Investment Grade Audit

Investment Grade Audit
For
The Town of Belleair

Presented By:
ABM Building Services, LLC.

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Executive Summary

ABM is pleased to present this Performance-Based Retrofit and Service Analysis to the Town of Belleair. The purpose of this analysis is to identify performance-based retrofit and service opportunities that will provide improved safety, new equipment, lower operating costs, energy efficiency, and simplified service procedures. The analysis consisted of detailed site surveys, staff and user interviews, utility bill analysis, operating cost analysis, data logging, and evaluation of energy conservation measures (ECMs) or other upgrades to improve the overall operations of the facilities.

Buildings included in this Study:

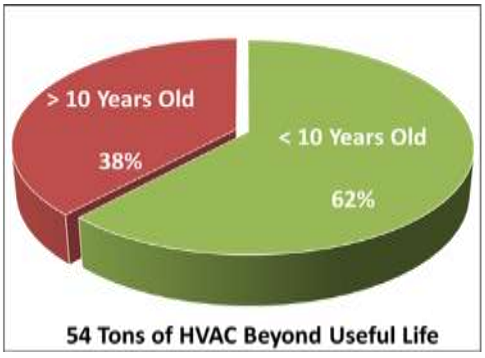
Facility	Address	Gross Square Feet
Town Hall	901 Ponce de Leon Blvd	14,155
Dimmitt Community Center	918 Osceola Rd	15,643
John J. Osborne Public Works Building	1075 Ponce De Leon Blvd	10,698
Water Treatment Operations	107 Belleair Ave	14,028*

**Square Footage is for Water Treatment Plant – The study also included an analysis of the seven (7) well pumps located throughout the town.*

Major findings in this document include details of the aging infrastructure, code violations, safety hazards, and inefficiencies in utility spending. Many key assets are at the end of, or beyond, their useful life expectancy. These outdated systems are inefficient and provide for cost savings opportunities once upgraded and properly maintained.

The most significant findings of the Investment Grade Audit were the various NEC (National Electrical Code) Violations associated with the three (3) Electrical Rooms in Town Hall. Some immediate repairs were made to ensure safety of the audit team and town staff. Beyond the need to correct violations, the electrical equipment is well beyond its useful life and components are not readily available to repair the existing systems. Details of these findings and recommended corrections are included in the Town Hall section of this document.

The aging HVAC Infrastructure is another key finding, as 38% of the facility cooling capacity (54 Tons) is older than 10 years. The analysis also evaluated the lack of internal resources necessary to maintain the HVAC (Heating, Ventilation, and Air Conditioning) and control systems in Town Buildings. The procurement processes and limited in-house HVAC capabilities have led to numerous challenges with outside vendors, leading to inefficiency of both equipment and staff utilization.



54 Tons of HVAC Beyond Useful Life

In this study, a financial solution to these technical problems has been identified, where the energy and operational cost savings will be sufficient to pay for the necessary upgrades and on-going maintenance services within the existing budget without adding any new taxpayer burden. The Financial Summary section provides all of the details regarding cost and savings of this program.

Baseline Utility Analysis

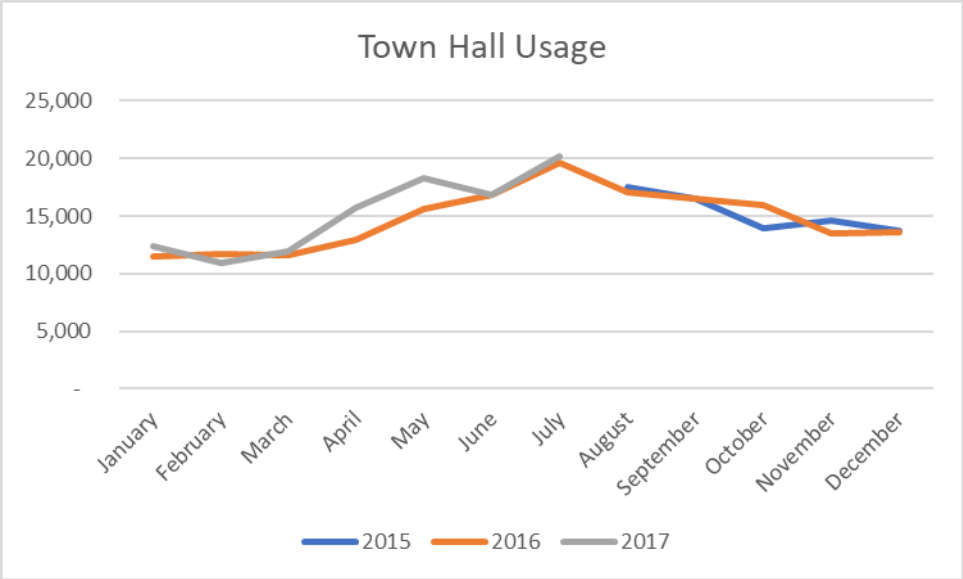
The tables below show the utility baseline from August 2015 through July 2017 (averaged to represent one virtual calendar year) as well as the utility rates for the Town of Belleair for the buildings and accounts in question. We examined and summarized actual utility bills for the baseline periods to create the baseline shown below.

Building/Facility	Building SF	Elec. Usage (kWh/yr.)	Elec. Cost ($/yr.)
Town Hall	14,155	179,477	$18,130
Public Works	10,698		
Water Treatment Plant	14,028	519,863	$46,441
Dimmitt Community Center	15,643	319,553	$32,358
Other	1	98,599	$10,452

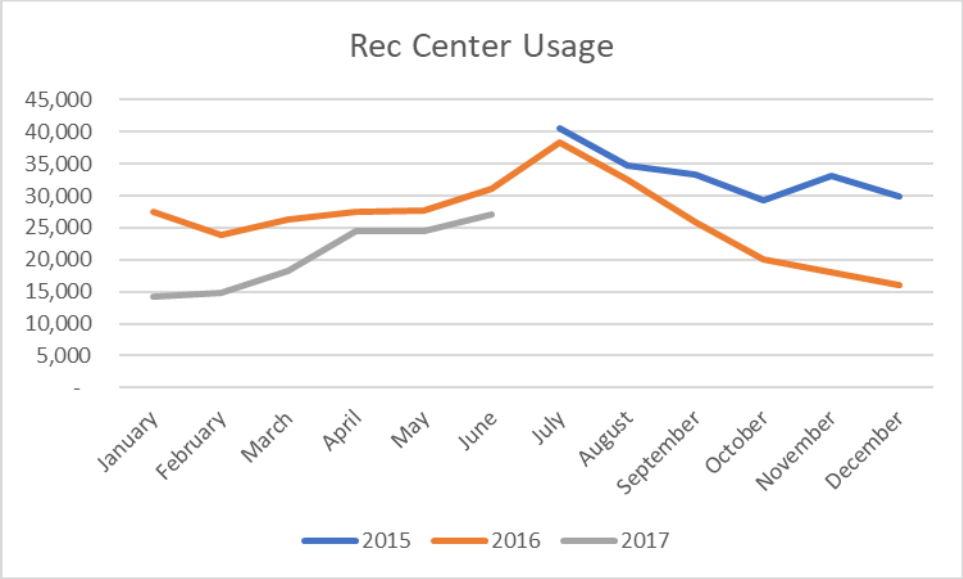
Public Works receives its power from the meter at the Water Treatment Plant across the street. The “Other” grouping includes town lights and water well pumps. The table below shows the utility rates from Duke Energy for the accounts that are included in this project.

