

CITY OF FORT PIERCE
ANNUAL MEASUREMENT AND VERIFICATION
REPORT CARD

PERFORMANCE PERIOD THREE
October 30, 2017 - October 29, 2018

QUICK VIEW

- ⊞ Excellent project health
- ⊞ Verified savings of \$489,735 exceed guaranteed dollar amounts for Year 3 by \$37,325.

KEY ACTION ITEMS

- ⊞ Presented Year 2 findings to Commission
- ⊞ Addressed ongoing equipment concerns for this project
- ⊞ Annual site inspections of equipment and operational functions

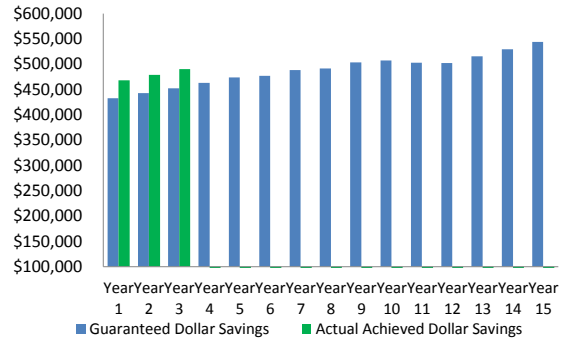
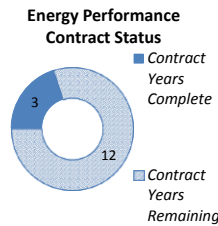
KEY DATES

- ⊞ October 30, 2017 is Start of Performance Year 3
- ⊞ October 29, 2018 is End of Performance Year 3
- ⊞ October 30, 2018 is Start of Performance Year 4

PERFORMANCE METRICS

Year	Guaranteed	Actual	Excess / (Deficit)
Year 1	\$432,665	\$467,849	\$35,184
Year 2	\$442,391	\$478,630	\$36,239
Year 3	\$452,410	\$489,735	\$37,327
Year 4	\$462,728		
Year 5	\$473,357		
Year 6	\$476,951		
Year 7	\$488,226		
Year 8	\$491,425		
Year 9	\$503,387		
Year 10	\$507,292		
Year 11	\$502,591		
Year 12	\$501,827		
Year 13	\$515,207		
Year 14	\$529,429		
Year 15	\$544,050		

Grayed blocks are future years



December 14th, 2018

Mike Reals, Director of Public Works
 City of Fort Pierce
 52 Savannah Road
 Fort Pierce, FL 34982
 Tel: 772-467-3811
 E-mail: mreals@fppwd.com

Re: Measurement and Verification Services

Dear Mr. Reals:

ConEdison Solutions is pleased to submit the Performance Period Year 3 Report for the above referenced project. Several key action items have taken place in the Performance Period Year 3 of this project. ConEdison Solution's has conducted a site visit over the past year to verify operation of the various equipment covered by the contract.

The purpose of this Measurement and Verification (M&V) Report is to summarize the 3rd year guarantee period activities that have taken place during Year 3 of the M&V period, covering October 30, 2017 through October 29, 2018, and to summarize the verified energy and water cost savings in accordance with the M&V Plan found in the contract. As shown in Table 2 (page 4), Verified Annual Savings, which are based on Year 3 conditions, are \$489,735, and exceed the guaranteed savings by \$37,327. As described in the contract, the third year guarantee is \$452,410.

In October 2018, CES provided Mike Reals at Fort Pierce with (80) additional 45 watt LED lamps for the city to install as needed.

ConEdison Solutions would like to setup a conference call after you all have had time to review this report. I will be in contact with you concerning the scheduling of this review. If you have any questions, please do not hesitate to contact me by telephone at (727) 417-6839 or by e-mail at schwermans@conedcebcom.

Sincerely,

Steven Schwerman
 P.M.P., C.E.M., C.M.V.P., C.E.A.
 Manager – Measurement and Verification
 ConEdison Solutions
 Office: (813) 375-3441

ENVIRONMENTAL IMPACT

By utilizing the electric energy savings values contained in the enclosed M&V report, ConEd is able to calculate the positive annual environmental impact of the energy conservation measures implemented.

Annual kWh Electricity Saved		Annual Tons CO ₂ Avoided	Equivalent Barrels Oil	Equivalent Homes for One Year	Equivalent Passenger Vehicles
2,613,952	=	1,945	4,504	210	417

[<https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>]

Measurement & Verification Report: Performance Year 3 (October 30, 2017 - October 29, 2018)

Guaranteed Energy, Water, and Wastewater Performance Savings Contract

City of Fort Pierce

December 14th, 2018



ConEdison Solutions

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1.0 .Executive Summary

The purpose of this Measurement and Verification (M&V) Report is to summarize the 3rd year guarantee period activities that have taken place during Year 3 of the M&V period, covering October 30, 2017 through October 29, 2018, and to summarize the verified energy and water cost savings in accordance with the M&V Plan found in the contract. As shown in Table 2 (page 4), Verified Annual Savings, which are based on Year 3 conditions, are \$489,735, and exceed the guaranteed savings by \$37,327. As described in the contract, the third year guarantee is \$452,410.

1.1 Project Background

On February 3rd 2014 BGA, Inc. (“BGA”), a ConEdison Solutions Company, specifically the ConEdison Solutions’ Florida office, submitted an Investment Grade Audit (IGA) of conservation measures (CM’s) for the City of Fort Pierce. The IGA was the result of the City of Fort Pierce implementing State of Florida enabling legislation (FS 489.145) entitled “Guaranteed Energy, Water, and Wastewater Performance Savings Contract”. The effort was undertaken with the intent of identifying energy and water usage savings that would produce savings sufficient to fund the CM’s as well as however many critically needed mechanical capital improvement projects that could fit within the twenty year payback requirement of the enabling legislation.

The IGA report was the product of months of effort by ConEdison’s engineering team to survey twenty-six (26) City facilities for in depth energy analysis and identify potential CM’s and capital projects. After initial surveys were complete and discussion were held with City staff, the final list of facilities was reduced to seventeen (17) facilities for various practical reasons (facilities being unoccupied, not maintained by the city, property for sale, etc.). The resulting analysis identified feasible potential projects and CMs, which guided the negotiations to create a favorable contract for the City, which was executed March 14, 2014. A conforming contract was approved by the City and executed March 4th, 2014. Construction began in April 2014 and was substantially completed in October of 2015. Primary metrics of the project:

- Excluding the financing procurement cost, the total project contract cost was \$6,039,229.
- Guarantee Year 3 started on October 30th, 2017.
- Energy Savings Costs are based on utility rates in accordance with contract dated March 3rd, 2014
- The CMs were guaranteed in Year 3 to provide energy and water cost savings of \$452,410 annual.
- The CMs have been verified to provide energy and water cost savings of \$489,735 annual.
- The performance Year 3 verified savings exceed guaranteed savings by \$37,327 annual.
- The project simple payback was 13.95 years.
- The term of the contract was 19 years.

The following facilities were included in the final project:

The City Hall building is located at 100 N. U.S. 1. The facility is three stories and approximately 54,315 square feet (ft²) built in 1990. There is an attached five-story parking garage and office shell space that was built in 2009 and was not included in the IGA.

The Fort Pierce Community Center (River Walk Center) is located at 600 N. Indian River Drive. The facility is a multi-purpose single-story community center and approximately 6,000 ft² built in 1959 and remodeled in 1972.

The Marina Dock Master & Laundry Building is located at 1 Avenue A. It consists of a two-story mixed use building that is approximately 2,912 ft². The second floor is a rented commercial office, apartment and City office (Marina Manager). Marina Laundry & Restrooms are located in a 310 ft² addition/renovation adjacent to the Dock Master space.

The Police Athletic League (PAL) Park is located at 903 South 21st Street. The facility formerly housed the YMCA and was turned over by St. Lucie County to the City in 2010, after having been vacant for several years. The 12,000 ft² pre-engineered steel building was completely renovated in 2011. It is primarily office and gymnasium space. The building area does not include the adjacent 5,000 ft² (boxing/workout facility).

The Police Main Station is located at 920 South US 1. The facility is a single-story 22,984 ft² building constructed in 1988.

The Willie B. Ellis Police Substation Avenue D is located at 1220 Avenue D. The facility is a two-story 6,346 ft² building constructed in 2000.

The Public Works Compound is located at 52 Savannah Road. The facility consists of six (6) buildings, four (4) of which were originally selected for IGA and five (5) of which were surveyed. The Director's Office/Fleet was originally constructed in 1964 and renovated in between the years of 1981 and 1984. The building is a two-story and approximately 19,786 ft² space. The Facilities & Parks/Grounds Divisions building is a single-story 7,875 ft² building constructed in 1964. The Solid Waste Division building is a single-story 12,096 ft² building, constructed in 1990, and includes a Public Works garage. The Streets Division/Garage is a single-story 7,298 ft² building constructed in 1964, which also includes a garage. The Z Storage building is a single-story 9,700 ft² building constructed in 1995.

The Seven Gables House is located at 408 North Indian River Drive. The building is a two-story 2,747 ft² historic home built in 1905, which serves as the City's Visitors Center.

The Sunrise Theater is located at 117 South 2nd Street. The building is a 45,300 ft² historic theater built in 1923. It was renovated in 1997 and reopened in 2006. In addition to the 1,200-seat main auditorium, there is also a 210-seat Black Box theater in the ground level storefront space.

The Indian Hill Maintenance Building is located at 1600 South 3rd Street. The building is a 5,246 ft² pre-engineered steel building erected in 2009.

1.2 Energy and Cost Savings for Year 3 of the Guarantee Period

The table below shows that contractually, BGA, Inc., a ConEdison Solutions Company, has installed equipment that is operating better than the guarantee. These savings calculations are based on equipment performance and stipulated operation.

Table 1: Guaranteed Savings Table from Contract

ATTACHMENT A TO SCHEDULE C

PROJECT SAVINGS SUMMARY

Savings Guarantee Term Year	Measured Utility Savings IPMVP* Option -A (note 1,3)	Modeled Utility Savings IPMVP* Option-D (note 2,3)	Stipulated Lighting Material Savings (note 3)	Stipulated HVAC Subcontractor Savings (note 3)	Stipulated Street Lighting Subcontractor (FPUA)	Total Annual Guaranteed Savings
1	\$285,591	\$31,482	\$5,108	\$2,000	\$108,483	\$432,665
2	\$294,159	\$32,426	\$5,261	\$2,060	\$108,483	\$442,391
3	\$302,983	\$33,399	\$5,419	\$2,122	\$108,483	\$452,410
4	\$312,073	\$34,401	\$5,582	\$2,185	\$108,483	\$462,728
5	\$321,435	\$35,433	\$5,749	\$2,251	\$108,483	\$473,357
6	\$331,078	\$36,496	\$5,922	\$2,319	\$101,130	\$476,951
7	\$341,011	\$37,591	\$6,099	\$2,388	\$101,130	\$488,226
8	\$351,241	\$38,719	\$6,282	\$2,460	\$92,715	\$491,425
9	\$361,778	\$39,880	\$6,471	\$2,534	\$92,715	\$503,387
10	\$372,631	\$41,077	\$6,665	\$2,610	\$84,299	\$507,292
11	\$383,810	\$42,309	\$6,865		\$69,596	\$502,591
12	\$395,325	\$43,578	\$7,071		\$55,841	\$501,827
13	\$407,184	\$44,886	\$7,283		\$55,841	\$515,207
14	\$419,400	\$46,232	\$7,501		\$42,086	\$515,234
15	\$431,982	\$47,619	\$7,726		\$42,086	\$529,429
16	\$444,941	\$49,048	\$7,958		\$42,086	\$544,050
17	\$458,290	\$50,519	\$8,197		\$42,086	\$559,109
18	\$472,038	\$52,035	\$8,443		\$42,086	\$574,620
19	\$486,200	\$53,596	\$8,696		\$42,086	\$590,597
Totals	\$7,173,152	\$790,729	\$128,297	\$22,928	\$1,448,198	\$9,563,304

* International Performance Measurement and Verification protocol

Note 1: There is a one-time measured savings the first year and then stipulated savings thereafter.

Note 2: The utility savings are total of water and electric savings.

Note 3: Savings assume a 3% escalation rate.

Table 2: Guaranteed versus Verified Annual Savings for Guarantee Period Year 3

ECM DESCRIPTION	GUARANTEED ANNUAL PROJECT SAVINGS	VERIFIED ANNUAL PROJECT SAVINGS	EXCESS/ SHORTFALL (DIFFERENCE)
CM 1 - Lighting Improvements & Controls	\$ 49,338	\$ 89,546	\$ 40,207
CM 2 - Street Lighting Retrofit	\$ 367,547	\$ 365,113	\$ (2,434)
CM 3 - Low Flow Plumbing Fixtures	\$ 1,375	\$ 1,375	\$ -
CM 4 - City Hall CHW Mechanical & Controls Upgrades	\$ 13,135	\$ 13,135	\$ -
CM 5 - Police Station CHW Mechanical & Controls Upgrades	\$ 1,535	\$ 1,535	\$ -
CM 6 - IT Split System Upgrades	\$ (2,080)	\$ (2,080)	\$ -
CM 7 - Air Curtains at Dock Doors	\$ 7,161	\$ 7,161	\$ -
CM 8 - Demand Controlled Ventilation	\$ 1,465	\$ 1,465	\$ -
CM 9 - Replace DX Equipment	\$ 444	\$ -	\$ (444)
CM 10 - Add Ductless Split System	\$ 10,855	\$ 10,855	\$ -
CM 11 - HVAC Controls Upgrade/Building Management System	\$ -	\$ -	\$ -
CM - 12 Vending Misers	\$ 1,632	\$ 1,632	\$ -
TOTALS	\$ 452,410	\$ 489,735	\$ 37,327

1.3 Energy, Water, and O&M Rate Data

Table 3: Year 3 Utility Rates

Location	Electricity Rate (\$/ kWh)	Electricity Demand (\$/kW)	Water Rate (\$/kgal)
City Hall	\$0.126	\$7.18	\$8.81
River Walk Center	\$0.152	\$7.18	N/A
Marina	\$0.140	\$6.82	N/A
PAL Park	\$0.170	\$7.18	N/A
Police Main Station	\$0.121	\$7.18	N/A
Police Substation Ave D	\$0.132	\$7.18	N/A
Public Works Compound	\$0.135	\$7.18	N/A
Seven Gables House	\$0.144	\$0.00	N/A
Sunrise Theater	\$0.132	\$7.18	N/A

Notes: a) Seven Gables House is on a non-demand rate, and receives no demand charge. b) One of the meters at the Marina is also on a non-demand rate, which is reflected in a lower average demand rate for the facility.

The facilities included in this project are under multiple rate structures which bills the customer on a rate (kWh) structure or both a rate (kWh) and demand (kW) based structure. The per kWh rates noted in the first column are the averaged total cost/ kWh for each location based on the historical bills received from FPUA, including power cost adjustment. The demand column is the demand rate applicable to each location based on the same bills. These rates are used to calculate the financial value of the energy savings for Year 3 of the guarantee. The energy rates and operational and maintenance (O&M) savings will be escalated by 3% per year thereafter year 1 and for the term of the contract.

1.4 Brief Project and CM Descriptions

CM 1: Lighting Improvements and Controls

Overview of CM 1

This conservation measure (CM) consists of several lighting efficiency improvements located throughout (17) buildings at the City of Fort Pierce facilities to reduce the energy consumption. This includes the installation of new lamps and ballasts replacing existing lamps and ballasts as indicated by the final IGA documents. In some cases new fixtures were installed and the existing fixtures were removed from service.

Changes to Scope of CM 1

There were changes to the scope of work that have impact on savings for the CM. There was an increase in the amount of fixtures that were installed during construction.

Savings are summarized in Table 5 of Section 2.1.4. Additional details regarding the savings calculations and the as-built fixture count are located in Appendix B.

CM 2: Street Lighting Retrofit

Overview of CM 2

This CM consists of retrofitting or replacing (3,212) Existing High Pressure Sodium (HPS) Street Lights, (353) metal halide cobra head fixtures, and (489) metal halide post top lighting fixtures throughout (non-FDOT) with exterior LED energy efficient street lights installed throughout specific areas in the City of Fort Pierce indicated by the final contract documents. Refer to section 2.2.1 for specific fixture location.

Changes to Scope of CM 2

There were changes to the scope of work that have impact on savings for the CM. During Construction, there was an overall small decrease in the amounts of fixtures that required retrofitting or replacement for both street lights and decorative fixtures. Although the HPS fixture counts increased to (3,305) fixtures, the metal halide cobra head fixtures decreased to (54) and the decorative post tops decreased to (487) that were retrofitted or replaced.

Savings are summarized in Table 6 of Section 2.2.4. Additional details regarding the savings calculations are located in Appendix C.

CM 3: Low Flow Plumbing Fixtures

Overview of CM 3

This CM consists of retrofitting or replacing several high flow plumbing fixtures such as lavatory sinks, kitchen faucets, flush valve and tank style toilets with low flow plumbing fixtures throughout City Hall at the City of Fort Pierce indicated by the final contract documents. Refer to section 2.3.1.

Changes to Scope of CM 3

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 7 of Section 2.3.4. Additional details regarding the savings calculations are located in Appendix D.

CM 4: City Hall Mechanical and Controls Upgrades

Overview of CM 4

This CM is mainly directed at improving the mechanical HVAC systems in the City Hall by installing new chilled water pumps, a high efficiency air-cooled chiller, and air handling units with energy efficient motors and VFDs along with new variable air volume boxes. Air handling unit AHU-2 is equipped with demand controlled ventilation to match the outside to the building occupancy. ConEdison Solutions upgraded the control system by installing direct digital controls removing the pneumatic controls.

Changes to Scope of CM 4

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 8 of Section 2.4.4. Additional details regarding the savings calculations are located in Appendix E.

CM 5: Police Main Station Mechanical and Controls Upgrades

Overview of CM 5

ConEdison Solutions retrofitted the existing DX (Direct Expansion) equipment at the Police Main Station. There are (24) chilled water fan coil units with the line voltage control system that were original to the building. The line voltage control system did not communicate with chiller plant direct digital controls (DDCs). The chilled water pumps were also original. The chiller was operating without all of its compressors.

The upgrades for this CM are as follows.

- Replace (2) 1.5 HP chilled water pumps.
- Replace (24) fan coil units with chilled water coils and electric heating coils with equal capacities.
- Replace chilled water control valves for (24) new FCUs for direct digital control.
- Provide direct digital control system programmed to control all of the above listed new equipment.
- Replace the 60 ton air cooled chiller and integrate the chiller plant controls with the new DDC system.

Changes to Scope of CM 5

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 9 of Section 2.5.4. Additional details regarding the savings calculations are located in Appendix F.

CM 6: IT Split System Upgrades

Overview of CM 6

The City Hall IT department is currently served by (2) 4-ton hi-efficiency (18+ EER) split systems and multiple VAV boxes served by chilled water AHU-6. The split systems are less than two years old. One of the split systems is cooling only the computer room, the second system is cooling part of the computer room and some office/lobby area outside the computer room. The combination of the existing equipment serving this area does not currently meet the heat load. Also, there is a need for back-up cooling should the current system(s) fail. The narrow adjacent wire room has a temporary (< 1-ton) portable air conditioning unit installed to assist in meeting the cooling demand in this area.

The existing 2 year old, 4-ton DX split system in the Police Main Station IT Room is undersized for the current heat load in the space based on interviews with site personnel. The upgrades for this CM are as follows:

- Install a new 7.5-ton computer room air conditioning (CRAC) unit dedicated to the computer room demand at City Hall. The existing units will remain for redundancy.
- Remove the existing, 2 year old, 4-ton split system serving the Police Station server room/IT area and turn it over to the City for their use as needed.
- Install a new dedicated 7-ton computer room air conditioning (CRAC) unit to serve the server room/IT area at the Police Station.

Changes to Scope of CM 6

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 10 of Section 2.6.4. Additional details regarding the savings calculations are located in Appendix G.

CM 7: Air Curtains at Dock Doors

Overview of CM 7

There are two (2) approximately 8'x13' exterior roll-up dock doors at the stage level that also remain open for extended periods of time allowing infiltration of outside air. For this CM, the scope of work included the following:

- Install an air curtain above each dock door to partially control the infiltration.

Changes to Scope of CM 7

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 11 of Section 2.7.4. Additional details regarding the savings calculations are located in Appendix H.

CM 8: Demand Controlled Ventilation

Overview of CM 8

HVAC systems are typically designed to deliver approximately 15 cubic feet per minute of outside air per person in each space. For systems serving spaces with large populations that are not occupied at their maximum occupancy the majority of time, a significant excess of outside air is delivered to the space during the under-occupied periods. At times when the system is not operating in economizer mode, this outside air requires more energy to heat, cool and dehumidify than is required by the same amount of return air.

CO2 demand control ventilation makes use of a sensor to measure the carbon dioxide (CO2) in the return air stream, and uses this information to determine the amount of outside air required to maintain an acceptable indoor air quality in the space. As the space population decreases, the CO2 decrease and the systems outside air can be reduced automatically.

Additionally, restrooms must have a specified amount of exhaust, and the volume of outside air must be sufficient to make up this amount. A minimum outside air rate will be maintained to meet the exhaust make up requirements to keep the system balanced.

For this CM, CES connected and programed the existing monitors and dampers for Demand Controlled Ventilation (DCV) on AHU-2A and 2B, serving the main theater at Sunrise Theatre. DCV for AHU-2 at City Hall is included in CM 4.

Changes to Scope of CM 8

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Savings are summarized in Table 12 of Section 2.8.4. Additional details regarding the savings calculations are located in Appendix I.

CM 9: Replace DX Equipment

Overview of CM 9

The existing DX equipment in the Main Police Station was inefficient and nearing the end of life cycle.

For this CM, CES proposed to remove and replace the 14 year old, 3-ton RTU serving the Gym at the Police Station with a new, high efficiency (15 SEER) model.

Changes to Scope of CM 9

There were changes to the scope of work that have impact on savings for the CM. This CM was removed from the project.

Savings are summarized in Table 13 of Section 2.9.4. Additional details regarding the savings calculations are located in Appendix J.

CM 10: Add DX Split System

Overview of CM 10

At the Police Main Station, the air cooled chiller, chilled water pumps and twenty-four fan coil units are scheduled to run twenty-four hours per day, seven days per week. Occupancy is limited during the evening and weekend hours to a report writing office on the East side of the building next to an entrance door to the building and the potential intermittent use of restrooms by these personnel.

For this CM, CES provided a new 1-ton ductless split system DX heat pump to serve only the report writing office during evening and weekend hours to allow a shut-down of the chilled water systems. The wall air handling unit was mounted on the East wall with the heat pump located just outside that wall next to the Gym. CES reprogrammed the chilled water system schedule to shut down during unoccupied periods including weekday evenings and weekends.

Changes to Scope of CM 10

There were changes to the scope of work that have a minimal impact on savings for the CM. The change in scope does not warrant an adjustment to the savings.

Savings are summarized in Table 14 of Section 2.10.4. Additional details regarding the savings calculations are located in Appendix K.

CM 11: HVAC Controls Upgrade/Building Management System

Overview of CM 11

The Sunrise Theatre has an older Siemens Apogee DDC system installed that is not operating properly and is critical for theatrical production control. This CM proposes to upgrade the Apogee system server software to the latest version, provide one (1) server license and conduct software/system changes and onsite client training. This upgrade includes the addition of the Remote Notification software, which allows enunciation of Insight Alarm, Status, and System Event information to various notification devices.

Changes to Scope of CM 11

There weren't any modifications that affected the project scope.

CM 12: Vending Misers

Overview of CM 12

This CM consists of installing occupancy sensing and plug load controllers to reduce unnecessary operation of vending machines during unoccupied periods at City Hall, River Walk, PAL Park, Police Main Station and Public Works Compound.

For this CM, CES proposed the following:

- Installation of Vending Miser on one (1) cold drink vending machine at City Hall.
- Installation of Vending Misers on two (2) cold drink vending machines at River Walk.
- Installation of Vending Misers on two (2) cold drink vending machines at PAL Park.
- Installation of Vending Miser on one (1) cold drink vending machine at the Police Main Station.
- Installation of Vending Misers on two (2) cold drink vending machines at the Public Works Compound.

