-17	1	$ 85.65
Dec-16	1	$ 85.65
Nov-16	1	$ 85.65
Oct-16	1	$ 85.65
Sep-16	1	$ 85.65
Aug-16	0	$ 79.87
Jul-16	1	$ 85.65
Jun-16	1	$ 85.65
May-16	1	$ 85.65
Apr-16	4	$ 100.04
Mar-16	2	$ 87.07
Feb-16	1	$ 81.57
Jan-16	1	$ 81.57
Dec-15	2	$ 87.07
Nov-15	1	$ 81.57
Oct-15	2	$ 87.07
Sep-15	0	$ 76.07
Aug-15	0	$ 76.07
Jul-15	0	$ 76.07
Jun-15	1	$ 81.57
May-15	2	$ 87.07
TOTALS	**33**	**$ 2,133.10**

The average monthly consumption in for this account is 1 thousand gallons. The average monthly consumption cost is $85.32. The blended rate is $64.64 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 013003-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	3	$ 94.07
Apr-17	3	$ 94.07
Mar-17	3	$ 97.21
Feb-17	2	$ 91.43
Jan-17	2	$ 91.43
Dec-16	5	$ 108.77
Nov-16	4	$ 102.99
Oct-16	2	$ 91.43
Sep-16	0	$ 79.87
Aug-16	2	$ 91.43
Jul-16	2	$ 91.43
Jun-16	8	$ 126.11
May-16	2	$ 91.43
Apr-16	4	$ 100.04
Mar-16	3	$ 92.57
Feb-16	3	$ 92.57
Jan-16	1	$ 81.57
Dec-15	4	$ 98.07
Nov-15	3	$ 92.57
Oct-15	3	$ 92.57
Sep-15	0	$ 76.07
Aug-15	1	$ 81.57
Jul-15	1	$ 81.57
Jun-15	2	$ 87.07
May-15	4	$ 98.07
TOTALS	**67**	**$ 2,325.98**

The average monthly consumption in for this account is 3 thousand gallons. The average monthly consumption cost is $93.04. The blended rate is $34.72 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 013004-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S/ST

Date	Consumption ()	Total Charges
May-17	2	$ 88.46
Apr-17	2	$ 88.46
Mar-17	0	$ 79.87
Feb-17	1	$ 85.65
Jan-17	0	$ 79.87
Dec-16	1	$ 85.65
Nov-16	0	$ 79.87
Oct-16	1	$ 85.65
Sep-16	0	$ 79.87
Aug-16	1	$ 85.65
Jul-16	0	$ 79.87
Jun-16	1	$ 85.65
May-16	0	$ 79.87
Apr-16	0	$ 77.59
Mar-16	1	$ 81.57
Feb-16	0	$ 76.07
Jan-16	1	$ 81.57
Dec-15	0	$ 76.07
Nov-15	1	$ 81.57
Oct-15	0	$ 76.07
Sep-15	1	$ 81.57
Aug-15	0	$ 76.07
Jul-15	0	$ 76.07
Jun-15	1	$ 81.57
May-15	0	$ 76.07
TOTALS	**14**	**$ 2,026.25**

The average monthly consumption in for this account is 1 thousand gallons. The average monthly consumption cost is $81.05. The blended rate is $81.05 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 013005-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	9	$ 127.74
Apr-17	9	$ 127.74
Mar-17	7	$ 120.33
Feb-17	7	$ 120.33
Jan-17	6	$ 114.55
Dec-16	14	$ 160.79
Nov-16	4	$ 102.99
Oct-16	5	$ 108.77
Sep-16	3	$ 97.21
Aug-16	6	$ 114.55
Jul-16	5	$ 108.77
Jun-16	6	$ 114.55
May-16	7	$ 120.33
Apr-16	7	$ 116.87
Mar-16	8	$ 120.07
Feb-16	5	$ 103.57
Jan-16	7	$ 114.57
Dec-15	5	$ 103.57
Nov-15	4	$ 98.07
Oct-15	3	$ 92.57
Sep-15	2	$ 87.07
Aug-15	5	$ 103.57
Jul-15	7	$ 114.57
Jun-15	7	$ 114.57
May-15	6	$ 109.07
TOTALS	**154**	**$ 2,816.79**

The average monthly consumption in for this account is 6 thousand gallons. The average monthly consumption cost is $112.67. The blended rate is $18.29 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account # 013006-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	1	$ 82.84
Apr-17	1	$ 82.84
Mar-17	2	$ 91.43
Feb-17	30	$ 253.27
Jan-17	2	$ 91.43
Dec-16	2	$ 91.43
Nov-16	5	$ 108.77
Oct-16	2	$ 91.43
Sep-16	1	$ 85.65
Aug-16	2	$ 91.43
Jul-16	2	$ 91.43
Jun-16	18	$ 183.91
May-16	2	$ 91.43
Apr-16	4	$ 100.04
Mar-16	4	$ 98.07
Feb-16	1	$ 81.57
Jan-16	1	$ 81.57
Dec-15	2	$ 87.07
Nov-15	2	$ 87.07
Oct-15	2	$ 87.07
Sep-15	0	$ 76.07
Aug-15	2	$ 87.07
Jul-15	2	$ 87.07
Jun-15	6	$ 109.07
May-15	1	$ 81.57
TOTALS	**97**	**$ 2,500.60**

The average monthly consumption in for this account is 4 thousand gallons. The average monthly consumption cost is $100.02. The blended rate is $25.78 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

SIEMENS

Tradewinds Park

Account # 013007-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W/S

Date	Consumption ()	Total Charges
May-17	0	$ 77.23
Apr-17	0	$ 77.23
Mar-17	0	$ 79.87
Feb-17	2	$ 91.43
Jan-17	2	$ 91.43
Dec-16	2	$ 91.43
Nov-16	2	$ 91.43
Oct-16	1	$ 85.65
Sep-16	1	$ 85.65
Aug-16	2	$ 91.43
Jul-16	2	$ 91.43
Jun-16	3	$ 97.21
May-16	2	$ 91.43
Apr-16	0	$ 94.42
Mar-16		$ 130.11
Feb-16		$ 485.07
Jan-16		$ 179.41
Dec-15		$ 130.11
Nov-15		$ 149.83
Oct-15		$ 174.83
Sep-15		$ 9.86
Aug-15		$ 279.94
Jul-15		$ 289.80
Jun-15		
May-15		$ 299.66
TOTALS	**19**	**$ 3,365.89**

There is not enough consumption data in the 24 month period to make any conclusions on this account.

Tradewinds Park

Account #	013008-01	**Meter #**	34309968
Rate		**Address**	
Meter Size	1.5"	**Meter Type**	W/S

Date	Consumption ()	Total Charges
May-17	7	$ 116.52
Apr-17	7	$ 116.52
Mar-17	12	$ 149.23
Feb-17	22	$ 207.03
Jan-17	4	$ 102.99
Dec-16	7	$ 120.33
Nov-16	3	$ 97.21
Oct-16	3	$ 97.21
Sep-16	3	$ 97.21
Aug-16	6	$ 114.55
Jul-16	1	$ 85.65
Jun-16	3	$ 97.21
May-16	8	$ 126.11
Apr-16	6	$ 111.26
Mar-16	7	$ 114.57
Feb-16	4	$ 98.07
Jan-16	4	$ 98.07
Dec-15	5	$ 103.57
Nov-15	4	$ 98.07
Oct-15	5	$ 103.57
Sep-15	3	$ 92.57
Aug-15	4	$ 98.07
Jul-15	3	$ 92.57
Jun-15	3	$ 92.57
May-15	8	$ 120.07
TOTALS	**142**	**$ 2,750.80**

The average monthly consumption in for this account is 6 thousand gallons. The average monthly consumption cost is $110.03. The blended rate is $19.37 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined.

Tradewinds Park

Account #	013009-01	**Meter #**	34309971
Rate		**Address**	
Meter Size	1.5"	**Meter Type**	W/S

Date	Consumption	Total Charges
May-17	N/A	$ 435.04
Apr-17	N/A	$ 435.04
Mar-17	N/A	$ 178.05
Feb-17	N/A	$ 178.05
Jan-17	N/A	$ 186.41
Dec-16	N/A	$ 167.69
Nov-16	N/A	$ 157.33
Oct-16	N/A	$ 157.33
Sep-16	N/A	$ 157.33
Aug-16	N/A	$ 157.33
Jul-16	N/A	$ 178.05
Jun-16	N/A	$ 167.69
May-16	N/A	$ 146.97
Apr-16	N/A	$ 152.83
Mar-16	N/A	$ 199.13
Feb-16	N/A	$ 149.83
Jan-16	N/A	$ 149.83
Dec-15	N/A	$ 139.97
Nov-15	N/A	$ 159.69
Oct-15	N/A	$ 149.83
Sep-15	N/A	$ 169.55
Aug-15	N/A	$ 159.69
Jul-15	N/A	$ 139.97
Jun-15	N/A	$ 149.83
May-15	N/A	$ 169.55
TOTALS	**0**	**$ 4,592.01**

This account only had total expense amounts per month available for water usage utility data. No relevant conclusions can be drawn from this data.

Tradewinds Park

Account # 019010-01	**Meter #**
Rate	**Address**
Meter Size 2"	**Meter Type** W

Date	Consumption ()	Total Charges
May-17	128	$ 841.06
Apr-17	128	$ 841.06
Mar-17	86	$ 623.87
Feb-17	82	$ 600.75
Jan-17	95	$ 675.89
Dec-16	110	$ 762.59
Nov-16	87	$ 629.65
Oct-16	87	$ 629.65
Sep-16	92	$ 658.55
Aug-16	93	$ 664.33
Jul-16	87	$ 629.65
Jun-16	152	$ 1,005.35
May-16	197	$ 1,265.45
Apr-16	145	$ 936.91
Mar-16	121	$ 786.25
Feb-16	79	$ 555.25
Jan-16	90	$ 615.75
Dec-15	172	$ 1,066.75
Nov-15	278	$ 1,649.75
Oct-15	244	$ 1,462.75
Sep-15	250	$ 1,495.75
Aug-15	293	$ 1,732.25
Jul-15	318	$ 1,869.75
Jun-15	286	$ 1,693.75
May-15	204	$ 1,242.75
TOTALS	**3904**	**$24,935.51**

The average monthly consumption in for this account is 156 thousand gallons. The average monthly consumption cost is $997.42. The blended rate is $6.39 in dollars per thousand gallons.

Tradewinds Park

Account # 019013-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** W

Date	Consumption ()	Total Charges
May-17	5	$ 105.29
Apr-17	5	$ 105.29
Mar-17	4	$ 102.99
Feb-17	1	$ 85.65
Jan-17	2	$ 91.43
Dec-16	5	$ 108.77
Nov-16	6	$ 114.55
Oct-16	6	$ 114.55
Sep-16	4	$ 102.99
Aug-16	5	$ 108.77
Jul-16	6	$ 114.55
Jun-16	5	$ 108.77
May-16	5	$ 108.77
Apr-16	6	$ 111.26
Mar-16	5	$ 103.57
Feb-16	3	$ 92.57
Jan-16	3	$ 92.57
Dec-15	5	$ 103.57
Nov-15	5	$ 103.57
Oct-15	5	$ 103.57
Sep-15	3	$ 92.57
Aug-15	5	$ 103.57
Jul-15	7	$ 114.57
Jun-15	7	$ 114.57
May-15	5	$ 103.57
TOTALS	**118**	**$ 2,611.90**

The average monthly consumption in for this account is 5 thousand gallons. The average monthly consumption cost is $104.48. The blended rate is $22.13 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined

SIEMENS

Tradewinds Park

Account # 019014-01	**Meter #**
Rate	**Address**
Meter Size 1.5"	**Meter Type** IRR

Date	Consumption ()	Total Charges
May-17	5	$ 105.29
Apr-17	5	$ 105.29
Mar-17	4	$ 102.99
Feb-17	1	$ 85.65
Jan-17	2	$ 91.43
Dec-16	5	$ 108.77
Nov-16	6	$ 114.55
Oct-16	6	$ 114.55
Sep-16	4	$ 102.99
Aug-16	5	$ 108.77
Jul-16	6	$ 114.55
Jun-16	5	$ 108.77
May-16	5	$ 108.77
Apr-16	6	$ 111.26
Mar-16	5	$ 103.57
Feb-16	3	$ 92.57
Jan-16	3	$ 92.57
Dec-15	5	$ 103.57
Nov-15	5	$ 103.57
Oct-15	5	$ 103.57
Sep-15	3	$ 92.57
Aug-15	5	$ 103.57
Jul-15	7	$ 114.57
Jun-15	7	$ 114.57
May-15	5	$ 103.57
TOTALS	**118**	**$ 2,611.90**

The average monthly consumption in for this account is 5 thousand gallons. The average monthly consumption cost is $104.48. The blended rate is $22.13 in dollars per thousand gallons. Without any additional information, the base charges cannot be determined for this account and a more accurate blended rate cannot be determined

RECOMMENDED IMPROVEMENT MEASURES

All recommended FIMs for this facility have been removed from the final scope by Broward County. Please refer to Section G of this report for documentation of these originally proposed opportunities.

D.44. Park - Vista View

FACILITY DESCRIPTION

Vista View Park is a large area of land, approximately 272 acres, that was a capped landfill that was repurposed to a multi-activity park. The park hosts picnic shelters, basketball courts, a playground, walking/fitness trails, and recreational air field. The park is located at 4001 SW 142nd Ave, Davie, FL 33330. The only sources of utility consumption at this park come from the office building, maintenance building, restroom buildings, and outdoor lighting.

Park Hours

November – March:	8AM – 6PM
March – November:	8AM – 7:30PM

Park Office Hours

Mon – Sun:	9AM – 5:30AM

COOLING SYSTEM – PARK OFFICE

Cooling for the park office building is provided by a Carrier direct expansion split system. The system is a 100% return air system in fair operating condition with a 13 SEER rating. The insulation of the copper refrigerant lines is in poor condition.



Park Office HVAC

COOLING SYSTEM – MAINTENANCE BUILDING

The cooling for the maintenance building is provided by one Carrier split DX unit that provides return air into the space. The carrier equipment was manufactured in 2009.

Maintenance Building HVAC

COOLING SYSTEM – GATEHOUSE

The cooling for the gatehouse building is provided by one Mitsubishi split system heat pump unit. The gatehouse HVAC equipment only gets used on weekends and holidays.

Gatehouse HVAC

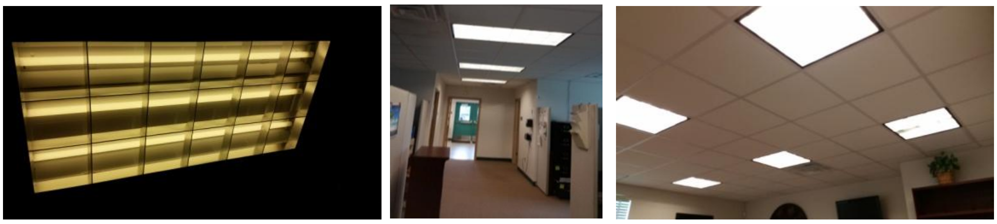
The table below summarizes the mechanical equipment inventory for this facility.

Namplate Data of Mechanical Equipment

General Information						Size / Capacity		Nameplate Information				
EQUIPMENT	Mfctr	Model	Serial	Description	Notes	HP	Tons/ MBTU	V	Ph	Amps	Eff /EER	Cal kW
Vista View Park												
AHU1	Carrier	FY4ANF036	2209A68123	fan		0.33		208	1	2.4		0.4
AHU2	Carrier	40RM-008--H611HC	0909U04312	fan		2.4		208	3	5.8		1.9
CU1	Carrier	24ACB336A500	1909E20097	compressor	R-410a			208	3	9.2	13 SEER	3.0
				fan		0.24		208	1	1.4		0.3
CU2	Carrier	38ARZ008--K511	3409G40129	compressor	R-22			208	3	29	13 SEER	9.4
				fan				230	1	1.5		0.3
				fan				230	1	1.5		0.3
Heat Pump	Mitsubishi	MUZ-FE12NA	9000182T	compressor	R-410a			208	1	8.6		1.6
				fan				208	1	0.56		0.1
				fan								
Irrigation Pump 1				nameplate unreadable								
Irrigation Pump 2	Weg			pump		10		208	3	26.1	88.50%	7.5
Irrigation Pump 3	Weg			pump		10		208	3	26.1	88.50%	7.5

LIGHTING SYSTEM

Interior lighting primarily consists of 55 Watt, T8 fluorescent lighting and compact florescent lighting in the office building, maintenance building, and restroom buildings.



Interior Lighting Examples

Exterior Lighting consists of metal halide street and parking lot lighting, PL32 light fixtures and compact florescent light fixtures.

Exterior Lighting Examples

The building does not make use of occupancy sensors or any other types of lighting control

DOMESTIC WATER SYSTEM

Domestic water usage is limited to restrooms and irrigation. Fixtures and water closets are operated manually and via motion sensors. The following are example of the types of fixture found within the restroom of the facility:

- 2.2 gpm faucets
- 1.5 and 1 gpf urinals
- 3.5 and 1.6 gpf toilets

Restroom Fixture Examples

There are two irrigation systems that are used at this park. The irrigation system is divided into a north section and a south section. The irrigation system uses water from the lake in the park.

Irrigation System

BUILDING CONTROLS SYSTEM

The building is currently not equipped with a building automation system. Each zone has a dedicated thermostat.

Building Controls

Some of the exterior lighting of the buildings at this park is controlled via time clock.

Exterior Lighting Controls

TRENDING DATA ACQUISITION

No trending data for HVAC equipment was collected for this facility.

UTILITY DATA ANALYSIS - ELECTRIC

The electric usage at this facility is monitored by three (3) electric meters of varying rate structures. When creating the baseline shown below, the most recent 24 month of electric billing data was utilized as obtained directly from the Florida Power and Light website. The data was made available via website's the user portal and historical data from the facility's smart meters.

The following table documents both the rate structure values used to calculate energy savings based on most recent electric billing data as well as the established demand and consumption values representing baseline electric usage for the facility.

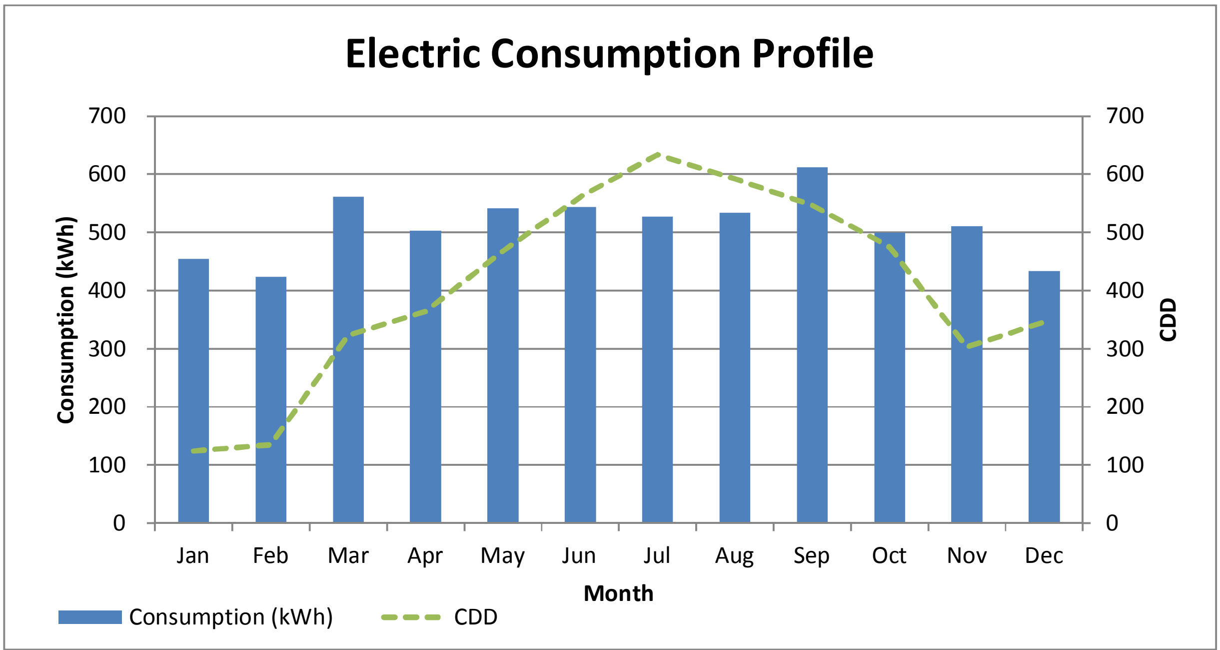
Electric Baseline Summary

Facility	# of Meters	Rate Structure	$ / kWh	$ / kW	Average Consumption per Year	Average Demand per Year	Max Demand
Vista View	Trailor	GS-1	$ 0.10069	-	6,146	-	-
	Lift	GS-1	$ 0.10069	-	20,261	-	-
	Maintenance	GSD-1	$ 0.05803	$ 11.46	74,136	94	21