Building/Facility	Building SF	Elec. ($/kWh)
Town Hall	14,155	$0.101
Public Works	10,698	---
Water Treatment Plant	14,028	$0.089
Dimmitt Community Center	15,643	$0.101
Other	N/A	$0.106

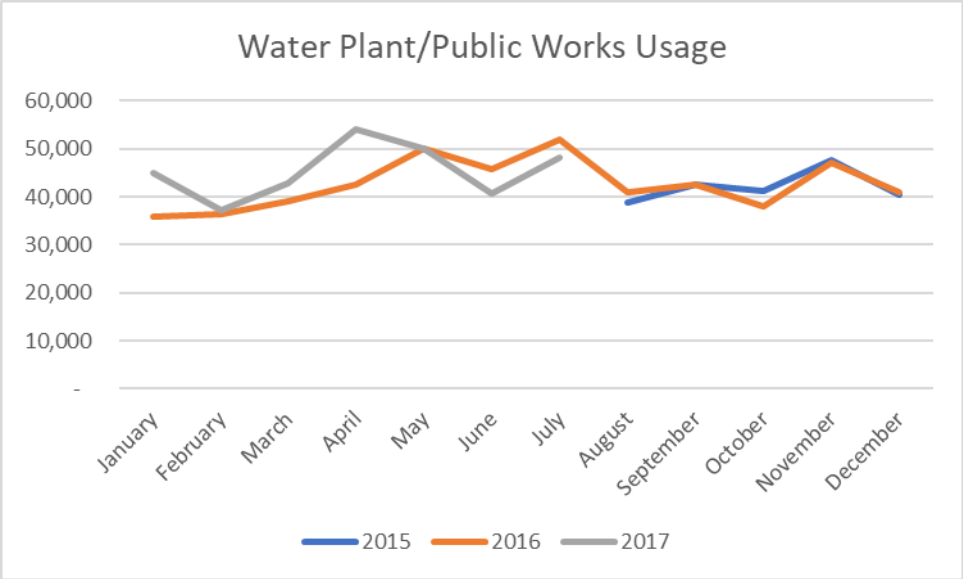
The graph below shows the electric usage profile for Town Hall. This building is conditioned by split DX Air handling Units (AHUs) and Heat Pumps. The constant year round load and 24/7 operation for the Police Station side of the building results in a relatively flat and fairly consistent usage pattern throughout the year with a slight dip during winter months.



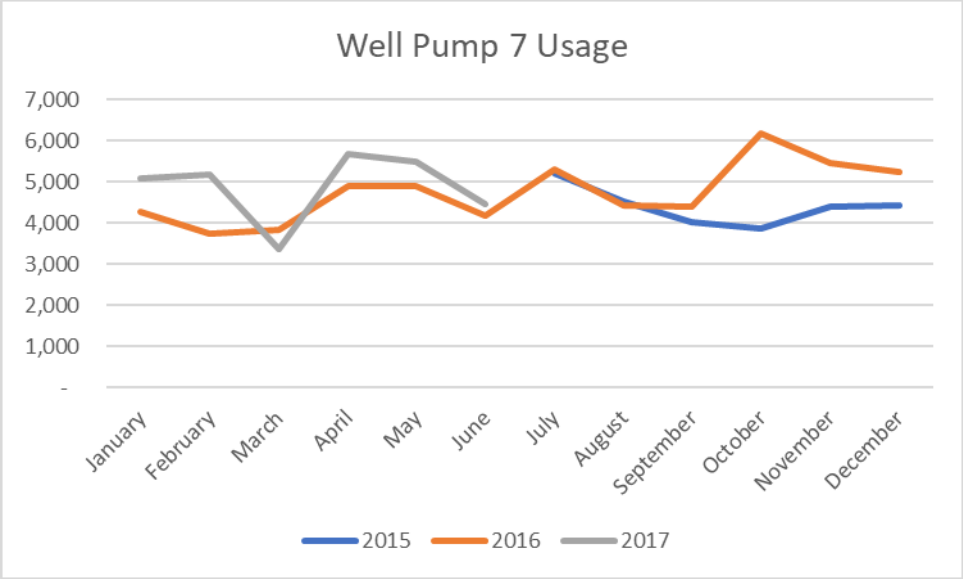
The relatively flat load profile for the Dimmitt Community Center can be attributed to excessive unoccupied runtime. However, we understand that the facility has been using the air conditioning system to keep the space dehumidified.



The electric usage for the Water Plant and Public Works (same meter) shows what we expect with respect to the operations in these buildings. Weather changes are less of a variable as these facilities are operated year-round.



The graph below shows the electric usage for the Water Well Pump #7. Seasonal variations are a function of water chemistry control at the treatment plant and residents leaving town during the summer months.