Changes to Scope of CM 12

There weren't any modifications that affected the project scope. There weren't changes to the scope of work that have impact on savings for the CM.

Additional details regarding the savings calculations are located in Appendix L.

1.5 Measurement and Verification Protocols

The International Performance Measurement and Verification Protocol (IPMVP) is the industry accepted standard guideline for performing measurement and verification. The measurement and verification options used for this project are based on the contract. BGA is using Option A and Option D as application based on the CM. A brief description of the two options is below:

Option A: Partially Measured Retrofit Isolation

Designed for retrofits where end-use "efficiency" or power draw can be measured or stipulated using manufacturers' performance specifications or one time measurements. Estimated or stipulated energy consumption is calculated by multiplying manufacturers' information or measured variable times the stipulated hours of operation for each period of operation. Some of the best applications for this option are individual loads or systems within a building, where energy usage can be broken down to one or two primary, straightforward parameters. As part of the contract, both parties must agree up front that the mainly stipulated

parameters are reasonable, realistic and accurate, and may only be changed by a mutually agreed upon modification to the contract.

Option D: Calibrated Simulation

This option involves determining energy savings during the Guarantee period using calibrated building simulation tools. Savings are determined through Option D is intended for energy conservation retrofits where calibrated simulations of the baseline energy use and/or calibrated simulations of the post-installation energy consumption are used to measure project savings. Option D may involve measurements of energy use before and after the retrofit for specific equipment or energy end-use, as required for proper calibration of the simulation program. Periodic inspections of the equipment may also be warranted. Energy consumption is calculated by developing calibrated, hourly simulation models of whole-building energy use, or equipment subsystems. This is done in both the baseline mode and in the post-installation mode. Comparisons can then be made for the (simulated) differences for a “typical” weather year, or for weather and operating conditions that correspond to a specific year during either the baseline or post-installation period. Table 4 summarizes the Measurement and Verification (M&V) approach for each CM.

Table 4: Measurement and Verification (M&V)

ECM	Description	M&V Approach
1	Lighting Improvements & Controls	A
2	Street Lighting Retrofit	A
3	Low Flow Plumbing Fixtures	D
4	City Hall CHW Mechanical & Controls Upgrades	D
5	Police Station CHW Mechanical & Controls Upgrades	D
6	IT Split System Upgrades	D
7	Air Curtains at Dock Doors	D
8	Demand Controlled Ventilation	D
9	Replace DX Equipment	D
10	Add Ductless Split System	D
11	HVAC Controls Upgrade/Building Management System	N/A
12	Vending Misers	A

If M&V approach is N/A, no energy savings are claimed for this measure, measurement and verification is not applicable.

1.6 Construction Period Savings

No construction period savings were claimed or calculated. The utility savings during the construction period for each conservation measure accrued entirely to the benefit of the City. Construction period savings were not counted in any stipulated or measured savings within the contract year as defined under the terms of the contract agreement.

2.0 DETAILS FOR EACH CONSERVATION MEASURE (CM)

2.1 CM 1: Lighting & Control Upgrades

2.1.1 Overview of CM, M&V Plan, and Savings Calculation

CM-1 Scope of Work

This CM consists of several lighting efficiency improvements located throughout the (17) buildings at the City of Fort Pierce facilities to reduce the energy consumption. This includes the installation of new lamps and ballasts replacing existing lamps and ballasts as indicated by the final IGA documents. In some cases new fixtures were installed and the existing fixtures were removed from service. ConEdison Solutions (CES) has provided the City of Fort Pierce with the proper lamps and ballast information to ensure current and future lamp stock will be consistent with this CM.

High Efficiency T8 Lighting Retrofits

- Existing fluorescent lighting fixtures containing either standard 32-watt T8 lamps and electronic ballasts or energy efficient 34-watt T12 lamps and magnetic ballasts were retrofitted with new T8 28-watt extra-long life lamps and high efficiency electronic ballasts.
- Existing 2'x2' 2-lamp fixtures with U-bent lamps were retrofitted with new T8 25-watt U-bent lamps and high efficiency ballasts.
- New "normal" and "low watt" ballasts were specified as "programmed start" to maximize lamp life, system sustainability, and savings associated with replacement and disposal costs.
- Existing inboard/outboard switching was maintained.
- Existing fluorescent dimming capability were maintained.

Compact Fluorescent Lamp (CFL) Retrofits

Existing incandescent lamps were replaced with new compact fluorescent lamps. New CFL wattages were specified to maintain existing lighting levels provided by incandescent lamps.

Occupancy Sensors

CES installed new controls on individual lighting systems to manage occupied and unoccupied schedules. Occupancy sensors include wall switch replacement type sensors installed in smaller rooms (offices, storage, single use bathroom, etc) and ceiling mounted occupancy sensors installed in larger areas (open offices, classrooms, gang bathrooms, meeting/conference rooms, hallways, etc.). Multi-setting digital timers were installed in utility spaces (electric, mechanical, telephone, custodial, janitorial, storage rooms, etc.).

High-Intensity Discharge (HID) Retrofits

Replaced or installed retrofit kits for HID wall pack lighting fixtures with induction lighting for building mounted exterior lighting.

New High Efficiency Lighting Fixtures

The selected existing fixtures were replaced with new fixtures. Criteria for new fixture installation include:

- Existing fixture at an end of useful life
- Specification of a better fixture existing application

- Cost effective energy savings
- Capability for automatic or on/off lighting controls
- Improvement in lighting level or quality

New fluorescent fixtures with T8 lamps and high efficiency electronic ballasts include:

- Wall Mounts
- 2'x2' Surface Mount
- 2'x4' Recessed Prismatic and Parabolic

New LED Exit Signs were installed to replace existing less efficient exit signs.

CM-1 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option A (Lighting efficiency). Under this approach the post-installation light fixture wattages were measured and the operating hours were estimated based upon data provided and agreed upon by facility personnel and IPMVP standards.

CM-1 Overview of M&V Activities

The performance of the CM shall be supported by the stipulated wattage of the existing fixtures based on manufacturer's data and the measured capacity data obtained after the retrofit. A power meter will be utilized to measure the connected electrical load (kW) of representative types of fixtures. At least (3) measurements of (6) different types of fixture to be replaced/retrofitted shall be made to obtain a statistical average. Fixtures that cannot be easily measured shall be stipulated. The measurements shall be taken one time and shall be stipulated for the remainder of the contract.

The hours of operation shall be stipulated. The stipulated hours of operation are displayed in the Lighting Audit Appendix B of this report. As long as the fixtures are operational at the time of inspection, the measure will be deemed as performing.

No annual inspections will be conducted. This information shall be utilized as the basis for the annual hours of operation agreed-upon according to IPMVP Option A.

CM-1 Overview of Savings Calculations Methods

Verified energy savings for this CM were calculated using a custom spreadsheet and substituting the verified as-built fixture quantities.

Appendix B contains printouts of the spreadsheet used to calculate savings.

2.1.2 CM-1 M&V Activities Performed this Period

Steven Schwerman representing CES visually inspected City Hall, Police Station, Public Works Compound, and Sunrise Theater December 11th 2018. Fixtures and occupancy controls were found performing as designed. Maintenance staff had proper lamps in replacement stocks. The performance of the CM shall be supported by the stipulated wattage of the existing fixtures based on manufacturer's data and the measured capacity data obtained after the retrofit.

CM-1 M&V Data Collection

A power meter was utilized to measure the connected electrical load (kWh) of representative types of fixtures. At least (3) measurements of (6) different types of fixture that were replaced/retrofitted were obtained for the statistical average. The measurements were taken one time and shall be stipulated for the remainder of the contract.

The hours of operation were stipulated based upon data provided by facility personnel during the IGA phase and IPMVP standards. The stipulated hours of operation are displayed in the lighting as-built in Appendix B of this report.

CM-1 M&V Sampling Plan

At least (3) measurements of (6) different types of fixture that were replaced/retrofitted were sampled for the statistical average.

Also, randomly selected areas were visually inspected based on location and quantity of measures installed by ConEdison construction manager.

CM-1 Performance

Post installation commissioning verified that the equipment is performing as expected.

CM-1 Performance Deficiency Details

There are no performance deficiencies associated with this CM.

CM-1 Savings Impact of Performance Deficiency

There are no performance deficiencies (savings impact) associated with this CM.

2.1.3 CM-1 Savings Calculations and Methodology

CM-1 Analysis Methodology:

The demand savings (kW) are based on the difference between the existing and proposed fixture wattages multiplied by the quantity of fixtures. Consumption savings (kWh) are the product of the demand savings (kW) times the annual hours of operation.

*Monthly Demand Savings (kW) = (KW existing-KW proposed) * Qty. of Fixtures Retrofitted*

*Consumption Savings (kWh) = (KW existing-KW proposed) * Qty. of Fixtures Retrofitted * Annual hrs of operation*

Occupancy sensor savings are calculated as follows:

*Consumption Savings (kWh) = [(KW proposed * Qty. of Fixtures * Annual hrs of operation existing)– (KW proposed * Qty. of Fixtures * Annual hours of operation proposed)]*

The pre-retrofit and post-retrofit kW values, initially based on utility wattage tables to estimate savings for this project, were updated based on the results of a statistically valid number of field measurements per IPMVP sampling guidelines.

CM-1 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel and occupancy sensor data obtained from data loggers. As long as the occupancy sensors are operational at time of inspections, the measure will be deemed as performing.

CM-1 Calculation Details

Refer to Appendix B for as-built worksheet.

CM-1 Savings or Baseline Adjustments

No baseline adjustments were performed for this CM. There is a savings increase to the CM. During development and included in the Investment Grade Audit savings analysis were values for overall consumption savings that were reduced by applying a 70% safety factor to the fixture wattages. Although this made the consumption savings values in the guaranteed value reduced, that safety factor proposed a more conservative value. CES removed the safety factor for the calculation of the post installation wattages. The removal of that safety factor is the reason for the large increase in consumption savings.

CM-1 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-1 Savings

There is an increase of savings in the amount of \$40,207 due to the increased scope of work for this CM and the removal of the safety factor applied to the fixture wattages.

Table 5.1a: Guaranteed versus Verified Annual Savings for CM-1 for Guarantee Year 3

CM 1 - Lighting Improvements & Controls						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 43,920	\$ 5,419	\$ 49,338	\$ 84,127	\$5,419	\$ 89,546	\$ 40,207

The verified savings are shown in Table 5.1c of Section 2.1.4.

CM-1 Guarantee:

Due to wattage variations between individual light fixtures of the same type, calculated utility savings are guaranteed at 85% for the City Hall and a 90% savings for the rest of the buildings as mutually agreed upon and represented in the contract.

2.1.4 CM-1 Details of O&M and Other Savings

Annual material maintenance savings were calculated by comparing the life expectancy of both the existing and new lamps and the associated costs of replacement as well as the lamp life that is left on the existing fixtures. Taking the difference between the projected replacement costs of the new lamps and ballasts material over the course of the project versus the replacement costs of the existing lamps and ballasts materials yields an annual savings. No labor cost savings were included in the original guarantee nor the savings verified

below; savings are estimated for is material only. The maintenance material savings is calculated using the formula below:

- Material Savings Per Year = $\{[F/(D/C)]*G*A\} - \{[F/(E/C)]*H*B\} / F$

Where:

A = # of existing lamps or ballasts

B = # of new lamps or ballasts

C = Hours lamps are used per year (hrs/year)

D = Life of existing lamps and ballasts (hrs)

E = Life of proposed lamps and ballasts (hrs)

F = Performance Contract Term (years)

G = Cost to replace existing fixture

H = Cost to replace new fixture

Table 5.1b: Verified Annual Savings for CM-1 for Guarantee Year 3

City of Ft. Pierce - Interior Lighting Annual Retrofit Savings Summary - Final As-Built					
Building	Energy Savings (Power)	Energy Savings (Sensors)	Total Energy Savings	Stipulated Lighting Material Savings	Total Annual Savings
City Hall	\$12,665	\$1,461	\$14,126	\$1,292	\$15,418
Ft. Pierce Community Center (Riverwalk)	\$9,240	\$159	\$9,400	\$497	\$9,897
Marina Dock Master / Marina Laundry	\$889	\$170	\$1,059	\$51	\$1,110
PAL Park	\$1,832	\$212	\$2,044	\$119	\$2,163
Police Main Station	\$15,048	\$2,429	\$17,477	\$691	\$18,168
Police Substation Ave D	\$1,462	\$188	\$1,650	\$82	\$1,732
Public Works Compound	\$27,014	\$1,859	\$28,873	\$2,617	\$31,489
Seven Gables House	\$494	\$12	\$505	\$14	\$520
Sunrise Theater	\$8,846	\$147	\$8,993	\$56	\$9,049
TOTALS	\$77,490	\$6,637	\$84,127	\$5,419	\$89,546

2.2 CM 2: Street Lighting Improvements

2.2.1 Overview of CM, M&V Plan, and Savings Calculation

CM-2 Scope of Work

This CM consists of retrofitting or replacing (3,212) Existing High Pressure Sodium (HPS) Street Lights, (353) metal halide cobra head fixtures, and (489) metal halide post top lighting fixtures throughout (non-FDOT) with exterior LED energy efficient street lights installed throughout specific areas in the City of Fort Pierce indicated by the final contract documents. The following is an overview of the scope of work and performance of the CM.

98 fixtures delivered to Mike Reals for replacement to deal with fixture failures October 2018.

High Efficiency Lighting LED's

- Existing HPS lamps were retrofitted with new LED extra-long life lamps.
- New “normal” and “low watt” ballasts were specified as "programmed start" to maximize lamp life, system sustainability, and savings associated with replacement and disposal costs.

New High Efficiency Lighting Fixtures

The selected existing fixtures were replaced with new fixtures.

Criteria for new fixture installation include:

- Existing fixture at an end of useful life
- Specification of a better fixture existing application
- Cost effective energy savings
- Capability for automatic or on/off lighting controls
- Improvement in lighting level or quality

CM-2 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option A (Lighting efficiency). Under this approach post-installation light fixture wattage were measured and the operating hours were estimated based upon baseline measurements and data provided by facility personnel and IPMVP standards.

CM-2 Installation Verification

Post installation inspections of the lighting measures were conducted by CES construction manager and the city to verify the lighting fixtures were installed as specified.

CM-2 As-Built Changes

There were changes to the scope of work that have impact on savings for the CM. During construction, there was an overall small decrease in the amounts of fixtures that required retrofitting or replacement for both street lights and decorative fixtures. Although the HPS fixture counts increased to (3,305) fixtures, the metal halide cobra head fixtures decreased to (54) and the decorative post tops decreased to (487) that were retrofitted or replaced.

Savings are summarized in Table 6.1 of Section 2.2.4. Additional details regarding the savings calculations are located in Appendix C.

CM-2 Overview of M&V Activities

The performance of the CM shall be supported by the stipulated wattage of the existing fixtures based on manufacturer's data and the measured capacity data obtained after the retrofit. A power meter will be utilized to measure the connected electrical load (kW) of representative types of fixtures. At least (3) measurements of the fixtures to be replaced/ retrofitted shall be made to obtain a statistical average. The measurements shall be taken one time and shall be stipulated for the remainder of the contract.

The hours of operation shall be stipulated. The stipulated hours of operation are displayed in the lighting audit Appendix C of this report. As long as the fixtures are operational at the time of inspection, the measure will be deemed as performing.

No annual inspections will be conducted. This information shall be utilized as the basis for the annual hours of operation agreed-upon according to IPMVP Option A.

CM-2 Overview of Savings Calculations Methods

Verified energy savings for this CM were calculated using a custom spreadsheet, substituting as-built fixture quantities and verified wattages for a statistical sampling of the fixtures.

2.2.2 CM-2 M&V Activities Performed this Period

Steven Schwerman representing CES conducted a facility inspection December 11th 2018. Conversations with JT Mcdemott identified that most fixtures are operating as designed. Further conversations with Frank Aponte confirmed that the majority of the fixtures are operating as designed. The performance of the CM shall be supported by the stipulated wattage of the existing fixtures based on manufacturer's data and the measured capacity data obtained after the retrofit.

In October 2018, CES provided Mike Reals at Fort Pierce with (80) additional 45 watt LED lamps for the city to install as needed. These replacement lamps were outside the CES warranty period. CES was concerned with the above normal failure rate so CES worked with the distributor Brian Frost with RES to supply these fixtures in good faith at no cost to the city.

Inspections of the failed lamps at the Public Works compound revealed excessive biological build-up around the heat dissipaters of these lamps. It appears that insects are collecting in the lamps and could be the cause of the circuits to overheat and fail. CES recommends sealing the decorative housing of the lamps if possible. If that preventive maintenance is not possible, selection of a different lamp might be required by the city.

CM-2 M&V Data Collection

A power meter was utilized to measure the connected electrical load (kWh) of representative types of fixtures. At least (3) measurements of the fixtures that were replaced/ retrofitted were obtained for the statistical average. The measurements were taken one time and shall be stipulated for the remainder of the contract.

The hours of operation were stipulated based upon data provided by facility personnel during the IGA phase and IPMVP standards. The stipulated hours of operation are displayed in the Lighting Audit Appendix C of this report.

CM-2 M&V Sampling Plan

(3) measurements of each different types of fixture that were replaced/ retrofitted were sampled for the statistical average. The results of those measurements can be found in Appendix C.

Also, randomly selected areas were visually inspected based on location and quantity of measures installed by ConEdison construction manager.

CM-2 Performance

Post installation commissioning verified that the equipment is performing as expected.

CM-2 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-2 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.2.3 CM-2 Savings Calculations and Methodology

CM-2 Analysis Methodology

Currently, the city owns all of the roadway lighting fixtures presented in the IGA report. The local utility Fort Pierce Utility Authority (FPUA), charges the city a fixed monthly rate per fixture for energy consumption. This rate is assigned based on the wattage and technology of the existing fixture.

As part of this CM, CES negotiated a new method for FPUA to charge the city for its street lighting energy use. The LED system would be charged at a fixed rate of \$0.118 per kilowatt-hour.

The demand savings (kW) are based on the difference between the existing and proposed fixture wattages multiplied by the quantity of fixtures. Consumption savings (kWh) are the product of the demand savings (kW) times the annual hours of operation.

*Monthly Demand Savings (kW) = (KW_{existing}-KW_{proposed}) * Qty. of Fixtures Retrofitted*

*Consumption Savings (kWh) = (KW_{existing}-KW_{proposed}) * Qty. of Fixtures Retrofitted * Annual hours of operation*

The pre-retrofit and post-retrofit kW values, initially based on utility wattage tables to estimate savings for this project, were updated based on the results of a statistically valid number of field measurements per IPMVP sampling guidelines.

CM-2 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel.

CM-2 Calculation Details

Refer to Table 6.1c for calculation details.

CM-2 Savings or Baseline Adjustments

No savings or baseline adjustments were performed for this CM.

CM-2 Energy Rates

The local utility Ft. Pierce Utility Authority (FPUA), charges the city a fixed monthly rate per fixture for energy consumption. This rate was assigned based on the wattage and technology of the existing fixture.

As part of this CM, ConEdison Solutions negotiated a new method for FPUA to charge the city for its street lighting energy use. The new LED system would be charged at a fixed rate of \$0.118 per kilowatt-hour.

CM-2 Savings

There is a decrease of savings in the amount of -\$2,434 due to the decreased scope of work for this CM from proposed savings versus verified savings.

Table 6.1: Guaranteed versus Verified Annual Savings for CM-2 for Guarantee Year 3

CM 2 - Street Lighting Retrofit						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 259,064	\$108,483	\$367,547	\$ 256,630	\$ 108,483	\$365,113	\$ (2,434)

CM-2 Guarantee

Due to wattage variations between individual light fixtures of the same type, calculated utility savings are guaranteed at 95% as mutually agreed upon and represented in the contract.

2.2.4 CM-2 Details of O&M and Other Savings

The existing maintenance costs incurred by the City of Fort Pierce are based on a flat rate charge per pole on its monthly bill from the electric utility. This cost covers the replacement of existing lamps, ballasts, photocells, and other supporting equipment as it pertains to street lighting maintenance. This cost does not include replacement of poles that have been damaged by automobiles, vandalism, or acts of god.

The new system will eliminate the existing utility “cost per pole” contract and assumes that the city entered into a service agreement to fix lighting fixture problems as needed. CES projected a scenario of how these costs will be accrued by the city over the life of the fixture.

The savings indicated are based on a comparison of continuation of the current billing structure and the projected life cycle maintenance costs of the induction lighting system. Some specific conditions that factored into this comparison are as follows:

1. The terms of the existing agreement with FPUA would remain unchanged over the next 19 years.

2. The material cost of the fixture replacement has been excluded during the warranty period of the fixtures. Therefore the savings over this time period only includes the labor cost associated with sending a work crew out the replace the fixture.

- QSSI Lighting Induction Cobraheads Warranty: 5 years
- Neptune Lighting Induction Post-top Warranty: 5 years
- Ripley Photocell Warranty: 10 years

3. Based on data provided by the fixture manufacture, CES assumed typical failure rates during the warranty period. These failure rates were then spread out evenly over the warranty period. They are as follows:

- QSSI Lighting Induction Cobraheads: 1% failure rate during warranty (0.2%/year for 5 years)
- Neptune Lighting Induction Post-top Retrofit: 3% failure rate during warranty (0.6%/year for 5 years)
- Ripley Photocell Retrofit: 3% failure during warranty (0.3%/year for 10 years)

4. The rated life of the fixture assumes that 50% of the fixtures will fail within the time interval specified. Based on the usage of the fixtures, this lifespan extends just past 20 years. Therefore the comparison assumes that the fixtures will fail at some incrementally increasing rate until the end of the usable life of the fixture. These increments start at the end of the warranty period (year 6) and extend until year 19. The failure rated increments used are as follows:

Year	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total
Failure Rate	1%	1%	2%	2%	3%	3%	4%	4%	5%	5%	5%	5%	5%	5%	50%

5. After all of these factors are taken into account, a cost comparison analysis is made which yields the indicated results. A breakdown of this comparison is shown in the following table:

Ft. Pierce ECM L2A - Street Lighting LED Cash Flow Analysis																				
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Photocell Labor	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 11,765	\$ 15,686	\$ 15,686	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608
Photocell Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,556	\$ 3,408	\$ 3,408	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260
Cobraheads Labor	\$ 784	\$ 784	\$ 784	\$ 784	\$ 784	\$ 3,922	\$ 3,922	\$ 7,843	\$ 7,843	\$ 11,765	\$ 11,765	\$ 15,686	\$ 15,686	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608
Cobraheads Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,565	\$ 3,565	\$ 7,130	\$ 7,130	\$ 10,695	\$ 10,695	\$ 14,260	\$ 14,260	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825
Total:	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 8,663	\$ 8,663	\$ 16,149	\$ 16,149	\$ 23,636	\$ 36,780	\$ 49,040	\$ 49,040	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300
Current	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982
Positive Cash Flow	\$ 82,021	\$ 82,021	\$ 82,021	\$ 82,021	\$ 82,021	\$ 75,319	\$ 75,319	\$ 67,832	\$ 67,832	\$ 60,346	\$ 47,202	\$ 34,942	\$ 34,942	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682
Average Annual Savings:																				\$ 53,154

Ft. Pierce ECM K2A - Post Top Lighting LED Cash Flow Analysis																				
Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Photocell Labor	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323
Photocell Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 304	\$ 406	\$ 406	\$ 507	\$ 507	\$ 507	\$ 507	\$ 507	\$ 507	\$ 507
Posttops Labor	\$ 279	\$ 279	\$ 279	\$ 279	\$ 279	\$ 465	\$ 465	\$ 929	\$ 929	\$ 1,394	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323
Posttops Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 465	\$ 465	\$ 929	\$ 929	\$ 1,394	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323
Total:	\$ 418	\$ 418	\$ 418	\$ 418	\$ 418	\$ 1,068	\$ 1,068	\$ 1,998	\$ 1,998	\$ 2,927	\$ 4,485	\$ 5,980	\$ 5,980	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476
Current	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880
Positive Cash Flow	\$ 26,462	\$ 26,462	\$ 26,462	\$ 26,462	\$ 26,462	\$ 25,812	\$ 25,812	\$ 24,882	\$ 24,882	\$ 23,953	\$ 22,395	\$ 20,900	\$ 20,900	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404
Average Annual Savings:																				\$ 23,067
Total Cash Flow	\$ 108,483	\$ 108,483	\$ 108,483	\$ 108,483	\$ 108,483	\$ 101,130	\$ 101,130	\$ 92,715	\$ 92,715	\$ 84,299	\$ 69,596	\$ 55,841	\$ 55,841	\$ 42,086	\$ 42,086	\$ 42,086	\$ 42,086	\$ 42,086	\$ 42,086	\$ 1,448,198

The table above calculates a cash flow savings over the life of the fixture. As can be seen, this is not a constant number each year and will begin to depreciate after the warranty period runs out. Therefore in the Master IGA Table calculations, CES used an average of all of the expected savings over the life of the system, as follows:

ECM	Total Savings	Contract Term	Average	Annual Savings
Roadway Lighting	\$1,009,927	19 years	=	\$53,154
Post Top Lighting	\$438,271	19 years	=	\$23,067
Total	\$1,448,198	19 years	=	\$78,221

2.3 CM 3: Low Flow Plumbing Fixtures

2.3.1 Overview of CM, M&V Plan, and Savings Calculation

CM-3 Scope of Work

ConEdison Solutions (CES) proposed replacing the older style 3.5 gallon per flush (gpf) water closet flush valves and tank style toilets with new 1.28 gpf flush valves or 1.28 gpf tank style toilet depending on existing conditions. The existing porcelain bowls were changed out as well to complete the low-flow replacement. Lavatory sink faucets where existing 2.2 gallon per minute (gpm) aerators were present were replaced with 0.5 gpm aerators. Urinal flush valves where existing 1.5 gpf were present were replaced with 0.125 gpm flush valves. The existing porcelain bowls were changed out as well to complete the low-flow replacement for urinals. Kitchen/ wash sinks aerators where existing 2.5 gpm aerators were present were replaced with 1.5 gpm aerators. The following table includes the fixture count.