Meter ACD2111; Account: 1842267765; Address: 4001 SW 142ND AVE # TRLR

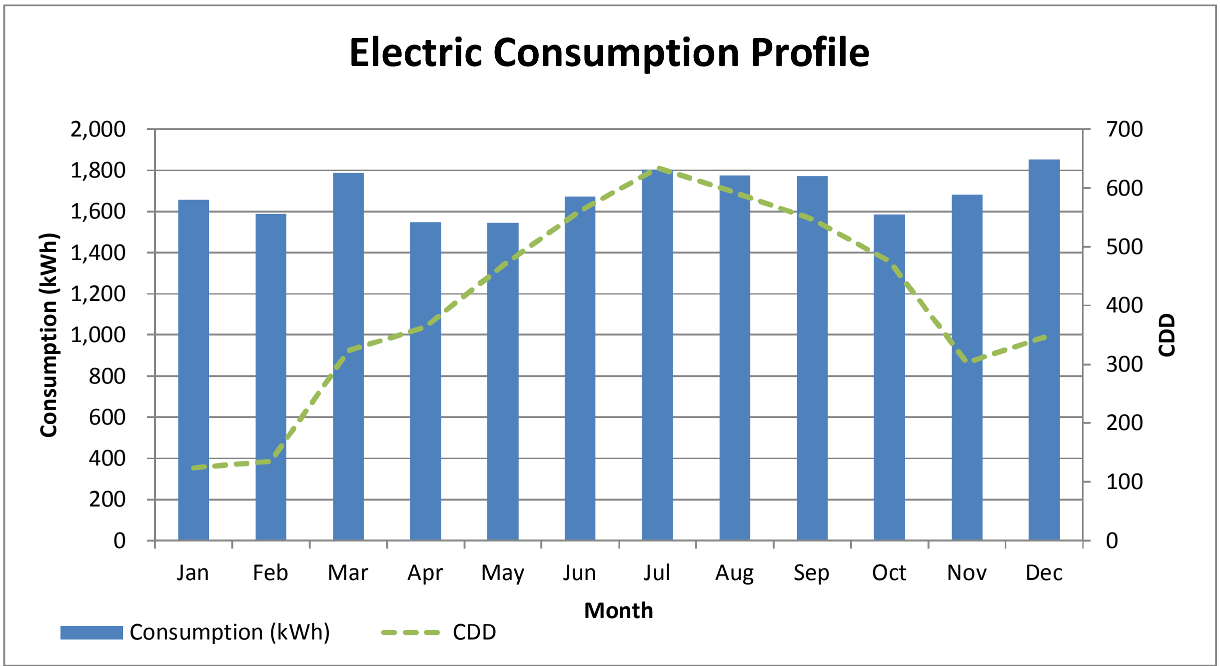
Date	Customer Charge	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 7.46	477	$ 45.90	$ 3.43	$ 57
Jul-15	$ 7.46	501	$ 48.21	$ 3.59	$ 59
Aug-15	$ 7.46	463	$ 44.55	$ 3.36	$ 55
Sep-15	$ 7.46	646	$ 62.16	$ 4.13	$ 74
Oct-15	$ 7.46	461	$ 44.36	$ 3.14	$ 55
Nov-15	$ 7.46	474	$ 45.61	$ 3.22	$ 56
Dec-15	$ 7.46	425	$ 40.89	$ 2.94	$ 51
Jan-16	$ 7.46	404	$ 36.66	$ 3.83	$ 48
Feb-16	$ 7.46	409	$ 37.11	$ 3.88	$ 48
Mar-16	$ 7.46	517	$ 46.91	$ 4.92	$ 59
Apr-16	$ 7.46	513	$ 46.55	$ 4.07	$ 58
May-16	$ 7.46	556	$ 50.45	$ 4.32	$ 62
Jun-16	$ 7.75	610	$ 54.34	$ 5.41	$ 68
Jul-16	$ 7.75	553	$ 49.27	$ 4.97	$ 62
Aug-16	$ 7.75	604	$ 53.81	$ 5.37	$ 67
Sep-16	$ 7.75	579	$ 51.58	$ 5.01	$ 64
Oct-16	$ 7.75	538	$ 47.93	$ 4.71	$ 60
Nov-16	$ 7.75	547	$ 48.73	$ 4.78	$ 61
Dec-16	$ 7.75	442	$ 39.38	$ 3.99	$ 51
Jan-17	$ 10.00	506	$ 45.60	$ 4.84	$ 60
Feb-17	$ 10.00	439	$ 39.56	$ 4.32	$ 54
Mar-17	$ 10.00	607	$ 56.53	$ 5.86	$ 72
Apr-17	$ 10.00	492	$ 45.82	$ 4.90	$ 61
May-17	$ 10.00	528	$ 49.24	$ 5.13	$ 64
AVERAGE TOTALS		**6,146**	**$ 565.57**	**$ 52.06**	**$ 714.52**

SIEMENS



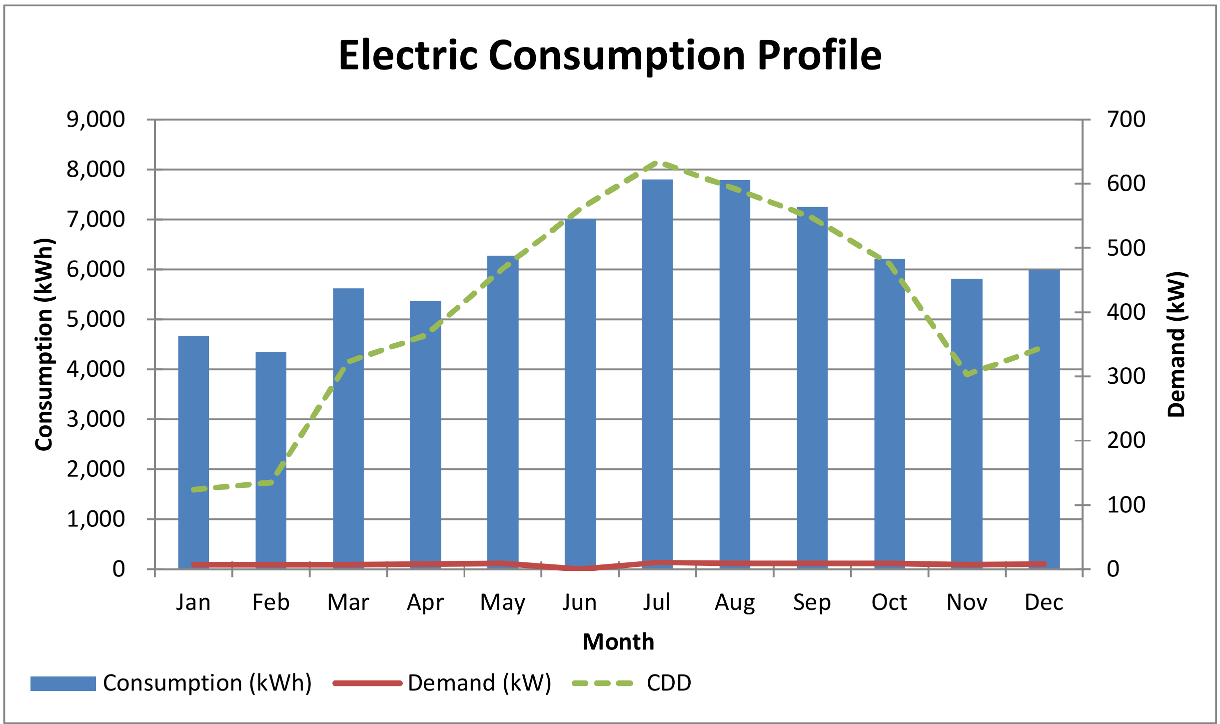
Meter KLL0901; Account: 9874947436; Address: 14801 ORANGE DR #LIFT

Date	Customer Charge	Consumption (kwh)	Consumption Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 7.46	1,620	$ 155.88	$ 10.15	$ 173
Jul-15	$ 7.46	1,955	$ 188.11	$ 12.13	$ 208
Aug-15	$ 7.46	1,749	$ 168.29	$ 10.91	$ 187
Sep-15	$ 7.46	1,920	$ 184.74	$ 11.00	$ 203
Oct-15	$ 7.46	1,600	$ 153.95	$ 9.30	$ 171
Nov-15	$ 7.46	1,519	$ 146.16	$ 8.84	$ 162
Dec-15	$ 7.46	2,089	$ 201.00	$ 11.95	$ 220
Jan-16	$ 7.46	1,339	$ 121.50	$ 11.25	$ 140
Feb-16	$ 7.46	1,336	$ 121.23	$ 11.21	$ 140
Mar-16	$ 7.46	1,561	$ 141.65	$ 13.47	$ 163
Apr-16	$ 7.46	1,561	$ 141.65	$ 10.35	$ 159
May-16	$ 7.46	1,483	$ 134.57	$ 9.87	$ 152
Jun-16	$ 7.75	1,724	$ 153.59	$ 14.06	$ 175
Jul-16	$ 7.75	1,649	$ 146.91	$ 13.49	$ 168
Aug-16	$ 7.75	1,798	$ 160.18	$ 14.64	$ 183
Sep-16	$ 7.75	1,623	$ 144.59	$ 12.84	$ 165
Oct-16	$ 7.75	1,567	$ 139.60	$ 12.42	$ 160
Nov-16	$ 7.75	1,844	$ 164.28	$ 14.50	$ 187
Dec-16	$ 7.75	1,618	$ 144.15	$ 12.78	$ 165
Jan-17	$ 10.00	1,975	$ 177.97	$ 16.39	$ 204
Feb-17	$ 10.00	1,840	$ 165.80	$ 15.34	$ 191
Mar-17	$ 10.00	2,016	$ 187.75	$ 17.39	$ 215
Apr-17	$ 10.00	1,532	$ 142.68	$ 13.42	$ 166
May-17	$ 10.00	1,603	$ 149.50	$ 13.80	$ 173
AVERAGE TOTALS		**20,261**	**$ 1,867.86**	**$ 150.75**	**$2,115.50**



Meter KLJ5249; Account: 7044259435; Address: 4001 SW 142ND AVE #MAINT

Date	Customer Charge	Consumption (kwh)	Demand (kW)	Demand Charge	Other Fees/Taxes	Total Charges
Jun-15	$ 7.46	6,659	0	$ -	$ 39.72	$ 687.91
Jul-15	$ 7.46	7,907	0	$ -	$ 47.05	$ 815.32
Aug-15	$ 7.46	7,325	0	$ -	$ 43.63	$ 755.90
Sep-15	$ 7.46	7,604	0	$ -	$ 41.71	$ 780.83
Oct-15	$ 7.46	6,438	0	$ -	$ 35.40	$ 662.32
Nov-15	$ 7.46	6,058	0	$ -	$ 33.37	$ 623.73
Dec-15	$ 7.46	6,392	0	$ -	$ 35.16	$ 657.66
Jan-16	$ 7.46	4,364	0	$ -	$ 35.16	$ 438.61
Feb-16	$ 7.46	4,240	0	$ -	$ 34.20	$ 426.40
Mar-16	$ 7.46	5,913	0	$ -	$ 49.27	$ 593.28
Apr-16	$ 7.46	5,399	0	$ -	$ 33.46	$ 530.83
May-16	$ 7.46	6,143	0	$ -	$ 37.94	$ 602.82
Jun-16	$ 7.75	7,342	0	$ -	$ 57.70	$ 719.55
Jul-16	$ 20.24	7,706	21	$ 218.82	$ 52.80	$ 658.67
Aug-16	$ 20.24	8,246	19	$ 197.98	$ 53.24	$ 663.97
Sep-16	$ 20.24	6,894	18	$ 187.56	$ 45.45	$ 581.40
Oct-16	$ 20.24	5,994	19	$ 197.98	$ 42.80	$ 546.33
Nov-16	$ 20.24	5,573	14	$ 145.88	$ 36.59	$ 467.98
Dec-16	$ 20.24	5,580	17	$ 177.14	$ 39.34	$ 502.33
Jan-17	$ 25.00	4,981	14	$ 145.88	$ 39.97	$ 467.12
Feb-17	$ 25.00	4,468	15	$ 159.00	$ 36.08	$ 449.96
Mar-17	$ 25.00	5,312	15	$ 159.00	$ 41.20	$ 510.45
Apr-17	$ 25.00	5,335	17	$ 180.20	$ 43.15	$ 534.84
May-17	$ 25.00	6,399	18	$ 190.80	$ 49.12	$ 608.55
AVERAGE TOTALS		**74,136**	**94**	**$ 980.12**	**$ 501.76**	**$7,143.38**



The billing is, as previously shown, analyzed as a combination of all meters. As described in a previous section, an index value is calculated and compared to similar facilities within the same geographic region. Below are the results of this comparison.

Benchmarking Summary

Facility	Faclity Type	kWh/Sq Ft	CBECS - 2012 kWh/Sq Ft Data		
			25th percentile	Median	75th percentile
Vista View	Recreation	16.09	3.7	7.3	17.6

Overall, this building is operating just below the 75th percentile of comparable facilities.

UTILITY DATA ANALYSIS - WATER

Account #	266317-164646	**Meter #**	77559675,60325956,86745021,86744980,70218879duel,70218880dual
Rate		**Address**	
Meter Size		**Meter Type**	W/S

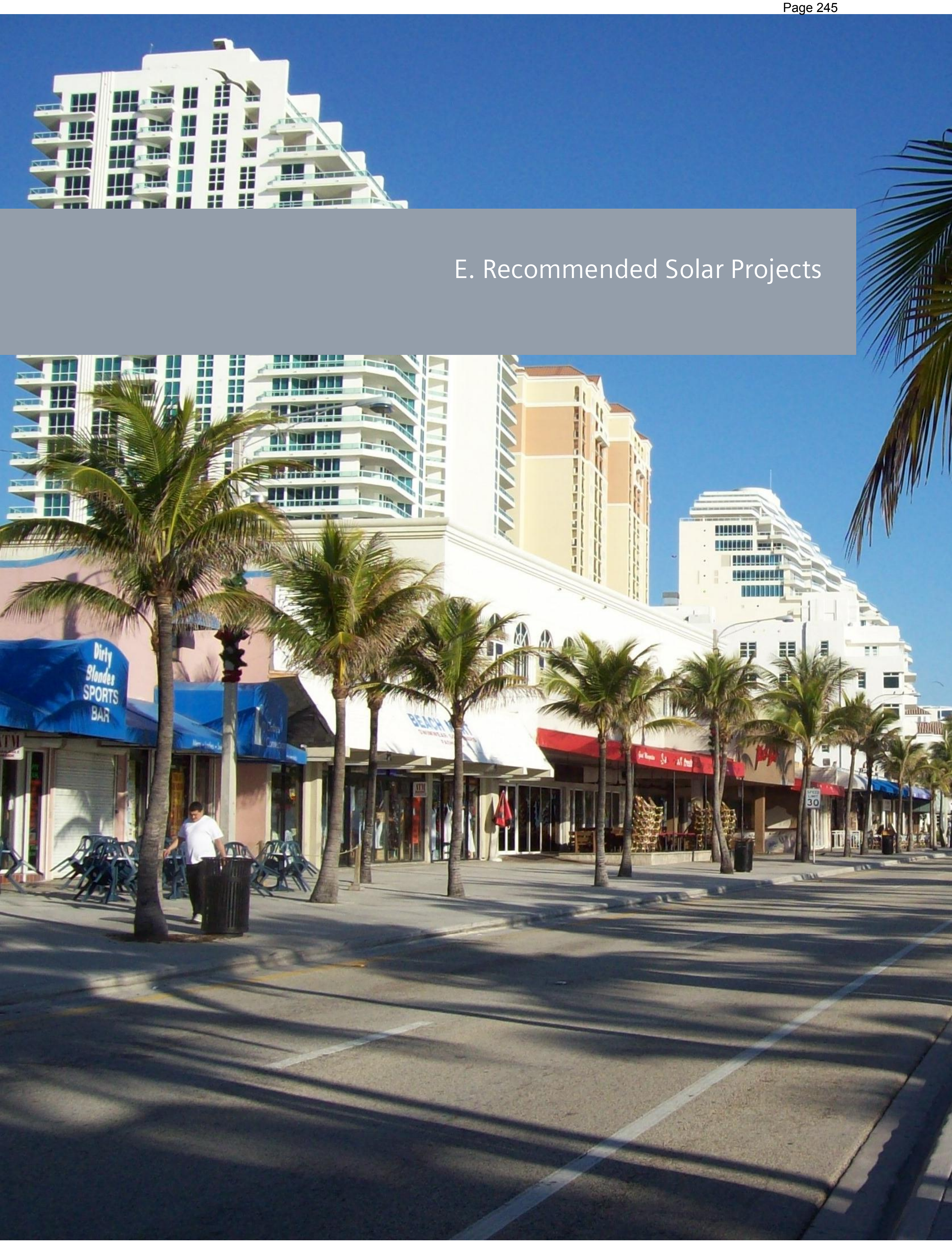
Date	Consumption ()	Total Charges
May-17		$ 1,596.51
Apr-17		$ 1,596.51
Mar-17	42	$ 1,576.60
Feb-17		$ 1,754.98
Jan-17	62	$ 1,774.80
Dec-16		$ 1,745.07
Nov-16		$ 1,497.32
Oct-16		$ 1,715.34
Sep-16	30	$ 1,400.74
Aug-16		$ 1,391.27
Jul-16		$ 1,467.03
Jun-16		$ 1,514.38
May-16		$ 1,448.09
Apr-16		$ 1,562.79
Mar-16		
Feb-16		$ 1,391.27
Jan-16		$ 1,732.19
Dec-15		$ 3,124.28
Nov-15		$ 1,391.27
Oct-15		$ 1,439.15
Sep-15		$ 1,355.54
Aug-15		$ 1,335.54
Jul-15		$ 1,417.14
Jun-15		$ 1,355.54
May-15		$ 1,398.19
TOTALS	**134**	**$37,981.54**

This account had very few water consumption data points in the 24 month period. Additionally, the expenses recorded take into account 7 different meters. Without additional information, ne relevant conclusions can be drawn from this data. Further breakdown for the consumption from each meter is needed.

RECOMMENDED IMPROVEMENT MEASURES

All recommended FIMs for this facility have been removed from the final scope by Broward County. Please refer to Section G of this report for documentation of these originally proposed opportunities.

E. Recommended Solar Projects



E. Recommended Solar Projects

SOLAR ENERGY PRODUCTION FIM

Currently, the only source of energy for Broward County facilities is through the utility services provided by the local electric utility provider Florida Power and Light. The power provided by Florida Power and Light is primarily generated using non-renewable resources such as natural gas, nuclear power, and oil. Solar power in the form of photovoltaic cells provide a method for on-site energy generation that allows for diversification of energy sourcing at the facility and a reduction of that facility's overall carbon footprint.

EXISTING CONDITIONS

Three facilities were selected as prime candidates for on-site solar power generation. The facilities chosen were Hollywood Library, Tamarac Library, and CB Smith Park. These facilities were visited to gain an understanding of where the solar structures would be placed, how the current conditions would affect the placement, and asses the conditions of the existing electrical equipment.

Siemens developed preliminary designs, budgets, and energy production numbers for solar PV installations at each of these sites. Based on budget constraints and logistical concerns, Broward County ultimately selected the proposed installation at CB Smith park for inclusion in the project. Accordingly, the recommended FIMs at the Hollywood and Tamarac Libraries have been removed from the final scope. Please refer to Section G of this report for documentation of these originally proposed opportunities

CB SMITH PARK

The proposed solar solution for this facility is two canopy installations. One canopy is designed to go over a section of the picnic area currently shaded by "Funbrellas". The second area is the pump/chemical reservoir area of the recreational water park within CB Smith Park. This is the area of the park with the highest energy intensity. The site visit revealed that there are no obstacles in the existing areas that would render them unsuitable for solar carport installation. The interconnection voltage is 480V/277V.



CB Smith Park Site Visit

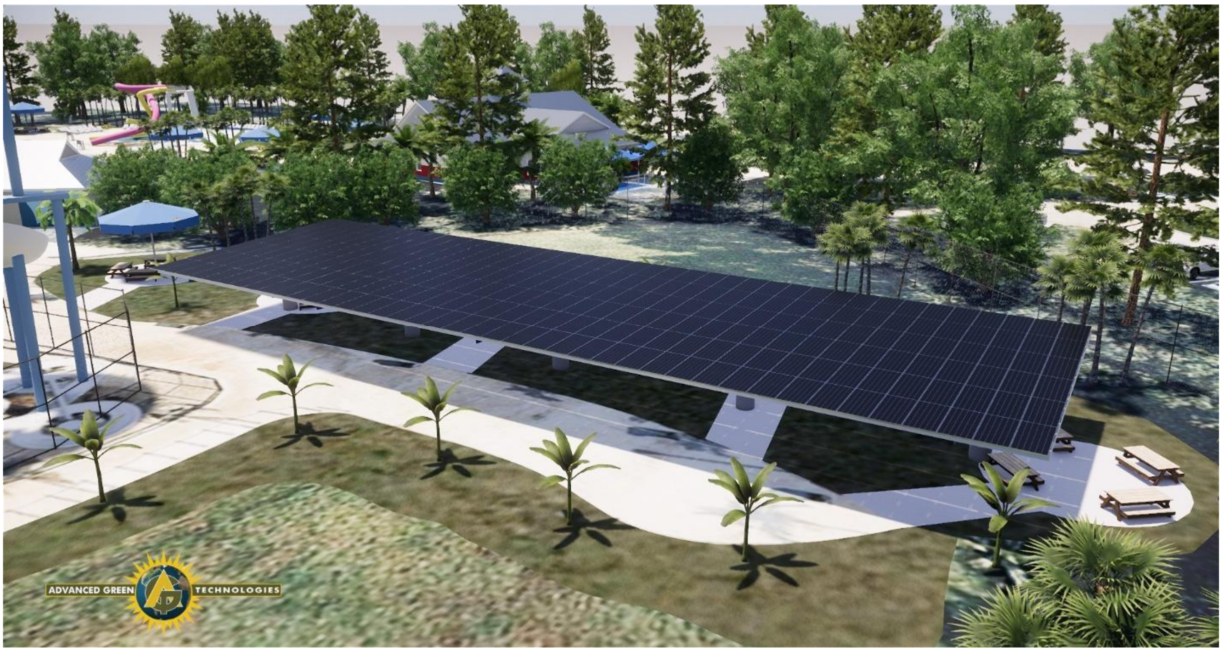
PROJECT SCOPE – CANOPY

The canopy solar energy production FIM begins by conduction a detailed structural and geotechnical analysis of the site where the foundation for the structural members of the canopies will be placed to verity it can withstand the different loads and forces that will be present when the canopies are erected. The canopies will be built in an area of high energy intensity to displace as much energy needed from the utility grid as possible. Once complete, the canopies will meet all necessary height regulations pertaining to this type of structure. The canopies will provide the benefit of offsetting facility utility costs, shading to customers visiting the site, and lowering the carbon footprint of this facility. Below are renderings of the proposed solar layout for this facility.