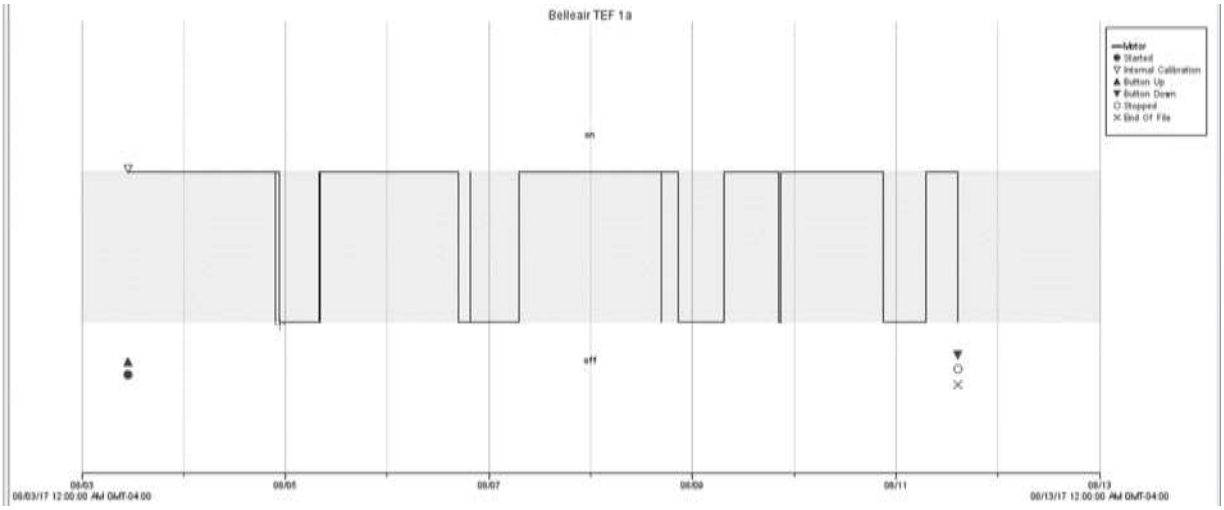


Data Logging

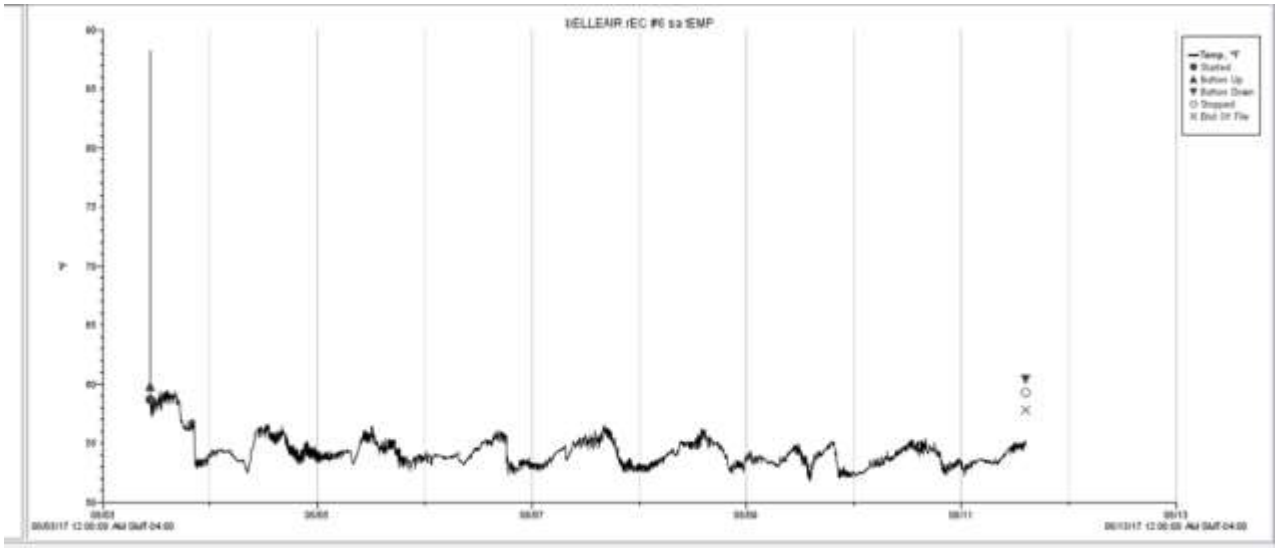
ABM uses interval data recorders (data loggers) to confirm the actual operations of equipment and controls. For the Town of Belleair facilities we deployed loggers in several waves to get a good idea of when things were operating and what those operating parameters were. We will highlight a couple of the charts here to illustrate our findings.

Data loggers come in a variety of configurations. For the project with the Town of Belleair, we used 4-channel loggers, space temperature/relative humidity loggers, motor on–off loggers and lighting loggers. These variables tell a great deal of information on the overall efficiency and runtimes of the HVAC systems in the buildings. We set these loggers up to record temperatures every 5 minutes for three weeks. While onsite, we also deployed space temperature loggers in common areas to find out if the HVAC system reacted like it was under good temperature and schedule control. Several Motor on-off state loggers were also deployed on supply fan motors and pump motors to get an idea on the actual runtime of the Air Handling Units (AHUs) or the Roof Top Units (RTUs) or the Well Pumps.

Finally, we deployed several lighting and occupancy sensors \ loggers to get the lighting runtime for a typical week of operation as well as the actual occupied periods for the spaces where these loggers were deployed. We'll get into the details of our findings in the next few paragraphs.

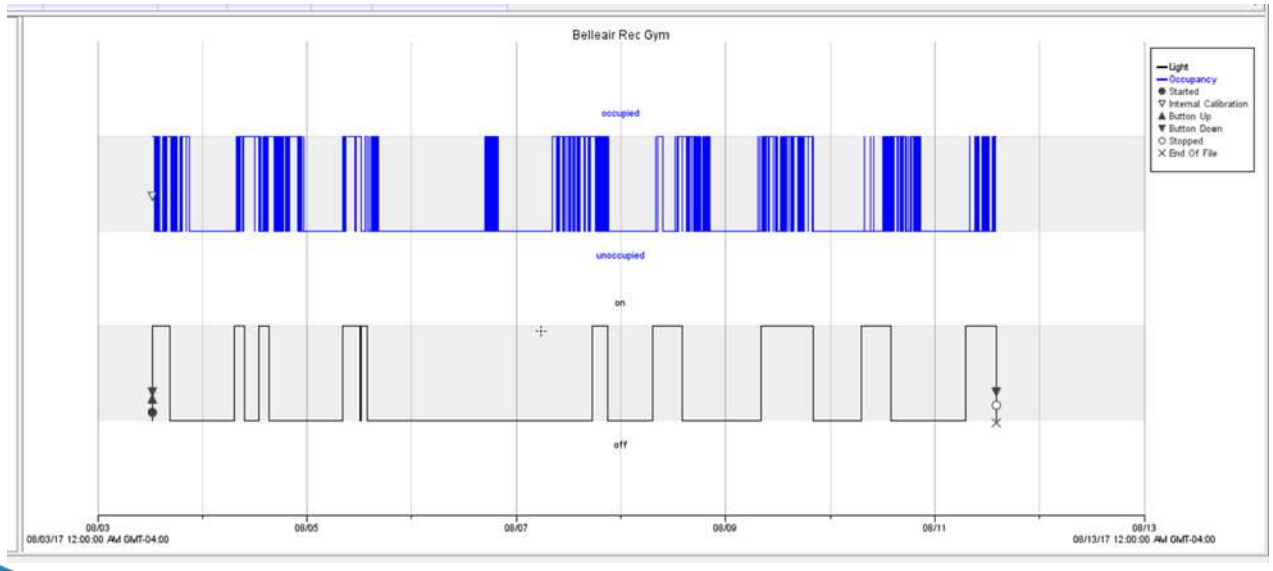


The above plot is from a motor on-off data logger that was placed on the Toilet Exhaust Fan Motor for the unit TEF 1A at the Dimmitt Community Center. The existing schedule and runtime of the fan is calculated from this information and compared against the actual schedule to match the building usage. In this case, the exhaust fan ran for 34 hours at a time only to be shut off for 14 hours at the end of every other day. The result can lead to excess infiltration if the HVAC is turned off while the exhaust fan is operating.



A temperature logger (data taken during the same period as above) shows the supply temperature for an air handling unit (AHU) serving the Dimmitt Community Center gym. Looking at the temperature logger data, it is very easy to ascertain the runtime, supply temperature, and relative humidity for these air handling units. These variables are used in the energy savings calculations to calculate the guaranteed savings for the project.

Our final logger type utilized for Town of Belleair is the lighting data loggers. Lighting loggers' record changes in state (when the light switches from "on" to "off" and vice versa) and places a time stamp on that event. We use the lighting loggers to confirm our observations and interviews with building occupants regarding lighting runtime, arguably the single biggest variable in lighting energy calculations. We'll go over those calculations next. We measured restrooms, offices, hallways, and common areas to get a good example of when the lights actually run in these spaces. The following is a sample lighting logger output file:



Actual “ON” and “OFF” times can be calculated from this data to determine actual run hours. The graph above shows one full week of data logging. The shaded vertical lines are the different days. As you can see from the graph, the lights for this space typically turn on each based on when people are inside the space. The data from all the loggers is then compiled into an easily referenced format as shown in the following table.

Area Type Averages				Normalized Weekly Lights On					Normalized Weekly Occupied					
Area Type	Abbrev.	Qty.	Watts	Peak	Off	Shldr 1	Shldr 2	Total	Peak	Off	Shldr 1	Shldr 2	Total	% sav
Classroom	CR	2	1035	45.57	0	0	0	45.57	23.03	0	0	0	23.03	49.47
Gym	G	1	4800	79.29	0	0	0	79.29	38.82	0	0	0	38.82	51.03
Hallway	H	2	173	89.31	0	0	0	89.31	61.27	0	0	0	61.27	31.4
Library	LI	1	2200	168	0	0	0	168	42.27	0	0	0	42.27	74.84
Office	O	1	290	44.79	0	0	0	44.79	26.43	0	0	0	26.43	40.99
Restroom	R	2	90	106.02	0	0	0	106.02	44.65	0	0	0	44.65	57.88
Bldg. Avg. for 9 Rooms			1098	86.31	0	0	0	86.31	40.73	0	0	0	40.73	52.81

This type of data logging was performed for each building to calculate the existing lighting runtime and the amount (%) of time the lighting is on when spaces are unoccupied. This data, coupled with lighting fixture power (kW) measurements, was used to calculate the lighting savings.