Location	High Flow FV Water Closet	High Flow Tank Water Closet	High Flow Urinal	High Flow Lavatory Faucet	High Flow Shower Head	High Flow Kitchen Faucet	High Flow Wash Faucet
City Hall	23	1	6	20	0	1	1

CM-3 M&V Guideline

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled based upon baseline observations and data provided by facility personnel along with IPMVP standards.

CM-3 Overview of M&V Activities

During the IGA investigations, the baseline water usage was determined from a detailed survey of the facilities' water systems and interviews with building personnel. A walk through of each building was performed and all the water consuming end use devices were documented. Estimates of water usage were then compared to a normal or expected use. The number of uses per day was estimated from building occupancy based on discussions with City facilities personnel.

CM-3 Overview of Savings Calculation Methods

A custom calculation model was used to determine the reduction in flow rate between the baseline conditions and post-retrofit condition was made to determine the expected flow rates and proposed savings.

CM-3 Installation Verification

Post installation inspections of the water conservation measures were conducted by CES construction manager and the city to verify the water conservation devices was installed as specified.

CM-3 As-Built Changes

There were not any changes which occurred during construction that affected the overall savings.

2.3.2 CM-3 M&V Activities

Steven Schwerman representing CES visually inspected the fixtures at City Hall December 11th 2018. CES performed flow rate measurements on a variety of bathroom faucet aerators. The aerators are rated at 1.0 gpm. Measurements revealed that the flow rates were closer to 0.5 gpm. This decrease in flow rates would account for additional savings. CES did not adjust the savings but did verify that the fixtures are performing better than expected. The performance of the CM shall be supported by the stipulated water usage of the existing fixtures based on manufacturer's data and the measured capacity data obtained after the retrofit.

CM-3 M&V Data Collection

The flow rates of the new fixtures are guaranteed to meet the manufacturer's data specifications. Total fixture usage are stipulated based on the water fixture consumption models included in Appendix D

CM-3 M&V Sampling Plan

Randomly selected areas were visually inspected based on location and quantity of measures installed by ConEdison construction manager.

CM-3 Performance

Post installation commissioning verified that the equipment is performing as expected.

CM-3 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-3 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.3.3 CM-3 Savings Calculations and Methodology

CM-3 Analysis Methodology

The methodology during IGA phase was to evaluate the water usage determined from a detailed survey of the facilities' water systems and interviews with building personnel. A walk through of each building was performed and all the water using end use devices were documented. Estimates of water usage were then compared to a normal or expected use.

The flush per day or minutes per day for a fixture is calculated by multiplying the number of users by the estimated use per day and dividing by the quantity of that particular fixture. The resulting daily usage rate is then multiplied by the quantity of the fixture, the existing flush or flow rate of the fixture, and the number of days per year that the fixture is in use. This gallon per year value is then divided by 1,000 to yield an annual consumption in kgals per year for that fixture.

$$\text{Flush / Toilet / Day} = (\# \text{ Persons} * \text{Flush/Person/Day}) / \# \text{ of Toilets}$$

$$\text{Annual Water use of Fixture} = (\# \text{ Fixture} * \text{Gal/Flush} * \text{Flush/Toilet/Day} * \text{Days/Year}) * 1\text{kGal}/1000 \text{ Gal}$$

The same calculation is performed for the expected yearly consumption of the replacement fixture using the new lower flush or flow rate.

$$\text{Annual Water Savings (kGal)} = \text{Existing Annual Water Use (Kgal)} - \text{Upgrade Annual Water Use (kGal)}$$

The difference between the existing fixture's annual consumption and the proposed replacement fixture's annual consumption is then calculated with the result being the annual water savings in kgals. An appropriate consumption water and sewer rate obtained from Fort Pierce Utility Authority billing data is used to calculate the annual dollar savings.

$$\text{Annual Dollar Savings} = \text{Annual Water Savings (kGal)} * (\text{Water Rate (\$/kGal)} + \text{Sewer Rate (\$/kGal)})$$

CM-3 Assumptions

Annual pre and post-construction flushes per day and/or minutes per day for a fixture type and end users/ occupancy rates were calculated by information provided by facility personnel.

CM-3 Calculation Details

Refer to Appendix D for as-built calculation worksheet.

CM-3 Savings or Baseline Adjustments

No savings or baseline adjustments were performed for this CM.

CM-3 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-3 Savings

The savings shall remain the same as listed in the final contract document. Refer to Table 7.1 for the verified utility savings.

Table 7.1: Guaranteed versus Verified Annual Savings for CM-3 for Guarantee Year 3

CM 3 - Low Flow Plumbing Fixtures						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 1,375	\$ -	\$ 1,375	\$ 1,375	\$ -	\$ 1,375	\$ -

CM-3 Guarantee

Calculated utility savings are guaranteed at 100% as mutually agreed upon and represented in the contract.

2.3.4 CM-3 Details of O&M and Other Savings

No O&M savings are included in the scope of work for this measure.

2.4 CM 4: City Hall CHW Mechanical & Controls Upgrades

2.4.1 Overview of CM, M&V Plan, and Savings Calculation

CM-4 Scope of Work

At City Hall, the chilled water air handlers and VAV boxes with the pneumatic control system are original to the building. Several of the VAV boxes are no longer operational. The pneumatic control system is an older technology that does not provide adequate feedback to ensure proper operation of components. The air handlers have inlet guide vanes to modulate airflow. This building has large spaces with highly variable occupancies, which makes the air handlers ideal candidates for VFDs instead of inlet guide vanes. These upgrades are mainly directed at improving the mechanical HVAC systems by installing new chilled water pumps, a high efficiency air-cooled chiller, and air handling units with energy efficient motors and VFDs along with new variable air volume boxes. Air handling unit AHU-2 is equipped with demand controlled ventilation to match the outside to the building occupancy. ConEdison Solutions plans on upgrading the control system by installing direct digital controls removing the pneumatic controls.

The components of the proposed scope of work are as follows:

- Replace (2) 7.5 HP chilled water pumps.
- Replace (7) air handling units with chilled water coils with equal capacities. Unit motors shall be premium efficiency. Variable Frequency Drives shall be installed on each unit. AHU-2 shall have demand controlled ventilation.
- Replace chilled water control valves for (7) new AHUs configured for direct digital control.
- Replace (76) VAV Boxes with equal airflow and electric heating coil capacities, as applicable. VAV Boxes shall be designed for direct digital control.
- Provide direct digital control system programmed to control all of the above listed new equipment.
- Integrate the existing chiller plant controls with the new DDC system.
- Replace 185 ton air cooled chiller with higher efficiency model.

The Variable Frequency Drives will be integrated with new sequences of operation and will automatically vary the speed of the fan in response to space HVAC load.

CM-4 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled based upon baseline observations and data provided by facility personnel.

CM-4 Overview of M&V Activities

The performance of the CM shall be supported by the calibrated simulation model developed by Carrier Hourly Analysis Program (HAP) energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data. Omega Test and Balance, INC commissioned the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

CM-4 Overview of Savings Calculations Methods

The Carrier HAP model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings, calculated loads, and average annual weather data for the Fort Pierce area.

Appendix E contains the model used to calculate savings.

2.4.2 CM-4 M&V Activities

Steven Schwerman representing CES visually inspected the equipment December 11th 2018. Conversations with Frank Aponte revealed continual preventive maintenance is occurring on a regular basis including yearly belt replacement. Mr. Aponte also explained that the city has replaced several components for this system. It was reported to CES that two (2) chiller pumps have been replaced, two (2) condenser fans have been replaced, and the electric shut off valve has been replaced twice (2). The controls mother board and two (2) relays have been replaced on the drives. As this system runs continually, these repairs can be common and considered normal required maintenance for a system this complex.

CES commissioned the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The savings shall be stipulated for the remainder of the contract.

Appendix E contains the spreadsheet used to calculate savings.

CM-4 M&V Measurement Equipment

Shortridge series 8400 flowhood air data multimeter, Alnor hydronic manometer HM680, Check-it digital psychrometer, Shortridge ADT446 Temp probe, and a Fluke 322 clamp meter.

CM-4 M&V Data Collection

The HAP model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings and average annual weather data for the Fort Pierce area. The model was developed by the Carrier HAP energy simulation software. The system was commissioned by Omega Test and Balance, INC.

Appendix G contains the model used to calculate savings and the test and balance report.

CM-4 M&V Sampling Plan

All systems included in this scope of work were commissioned by Omega Test and Balance, INC and visually inspected by ConEdison construction manager.

CM-4 M&V Data

The M&V data used for this CM is shown in Appendix G.

CM-4 Performance

Post installation commissioning by CES and Omega verified that the equipment is performing as expected.

CM-4 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-4 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.4.3 CM-4 Savings Calculations and Methodology

CM-4 Analysis Methodology

The performance of the CM was supported by the calibrated simulation model developed by Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

The HAP model estimates design cooling loads for commercial buildings in order to determine required sizes for HVAC system components. The program provides information needed for selecting and specifying equipment. Specifically, the program performs the following tasks:

- Calculates design cooling loads for spaces, zones, and coils in the HVAC system.
- Determines required airflow rates for spaces, zones and the system.
- Sizes cooling coils.
- Sizes air circulation fans.
- Sizes chillers.

The HAP model estimates annual energy use and energy costs for HVAC and non-HVAC energy consuming systems in a building by simulating building operation for each of the 8,760 hours in a year. Results of the energy analysis are used to compare the energy use and energy costs of alternate HVAC system designs so the best design can be chosen. Specifically, the HAP model performed the following tasks during the energy analysis:

- Simulated hour-by-hour operation of air conditioning systems in the building.
- Simulated hour-by-hour operation of plant equipment in the building.
- Simulated hour-by-hour operation of non-HVAC systems including lighting and appliances.
- Used results of the hour-by-hour simulations to calculate total annual energy use and energy costs.
- Costs are calculated using actual utility rates and demand charges.
- Generated graphical reports of annual data.

ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the HAP model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract. The results of the calibrated simulation model follow IPMVP Option D guidelines.

CM-4 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel.

CM-4 Calculation Details

Refer to Appendix E for as-built worksheet.

CM-4 Savings or Baseline Adjustments

No savings or baseline adjustments were performed. Refer to Table 8.1 for verified savings.

CM-4 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-4 Savings

Savings for this CM are based on the calibrated simulation model. The savings remain the same as listed in the final contract document.

Table 8.1: Guaranteed versus Verified Annual Savings for CM-4 for Guarantee Year 3

CM 4 - City Hall CHW Mechanical & Controls Upgrades						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 11,013	\$ 2,122	\$ 13,135	\$ 11,013	\$2,122	\$ 13,135	\$ -

CM-4 Guarantee

Due to unpredictable variations in building use, thermostat settings, and weather, the utility savings are guaranteed at 95% as mutually agreed upon and represented in the contract

2.4.4 CM-4 Details of O&M and Other Savings

As mutually agreed upon during the IGA, ConEdison Solutions assumed an offset of \$2,122 of annual repair costs due to the HVAC upgrades for this CM.

2.5 CM 5: Police Station CHW Mechanical & Controls Upgrades

2.5.1 Overview of CM, M&V Plan, and Savings Calculation

CM-5 Scope of Work

ConEdison Solutions retrofitted the existing DX (Direct Expansion) equipment at the Police Main Station. There are (24) chilled water fan coil units (FCUs) with the line voltage control system that were original to the building. The line voltage control system did not communicate with the chiller plant direct digital controls (DDCs). The chilled water pumps were also original. The chiller was operating without all of its compressors.

The upgrades for this CM are as follows.

- Replaced (2) 1.5 HP chilled water pumps.
- Replaced (24) fan coil units (FCUs) with chilled water coils and electric heating coils with equal capacities.
- Replaced chilled water control valves for (24) new FCUs configured for direct digital control.
- Provided direct digital control system programmed to control all of the above listed new equipment.
- Replaced the 60 ton air cooled chiller and integrate the chiller plant controls with the new DDC system.

CM-5 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled based upon baseline observations and data provided by facility personnel.

CM-5 Overview of M&V Activities

The performance of the CM shall be supported by the calibrated simulation model developed by Carrier Hourly Analysis Program (HAP) energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data. ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the HAP model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

CM-5 Overview of Savings Calculations Methods

The Carrier HAP model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings, calculated loads, and average annual weather data for the Fort Pierce area.

Appendix F contains the model used to calculate savings.

2.5.2 CM-5 M&V Activities

Steven Schwerman representing CES visually inspected the equipment December 11th 2018. Conversations with Frank Aponte revealed continual preventive maintenance is occurring on a regular basis including yearly belt replacement. Mr. Aponte also explained that the city has replaced limited components for this system. It was reported to CES that the controls mother board and four (4) separate times the fan motor has been replaced. As this system runs continually, these repairs can be common and considered normal required maintenance for a system this complex.

ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the HAP model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The savings shall be stipulated for the remainder of the contract.

Appendix F contains the model used to calculate savings and the test and balance report.

CM-5 M&V Measurement Equipment

Shortridge series 8400 flowhood air data multimeter, Alnor hydronic manometer HM680, Check-it digital psychrometer, Shortridge ADT446 Temp probe, and a Fluke 322 clamp meter.

CM-5 M&V Data Collection

ConEdison Solutions used the Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

CM-5 M&V Sampling Plan

All systems included in this scope of work were commissioned by Omega Test and Balance INC and visually inspected by ConEdison construction manager.

CM-5 M&V Data

The M&V data used for this CM is shown in Appendix F.

CM-5 Performance

Post installation commissioning by CES and Omega verified that the equipment is performing as expected.

CM-5 Performance Deficiency Details

There are no performance deficiencies associated with this CM.

CM-5 Savings Impact of Performance Deficiency

There are no performance deficiencies (savings impact) associated with this CM.

2.5.3 CM-5 Savings Calculations and Methodology

CM-5 Analysis Methodology

The performance of the CM was supported by the calibrated simulation model developed by Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

The HAP model estimates design cooling loads for commercial buildings in order to determine required sizes for HVAC system components. The program provides information needed for selecting and specifying equipment. Specifically, the program performs the following tasks:

- Calculates design cooling loads for spaces, zones, and coils in the HVAC system.
- Determines required airflow rates for spaces, zones and the system.
- Sizes cooling coils.
- Sizes air circulation fans.
- Sizes chillers.

The HAP model estimates annual energy use and energy costs for HVAC and non-HVAC energy consuming systems in a building by simulating building operation for each of the 8,760 hours in a year. Results of the energy analysis are used to compare the energy use and energy costs of alternate HVAC system designs so the best design can be chosen. Specifically, the HAP model performed the following tasks during the energy analysis:

- Simulated hour-by-hour operation of air conditioning systems in the building.
- Simulated hour-by-hour operation of plant equipment in the building.
- Simulated hour-by-hour operation of non-HVAC systems including lighting and appliances.
- Used results of the hour-by-hour simulations to calculate total annual energy use and energy costs.
- Costs are calculated using actual utility rates and demand charges.
- Generated graphical reports of annual data.

ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the HAP model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

The results of the calibrated simulation model follow IPMVP Option D guidelines.

CM-5 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel.

CM-5 Calculation Details

Refer to Appendix E for the calibrated simulation model.

CM-5 Savings or Baseline Adjustments

No savings or baseline adjustments were performed.

CM-5 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-5 Savings

Savings for this CM are based on the calibrated simulation model. The savings remain the same as listed in the final contract document.

Table 9.1: Guaranteed versus Verified Annual Savings for CM-4 for Guarantee Year 3

CM 5 - Police Station CHW Mechanical & Controls Upgrades						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 1,535	\$ -	\$ 1,535	\$ 1,535	\$ -	\$ 1,535	\$ -

CM-5 Guarantee

Due to unpredictable variations in building use, thermostat settings, and weather, the utility savings are guaranteed at 95% as mutually agreed upon and represented in the contract.

2.4.4 CM-5 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

2.6 CM 6: IT Split System Upgrades

2.6.1 Overview of CM, M&V Plan, and Savings Calculation

CM-6 Scope of Work

The City Hall IT department was served by (2) 4-ton hi-efficiency (18+ EER) split systems and multiple VAV boxes served by chilled water AHU-6. One of the split systems was cooling only the computer room, the second system is cooling part of the computer room and some office/lobby area outside the computer room. The combination of the existing equipment serving this area did not meet the heat load. Also, there was a need for back-up cooling should the system(s) fail. The narrow adjacent wire room has a temporary (< 1-ton) portable air conditioning unit installed to assist in meeting the cooling demand in this area.

The existing 2 year old, 4-ton DX split system in the Police Main Station IT Room was undersized for the current heat load in the space based on interviews with site personnel. CES installed the following:

- Installed a new 7.5-ton computer room air conditioning (CRAC) unit dedicated to the computer room demand at City Hall. The existing units remain for redundancy.
- Removed the existing, 2 year old, 4-ton split system serving the Police Station server room/IT area and turn it over to the City for their use as needed.
- Installed a new dedicated 7-ton computer room air conditioning (CRAC) unit to serve the server room/IT area at the Police Station.

CM-6 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled based upon baseline observations and data provided by facility personnel.

CM-6 Overview of M&V Activities

The performance of the CM shall be supported by custom calculation model developed by ConEdison Solutions. ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed.

CM-6 Overview of Savings Calculations Methods

For these smaller applications, a custom calculation model was used to calculate annual energy based on the equipment efficiency ratings and average annual weather data for the Fort Pierce area.

Appendix G contains the model used to calculate savings.

2.6.2 CM-6 M&V Activities

Steven Schwerman representing CES visually inspected the equipment December 11th 2018. The equipment was performing as designed. Conversations with Frank Aponte revealed continual preventive maintenance is occurring on a regular basis. Mr. Aponte also explained that the city has replaced limited components for this system at the Police Station affectionately named "Olaf". It was reported to CES that the controls mother board on "Olaf" has been replaced twice (2). As this system runs continually, these repairs can be common and considered normal required maintenance for a system such as this.

The CRAC unit at city hall was found performing as designed. No repairs were reported.

ConEdison Solutions commissioned the new equipment one time at the completion of construction to ensure that it is performing as per the efficiencies and sequences of operation in the model. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed.

Appendix G contains the spreadsheet used to calculate savings.

CM-6 M&V Data Collection

ConEdison Solutions used a custom calculation model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings and average annual weather data for the Fort Pierce area.

The M&V department compared the baseline and post-installation consumption usage that was modeled and cross-referenced the observations and data provided by facility personnel.

CM-6 M&V Sampling Plan

All systems included in this scope of work were visually inspected by ConEdison construction manager.

CM-6 M&V Data

The M&V data used for this CM is shown in Appendix G.

CM-6 Performance

Post installation commissioning verified that the equipment is performing as expected.

CM-6 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-6 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.6.3 CM-6 Savings Calculations and Methodology

CM-6 Analysis Methodology

A custom calculation model was used to calculate annual energy use based on the equipment efficiency ratings and average annual weather data for the Fort Pierce area.

Due to capital improvement characteristic, there are no utility savings associated with this CM. The electric consumption was predicted to increase due to the increased size and decreased efficiency of the new units. This project is included at the request of the City of Fort Pierce as capital improvement project to be funded with the energy savings generated by other CMs as mutually agreed upon and represented in the contract.

The performance of the CM was supported by the model developed by CES. The results of the model follow IPMVP Option D guidelines.

CM-6 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel.

CM-6 Calculation Details

Refer to Appendix G for custom model.

CM-6 Savings or Baseline Adjustments

There are no savings or baseline adjustments for this CM.

CM-6 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-6 Savings and Guarantee:

Due to capital improvement characteristic, there are no utility savings associated with this CM. The electric consumption was predicted to increase due to the increased size and decreased efficiency of the new units. This project is included at the request of the City of Fort Pierce as capital improvement project to be funded with the energy savings generated by other CMs as mutually agreed upon and represented in the contract.

2.6.4 CM-6 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

Table 10: Verified Annual Savings for CM-6 for Guarantee Year 3

CM 6 - IT Split System Upgrades						
Proposed			Verified			Excess Savings (Proposed vs. Verified)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ (2,080)	\$ -	\$ (2,080)	\$ (2,080)	\$ -	\$ (2,080)	\$ -

2.7 CM 7: Air Curtains at Dock Doors

2.7.1 Overview of CM, M&V Plan, and Savings Calculation

CM-7 Scope of Work

There are two (2) approximately 8'x13' exterior roll-up dock doors at the stage level that remained open for extended periods of time allowing infiltration of outside air. For this CM, CES installed an air curtain above each dock door to partially control the infiltration.

CM-7 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled based upon baseline observations and data provided by facility personnel.

CM-7 Overview of M&V Activities

The performance of the CM shall be supported by custom calculation model developed by Berner International Corporation's Energy Savings Calculator program. ConEdison Solutions inspected the curtains at the completion of construction to ensure that it is performing as per the design. As long as the facility ensures that the curtains are maintained per manufacturer's requirements, this CM will be deemed performing as designed.

CM-7 Overview of Savings Calculations Methods

Berner International Corporation's Energy Savings Calculator program was used to calculate annual energy based on the 30 year average climatic data from NOAA's nearest data collection site in Vero Beach, FL.

2.7.2 CM-7 M&V Activities

Steven Schwerman representing CES visually inspected and operated the equipment December 11th 2018. Conversations with Mike Alexander reported that the units are performing as designed.

CM-7 M&V Data Collection

No data collection was used to verify data.

CM-7 Performance

The areas included in scope of work were visually inspected by ConEdison construction manager.

CM-7 Performance Deficiency Details

There is no performance deficiencies associated with this measure.

CM-7 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this measure.

2.7.3 CM-7 Savings Calculations and Methodology

CM-7 Analysis Methodology

Savings were calculated using Berner International Corporation's Energy Savings Calculator program and 30 year average climatic data from NOAA's nearest data collection site in Vero Beach, FL. Normal interior operating conditions are assumed as 75 degrees F and 55% relative humidity. Open time was estimated as an average of 10 hours per week. The door openings were measured on site.

The performance of the CM was supported by the model. The results of the model follow IPMVP Option D guidelines.

CM-7 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel. Open time was estimated as an average of 10 hours per week.

CM-7 Calculation Details

Refer to Appendix H for Berner savings model.

CM-7 Savings or Baseline Adjustments

There are no savings or baseline adjustments for this CM.