CB Smith Park-Proposed Solar Layout

CB Smith Park-Proposed Solar Layout

CB Smith Park-Proposed Solar Layout



CB Smith Park-Proposed Solar Layout

CB Smith Park-Proposed Solar Layout

SAVINGS

The energy and cost savings were developed using a modeling program "HelioScope". 'HelioScope" is an easy-to-use, cloud based solar modeling platform that produces models that consistently demonstrate agreement with "PVsyst" modeling results within 1 percent. The software includes a detailed and comprehensive library of solar panels and inverters, which allows for the modeling of any number of system configurations. This HelioScope model incorporates TMY3 weather data provided by the National Renewable Energy Laboratory for the location nearest the site, in this case, Ft Lauderdale Hollywood International Airport. HelioScope data files that are obtained from the inverter and panel manufacturer, respectively, are used to model equipment/system performance and its subsequent generation. The outputs from this model are provided in the Appendix.

A spreadsheet model was used to take the energy savings from HelioScope and translate those savings into cost savings by using the blended electricity rates for this facility. Utility rate escalation and performance degradation factors were used to model the savings that were calculated for one year of production into year-to-year savings over the useful life of the equipment. Full calculations are provided in Section H, Appendices of this audit. SIEMENS strongly recommends utilizing the solar maintenance services offered by SIEMENS to comply with the maintenance requirements for the M&V savings to be guaranteed for the guarantee period.

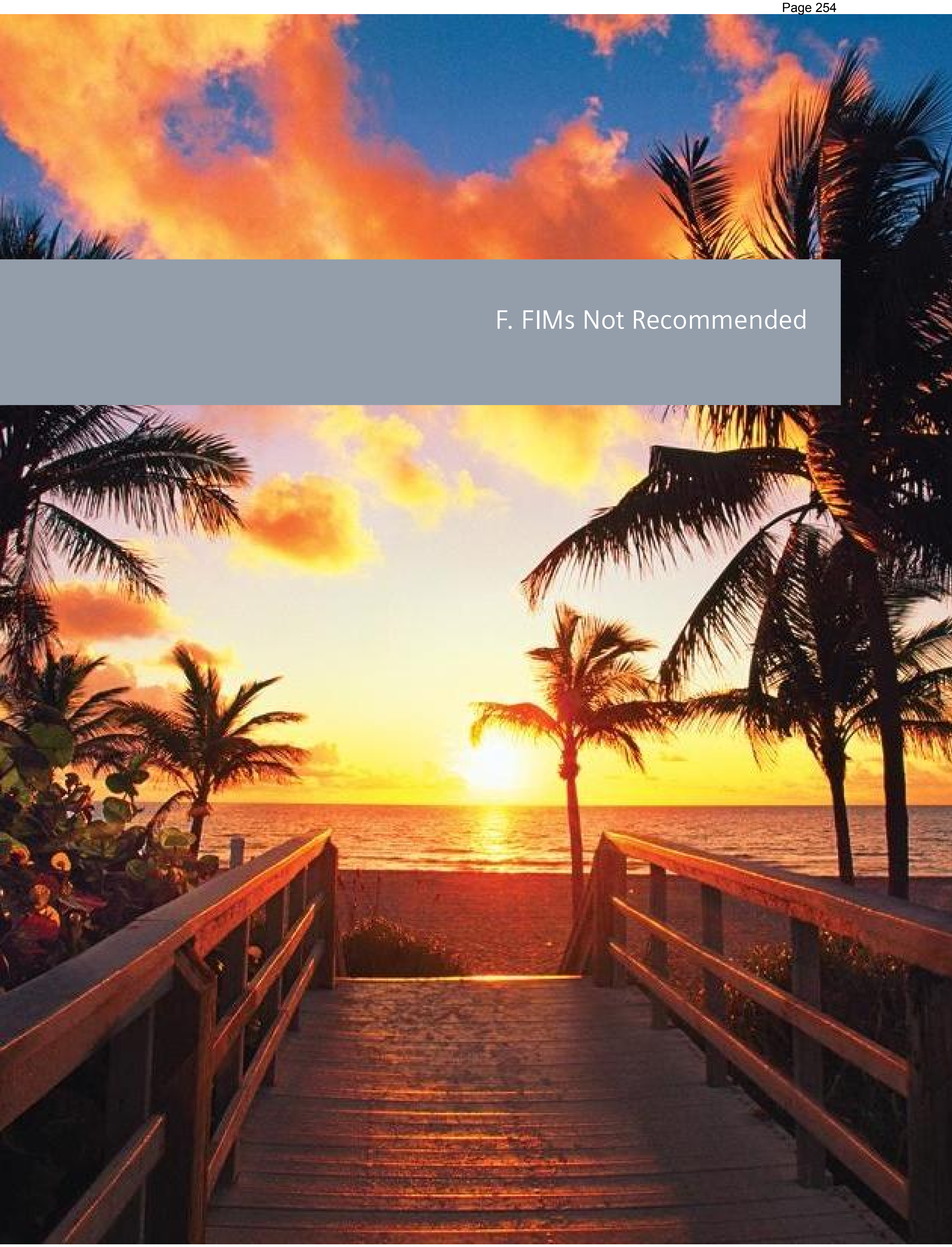
The unit values for the first-year savings for CB Smith Park are as follows:

- CB Smith: 627,043kWh

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
CB Smith Water Park	Solar - Canopy	$ 54,045.00	$ -	$ -	$ -	$ 54,045.00	$ 2,434,346.31	45.04
PA Cost							$ 9,727.14	
Total					**$ -**	**$54,045.00**	**$ 2,444,073.45**	**45.22**
NOTE: Savings based off a blended electric rate of $0.086/kWh								

F. FIMs Not Recommended



F. Description of FIMs Not Recommended

F.1. Lighting Systems Solutions

A complete lighting audit was perfromed at all facilities included within the scope provided. In an effort to create the desired paybacks, scope was removed from the comprehensive lighting solution apporach of specific facilities. This included such scope as interior and exterior retrofits and sensor applications. The following identifies the scope of work that was removed and their resulting, stand-alone, paybacks.

SOUTH REGIONAL COURTHOUSE

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
South Regional Courthouse	Existing High Intensity Discharge - Proposed New LED Fixture	18	18
	Existing Compact Fluorescent - Proposed New LED Fixture	48	48
	Existing T8 Fluorescent - Proposed Retrofit LED	57	47
	Existing Compact Fluorescent - Proposed Retrofit LED	5	5

FIM Financial Summary

South Regional Courthouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior	$ 1,734	$ -	$ 546	$ -	$ 2,280	$ 51,257	22.5
Lighting - Occupancy	$ 55	$ -	$ -	$ -	$ 55	$ 6,302	114.4

HIGH & BRDG ADMINISTRATION

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
HIGH & BRDG Administration, Pompano	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing High Intensity Discharge - Proposed Retrofit LED	5	5
	Existing High Intensity Discharge - Proposed New LED Fixture	24	24

FIM Financial Summary

HIGH & BRDG Administration, Pompano	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior	$ 2,247	$ -	$ 298	$ -	$ 2,545	$ 41,922	16.5

MASS TRAN, DOWNTOWN TERMINAL

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
MASS TRAN, Downtown Terminal	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing High Intensity Discharge - Proposed New LED Fixture	46	46
	Existing T5 Fluorescent - Proposed RETROFIT LED	136	136

FIM Financial Summary

MASS TRAN, Downtown Terminal	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior	$ 2,975	$ -	$ 676	$ -	$ 3,651	$ 55,391	15.2

SIEMENS

PARK, CB SMITH

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
CB SMITH PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	124	124
	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	93	65
	Existing High Intensity Discharge - Proposed Retrofit LED	34	34
	Existing High Intensity Discharge - Proposed New LED Fixture	23	23
	Existing Incandescent - Proposed New LED Fixture	4	4
	Existing T8 Fluorescent - Proposed New LED Fixture	84	84
	Existing Compact Fluorescent - Proposed New LED Fixture	47	47
	Existing Incandescent - Proposed Relamp LED	10	10
	Existing Compact Fluorescent - Proposed Relamp LED	28	28
	Existing T8 Fluorescent - Proposed Retrofit LED	48	48

FIM FINANCIAL SUMMARY

CB SMITH PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior and Sensors	$ 10,758	$ -	$ 2,309	$ -	$ 13,067	$ 194,441	14.9
Lightgin - COMBINED	$ 14,152	$ -	$ 2,733	$ -	$ 16,885	$ 237,100	14.0

PARK, QUIET WATERS

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
QUIET WATERS PARK	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	169	132
	Existing High Intensity Discharge - Proposed Retrofit LED	4	4
	Existing High Intensity Discharge - Proposed New LED Fixture	20	20
	Existing Compact Fluorescent - Proposed Relamp LED	36	36

FIM Financial Summary

QUIET WATERS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior and Sensors	$ 10,629	$ -	$ 2,412	$ -	$ 13,041	$ 208,075	16.0

LIBRARY, TAMARAC

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, TA, Tamarac	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	17	17
	Existing T8 Fluorescent - Proposed Retrofit LED	34	34
	Existing T8 Fluorescent - Proposed New LED Fixture	135	135
	Existing Compact Fluorescent - Proposed Relamp LED	121	121
	Existing Compact Fluorescent - Proposed Retrofit LED	35	35
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	3	3
	Existing T5 Fluorescent HO - Proposed RETROFIT LED	20	20
	Existing T5 Fluorescent HO - Proposed New LED Fixture	474	339

FIM Financial Summary

LIBRARY, TA, Tamarac	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 4,557	$ 3,396	$ 2,189	$ -	$ 10,142	$ 159,519	15.7

LIBRARY, TYRONE BRYANT

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, BR, Tyrone Bryant	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing T8 Fluorescent - Proposed Retrofit LED	23	23
	Existing Compact Fluorescent - Proposed Retrofit LED	28	28
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	2	2
	Existing T5 Fluorescent HO - Proposed RETROFIT LED	92	92
	Existing Compact Fluorescent - Proposed New LED Fixture	67	67

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, BR, Tyrone Bryant	Existing High Intensity Discharge - Proposed New LED Fixture	41	41

FIM Financial Summary

LIBRARY, BR, Tyrone Bryant	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 1,067	$ 982	$ 446	$ -	$ 2,495	$ 32,632	13.1
Lighting - Exterior	$ 867	$ 477	$ 343	$ -	$ 1,687	$ 28,365	16.8

LIBRARY, YOUNG AT ART

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, YAA, Young at Art	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	508	508
	Existing T8 Fluorescent - Proposed Retrofit LED	233	233
	Existing Compact Fluorescent - Proposed Relamp LED	10	10
	Existing Compact Fluorescent - Proposed Retrofit LED	78	78
	Existing T5 Fluorescent - Proposed RETROFIT LED	136	136

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, YAA, Young at Art	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	122	122
	Existing High Intensity Discharge - Proposed New LED Fixture	10	10
	Existing Compact Fluorescent - Proposed New LED Fixture	65	65
	Existing Compact Fluorescent - Proposed Retrofit LED	2	2
	Existing T5 Fluorescent - Proposed RETROFIT LED	45	45

FIM Financial Summary

LIBRARY, YAA, Young at Art	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 3,733	$ -	$ 711	$ -	$ 4,444	$ 58,079	13.1
Lighting - Exterior	$ 1,488	$ -	$ 575	$ -	$ 2,063	$ 44,385	21.5

LIBRARY, MIRAMAR

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, MI, Miramar	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	79	79
	Existing T8 Fluorescent - Proposed Retrofit LED	119	119
	Existing T8 Fluorescent - Proposed New LED Fixture	631	631
	Existing Incandescent - Proposed Relamp LED	14	14
	Existing Compact Fluorescent - Proposed Relamp LED	279	279
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	21	21
	Existing T5 Fluorescent HO - Proposed RETROFIT LED	35	35
	Existing Compact Fluorescent - Proposed New LED Fixture	270	196

FIM Financial Summary

LIBRARY, MI, Miramar	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 15,678	$ -	$ 3,057	$ -	$ 18,735	$ 274,322	14.6

PARK, ROOSEVELT GARDENS

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
ROOSEVELT GARDENS PARK	Existing T8 Fluorescent - Proposed Retrofit LED	46	46
	Existing T8 Fluorescent - Proposed New LED Fixture	9	9
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	15	15

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
ROOSEVELT GARDENS PARK	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	44	44
	Existing Compact Fluorescent - Proposed New LED Fixture	11	11

FIM Financial Summary

ROOSEVELT GARDENS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 464	$ -	$ 102	$ -	$ 566	$ 10,610	18.8
Lighting - Exterior and Sensors	$ 1,825	$ -	$ 546	$ -	$ 2,371	$ 58,996	24.9
Lighting - Occupancy	$ 10	$ -	$ -	$ -	$ 10	$ 1,137	119.6

PARK, FRANKLIN

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
FRANKLIN PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	200	200

PARK, VISTA VIEW

Interior Lighting Retrofit Scope Considered

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
VISTA VIEW PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	10	10
	Existing T8 Fluorescent - Proposed Retrofit LED	58	58
	Existing T8 Fluorescent - Proposed New LED Fixture	27	27
	Existing Compact Fluorescent - Proposed Retrofit LED	6	6

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
VISTA VIEW PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	1	1
	Existing High Intensity Discharge - Proposed New LED Fixture	62	62
	Existing Compact Fluorescent - Proposed New LED Fixture	22	22
	Existing Compact Fluorescent - Proposed Relamp LED	13	13
	Existing T8 Fluorescent - Proposed Retrofit LED	4	4

FIM Financial Summary

VISTA VIEW PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 398	$ 394	$ 98	$ -	$ 890	$ 12,485	14.0
Lighting - Exterior and Sensors	$ 1,250	$ 685	$ 592	$ -	$ 2,527	$ 39,199	15.5

The following further details the sensor scope mentioed in a few of the above tables:

Controls: Occupancy Sensors and Photocells

The addition of new occupancy sensors and daylighting controls (photocells) were evaluated with project payback as the primary metric. Due to the low power density of the proposed lighting retrofit, occupancy sensing controls do not improve payback unless there is a substantial amount of time lights are on in unoccupied spaces. The proposed design includes the addition of occupancy sensors only in spaces where logger data indicates substantial opportunities exist. Similarly, a few buildings have perimeter spaces with glazing from floor to ceiling where daylighting controls could be used to reduce energy use. Evaluation of proposed simple daylighting controls indicated in many cases, more than 100% or the retrofit energy use would need to be removed in order to match payback. Additionally, the linear UL Type B LED tubes are not dimmable, which results in the need to use an on/off protocol which can be distracting to occupants, and generally not desired.

Interior Sensor Scope Considered

Building Name	Areas Controlled by sensors
MARKHAM PARK	8
BCJC N Wing	23
BC Agriculture Extension	5
ROOSEVELT GARDENS PARK	2
South Regional Courthouse	10
West Regional Courthouse	7

Exterior Sensor Scope Considered

Building Name	Areas Controlled by sensors
CB SMITH PARK	3
QUIET WATERS PARK	5
BC Agriculture Extension	2
ROOSEVELT GARDENS PARK	1

F.2. Water Conservation Solutions

A water audit was performed at all facilities within the scope provided except for at the Mid-rise/East Parking building, the Young at Arts library, Pompano Beach Branch Library and Lafayette Hart Park. This audit was performed in an effort to create the desired paybacks. Scope, in the form of flush valve and china replacements, flow restrictors, and low flow showerheads, was removed from the comprehensive water retrofit approach of specific facilities. The following identifies those facilities that were removed and their resulting, stand alone, paybacks.

Water - Retrofits

	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
CB Smith Park	$ 199	$ 1,539	$ 1,288	$ 3,026	$ 189,622	62.7
Markham Park	$ 188	$ 1,098	$ 673	$ 1,960	$ 67,188	34.3
Quiet Waters Park	$ 103	$ 1,050	$ 455	$ 1,608	$ 46,046	28.6
Main Library	$ 117	$ 3,706	$ 765	$ 4,588	$ 98,575	21.5
Mirmar Library	$ 1,065	$ 1,233	$ 481	$ 2,779	$ 50,905	18.3
East Regional Library	$ 76	$ 1,183	$ 175	$ 1,435	$ 24,525	17.1
Tamarac Library	$ 114	$ 1,188	$ 175	$ 1,477	$ 25,565	17.3
Imperial Point Library	$ 7	$ 79	$ 1	$ 87	$ 3,463	39.9
Lauderhill Library	$ 60	$ 652	$ 105	$ 817	$ 12,479	15.3
EOC	$ 14	$ 56	$ 237	$ 307	$ 23,518	76.6
West Regional Courthouse	$ 206	$ 3,580	$ 377	$ 4,164	$ 56,612	13.6
HIGH & Bridge Admin	$ 28	$ 299	$ 201	$ 528	$ 33,037	62.6
BCJC State Att (LTS)	$ 44	$ 439	$ 24	$ 507	$ 8,669	17.1
Hunter & Hughes	$ 276	$ 1,261	$ 303	$ 1,840	$ 38,683	21.0
South Regional Health Center	$ 256	$ 1,258	$ 246	$ 1,760	$ 31,724	18.0
NW Health Center	$ 42	$ 316	$ 29	$ 387	$ 10,176	26.3
Fleet Services 3&4	$ 11	$ 162	$ 85	$ 258	$ 7,194	27.9
State Attorney & Clerks Warhouse	$ 2	$ 20	$ 22	$ 43	$ 2,794	64.9
Fleet Services 2	$ 2	$ 55	$ 85	$ 142	$ 6,565	46.1
West Regional Maintenance	$ 11	$ 30	$ 12	$ 53	$ 2,794	52.7
BC Government Center	$ 2,393	$ 23,140	$ 1,387	$ 26,920	$ 209,108	7.8

Ice Machine Heat Exchanger: With a refrigeration heat exchanger system installed, cold discharge water from an ice machine or refrigeration unit is exposed to incoming domestic water in a reservoir. This heat exchange can cool incoming water by more than 16%. This drop in temperature improves the efficiency of the ice machine by more than 18%. This creates energy savings by reducing the cooling load and cycle time of the ice machine or refrigeration unit.

In the water audit, ice machines at the facilities within the scope of work were identified and analyzed for potential sources for energy savings. This audit was performed in an effort to create the desired paybacks. The following identifies those facilities that were removed and their resulting, stand alone, paybacks.

	Savings KWH	Total Savings	Project Cost	Payback
EOC	$ 83	$ 83	$ 1,303	15.7
CB Smith	$ 193	$ 193	$ 2,607	13.5

Smart Irrigation Controls: Most automated irrigation systems develop watering schedules based on manual time-based irrigation controllers. These controllers require manual adjustments, cannot be controlled remotely, and develop watering schedules based on daily or weekly time schedules. Due to the fact they operate without consideration of weather conditions, these systems are prone to overwatering on days when there is little to no need for irrigation due to favorable weather conditions. Central controlled smart irrigation systems receive or collect data daily to calculate the ET rates (evapotranspiration rates) of the controller's microclimate. ET calculations incorporate various climate parameters (wind, sunlight, temperature, and precipitation) to determine the base water demand of the irrigation system. This enables the system to create a water efficient daily irrigation schedule to water as conservatively as possible. Central controlled smart irrigation systems can be monitored and controlled remotely through various management software.

In the water audit, irrigation systems at the facilities within the scope of work were identified and analyzed for potential sources for energy savings. This audit was performed in an effort to create the desired paybacks. The following identifies those facilities that were removed and their resulting, stand alone, paybacks.

Water - Irrigation				
	Savings Water	Total Savings	Project Cost	Payback
Hunter and Hughes	$ 2,640	$ 2,640	$ 34,948	13.2

On-Site Hypochlorite Generation: Sodium hypochlorite generators produce pool chlorination chemicals from the electrochemical reaction between salt, water, and electricity. On-site production of chlorine as a solution of sodium hypochlorite alleviates the risks to public health and safety relating to the storage and transportation of hazardous acid and concentrated chlorine solutions. The only raw material, salt, is an inert, safe compound that is stored in a feeder on-site and used as required by the chlorine generator. On-site generation systems create a pH neutral chlorine allowing for a more stable, effective chlorine to treat your commercial pool or aquatic center. On-site hypochlorite is a dilute form of disinfectant compared to chlorine gas or concentrated commercial hypochlorite. The raw materials required by on-site generators are 75% to 90% cheaper than the annual cost of traditional chlorine and pool chemicals. On-site generation also allows for improved inactivation of microorganisms, increased water quality by reduced disinfection byproducts, and reduced threat to public safety.