Calculations

With the understanding of a few key principles and the definition of the variables in question, we can determine what the annual energy savings should be for each of the measures that we plan to implement. There is a fine balance between being aggressive with the savings estimate and being overly conservative. Forecasting accurate savings is key in these projects because too much promised savings means the client is frustrated and the contractor has tarnished their reputation in a very competitive market. On the other hand, if the savings are too conservative, then the client may not choose to implement upgrades and projects that would have been beneficial to the facility and the budget.

Savings Measurement & Verification Calculation Formulas

General Details:

- TMY3 Bin Weather Data for Tampa International Airport (USAF # 722110) was used for energy savings calculations
- Energy cost savings are calculated using the rates calculated from the baseline utility data:

  Annual MMBTU Saved * $/MMBTU
- Heating and Cooling Design Temps are from ASHRAE Design values
- Balance Point (BP) of the buildings is estimated based on the building type and usage
- HOBO Data Loggers were used to verify the equipment runtime, space temps/RH levels, lighting runtime, and occupancy.
- Motor wattage and current measurements were performed to get the actual motor loading and power draw used in the energy savings calculations
- Basic equations and formulae used are included here, for actual detailed Calculations, Bin methodology was used.

Lighting Savings

The existing lighting kW baseline is calculated by counting and recording each individual fixture on a room-by-room basis and noting individual wattage. The existing fixture wattages are multiplied by the number of fixtures and tabulated to determine the KW connected load. Annual run hours (diversity factor) are applied to each individual fixture to calculate annual kWh consumption. This will serve as the existing baseline for lighting connected load and lighting consumption. After determining a list of proposed ECMs, the same calculations are conducted for the proposed lighting. Each proposed upgrade is counted and recorded and each individual retrofit type will be allocated the new wattage to determine the new KW. The annual run hours are applied to determine the new annual kWh consumption. HOBO Lighting, occupancy loggers, and personnel interviews are used to get the lighting runtime.

The total lighting system kW demand savings are calculated by subtracting the proposed system kW demand from the existing system kW demand. Similarly, the total kWh savings are calculated by subtracting the proposed Kwh from the existing kWh. The calculation is represented by the following equation:

- Total kW Demand Savings = ∑ [Existing kW Demand – Proposed kW Demand]
- Total kWh Savings = ∑ [Existing kWh – Proposed kWh]
- The sum total of the lighting savings is the total kWh and kW demand dollar savings.
- Total kW Demand Dollars Savings = ∑ [kW Demand Savings * kW Utility Rate * 12 Months]
- Total kWh Dollars Savings = ∑ [kWh Savings * kWh Utility Rate]

Equipment Scheduling (Controls Upgrade)

The existing heating and cooling equipment usage is calculated on a bin-hour/temperature basis through a calculation of the net heating and cooling energy required to maintain comfortable environmental conditions. This technique varies for each type of HVAC system, such as single zone constant volume with reheat; single zone variable air volume with reheat; multi-deck constant volume; dual duct multi-zone constant volume; or single zone DX cooling with baseboard independent heating. Each of these systems requires different equations to evaluate energy use during occupied and unoccupied hours. ABM can develop customized spreadsheets to calculate energy requirements for each zone and system type in a building. The formula developed considers the following:

- Zone loads based on occupied/unoccupied periods at various outdoor air temperatures & interior heat loads
- HVAC system operating parameters that provide the necessary heating, cooling, & ventilation rates needed to meet zone loads through a combination of air quantity, discharge air temperature, & outdoor air cfm
- Sum the annual heating, cooling, and fan energy for each temperature bin for each zone
- Sum all zones and compare with annual HVAC energy consumption based on utility bills, after subtracting lighting, equipment, and other electrical and thermal loads unrelated to the HVAC systems

Calculation Methodology

1. HOBO Motor on/off , temp/RH loggers, along with Outdoor Air Temps are used to determine the runtime and setpoints of the equipment
2. The equipment load is assumed to vary linearly with OAT (Outdoor Air Temp) with Balance Point (BP) being the temp when the building is in equilibrium with no heating or cooling need

3. EER /COP for the equipment used in the calculation is obtained from the cutsheet (where name plate data is available) and derated for equipment in poor condition
4. Building Schedule is obtained from the town system, and is specific to each building. Difference between the existing equipment schedule and actual (or proposed) schedule results in these savings
5. Cooling Setpoint of 80-85 F and Heating Setpoint of 55-60 F will be maintained during Unoccupied Hours. Extra equipment runtime to maintain these temps during night/weekend is taken into account while calculating savings.

Cooling Savings	$\left(\text{shutdown period}\right) \times \left(\text{cooling period}\right) \times \left(\text{temp. limit diversity factor}\right) \times \left(\frac{\text{(avg. tons) x 12}}{\text{EER}}\right)$

Equipment Upgrade

1. HOBO Motor on/off, Temp/RH loggers, along with Outdoor Air Temps are used to determine the runtime and setpoints of the equipment
2. The equipment load is assumed to vary linearly with OAT (Outdoor Air Temp) with Balance Point (BP) being the temp when the building is in equilibrium with no heating or cooling need
3. Pre and post EER is obtained from the nameplate data of the existing equipment and cutsheet for proposed new equipment
4. Equipment Upgrade Savings are only taken for the Occupied Period

Cooling Savings	$\left(\text{demand savings}\right) \times \left(\text{operating period}\right)$
Demand Savings	$\left(\text{load factor}\right) \times \text{tons} \times 12 \times \left(\frac{1}{\text{exist EER}} - \frac{1}{\text{new EER}}\right)$
Load Factor	$\frac{\text{present cooling energy}}{\left(\text{tons} \times \frac{12}{\text{exist EER}} \times \left(\text{operating period}\right)\right)}$

Variable Frequency Drives (VFDs) on Pumps

1. Hobo loggers were used to determine the runtime of the equipment.
2. Actual power measurements were taken for the fan motors and pool pump motors to ensure accurate baseline kW.
3. Savings for VFDs were calculated only during the occupied runtime.
4. Percent (%) loading on the motor was assumed based on the typical building type and occupancy patterns to simulate the actual load on the pump or fan motor.

Calculation Methodology

Existing Pump kW = Pump BHP x 0.746/Motor Efficiency
Existing Pump kWh = Existing Pump kW x Full Load Heating Hours

Where:

- Pump BHP = GPM x Head/(3960 x Pump Efficiency) OR Pump HP x % Pump Loading
- Full Load Heating Hours = Heating Bin Hours x % Heating Load
- Proposed Pump kW = (Existing Pump kW x % Flow ^ VFD Exponent) / VFD Efficiency
- Proposed Pump kWh = Proposed Pump kW x Heating Bin Hour
- kW Saved per Year = (Existing Pump kW – Proposed Pump kW) x 12 months per Year
- kWh Saved per Year = Existing Pump kWh – Proposed Pump kWh

Fan Savings

$$(\text{fan HP}) \times 0.746 \times \left[1 - (\text{avg. \% load})^3\right] \times (\text{operating period})$$

Outdoor Air Adjustment

- The amount of outdoor air 'required' was calculated based on the ASHRAE 62
- Co2 readings and damper positions were taken into account \for the baseline adjustment for outdoor air
- The difference between the actual OA and the required OA is Δcfm