CM-7 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-7 Guarantee

The savings are guaranteed at 100% and are stipulated based on ASHRAE methodology as mutually agreed upon per the contract.

CM-7 Savings

The estimated heat loads are for these areas are listed below:

- Sensible Heat Load = 64,213 BTU/H
- Latent Heat Load = 157,217 BTU/H
- Total Heat Gain Rate = 221,430 BTU/H

At the average blended electric rate of \$0.124 per kWh, determined from the theatre's electric bills over the last two years, the avoided cost of heat gain during 32 weeks for the cooling season is \$6,750 annually.

The proposed air curtains have 6 HP combined and would consume \$177.32 annually at the same electric rate over the same operating period.

The net annual savings is summarized in the table below:

Table 11: Annual Savings for CM-7 for Guarantee Year 3

CM 7 - Air Curtains at Dock Doors						
Proposed			Verified			Excess Savings (Proposed vs. Verified)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 7,161	\$ -	\$ 7,161	\$ 7,161	\$ -	\$ 7,161	\$ -

2.7.4 CM-7 Details of O&M and Other Savings

No O&M savings are included in the scope of work for this measure

2.8 CM 8: Demand Controlled Ventilation

2.8.1 Overview of CM, M&V Plan, and Savings Calculation

CM-8 Scope of Work

ConEdison Solutions connected and programed the existing monitors and dampers for Demand Controlled Ventilation (DCV) on AHU-2A and 2B, serving the main theater at Sunrise Theatre.

For systems serving spaces with large populations that are not occupied at their maximum occupancy the majority of time, a significant excess of outside air is delivered to the space during the under-occupied periods. At times when the system is not operating in economizer mode, this outside air requires more energy to heat, cool and dehumidify than is required by the same amount of return air.

Carbon dioxide (CO₂) demand control ventilation makes use of a sensor to measure the CO₂ in the return air stream, and uses this information to determine the amount of outside air required to maintain an acceptable indoor air quality in the space. As the space population decreases, the CO₂ decrease and the systems outside air can be reduced automatically.

Additionally, restrooms must have a specified amount of exhaust, and the volume of outside air must be sufficient to make up this amount. A minimum outside air rate will be maintained to meet the exhaust make up requirements to keep the system balanced.

CM-8 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled using a custom calculation model based upon baseline observations and data provided by facility personnel.

CM-8 Overview of M&V Activities

The performance of the CM shall be supported by the calibrated simulation model developed by Carrier Hourly Analysis Program (HAP) energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data. ConEdison Solutions commissioned the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

CM-8 Overview of Savings Calculations Methods

The Carrier HAP model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings, calculated loads, and average annual weather data for the Fort Pierce area.

Appendix I contains the calibrated simulation model used to calculate savings.

2.8.2 CM-8 M&V Activities

Steven Schwerman representing CES discussed with Mike Alexander the equipment December 11th 2108. The equipment was reported as performing as designed.

ConEdison Solutions calibrated the CO2 sensors one time at the completion of construction to ensure that it is performing as per the HAP model. As long as the facility ensures that the CO2 sensors stay calibrated and maintained per manufacturer's requirements, this CM will be deemed performing as designed. The savings shall be stipulated for the remainder of the contract.

Appendix I contains the HAP model used to calculate savings.

CM-8 M&V Data Collection

ConEdison Solutions used the Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

CM-8 M&V Sampling Plan

All systems included in this scope of work were visually inspected by ConEdison construction manager.

CM-8 M&V Data

The M&V data used for this CM is shown in Appendix F.

CM-8 Performance

Post installation commissioning by CES verified that the equipment is performing as expected.

CM-8 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-8 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.8.3 CM-8 Savings Calculations and Methodology

CM-8 Analysis Methodology

The performance of the CM was supported by the calibrated simulation model developed by Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

The HAP model estimates design loads for commercial buildings in order to determine required sizes for HVAC system components. The program provides information needed for selecting and specifying equipment. Specifically, the program performs the following tasks:

- Calculates design loads for spaces, zones, and coils in the HVAC system.
- Determines required airflow rates for spaces, zones and the system.
- Sizes cooling coils.
- Sizes air circulation fans.
- Sizes chillers.

The HAP model estimates annual energy use and energy costs for HVAC and non-HVAC energy consuming systems in a building by simulating building operation for each of the 8,760 hours in a year. Results of the energy analysis are used to compare the energy use and energy costs of alternate HVAC system designs so

the best design can be chosen. Specifically, the HAP model performed the following tasks during the energy analysis:

- Simulated hour-by-hour operation of air conditioning systems in the building.
- Simulated hour-by-hour operation of plant equipment in the building.
- Simulated hour-by-hour operation of non-HVAC systems including lighting and appliances.
- Used results of the hour-by-hour simulations to calculate total annual energy use and energy costs.
- Costs are calculated using actual utility rates and demand charges.
- Generated graphical reports of annual data.

ConEdison Solutions calibrated the CO2 sensors one time at the completion of construction to ensure that it is performing as per the HAP model. As long as the facility ensures that the CO2 sensors stay calibrated and maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

The results of the calibrated simulation model follow IPMVP Option D guidelines.

CM-8 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel.

CM-8 Calculation Details

Refer to Appendix I for HAP model results.

CM-8 Savings or Baseline Adjustments

No savings or baseline adjustments were performed. Refer to Table 12.1b in Section 2.8.4 for verified savings.

CM-8 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-8 Savings

Savings for this CM are based on the calibrated simulation model. The savings remain the same as listed in the final contract document.

Table 12.1: Guaranteed versus Verified Annual Savings for CM-8 for Guarantee Year 3

CM 8 - Demand Controlled Ventilation						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 1,465	\$ -	\$ 1,465	\$ 1,465	\$ -	\$ 1,465	\$ -

CM-8 Guarantee

The savings are guaranteed at 100% and are stipulated based on ASHRAE methodology as mutually agreed upon per the contract.

2.8.4 CM-8 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

2.9 CM 9: Replace DX Equipment

2.9.1 Overview of CM, M&V Plan, and Savings Calculation

CM-9 Scope of Work

At the Police Main Station, CES was to replace the 14 year old, 3-ton RTU serving the Gym at the Police Station with a new, high efficiency (15 SEER) model.

CM-9 Scope of Work Change

This CM was removed from the project.

CM-9 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled using a custom calculation model based upon baseline observations and data provided by facility personnel.

CM-9 Overview of Savings Calculations Methods

For this smaller application, a custom calculation model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings and cooling degree days for Fort Pierce.

2.9.2 CM-7 M&V Activities

No annual inspections were conducted. Conversations with Frank Aponte on December 11th 2018 revealed that the equipment is performing as designed.

CM-9 M&V Data Collection

No data collection was used to verify data.

2.9.3 CM-9 Savings Calculations and Methodology

CM-9 Analysis Methodology

For this smaller application, a custom calculation model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings and cooling degree days for Fort Pierce.

The performance of the CM was supported by the model. The results of the model follow IPMVP Option D guidelines.

CM-9 Savings or Baseline Adjustments

There are savings adjustments for this CM as this CM was not installed. The entirety of the savings was removed from this project.

CM-9 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-9 Guarantee

The savings were guaranteed at 100% and are stipulated based on ASHRAE methodology as mutually agreed upon per the contract. Since this CM was removed from the scope of the project, the guarantee savings for this CM are offset by increases of savings from other CM's.

Table 13.1: Guaranteed Annual Savings for CM-9 for Guarantee Year 3

CM 9 - Replace DX Equipment						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 444	\$ -	\$ 444	\$ -	\$ -	\$ -	\$ (444)

2.9.4 CM-9 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

2.10 CM 10: Add Ductless Split System

2.10.1 Overview of CM, M&V Plan, and Savings Calculation

CM-10 Scope of Work

At the Police Main Station, CES installed a new 1-ton ductless split system direct exchange (DX) heat pump to serve only the report writing office during evening and weekend hours to allow a shut-down of the chilled water systems. The wall air handling unit can be mounted on the East wall with the heat pump located just outside that wall next to the Gym.

CM-10 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option D (Calibrated Simulation Model). Under this approach the baseline and post-installation consumption usage were modeled using a custom calculation model based upon baseline observations and data provided by facility personnel.

CM-10 Overview of M&V Activities

The performance of the CM shall be supported by the calibrated simulation model developed by Carrier Hourly Analysis Program (HAP) energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data. ConEdison Solutions commissioned the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

CM-10 Overview of Savings Calculations Methods

The Carrier HAP model was used to calculate annual energy use to determine the savings potential based on the equipment efficiency ratings, calculated loads, and average annual weather data for the Fort Pierce area.

Appendix K contains the model used to calculate savings.

2.10.2 CM-10 M&V Activities

Steven Schwerman representing CES visually inspected the equipment December 11th 2018. Conversations with Frank Aponte on December 11th 2018 revealed that the equipment is performing as designed. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The savings shall be stipulated for the remainder of the contract.

Appendix K contains the spreadsheet used to calculate savings.

CM-10 M&V Data Collection

ConEdison Solutions used the Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

CM-10 M&V Sampling Plan

All systems included in this scope of work were visually inspected by ConEdison construction manager.

CM-10 M&V Data

The M&V data used for this CM is shown in Appendix F.

CM-10 Performance

Post installation commissioning by CES verified that the equipment is performing as expected.

CM-10 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-10 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM

2.10.3 CM-10 Savings Calculations and Methodology

CM-10 Analysis Methodology

The performance of the CM was supported by the calibrated simulation model developed by Carrier HAP energy simulation software that performs energy calculations based on estimated system loads and an hour-by-hour simulation technique for the energy analysis on a typical meteorological year (TMY) weather data.

The HAP model estimates design loads for commercial buildings in order to determine required sizes for HVAC system components. The program provides information needed for selecting and specifying equipment. Specifically, the program performs the following tasks:

- Calculates design loads for spaces, zones, and coils in the HVAC system.
- Determines required airflow rates for spaces, zones and the system.
- Sizes cooling coils.
- Sizes air circulation fans.
- Sizes chillers.

The HAP model estimates annual energy use and energy costs for HVAC and non-HVAC energy consuming systems in a building by simulating building operation for each of the 8,760 hours in a year. Results of the energy analysis are used to compare the energy use and energy costs of alternate HVAC system designs so the best design can be chosen. Specifically, the HAP model performed the following tasks during the energy analysis:

- Simulated hour-by-hour operation of air conditioning systems in the building.
- Simulated hour-by-hour operation of plant equipment in the building.
- Simulated hour-by-hour operation of non-HVAC systems including lighting and appliances.
- Used results of the hour-by-hour simulations to calculate total annual energy use and energy costs.
- Costs are calculated using actual utility rates and demand charges.
- Generated graphical reports of annual data.

As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calibrated simulation model for the remainder of the contract.

The results of the calibrated simulation model follow IPMVP Option D guidelines.

CM-10 Assumptions

Annual pre and post-construction operational hours were calculated by information provided by facility personnel. For the calculation, the chilled water systems were scheduled off from 6:00 pm until 6:00 am daily.

CM-10 Calculation Details

Refer to Appendix K for HAP model results.

CM-10 Savings or Baseline Adjustments

No savings or baseline adjustments were performed. Refer to Table 14.1 in Section 2.10.3 for verified savings.

CM-10 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-10 Savings

Savings for this CM are based on the calibrated simulation model. The savings remain the same as listed in the final contract document.

Table 14.1: Guaranteed versus Verified Annual Savings for CM-10 for Guarantee Year 3

CM 10 - Add Ductless Split System						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 10,855	\$ -	\$ 10,855	\$ 10,855	\$ -	\$ 10,855	\$ -

CM-10 Guarantee

Due to unpredictable variations in building use, thermostat settings, and weather, the utility savings are guaranteed at 95% as mutually agreed upon and represented in the contract.

2.10.4 CM-10 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

2.11CM 11: HVAC Controls Upgrade/Building Management System

2.11.1 Overview of CM, M&V Plan, and Savings Calculation

CM-11 Scope of Work

At the Sunrise Theatre, ConEdison Solutions upgraded the Apogee system server software to the latest version; provide one (1) server license and conduct software/system changes and onsite client training. This upgrade included the addition of the Remote Notification software, which allows enunciation of Insight Alarm, Status, and System Event information to various notification devices.

CM-11 M&V Plan

There is no M & V plan for this ECM since energy savings are not being quantified.

CM-11 Overview of M&V Activities

No annual inspections will be conducted. No activities for this measure will be performed.

2.11.2 ECM-11 M&V Activities

ConEdison Solutions are not claiming energy savings. Steven Schwerman with CES discussed with Mike Alexander the equipment December 11th 2018. The equipment was reported as performing as designed.

CM-11 M&V Measurement Equipment

No equipment was used to verify the scope of work.

CM-11 M&V Equipment Calibration

No equipment was used to verify the scope of work.

CM-11 M&V Data Collection

No data collection was used to verify data.

CM-11 M&V Sampling Plan

Not applicable.

CM-11 M&V Data

Not applicable.

CM-11 Performance

The areas included in scope of work were visually inspected by ConEdison construction manager.

CM-11 Performance Deficiency Details

There is no performance deficiencies associated with this measure.

CM-11 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this measure.

2.11.3 ECM-11 Savings Calculations and Methodology

CM-11 Analysis Methodology

Not applicable

CM-11 Assumptions

Not applicable

CM-11 Calculation Details

Not applicable

CM-11 Savings or Baseline Adjustments

Not applicable

CM-11 Energy Rates

Not applicable

CM-11 Guarantee

Not applicable

CM-11 Savings

Not applicable

2.11.4 ECM-11 Details of O&M and Other Savings

No O&M savings are included in the scope of work for this measure

2.12 CM 12: Vending Machine Controls

2.12.1 Overview of CM, M&V Plan, and Savings Calculation

CM-12 Scope of Work

ConEdison Solutions installed occupancy sensing, plug load controlling devices that reduce the unnecessary operation of the City's vending machines during unoccupied periods at select sites. ConEdison Solutions proposed to install a Vending Miser on each machine. The Vending Miser consists of a Passive Infrared Sensor (PIR) and a microcontroller. The Vending Miser is an occupancy-based energy controller which will power the machine down during unoccupied hours at night and over weekends. It then monitors the room's temperature and automatically re-powers the cooling system at one to three hour intervals to ensure the product stays cold. The controller is designed so that it will not de-energize the vending machine in the middle of a cooling compressor cycle. It saves money by turning off lighting and by managing compressor cooling cycles when they are not needed.

For this CM, ConEdison Solutions proposed the following:

- Installation of Vending Miser on one (1) cold drink vending machine at City Hall.
- Installation of Vending Misers on two (2) cold drink vending machines at River Walk.
- Installation of Vending Misers on two (2) cold drink vending machines at PAL Park.
- Installation of Vending Miser on one (1) cold drink vending machine at the Police Main Station.
- Installation of Vending Misers on two (2) cold drink vending machines at the Public Works Compound.

CM-12 M&V Plan

The M & V approach is based upon The International Performance Measurement and Verification Protocol (IPMVP) Option A (Partially Measured Retrofit Isolation). Under this approach the baseline and post-installation consumption usage were modeled using a custom calculation model based upon baseline observations and data provided by facility personnel.

CM-12 Overview of M&V Activities

The performance of the CM shall be supported by a custom calculation model specially designed for this CM. ConEdison Solutions verified the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per design, this CM will be deemed performing as designed. The energy savings shall be stipulated based on the calculations for the remainder of the contract.

CM-12 Overview of Savings Calculations Methods

A custom calculation model was used to determine annual energy use to determine the savings potential based on the equipment and average annual operation hours. The custom calculation model was developed by ConEdison Solutions.

2.12.2 CM-12 M&V Activities

ConEdison Solutions commissioned the new equipment one time at the completion of construction. As long as the facility ensures that the equipment is maintained per manufacturer's requirements, this CM will be deemed performing as designed. The savings shall be stipulated for the remainder of the contract.

Appendix L contains the spreadsheet used to calculate savings.

CM-12 M&V Data Collection

ConEdison Solutions used a custom spreadsheet to calculate annual energy use to determine the savings potential based on the equipment. The custom calculation model was developed by ConEdison Solutions.

The M&V department compared the baseline and post-installation consumption usage that was modeled and cross-referenced the observations and data provided by facility personnel.

CM-12 M&V Sampling Plan

All equipment included in this scope of work were visually inspected by ConEdison construction manager.

CM-12 M&V Data

The M&V data used for this CM is from the final IGA.

CM-12 Performance

Post installation commissioning verified that the equipment is performing as expected.

CM-12 Performance Deficiency Details

There is no performance deficiencies associated with this CM.

CM-12 Savings Impact of Performance Deficiency

There is no performance deficiencies (savings impact) associated with this CM.

2.12.3 CM-12 Savings Calculations and Methodology

CM-12 Analysis Methodology

A custom calculation model was used to determine annual energy use to determine the savings potential based on the equipment average annual operation hours. The custom calculation model was developed by ConEdison Solutions.

The performance of the CM was supported by the model developed by ConEdison Solutions. The energy savings are stipulated based on the model for the remainder of the contract.

The results of the custom calculation model follow IPMVP Option A guidelines.

CM-12 Assumptions

City Hall, PAL Park and Public Works operate typically five (5) days per week, the Police Station operates twenty-four (24) hours year-round, and the River Walk vending machines are located in an unsecured outdoor area available twenty-four (24) hours year-round. City Hall annual occupied hours are assumed at seventy (70) hours per week which should cover normal after business hours activities, including late nights for meetings. PAL Park annual occupied hours are assumed at sixty (60) hours per week, including set-up and clean-up activities. Public Works annual occupied hours are assumed at fifty (50) hours per week for normal business operations. Since the Police Station drink machine is located in a break room, CES has proposed that at least two (2) hours per day would be unoccupied even if the building is occupied elsewhere. The River Walk vending machine area has less foot traffic during night-time hours. CES has proposed at least two (2) hours per day that would be considered unoccupied.

CM-12 Calculation Details

Qty	Building	Qty Vending Machines	Qty Vending Machines w/o lights	Qty Coolers	Total Connected Demand (kW)	Existing Annual Hours of Operation	Existing Electric Consumption (kWh)	Annual Occupied Hours	Proposed Annual Hours of Operation	Proposed Electric Consumption	Operating Months per Year	Annual Electric Savings
[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]
1	City Hall	1	0	0	0.43	8,760	3,741	3,640	4,493	1,919	12	1,822
2	River Walk Center	2	0	0	0.85	8,760	7,481	8,030	8,152	6,962	12	520
2	PAL Park	2	0	0	0.85	8,760	7,481	3,120	4,060	3,467	12	4,014
1	Main Police Station	1	0	0	0.43	8,760	3,741	8,030	8,152	3,481	12	260
2	Public Works Compound	2	0	0	0.85	8,760	7,481	2,600	3,627	3,097	12	4,384
8					3.42		29924			18925		10999

Item	Value	Units	cell ref	Remarks
Existing Annual Hours of Operation per Machine	8,760	Hrs	[D14]	Vending Machines are constantly plugged in
Time Between Auto Repower	2	Hrs	[D15]	based on independent testing data
Duration of Auto Repower	0.4	Hrs	[D16]	based on independent testing data
Watts used for Vending Machine	427	W	[D17]	industry average
Watts used for Vending Machine without lights	233	W	[D18]	industry average
Watts used for Coolers	233	W	[D19]	industry average

Cell Ref.	Comment
A	Estimated quantity of machines appropriate for retrofit, per site audit
B	Facility analyzed
C	Quantity of vending machines appropriate for retrofit
D	Quantity of snack machines appropriate for retrofit
E	Quantity of coolers appropriate for retrofit
F	Total connected electric demand per building = [colC] x [F17] / 1,000 + [colD] x [F18] / 1,000 + [colE] x [F19] / 1,000
G	[F14]
H	[colF] x [colG]
I	Annual Hours the building is occupied
J	[colI] + ([D14] ÷ 52 - [colI] ÷ 52) ÷ ([D15] + [D16]) x [D16] x 52 weeks
K	[colF] x [colJ]
L	Months per year the machine is powered on
M	[colH] - [colK]

CM-12 Savings or Baseline Adjustments

No savings or baseline adjustments were performed for this CM.

CM-12 Energy Rates

The Energy Rates for this CM can be found in Section 1.3 Energy, Water, and O&M Rate Data.

CM-12 Savings

Savings for this CM are based on the calibrated simulation model. The savings remain the same as listed in the contract document.

Table 15.1a: Guaranteed versus Verified Annual Savings for CM-12 for Guarantee Year 3

CM - 12 Vending Misers						
Guaranteed			Verified			Excess Savings (Verified vs. Guaranteed)
Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	Utility Savings (\$)	Maintenance Savings (\$)	Annual Project Savings	
\$ 1,632	\$ -	\$ 1,632	\$ 1,632	\$ -	\$ 1,632	\$ -

CM-12 Guarantee

Calculated utility savings are guaranteed at 100% as mutually agreed upon and represented in the contract.

2.12.4 CM-12 Details of O&M and Other Savings

No operation and maintenance savings were used for this CM.

3.0 Appendix

- A. Annual Savings Guarantees and Annual M&V Service Fees
- B. Lighting Improvement and Controls As-Built Data
- C. Street Lighting As-Built Data
- D. Low Flow Plumbing Fixtures
- E. City Hall CHW Mechanical & Controls Upgrades
- F. Police Station CHW Mechanical & Controls Upgrades
- G. IT Split System Upgrades
- H. Air Curtains at Dock Doors
- I. Demand Controlled Ventilation
- J. Replace DX Equipment
- K. Add Ductless Split System
- L. Vending Misers

Appendix A

Annual Savings Guarantees and Annual M&V Service Fees

ATTACHMENT A TO SCHEDULE C

PROJECT SAVINGS SUMMARY

Savings Guarantee	Measured Utility Savings IPMVP*	Modeled Utility Savings IPMVP*	Stipulated Lighting Material Savings	Stipulated HVAC Subcontractor Savings (note 3)	Stipulated Street Lighting Subcontractor (FPUA)	Total Annual Guaranteed Savings
Term Year	Option-A (note 1.3)	Option-D (note 2.3)	(note 3)			
1	\$285,591	\$31,482	\$5,108	\$2,000	\$108,483	\$432,665
2	\$294,159	\$32,426	\$5,261	\$2,060	\$108,483	\$442,391
3	\$302,983	\$33,399	\$5,419	\$2,122	\$108,483	\$452,410
4	\$312,073	\$34,401	\$5,582	\$2,185	\$108,483	\$462,728
5	\$321,435	\$35,433	\$5,749	\$2,251	\$108,483	\$473,357
6	\$331,078	\$36,496	\$5,922	\$2,319	\$101,130	\$476,951
7	\$341,011	\$37,591	\$6,099	\$2,388	\$101,130	\$488,226
8	\$351,241	\$38,719	\$6,282	\$2,460	\$92,715	\$491,425
9	\$361,778	\$39,880	\$6,471	\$2,534	\$92,715	\$503,387
10	\$372,631	\$41,077	\$6,665	\$2,610	\$84,299	\$507,292
11	\$383,810	\$42,309	\$6,865		\$69,596	\$502,591
12	\$395,325	\$43,578	\$7,071		\$55,841	\$501,827
13	\$407,184	\$44,886	\$7,283		\$55,841	\$515,207
14	\$419,400	\$46,232	\$7,501		\$42,086	\$515,234
15	\$431,982	\$47,619	\$7,726		\$42,086	\$529,429
16	\$444,941	\$49,048	\$7,958		\$42,086	\$544,050
17	\$458,290	\$50,519	\$8,197		\$42,086	\$559,109
18	\$472,038	\$52,035	\$8,443		\$42,086	\$574,620
19	\$486,200	\$53,596	\$8,696		\$42,086	\$590,597
Totals	\$7,173,152	\$790,729	\$128,297	\$22,928	\$1,448,198	\$9,563,304

* International Performance Measurement and Verification protocol

Note 1: There is a one-time measured savings the first year and then stipulated savings thereafter.

Note 2: The utility savings are total of water and electric savings.

Note 3: Savings assume a 3% escalation rate.