In the water audit, pool and aquatic systems at the facilities within the scope of work were identified and analyzed for potential sources for cost savings. This audit was performed in an effort to create the desired paybacks. The following identifies those facilities that were removed and their resulting, stand alone, paybacks.

Water - Pool Solutions

	Total Savings	Project Cost	Payback
Quiet Waters Park	$ 9,649	$ 165,596	17.2

F.3. Building Envelope

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The following is a summary of those facilities where scope was excluded due to their financial results.

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, multiple variable were taken into consideration; including: HVAC equipment operating efficiency, runhours, age and condition. Other variables include building occupancy, hours of operation, and bin weather data for the geographic area where the facility resides. Input variables that were not directly measured onsite or obtained from the County include material properties; such as of walls, ceiling tiles, as well as the recommended insulation for installation. The spreadsheet simulated a current operating conditions of the facility and compared them to proposed conditions to obtain savings.

The resulting economics of implementing the following building envelope projects at these facilities resulted in paybacks in excess of 12 years. In an effort to adhere to required project payback and overall cash flows, these FIMs were not included in the final scope.

GALT OCEAN LIBRARY

PROJECT SCOPE

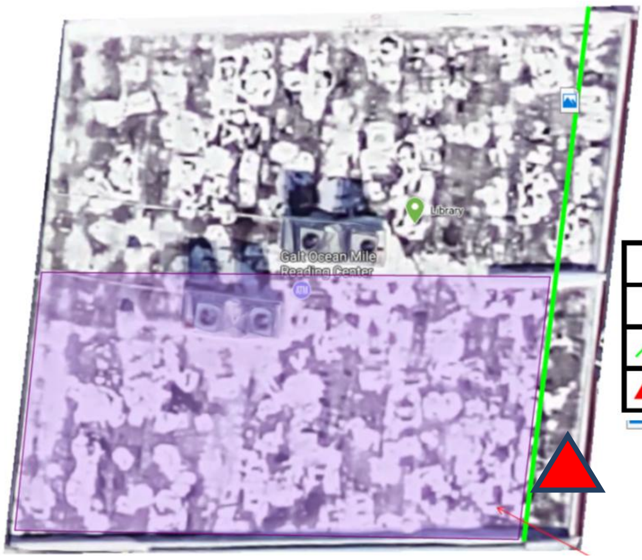
Galt Ocean library is contained within a strip-mall style complex. The building contains a large soffit that stretches out over the sidewalk located in front of the building. This soffit contains no insulation. The soffit also contains six large vent openings, in addition to a continuous strip vent, that directly connect the exterior environment to the interior of the building. The soffit should be isolated from the interior of the building with an insulated, air-tight barrier.

Large vents (red arrows) and strip vent (yellow line) shown here

View of soffit from interior of building. All light is coming from the exterior through the vents.

SCOPE SCHEMATICS

The following are illustrations depicting the specific locations at each building where the recommended improvement measures are to be implemented.



Galt Ocean Library		
	ECM #	ECM Description
	1.1	Seal/insulate boundary to vented soffit.
▲	2	Door seals

FIM Financial Summary

LIBRARY, GO, Galt Ocean	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Door Gaskets	$ 1	$ -	$ -	$ -	$ 1	$ 377	264.6
Building Envelope - Insulation	$ 423	$ -	$ -	$ -	$ 423	$ 8,208	19.4
Building Envelope - COMBINED	$ 425	$ -	$ -	$ -	$ 425	$ 8,585	20.2

Most building envelope improvements will not depreciate over time and will be there, and contributing to decrease energy costs, for the remaining useful life of the building. Insulation within a building can have an expected life of 20 years. Moving forward with this solution will benefit the County beyond the years specified by the simple payback value. If an addition, monetary value is assigned and calculated taking into account the additional years of useful life on the material, an additional source of savings can be used to more accurately represent the long-term impact of this FIM.

He following table presents the calculated salvage value of building insulation beyond that of the resulting simple payback for this project; resulting in a modified payback to be considered.

Modified Payback

LIBRARY, GO, Galt Ocean	FIM Life (Yr)	Salvage Value ($)	Modified Payback (Yr)
Building Envelope - Door Gaskets			
Building Envelope - Insulation	20	$2,173	14.3
Building Envelope - COMBINED	20	$2,273	14.9

EVERGLADES HOLIDAY PARK

PROJECT SCOPE

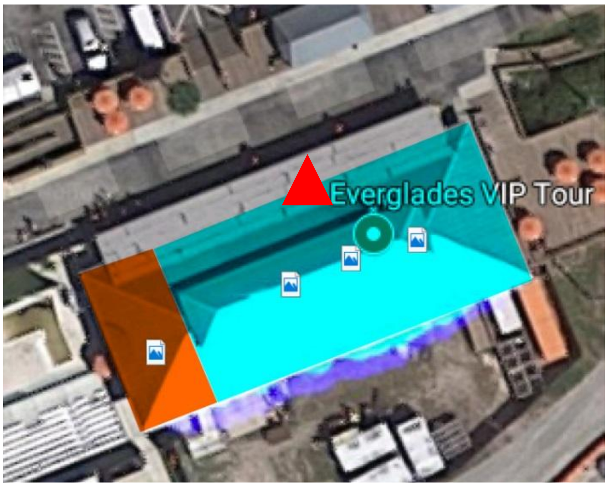
The Everglades park building is mostly uninsulated at the attic boundary. The attic also contains all of the ductwork. To mitigate the large amount of heat gain from the attic, the ductwork, and duct leakage, we propose to encapsulate the attic using SPF on the interior roof decking.

Attic is largely uninsulated.

There is a small section (gift shop area) that contains a little insulation. It is not installed in such a way as to result in good performance though.

SCOPE SCHEMATICS

The following are illustrations depicting the specific locations at each building where the recommended improvement measures are to be implemented.



Bldg		
	ECM #	ECM Description
■ (cyan)	1.1	Encapsulate attic with 1/2# SPF.
■ (orange)	1.2	Remove existing FG and encapsulate attic with 1/2# SPF.
▲	2	Door Gasketing

FIM Financial Summary

EVERGLADES HOLIDAY PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Insulation	$ 2,539	$ -	$ -	$ -	$ 2,539	$ 62,274	24.5

Most building envelope improvements will not depreciate over time and will be there, and contributing to decrease energy costs, for the remaining useful life of the building. Insulation within a building can have an expected life of 20 years. Moving forward with this solution will benefit the County beyond the years specified by the simple payback value. If an addition, monetary value is assigned and calculated taking into account the additional years of useful life on the material, an additional source of savings can be used to more accurately represent the long-term impact of this FIM.

He following table presents the calculated salvage value of building insulation beyond that of the resulting simple payback for this project; resulting in a modified payback to be considered.

Modified Payback

FIM Life (Yr)	Salvage Value ($)	Modified Payback (Yr)
20	$16,485	18.0

ROOSEVELT GARDENS PARK

PROJECT SCOPE

This entire building has fiberglass batt insulation strapped to the interior surface of the roof deck. String has been used to create a netting of sorts to keep it in place. However, the soffit areas are vented and there is no durable air barrier separating the soffit areas from the "interior" of the attic space. There are many areas where the fiberglass has fallen down or been damaged, resulting in massive air exchange with the exterior environment. The suggested measure is to increase the durability of the soffit/interior boundary by applying a layer of SPF to the vertical knee wall areas that are currently relying on paper to create this air-barrier.

You can see daylight where some fiberglass has fallen away from the roof surface.

This blue outline represents the barrier between soffit and interior.

SCOPE SCHEMATICS

The following are illustrations depicting the specific locations at each building where the recommended improvement measures are to be implemented.

Roosevelt Gardens		
	ECM #	ECM Description
	1	Seal/Insulate to separate soffits from interior

Fim Financial Summary

ROOSEVELT GARDENS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Door Seals	$ 8	$ -	$ -	$ -	$ 8	$ 2,114	272.9
Building Envelope - Insulation	$ 1,187	$ -	$ -	$ -	$ 1,187	$ 23,055	19.4

Insulation within a building can have an expected life of 20 years. Moving forward with this solution will benefit the County beyond the years specified by the simple payback value. If an addition, monetary value is assigned and calculated taking into account the additional years of useful life on the material, an additional source of savings can be used to more accurately represent the long-term impact of this FIM.

He following table presents the calculated salvage value of building insulation beyond that of the resulting simple payback for this project; resulting in a modified payback to be considered.

Modified Payback

FIM Life (Yr)	Salvage Value ($)	Modified Payback (Yr)
15	$280	236.7
20	$6,103	14.3

IMPERIAL POINT LIBRARY

PROJECT SCOPE

Imperial Point library has an entry stairwell which contains large amounts of glass, facing both east and south. Solar film is recommended on the east and south aspects to reduce heat gain.

Interior view of area to receive film.

SCOPE SCHEMATICS

The following are illustrations depicting the specific locations at each building where the recommended improvement measures are to be implemented.

Blue is east. Green is south.

Imperial Point Library		
	ECM #	ECM Description
	1.1	Film east windows to reduce heat gain.
	1.2	Film south windows to reduce heat gain.
	2	Door Gasketing

FIM Financial Summary

LIBRARY, IP, Imperial Point	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Door Gaskets	$ 1	$ -	$ -	$ -	$ 1	$ 377	360.3
Building Envelope - Window Film	$ 768	$ -	$ -	$ -	$ 768	$ 13,942	18.1
Building Envelope - COMBINED	$ 769	$ -	$ -	$ -	$ 769	$ 14,319	18.6

Most building envelope improvements will not depreciate over time and will be there, and contributing to decrease energy costs, for the remaining useful life of the building. Insulation within a building can have an expected life of 20 years. Moving forward with this solution will benefit the County beyond the years specified by the simple payback value. If an addition, monetary value is assigned and calculated taking into account the additional years of useful life on the material, an additional source of savings can be used to more accurately represent the long-term impact of this FIM.

He following table presents the calculated salvage value of building insulation beyond that of the resulting simple payback for this project; resulting in a modified payback to be considered.

Modified Payback

LIBRARY, IP, Imperial Point	FIM Life (Yr)	Salvage Value ($)	Modified Payback (Yr)
Building Envelope - Door Gaskets	15	$50	312.6
Building Envelope - Window Film	20	$3,691	13.3
Building Envelope - COMBINED	20	$3,790	13.7

BG AGRICULTURAL CENTER

PROJECT SCOPE

The extension office contains a good deal of single pane glass that is contributing to excessive heat gain and comfort issues. These should receive solar film.

Desks have been removed from the sunny area due to comfort issues resulting from heat gain.

Occupants are attempting to keep heat out by use of paper and fabric

SCOPE SCHEMATICS

The following are illustrations depicting the specific locations at each building where the recommended improvement measures are to be implemented.

Extension Education		
	ECM #	ECM Description
	1.2	Apply Window Film - South
	1.3	Apply Window Film - West
	1.11	Apply Window Film - East
	1.12	Apply Window Film - East
	1.13	Apply Window Film - East
	2	Install door seals

Fim Financial Summary

BC Agriculture Extension	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Window Film	$ 1,264	$ -	$ -	$ -	$ 1,264	$ 28,266	22.4

Insulation within a building can have an expected life of 20 years. Moving forward with this solution will benefit the County beyond the years specified by the simple payback value. If an addition, monetary value is assigned and calculated taking into account the additional years of useful life on the material, an additional source of savings can be used to more accurately represent the long-term impact of this FIM.

He following table presents the calculated salvage value of building insulation beyond that of the resulting simple payback for this project; resulting in a modified payback to be considered.

Modified Payback

FIM Life (Yr)	Salvage Value ($)	Modified Payback (Yr)
15	$3,741	19.4

F.4. DX Replacements

As DX equipment ages and the condition of the equipment deteriorate, the energy efficiency of these units also degrades. In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. All calculations were based off Trane manufacturer cut-sheets.

The resulting economics of implementing HVAC replacements at these facilities resulted in paybacks in excess of 12 years. In an effort to adhere to required project payback and overall cash flows, these FIMs were not included in the final scope.

The following is a summary of those facilities where DX replacements were excluded and their financial results.

BC AGRICULTURAL EXTENSION – SCOPE CONSIDERED

This FIM consider replacing the condensing unit of the building's DX system. The multizone air handler is in good physical condition; therefore, the coils were to be replaced in order to accommodate the change from R-22 to R-410A.

Scope of Work Considered

Building	Equipment	Make	Model
BG Agricultural Extension	Condenser	Carrier	38AKS034---501
BG Agricultural Extension	AHU	Trane	MCCA025GAMOAA

FIM Financial Summary

BC Agriculture Extension	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacement	$ 568	$ 875	$ -	$ -	$ 1,443	$ 83,462	57.8

MARKHAM PARK – SCOPE CONSIDERED

The following seven (7) DX systems were identified for replacement. The DX spit systems require replacement of both the condensing unit and air handler.

Scope of Work Considered

Building	Equipment	Make	Model
Markham Park	Condenser	Carrier	38ARZ007--K501--
Markham Park	Condenser	Carrier	38ARZ007--K501--
Markham Park	AHU	Carrier	40RM-008--H611HC
Markham Park	AHU	Carrier	40RM-008--H611HC
Markham Park	AHU		
Markham Park	AHU		
Markham Park	AHU		
Markham Park	Condenser	ICP	M2A348AKA200
Markham Park	Condenser	Thermal Zone	TZAA-348-2C757
Markham Park	Condenser	Thermal Zone	TZAA-348-2A757
Markham Park	Condenser	American Standard	2A7A4048B1000AA
Markham Park	Condenser	Ruud	13AJA60A01
Markham Park	AHU	York	AHR60D3XH21A
Markham Park	AHU		

FIM Financial Summary

MARKHAM PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ 2,469	$ 1,187	$ -	$ -	$ 3,656	$ 180,848	49.5

Additional Costs: Associated with the scope of work summarized above are additional costs uncovered by contracted MEPs (mechanical, electrical, and plumbing vendor). This cost was requested to be listed separately. For this facility, the cost is:

- $10,027

The identified issue at Markham Park concerns the location of the air handlers in some of the buildings. In order to replace the units, trusses and supporting roof beams need to be cut and later replaced as the units are situated in the attic space.

TRADEWINDS PARK – SCOPE CONSIDERED

This FIM assessed replacing the condensing unit and air handler of following two (2) DX units.

Scope of Work Considered

Bldg	Equipment	Make	Model
Tradewinds Park	AHU		
Tradewinds Park	Condenser		
Tradewinds Park	AHU	Ruud	UBHK-21J11SFC
Tradewinds Park	Condenser	Ruud	UAMB-036JBZ

FIM Financial Summary

TRADEWINDS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ 70	$ -	$ -	$ -	$ 70	$ 20,262	288.2

Code Compliance: Associated with the scope of work summarized above are code compliance issued uncovered by contracted MEPs (mechanical, electrical, and plumbing vendor). This cost was requested to be listed separately. For this facility, the code compliance cost is:

- $2,000

The identified issue at Tradewinds Park includes changes in outside air requirements as stated by current building code.

QUIET WATERS PARK – SCOPE CONSIDERED

This FIM assessed replacing the condensing units and air handlers of the following DX units.

Scope of Work Considered

Building	Equipment	Make	Model
Quiet Waters Park	AHU	Carrier	40RM-012--B610HC
Quiet Waters Park	Condenser	Carrier	38ARZ008--K501

FIM Financial Summary

QUIET WATERS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ -	$ -	$ -	$ -	$ -	$ 16,223	

EVERGLADES HOLIDAY PARK – SCOPE CONSIDERED

This FIM assessed replacing the condensing units and air handlers of the following DX units.

Scope of Work Considered

Building	Equipment	Make	Model
Everglades Holiday Park	AHU		
Everglades Holiday Park	Condenser	Payne	PA13NR060
Everglades Holiday Park	AHU		
Everglades Holiday Park	Condenser	Carrier	24ABS360A300

FIM Financial Summary

EVERGLADES HOLIDAY PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ 1,057	$ 296	$ -	$ -	$ 1,354	$ 90,744	67.0

FRANKLIN PARK – SCOPE CONSIDERED

This FIM assessed replacing the condensing units of the following DX units. The AHUs are in good physical condition; therefore, the coils would have been replaced in order to accommodate the change from R-22 to R-410A.

Scope of Work Considered

Building	Equipment	Make	Model
Franklin Park	AHU	Carrier	39TVRNAB--U-CJL-AB
Franklin Park	Condenser	Thermal Zone	TZAA-090CA757
Franklin Park	Condenser	Thermal Zone	TZAA-090CA757

FIM Financial Summary

FRANKLIN PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ 181	$ 155	$ -	$ -	$ 336	$ 40,343	120.0

Code Compliance: Associated with the scope of work summarized above are code compliance issued uncovered by contracted MEPs (mechanical, electrical, and plumbing vendor). This cost was requested to be listed separately. For this facility, the code compliance cost is:

- $4,178

The identified issue at Tradewinds Park includes changes in outside air requirements as stated by current building code.

VISTA VIEW PARK – SCOPE CONSIDERED

This FIM assessed replacing the condensing units and air handlers of the following DX units.

Scope of Work Considered

Building	Equipment	Make	Model
Vista View Park	AHU	Carrier	40RM-008--H611HC
Vista View Park	Condenser	Carrier	38ARZ008--K511

FM Financial Summary

VISTA VIEW PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacements	$ -	$ -	$ -	$ -	$ -	$ 17,603	

TYRONE BRYANT LIBRARY – SCOPE CONSIDERED

This FIM assessed replacing the condensing units of the following DX units. The AHUs are in good physical condition; therefore, the coils would have been replaced in order to accommodate the change from R-22 to R-410A.

Scope of Work Considered

Building	Equipment	Make	Model
Tyrone Bryant Library	Condenser	Trane	TTA240B300FB
Tyrone Bryant Library	Condenser	Trane	TTA180B300FA
Tyrone Bryant Library	AHU	Trane	MCCB030UA

FIM Financial Summary

LIBRARY, BR, Tyrone Bryant	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System Replacement	$ 450	$ 561	$ -	$ -	$ 1,011	$ 60,442	59.8

STATE ATTORNEY & CLERKS WAREHOUSE – SCOPE CONSIDERED

This FIM assessed replacing the condensing units and air handlers of the following DX units.

Scope of Work Considered

Building	Equipment	Make	Model
State Attorney & Clerks Warehouse	Condenser 8	Rheem	RAND-060JAZ
State Attorney & Clerks Warehouse	Condenser 3	Rheem	RAND-060CAZ
State Attorney & Clerks Warehouse	Condenser 2	Rheem	RAND-042JAZ
State Attorney & Clerks Warehouse	Condenser 1	Rheem	RAKA-060CAS
State Attorney & Clerks Warehouse	AHU 8	Rheem	RBEA-24J10NUBAI
State Attorney & Clerks Warehouse	AHU 3	Rheem	RHGE-075ZK
State Attorney & Clerks Warehouse	AHU 2	Rheem	
State Attorney & Clerks Warehouse	AHU 1	Rheem	

FIM Financial Summary

State Attorney & Clerks Warehouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Split System COMBINED	$ 1,664	$ 479	$ -	$ -	$ 2,143	$ 65,031	30.3

F.5. Additional Solar Opportunities

SOLAR PV

The possibility for the installation of on-site solar generation plants whether in the form of rooftop or carport design was assessed for 11 total sites. Due to the restrictions on project payback, only 1 facility was able to be proposed as a viable project in this IGA. Broward County instructed Siemens to discontinue the analysis of 2 facilities, East Regional Library and Young at Arts Library, before a comprehensive savings analysis could be completed. Broward County did not select to move forward with 2 other facilities, Hollywood Library and Tamarac Library after being reported in the IGA. The scope of work for those facilities can be found in the FIMs not selected section. The following list will identify the remaining 6 facilities were assessed but not chosen for this project along with their proposed first year energy savings.

ROOFTOP

- Edgar Mills Center: 187,376 kWh
- Emergency Operations Center: 163,878 kWh
- Fleet Services 2: 145,286 kWh
- Highway & Bridge Administration: 280,845 kWh

CARPORT

- Miramar Library: 860,582 kWh
- Quiet Waters Park: 502,763 kWh

FIM Financial Summary

Solar PV	Savings KWH	Total Savings	Project Cost	Payback
TOTAL	$ 167,044	$ 167,044	$ 5,254,580	31.5

The table above summarizes the financial impact of the 6 facilities that were analyzed but not selected for this project. With a total project cost of $5,254,580 and a first year savings of $167,044, the simple payback calculates to 31.5 years.

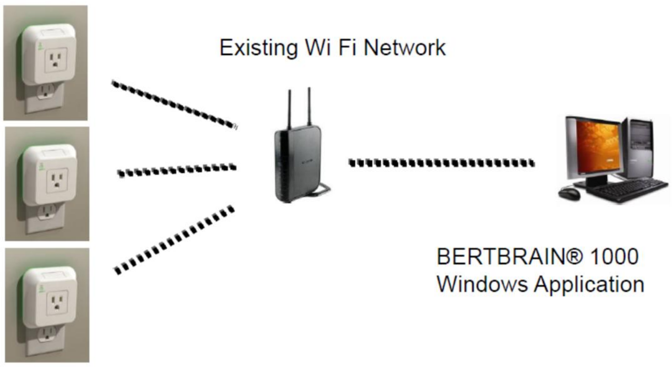
F.6. Plug Load Management

Miscellaneous plug loads from copiers, computers, computer screens, and coffee machines can make up enough of a portion of the energy consumption of a building to merit monitoring and controlling. Some of these loads may operate on standby during unoccupied periods that may reduce to amount of wattage draw from receptacles. Alternatively, many plug load devices leak energy in standby or off mode. Bert, which stands for Best Energy Reduction Technologies, is a patented Wi-Fi based solution that automatically and remotely controls and schedules plug load devices to turn on/off.