Calculation Methodology

- Average Winter Outdoor Temperature (below balance point temperature) = AWO
- Annual Hours Below Balance Point Temperature (from Bin or Hourly Data) = AHB
- Average Space Set point Temperature = ASST
- Pre-Retrofit CFM = 0
- Post-Retrofit CFM = Based on ASHRAE 62 (depending on the sq-ft and occupancy of each school)
- Total Annual BTUs adjusted = CFM Savings x 1.08 x (ASST – AWO) x AHB

$$Cooling\ \ Adjustment[kWh] = Ton - hr / cfm \times \Delta cfm \times kw / Ton$$

Building Envelope Upgrades

From the ASHRAE fundamentals handbook, the equation for heat transfer estimation is:

$$q = 1.08 \bullet Q \bullet \Delta T$$

Where:

- q = heat loss/gain, measured in Btu/hr.
- 1.08 is a conversion factor accounting for the density of air (~ 0.075 lb/ft³ at sea level), the specific heat of air (0.24 Btu/lb/°F) and a conversion from minutes to hours (60)
- ΔT is the temperature difference between the outdoors and the building setpoint.
- Q is the rate of airflow rate

Airflow rate is calculated as:

$$Q = A \bullet \sqrt{Cs\Delta T + Cw \bullet V^2}$$

Where:

- Q is the airflow rate
- A is the gap area (as recorded in the survey)
- Cs is the stack coefficient
- Cw is the wind coefficient
- V is the average wind speed

The stack and wind coefficients are dependent on building height and are available as table lookups provided from ASHRAE. Average wind speed is obtained from NOAA comparative climactic data for locations throughout the U.S. Temperature bin data, obtained from a software package called BinMaker Pro which utilizes climactic design data obtained from ASHRAE. For each temperature bin, the heat loss/gain equation is applied and the summation of outputs from these equations provides an estimate of the heat transfer characteristics for a particular building.

Facility Analysis

The objective of this technical site assessment is to demonstrate how a customized guaranteed energy savings project was developed for the Town of Belleair. This project will reduce the energy consumption of the facilities and will enable the replacement of existing mechanical equipment that is beyond its useful life.

ABM Building Services conducted detailed, onsite surveys of the Town of Belleair buildings that were included within the Letter of Intent. These surveys focused on lighting; heating, ventilating, and air conditioning (HVAC) equipment; building automation; and facility operations that impact energy usage and operating costs. We evaluated the energy consumption (propane, electric & water), building control strategies, condition of the existing equipment, existing lighting technology, security, and building envelope.

This information was obtained by making direct observations of the operation of each building and its energy consuming equipment. We also reviewed the internal uses by people and miscellaneous “plug load” equipment such as copiers, computers, vending machines, etc. Additionally, the operation and occupant schedules for each facility and major equipment loads were determined. We had discussions with the town staff regarding the operating systems, building envelopes, recent modifications or renovations, planned changes, and normal operation of each building.

We performed an evaluation as to the feasibility of implementing energy conservation measures (ECMs) to reduce building energy costs, provide a better working environment for the staff, and improve the overall operations of the facilities. These ECMs were evaluated from the standpoint of applicability to each building, impact on the working environment, construction costs, and resulting savings. These financial figures are then rolled into a Pro-forma cash flow to determine the overall financial impact of the program.

The technical site assessment is broken down by building and includes each energy conservation measure (ECM) recommended to produce an energy project. Building-by-building information is presented in the following order:

Town Hall

ECM-3 Controls
ECM-4 HVAC Upgrades
ECM-5 Lighting Upgrades (LED)
ECM-5.1 Daylighting
ECM-6 Building Envelope
ECM-6.1 Roofing & Skylight
ECM-8 Electrical Panels
ECM-17 Commissioning

Dimmitt Community Center

ECM-3 Controls
ECM-4 HVAC Upgrades
ECM-5 Lighting Upgrades (LED)
ECM-6 Building Envelope
ECM-17 Commissioning

Public Works

ECM-3 Controls
ECM-17 Commissioning

Water Treatment Operations

ECM-3 Controls
ECM-6 Building Envelope
ECM-17 Commissioning
ECM-20 Variable Frequency Drives (VFD)
ECM-20.1 Well Pump Control Integration

Preliminary Project Timeline

Town of Belleair Project Plan																
WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Commission Approval / Contract Award & Signed																
Town Hall																
Electrical: Detail Design and Take-Offs																
Electrical: Material Procurement																
Electrical: Preliminary Field Assembly New MDP's																
Electrical: South Room 400A MDP Demo/Install																
Electrical: East Room 400A MDP Demo/Install																
Electrical: Utility Room 200A MDP Demo/Install																
Electrical: Safety Labeling - Floor and Clearance																
Electrical: Safety Compliance Sign Off																
HVAC: Material Procurement																
HVAC: Equipment Replacement																
HVAC: Recommissioning Existing Units																
HVAC: Controls Modifications																
Lighting: Material Procurement																
Lighting: Install																
Lighting: Solar Tube Material Procurement																
Lighting: Solar Tube Install																
Building Envelope: Install																
Roofing: Material Procurement																
Roofing: Skylight Replacement (Weather Dependent)																
Roofing: Remove / Replace (Weather Dependent)																
Customer Walk Through																
Customer Sign Off																
Rec Center																
HVAC: Material Procurement																
HVAC: Equipment Replacement																
HVAC: Recommissioning Existing Units																
HVAC: Controls Modifications																
Lighting: Material Procurement																
Lighting: Install																
Building Envelope: Install																
Customer Walk Through																
Customer Sign Off																
Water Treatment Plant																
HVAC: Recommissioning Existing Units																
HVAC: Controls Modifications																
Building Envelope: Install																
Well Pump VFD's: Material Procurement																
Well Pump VFD's: Installation																
Customer Walk Through																
Customer Sign Off																
Public Works																
HVAC: Recommissioning Existing Units																
HVAC: Controls Modifications																
Customer Walk Through																
Customer Sign Off																
Project Acceptance and close out																

Town Hall

Estimated Town Hall Energy

Current Costs	**$18,130**
Current $/SF	**$1.28**
Post-ABM Costs	**$11,355**
Post-ABM $/SF	**$0.80**

ECM Number: ECM-3

ECM Title: Controls

Existing Conditions:

The HVAC controls at the Town Hall are comprised of conventional thermostats and a few set back thermostats. A room thermostat controls each of the 8 main air conditioning systems. There are currently just a few units on a night set back or occupancy scheduling. The majority of the units do not have this capability. All of the existing thermostats control is performed at the device by anyone who may have access.

Existing thermostat pictured above.

Proposed ECM:

ABM proposes to replace the existing thermostats with new, Web based thermostats. These new thermostats will have the capability for remote monitoring. This can be accomplished by most smart devices. These thermostats will also allow for remote scheduling and temperature set point adjustment and will have the following features:

- Occupancy / Vacancy scheduling
- Night set back program
- Remote temperature adjustments

Spaces will be controlled to an occupied/unoccupied temperature schedule. Night setback during unoccupied hours will be implemented. We will also provide and install a communicating thermostat for the IT room unit.

Sample of a web-based thermostat pictured above.

ECM Number: ECM-4 & ECM-17

ECM Title: HVAC Upgrades & Commissioning

Existing Conditions:

The HVAC systems at the Town Hall are comprised of Eight (8) split systems and Five (5) rooftop package units. Five (5) of the split systems are in poor condition and are at the end of their life expectancy.