SCHEDULE D – MEASUREMENT AND VERIFICATION FEES

Upon City acceptance of final completion of the construction phase of the conservation measures, the measurement and verification (M&V) phase of the contract shall commence. Compensation to Company for annual the M&V services **is not** included in the conservation measure construction phase compensation. Annually, the City shall issue a purchase order to Company for authorization of M&V services, the annual purchase order amount shall be based on the following table:

Guarantee Year	M&V Services Fee Payable to Company
1	\$10,000.00
2	\$10,300.00
3	\$10,609.00
4	\$10,927.00
5	\$11,255.00
6	\$11,593.00
7	\$11,941.00
8	\$12,299.00
9	\$12,668.00
10	\$13,048.00
11	\$13,439.00
12	\$13,842.00
13	\$14,258.00
14	\$14,685.00
15	\$15,126.00

16	\$15,580.00
17	\$16,047.00
18	\$16,528.00
19	\$17,024.00

If, at any time during the Guarantee Term, City elects not to proceed with ordering M&V Services through a separate Purchase Order or otherwise, at its sole discretion, such remaining M&V Services Fees shall be waived and no further M&V Services will be required to be provided by the Company.

Appendix B

Lighting Improvement and Controls As-Built Data

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Measurement & Verification, City of Ft. Pierce - L&S Enterprises, LLC EC0002615
City Complex

Building	Room	ECM	Voltage	Amperage	Watts	Avg Volts	Avg Amps	Avg Watts
PW Compound/844	EOC Ready Room	Retrofit fixture with (2) 28w T8 lamps & Normal Power Electronic Ballast	116.2	0.42	48	119.6	0.40	48
PW Compound/834	Conference		121.3	0.39	47			
PW Compound/799	Warehouse		121.2	0.40	48			
PW Compound/886	Shop Office	Relamp & ReBallast fixture with (2) 28w T8 lamp and Low Power Electronic Ballast	122.2	0.35	42	122.8	0.34	42
PW Compound/604	Gymnasium		121.5	0.34	41			
City Hall	118		124.7	0.34	42			
PW Compound/777	Shop 4	Relamp & Reballast fixture with (4) 28w T8 lamps and Low Power Electronic Ballast	123.9	0.68	83	120.1	0.70	83
PW Compound/774	Shop 1		116.4	0.73	84			
Community Center	Kitchen		120.1	0.70	83			
PW Compound/840	Hall	Relamp & Reballast fixture with (2) 2' T8 lamps and NP Elec. Ballast	116.8	0.27	31	117.7	0.27	31
PW Compound/837	Reception		118.6	0.26	31			
City Hall	118		117.6	0.27	31			
Police Station/650	Bldg. Eave	Replace fixture with 40w Induction	117.6	0.35	41	119.8	0.35	41
PW Compound/808	Rear Canopy		120.3	0.34	41			
Community Center	Front Canopy		121.4	0.35	42			
PAL Park/679	Exterior	Replace fixture with 80w Induction	116.7	0.71	82	118.0	0.70	82
Police Station/657	Generator		118.1	0.69	81			
PW Compound/873	Entry		119.3	0.69	82			

Street Lights

Facility ID (Pole #)	Type	Fixture	Voltage	Amperage	Watts	Avg Volts	Avg Amps	Avg Watts
22780	Street	Philips StreetView 72W48LED CobraHead	116.2	0.68	78	119.6	0.66	78
22783			121.3	0.65	78			
12784			121.2	0.64	77			
10684	Street	Neptun LED-452120-UNV Cobrahead	122.2	1.01	122	122.8	1.00	122
10686			121.5	1.01	121			
10688			124.7	0.99	122			
11029	PostTop	Neptun LED-348060 Lamp Replacement	123.9	0.68	61	120.1	0.70	61
11031			116.4	0.73	61			
11032			120.1	0.70	61			

Appendix C

Parking Lot As-Built Data

CM 2 - Street Lighting As-Built

Existing Fixture Style	Existing Fixture Tech.	Existing Fixture Power (Watts)	Contracted Qty.	Installed Qty.
Cobra-Head	HPS	150	2,561	2,507
Cobra-Head	HPS	250	651	798
Cobra-Head	Metal Halide	250	276	2
Cobra-Head	Metal Halide	400	77	52
Post Top	Metal Halide	100	0	26
Post Top	Metal Halide	150	27	52
Post Top	Metal Halide	175	462	409
			4,054	3,846

FT. PIERCE ROADWAY LIGHTING SAVINGS ANALYSIS															
ECM 2				Existing System					Verified ECM				Savings		
Existing Fixture Style	Existing Fixture Tech.	Existing Fixture Power (Watts)	Qty.	Energy Rate	Maint. Rate	Existing Annual Energy Cost	Existing Annual Maint. Cost	Existing Annual Cost	Measured LED Lamp Power (Watts)	Verified Annual Energy Cost	Verified Annual Maint. Cost	Verified Monthly Total Cost	Annual Energy Savings	Annual Maint. Savings	Total Annual Savings
Cobra-Head	HPS	150	2,507	\$ 7.81	\$ 1.60	\$234,956	\$48,134	\$283,090	78	\$101,066	\$21,686	\$122,752	\$133,890	\$26,449	\$160,339
Cobra-Head	HPS	250	798	\$ 12.34	\$ 1.60	\$118,168	\$15,322	\$133,489	122	\$50,317	\$6,903	\$57,220	\$67,850	\$8,419	\$76,269
Cobra-Head	HPS	400	2	\$ 19.02	\$ 2.64	\$456	\$63	\$520	245	\$253	\$17	\$271	\$203	\$46	\$249
Cobra-Head	Metal Halide	400	52	\$ 19.02	\$ 2.64	\$11,868	\$1,647	\$13,516	245	\$6,585	\$450	\$7,034	\$5,284	\$1,198	\$6,481
Post Top	Metal Halide	150	52	\$ 6.68	\$ 3.91	\$4,168	\$2,440	\$6,608	61	\$1,639	\$406	\$2,045	\$2,529	\$2,034	\$4,563
Post Top	Metal Halide	175	409	\$ 9.06	\$ 4.62	\$44,466	\$22,675	\$67,141	61	\$12,895	\$3,190	\$16,085	\$31,572	\$19,485	\$51,057
Post Top	Metal Halide	100	26	\$ 4.45	\$ 4.62	\$1,389	\$1,441	\$2,831	61	\$820	\$203	\$1,023	\$570	\$1,239	\$1,808
			3,846		Totals:	\$415,473	\$91,723	\$507,196		\$173,575	\$32,854	\$206,429	\$241,898	\$58,869	\$300,767

Facility ID (Pole #)	Type	Fixture	Voltage	Amperage	Watts	Avg Volts	Avg Amps	Avg Watts
22780	Street	Philips StreetView 72W48LED CobraHead	116.2	0.68	78	119.6	0.66	78
22783	Street	Philips StreetView 72W48LED CobraHead	121.3	0.65	78			
12784	Street	Philips StreetView 72W48LED CobraHead	121.2	0.64	77			
10684	Street	Neptun LED-452120-UNV Cobrahead	122.2	1.01	122	122.8	1.00	122
10686	Street	Neptun LED-452120-UNV Cobrahead	121.5	1.01	121			
10688	Street	Neptun LED-452120-UNV Cobrahead	124.7	0.99	122			
11029	PostTop	Neptun LED-348060 Lamp Replacement	123.9	0.68	61	120.1	0.70	61
11031	PostTop	Neptun LED-348060 Lamp Replacement	116.4	0.73	61			
11032	PostTop	Neptun LED-348060 Lamp Replacement	120.1	0.70	61			

Ft. Pierce ECM L2A - Street Lighting LED Cash Flow Analysis																					
	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Photocell	Labor	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 1,176	\$ 11,765	\$ 15,686	\$ 15,686	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,556	\$ 3,408	\$ 3,408	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260	\$ 4,260	-
Posttops	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
Cobraheads	Labor	\$ 784	\$ 784	\$ 784	\$ 784	\$ 784	\$ 3,922	\$ 3,922	\$ 7,843	\$ 7,843	\$ 11,765	\$ 11,765	\$ 15,686	\$ 15,686	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	\$ 19,608	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,565	\$ 3,565	\$ 7,130	\$ 7,130	\$ 10,695	\$ 10,695	\$ 14,260	\$ 14,260	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	\$ 17,825	-
	Total:	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 8,663	\$ 8,663	\$ 16,149	\$ 16,149	\$ 23,636	\$ 36,780	\$ 49,040	\$ 49,040	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	\$ 61,300	-
	Current	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	\$ 83,982	-
	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Labor	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 1,961	\$ 5,098	\$ 5,098	\$ 9,019	\$ 9,019	\$ 12,941	\$ 23,529	\$ 31,372	\$ 31,372	\$ 39,215	\$ 39,215	\$ 39,215	\$ 39,215	\$ 39,215	\$ 39,215	\$ 372,543
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 3,565	\$ 3,565	\$ 7,130	\$ 7,130	\$ 10,695	\$ 13,251	\$ 17,668	\$ 17,668	\$ 22,085	\$ 22,085	\$ 22,085	\$ 22,085	\$ 22,085	\$ 22,085	\$ 213,183
Positive Cash Flow		\$ 82,021	\$ 82,021	\$ 82,021	\$ 82,021	\$ 82,021	\$ 75,319	\$ 75,319	\$ 67,832	\$ 67,832	\$ 60,346	\$ 47,202	\$ 34,942	\$ 34,942	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 22,682	\$ 1,009,928
																					\$ 1,009,927.51
Average Annual Savings:																					\$ 53,154

Ft. Pierce ECM K2A - Post Top Lighting LED Cash Flow Analysis																					
	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Photocell	Labor	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 139	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 304	\$ 406	\$ 406	\$ 507	\$ 507	\$ 507	\$ 507	\$ 507	\$ 507	-
Posttops	Labor	\$ 279	\$ 279	\$ 279	\$ 279	\$ 279	\$ 465	\$ 465	\$ 929	\$ 929	\$ 1,394	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 465	\$ 465	\$ 929	\$ 929	\$ 1,394	\$ 1,394	\$ 1,858	\$ 1,858	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	\$ 2,323	-
Cobraheads	Labor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	-
	Total:	\$ 418	\$ 418	\$ 418	\$ 418	\$ 418	\$ 1,068	\$ 1,068	\$ 1,998	\$ 1,998	\$ 2,927	\$ 4,485	\$ 5,980	\$ 5,980	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	\$ 7,476	-
	Current	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	\$ 26,880	-
	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Labor	\$ 418	\$ 418	\$ 418	\$ 418	\$ 418	\$ 604	\$ 604	\$ 1,068	\$ 1,068	\$ 1,533	\$ 2,787	\$ 3,716	\$ 3,716	\$ 4,646	\$ 4,646	\$ 4,646	\$ 4,646	\$ 4,646	\$ 4,646	\$ 45,061
	Material	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 465	\$ 465	\$ 929	\$ 929	\$ 1,394	\$ 1,698	\$ 2,264	\$ 2,264	\$ 2,830	\$ 2,830	\$ 2,830	\$ 2,830	\$ 2,830	\$ 2,830	\$ 27,388
Positive Cash Flow		\$ 26,462	\$ 26,462	\$ 26,462	\$ 26,462	\$ 26,462	\$ 25,812	\$ 25,812	\$ 24,882	\$ 24,882	\$ 23,953	\$ 22,395	\$ 20,900	\$ 20,900	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 19,404	\$ 438,271
																					\$ 438,270.98
Average Annual Savings:																					\$ 23,067

Total Cash Flow

\$ 108,483

\$ 108,483

\$ 108,483

\$ 108,483

\$ 108,483

\$ 101,130

\$ 101,130

\$ 92,715

\$ 92,715

\$ 84,299

\$ 69,596

\$ 55,841

\$ 55,841

\$ 42,086

\$ 42,086

\$ 42,086

\$ 42,086

\$ 42,086

\$ 42,086

\$ 42,086

\$ 42,086

\$ 1,448,198

Appendix D

Low Flow Plumbing Calculations

The following table includes the fixture count.

Location	High Flow FV Water Closet	High Flow Tank Water Closet	High Flow Urinal	High Flow Lavatory Faucet	High Flow Shower Head	High Flow Kitchen Faucet	High Flow Wash Faucet
City Hall	23	1	6	20	0	1	1

**City of Fort Pierce
City Hall**

Existing Water Consumption

Flush Fixture	Daily Uses	Flowrate (GPF)	Duration (flush)	Occupants (FTE)	Water Use (gallons)
Water Closet (female)	3	3.5	1	33.4	350.7
Water Closet (male)	1	3.5	1	29.6	103.6
Urinal (male)	2	1.5	1	28.4	85.2
Waterless Urinal (male)	2	0	1	0	0

Flow Fixture	Daily Uses	Flowrate (GPM)	Duration (seconds)	Occupants (FTE)	Water Use (gallons)
Lavatory (conventional)	3	2.2	30	65.6	216.48
Lavatory (auto control)	3	2.2	12	65.6	86.592
Kitchen Sink	1	2.5	15	0	0
Shower	0.1	2.5	300	0	0

Total Daily Volume (gal) 842.572
Annual Work Days 260
Annual Volume (gal) 219068.7
Rainwater or Graywater Volume (gal) 0
Total Annual Volume (gal) 219068.7

Proposed Water Consumption

Flush Fixture	Daily Uses	Flowrate (GPF)	Duration (flush)	Occupants (FTE)	Water Use (gallons)
Water Closet (female)	3	1.28	1	33.4	128.256
Water Closet (male)	1	1.28	1	29.6	37.888
Urinal (male)	2	0.125	1	28.4	7.1
Waterless Urinal (male)	2	0	1	0	0

Flow Fixture	Daily Uses	Flowrate (GPM)	Duration (seconds)	Occupants (FTE)	Water Use (gallons)
Lavatory (conventional)	3	0.5	30	65.6	49.2
Lavatory (auto control)	3	0.5	12	65.6	19.68
Kitchen Sink	1	1.5	15	0	0
Shower	0.1	1.5	300	0	0

Total Daily Volume (gal) 242.1
Annual Work Days 260
Annual Volume (gal) 62952
Rainwater or Graywater Volume (gal) 0
Total Annual Volume (gal) 62952

FTE Occupant Multipliers

# Full Time Occupants	# Transients	Transient Factor	# Retail Customers	Retail Cust Factor	FTE Occupants
25	2	0.5	37	0.2	33.4
24	2	1	36	0.1	29.6
24	2	0.4	36	0.1	28.4
0	0	0.4	0	0.1	0

# Full Time Occupants	# Transients	Transient Factor	# Retail Customers	Retail Cust Factor	FTE Occupants
49	4	0.5	73	0.2	65.6
49	4	0.5	73	0.2	65.6
0	0	0	73	0	0
0	0	0	0	0	0

Flush Fixture	Flow Rate (gpf)
Conventional Water Closet	3.5
Low-Flow Water Closet	1.28
Conventional Urinal	1.5
Low-Flow Urinal	0.125

Flow Fixture	Flow Rate (gpm)
Conventional Lavatory	2.2
Low-Flow Lavatory	0.5
Ultra Low-Flow Lavatory	0.35
Kitchen Sink	2.5
Low-Flow Kitchen Sink	1.5
Shower	2.5
Low-Flow Shower	1.5

Existing Water Consumption = 219068.72 gal/year
Proposed Water Consumption 62952 gal/year
Consumption Reduction 156116 gal/year
% Reduction over baseline = 71.26%

Var. Water Rate (\$/Kgal) = \$8.30
Annual Water Savings = **\$1,295.77**

Fixture	Qty
Flush Valve WC	23
Tank WC	1
Urinal	6
Lavatory	20
Shower	0
Kitchen Sink	2

Appendix E

E.1 - City Hall CHW Mechanical & Controls Upgrades Data

E.2 - Test and Balance Report

Annual Cost Summary

Ft. Pierce City Hall Baseline
ConEdison Solutions

11/05/2013
03:08PM

Table 1. Annual Costs

Component	Baseline Building (\$)	ECM - 1A Lighting (\$)	ECM AHU VFD, DCV & CHILLER (\$)
Air System Fans	10,043	9,564	5,769
Cooling	47,171	45,677	38,427
Heating	0	0	0
Pumps	4,381	4,424	4,439
Heat Rejection Fans	0	0	0
HVAC Sub-Total	61,595	59,665	48,636
Lights	19,171	10,521	10,557
Electric Equipment	14,540	14,686	14,736
Misc. Electric	5,563	4,696	4,712
Misc. Fuel Use	0	0	0
Non-HVAC Sub-Total	39,273	29,904	30,005
Grand Total	100,868	89,568	78,641

Table 2. Annual Cost per Unit Floor Area

Component	Baseline Building (\$/ft²)	ECM - 1A Lighting (\$/ft²)	ECM AHU VFD, DCV & CHILLER (\$/ft²)
Air System Fans	0.195	0.186	0.112
Cooling	0.916	0.886	0.746
Heating	0.000	0.000	0.000
Pumps	0.085	0.086	0.086
Heat Rejection Fans	0.000	0.000	0.000
HVAC Sub-Total	1.195	1.158	0.944
Lights	0.372	0.204	0.205
Electric Equipment	0.282	0.285	0.286
Misc. Electric	0.108	0.091	0.091
Misc. Fuel Use	0.000	0.000	0.000
Non-HVAC Sub-Total	0.762	0.580	0.582
Grand Total	1.958	1.738	1.526
Gross Floor Area (ft²)	51528.0	51528.0	51528.0
Conditioned Floor Area (ft²)	51528.0	51528.0	51528.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	Baseline Building (%)	ECM - 1A Lighting (%)	ECM AHU VFD, DCV & CHILLER (%)
Air System Fans	10.0	10.7	7.3
Cooling	46.8	51.0	48.9
Heating	0.0	0.0	0.0
Pumps	4.3	4.9	5.6
Heat Rejection Fans	0.0	0.0	0.0
HVAC Sub-Total	61.1	66.6	61.8
Lights	19.0	11.7	13.4
Electric Equipment	14.4	16.4	18.7
Misc. Electric	5.5	5.2	6.0
Misc. Fuel Use	0.0	0.0	0.0
Non-HVAC Sub-Total	38.9	33.4	38.2
Grand Total	100.0	100.0	100.0

Annual Cost Summary

Ft. Pierce City Hall Baseline
ConEdison Solutions

11/05/2013
03:08PM

OMEGA TEST AND BALANCE, INC.
~~~A CERTIFIED INDEPENDENT TEST AND BALANCE COMPANY~~~
126 WISTERIA AVENUE, FORT PIERCE, FLORIDA 34982
CELL (772)216-7632
TABB CERTIFICATION NO. BB032001C
WWW.OMEGATESTANDBALANCE.ORG
omegamaniac532002@yahoo.com

TESTING, ADJUSTING, AND BALANCING REPORT

FORT PIERCE CITY HALL
100 NORTH US HWY. ONE
FORT PIERCE, FLORIDA

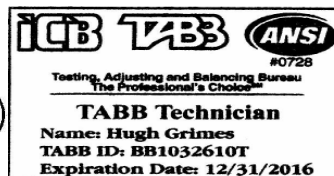
MECHANICAL ENGINEER:
BGA, INC.
3101 WEST MARTIN LUTHER KING BLVD., SUITE 110
TAMPA, FLORIDA 33607

GENERAL/MECHANICAL CONTRACTOR:
GRIMES HEATING & AIR CONDITIONING
3054 NORTH US HWY. ONE
FORT PIERCE, FLORIDA 34946

READINGS BY:
HUGH A. GRIMES,
T.A.B.B. CERTIFIED CONTRACTOR/SUPERVISOR/TECHNICIAN

MAY 5, 2015

~~ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES~~



TESTING, ADJUSTING AND BALANCING BUREAU
"THE PROFESSIONAL'S CHOICE"



OMEGA TEST AND BALANCE, INC.
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126 WISTERIA AVENUE, FORT PIERCE, FLORIDA 34982
CELL (772)216-7632
TABB CERTIFICATION NO. BB032001C/BB032002S/BB1032610T
WWW.OMEGATESTANDBALANCE.ORG
omegamaniac532002@yahoo.com

FORT PIERCE CITY HALL
TEST AND BALANCE INSTRUMENTS

SHORTRIDGE SERIES 8400 FLOWHOOD W/ADM860 AIR DATA MULTIMETER

RANGE: 0 TO 61 IN H.G
ACCURACY: 0.05% FS
CALIBRATION DATE: OCTOBER 5, 2014

ALNOR HYDRONIC MANOMETER HM680

RANGE: 0 TO 300 PSI/0 TO 9999 GPM/-40° TO 250°F
ACCURACY: ±1% OR .072 PSI/±0.5° F
CALIBRATION DATE: OCTOBER 5, 2014

CHECK-IT DIGITAL PSYCHROMETER—MODEL #622

RANGE: 35° TO 205° F, 5% TO 100% RH
ACCURACY: ±2° ±1 DIGIT ±3%
CALIBRATION DATE: OCTOBER 5, 2014

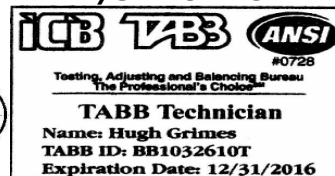
SHORTRIDGE ADT446 TEMPROBE

RANGE: -20° TO 180° F
ACCURACY: ± 0.5° FROM 32° TO 158° F
CALIBRATION DATE: OCTOBER 5, 2014

FLUKE 322 CLAMP METER

HUGH A. GRIMES,
CERTIFIED T.A.B.B. CONTRACTOR/SUPERVISOR/TECHNICIAN

~~~ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES~~~



TESTING, ADJUSTING AND BALANCING BUREAU
"THE PROFESSIONAL'S CHOICE"



FORT PIERCE CITY HALL CHILLED WATER AIRHANDLING UNITS

UNIT	AHU-1	AHU-2	AHU-3
MAKE	TRANE	TRANE	TRANE
MODEL NO.	CSAA012UA	CSAA004UA	CSAA012UA
SERIAL NO.	K14G59971	K14G59977	K14G59983
SHEAVE SIZE	2AK49X1-5/16	2AK25X1	24K44X1-5/16
BELTS/SIZE	AX37	AX39	AX36
FILTERS/SIZE	16X20X2	20X20X2	16X20X2
MOTOR			
MAKE/FRAME	BALDOR/215T	BALDOR/184T	BALDOR/215T
HP/RPM	7.5/1800	3/1800	7.5/1800
V/PH/HZ	460/3/60	460/3/60	460/3/60
FL AMPS/SF	20.4/19.4/9.7 1.15	4.2 1.15	20.4/19.4/9.7 1.15
ACTUAL VOLTS	476/474/473	473/472/471	475/471/470
ACTUAL AMPS	6.8/6.9/7.0	3.6/3.3/3.2	6.4/6.1/6.0
SHEAVE SIZE	2AK49HX1-3/16	2BK65X1-1/8	24K44X1-3/16
CL DISTANCE	12.1	13.9	12.4
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	6115 6147**	2400 2472**	5900 6154**
O/A CFM	1850 1591*	1065 915*	810 696*
R/A CFM	4265 4556	1335 1557	5090 5458
EXT. SP	1.5 1.71	1.5 .80	1.5 1.82
DISC. SP	NA 1.18	NA .41	NA 1.21
SUCT. SP	NA -.53	NA -.29	NA -.61
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	76.4/63.4 73.3/62.4	82.1/71.2 73.7/62.4	76.7/64.7 73.2/61.4
LAT	54.0/53.4 55.1/54.6	52.9/52.8 54.7/54.1	55.0/54.36 54.7/54.0
EWT	44.0 44.7	44.0 43.8	44.0 43.8
LWT	58.0 58.7	58.0 57.9	58.0 58.8
GPM	25.52 25.79	20.15 20.22	26.11 26.29
PD FT/INCH	4.66 4.72	6.19 6.23	4.84 4.90
VALVE	50% CLOSED	35% CLOSED	47% CLOSED

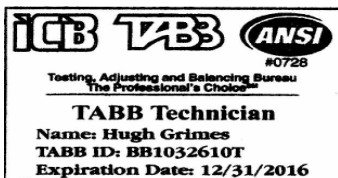
REMARKS:

---*DESIGN O/A = 8135 CFM FOR AHU'S. O/A FAN IS ONLY CAPABLE OF PRODUCING 7000 CFM. ALL O/A VALUES REPORTED ARE BALANCED @ APPROXIMATELY 86% PROPORTIONALLY.
 ---**ALL AHU TOTALS OBTAINED BY ADDING VAV TOTALS @ MAX COOL @ 60 HZ.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



BOX #	MAKE	BOX SIZE	MAX DESIGN	MAX ACTUAL	MIN DESIGN	MIN ACTUAL	CAL FACTOR
3-1	TRANE	5	300	309	40	43	.95
3-2	TRANE	6	350	356	60	63	.96
3-3	TRANE	8	445	451	105	109	.99
3-4	TRANE	8	445	449	105	111	1.0
3-5	TRANE	6	200	207	60	63	.92
3-6	TRANE	14	1625	1634	320	328	1.10
3-7	TRANE	6	210	214	60	61	.94
3-8	TRANE	8	765	773	105	109	1.02
3-9	TRANE	8	450	457	105	113	1.0
3-10	TRANE	6	320	329	60	62	.97
3-11	TRANE	8	540	551	105	108	1.01
3-12	TRANE	5	170	176	40	42	.93
3-13	TRANE	5	240	248	40	44	.96
			6060	6154	1205	1256	

REMARKS:

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE CITY HALL CHILLED WATER AIRHANDLING UNITS

UNIT	AHU-4	AHU-5	AHU-6
MAKE	TRANE	TRANE	TRANE
MODEL NO.	CSAA017UA	CSAA012UA	CSAA017UA
SERIAL NO.	K14G66661	K14G59995	K14G59989
SHEAVE SIZE	2AK51HX1-5/16	2AK49HX1-5/16	2TB54X1-5/16
BELTS/SIZE	A41	A40	B44
FILTERS/SIZE	16X20X2	16X20X2	16X20X2
MOTOR			
MAKE/FRAME	BALDOR/215T	BALDOR/215T	BALDOR/215T
HP/RPM	7.5/1800	7.5/1800	7.5/1800
V/PH/HZ	460/3/60	460/3/60	460/3/60
FL AMPS/SF	20.4/19.4/9.7 1.15	20.4/19.4/9.7 1.15	20.4/19.4/9.7 1.15
ACTUAL VOLTS	477/476/474	469/473/474	476/475/474
ACTUAL AMPS	7.4/7.6/7.6	6.2/6.0/6.1	7.9/8.1/8.2
SHEAVE SIZE	2AK54X1-3/8	2AK49HX1-3/8	2BK57HX1-3/8
CL DISTANCE	13.4	12.1	13.4
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	7750 7930**	6120 6255**	8930 9169**
O/A CFM	1125 967*	900 774*	900 777*
R/A CFM	6625 6963	5220 5511	8030 8392
EXT. SP	1.5 1.82	1.5 1.60	1.5 2.02
DISC. SP	NA 1.30	NA 1.19	NA 1.47
SUCT. SP	NA -.52	NA -.41	NA -.55
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	76.2/64.0 72.8/60.4	76.2/64.0 73.1/60.8	75.0/62.70 71.9/60.3
LAT	55.0/54.2 54.5/53.9	55.0/54.28 55.1/54.4	55.5/54.67 53.7/53.1
EWT	44.0 43.8	44.0 43.7	44.0 43.8
LWT	58.0 57.6	58.0 57.1	58.0 57.2
GPM	32.19 32.49	25.23 25.69	30.01 31.01
PD FT/INCH	5.29 5.35	4.57 4.71	3.43 3.69
VALVE	40% CLOSED	45% CLOSED	35% CLOSED

REMARKS:

---*DESIGN O/A = 8135 CFM FOR AHU'S. O/A FAN IS ONLY CAPABLE OF PRODUCING 7000 CFM. ALL O/A VALUES REPORTED ARE BALANCED @ APPROXIMATELY 86% PROPORTIONALLY.
---**ALL AHU TOTALS OBTAINED BY ADDING VAV TOTALS @ MAX COOL @ 60 HZ.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



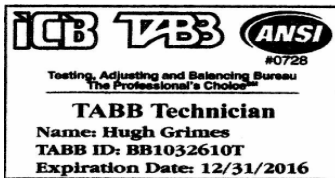
ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE CITY HALL CHILLED WATER AIRHANDLING UNITS

UNIT	AHU-7		
MAKE	TRANE		
MODEL NO.	CSAA017UA		
SERIAL NO.	K14G60007		
SHEAVE SIZE	2BK57X1-5/16		
BELTS/SIZE	B44		
FILTERS/SIZE	20X20X2 20X24X2		
MOTOR			
MAKE/FRAME	BALDOR/235T		
HP/RPM	10/1745		
V/PH/HZ	460/3/60		
FL AMPS/SF	12.4/1.15		
ACTUAL VOLTS	473/471/474		
ACTUAL AMPS	8.9/9.1/9.2		
SHEAVE SIZE	2BT54X1-1/2		
CL DISTANCE	14.7		
HEAT	ELECTRIC		
EVAPORATOR	DESIGN ACTUAL		
SUPPLY CFM	8900 9218**		
O/A CFM	1485 1277*		
R/A CFM	7415 7941		
EXT. SP	1.5 1.99		
DISC. SP	NA 1.48		
SUCT. SP	NA -.51		
COIL			
OUTSIDE AIR	DESIGN ACTUAL		
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL		
RAT	77.6/66.3 72.9/61.2		
LAT	55.5/55.4 54.3/53.9		
EWT	44.0 43.7		
LWT	58.0 57.2		
GPM	42.55 43.11		
PD FT/INCH	3.70 3.72		
VALVE	35% CLOSED		

REMARKS:

---*DESIGN O/A = 8135 CFM FOR AHU'S. O/A FAN IS ONLY CAPABLE OF PRODUCING 7000 CFM. ALL O/A VALUES REPORTED ARE BALANCED @ APPROXIMATELY 86% PROPORTIONALLY.
---**ALL AHU TOTALS OBTAINED BY ADDING VAV TOTALS @ MAX COOL @ 60 HZ.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



**FORT PIERCE CITY HALL
VAV TEST SHEET
AHU-7**

BOX #	MAKE	BOX SIZE	MAX DESIGN	MAX ACTUAL	MIN DESIGN	MIN ACTUAL	CAL FACTOR
7-1	TRANE	5	250	256	41	44	.93
7-2	TRANE	8	600	624	105	109	1.0
7-3	TRANE	8	820	834	136	141	1.05
7-4	TRANE	5	200	212	40	42	.92
7-5	TRANE	16	2000	2047	240	246	1.10
7-6	TRANE	8	700	717	116	121	1.04
7-7	TRANE	5	200	213	40	42	.96
7-8	TRANE	8	500	522	105	108	.99
7-9	TRANE	6	300	318	60	63	1.01
7-10	TRANE	8	420	428	105	108	1.02
7-11	TRANE	5	200	211	40	42	.96
7-12	TRANE	8	460	472	105	113	1.02
7-13	TRANE	10	1100	1126	183	196	1.08
7-14	TRANE	8	600	614	105	113	1.01
7-15	TRANE	8	600	624	105	109	1.0
			8950	9218	1526	1597	

REMARKS:

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



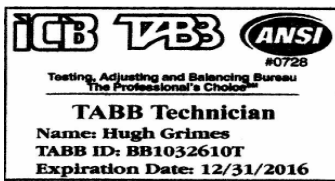
FORT PIERCE CITY HALL

CHILLER TEST REPORT

	CHILLER #1	
EQUIPMENT DATA		
MAKE	TRANE	
MODEL NO.	CGAM120	
SERIAL NO.	V14F4275	
VOLTS/PHASE/HZ	460/3/60	
EVAPORATOR DATA		
	DESIGN ACTUAL	
GPM	192 204	
EFT	44.0 43.8	
LFT	58.0 53.9	
PD	7.70 7.93	
COMPRESSOR DATA		
NO. COMPRESSORS	4	
RLA	51.0 EACH	
VOLTS	460/3/60	
REFRIGERANT	410A	
FLA	72.0	
CONDENSOR DATA		
NO. FANS	8	
RLA	3.2	
VOLTS	460/3/60	
HP	1.27	

REMARKS: SEE STARUP MANUAL FROM TRANE FOR FURTHER INFORMATION.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE CITY HALL PUMP TEST REPORT

	PUMP CHWP-1	PUMP CHWP-2	
DESIGN DATA			
SERVICE	CHILLER 1	CHILLER 1	
MAKE	B&G	B&G	
MODEL NO.	SERIES 80	SERIES 80	
SERIAL NO.	NA	NA	
GPM/HD FT	192/50	192/50	
PUMP RPM	1750	1750	
IMPELLER SIZE	9.5	9.5	
MOTOR DATA			
MAKE/FRAME	WEG/184JM	WEG/184JM	
HP (W)/RPM	5/1750	5/1750	
VOLTS/PHASE/HZ	230-460/3/60	230-460/3/60	
FLA/SF	13.0-6.5/NA	13.0-6.5/NA	
TEST DATA			
PUMP RPM	1750	1750	
IMPELLER SIZE	9.5	9.5	
DELTA P	21.1	21.15	
GPM/HD FT	204.6/47.74	203.2/48.85	
VOLTS	471/474/473	474/473/473	
AMPS	4.8/4.6/4.7	4.8/4.8/4.8	
DISCHARGE PRESSURE	47.5	47.9	
SUCTION PRESSURE	26.4	26.75	

REMARKS:

ALL WORK PERFORMED IN ACCORDANCE WITH TAB/SMACNAB STANDARDS AND PROCEDURES

Appendix F

F.1 - Police Station CHW Mechanical & Controls Upgrades F.2 - Test and Balance Report

Annual Cost Summary

Ft. Pierce Police Dept
ConEdison Solutions

11/05/2013
03:28PM

Table 1. Annual Costs

Component	Baseline Building (\$)	ECM 1 Lighting (\$)	ECM 10 Ductless Split (\$)	ECM 5 Replace Chiller (\$)
Air System Fans	15,093	15,231	7,962	7,945
Cooling	22,617	21,895	18,296	16,858
Heating	730	827	246	246
Pumps	1,145	1,154	606	604
Heat Rejection Fans	0	0	0	0
HVAC Sub-Total	39,585	39,107	27,110	25,653
Lights	10,881	7,422	7,722	7,706
Electric Equipment	18,977	19,151	19,925	19,884
Misc. Electric	10,443	3,779	3,931	3,923
Misc. Fuel Use	0	0	0	0
Non-HVAC Sub-Total	40,301	30,352	31,579	31,513
Grand Total	79,885	69,459	58,689	57,166

Table 2. Annual Cost per Unit Floor Area

Component	Baseline Building (\$/ft²)	ECM 1 Lighting (\$/ft²)	ECM 10 Ductless Split (\$/ft²)	ECM 5 Replace Chiller (\$/ft²)
Air System Fans	0.643	0.649	0.339	0.339
Cooling	0.964	0.933	0.779	0.718
Heating	0.031	0.035	0.011	0.011
Pumps	0.049	0.049	0.026	0.026
Heat Rejection Fans	0.000	0.000	0.000	0.000
HVAC Sub-Total	1.686	1.666	1.155	1.093
Lights	0.464	0.316	0.329	0.328
Electric Equipment	0.808	0.816	0.849	0.847
Misc. Electric	0.445	0.161	0.168	0.167
Misc. Fuel Use	0.000	0.000	0.000	0.000
Non-HVAC Sub-Total	1.717	1.293	1.345	1.342
Grand Total	3.403	2.959	2.500	2.435
Gross Floor Area (ft²)	23475.0	23475.0	23475.0	23475.0
Conditioned Floor Area (ft²)	23475.0	23475.0	23475.0	23475.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	Baseline Building (%)	ECM 1 Lighting (%)	ECM 10 Ductless Split (%)	ECM 5 Replace Chiller (%)
Air System Fans	18.9	21.9	13.6	13.9
Cooling	28.3	31.5	31.2	29.5
Heating	0.9	1.2	0.4	0.4
Pumps	1.4	1.7	1.0	1.1
Heat Rejection Fans	0.0	0.0	0.0	0.0
HVAC Sub-Total	49.6	56.3	46.2	44.9
Lights	13.6	10.7	13.2	13.5
Electric Equipment	23.8	27.6	34.0	34.8
Misc. Electric	13.1	5.4	6.7	6.9
Misc. Fuel Use	0.0	0.0	0.0	0.0
Non-HVAC Sub-Total	50.4	43.7	53.8	55.1
Grand Total	100.0	100.0	100.0	100.0

Annual Cost Summary

Ft. Pierce Police Dept
ConEdison Solutions

11/05/2013
03:28PM

OMEGA TEST AND BALANCE, INC.
~~~A CERTIFIED INDEPENDENT TEST AND BALANCE COMPANY~~~
126 WISTERIA AVENUE, FORT PIERCE, FLORIDA 34982
CELL (772)216-7632
TABB CERTIFICATION NO. BB032001C
WWW.OMEGATESTANDBALANCE.ORG
omegamaniac532002@yahoo.com

TESTING, ADJUSTING, AND BALANCING REPORT

FORT PIERCE POLICE STATION
920 US HWY. ONE
FORT PIERCE, FLORIDA

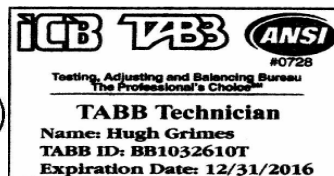
MECHANICAL ENGINEER:
BGA, INC.
3101 WEST MARTIN LUTHER KING BLVD., SUITE 110
TAMPA, FLORIDA 33607

GENERAL/MECHANICAL CONTRACTOR:
GRIMES HEATING & AIR CONDITIONING
3054 NORTH US HWY. ONE
FORT PIERCE, FLORIDA 34946

READINGS BY:
HUGH A. GRIMES,
T.A.B.B. CERTIFIED CONTRACTOR/SUPERVISOR/TECHNICIAN

MAY 7, 2015

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TESTING, ADJUSTING AND BALANCING BUREAU
"THE PROFESSIONAL'S CHOICE"



OMEGA TEST AND BALANCE, INC.
~~~A CERTIFIED INDEPENDENT TEST AND BALANCE COMPANY~~~
126 WISTERIA AVENUE, FORT PIERCE, FLORIDA 34982
CELL (772)216-7632
TABB CERTIFICATION NO. BB032001C/BB032002S/BB1032610T
WWW.OMEGATESTANDBALANCE.ORG
omegamaniac532002@yahoo.com