Bert controllers function with a built in relay operating on a timer. The relay severs electrical connection between the device and the electrical receptacle. Each Bert controller is equipped with an override button which allows an operator working beyond the schedule to release the connected device from its OFF command. This reestablishes the electrical connected and allows the device to be used as normal. The Bert units do not limit device usage to a couple of hours once the override is pushed. It will not schedule the connected device to turn off until the next scheduled time.

PROJECT SCOPE

This FIM addresses the installation of wireless Bert controllers at the outlet of specified equipment. The wireless controllers will be integrated in the existing Wi-Fi Network of each building and scheduled from a central computer. Not every device merits the installation of a Bert controller. Due to the habits of City employees, some equipment is shut off at the end of the work day. Energy leaks through electric receptacles are not significant enough to produce energy savings of value.



Other plug load equipment, such and vending and ice machines, have alternative energy saving devices that have already been included in the scope of work to be performed. The remaining opportunities for plug load management do not result in enough energy savings to justify the installation of these controls.

F.7. Musco Sports Lighting Retrofit

Ball field lighting is a necessary component of all outdoor parks that hold nighttime sporting events. The County currently has Musco Lighting technology and control capability installed at most parks. Musco Lighting has identified this technology as outdated and an opportunity to upgrade to their Green Series equipment.

PROJECT SCOPE

This FIM involves replacing the existing Musco lighting with new HID SportsCluster Green equipment. Musco Green series reduces fixture count in the lighting fixture cluster while maintaining lighting levels and yields in a reduction light pollution to surrounding areas. The Control Link system monitors and operates Musco lighting systems for facility staff.

The scope includes Musco SportsCluster Green Technology Sports Lighting Fixtures with:

- Factory aimed and assembled pole top HID or LED luminaire assemblies
- Remote Electrical Enclosure with Ballasts, Capacitors and Fuses
- Mounting hardware for the pole top units and electrical component enclosures
- Pole length wire harness
- Disconnects
- Musco provided Constant 25 year warranty including parts and labor for the Musco equipment that will be mounted on existing structures.
- Control Link® Control & Monitoring System for flexible control and solid management of your lighting system
- Lighting Contactors sized for the voltages available at the site.

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Savings are realized from decreasing the number of lamps necessary per pole.

The costs associated with upgrading existing Musco technology at these locations make this FIM economically unfavorable for implementation under this energy savings performance contract.

G. Description of FIMs Not Selected

This section itemizes those Facility Improvement Measures included in the Investment Grade Audit submitted on January 17, 2018 but where not selected by Broward County to be included in the final scope of work.

G.1. CB Smith Park

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- LED Replacement for High Intensity Discharge Interior
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
CB SMITH PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	48	48
	Existing T8 Fluorescent - Proposed Retrofit LED	204	204
	Existing T8 Fluorescent - Proposed New LED Fixture	8	8
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture	9	9
	Existing High Intensity Discharge - Proposed Retrofit LED	5	5
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	8	8

FIM SAVINGS SUMMARY

Annual Electric Consumption: 38,560 kWh

Annual Electric Demand: 133.38 kW

FIM Financial Summary

CB SMITH PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 3,394	$ -	$ 424	$ -	$ 3,818	$ 42,658	11.2

G.2. Markham Park

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
MARKHAM PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	115	115
	Existing High Intensity Discharge - Proposed Retrofit LED	2	2
	Existing High Intensity Discharge - Proposed New LED Fixture	78	78
	Existing Incandescent - Proposed New LED Fixture	1	1
	Existing Compact Fluorescent - Proposed New LED Fixture	13	13
	Existing Incandescent - Proposed Relamp LED	28	28
	Existing Compact Fluorescent - Proposed Relamp LED	92	92
	Existing T8 Fluorescent - Proposed Retrofit LED	46	46
	Existing T12 Fluorescent - Proposed Retrofit LED	2	2

FIM SAVINGS SUMMARY

Annual Electric Consumption: 147,012 kWh

Annual Electric Demand: 395.58 kW

FIM Financial Summary

MARKHAM PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 11,299	$ -	$ 2,313	$ -	$ 13,612	$ 147,476	10.8

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability. Recommended improvements will decrease energy consumption and provide a calculated financial return that can be projected to pay for the cost of the improvements over a defined period of time.

PROJECT SCOPE

The three buildings included in the scope all have attic related deficiencies. The Front Office and Target Range both rely on a suspended tile ceiling as an air barrier, while the Trap Shoot building has a drywall/T&G ceiling. All three buildings have ductwork located within the attic spaces. The suggested measure for all three buildings is to encapsulate the attic using SPF on the roof deck. This will dramatically reduce the attic temperature (reducing gains through ductwork surface area and duct leakage) and create an effective air barrier between inside/outside reducing uncontrolled air exchange.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 124,492 kWh

FIM Financial Summary

MARKHAM PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - COMBINED	$ 9,427	$ -	$ -	$ -	$ 9,427	$ 121,052	12.8

G.3. Tradewinds Park

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps:
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
TRADEWINDS PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	20	20
	Existing T8 Fluorescent - Proposed Retrofit LED	28	28

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
TRADEWINDS PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	103	103
	Existing Compact Fluorescent - Proposed New LED Fixture	12	12
	Existing T8 Fluorescent - Proposed Retrofit LED	14	14
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture With Sensor	40	40

EXTERIOR LIGHTING SENSOR SCOPE

Building Name	Areas Controlled by sensors
TRADEWINDS PARK	1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 37,327 kWh

Annual Electric Demand: 107.16 kW

FIM Financial Summary

TRADEWINDS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 3,321	$ -	$ 598	$ -	$ 3,919	$ 43,775	11.2

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Flush Valves
- Urinals
- Showers
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 187,885 gallons

Annual Energy savings: 2,066 kWh

All analysis for water savings, energy savings, deferred maintenance savings, and financial details is provided in Section H, Appendices of this Report.

FIM Financial Summary

TRADEWINDS PARK	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 180	$ 1,435	$ 160	$ 1,775	$ 22,488	12.7

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability.

PROJECT SCOPE

District office - This building has a tremendous number (70+) recessed can light fixtures in the ceiling, creating air leakage pathways to the attic space and to the exterior. To "cap" the leakage that's happening here, it is recommended the application of SPF to the roof deck to encapsulate the attic and eliminate the air exchange. Ductwork is also located in the attic. The negative effects of duct leakage will be reduced as a result of encapsulation, too.

Museum - This building has no insulation in the ceiling or attic. Ductwork is located in attic. Attic encapsulation with SPF is recommended for same reasons as listed above.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 36,908 kWh

FIM Financial Summary

TRADEWINDS PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - COMBINED	$ 2,386	$ -	$ -	$ -	$ 2,386	$ 31,349	13.1

G.4. Everglades Holiday Park

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

1. LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
EVERGLADES HOLIDAY PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	5	5
	Existing High Intensity Discharge - Proposed New LED Fixture	10	10

FIM SAVINGS SUMMARY

Annual Electric Consumption: 23,295 kWh

Annual Electric Demand: 50.16 kW

FIM Financial Summary

EVERGLADES HOLIDAY PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 1,775	$ -	$ 303	$ -	$ 2,078	$ 20,188	9.7

G.5. Delevoe Park

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps:
- LED Replacement for Pin-Based Compact Fluorescent Fixtures:
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
DELEVOE PARK	Existing T8 Fluorescent - Proposed Retrofit LED	51	51
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	10	10
	Existing Compact Fluorescent - Proposed Retrofit LED	5	5
	Existing T8 Fluorescent U Tube - Proposed Retrofit LED With Reflector kit	33	33

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
DELEVOE PARK	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	34	34
	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	22	22
	Existing High Intensity Discharge - Proposed Retrofit LED	63	63
	Existing High Intensity Discharge - Proposed New LED Fixture	6	6

Exterior Lighting Sensor Scope

Building Name	Areas Controlled by sensors
DELEVOE PARK	2

FIM SAVINGS SUMMARY

Annual Electric Consumption: 78,805 kWh

Annual Electric Demand: 62.8 kW

FIM Financial Summary

DELEVOE PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 5,788	$ -	$ 1,223	$ -	$ 7,011	$ 75,490	10.8

G.6. Vista View Park

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 118,625 gallons

Annual Energy savings: 1,555 kWh

FIM Financial Summary

VISTA VIEW PARK	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 134	$ 1,452	$ 143	$ 1,729	$ 19,916	11.5

G.7. Lafayette Hart Park

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LAFAYETTE HART PARK	Existing T8 Fluorescent - Proposed Retrofit LED	33	33

FIM SAVINGS SUMMARY

Annual Electric Consumption: 3,403 kWh

FIM Financial Summary

LAFAYETTE HART PARK	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 337	$ -	$ 51	$ -	$ 388	$ 4,364	11.3

G.8. Main Library

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, MN, Main	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing High Intensity Discharge - Proposed Retrofit LED	37	37
	Existing High Intensity Discharge - Proposed New LED Fixture	74	74
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture With Sensor	7	7
	Existing Compact Fluorescent - Proposed Retrofit LED	10	10

FIM SAVINGS SUMMARY

Annual Electric Consumption: 526,172 kWh

Annual Electric Demand: 1,417 kW

FIM Financial Summary

LIBRARY, MN, Main	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 47,453	$ -	$ 9,079	$ -	$ 56,532	$ 541,139	9.6

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability.

PROJECT SCOPE

The library has limited envelope potential due to the exposed nature of the exterior shell, which is composed of concrete and glass. Few areas are "hidden" by suspended ceilings and the like, that typically allow insulation to be applied. The library does, however, have a significant portion of east facing glass that would benefit from window film to reduce heat gain in the morning hours.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 146,502 kWh

FIM Financial Summary

LIBRARY, MN, Main	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Window Film	$ 12,152	$ -	$ -	$ -	$ 12,152	$ 187,080	15.4

CHILLER REPLACEMENT AND OPTIMAL CHILLER START

The chiller replacement aims to improve chiller plant energy efficiency by replacing the aged inefficient lead chiller (Chiller 2) with a new chiller of a similar model and better efficiency. The associated optimal chiller start control will also be implemented.

PROJECT SCOPE

The followings are included in the scope of work of the chiller replacement:

- Provide one (1) 350 nominal ton R-123 water-cooled centrifugal chiller
- Remove the old chiller and be responsible for the proper demolition of the unit.
- Replace the old lead chiller with the new chiller
- Connect the new chiller to the piping system.
- Start up the new chiller

To reduce the electric demand, the optimal chiller start control will be implemented with the chiller replacement. The following is included in this measure:

- Sequence of operations for those proposed measures will be developed
- Associated control program will be implemented.

Chiller Replacement:

Cooling for the building is provided by a chiller plant consisting of two (2) water-cooled York chillers. Chiller #1 is a two-pass machine of approximately 350 tons. The spot measured chiller efficiency of Chiller # 1 was approximately 0.90 kW/Ton. Chiller #2 is currently not in use due to its inefficient conditions. The new chiller with design efficiency of 0.66 kW/Ton will be installed to replace the existing inefficient Chiller #2, and then Chiller #2 will become the lead chiller to reduce chiller plant energy consumption.

Optimal Chiller Start to Reduce Electric Demand: The purpose of this measure is to avoid high electric demand charge caused by both chillers starting at the full load. When the 2nd chiller is called due to cooling load increase or lead- lag switch, limit the lead chiller current to 80% (adjustable) before turning on the second chiller. The current limit for the 2nd chiller is also limited to 80% (adjustable) during starting. After both chillers are on for 30 minutes (adjustable), release the current limits back to normal values.

During lead-lag switch, reduce the current of the running chiller before turning on another chiller. When the 2nd chiller is turned on, limiting its current to 80% (adjustable) for 30 minutes (adjustable) before changing back to the normal limit.

SAVINGS

The energy and cost savings were developed using a spreadsheet model. Using nameplate data, onsite electrical spot measurements, and data logging information, the total HVAC electrical contribution of this facility's electric utility bill was determined. The calculations took into consideration current conditions and efficiencies. Savings were obtained by replacing existing efficiency values with the higher efficiency value of the new equipment; as published by the manufacturer. The detailed calculations are available in the Appendix. All calculations were based off Trane manufacturer cut-sheets, also provided as part of the Appendix.

Full calculations are provided in Section H, Appendices of this audit.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 227,000 kWh

Annual Demand Consumption: 370 kW

FIM Financial Summary

LIBRARY, MN, Main	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lead Chiller Replacement / Optimal Start	$ 15,203	$ 5,053	$ -	$ -	$ -	$ 18,750	$ 39,005	$ 491,329	12.6

Savings Capital: This facility had two capital projects listed to be completed within the next five years: retrottiting stairwell and exterior lighting. Therefore, the financials incorporated some capital cost in order to improve the payback within requested parameters.

OPTIMAL CHILLER START

PROJECT SCOPE

To reduce the electric demand, the optimal chiller start control will be implemented with the chiller replacement. The following is included in this measure:

- Sequence of operations for those proposed measures will be developed
- Associated control program will be implemented.

SAVINGS

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Main Library	Optimal chiller	$ -	$ 5,052.60	$ -	$ -	$ 5,052.60	$ 20,431.98	4.0

G.9. Miramar Library

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior:
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope Considered

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, MI, Miramar	Existing High Intensity Discharge - Proposed Retrofit LED	38	38
	Existing High Intensity Discharge - Proposed New LED Fixture	12	12
	Existing Incandescent - Proposed Relamp LED	2	2
	Existing Compact Fluorescent - Proposed Retrofit LED	25	25

FIM SAVINGS SUMMARY

Annual Electric Consumption: 38,301 kWh

Annual Electric Demand: 107.16 kW

FIM Financial Summary

LIBRARY, MI, Miramar	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Exterior	$ 2,316	$ -	$ 670	$ -	$ 2,986	$ 31,372	10.5

G.10. Hollywood Library

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- LED Replacement for High Intensity Discharge Interior
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, HO, Hollywood	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	21	21
	Existing T8 Fluorescent - Proposed Retrofit LED	284	284
	Existing T8 Fluorescent - Proposed New LED Fixture	84	84
	Existing High Intensity Discharge - Proposed Retrofit LED	31	31
	Existing Incandescent - Proposed Relamp LED	8	8
	Existing Compact Fluorescent - Proposed Relamp LED	32	32
	Existing Compact Fluorescent - Proposed Retrofit LED	66	66
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	12	12

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, HO, Hollywood	Existing High Intensity Discharge - Proposed New LED Fixture	8	8
	Existing Compact Fluorescent - Proposed Retrofit LED	25	25

FIM SAVINGS SUMMARY

Annual Electric Consumption: 63,312 kWh

Annual Electric Demand: 257.64 kW

FIM Financial Summary

LIBRARY, HO, Hollywood	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 3,795	$ 2,952	$ 1,093	$ -	$ 7,839	$ 84,659	10.8

G.11. East Regional Library

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, FL, East Regional	Existing High Intensity Discharge - Proposed Retrofit LED	6	6
	Existing High Intensity Discharge - Proposed New LED Fixture	10	10

FIM SAVINGS SUMMARY

Annual Electric Consumption: 52,454 kWh

Annual Electric Demand: 171 kW

FIM Financial Summary

LIBRARY, FL, East Regional	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 3,047	$ 1,960	$ 836	$ -	$ 5,843	$ 58,477	10.0

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability.

PROJECT SCOPE

The East Regional Library has large air leakage pathways at the two ends of the old building area. The original design of the building included large openings at these two ends, connecting the soffit area to the interior of the building. It is suggested that these air leakage pathways be sealed off to eliminate this source of heat and moisture intrusion.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 13,227 kWh

FIM Financial Summary

LIBRARY, FL, East Regional	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - COMBINED	$ 1,097	$ -	$ -	$ -	$ 1,097	$ 18,481	16.8

G.12. Deerfield Beach Library

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, DB, Deerfield Beach	Existing High Intensity Discharge - Proposed Retrofit LED	12	12
	Existing High Intensity Discharge - Proposed New LED Fixture	18	18

FIM SAVINGS SUMMARY

Annual Electric Consumption: 42,842 kWh

Annual Electric Demand: 177.84 kW

FIM Financial Summary

LIBRARY, DB, Deerfield Beach	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 2,486	$ 2,037	$ 703	$ -	$ 5,226	$ 55,056	10.5

WATER CONSERVATION

PROJECT SCOPE

The following section summarizes the water conservation scope of work originally proposed:

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 86,803 gallons

Annual Energy savings: 1,034 kWh

FIM Financial Summary

LIBRARY, DB, Deerfield Beach	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 60	$ 663	$ 51	$ 774	$ 8,031	10.4

G.13. Imperial Point Library

The use of occupancy sensors have been proposed in the majority of the offices, warehouses, garages, and locker rooms. Sensor savings have been determined from logger reports indicating the estimated sensor savings for each space type for every building.

Interior Lighting Occupancy Sensor Scope

Building Name	Areas Controlled by sensors
LIBRARY, IP, Imperial Point	4

G.14. Collier Library

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, CC, Collier City	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	16	16
	Existing T8 Fluorescent - Proposed Retrofit LED	163	163
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	42	42
	Existing Compact Fluorescent - Proposed Relamp LED	30	30
	Existing Compact Fluorescent - Proposed Retrofit LED	10	10
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	21	21

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, CC, Collier City	Existing High Intensity Discharge - Proposed Retrofit LED	33	33
	Existing High Intensity Discharge - Proposed New LED Fixture	13	13

FIM SAVINGS SUMMARY

Annual Electric Consumption: 50,375 kWh
Annual Electric Demand: 182.4 kW

FIM Financial Summary

LIBRARY, CC, Collier City	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 2,922	$ 2,082	$ 784	$ -	$ 5,789	$ 63,752	11.0

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 42,746 gallons
Annual Energy savings: 991 kWh

FIM Financial Summary

LIBRARY, CC, Collier City	Savings KWH	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Water - Retorfits	$ 58	$ 327	$ 143	$ 206	$ 733	$ 8,877	12.1

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability.

The old portion of Collier library contains an uninsulated soffit area, part of which contains electrical penetrations (lighting) which allow air to transfer into the building from the exterior. This thin plastered soffit should be sealed and insulated to eliminate air leakage and reduce conductive heat gain.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 2,092 kWh

FIM Financial Summary

LIBRARY, CC, Collier City	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - COMBINED	$ 173	$ -	$ -	$ 390	$ 564	$ 6,821	12.1

G.15. Lauderhill Library

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, LC, Lauderhill	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	7	7
	Existing T8 Fluorescent - Proposed Retrofit LED	215	215
	Existing Compact Fluorescent - Proposed Retrofit LED	18	18
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	10	10

FIM SAVINGS SUMMARY

Annual Electric Consumption: 52,711 kWh
Annual Electric Demand: 186.96 kW

FIM Financial Summary

LIBRARY, LC, Lauderhill	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 3,057	$ 2,140	$ 630	$ -	$ 5,827	$ 64,767	11.1

G.16. Riverland Branch Library

PROJECT SCOPE – LIGHTING OCCUPANCY SENSORS

The use of occupancy sensors have been proposed in the majority of the offices, warehouses, garages, and locker rooms. Sensor savings have been determined from logger reports indicating the estimated sensor savings for each space type for every building.

Interior Lighting Occupancy Sensor Scope

Building Name	Areas Controlled by sensors
LIBRARY, RV, Riverland Branch	2

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Tank Style Water Closets
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 12,022 gallons

Annual Energy savings: 276 kWh

FIM Financial Summary

LIBRARY, RV, Riverland Branch	Savings KWH	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Water - Retorfits	$ 16	$ 137	$ 11	$ 197	$ 362	$ 4,380	12.1

G.17. Hollywood Beach Library

PROJECT SCOPE – EXTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, HB, Hollywood Beach	Existing High Intensity Discharge - Proposed New LED Fixture	7	7

FIM SAVINGS SUMMARY

Annual Electric Consumption: 6,419 kWh

FIM Financial Summary

LIBRARY, HB, Hollywood Beach	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 647	$ -	$ 104	$ -	$ 751	$ 7,553	10.1

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 21,134 gallons

Annual Energy savings: 1,242 kWh

FIM Financial Summary

LIBRARY, HB, Hollywood Beach	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 125	$ 161	$ 2	$ 288	$ 220	0.8

G.18. Galt Ocean Library

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

The following section summarizes the lighting scope of work originally proposed:

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

NOTE: Lighting systems in some of the buildings fall outside of the dominant scenario and require an adjusted design approach. In this case, the main library spaces in this building are scheduled to be remodeled, including reconfiguration of walls in some spaces. The remodeling will remove the existing suspended grid ceiling and replace it with new ceilings. In this scenario, new LED luminaires have been specified in new and existing locations. This varies from other spaces in that new luminaires will be used instead of retrofitting of existing luminaires. Additionally, any payback evaluation must consider that "doing nothing" is not an option, as the labor to install luminaires in a new ceiling is required regardless of the fixtures used.