Tag	Grade	Manufacturer	Install Date	Tons	ASHRAE Life Expectancy	Remaining Useful Life	% Useful Life	Projected Replacement Year
SS1 CU	A	ICP	2015	5	15	13	87%	2030
SS1 AHU		Carrier	2015		15	13	87%	2030
SS2 CU	**F**	**Carrier**	**1999**	**3**	**15**	**-3**	**-20%**	**2018**
SS2 AHU		**Carrier**	**1992**		**15**	**-10**	**-67%**	**2018**
SS3 CU	B	Carrier	2012	5	15	10	67%	2027
SS3 AHU		Carrier	2012		15	10	67%	2027
SS4 CU	B	ICP	2015	7.5	15	13	87%	2030
SS4 AHU		ICP	2014		15	12	80%	2029
SS5 CU	**D**	**Carrier**	**2004**	**5**	**15**	**2**	**13%**	**2018**
SS5 AHU		**Carrier**			**15**	**0**	**0%**	**2018**
SS6 CU	**C**	**Rheem**	**2007**	**1.5**	**15**	**5**	**33%**	**2018**
SS6 AHU		**Rheem**			**15**	**0**	**0%**	**2018**
SS7 CU	**C**	**Carrier**	**2007**	**2**	**15**	**5**	**33%**	**2018**
SS7 AHU		**Carrier**			**15**	**0**	**0%**	**2018**
SS8 CU	**C**	**Rheem**	**2006**	**4**	**15**	**4**	**27%**	**2018**
SS8 AHU		**Rheem**			**15**	**0**	**0%**	**2018**
RTU 1 (Old)*	**C**	**Rheem**	**2010**	**2**	**15**	**8**	**53%**	**2018**
RTU 1 New	A	ICP	2015	3	15	13	87%	2030
RTU 2	A	ICP	2015	3	15	13	87%	2030
RTU 3	A	ICP	2015	5	15	13	87%	2030
RTU 4	A	ICP	2015	5	15	13	87%	2030
Exhaust Fan 1	**F**	**Greenheck**	**1968**	**1**	**15**	**-34**	**-227%**	**2018**
Exhaust Fan 2	**F**	**Greenheck**	**1968**	**1**	**15**	**-34**	**-227%**	**2018**

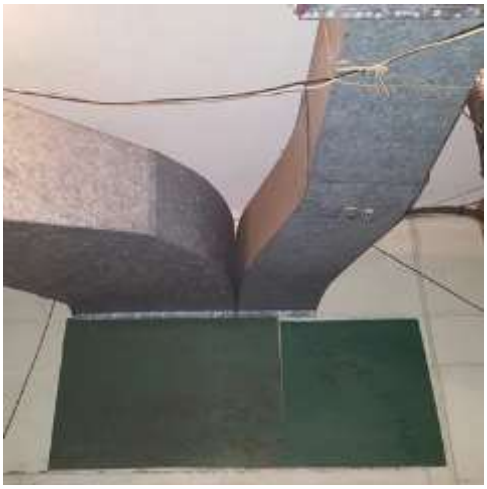
**RTU 1 (Old) is being replaced due to improper size for use, not age*

One of the rooftop package units is oversized for the job it is supposed to be performing. It is serving the IT room, wasting energy and causing humidity issues in the space. The high humidity in the space was causing excessive condensation, leading to a drain line being installed as a work around.

The four (4) new rooftop package units appear to have been installed incorrectly and not to the Florida Building code. Hurricane tie downs to the roof joists and structural supports were not observed on one of the units and hurricane attachments, if any, are inadequate. The roofing of the curbs on the roof was not done properly.

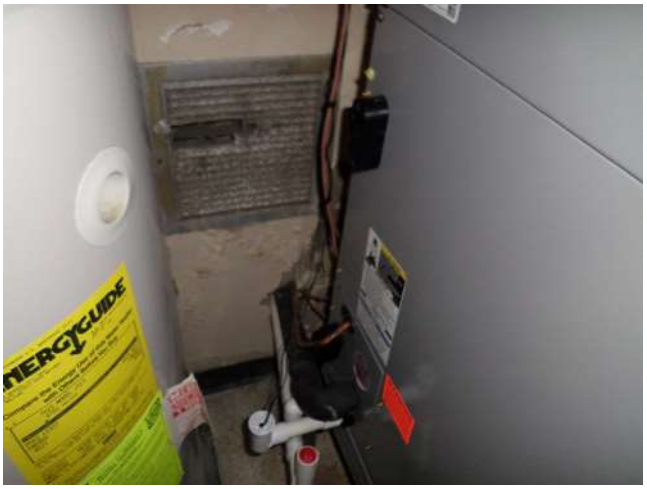
The drain and electrical wiring lines for these 4 units are on wooden blocks and the PVC piping has started sagging causing double traps on drain lines.

The east mechanical room is not air conditioned and the air handling unit is beginning to rust due to condensation onto the frame. The vent to the outside air is closed.



The hallway mechanical room is currently open outside air through a slotted vent. This uncontrolled outside air will introduce heat and humidity to the space even when outside air is not needed. The heat load will cause the air conditioning to run more than necessary, wasting electricity. The uncontrolled humidity source could also cause comfort issues.

Two (2) exhaust fans were found that are beyond useful life and inefficient as well.



Proposed ECM:

ABM proposes to replace Five (5) split systems (SS2, SS5, SS6, SS7, and SS8) and one (1) rooftop package unit (RTU1 old). The split systems will be high efficiency units with extended warranties. The rooftop unit will be replaced with a high efficiency ductless mini split system.

The A/C units tasked with introducing outside air into the building will have a new Global Plasma Solutions devices installed in them that will allow for maximum energy efficiency.

Plasma Explained

GPS' needlepoint cold plasma has many benefits.

Odor Control – The ions produced by GPS' patented needlepoint ionization breaks down gases with electron-volt potential numbers below 12 to harmless compounds prevalent in the atmosphere such as oxygen, nitrogen, water vapor and carbon dioxide. The resultant compounds are a function of the entering contaminants into the plasma field. A simple example would be formaldehyde, which is produced by building furnishings and thought to be carcinogenic; formaldehyde breaks down to carbon dioxide and water vapor, thus eliminating the health hazard. Another example is ammonia, which is produced by occupants (typical body odor smell), and ammonia breaks down to oxygen, nitrogen and water vapor. As you can see, what chemical you start with determines how it reacts with the ionization field and how it breaks down.

Reduction in Airborne Particles – The positive and negative ions are drawn to airborne particles by their electrical charge. Once the ions attach to the particle, the particle grows larger by attracting nearby particles of the opposite polarity, thereby increasing the filtration effectiveness.

Kills Virus, Bacteria, & Mold in the Space – Similar to how positive and negative ions surround particles, they are also attracted to pathogens. When the ions combine on the surface of a pathogen, they rob the pathogen of the hydrogen necessary for them to survive. During the final step of deactivation, the ions eliminate hydrogen from the pathogen and then the plasma cleansing process is complete, making the airborne virus, bacteria or mold spore inactive.

Ions Occur Naturally

GPS' patented technology produces the same ions that are found naturally in the atmosphere. Around waterfalls, at the beach or high in the mountains, ion levels are normally found to be in the range of 3,000 to 5,000 ions per cubic centimeter (ions/cc). GPS' technology recreates those levels of ions within buildings to achieve the same odor and pathogen control Mother Nature provides. A building without GPS will have ions levels less than 100 ions/cc. A building with GPS will have ion levels ranging from 800 ions/cc to 3,000 ions/cc depending on where the ion measurement is taken.