FORT PIERCE POLICE STATION
TEST AND BALANCE INSTRUMENTS

SHORTRIDGE SERIES 8400 FLOWHOOD W/ADM860 AIR DATA MULTIMETER

RANGE: 0 TO 61 IN H.G
ACCURACY: 0.05% FS
CALIBRATION DATE: OCTOBER 5, 2014

ALNOR HYDRONIC MANOMETER HM680

RANGE: 0 TO 300 PSI/0 TO 9999 GPM/-40° TO 250°F
ACCURACY: ±1% OR .072 PSI/±0.5° F
CALIBRATION DATE: OCTOBER 5, 2014

CHECK-IT DIGITAL PSYCHROMETER—MODEL #622

RANGE: 35° TO 205° F, 5% TO 100% RH
ACCURACY: ±2° ±1 DIGIT ±3%
CALIBRATION DATE: OCTOBER 5, 2014

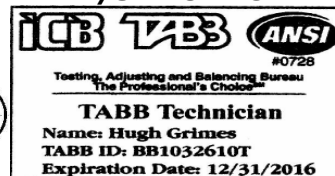
SHORTRIDGE ADT446 TEMPROBE

RANGE: -20° TO 180° F
ACCURACY: ± 0.5° FROM 32° TO 158° F
CALIBRATION DATE: OCTOBER 5, 2014

FLUKE 322 CLAMP METER

HUGH A. GRIMES,
CERTIFIED T.A.B.B. CONTRACTOR/SUPERVISOR/TECHNICIAN

~~~ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES~~~



TESTING, ADJUSTING AND BALANCING BUREAU
"THE PROFESSIONAL'S CHOICE"



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-1	FC-2	FC-3
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCHD054	BCHD036	BCHD054
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	.5/NA	.5/NA	.5/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	7.2/NA	7.2/NA	7.2/NA
ACTUAL VOLTS	123	121	121
ACTUAL AMPS	6.1 @ 80%**	4.4 @ 55%**	6.2 @ 80%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1500 1397	1100 1169	1400 1388
O/A CFM	1350 53	990 61	1230 51
R/A CFM	150 1344	110 1108	170 1337
EXT. SP	.26 .31	.20 .30	.20 .31
DISC. SP	NA .16	NA .18	NA .17
SUCT. SP	NA -.15	NA -.12	NA -.14
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	79.2/66.2 72.5/61.4	79.2/66.2 72.7/61.8	79.4/66.4 73.1/62.4
LAT	52.65/52.35 55.20/54.30	55.58/54.97 55.40/54.00	52.24/52.14 54.90/53.60
EWT	44.0 44.1	44.0 43.8	44.0 44.2
LWT	56.0 56.7	56.0 56.2	56.0 55.9
GPM	10.35 10.47	6.31 6.61	9.95 10.03
PD FT/INCH	4.34 4.41	6.37 6.77	4.05 4.14
VALVE	100% OPEN	60% OPEN	80% OPEN

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-4	FC-5	FC-6
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCHD036	BCHD036	BCHD024
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	.5/NA	.5/NA	.5/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	7.2/NA	7.2/NA	7.2/NA
ACTUAL VOLTS	119	123	125
ACTUAL AMPS	4.0 @50%**	4.1 @ 50%**	3.3 @ 40%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1150 1191	1100 1183	800 867
O/A CFM	800 66	990 48	300 63
R/A CFM	350 1125	110 1135	500 804
EXT. SP	.20 .29	.20 .32	.20 .29
DISC. SP	NA .16	NA .16	NA .15
SUCT. SP	NA -.13	NA -.16	NA -.14
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	81.8/68.9 72.7/61.4	79.2/66.8 71.9/61.2	83.5/72.6 72.6/61.0
LAT	56.56/55.94 55.10/54.40	55.80/55.23 55.20/54.10	60.29/59.71 55.20/54.40
EWT	44.0 43.6	44.0 43.9	44.0 43.7
LWT	56.0 55.8	56.0 56.2	56.0 56.9
GPM	7.94 8.13	6.57 6.69	5.98 6.03
PD FT/INCH	9.61 9.70	6.84 6.90	4.53 4.58
VALVE	65% OPEN	55% OPEN	40% OPEN

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
 ---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-7B	FC-8A	FC-8B
MAKE	TRANE	TRANE	TRANE
MODEL NO.	FCCB02	BCHD018	BCHD054
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	.24/NA	.5/NA	.5/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	4.2/NA	7.2/NA	7.2/NA
ACTUAL VOLTS	122	122	124
ACTUAL AMPS	1.1 @ 35%**	2.0 @ 33%**	4.2 @ 55%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	165 179	400 431	1350 1202
O/A CFM	0 0	100 39	200 44
R/A CFM	165 179	300 392	1150 1158
EXT. SP	.234 .150	.20 .27	.20 .31
DISC. SP	NA .09	NA .14	NA .18
SUCT. SP	NA -.06	NA -.13	NA -.13
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	78.0/65.0 72.3/61.4	79.7/66.8 71.9/61.2	79.7/66.8 72.3/61.4
LAT	64.47/53.88 55.20/54.30	52.77/52.47 54.80/54.00	52.14/52.04 54.70/53.20
EWT	44.0 44.2	44.0 43.6	44.0 43.9
LWT	56.0 56.5	56.0 57.0	56.0 57.2
GPM	.99 1.10	2.88 2.92	9.96 10.11
PD FT/INCH	2.02 2.12	3.83 3.87	4.05 4.10
VALVE	60% CLOSED	55% CLOSED	40% CLOSED

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-9A	FC-9B	FC-10
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCHD036	BCHD036	FCCB02
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	.5/NA	.5/NA	.24/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	7.2/NA	7.2/NA	4.2/NA
ACTUAL VOLTS	123	124	125
ACTUAL AMPS	3.8 @ 55%**	3.9 @ 55%**	1.1 @ 33%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1100 1171	1100 1161	165 180
O/A CFM	350 53	300 33	0 0
R/A CFM	750 697	800 1128	165 180
EXT. SP	.20 .33	.20 .27	.234 .140
DISC. SP	NA .19	NA .16	NA .08
SUCT. SP	NA -.14	NA -.11	NA -.06
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	81.2/68.5 73.1/62.0	81.2/68.5 70.8/61.1	78.0/65.0 72.7/60.8
LAT	56.21/55.64 55.10/54.60	56.21/55.64 55.50/55.00	54.47/53.88 55.20/54.40
EWT	44.0 44.2	44.0 44.2	44.0 43.9
LWT	56.0 56.9	56.0 56.6	56.0 55.8
GPM	7.48 7.55	7.48 7.60	.99 1.19
PD FT/INCH	8.63 8.71	8.63 8.77	2.02 2.12
VALVE	50% CLOSED	55% CLOSED	65% CLOSED

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
 ---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-11	FC-12	FC-13A
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCHD072	BCHD072	BCHD054
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	.5/NA	.5/NA	1.0/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	7.2/NA	7.2/NA	14.4/NA
ACTUAL VOLTS	123	123	122
ACTUAL AMPS	6.4 @ 75%**	7.0 @ 80%**	7.0 @ 45%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1550 1603	1600 1613	1500 1599
O/A CFM	150 39	400 40	300 66
R/A CFM	1400 1565	1200 1573	1200 1533
EXT. SP	.26 .40	.25 .35	.20 .37
DISC. SP	NA .26	NA .21	NA .22
SUCT. SP	NA -.14	NA -.14	NA -.15
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	78.0/65.0 73.3/62.1	80.8/68.0 71.9/60.8	80.4/67.9 72.8/61.4
LAT	55.03/54.64 55.30/54.50	55.92/55.54 54.90/54.00	57.69/57.23 55.20/53.90
EWT	44.0 43.2	44.0 43.6	44.0 43.6
LWT	56.0 55.7	56.0 55.9	56.0 56.2
GPM	8.06 8.33	10.46 10.80	8.53 8.39
PD FT/INCH	2.27 2.31	3.63 3.71	2.20 2.16
VALVE	100% OPEN	100% OPEN	100% OPEN

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
 ---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-13B	FC-14	FC-15
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCDH054	BCHD024	BCHD036
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	1.0/NA	.5/NA	.5/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	14.4/NA	7.2/NA	7.2/NA
ACTUAL VOLTS	125	123	125
ACTUAL AMPS	7.1 @ 45%**	3.88 @ 55%**	3.9 @ 55%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1500 1601	800 841	900 857
O/A CFM	300 71	80 31	100 57
R/A CFM	1200 1530	720 810	800 800
EXT. SP	.20 .35	.20 .26	.20 .28
DISC. SP	NA .22	NA .16	NA .17
SUCT. SP	NA -.13	NA -.10	NA -.11
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	80.4/67.9 72.2/61.1	78.0/65.0 72.8/61.1	79.3/66.4 73.7/62.9
LAT	57.69/57.23 55.20/54.20	53.27/53.09 55.30/54.40	54.60/54.34 55.60/54.80
EWT	44.0 43.9	44.0 44.2	44.0 43.7
LWT	56.0 56.4	56.0 56.1	56.0 57.8
GPM	8.53 8.69	4.71 4.77	5.52 5.55
PD FT/INCH	2.20 2.31	4.11 4.18	5.02 5.02
VALVE	40% CLOSED	30% CLOSED	100% OPEN

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-16	FC-17	FC-18
MAKE	TRANE	TRANE	TRANE
MODEL NO.	BCHD054	BCHD054	BCHD036
SERIAL NO.	NA*	NA*	NA*
SHEAVE SIZE	DD	DD	DD
BELTS/SIZE	DD	DD	DD
FILTERS/SIZE	MERV 8/2	MERV 8/2	MERV 8/2
MOTOR			
MAKE/FRAME	DD	DD	DD
HP/RPM	1.0/NA	.5/NA	1.0/NA
V/PH/HZ	120/1/60	120/1/60	120/1/60
FL AMPS/SF	14.4/NA	7.2/NA	14.4/NA
ACTUAL VOLTS	126	123	122
ACTUAL AMPS	6.6 @ 75%**	7.1 @ 100%**	7.7 @ 75%**
SHEAVE SIZE	DD	DD	DD
CL DISTANCE	DD	DD	DD
HEAT	ELECTRIC	ELECTRIC	ELECTRIC
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
SUPPLY CFM	1600 1631	1400 1389	1400 1444
O/A CFM	160 63	140 42	150 53
R/A CFM	1440 1568	1260 1347	1250 1391
EXT. SP	1.0 .44	.50 .34	1.0 .50
DISC. SP	NA .24	NA .21	NA .33
SUCT. SP	NA -.20	NA -.13	NA -.17
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	DESIGN ACTUAL
RAT	79.2/66.2 73.0/61.2	79.2/66.2 72.2/60.4	80.6/67.8 74.1/63.1
LAT	52.69/52.58 55.30/53.90	56.90/56.44 54.80/54.10	57.35/56.54 54.40/53.80
EWT	44.0 43.6	44.0 43.8	44.0 44.2
LWT	56.0 55.5	56.0 55.8	56.0 56.6
GPM	10.88 10.91	7.07 7.17	8.34 8.41
PD FT/INCH	4.74 4.75	1.57 1.58	10.49 10.49
VALVE	100% OPEN	40% OPEN	100% OPEN

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
 ---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION CHILLED WATER FAN COIL UNITS

UNIT	FC-19	FC-20	
MAKE	TRANE	TRANE	
MODEL NO.	BCHD036	BCHD054	
SERIAL NO.	NA*	NA*	
SHEAVE SIZE	DD	DD	
BELTS/SIZE	DD	DD	
FILTERS/SIZE	MERV 8/2	MERV 8/2	
MOTOR			
MAKE/FRAME	DD	DD	
HP/RPM	.5/NA	1.0/NA	
V/PH/HZ	120/1/60	120/1/60	
FL AMPS/SF	7.2/NA	14.4/NA	
ACTUAL VOLTS	122	123	
ACTUAL AMPS	5.9 @ 59%**	6.9 @ 60%**	
SHEAVE SIZE	DD	DD	
CL DISTANCE	DD	DD	
HEAT	ELECTRIC	ELECTRIC	
EVAPORATOR	DESIGN ACTUAL	DESIGN ACTUAL	
SUPPLY CFM	1250 1279	1250 1293	
O/A CFM	300 43	160 60	
R/A CFM	950 1236	1090 1233	
EXT. SP	.50 .27	1.0 .54	
DISC. SP	NA .16	NA .36	
SUCT. SP	NA -.11	NA -.13	
COIL			
OUTSIDE AIR	DESIGN ACTUAL	DESIGN ACTUAL	
OAT			
LAT			
EWT			
LWT			
GPM			
PD FT/INCH			
VALVE			
RETURN AIR	DESIGN ACTUAL	DESIGN ACTUAL	
RAT	80.8/67.9 72.3/61.4	79.2/66.2 71.8/60.4	
LAT	56.74/56.04 55.00/54.00	51.84/51.74 55.60/55.00	
EWT	44.0 44.4	44.0 44.2	
LWT	56.0 56.6	56.0 56.3	
GPM	7.81 7.89	8.95 9.10	
PD FT/INCH	9.33 9.37	3.35 3.40	
VALVE	40% CLOSED	100% OPEN	

REMARKS: ---*SERIAL NUMBER NOT AVAILABLE. JOB ORDER NUMBER ONLY.
---**FAN SPEED.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES

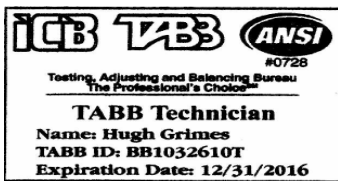


FORT PIERCE POLICE STATION CHILLER TEST REPORT

	CHILLER #1	
EQUIPMENT DATA		
MAKE	TRANE	
MODEL NO.	CGAM060F	
SERIAL NO.	V14F42714	
VOLTS/PHASE/HZ	460/3/60	
EVAPORATOR DATA		
	DESIGN ACTUAL	
GPM	166 168.3	
EFT	52.2 49.1	
LFT	44.0 43.8	
PD	17.6 17.7	
COMPRESSOR DATA		
NO. COMPRESSORS	4	
RLA	24	
VOLTS	460/3/60	
REGRIGERANT	410A	
FLA	NA	
CONDENSOR DATA		
NO. FANS	4	
RLA	3.2	
VOLTS	460	
HP	1.27	

REMARKS: ---SEE TRANE STARTUP MANUAL FOR ADDITIONAL INFORMATION.

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES



FORT PIERCE POLICE STATION PUMP TEST REPORT

	PUMP CHWP-1	PUMP CHWP-2	
DESIGN DATA			
SERVICE	CHILLER 1	CHILLER 1	
MAKE	B&G	B&G	
MODEL NO.	E-1510	E-1510	
SERIAL NO.	NA	NA	
GPM/HD FT	166/60	166/60	
PUMP RPM	1750	1750	
IMPELLER SIZE	8.125	8.125	
MOTOR DATA			
MAKE/FRAME	WEG/184T	WEG/184T	
HP (W)/RPM	5/1750	5/1750	
VOLTS/PHASE/HZ	208-230-460/3/60	208-230-460/3/60	
FLA/SF	13.0-6.5/NA	13.0-6.5/NA	
TEST DATA			
PUMP RPM	1750	17750	
IMPELLER SIZE	8.125	8.125	
DELTA P	25.62	25.62	
GPM/HD FT	168.3/59.19	169.0/59.2	
VOLTS	469/468/467	469/469/467	
AMPS	4.2/4.4/4.1	4.0/3.9/4.3	
DISCHARGE PRESSURE	42.9	43.0	
SUCTION PRESSURE	17.28	17.38	
VALVE	40% CLOSED	40% CLOSED	

REMARKS:

ALL WORK PERFORMED IN ACCORDANCE WITH TABB/SMACNA STANDARDS AND PROCEDURES

Appendix G

IT Split System Upgrade Calculations

CM 6: IT Split System Upgrades Calculation

City of Fort Pierce - DX Equipment Replacement CM 6 - Replace Existing Splits with 8 ton Split at City Hall

Existing	
Unit Capacity =	8 tons
EER =	13.5
KW/Ton =	0.88888889
Elec Cost =	\$0.119 KWH

Annual Ton hrs = 24269.2 ton hrs

Annual KWH =	21,572.62
Annual Elec Cost =	\$2,567.14

Annual Elec Saving =	-\$702.33
----------------------	-----------

Installed	
Unit Capacity =	8 tons
EER =	10.6
KW/Ton =	1.1320755

Annual Ton hrs = 24269.2 ton hrs

Annual KWH =	27,474.57
Annual Elec Cost =	\$3,269.47

Annual KWH Saving =	-5,901.94
---------------------	-----------

Sizing Diversity = 85%

Cooling DD = 3569

EER estimated from SEER and derated for age on Existing Units.

EER calculated from Manufacturer Data on the Installed Unit.

CM 6: IT Split System Upgrades Calculation

City of Fort Pierce - DX Equipment Replacement CM 6 - Replace 4 Ton Split with 7 ton Split at Police Station

Existing	
Unit Capacity =	4 tons
EER =	11.2
KW/Ton =	1.0714286
Elec Cost =	\$0.114 KWH

Annual Ton hrs = 12134.6 ton hrs

Annual KWH =	13,001.36
Annual Elec Cost =	\$1,482.15

Annual Elec Saving =	-\$1,258.43
----------------------	-------------

Installed	
Unit Capacity =	7 tons
EER =	10.6
KW/Ton =	1.1320755

Annual Ton hrs = 21235.55 ton hrs

Annual KWH =	24,040.25
Annual Elec Cost =	\$2,740.59

Annual KWH Saving =	-11,038.89
---------------------	------------

Sizing Diversity = 85%

Cooling DD = 3569

EER from Manufacturer Data and derated for age on Existing Unit.

EER calculated from Manufacturer Data on the Installed Unit.

Appendix H

Air Curtains at Dock Doors Data

Energy Savings Calculator

[Home](#) >

[Sales Support](#)

> Energy Savings Calculator

Air Conditioning

This calculator will estimate the cost savings of a Berner air door when used to keep cooler air inside and warmer air outside. This is a typical application during summer months.

Sensible heat load 64,213 BTU/HR
 Latent heat load 157,217 BTU/HR
 Total heat gain rate 221,430 BTU/HR
 Cost of heat gain: \$ 6,927 per season -savings
 Cost to purchase/install Air Door \$ 16,258.00 - estimate
 Cost to run Air Door \$ 177.32 per season - cost
 Airdoor will pay for itself in 3.4800371083856 years (not including annual operating cost and seasonal adjustments)
 Job Name Sunrise Theatre
 Address
 City
 State
 Zip Code
 Contact
 Phone Number
 Door Location / Description Dock Doors
 Air Curtain Model Number VSB3096AB

Contact Berner if more information is needed to assist with your calculation.

(800) 245-4455
 info@berner.com

Inputs for Calculation	
Height	13'
Width	15.6'
OAT	85 F
OA Humidity	60%
IAT	75 F
IA Humidity	
Wind Speed	6.5 MPH
Open	5 HR
Days	2/wk
WKS	32/yr (Cooling)
Cost	\$0.1238/kWh
HP	6 (2 Doors)

ECM 7 - Air Curtain at Dock

Location	Annual Savings	Units
Sunrise Theatre	54,521	kWh
	\$6,750	Utility Cost Savings

Appendix I

Demand Controlled Ventilation Data

Annual Cost Summary

Ft. Pierce City Hall Baseline
ConEdison Solutions

11/05/2013
03:08PM

Table 1. Annual Costs

Component	Baseline Building (\$)	ECM - 1A Lighting (\$)	ECM AHU VFD, DCV & CHILLER (\$)
Air System Fans	10,043	9,564	5,769
Cooling	47,171	45,677	38,427
Heating	0	0	0
Pumps	4,381	4,424	4,439
Heat Rejection Fans	0	0	0
HVAC Sub-Total	61,595	59,665	48,636
Lights	19,171	10,521	10,557
Electric Equipment	14,540	14,686	14,736
Misc. Electric	5,563	4,696	4,712
Misc. Fuel Use	0	0	0
Non-HVAC Sub-Total	39,273	29,904	30,005
Grand Total	100,868	89,568	78,641

Table 2. Annual Cost per Unit Floor Area

Component	Baseline Building (\$/ft²)	ECM - 1A Lighting (\$/ft²)	ECM AHU VFD, DCV & CHILLER (\$/ft²)
Air System Fans	0.195	0.186	0.112
Cooling	0.916	0.886	0.746
Heating	0.000	0.000	0.000
Pumps	0.085	0.086	0.086
Heat Rejection Fans	0.000	0.000	0.000
HVAC Sub-Total	1.195	1.158	0.944
Lights	0.372	0.204	0.205
Electric Equipment	0.282	0.285	0.286
Misc. Electric	0.108	0.091	0.091
Misc. Fuel Use	0.000	0.000	0.000
Non-HVAC Sub-Total	0.762	0.580	0.582
Grand Total	1.958	1.738	1.526
Gross Floor Area (ft²)	51528.0	51528.0	51528.0
Conditioned Floor Area (ft²)	51528.0	51528.0	51528.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	Baseline Building (%)	ECM - 1A Lighting (%)	ECM AHU VFD, DCV & CHILLER (%)
Air System Fans	10.0	10.7	7.3
Cooling	46.8	51.0	48.9
Heating	0.0	0.0	0.0
Pumps	4.3	4.9	5.6
Heat Rejection Fans	0.0	0.0	0.0
HVAC Sub-Total	61.1	66.6	61.8
Lights	19.0	11.7	13.4
Electric Equipment	14.4	16.4	18.7
Misc. Electric	5.5	5.2	6.0
Misc. Fuel Use	0.0	0.0	0.0
Non-HVAC Sub-Total	38.9	33.4	38.2
Grand Total	100.0	100.0	100.0

Annual Cost Summary

Ft. Pierce City Hall Baseline
ConEdison Solutions

11/05/2013
03:08PM

Appendix J

Replace DX Equipment Data

DX Equipment Calculation Details

City of Fort Pierce - DX Equipment Replacement

ECM 9 - Replace 3 Ton RTU at Police Station

Existing	
Unit Capacity =	3 tons
EER =	8.7
KW/Ton =	1.3793103
Elec Cost =	\$0.114 KWH

Annual Ton hrs = 9100.95 ton hrs

Annual KWH =	12,553.03
Annual Elec Cost =	\$1,431.05

Annual Elec Saving =	\$418.84
----------------------	----------

Proposed	
Unit Capacity =	3 tons
EER =	12.3
KW/Ton =	0.97561

Annual Ton hrs = 9100.95 ton hrs

Annual KWH =	8,878.98
Annual Elec Cost =	\$1,012.20

Annual KWH Saving =	3,674.06
---------------------	----------

Sizing Diversity = 85%
Cooling DD = 3569

EER converted from known SEER and derated for age on Existing Unit.

EER converted from known SEER from quoted Proposed Unit.

Appendix K

Add Ductless Split System Data



Submittal

Prepared For:
Con Edison

Date: July 17, 2014

Customer P.O. Number:
Customer Project Number:

Sold To:
Grimes Air Conditioning

Job Number:
Job Name:
City of Ft Pierce Replacements – Police Dept

Trane U.S. Inc. is pleased to provide the enclosed submittal for your review and approval.

Product Summary

Qty	Product
1	Split System Air Conditioning Units (Small)

The attached information describes the equipment we propose to furnish for this project, and is submitted for your approval.

Chris Cowling
Trane
6965 Vista Parkway North, Suite 11
Royal Palm Beach, FL 33411
Phone: (561) 683-1521
Fax: (561) 697-8714

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 Split System Air Conditioning Units (Small) 11

Tag Data - Split System Air Conditioning Units (Small) (Qty: 1)

Item	Tag(s)	Qty	Description	Model Number
A1	AH/CU-7A	1	1.5 - 5 Ton Unitary Split Systems	4TTR7048A1000 / TAM7A0C48H-1S

Product Data - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A**

Split System Cooling Outdoor Unit

4 Ton Nominal Cooling Capacity

200 - 230 Volt 1 Phase 60 Hertz

Condenser coil coating

Multi-poise 4-way air handling unit

Hi-eff vari-speed blower

23.5" wide x 21.5" deep

4 Ton air handler

Power Supply

7.21/9.60 kW Electric Htr w/Ckt Brk for 208/240V 1 Phase 60 Hz (Fld)

Mechanical Specifications - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****Air-Tite IITM cabinet**

- 2% or less air leakage
- Precision applied - durable door seals - Specially designed air seal around refrigerant, condensate and conduit connections

- Double wall foamed cabinet system - R-4.2 insulating value
- No loose fiber design
- Smooth cleanable interior design - Sweat eliminating design
- Composite foamed cabinet doors - Water proof cabinet design
- Integrated horizontal drain pans
- Modular cabinet with 5/16" allen wrench "quick latch" design

Multi-position up/down flow horizontal left/ right

Side return option (sold as accessory)

Control board protection pocket built into cabinet wall

Alert port to view control board codes without door removal