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
LIBRARY, GO, Galt Ocean	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	3	3
	Existing T8 Fluorescent - Proposed New LED Fixture	35	33
	Existing Exit Sign - Proposed New LED Fixture	7	9
	Existing Compact Fluorescent - Proposed Retrofit LED	9	9
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	46	46
	Existing Miscellaneous - Proposed New LED Fixture	0	1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 12,475 kWh

FIM Financial Summary

LIBRARY, GO, Galt Ocean	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 1,217	$ -	$ 277	$ 1,370	$ 2,864	$ 34,616	12.1

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 72,204 gallons

Annual Energy savings: 922 kWh

FIM Financial Summary

LIBRARY, GO, Galt Ocean	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 90	$ 823	$ 75	$ 989	$ 10,208	10.3

G.19. BC Agricultural Center

WATER CONSERVATION

The following section summarizes the water conservation scope of work originally proposed:

- Showers
- Flush Valves

FIM SAVINGS SUMMARY

Annual Water savings: 12,689 gallons

Annual Energy savings: 215 kWh

FIM FINANCIAL SUMMARY

BC Agriculture Extension	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 11	$ 155	$ 32	$ 198	$ 2,348	11.8

G.20. BCJC N Wing

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting retrofit scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
BCJC N Wing	Existing High Intensity Discharge - Proposed Retrofit LED	5	5
	Existing High Intensity Discharge - Proposed New LED Fixture	25	25

FIM SAVINGS SUMMARY

Annual Electric Consumption: 635,167 kWh

Annual Electric Demand: 1,725.96 kW

FIM Financial Summary

BCJC N Wing	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 49,983	$ -	$ 14,113	$ 833	$ 64,930	$ 650,180	10.0

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of high efficient plumbing products and controls. The use of these devices is detailed below, and selected for their efficiency, durable, reductions in long-term maintenance costs, and improved hygiene.

PROJECT SCOPE

The following section summarizes the water conservation scope of work originally proposed:

- Showers
- Bathroom Faucets/Aerators
- Tank Style Water Closets
- Urinals
- Flush Valves

FIM SAVINGS SUMMARY

Annual Water savings: 1,438,862 gallons

Annual Energy savings: 6,390 kWh

FIM Financial Summary

BCJC N Wing	Savings KWH	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Water - Retorfits	$ 511	$ 16,403	$ 968	$ 10,833	$ 28,716	$ 345,689	12.0

NOTE: This facility had water retrofits identified as a capital project. Therefore, the financials incorporated capital cost in order to show an accurate payback.

MECHNICAL / AUTOMATION OPTIMIZATION

Automation optimization improves the energy efficiency of existing central chiller plant and heating, cooling and air conditioning (HVAC) systems by reducing energy consumption. During automation optimization, the sequence of operation for each controlled device is developed using in-depth investigations of existing mechanical and control systems, and improved through control programming.

PROJECT SCOPE

Based on trending data and site visits, the following facility improvement measures are proposed to improve the energy efficiency of the existing systems.

- Chiller plant optimization
  - Automation
  - VFD installation on all pumps
  - Replace all existing pump motors
  - Installation of new control valves
- Optimal chiller start to reduce electric demand
- Air handling unit (AHU) static pressure reset at unoccupied hours

To implement the optimization measures:

- Sequence of operations for those proposed measures will be developed, and associated control program will be implemented.
- Sensors required for the measures will be either calibrated, repaired or installed

The implementation of optimization measures assume that existing mechanical equipment and control devices are operable normally, and support implementation of the proposed measures. If during the implementation mechanical equipment and/or control devices are deteriorated such as to prevent proper operations, the measures may be cancelled or modified accordingly.

Chiller Plant Optimization: Chiller plant optimization systematically controls plant mechanical components to improve the overall efficiency. Chiller plant optimization includes chilled water pump speed control (based on dynamic differential pressure that reflects the cooling load), condenser water temperature control (to improve chiller efficiency), and condenser water pump control.

Optimal Equipment Start to Reduce Electric Demand: The purpose of this measure is to avoid high electric demand charges caused by both chillers starting at full load. When the 2nd chiller is called due to cooling load increases or lead- lag switches, limit the lead chiller current to 80% (adjustable) before turning on the second chiller. The current limit for the 2nd chiller is also limited to 80% (adjustable) during starting. After both chillers are on for 30 minutes (adjustable), release the current limits back to normal values.

During lead-lag switch, reduce the current of the running chiller before turning on another chiller. When the 2nd chiller is turned on, limiting its current to 80% (adjustable) for 30 minutes (adjustable) before changing back to the normal limit.

The same strategy can be applied to other HVAC equipment.

AHU Static Pressure Reset at Unoccupied Hours: Based on trending data, the existing HVAC systems use the same static pressure set points to control AHU supply air fan speed during both occupied and unoccupied hours. Resetting static pressure to lower values during unoccupied hours can reduce AHU fan energy consumption.

AHU occupied and unoccupied modes are defined based on schedules. During unoccupied mode, reset AHU static pressure set points to lower values, and modulate AHU fan speed to maintain the set points.

To simply the implementation, each AHU equipped with a VFD will have 2 static pressure set points, one for the occupied mode, and another for the unoccupied mode.

SAVINGS

The savings for Automation Optimization were calculated as followings:

- Building load profiles which were simulated based on available trending data
- Building electricity use for the past 24 months
- Existing operation schedules provided by the County in June 2017
- Nameplate data, onsite measurements, and trending data from control systems

Models and calculations were created and conducted in Excel spreadsheets. The Bin weather data was used for annual energy consumption simulation. The average blended electric rate calculated based on electric bills from 24 months was applied for energy cost calculations.

SIEMENS

FIM SAVINGS SUMMARY

The annual energy savings for each measure is summarized as follows:

- Chiller plant optimization: 1,086,000 kWh per year
- Optimal chiller start to reduce electric demand: 450 kW per year
- AHU static pressure at unoccupied hours: 44,000 kWh per year

FIM Financial Summary

BCJC N Wing	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Chiller Plant Optimization	$ 66,128	$ -	$ -	$ -	$ -	$ -	$ 66,128	$ 583,332	8.8
Optimal chiller start to reduce electric demand	$ -	$ 7,430	$ -	$ -	$ -	$ -	$ 7,430	$ 22,226	3.0
AHU SP reset at unoccupied hours	$ 2,706	$ -	$ -	$ -	$ -	$ -	$ 2,706	$ 22,226	8.2
Retro-commissioning	$ 15,728	$ -	$ -	$ -	$ -	$ -	$ 15,728	$ 77,837	4.9

RETRO-COMMISSIONING

The purpose of retro-commissioning is to improve the efficiency of existing mechanical and control systems, and address issues developed due to equipment and/or device performance degradations, and facility use changes. In the retro-commissioning process, systematic evaluation of system performance is conducted, and energy efficiency improvement measures of no-cost or low-cost are identified and implemented.

PROJECT SCOPE

The following scopes are included in the retro-commissioning process:

- Sensor calibrations and repair
- Identifications and evaluations of energy efficiency measures, which are not proposed in the Automation Optimization section
- Implementations of low-cost or no-cost measures

FIM SAVINGS SUMMARY

Annual Energy Consumption Savings: 224,000 kWh.

FIM Financial Summary

BCJC N Wing	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cos	Payback
Retrocommissioning	$ 15,728	$ -	$ -	$ -	$ -	$ -	$ 15,728	$ 77,837	4.9

CHILLER PLANT OPTIMIZATION

PROJECT SCOPE

Based on trending data and site visits, the following facility improvement measures are proposed to improve the energy efficiency of the existing systems.

Optimal Equipment Start to Reduce Electric Demand: The purpose of this measure is to avoid high electric demand charges caused by both chillers starting at full load. When the 2nd chiller is called due to cooling load increases or lead- lag switches, limit the lead chiller current to 80% (adjustable) before turning on the second chiller. The current limit for the 2nd chiller is also limited to 80% (adjustable) during starting. After both chillers are on for 30 minutes (adjustable), release the current limits back to normal values.

During lead-lag switch, reduce the current of the running chiller before turning on another chiller. When the 2nd chiller is turned on, limiting its current to 80% (adjustable) for 30 minutes (adjustable) before changing back to the normal limit.

The same strategy can be applied to other HVAC equipment.

SAVINGS

Models and calculations were created and conducted in Excel spreadsheets. The Bin weather data was used for annual energy consumption simulation. The average blended electric rate calculated based on electric bills from 24 months was applied for energy cost calculations.

FIM SAVINGS SUMMARY

Annual Electric Consumption: - kWh

Annual Electric Demand: 76.5 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
BCJC N Wing	Chiller start to	$ -	$ 7,429.85	$ -	$ -	$ 7,429.85	$ 23,871.37	3.2

G.21. South Regional Courthouse

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
South Regional Courthouse	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	45	45
	Existing T8 Fluorescent - Proposed Retrofit LED	292	292
	Existing Incandescent - Proposed Relamp LED	7	7
	Existing Compact Fluorescent - Proposed Relamp LED	196	196
	Existing Compact Fluorescent - Proposed Retrofit LED	29	29
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	892	892

FIM SAVINGS SUMMARY

Annual Electric Consumption: 118,092 kWh

Annual Electric Demand: 476.52 kW

FIM Financial Summary

South Regional Courthouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 11,080	$ -	$ 3,888	$ -	$ 14,968	$ 193,863	13.0

BUILDING ENVELOPE

A complete building envelope audit was conducted for all facilities within the scope of work issued for this investment grade audit. The building envelope audit's primary goal is to discover and define improvements that can reduce energy consumption, improve occupant comfort and productivity, and increase building and structural durability.

PROJECT SCOPE

The South Regional Courthouse contains large quantities of soffit areas that extend out over the exterior environment. These soffits are all very leaky, allowing outside air/moisture to easily infiltrate the building. These soffits should be air-sealed to eliminate this air intrusion.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 4,097 kWh

FIM Financial Summary

South Regional Courthouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Building Envelope - Air-Seal Soffits	$ 340	$ -	$ -	$ 606	$ 946	$ 11,453	12.1

AUTOMATION OPTIMIZATION

Automation optimization improves the energy efficiency of existing central chiller plant, and heating, cooling and air conditioning systems (HVAC) to reduce energy consumption and costs by implementing optimization control strategies. During automation optimization, the sequence of operation for each measure for controlled devices is developed based on in-depth investigations of the existing mechanical and control systems, and the measure is implemented in existing control systems through control programming.

PROJECT SCOPE

Based on trending data and site visits, the following facility improvement measures are proposed to improve the energy efficiency of the existing systems.

Supply air or room temperature reset: For variable air volume (VAV) terminal box, when calling reheating, reset supply air temperature while satisfying the room humidity requirements. This measure can reduce the energy consumption caused by reheating. In addition, room temperature at not critical areas can be reset at unoccupied hours to reduce energy consumption of HVAC systems.

FIM SAVINGS SUMMARY

The annual energy savings for each measure is summarized as follows:

Supply air or room temperature reset: 34,000 kWh per year

FIM Financial Summary

South Regional Courthouse	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Chiller Lead/Lag Optimization	$ -	$ 1,742	$ -	$ -	$ -	$ -	$ 1,742	$ 6,673	3.8
AHU SAT Reset	$ 2,800	$ -	$ -	$ -	$ -	$ -	$ 2,800	$ 6,673	2.4
OA Intake Control	$ 5,585	$ -	$ -	$ -	$ -	$ -	$ 5,585	$ 22,937	4.1

AUTOMATION OPTIMIZATION

Automation optimization improves the energy efficiency of existing central chiller plant, and heating, cooling and air conditioning systems (HVAC) to reduce energy consumption and costs by implementing optimization control strategies. During automation optimization, the sequence of operation for each measure for controlled devices is developed based on in-depth investigations of the existing mechanical and control systems, and the measure is implemented in existing control systems through control programming.

PROJECT SCOPE

Based on trending data and site visits, the following facility improvement measures are proposed to improve the energy efficiency of the existing systems.

- Outdoor air (OA) intake control

Outdoor air intake control: Based on trending data, it was found that the existing HVAC systems were turned on when the building was still unoccupied, and off several hours after the building was unoccupied. Closing the OA dampers at unoccupied hours at warm and humid seasons can reduce energy consumption and better control indoor humidity levels. At occupied hours, using demand controlled ventilation to control the amount of OA intake to save energy.

SAVINGS

FIM SAVINGS SUMMARY

The annual energy savings for each measure is summarized as follows:

OA intake control: 68,099 kWh per year

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
South Regional Courthouse	OA Reduction	$ 5,584.50	$ -	$ -	$ -	$ 5,584.50	$ 24,574.99	4.4

G.22. Emergency Operations Center

EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Emergency Operations Center	Existing High Intensity Discharge - Proposed New LED Fixture	24	24
	Existing Compact Fluorescent - Proposed Retrofit LED	8	8

FIM SAVINGS SUMMARY

Annual Electric Consumption: 178,191 kWh

Annual Electric Demand: 452.58 kW

Fim Financial Summary

Emergency Operations Center	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 14,363	$ -	$ 2,289	$ -	$ 16,652	$ 171,394	10.3

CHILLER REPLACEMENT AND ROOM TEMPERATURE RESET

The chiller replacement aims to improve chiller energy efficiency by replacing the aged inefficient chiller with a new chiller of a similar model and better efficiency. This measure will also fulfill the County's request to add redundancy to the existing plant.

Resetting room temperature at unoccupied hours is a common strategy to reduce building energy consumption. This work will be done in conjunction with the plant upgrades as the re-sequencing and updates of current sequences within the BAU will be required.

PROJECT SCOPE

The followings are included in the scope of work of the combined FIM:

- Provide two (2) 115 nominal ton R-134a air-cooled screw chiller
- Remove the old chiller and be responsible for the proper demolition of the unit.
- Expand the current plant enclose
- Connect the new chiller to the existing piping system

- Additional piping for new redundant chiller
- Additional electrical needs for redundant chiller
- Start up the new chillers
- Reset room temperatures

Chiller Replacement: Cooling for the building is provided by a chiller plant consisting of one (1) air-cooled 110-ton Trane rotary liquid chiller. The chiller is original to the building's construction, 1997, and has a history of failures and the coils are visibly, extensively damaged. It is at the end of its useful life. The existing chiller will be replaced by one (1) new 115-nominal ton air-cooled R-134a chiller with better efficiency.

Room Temperature Reset: Based on trending data, most rooms in the building used constant room temperature set point. For spaces that need HVAC for comfort, room temperature can be reset during unoccupied hours to save energy. During unoccupied mode, reset the room temperature cooling set point to 78°F (adjustable), and reset room temperature heating set point to 65°F (adjustable). The occupied and unoccupied modes are defined based on schedules.

FIM SAVINGS SUMMARY

Annual Energy Consumption Savings: 241,000 kWh.

FIM Financial Summary

Emergency Operations Center	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Chiller Replace & Redundancy & Resets	$ 17,767	$ -	$ -	$ -	$ -	$ 38,250	$ 56,017	$ 707,434	12.6

ROOM TEMPERATURE RESET - ONLY

PROJECT SCOPE

Room Temperature Reset: Based on trending data, most rooms in the building used constant room temperature set point. For spaces that need HVAC for comfort, room temperature can be reset during unoccupied hours to save energy. During unoccupied mode, reset the room temperature cooling set point to 78°F (adjustable), and reset room temperature heating set point to 65°F (adjustable). The occupied and unoccupied modes are defined based on schedules.

SAVINGS

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Emergency Operations Center	AHU temp reset at unoccupied hours	$ 5,029.45	$ -	$ -	$ -	$ 5,029.45	$ 24,171.26	4.8

G.23. West Regional Courthouse

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
West Regional Courthouse	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	2	2
	Existing T8 Fluorescent - Proposed Retrofit LED	548	548
	Existing T8 Fluorescent - Proposed New LED Fixture	517	517
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	2	2
	Existing Compact Fluorescent - Proposed Retrofit LED	413	413
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	3	3

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
West Regional Courthouse	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	12	12
	Existing High Intensity Discharge - Proposed Retrofit LED	6	6
	Existing High Intensity Discharge - Proposed New LED Fixture	21	21
	Existing Compact Fluorescent - Proposed New LED Fixture	7	7

FIM SAVINGS SUMMARY

Annual Electric Consumption: 202,200 kWh

Annual Electric Demand: 720.48 kW

FIM Financial Summary

West Regional Courthouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 17,699	$ -	$ 3,276	$ -	$ 20,975	$ 246,290	11.7

G.24. Highway and Bridge Administration

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures
- LED Replacement for High Intensity Discharge Interior
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
HIGH & BRDG Administration, Pompano	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	10	10
	Existing T8 Fluorescent - Proposed Retrofit LED	107	107
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture	4	4
	Existing Incandescent - Proposed Relamp LED	6	6
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	2	2

FIM SAVINGS SUMMARY

Annual Electric Consumption: 12,668 kWh

Annual Electric Demand: 55.86 kW

FIM Financial Summary

HIGH & BRDG Administration, Pompano	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 1,217	$ -	$ 169	$ -	$ 1,386	$ 13,846	10.0

AUTOMATION – SCHEDULES

Standard thermostats control an HVAC unit by measuring the ambient temperature at the thermostat and either turning the unit on if the ambient temperature is above the temperature setpoint or turning the unit off when the ambient temperature reaches the setpoint. Most commercial facilities have set hours of operation where the facility is occupied and there is a need for conditioned space. Outside of hours of operation a facility will usually not have occupancy and won't have a need for air conditioning. Advanced Siemens thermostats allow for the utilization of this fact to translate into energy savings by changing the setpoint temperatures of a building automatically depending on the hours of operation. In addition, these thermostats have the capability to be wirelessly connected to a BAS system for remote monitoring and control.

PROJECT SCOPE

This FIM address the turn-key replacement and installation of two (2) thermostats with scheduling capabilities.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 59,375 kWh

FIM Financial Summary

HIGH & BRDG Administration, Pompano	Savings KWH	Total Savings	Project Cost	Payback
HVAC Schedules	$ 3,902	$ 3,902	$ 6,381	1.6

G.25. BCJC State Attorney's Office (LTS)

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
BCJC States Attorney Office (LTS)	Existing High Intensity Discharge - Proposed New LED Fixture	1	1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 22,714 kWh

Annual Electric Demand: 66.12 kW

FIM Financial Summary

BCJC States Attorney Office (LTS)	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 1,354	$ 740	$ 261	$ -	$ 2,355	$ 19,466	8.3

G.26. BC Government Center

RETRO-COMMISSIONING

The purpose of retro-commissioning is to improve the efficiency of existing mechanical and control systems. It addresses issues that have developed during buildings' life due to performance degradations and facility use changes. In the retro-commissioning process, systematic evaluation of system performance is conducted, and energy efficiency improvement measures of no-cost or low-cost are identified and implemented.

PROJECT SCOPE

The following scopes are included in retro-commissioning:

- Sensor calibration and repair
- Identifications and evaluations of energy efficiency measures, which are not already proposed in the Automation Optimization section
- Implementations of low cost or no cost measures

FIM SAVINGS SUMMARY

Annual Energy Consumption Savings: 301,000 kWh.

FIM Financial Summary

BC Gov. Center	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Retrocommissioning	$ 21,121	$ -	$ -	$ -	$ -	$ -	$ 21,121	$ 104,529	4.9

G.27. Edgar Mills Center

INTERIOR LIGHTING PROJECT SCOPE

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Edgar Mills Center	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	74	74
	Existing Compact Fluorescent - Proposed Retrofit LED	111	111
	Existing T5 Fluorescent - Proposed RETROFIT LED	877	877

FIM SAVINGS SUMMARY

Annual Electric Consumption: 9,015 kWh

Annual Electric Demand: 763.08 kW

FIM Financial Summary

Edgar Mills Center	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 10,258	$ 6,733	$ 3,513	$ -	$ 20,503	$ 206,018	10.0

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – EXTERIOR LIGHTING

LED Replacement for High Intensity Discharge Exterior

The replacement of HID (high intensity discharge), including metal halide or high-pressure sodium n exterior applications provides significant energy reduction opportunities when changing over to LED. For exterior pole mounted applications, often the number of fixtures can be reduce based on the improved photometric and light distribution of the new LED fixtures that wasn't previously available in HID fixtures. All proposed LED fixtures are from recognized manufacturers that have met the required standards for light quality, efficiency and longevity. In our design effort and fixture selection process, consideration is given to the maintenance benefits of the prescribed solution resulting in less future costs to maintain exterior fixtures in difficult to reach applications. The proposed LED fixture replacement has been specified to furnish light levels that are in compliance with recommended light levels and support the existing site condition requirements. Where time clocks or automated lighting controls are not in place, proposed LED building and site lighting will incorporate an integral photocell to maximize energy savings.

In general, the design approach is to replace existing HID luminaires with new LED luminaires of like type, ie: shoeboxes, wallpacks, floodlights. Some fixture types are replaced with new LED fixtures of a different type, ie: recessed canopy lights replaced with low profile LED canopy lights.

Where deemed appropriate in parks and office buildings, integral occupancy sensors have been used on pole mounted shoebox luminaires in parking lots to automatically dim the lighting during hours of inactivity.

Decorative post top luminaires, recessed step lights, and bollards typically use low wattage HID lamps in architectural form factors. Replacement luminaires of this type are relatively high in cost, with relatively low energy savings potential. As a result, the proposed design typically calls for removing the HID lamp and ballast, and installing a new screw based LED lamp.

LED Replacement for Fluorescent Exterior

Luminaires with pin based compact fluorescent lamps will generally be retrofit by removing the existing fluorescent lamps and ballast, and installing new line voltage, pin based LED lamps. Existing screw based incandescent and fluorescent lamps will be replaced with new screw based LED lamps.

Exterior fixtures with existing linear fluorescent lamps, such as surface mounted enclosed and gasketed fixtures in park pavilions are evaluated for fixture condition, and either retrofit with new LED T8, UL Type B lamps, or replaced with new luminaires utilizing dedicated LED boards and drivers.