ASHRAE 62 is the worldwide standard used to calculate outside air requirements in commercial buildings. Within ASHRAE 62 there are two methods for determining outside air requirements; Ventilation Rate Procedure (VRP) and the Indoor Air Quality Procedure (IAQP).

VRP Explained

The VRP is the most commonly used method for determining outside air requirements. The outside air is calculated based on the zone use, the maximum number of occupants, the square footage of the zone and the ventilation effectiveness. The amount of outside air per person is provided in Table 6.1 in the ASHRAE Standard. The amount of outside air required per square foot is also found in Table 6.1. The ventilation effectiveness can be found in Table 6.2 and is based upon the supply and return duct locations, as well as the temperature difference between the supply air and the space temperature.

Using a classroom as an example with students ages 9+, the outside air required is 10 CFM per person and 0.12 CFM per square foot. If the ventilation effectiveness is 0.8, the outside air required to the space would be as follows for 30 students and an 800 sq. ft. space:

(10 X 30 + 0.12 X 800) / 0.8 = 495 CFM of Outside Air

The cooling and heating equipment would have to be sized to handle 495CFM of outside air.

In an effort to save energy using the VRP, ASRHAE 62 will allow the outside air to be reduced based on an occupancy sensing technique such as carbon dioxide (C02) Demand Control Ventilation (DCV). This allows the outside air to be "reset" based on the C02 levels. Most controls systems are set up to maintain a difference of 700PPM differential of C02 between inside and outside. If the outside level of C02 is 300PPM, and considering a 700 PPM differential, the C02 DCV setpoint would be 1,000 PPM. If only a few people were in the space, the

outside air would be reduced to maintain the 1,000PPM setpoint and much energy would be saved, assuming the HVAC equipment was designed to work efficiently at part load. In some situations, DCV with the VRP can lead to higher humidity conditions because standard packaged rooftop units cannot off-load sufficiently and that leads to large temperature and humidity swings as a large compressor is energizing to cool/dehumidify a much smaller load. The designer must take precaution as to how the selected equipment will operate during part-load conditions.

IAQP Explained

The IAQP is used less frequently than the VRP. Why you may ask? The primary reason is that the IAQP usually requires more time. In addition, engineers are most often trained only on the VRP. The IAQP has the potential to save the most equipment cost on new and retrofit projects plus provide much higher energy savings due to the ability to reduce outside air by adding air purification and cleaning the air in the building, thus allowing the air to be recirculated and thereby reducing the need for higher outside air quantities. Unlike the VRP, the IAQP does not look at the amount of outside air per person or per square foot, instead it requires reviewing the contaminants of concern and running mass balance equations to determine the steady state conditions of contaminants based on a filtration effectiveness for the chemicals modeled.

In an effort to reduce the consulting engineers' time, GPS has developed an IAQ spreadsheet based on ASHRAE 62. The spreadsheet calculates both the VRP outside air requirements and the IAQP requirements simultaneously. All of the mass balance equations and the effectiveness of GPS' products are already included in the spreadsheet for each chemical modeled. In a matter of a few minutes, one can see how low you can go with the outside air using the IAQP. Generally, the pressurization requirements of the building is the limiting factor as to how low you can go with the outside air. This method applies to all commercial, non-healthcare, applications. Over 600 projects have been designed using GPS' IAQ spreadsheet.

The Tampa Bay Times forum saved over 700 tons in chiller capacity, which resulted in over $1 million in first cost savings and over $100,000 per year in energy! K-12 applications with 100,000 square feet usually save $350,000 to $500,000 in first cost and over $0.30/sq. ft. per year!

In addition to the reduced outside air, DCV can be used with the IAQP. This combination will provide for the most energy efficient building possible while providing exceptional IAQ. Since the cooling/dehumidification equipment is downsized during design, part load conditions do not cause the same "hunting/cycling" that occurs when using the VRP.

Considering how polluted outside air can be, it makes complete sense ($cents$) to reduce outside air, recirculate the indoor air that's already conditioned and simply purify the indoor air.

All new equipment will have new disconnects and electrical wiring whips will be installed on the equipment. Following installation, all equipment will be tested to ensure that it is performing to the manufacturer's specifications and operating efficiently.

In addition, two (2) inefficient exhaust fans will be replaced with higher efficiency fans. The three (3) systems that are not being replaced, due to their newer age, will have a performance evaluation and functional test performed on them and will be recommissioned. Note: All new equipment will be installed to the Florida Energy Code and Florida Mechanical code requirements including wind force load calculations and hurricane attachments.

All of the new outdoor condensing units will be coil coated to lengthen the life of the equipment. This will include the base pans and compressors as well as the condenser coils.

ABM uses Corrosion Solutions as our coil coating partner. We have a long track record with their product and it absolutely holds up the best overtime. A little bit about them and their product

Corrosion Solutions offers the most detailed applications in the industry using what we see and believe to be the best materials available today.

Our coil coating material is a Heresite Protective Coatings Inc product called Perfect Coat PC-2000, an air dried Phenolic coating that has all the properties to make PC-2000 one of the most long lasting, most durable coating available.

The slotted double doors on the East Mechanical room will be replaced. This mechanical room contains two (2) air conditioning air handlers and a larger electrical panel. We will condition this space to help with the rust and corrosion and to extend the life of the equipment in this space.

ECM Number: ECM-5

ECM Title: Lighting Upgrades (LED)

Existing Conditions:

The lighting at Town Hall is a combination of fluorescent tubes, compact fluorescent lamps and some LED inside and outside of the facility.

Proposed ECM:

The new lighting for Town Hall will be a complete LED retrofit. All lighting will be changed to new LED. All lamps, ballasts and LED technology installed per ABM's scope of work were specified by the manufacturers lamp and ballast guide.

Our proposed scope is listed in the table below and will include:

- Fluorescent lamps will all be replaced with LED lamps.
- Occupancy controls have also been proposed where appropriate. These controls will keep lighting turned off in unoccupied areas saving significant additional usage costs over and above the savings due to the fixture replacement or retrofit.

All lamps and ballasts must be compatible and approved by the manufacturers. If unapproved materials are installed after ABM's installation of the lighting upgrade, damage may ensue and manufacturer's warranties may be void. By installing or incorporating unapproved materials, customer agrees and acknowledges assuming all responsibility and liability associated with doing so and will hold ABM harmless from liabilities resulting from such action, and customer acknowledge that all warranties provided by ABM are void.