Alert code notification

Low voltage terminal connection point

Quarter turn phillips head door fasteners

Vortica blower with polarized plug connections and integrated slide deck for easy removal

Aluminum coil with integrated slide deck for easy removal and polarized plug connections on coil EEV

Patented enhanced coil fin

Electronic Expansion Valve (EEV) with low ambient and low superheat compressor protection

Dual refrigerant compatible as shipped

Slide in electric heaters with polarized plug connections (sold as accessory)

Slide in hot water coils with polarized plug connections (sold as accessory)

UVC light kit with safety switch and polarized plug connections (sold as accessory)

Labeled panels and connections

Molded in 1" standard filter rail

Variable speed ECM motor

Soft start fan motor operation

Comfort RTM mode

Built in fan delay modes

Maximum width of 23 1/2"

Compact 20 13/16" depth with doors removed

Two tone color

Fused 24v power

Safety door switch

Heater Section - 1 Phase Vertical Air Handler

A compartment is provided in the blower section for field installation of supplementary heater. Polarized plugs are provided for making electrical connections to the air handler control box from the supplementary heater.

General - 4TTR7

The 4TTR6 is fully charged from the factory for matched indoor section and up to 15" of piping. This unit is designed to operate at outdoor ambient temperatures as high as 115 Degrees Fahrenheit. Cooling capacities are matched with a wide selection of air handlers and furnace coils that are AHRI certified. The unit shall be certified to UL 1995. Exterior is designed for outdoor application.

Casing - 4TTR7

Unit casing is constructed of heavy gauge, G60 galvanized steel and painted with a weather-resistant powder paint on all louvers and panels. Corrosion and weatherproof CMBP-G30 DuraTuff™ base.

Refrigerant Controls - 4TTR7

Refrigeration system controls include condenser fan, compressor contactor and high pressure switch. High and low pressure controls are inherent to the compressor. A factory installed liquid line drier is standard.

Compressor - 4TTR7

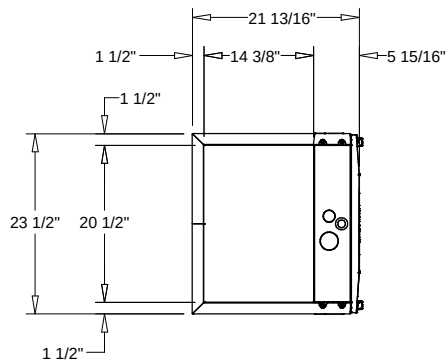
The Climatuff 2-stage compressor features internal over temperature and pressure protection and hermetic motor. Other features include: centrifugal oil pump and modular plugs for electrical connections.

Condenser Coil - 4TTR7

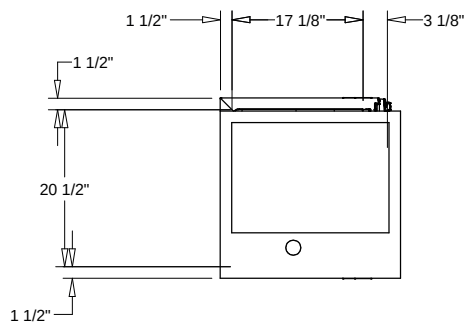
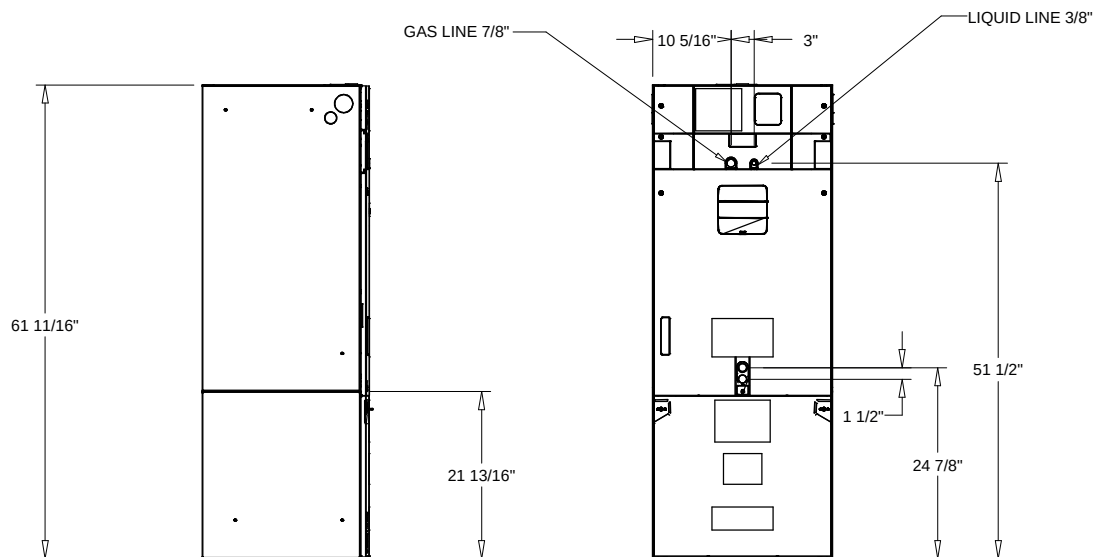
The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels.

Low Ambient Cooling - 4TTR7

As manufactured, this unit has a cooling capability to 55 Degrees Fahrenheit . For low ambient cooling below 55 Degrees Fahrenheit see Application Guide.

Unit Dimensions - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****NOTES:**

1. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION



AIRHANDLER - TAM4A0C48

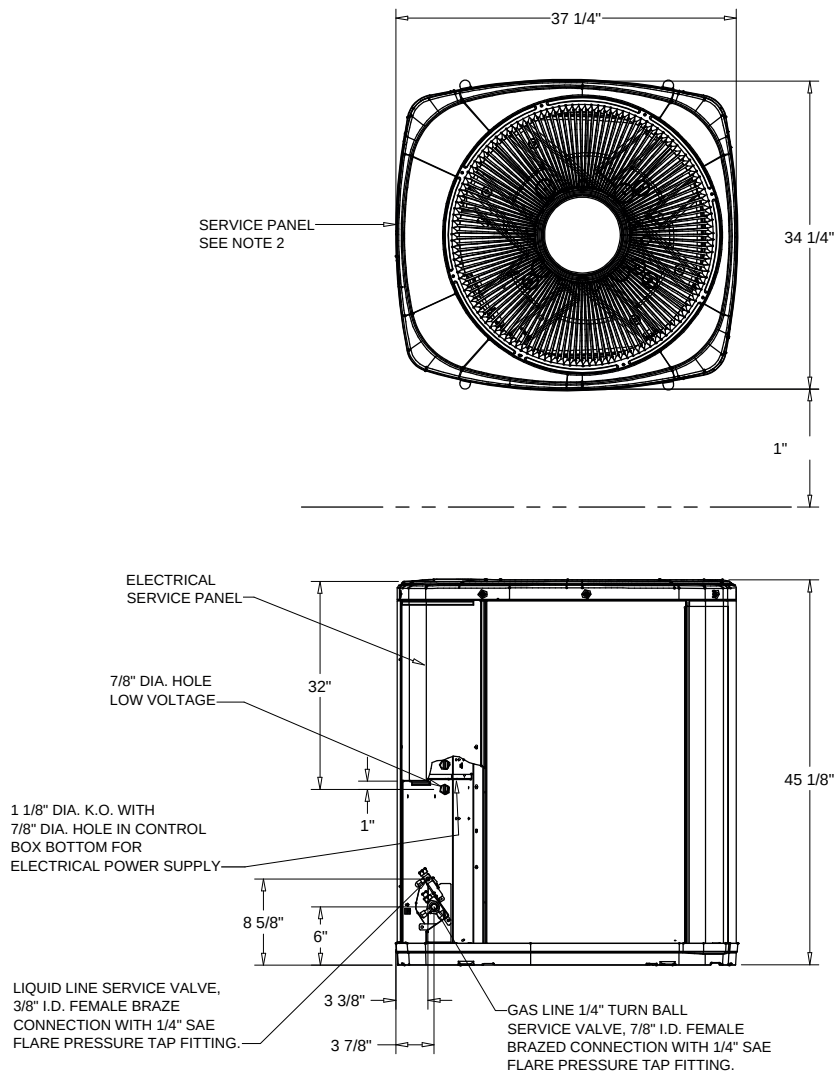
DRAWING

Unit Dimensions - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****ELECTRICAL / GENERAL DATA**

GENERAL ⁽¹⁾⁽²⁾⁽⁴⁾ Model: TAM7A0C48H41SA Unit Primary Voltage: 208 Unit Secondary Voltage: 230 Unit Hertz: 60 Unit Phase: 1	INDOOR MOTOR ⁽¹⁾ Number: 1 Horsepower: 0.75 Motor Speed (RPM): Variable ECM Phase: 1 Full Load Amps: 4.2 Locked Rotor Amps:	FILTERS ⁽³⁾ Type: Throwaway Furnished: No Number: 1 Recommended: 22"x20"x1"
STANDARD ⁽⁵⁾ 230 Volt / 208 Volt Minimum Circuit Ampacity: 5.0/5.0 Maximum Overload Protection: 15.0/15.0	REFRIGERANT Type: R-410A REF. Line Connections Coupling or Conn. Size - Gas: 7/8" Coupling or Conn. Size - Liq.: 3/8"	Weights Shipping: 175.0 lb Net: 163.0 lb
ELECTRIC HEAT 240 Volt / 208 Volt Capacity Circuit #1: 9.60/7.20 Capacity Circuit #2: N/A Capacity Circuit #3: N/A # of Circuit: 1 Phase: 1 Heater Amps Per Circuit Circuit #1: 40.0/34.60 Heater Amps Per Circuit Circuit #2: N/A Heater Amps Per Circuit Circuit #3: N/A Minimum Circuit Ampacity Circuit #1: 55.0/49.0 Minimum Circuit Ampacity Circuit #2: N/A Minimum Circuit Ampacity Circuit #3: N/A Maximum Overload Protection Circuit #1: 60.0/50.0 Maximum Overload Protection Circuit #2: N/A Maximum Overload Protection Circuit #3: N/A	NOTES: 1. These air handlers are a.r.i. certified with various split system air conditioners and heat pumps (ari standard 210/240). refer tothesplit system outdoor unit product data guides for performance data. 2. 3/4" male plastic pipe (ref.: astm 1785-76) 3. Minimum filter size for horizontal applications will be based on airflow selection and will be calculated as follows: low velocity filter: face area (sq. ft.) = cfm / 300 high velocity filter: face area (sq. ft.) = cfm / 500 4. For customer ease of filter maintenance, it is recommended that a properly sized, remote filter and grille be installed for horizontal applications. airflow should not exceed the face value of the filter being used 5. Standard mca and mop without electric heat.	

Unit Dimensions - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****NOTES**

1. TOP DISCHARGE AREA SHOULD BE UNRESTRICTED FOR AT LEAST 60" ABOVE UNIT. UNIT SHOULD BE PLACED SO ROOF RUN-OFF WATER DOES NOT POUR DIRECTLY ON UNIT, AND SHOULD BE AT LEAST 12" FROM WALL AND ALL SURROUNDING SHRUBBERY ON TWO SIDES. OTHER TWO SIDES UNRESTRICTED.
2. ELECTRICAL AND REFRIGERANT COMPONENT CLEARANCES PER PREVAILING CODES.
3. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION



AIRHANDLER - 4TTR7048

OUTLINE DRAWING

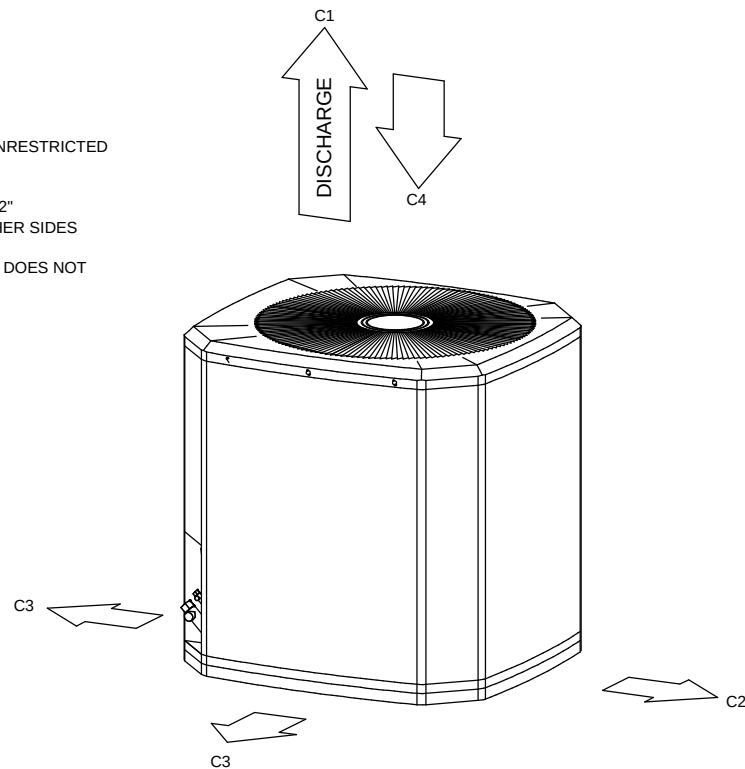
Unit Dimensions - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****ELECTRICAL / GENERAL DATA**

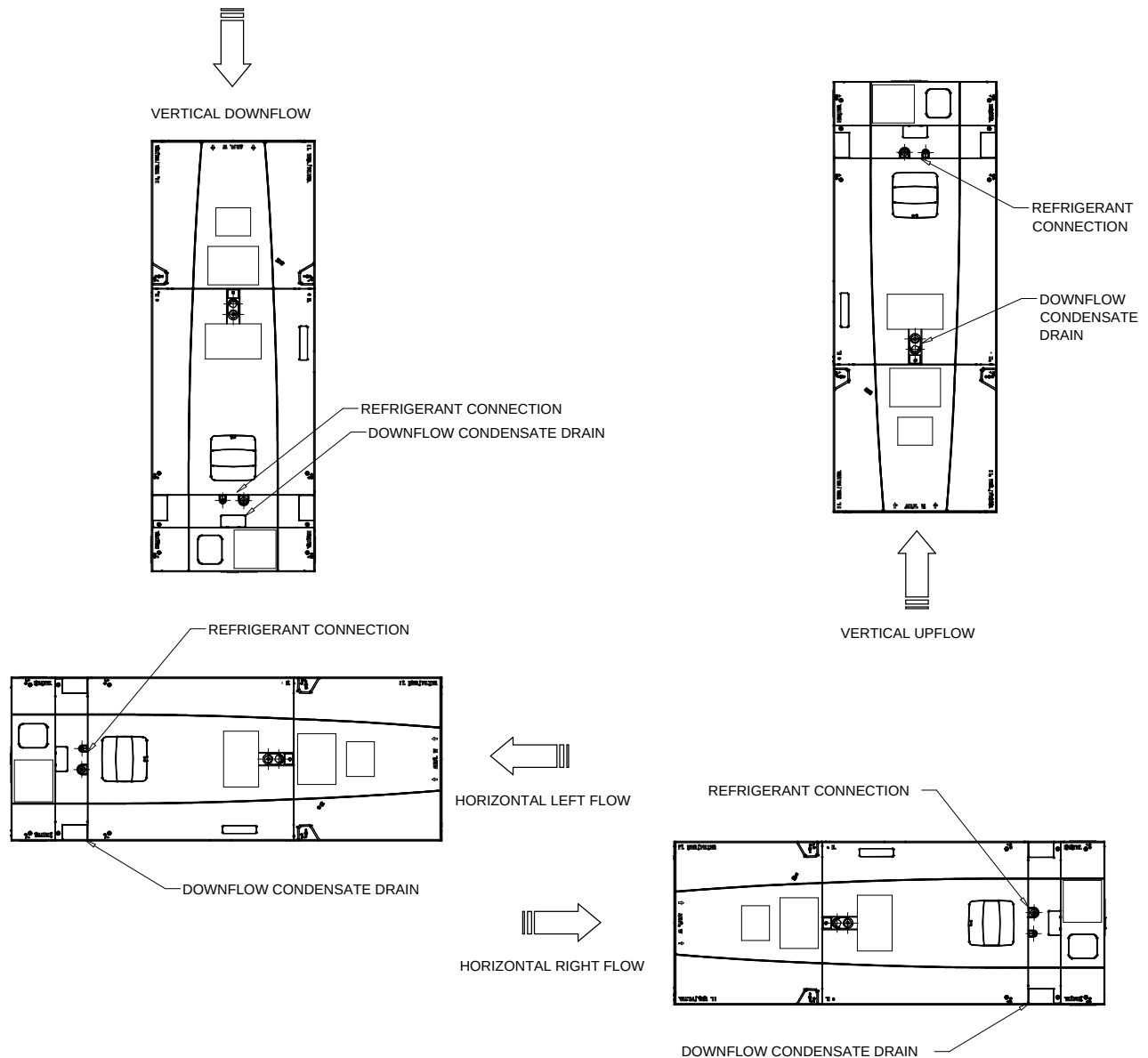
GENERAL Model: 4TTR7048* Voltage: 208 Unit Hertz: 230 Unit Phase: 60 1	POWER CONN. Minimum Circuit Ampacity: 28.0 Maximum Circuit Breaker: 45.0 Minimum Protection Rating: 45.0	COMPRESSOR Number: 1 Phase: 1 Rated Load Amps: 21.2 Locked Rotor Amps: 104.0
OUTDOOR MOTOR Number: 1 Horsepower: 0.20 Motor Speed (RPM): 835 Phase: 1 Full Load Amps: 1.0 Locked Rotor Amps: -	NOTES: 1. Certified in accordance with the Unitary Air-Conditioner equipment certification program which is based on AHRI Standard 210/240. 2. Calculated in accordance with N.E.C. Use only HACR circuit breakers or fuses. 3. Standard line lengths - 60'. Standard lift - 60' Suction and Liquid line. For Greater lengths and lifts refer to refrigerant piping software Pub# 32-3312-0 4. * = 15, 20, 25, 30, 40 and 50 foot lineset available.	
REFRIGERANT Type: R410A Charge: 12.6 lb Line Size O.D. Gas: 7/8" Line Size O.D. LIQ: 3/8"		

WEIGHT	
NET	308.0 lb
SHIPPING	271.0 lb

NOTES:

- C1. TOP DISCHARGE SHOULD BE UNRESTRICTED
FOR AT LEAST 60" ABOVE UNIT
- C2. PLACE UNIT FROM WALL
- C3. PLACE SHRUBBERY AT LEAST 12"
FROM UNIT ON TWO SIDES, OTHER SIDES
UNRESTRICTED
- C4. PLACE UNIT SO ROOF RUN-OFF DOES NOT
FALL DIRECTLY ON UNIT

**WEIGHT AND CLEARANCE**

Weight, Clearance & Rigging Diagram - Split System Air Conditioning Units (Small)**Item: A1 Qty: 1 Tag(s): AH/CU-7A****NOTES**

1. NO INTERNAL MODIFICATIONS REQUIRED FOR ANY POSITION.
2. BADGE ROTATION WILL BRAND IN CORRECT POSITION.

MINIMUM UNIT CLEARANCE TABLE		
	TO COMBUSTIBLE MATERIALS (REQUIRED)	SERVICE CLEARANCE (RECOMMENDED)
SIDE	0	2"
FRONT	0	21"
BACK	0	0
INLET DUCT	0	0
OUTLET DUCT	0	0

CLEARANCE NOTES:

* 1" FOR THE FIRST 3 FT. OF OUTLET DUCT
 WHEN ELECTRIC HEATERS ARE INSTALLED EXCEPT
 MODELS BAYHTR1405, 1408, AND 1410 ARE APPROVED FOR
 0" PLENUM AND DUCT CLEARANCE IN THE UPFLOW
 CONFIGURATION ONLY ON TWE-P MODELS.

Field Installed Options - Part/Order Number Summary

This is a report to help you locate field installed options that arrive at the jobsite. This report provides part or order numbers for each field installed option, and references it to a specific product tag. It is NOT intended as a bill of material for the job.

Product Family - Split System Air Conditioning Units (Small)

Item	Tag(s)	Qty	Description	Model Number
A1	AH/CU-7A	1	1.5 - 5 Ton Unitary Split Systems	4TTR7048A1000 - TAM7A0C48H-1S

Field Installed Option Description	Part/Ordering Number
7.21/9.60 kW Electric Htr w/Ckt Brk for 208/240V 1 Phase 60 Hz	BAYEVAC10BK1AB

Annual Cost Summary

Ft. Pierce Police Dept
ConEdison Solutions

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Table 1. Annual Costs

Component	Baseline Building (\$)	ECM 1 Lighting (\$)	ECM 10 Ductless Split (\$)	ECM 5 Replace Chiller (\$)
Air System Fans	15,093	15,231	7,962	7,945
Cooling	22,617	21,895	18,296	16,858
Heating	730	827	246	246
Pumps	1,145	1,154	606	604
Heat Rejection Fans	0	0	0	0
HVAC Sub-Total	39,585	39,107	27,110	25,653
Lights	10,881	7,422	7,722	7,706
Electric Equipment	18,977	19,151	19,925	19,884
Misc. Electric	10,443	3,779	3,931	3,923
Misc. Fuel Use	0	0	0	0
Non-HVAC Sub-Total	40,301	30,352	31,579	31,513
Grand Total	79,885	69,459	58,689	57,166

Table 2. Annual Cost per Unit Floor Area

Component	Baseline Building (\$/ft²)	ECM 1 Lighting (\$/ft²)	ECM 10 Ductless Split (\$/ft²)	ECM 5 Replace Chiller (\$/ft²)
Air System Fans	0.643	0.649	0.339	0.339
Cooling	0.964	0.933	0.779	0.718
Heating	0.031	0.035	0.011	0.011
Pumps	0.049	0.049	0.026	0.026
Heat Rejection Fans	0.000	0.000	0.000	0.000
HVAC Sub-Total	1.686	1.666	1.155	1.093
Lights	0.464	0.316	0.329	0.328
Electric Equipment	0.808	0.816	0.849	0.847
Misc. Electric	0.445	0.161	0.168	0.167
Misc. Fuel Use	0.000	0.000	0.000	0.000
Non-HVAC Sub-Total	1.717	1.293	1.345	1.342
Grand Total	3.403	2.959	2.500	2.435
Gross Floor Area (ft²)	23475.0	23475.0	23475.0	23475.0
Conditioned Floor Area (ft²)	23475.0	23475.0	23475.0	23475.0

Note: Values in this table are calculated using the Gross Floor Area.

Table 3. Component Cost as a Percentage of Total Cost

Component	Baseline Building (%)	ECM 1 Lighting (%)	ECM 10 Ductless Split (%)	ECM 5 Replace Chiller (%)
Air System Fans	18.9	21.9	13.6	13.9
Cooling	28.3	31.5	31.2	29.5
Heating	0.9	1.2	0.4	0.4
Pumps	1.4	1.7	1.0	1.1
Heat Rejection Fans	0.0	0.0	0.0	0.0
HVAC Sub-Total	49.6	56.3	46.2	44.9
Lights	13.6	10.7	13.2	13.5
Electric Equipment	23.8	27.6	34.0	34.8
Misc. Electric	13.1	5.4	6.7	6.9
Misc. Fuel Use	0.0	0.0	0.0	0.0
Non-HVAC Sub-Total	50.4	43.7	53.8	55.1
Grand Total	100.0	100.0	100.0	100.0

Annual Cost Summary

Ft. Pierce Police Dept
ConEdison Solutions

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Appendix L

Vending Misers Data

CM 12 Savings Calculations

Row	Qty	Building	Qty Vending Machines	Qty Vending Machines w/o lights	Qty Coolers	Total Connected Demand (kW)	Existing Annual Hours of Operation	Existing Electric Consumption (kWh)	Annual Occupied Hours	Proposed Annual Hours of Operation	Proposed Electric Consumption	Operating Months per Year	Annual Electric Savings
3	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]
4	1	City Hall	1	0	0	0.43	8,760	3,741	3,640	4,493	1,919	12	1,822
5	2	River Walk Center	2	0	0	0.85	8,760	7,481	8,030	8,152	6,962	12	520
6	2	PAL Park	2	0	0	0.85	8,760	7,481	3,120	4,060	3,467	12	4,014
7	1	Main Police Station	1	0	0	0.43	8,760	3,741	8,030	8,152	3,481	12	260
8	2	Public Works Compound	2	0	0	0.85	8,760	7,481	2,600	3,627	3,097	12	4,384
9													
10	8					3.42		29,924			18,925		10,999

13	Item	Value	Units	Cell ref	Remarks
14	Existing Annual Hours of Operation per Machine	8,760	Hrs	[D14]	Vending Machines are constantly plugged in
15	Time Between Auto Repower	2	Hrs	[D15]	based on independent testing data
16	Duration of Auto Repower	0.4	Hrs	[D16]	based on independent testing data
17	Watts used for Vending Machine	427	W	[D17]	industry average
18	Watts used for Vending Machine without lights	233	W	[D18]	industry average
19	Watts used for Coolers	233	W	[D19]	industry average

Col Ref.	Comment
A	Estimated quantity of machines appropriate for retrofit, per site audit
B	Facility analyzed
C	Quantity of vending machines appropriate for retrofit
D	Quantity of snack machines appropriate for retrofit
E	Quantity of coolers appropriate for retrofit
F	Total connected electric demand per building = [colC] x [F17] / 1,000 + [colD] x [F18] /1,000 + [colE] x [F19] /1,000
G	[F14]
H	[colF] x [colG]
I	Annual Hours the building is occupied
J	[colI] + ([D14] ÷ 52 - [colI] ÷ 52) ÷ ([D15] + [D16]) x [D16] x 52 weeks
K	[colF] x [colJ]
L	Months per year the machine is powered on
M	[colH] - [colK]

CM 12 Savings Summary

City Hall

Annual Savings	Units
1,822 kWh	
\$217 Utility Cost Savings	

River Walk Center

Annual Savings	Units
520 kWh	
\$75 Utility Cost Savings	

PAL Park

Annual Savings	Units
4,014 kWh	
\$642 Utility Cost Savings	

Main Police Station

Annual Savings	Units
260 kWh	
\$30 Utility Cost Savings	

Public Works Compound

Annual Savings	Units
4,384 kWh	
\$574 Utility Cost Savings	

VendingMiser®

ENERGY MANAGEMENT SYSTEM For Refrigerated Vending Machines

Improve the profitability of your existing cold drink machines. Vending Miser® puts you on a cost-effective refresher course for energy savings and conservation.

VendingMiser cuts energy costs down to size. VendingMiser incorporates its innovative energy-saving technology into a small, plug-and-play powerhouse that installs in minutes either on the wall or on the vending machine. It's that easy.

With VendingMiser there's no need to have new machines to achieve maximum energy savings resulting in a reduction in operating costs and greenhouse gas emissions. When equipped with the VendingMiser, refrigerated beverage vending machines use less energy and are comparable in daily energy performance to new ENERGY STAR® qualified machines.

Power play

Compatible with all types of cold drink vending machines, the VendingMiser uses a Passive Infrared Sensor (PIR) to power down the machine when the area surrounding it is vacant. Then it monitors the room's temperature and automatically re-powers the cooling system at one- to three-hour intervals, independent of sales, to ensure that the product stays cold.

This Miser runs the bank

For a series of up to four machines, VendingMiser can use its embedded Sensor Repeater, which allows it to be controlled from the PIR sensor of any other Miser in the bank.

Refresher course

VendingMiser's microcontroller will never power down the machine while the compressor is running, eliminating compressor short-cycling. In addition, when the machine is powered up, the cooling cycle is allowed to finish before again powering down. This reduces the wear and tear on your machines, extending the lifespan and prolonging your profitability. Maintenance savings is generated through reduced running time of vendor components – estimated at \$40 - \$80 per year, per machine. The VendingMiser has been tested and accepted for use by major bottlers.

VendingMiser reduces energy consumption an average of 46%—typically \$150 per machine.



Vending Miser offers...

- A quick, inexpensive solution to energy savings and conservation
- Longer machine lifespan
- Early return on investment
- Environmental benefits

VendingMiser can also control other cooled product vending machines, such as refrigerated candy machines.

VendingMiser Technical Specifications Electrical Specifications

Input Voltage: 115 Volts
Input Frequency: 50/60 Hz
Maximum Load: 12 Amps (Steady-State)
Power Consumption: Less than 1 Watt (Standby)

Environmental Specifications

Operating Temp: -15°C to 75°C
Storage Temp: -40°C to 85°C
Relative Humidity: 95% Maximum (Non-Condensing)

Compatibility

Vending Machines: Any machine, except those containing perishable goods such as dairy products

Inactivity Timeouts

Occupancy Timeout: 15 minutes
Auto Re-power: One to three hours, dynamically adjusted, based on ambient temperature

Dimensions

Size: 4.5"W x 1.75"H x 3.25"D
Weight: 2.2 lbs. (includes power cable)

Regulatory Approvals

Safety: UL/C-UL Listed
Information Technology Equipment (ITE) 9T79

Other energy-saving products offered include CoolerMiser™, SnackMiser™ and PlugMiser™.



Frequently Asked Questions

Will VendingMiser® keep my drinks cold?

Absolutely - VendingMiser® has been tested and accepted for use by both major bottlers.

Is the VendingMiser® easy to install?

Yes! VendingMiser® is a simple external plug-and-play product. The VendingMiser® can be installed on the wall with simple hand tools or it can be attached to the vending machine without tools using the new Easy-Install system. The Easy-Install System allows quick installation in 5 minutes.

Is VendingMiser® safe for all machines?

Yes! VendingMiser® is compatible with all types of cold drink vending machines. In fact, by reducing run time of the machines, VendingMiser® reduces maintenance costs.

Has VendingMiser® been field tested?

Tens of thousands of VendingMisers® are operational in the field. Typical energy savings have been independently documented to be between 35% and 45%. Measurement and verification test results as well as testimonials are available on the website.

Are there any locations not appropriate for VendingMiser®?

VendingMiser's® savings are generated as a result of location vacancy. Therefore, a machine in a location that is occupied 24-hours, 7 days a week will likely generate little savings. Our VM2IQ is more appropriate for this type of location and will typically save up to 35% energy use.

Technical Specifications

ELECTRICAL SPECIFICATIONS

Input Voltage: 115 Volts (230 Volts available)
Input Frequency: 50/60 Hz
Maximum Load: 12 Amps (Steady-State)
Power Consumption: Less than 1 Watt (Standby)

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Occupancy Timeout: 15 minutes
Auto Repower: One to three hours, dynamically adjusted, based on ambient temperature

DIMENSIONS

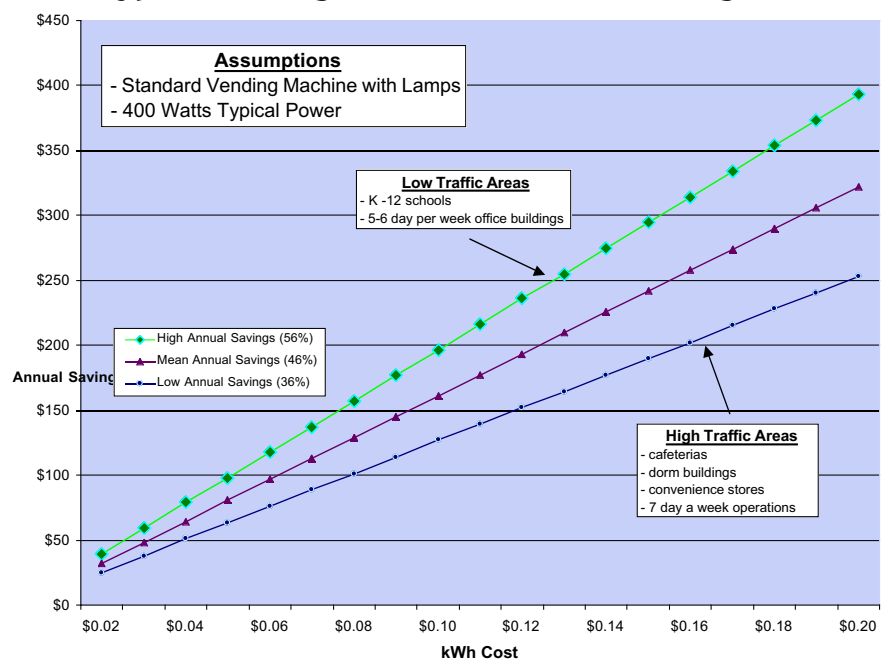
Size: 4.5"W x 1.75"H x 3.25"D
Weight: 2.2 lb. (incl. power cable)

REGULATORY APPROVALS

Safety: UL/C-UL Listed
 Information Technology Equipment (ITE) 9T79



Typical Saving Generated with VendingMiser®



VendingMiser® Products

VM150	VendingMiser® with PIR Sensor
VM151	VendingMiser® only
VM160	Weatherproof VendingMiser® with PIR Sensor
VM161	Weatherproof VendingMiser® only
VM170	Easy-Install VendingMiser® with PIR Sensor
VM171	Easy-Install VendingMiser® only
VM180	Weatherproof Easy-Install VendingMiser w/PIR sensor
VM181	Weatherproof Easy-Install VendingMiser only