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Edgar Mills Center	Existing High Intensity Discharge - Proposed Retrofit LED	2	2
	Existing High Intensity Discharge - Proposed New LED Fixture	59	59
	Existing T5 Fluorescent HO - Proposed RETROFIT LED	180	180

SAVINGS

The energy and cost savings were developed using a spreadsheet model. In the analysis, the existing lighting wattage per fixture was reduced to reflect the installation of higher efficiency technology. A detailed room by room survey of the facility, available in Section H, Appendices, was performed to accurately determine the existing lighting type and quantity.

The runtime operations of the new lighting fixtures are reduced in areas that are recommended for lighting occupancy sensors. This runtime reduction was determined based on the results of lighting and occupancy data logging sessions conducted at various facilities. The results of these data logging session, as well as the resulting hour of operations of lights per space type are provided also provided in Section H, Appendices.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 88,886 kWh

Annual Electric Demand: 248.52 kW

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Edgar Mills Center	Lighting - Exterior	$ 5,068.25	$ 2,790.60	$ -	$ 1,184	$ 9,042.85	$ 93,236.12	10.3

CHILLER COIL REPLACEMENT AND ROOM TEMPERATURE RESET

PROJECT SCOPE

The followings are included in the scope of work for the combined FIM:

- Provide evaporator coils for the two air-cooled chillers
- Remove the old coils.
- Test the chillers with new coils
- Reset room temperature

SAVINGS

FIM SAVINGS SUMMARY

Annual Energy Consumption Savings: 57,268 kWh.

FIM Financial Summary

Building or Facility	Description	SAVINGS Electric KWh $	SAVINGS Electric KW $	SAVINGS Water $	SAVINGS O & M	Total Savings	Project Costs	Simple Payback
Edgar Mills Center	Chiller Coil Replacement &	$ 4,743.85	$ -	$ -	$ -	$ 4,743.85	$ 127,888.56	27.0

G.28. Hunter Hughes Health Center

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
hunter & hughes bldg	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	15	15
	Existing High Intensity Discharge - Proposed New LED Fixture	23	23
	Existing T8 Fluorescent - Proposed New LED Fixture	20	20

Exterior Lighting Sensor Scope

Building Name	Areas Controlled by sensors
hunter & hughes bldg	2

PROJECT SCOPE – OCCUPANCY SENSORS

The use of occupancy sensors have been proposed in the majority of the offices, warehouses, garages, and locker rooms. Sensor savings have been determined from logger reports indicating the estimated sensor savings for each space type for every building.

Interior Lighting Occupancy Sensor Scope

Building Name	Areas Controlled by sensors
hunter & hughes bldg	85

FIM SAVINGS SUMMARY

Annual Electric Consumption: 254,435 kWh
Annual Electric Demand: 526.68 kW

FIM Financial Summary

Hunter & Hughes bldg	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 14,614	$ 5,045	$ 2,525	$ -	$ 22,183	$ 199,350	9.0

G.29. South Regional Health Center

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
south regional health center	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	15	15
	Existing T8 Fluorescent - Proposed Retrofit LED	293	293
	Existing T8 Fluorescent - Proposed New LED Fixture	325	325
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	18	18
	Existing Compact Fluorescent - Proposed Retrofit LED	20	20
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	3	3

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
south regional health center	Existing High Intensity Discharge - Proposed New LED Fixture	26	26
	Existing Compact Fluorescent - Proposed Relamp LED	20	20

FIM SAVINGS SUMMARY

Annual Electric Consumption: 159,468 kWh
Annual Electric Demand: 533.2 kW

FIM Financial Summary

South Regional Health Center	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 8,864	$ 6,112	$ 1,701	$ -	$ 16,677	$ 156,985	9.4

MECHANICAL

In recent years the energy efficiency of DX equipment has improved due to mandates as well as manufacture improvements. DX air-conditioning systems are rated by their Seasonal Energy Efficiency Ratios (SEER). The higher the SEER rating the more energy efficient the units are. Older units have average SEER ratings between 8-10 while new units have average SEER ratings of 13 or greater.

Cooling for this building is primarily provided by a chiller plant. This FIM addresses the roof-top unit that formerly served the TB ward and now cools a storage space.

PROJECT SCOPE

This FIM addresses the replacement of one (1) roof top unit (Aon) This Aon unit was originally installed and designed to condition patient rooms. The space has been repurposed for storage. New unit specifications for a smaller OA makeup unit will be incorporated into the location where the current RTU sits.

The new equipment will be of equal capacity and include, as part of the installation, package new programmable thermostats provided by Siemens. The thermostats will be able to communicated, via their own IP address, to remote BAUs for additional access. The units will be placed on a time of day schedule. The new schedule will command the units to turn on 1.5 hours before the facility opens and 1.5 hours after it closes.

Scope of Work

Building	Equipment	Make	Model	Tons	Existing EER	New EER
South Regional Health Center	RTU	Aon	RQ-006-3-V-FB19	6		13.1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 6,876 kWh

Annual Electric Demand: 39.9 kW

FIM Financial Summary

South Regional Health Center	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
RTU Replacement	$ 382	$ 454	$ -	$ 1,133	$ 1,969	$ 24,331	12.4

Savings Capital: Capital budget dollars were used in order to improve the payback to the requested limitation values. These dollars represent unused amounts left over from the Capital Project Plan total. Funds were first applied to their respective capital project until the required payback was achieved. All remaining amounts were distributed to FIM opportunites such as the one above.

AUTOMATION OPTIMIZATION

PROJECT SCOPE

Based on trending data and site visits, the following facility improvement measures are proposed to improve the energy efficiency of the existing systems.

- Room temperature reset
- AHU runtime reschedule
- Outdoor air (OA) intake control

To implement the optimization measures:

- Sequence of operations for those proposed measures will be developed, and associated control program will be implemented.
- Sensors required for the measures will be calibrated, repaired or installed

The implementation of the optimization measures are based on the condition that the existing mechanical equipment and control devices are operable normally and allow the implementation of the proposed measures. If during the implementation, the mechanical equipment, and the devices are deteriorated and prevent the implementations, the measures may be cancelled or modified accordingly.

Room Temperature Reset: Based on trending data, most rooms in the building used constant room temperature set point. For spaces that need HVAC for comfort, room temperature can be reset during unoccupied hours to save energy. During unoccupied mode, reset the room temperature cooling set point to 78°F (adjustable), and reset room temperature heating set point to 65°F (adjustable). The occupied and unoccupied modes are defined based on schedules.

AHU Runtime Reschedule: Based on trending data, AHU1, 2 and 7 existing operation hours were from 4:00Am to 11:00PM. Schedule the operation hours to 6:00AM to 7:00PM to reduce energy consumption.

Outdoor air intake control: Based on trending data, it was found that the OA dampers of the existing HVAC systems were open during unoccupied hours. Closing the OA dampers at unoccupied hours at warm and humid seasons can reduce energy consumption and better control indoor humidity levels.

FIM SAVINGS SUMMARY

Annual Energy Consumption Savings: 57,000 kWh per year.

FIM Financial Summary

South Regional Health Center	Savings KWH	Savings KW	Savings Gas	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Reschedules, Resets, and OA Control	$ 3,915	$ -	$ -	$ -	$ -	$ -	$ 3,915	$ 32,823	8.4

G.30. NW Family Success Center

EXTERIOR LIGHTING PROJECT SCOPE

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Family Success Center, NW	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	13	13
	Existing High Intensity Discharge - Proposed Retrofit LED	12	12
	Existing High Intensity Discharge - Proposed New LED Fixture	3	3
	Existing Compact Fluorescent - Proposed Relamp LED	6	6
	Existing Compact Fluorescent - Proposed Retrofit LED	1	1

Exterior Lighting Sensor Scope

Building Name	Areas Controlled by sensors
Family Success Center, NW	3

OCCUPANCY SENSORS PROJECT SCOPE

The use of occupancy sensors have been proposed in the majority of the offices, warehouses, garages, and locker rooms. Sensor savings have been determined from logger reports indicating the estimated sensor savings for each space type for every building.

Interior Lighting Occupancy Sensor Scope

Building Name	Areas Controlled by sensors
Family Success Center, NW	1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 35,121 kWh

Annual Electric Demand: 126.54 kW

FIM Financial Summary

Family Success Center, NW	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 2,100	$ 1,111	$ 571	$ 2,439	$ 6,222	$ 66,767	10.7

NOTE: This facility had a capital project listed to be completed within the next five years: retrofitting all lights.

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

The following section describes all water conservation scope of work proposed:

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 42,842 gallons

Annual Energy savings: 399 kWh

FIM Financial Summary

Family Success Center, NW	Savings KWH	Savings Water	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Water - Retorfits	$ 22	$ 327	$ 74	$ 23	$ 447	$ 5,408	12.1

G.31. Mid-Rise / East Parking

EXTERIOR LIGHTING PROJECT SCOPE

The following section describes all lighting scope of work proposed:

- LED Replacement for High Intensity Discharge Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Mid-Rise / East Parking	Existing High Intensity Discharge - Proposed New LED Fixture	19	19

FIM SAVINGS SUMMARY

Annual Electric Consumption: 442,235 kWh

Annual Electric Demand: 638.4 kW

FIM Financial Summary

Mid-Rise / East Parking	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 24,859	$ -	$ 8,571	$ -	$ 33,430	$ 212,771	6.4

G.32. State Attorney & Clerks Warehouse

LIGHTING RETROFIT

The following section describes all lighting scope of work proposed for implementation.

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed:

- LED Replacement of Linear Lamps
- LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
State Attorney & Clerks Warehouse	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	4	4
	Existing T8 Fluorescent - Proposed Retrofit LED	42	42
	Existing Incandescent - Proposed Relamp LED	2	2
	Existing T8 Fluorescent - Proposed Retrofit LED	84	84

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed:

- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
State Attorney & Clerks Warehouse	Existing Compact Fluorescent - Proposed Relamp LED	7	7

FIM SAVINGS SUMMARY

Annual Electric Consumption: 26,303 kWh

Annual Electric Demand: 77.52 kW

FIM Financial Summary

State Attorney & Clerks Warehouse	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 2,318	$ -	$ 449	$ -	$ 2,767	$ 26,081	9.4

AUTOMATION – SCHEDULES

Standard thermostats control an HVAC unit by measuring the ambient temperature at the thermostat and either turning the unit on if the ambient temperature is above the temperature setpoint or turning the unit off when the ambient temperature reaches the setpoint. Most commercial facilities have set hours of operation where the facility is occupied and there is a need for conditioned space. Outside of hours of operation a facility will usually not have occupancy and won't have a need for air conditioning. Advanced Siemens thermostats allow for the utilization of this fact to translate into energy savings by changing the setpoint temperatures of a building automatically depending on the hours of operation. In addition, these thermostats have the capability to be wirelessly connected to a BAS system for remote monitoring and control.

PROJECT SCOPE

This FIM address the turn-key replacement and installation of two (2) thermostats with scheduling capabilities for the units with the serial number ending in 5679 and 3984.

FIM SAVINGS SUMMARY

Annual Electric Consumption: 19,089 kWh

FIM Financial Summary

State Attorney & Clerks Warehouse	Savings KWH	Total Savings	Project Cost	Payback
Split Sustem Scheduling	$ 1,138	$ 1,138	$ 5,013	4.4

G.33. Mass Transit Downtown Terminal

LIGHTING RETROFIT

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for Screw Based Incandescent and Compact fluorescent fixtures
- LED Replacement for Pin-Based Compact Fluorescent Fixtures
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
MASS TRAN, Downtown Terminal	Existing T8 Fluorescent - Proposed Retrofit LED	25	25
	Existing Incandescent - Proposed Relamp LED	2	2
	Existing Compact Fluorescent - Proposed Relamp LED	1	1
	Existing T12 Fluorescent - Proposed Retrofit LED	4	4
	Existing Compact Fluorescent - Proposed Retrofit LED	1	1
	Existing T8 Fluorescent U Tube - Proposed New LED Fixture	2	2

FIM SAVINGS SUMMARY

Annual Electric Consumption: 52,963 kWh

Annual Electric Demand: 152.76 kW

FIM Financial Summary

MASS TRAN, Downtown Terminal	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lighting - Interior	$ 315	$ -	$ 47	$ -	$ 362	$ 4,733	13.1

SIEMENS

WATER CONSERVATION

This FIM addresses the reduction of water consumption, wastewater production, and hot water energy usage through the installation of highly efficient, plumbing products and controls. The use of these devices and others are detailed below and were selected not only for their efficiency, but also to provide for durable, long-term use with minimal maintenance and improved hygiene.

PROJECT SCOPE

The following section describes all lighting scope of work proposed for implementation.

- Flush Valves
- Urinals
- Bathroom Faucets/Aerators

FIM SAVINGS SUMMARY

Annual Water savings: 78,921 gallons

Annual Energy savings: 1,096 kWh

FIM Financial Summary

MASS TRAN, Downtown Terminal	Savings KWH	Savings Water	Savings O&M	Total Savings	Project Cost	Payback
Water - Retorfits	$ 62	$ 900	$ 65	$ 1,027	$ 10,559	10.3

G.34. Fleet Services #2

LIGHTING RETROFIT

PROJECT SCOPE – INTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement of Linear Lamps
- LED Replacement for High Intensity Discharge Interior
- Emergency Lighting

Interior Lighting Retrofit Scope

BUILDING NAME	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Fleet Services # 2, SR 84	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	4	4
	Existing T8 Fluorescent - Proposed Retrofit LED	8	8
	Existing High Intensity Discharge - Proposed New LED High-Bay Fixture	48	48
	Existing T8 Fluorescent - Proposed Retrofit LED With Reflector kit	30	30
	Existing High Intensity Discharge - Proposed New LED Fixture	12	12

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting Retrofit Scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
Fleet Services #2, SR 84	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	7	7
	Existing High Intensity Discharge - Proposed New LED Fixture With Sensor	18	14
	Existing High Intensity Discharge - Proposed New LED Fixture	12	12
	Existing T8 Fluorescent - Proposed New LED Fixture	4	4

Exterior Lighting Sensor Scope

Building Name	Areas Controlled by sensors
Fleet Services #2, SR 84	3

FIM SAVINGS SUMMARY

Annual Electric Consumption: 79,010 kWh

Annual Electric Demand: 278.16 kW

FIM Financial Summary

Fleet Services #2, SR 84	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 6,312	$ -	$ 834	$ -	$ 7,146	$ 79,706	11.2

G.35. West Regional Maintenance

PROJECT SCOPE – EXTERIOR LIGHTING

The following section describes all lighting scope of work proposed for implementation.

- LED Replacement for High Intensity Discharge Exterior
- LED Replacement for Fluorescent Exterior

Exterior Lighting retrofit scope

BUILDING	EXISTING & RETROFIT STANDARD LEGEND DESCRIPTIONS	EXISTING QTY	RETROFIT QTY
West Regional Maintenance Center	Existing Excluded due to lack of cost effective replacement or more efficient option - No Retrofit Proposed	2	2
	Existing High Intensity Discharge - Proposed New LED Fixture	2	2
	Existing Compact Fluorescent - Proposed Relamp LED	1	1

FIM SAVINGS SUMMARY

Annual Electric Consumption: 3,234 kWh

FIM Financial Summary

West Regional Maintenance Center	Savings KWH	Savings KW	Savings O&M	Savings Capital	Total Savings	Project Cost	Payback
Lightgin - COMBINED	$ 326	$ -	$ 46	$ -	$ 372	$ 3,891	10.5

G.36. Solar Opportunities

PROJECT SCOPE – SOLAR CARPORT AND ROOFTOP

The following section describes all solar scope of work proposed for implementation.

- Hollywood Library – Rooftop Solar
- Tamarac Library – Rooftop Solar'
- CB Smith Park – Carport Solar

HOLLYWOOD LIBRARY

The proposed solar solution for this facility is a rooftop solar installation. Although the rooftop was not accessible at the time of the site visit, satellite imaging showed no apparent degradation of the roof. The roof type is modified bitumen and the structural deck is concrete. The interconnection voltage is 480V/277V.

Hollywood Library Site Visit

Below is the rendering of the proposed solar layout for this facility.

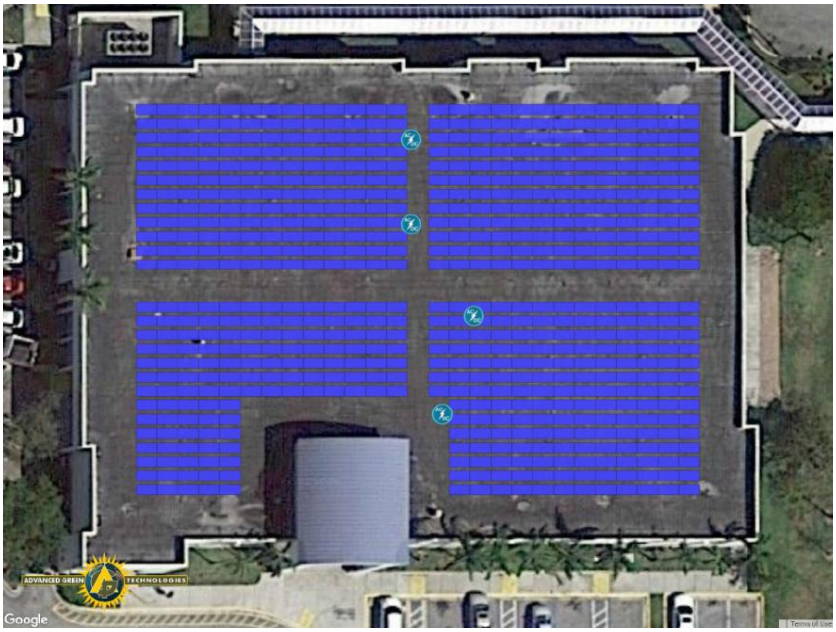
Hollywood Library-Proposed Solar Layout

TAMARAC LIBRARY

The proposed solar solution for this facility is a rooftop solar installation. The rooftop showed no apparent degradation and was in good condition. The roof type is modified and the structural deck is concrete. The interconnection voltage is 480V/277V.

Tamarac Library Site Visit

Below is the rendering of the proposed solar layout for this facility.



Tamarac Library-Proposed Solar Layout

CB SMITH PARK

The proposed solar solution for this facility is a carport installation. The carport was designed to go over the parking lot of the recreational water park within CB Smith Park as this is the area of the park with the highest energy intensity. The site visit revealed that there are no obstacles in the existing parking lot that would render it unsuitable for solar carport installation. The interconnection voltage is 480V/277V.

CB Smith Park Site Visit

Below is the rendering of the proposed solar layout for this facility.

CB Smith Park-Proposed Solar Layout

PROJECT SCOPE - ROOFTOP

The rooftop solar energy production FIM begins by conducting a detailed structural analysis of the roof and structural members of the facility in order to verify it can withstand the different loads and forces that will be present when photovoltaic modules are placed on the roof. A specialized racking system will be placed in an optimal layout that allows for maximum solar energy production, access to equipment for operation and maintenance purposes, and sound structural installation to withstand the weather elements present in this region. The photovoltaic modules will be placed on this racking system and connected to inverters and transformers which convert the direct current generated by the modules into alternating current that is the standard form of electricity supplied to this facility in the required amounts of amperage and voltage This system is designed to supplement, but not exceed, the electrical needs for this facility.

PROJECT SCOPE – CARPORT

The carport solar energy production FIM begins by conduction a detailed structural and geotechnical analysis of the site where the foundation for the structural members of the carport will be placed in order to verity it can withstand the different loads and forces that will be present when the carport is erected. The carport will be built on a parking lot that is near an area of high energy intensity in order to displace as much energy needed from the utility grid as possible. Once complete, the carport will meet all necessary height regulations pertaining to this type of structure. The carport will provide the benefit of offsetting facility utility costs, shading to customers visiting the site, and lowering the carbon footprint of this facility.

FIM SAVINGS SUMMARY

- CB Smith: 1,502,083 kWh
- Hollywood Library: 391,596 kWh
- Tamarac Library: 316,048 kWh

FIM Financial Summary

Solar PV - ALL Sites	Savings KWH	Total Savings	Project Cost	Payback
TOTAL	$ 176,687	$ 176,687	$ 5,013,336	28.4

H. Appendices

Refer to submitted files contained on USB

Performance Assurance Baseline Documentation

HVAC Replacements – Pre-retrofit Building Conditions

Locations	Unit / Serial Number	Make / Model	Number of Compressors Running	Annual Operating Hours (AOH)	Pre-Retrofit Unit Draw (kW_{pre})	Pre-Retrofit Electric Consumption (kWh_{pre})
Delevoe Park	CU / 0200G00157	Carrier / 38AK-007-V511	1	1,617	6.3	10,129
Delevoe Park	CU / 0200G00154	Carrier / 38AK-007-V511	1	5,898	9.6	56,507
Delevoe Park	CU / 2509G30115	Carrier / 38ARZ007-K501	1	2,769	6.1	16,833
Delevoe Park	CU / N0M8454757	York / HA090C00A2AAA1A	1	3,056	6.4	19,579
Roosevelt Gardens Park	CU / 200710-CCCF07870	Aaon / CA1305	1	4,495	9.8	43,896
Roosevelt Gardens Park	CU / 3707E24294	Carrier / 24ABR350A350	1	3,001	4.7	14,190
			2	500	7.6	3,794
Roosevelt Gardens Park	CU / 0307E13587	Carrier / 24ABR360HB0330	1	4,408	5.4	23,711
			2	735	7.6	5,572
BCJC State Attorney's Office	CU / E041019146	Heil / HAC260AKC4	1	319	5.8	1,837
BCJC State Attorney's Office	CU / E031042841	Heil / HAC260AKA5	1	3,457	5.6	19,437
BCJC State Attorney's Office	CU / E041051921	Heil / HAC260AKC4	1	4,342	4.9	21,326
BCJC State Attorney's Office	CU		1	3,286	3.3	10,732
BCJC State Attorney's Office	CU / E031626923	Heil / HAC260AKA5	1	22	5.2	115
BCJC State Attorney's Office	CU / L021633160	Heil / HAC260AKA4	1	22	6.3	142
Fleet Services #2	CU / W101505366	Thermal Zone / TZAA-360-CC757	1	7,318	6.3	46,112
Fleet Services #2	CU / R162N4N4F	Allegiance 10 / 7C0060B300A0	1	6,979	7.8	54,439
Imperial Point Library	RTU / 1204G20562	Carrier / 501FF012-511	1	3,995	7.1	28,300
Imperial Point Library	RTU	Carrier	1	6,908	12.2	83,919
			2	604	18.8	11,340
Imperial Point Library	RTU / 927100499D	Trane / TCD180E300AA	1	3,165	16.1	51,080

SIEMENS

Imperial Point Library	RTU	Trane / TSC120E3R0A0000	1	5,121	12.2	62,335
Collier City Library	RTU / NFMM065842	DS-03C00AFDAA	1	5,076	4.8	24,191
Collier City Library	RTU / NFMM063451	DU-08C00ATDAA3A	1	2,384	5.2	12,362
			2	7,299	9.5	69,103
Collier City Library	RTU / NFMM063455	DU-07C00ATDAA3A	1	3,178	8.5	26,834
			2	308	11.0	3,411
Riverland Branch Library	RTU / 4303G50596	Carrier / 50TFF012-V511	1	3,856	6.2	24,040
			2	2,806	10.8	30,207
Riverland Branch Library	RTU / 4203F59320	Carrier / 50TJ-024-V5A1YA	1	1,495	6.6	9,790
			2	4,993	16.1	80,165

HVAC Replacements – Pre-retrofit Building Conditions (continued)

Locations	Unit / Serial Number	Make / Model	Number of Compressors Running	Annual Operating Hours (AOH)	Pre-Retrofit Unit Draw (kW_{pre})	Pre-Retrofit Electric Consumption (kWh_{pre})
Northwest Family Success Center	DX Unit / 4032MMBAD	Trane / TTA090A300FA	1	3,994	5.7	22,713
			2	888	7.7	6,846
Northwest Family Success Center	DX Unit / 4042KKR2F	Trane / 2TTA0072A3000AA	1	2,746	5.6	15,429
Northwest Family Success Center	RTU	Trane / TCD211C300BA	1	3,890	14.3	55,755
Northwest Family Success Center	RTU / 217101092D	Trane / TCD211C300BA	1	5,189	13.4	69,657
Fleet Services #3	DX Unit / 3708X70430	PA13HR048-H	1	1,707	7.4	12,658
Fleet Services #3	DX Unit / 4991 M1903	Rheem / RAKA-060CAS	1	5,639	3.5	19,836
Fleet Services #3	RTU / 1001G40510	Carrier / 50HS-024-311AA	1	416	3.0	1,257
CB Smith Park	CU / 7134 M0805 05763	Rheem / RAKB-060DAS	1	7,072	6.9	48,683
CB Smith Park	CU / 7134 M2604 17920	Rheem / RAKB-060DAS	1	3,333	6.9	22,945
CB Smith Park	CU / WHGP141750	HABE-F036SD	1	1,611	7.8	12,564
Deerfield Beach Library	CU / 2007Q06731	Carrier / 38AKS044	1	3,037	44.5	135,156
Deerfield Beach Library	CU / 1208G40045	Carrier / 38AKS014-K521	1	2,596	12.8	33,129
Deerfield Beach Library	CU / 4204E28652	Carrier / 38KC060	1	3,588	5.5	19,634
Lauderhill Library	CU / NBNM018535	York / HB360C00A4	1	628	12.7	7,956
			2	628	25.3	15,912
			3	628	38.0	23,868
			4	628	50.7	31,824
Lauderhill Library	CU / NBNM019280	York / HB180C00A	1	1,256	10.2	12,789
			2	1,256	20.4	25,579
Hunter & Hughes	CU / L412TPNBF	Trane / TTH060C10042	1	436	8.3	3,607
Hunter & Hughes	CU / L433YG1AH	Trane / TTA180B300CB	1	4,024	6.6	26,563
			2	1,207	17.7	21,415
Hunter & Hughes	CU / 63953Y4AD	Trane / TTA240B300FA	1	1,820	11.4	20,654

			2	3,874	24.2	93,580
Hunter & Hughes	CU / 13051S7LTA	Trane / TTA240B300AA	1	8,736	12.6	110,158
			2	1,162	27.1	31,492
Hunter & Hughes	CU / 8281411AD	Trane / TTA150B300FA	1	4,576	6.5	29,904
			2	1,196	16.2	19,390
Hunter & Hughes	CU / 831504RAD	Trane / TTA180B300FA	1	1,352	8.4	11,398
			2	2,496	15.6	38,847

HVAC Replacements – Pre-retrofit Building Conditions (continued)

Locations	Unit / Serial Number	Make / Model	Number of Compressors Running	Annual Operating Hours (AOH)	Pre-Retrofit Unit Draw (kW_{pre})	Pre-Retrofit Electric Consumption (kWh_{pre})
Hunter & Hughes	CU / 10092Y5YTD	Trane / TTA180B300AA	1	4,118	8.4	34,452
			2	1,235	17.4	21,461
Hunter & Hughes	CU / 10091Y	Trane / TTA180B300AA	1	4,918	7.1	34,745
			2	1,204	13.5	16,236
Hunter & Hughes	CU / 7421UPSAD	Trane / TTA180B300FA	1	3,462	8.3	28,827
			2	1,039	17.4	18,024

Time of Day Scheduling – Pre-Retrofit Building Conditions

Location	Unit / Serial Number	Existing Unit Make / Model	Proposed Unit Make / Model	Pre-Retrofit Scheduled Hours per Week (HPW_{pre})	Compressor Cycling Factor	Pre-Retrofit Operating Hours per Week (HPW_{pre})	Unit Electric Demand (kW_{unit})	Pre-Retrofit Electric Use (kWh_{pre})
Markham Park (Office)	CU / 1404G50042	Carrier / 38ARZ007-K501	Not Replaced	161.0	0.75	120.8	7.3	45,837
Markham Park (Office)	CU / 1404G50045	Carrier / 38ARZ007-K501	Not Replaced	168.0	0.75	126.0	7.3	47,830
Markham Park (Target Range)	CU / W331421556	Thermal Zone / TZAA-348-2C757	Not Replaced	83.5	0.75	62.6	4.2	13,677
Markham Park (Target Range)	CU / 8346W261318228	Thermal Zone / TZAA-348-2A757	Not Replaced	83.0	0.75	62.3	4.2	13,595
Markham Park (Target Range)	CU / 6313U831F	American Standard / 2A7A4048B1000AA	Not Replaced	153.5	0.75	115.1	4.2	25,143
Markham Park (Target Range)	CU / 7658N410804461	Ruud / 13AJA60A01	Not Replaced	153.5	0.75	115.1	5.3	31,728
Markham Park (Target Range)	CU / E071132428	ICP / M2A348AKA200	Not Replaced	153.5	0.75	115.1	4.2	25,143
Everglades Holiday Park	CU / 4107X0624	Payne / PA13NR060	Not Replaced	168.0	0.75	126.0	5.2	34,070
Everglades Holiday Park	CU / 2108E23960	Carrier / 24ABS360A300	Not Replaced	168.0	0.75	126.0	5.2	34,070
Franklin Park	CU / F171703307	Thermal Zone / TZAA-090CA757	Not Replaced	168.0	0.75	126.0	6.0	39,312
Franklin Park	CU / F171403303	Thermal Zone / TZAA-090CA757	Not Replaced	168.0	0.75	126.0	6.2	40,622

Time of Day Scheduling – Pre-Retrofit Building Conditions (continued)

Location	Unit / Serial Number	Existing Unit Make / Model	Proposed Unit Make / Model	Pre-Retrofit Scheduled Hours per Week (HPWpre)	Compressor Cycling Factor	Pre-Retrofit Operating Hours per Week (HPWpre)	Unit Electric Demand (kWunit)	Pre-Retrofit Electric Use (kWhpre)
Delevoe Park	CU / 0200G00154	Carrier / 38AK-007-V511	Trane / TTA073G30SA	168.0	0.75	126.0	5.8	38,002
Delevoe Park	CU / 2509G30115	Carrier / 38ARZ007-K501	Trane / TTA073G30SA	168.0	0.75	126.0	5.4	35,381
Delevoe Park	CU / N0M8454757	York / HA090C00A2AAA1A	Trane / TTA090G30SA	168.0	0.75	126.0	5.5	36,036
Roosevelt Gardens Park	CU / 200710-CCCF07870	Aaon / CA1305	Trane / 4TTR6060J1	168.0	0.75	126.0	4.9	32,105
Roosevelt Gardens Park	CU / 0307E13587	Carrier / 24ABR360HB0330	Trane / 4TTR6060J1	84.0	0.75	63.0	3.1	10,156
				84.0	0.75	63.0	4.4	14,414
Roosevelt Gardens Park	CU / 3707E24294	Carrier / 24ABR350A350	Trane / 4TTR6060J1	56.0	0.75	42.0	2.8	6,115
				56.0	0.75	42.0	4.4	9,610
BCJC State Attorney's Office	CU		4TTR6060J1	168.0	0.75	126.0	2.6	17,035
BCJC State Attorney's Office	CU/ E041051921	Heil / HAC260AKC4	4TTR6060J1	168.0	0.75	126.0	4.1	26,863
BCJC State Attorney's Office	CU / E031042841	Heil / HAC260AKA5	4TTR6060J1	168.0	0.75	126.0	4.1	26,863
Northwest Health Center	CU / 4415E11282	Carrier / 24ABB342005	Not Replaced	153.5	0.75	115.1	3.7	22,150
Northwest Health Center	CU / 3916E01941	Carrier / 24ABB342A500	Not Replaced	88.5	0.75	66.4	3.5	12,011
Fleet Services #2	CU / R162N4N4F	Allegiance 10 / 7C0060B300A0	4TTR4060L1	168.0	0.75	126.0	1.0	6,224
Fleet Services #2	CU / W101505366	Thermal Zone / TZAA-360-CC757	4TTR4060L1	168.0	0.75	126.0	1.0	6,224
Hunter & Hughes	CU / L412TPNBF	Trane / TTH060C10042	4TTR6060J1	69.0	0.65	44.9	5.1	11,894
Hunter &	CU / L433YG1AH	Trane /	TTA180J30TA	84.0	0.75	63.0	4.7	15,397

Hughes		TTA180B300CB		84.0	0.75	63.0	12.7	41,605
Hunter & Hughes	CU / 63953Y4AD	Trane / TTA240B300FA	TTA240030T0	53.8	0.75	40.3	8.5	17,821
				114.2	0.75	85.7	18.1	80,642
Hunter & Hughes	CU / 13051S7LTA	Trane / TTA240E300AA	TTA240030T0	115.9	0.75	86.9	8.4	37,975
				52.1	0.75	39.1	18.0	36,560
Hunter & Hughes	CU / 8281411AD	Trane / TTA150B300FA	TTA150030S0	132.7	0.75	99.5	4.6	23,810
				35.3	0.75	26.5	11.4	15,685
Hunter & Hughes	CU / 831504RAD	Trane / TTA180B300FA	TTA180030S0	58.8	0.75	44.1	6.1	13,989
				109.2	0.75	81.9	11.4	48,550

Time of Day Scheduling – Pre-Retrofit Building Conditions (continued)

Location	Unit / Serial Number	Existing Unit Make / Model	Proposed Unit Make / Model	Pre-Retrofit Scheduled Hours per Week (HPW_{pre})	Compressor Cycling Factor	Pre-Retrofit Operating Hours per Week (HPW_{pre})	Unit Electric Demand (kW_{unit})	Pre-Retrofit Electric Use (kWh_{pre})
Hunter & Hughes	CU / 10092Y5YTD	Trane / TTA180E300AA	TTA180030S0	84.0	0.75	63.0	6.1	19,984
				84.0	0.75	63.0	12.7	41,605
Hunter & Hughes	CU / 10091Y	Trane / TTA180E300AA	TTA180030S0	134.4	0.75	100.8	5.0	26,208
				33.6	0.75	25.2	9.5	12,449
Hunter & Hughes	CU / 7421UPSAD	Trane / TTA180B300FA	TTA180030S0	66.3	0.75	49.7	6.1	15,761
				66.3	0.75	49.7	12.7	32,814
Imperial Point Library	RTU / 1204G20562	Carrier / 501FF012-511	THC120F3R0A	70.0	0.75	52.5	5.0	13,650
Imperial Point Library	RTU	Carrier	THC120F3R0A	154.6	0.75	115.9	6.2	37,373
				13.4	0.75	10.1	9.6	5,032
Imperial Point Library	RTU / 927100499D	Trane / TCD180E300AA	THD180G3RGB	93.0	0.75	69.8	13.6	49,327
Imperial Point Library	RTU	Trane / TSC120E3R0A0000	THC120F3R0A	96.0	0.75	72.0	10.4	38,938
Collier City Library	RTU / 100811534L	Trane / THC060E3ROA	Not Replaced	124.0	0.75	93.0	6.0	28,774
Collier City Library	RTU	Trane	Not Replaced	96.0	0.75	72.0	6.0	22,277
Collier City Library	RTU / 100810870L	Trane / THC092E3R0A	Not Replaced	168.0	0.75	126.0	4.6	29,812
Collier City Library	RTU / 100810128D	Trane / TDC181E300BA	Not Replaced	105.7	0.75	79.3	9.6	39,457
				105.7	0.75	79.3	14.6	60,361
Collier City Library	RTU / NFMM065842	DS-03C00AFDAA	THC036E3REA	105.7	0.75	79.3	3.2	13,194
Collier City Library	RTU / NFMM063451	DU-08C00ATDAA3A	THC092F3RCA	34.9	0.75	26.2	3.3	4,488
				104.6	0.75	78.5	6.0	24,482
Riverland Branch Library	RTU / 4203F59320	Carrier / 50TJ-024-V5A1YA	THD240G3RNB	35.3	0.75	26.5	5.7	7,843
				132.7	0.75	99.5	14.0	72,465

Riverland Branch Library	RTU / 4303G50596	Carrier / 50TFF012-V511	THC120F3RGA--B0C5A	92.4	0.75	69.3	5.3	19,099
				75.6	0.75	56.7	9.1	26,830
Northwest Family Success Center	DX Unit / 4032MMBAD	Trane / TTA090A300FA	THD210G3RNB	84.0	0.75	63.0	4.3	14,087
				84.0	0.75	63.0	5.8	19,001
Northwest Family Success Center	DX Unit / 4042KKR2F	Trane / 2TTA0072A3000AA	THD210G3RNB	168.0	0.75	126.0	4.6	30,139
Northwest Family Success Center	RTU	Trane / TCD211C300BA	THD210G3RNB	168.0	0.75	126.0	13.8	90,418

Time of Day Scheduling – Pre-Retrofit Building Conditions (continued)

Location	Unit / Serial Number	Existing Unit Make / Model	Proposed Unit Make / Model	Pre-Retrofit Scheduled Hours per Week (HPW_{pre})	Compressor Cycling Factor	Pre-Retrofit Operating Hours per Week (HPW_{pre})	Unit Electric Demand (kW_{unit})	Pre-Retrofit Electric Use (kWh_{pre})
Northwest Family Success Center	RTU / 217101092D	Trane / TCD211C300BA	THD210G3RNB	168.0	0.75	126.0	11.5	75,348
Fleet Services #3	DX Unit / 3708X70430	PA13HR048-H	4TTR4048L1	168.0	0.75	126.0	7.1	46,519
Fleet Services #3	RTU / 1001G40510	Carrier / 50HS-024-311AA	4TCC4024-1000	168.0	0.75	126.0	4.1	26,863

East Regional Library Pre-Retrofit Design Air Flow

Unit	Serves	Pre-Retrofit Outside Air Damper Position, $OA\%_{Pre}$	Design Air Flow (CFM)
AHU-1	Corridor	30	12500
AHU-2	Mail, Parole Extension	30	900
AHU-3	Lounge	30	1000
AHU-4	Health Department	30	2000
AHU-5	Property Appraiser	30	2400
AHU-6	Social & Health Services	30	3500
AHU-7	Youth Services	30	2300
AHU-8		30	2700
AHU-9	Community Room	30	1830
AHU-10	Supervisor of Elections	30	2000
AHU-11	Veterans Services	30	1000
AHU-12	Tax Collector	30	4300
AHU-13	Public Defender	30	3300
AHU-14	Clerk of Circuit Court	30	7650
AHU-15	State Attorney	30	3600
AHU-16	Court Room #1, 2, 3	30	5200
AHU-17		30	5200
AHU-18		30	5200
AHU-19	Court Room Waiting	30	1200
Total (CFM_{TOT})			**67,780**

BROWARD COUNTY FLORIDA

SIEMENS

Contracted Baseline Operating Parameters: East Regional Library – Art Serve

OA%	Sunday/ Holiday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Hour	1	2	3	4	5	6	7
0	0%	0%	0%	0%	0%	0%	0%
1	0%	0%	0%	0%	0%	0%	0%
2	0%	0%	0%	0%	0%	0%	0%
3	0%	0%	0%	0%	0%	0%	0%
4	0%	0%	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%	0%	0%
6	0%	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%	0%
9	0%	Existing	Existing	Existing	Existing	Existing	0%
10	0%	Existing	Existing	Existing	Existing	Existing	Existing
11	0%	Existing	Existing	Existing	Existing	Existing	Existing
12	0%	Existing	Existing	Existing	Existing	Existing	Existing
13	0%	Existing	Existing	Existing	Existing	Existing	Existing
14	0%	Existing	Existing	Existing	Existing	Existing	Existing
15	0%	Existing	Existing	Existing	Existing	Existing	Existing
16	0%	Existing	Existing	Existing	Existing	Existing	Existing
17	0%	Existing	Existing	Existing	Existing	Existing	Existing
18	0%	Existing	Existing	Existing	Existing	Existing	0%
19	0%	Existing	Existing	Existing	Existing	Existing	0%
20	0%	0%	0%	0%	0%	0%	0%
21	0%	0%	0%	0%	0%	0%	0%
22	0%	0%	0%	0%	0%	0%	0%
23	0%	0%	0%	0%	0%	0%	0%

Contracted Baseline Operating Parameters: East Regional Library - Library/Reading Center

OA%	Sunday/ Holiday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Hou r	1	2	3	4	5	6	7
0	0%	0%	0%	0%	0%	0%	0%
1	0%	0%	0%	0%	0%	0%	0%
2	0%	0%	0%	0%	0%	0%	0%
3	0%	0%	0%	0%	0%	0%	0%
4	0%	0%	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%	0%	0%
6	0%	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%	0%
10	0%	Existing	0%	Existing	Existing	Existing	0%
11	0%	Existing	0%	Existing	Existing	Existing	0%
12	0%	Existing	Existing	Existing	Existing	Existing	0%
13	0%	Existing	Existing	Existing	Existing	Existing	0%
14	0%	Existing	Existing	Existing	Existing	Existing	0%
15	0%	Existing	Existing	Existing	Existing	Existing	0%
16	0%	Existing	Existing	Existing	Existing	Existing	0%
17	0%	Existing	Existing	Existing	Existing	Existing	0%
18	0%	0%	Existing	0%	0%	0%	0%
19	0%	0%	Existing	0%	0%	0%	0%
20	0%	0%	0%	0%	0%	0%	0%
21	0%	0%	0%	0%	0%	0%	0%
22	0%	0%	0%	0%	0%	0%	0%
23	0%	0%	0%	0%	0%	0%	0%

Contracted Baseline Operating Parameters: East Regional Library – Stonewall Library & Archives

OA%	Sunday/ Holiday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Hour	1	2	3	4	5	6	7
0	0%	0%	0%	0%	0%	0%	0%
1	0%	0%	0%	0%	0%	0%	0%
2	0%	0%	0%	0%	0%	0%	0%
3	0%	0%	0%	0%	0%	0%	0%
4	0%	0%	0%	0%	0%	0%	0%
5	0%	0%	0%	0%	0%	0%	0%
6	0%	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%	0%
10	0%	0%	0%	0%	0%	0%	Existing
11	0%	Existing	Existing	Existing	Existing	Existing	Existing
12	0%	Existing	Existing	Existing	Existing	Existing	Existing
13	0%	Existing	Existing	Existing	Existing	Existing	Existing
14	0%	Existing	Existing	Existing	Existing	Existing	Existing
15	0%	Existing	Existing	Existing	Existing	Existing	Existing
16	0%	Existing	Existing	Existing	Existing	Existing	Existing
17	0%	Existing	Existing	Existing	Existing	Existing	0%
18	0%	0%	0%	0%	0%	0%	0%
19	0%	0%	0%	0%	0%	0%	0%
20	0%	0%	0%	0%	0%	0%	0%
21	0%	0%	0%	0%	0%	0%	0%
22	0%	0%	0%	0%	0%	0%	0%
23	0%	0%	0%	0%	0%	0%	0%