Location	Area	Room	Burn	Qty	Fixture	Fixture Attributes	Existing Wattage	Action	Proposed	Qty	Control	Control Hrs Saved	Proposed Wattage
Town of Belleair FL	Town Hall - Interior	Lobby	2080	4	LED-L10-1	6-in Can-Medium-PAR30-Open - no lens-Recessed	10.0	Do Nothing	Do Nothing	4		0	40.0
Town of Belleair FL	Town Hall - Interior	Lobby	2080	2	HAL-H50/LV-1	Track-MR16-Clear-Track	50.0	Relamp	INSTALL NEW 6W MR16 LED LAMP	2		0	12.0
Town of Belleair FL	Town Hall - Interior	Right Hallway	2080	5	F-F32T8-2	Troffer-2X4-Prismatic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	5		0	120.0
Town of Belleair FL	Town Hall - Interior	Right Hallway	2080	2	UFL-FU31T8/6-2	2X2-Troffer-Prismatic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	2		0	68.0
Town of Belleair FL	Town Hall - Interior	Back Hallway	2080	3	F-F32T8-2	Troffer-2X4-Prismatic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3		0	72.0
Town of Belleair FL	Town Hall - Interior	Back Hallway	2080	6	UFL-FU31T8/6-2	2X2-Troffer-Prismatic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	6		0	204.0
Town of Belleair FL	Town Hall - Interior	Left Hallway	2080	7	F-F32T8-2	Troffer-2X4-Prismatic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	7		0	168.0
Town of Belleair FL	Town Hall - Interior	Trophy Case	2080	1	F-F20T12-1	Strip-1X2-Open - no lens-Surface	20.0	Retrofit	RETROFIT W/ (1) NEW 2' TLED LAMP AND NEW ELECTRONIC BALLAST	1		0	10.0
Town of Belleair FL	Town Hall - Interior	Main Office 1	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (1)	624	224.0
Town of Belleair FL	Town Hall - Interior	Main Office 1	2080	1	F-F32T8-2	Troffer-1X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	24.0
Town of Belleair FL	Town Hall - Interior	Main Office 1	2080	2	CFL-CF32W-1	Decorative-Medium-Frosted-Suspended	32.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	2		0	17.0
Town of Belleair FL	Town Hall - Interior	Office 2	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (2)	624	224.0
Town of Belleair FL	Town Hall - Interior	Office 2	2080	5	CFL-CF32W-1	6-in Can-Medium-Open - no lens-Recessed	32.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	5		0	42.5
Town of Belleair FL	Town Hall - Interior	Office 3	2080	5	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	5	SWITCH MOUNT OCCUPANCY SE... (1)	624	280.0
Town of Belleair FL	Town Hall - Interior	Building Department Office 4	2080	11	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	11	SWITCH MOUNT OCCUPANCY SE... (3)	624	616.0
Town of Belleair FL	Town Hall - Interior	Building Department Office 4	2080	2	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	2		0	68.0
Town of Belleair FL	Town Hall - Interior	Conference Room 1	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (2)	624	224.0
Town of Belleair FL	Town Hall - Interior	Break Room	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (1)	624	224.0
Town of Belleair FL	Town Hall - Interior	Multipurpose Room	2080	7	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	7		0	392.0
Town of Belleair FL	Town Hall - Interior	Restroom and Storage	2080	2	F-F32T8-2	Troffer-1X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2		0	48.0
Town of Belleair FL	Town Hall - Interior	Susan Lee Office 5	2080	3	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	624	108.0
Town of Belleair FL	Town Hall - Interior	Stefan Office 6	2080	3	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	624	108.0
Town of Belleair FL	Town Hall - Interior	Cathy Office 7	2080	3	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	624	108.0
Town of Belleair FL	Town Hall - Interior	Christine Office 7	2080	2	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	624	72.0
Town of Belleair FL	Town Hall - Interior	Murphy Office 8	2080	4	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (1)	624	144.0
Town of Belleair FL	Town Hall - Interior	Conference Room 2	2080	3	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	624	108.0
Town of Belleair FL	Town Hall - Interior	Secured Area Data	500	1	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1	SWITCH MOUNT OCCUPANCY SE... (1)	150	36.0
Town of Belleair FL	Town Hall - Interior	Reception	2080	2	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	624	72.0
Town of Belleair FL	Town Hall - Interior	Restricted Access Office 9	2080	6	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	6	SWITCH MOUNT OCCUPANCY SE... (1)	624	336.0
Town of Belleair FL	Town Hall - Interior	Mens Restroom	2080	2	F-F32T8-2	Troffer-2X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	624	48.0
Town of Belleair FL	Town Hall - Interior	Mens Restroom	2080	1	F-F32T8-1	Troffer-1X4-Parabolic-Recessed	30.0	Retrofit	RETROFIT W/ (1) NEW 4' TLED LAMP AND NEW ELECTRONIC BALLAST	1		0	12.0
Town of Belleair FL	Town Hall - Interior	Womens Restroom	2080	2	F-F32T8-2	Troffer-2X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	624	48.0
Town of Belleair FL	Town Hall - Interior	Womens Restroom	2080	1	F-F32T8-1	Troffer-1X4-Parabolic-Recessed	30.0	Retrofit	RETROFIT W/ (1) NEW 4' TLED LAMP AND NEW ELECTRONIC BALLAST	1		0	12.0
Town of Belleair FL	Town Hall - Interior	Utility	500	1	INCAN-I150-1	Keyless-Medium-Open - no lens-Surface	150.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	1		0	8.5
Town of Belleair FL	Town Hall - Interior	Office 10	2080	6	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	6	SWITCH MOUNT OCCUPANCY SE... (2)	624	336.0
Town of Belleair FL	Town Hall - Interior	Vault	2080	1	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Town Hall - Interior	Town Hall Meeting Room	2080	15	F-F32T8-3	Troffer-2X4-Parabolic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	15	SWITCH MOUNT OCCUPANCY SE... (2)	624	540.0
Town of Belleair FL	Town Hall - Interior	Front Reception	2080	16	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	16		0	896.0
Town of Belleair FL	Town Hall - Interior	Front Reception	2080	2	CFL-CF32W-1	Decorative-Medium-Frosted-Suspended	32.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	2		0	17.0
Town of Belleair FL	Town Hall - Interior	Police Area Restroom	8760	2	F-F32T8-2	Troffer-1X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	2628	48.0
Town of Belleair FL	Town Hall - Interior	Storage	500	1	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Town Hall - Interior	Hallway	8760	2	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2		0	112.0
Town of Belleair FL	Town Hall - Interior	Hallway	8760	1	CFL-CFT40W-2	Troffer-Biax-Parabolic-Recessed	80.0	Retrofit	RETROFIT W/ (2) NEW 2' BIAX TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	42.0
Town of Belleair FL	Town Hall - Interior	Reception Office 1	2080	3	CFL-CFT40W-2	Troffer-Biax-Parabolic-Recessed	80.0	Retrofit	RETROFIT W/ (2) NEW 2' BIAX TLED LAMPS AND NEW ELECTRONIC BALLAST	3		0	126.0
Town of Belleair FL	Town Hall - Interior	Reception Office 1	2080	5	INCAN-I25-1	4-in Can-Medium-Open - no lens-Recessed	25.0	Relamp	INSTALL NEW 6W LED A-LAMP	5		0	30.0
Town of Belleair FL	Town Hall - Interior	Office 2	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (2)	624	224.0
Town of Belleair FL	Town Hall - Interior	Office 3	2080	4	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (2)	624	224.0
Town of Belleair FL	Town Hall - Interior	Restroom	8760	1	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1	SWITCH MOUNT OCCUPANCY SE... (1)	2628	56.0
Town of Belleair FL	Town Hall - Interior	Back Hallway	8760	2	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	2628	112.0
Town of Belleair FL	Town Hall - Interior	Back Hallway	8760	1	F-F32T8-2	Troffer-2X4-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	24.0
Town of Belleair FL	Town Hall - Interior	Office 4	2080	6	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	6	SWITCH MOUNT OCCUPANCY SE... (1)	624	336.0
Town of Belleair FL	Town Hall - Interior	Fitness Center	8760	11	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	11		0	616.0
Town of Belleair FL	Town Hall - Interior	Exterior Access	8760	1	CFL-CFS15W-1	Keyless-Medium-Open - no lens-Surface	15.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	1		0	8.5
Town of Belleair FL	Town Hall - Interior	Squad Room	8760	11	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	11	SWITCH MOUNT OCCUPANCY SE... (3)	2628	616.0
Town of Belleair FL	Town Hall - Interior	Squad Room	8760	1	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	34.0
Town of Belleair FL	Town Hall - Interior	Locker Room	8760	3	F-F32T8-4	Troffer-2X4-Parabolic-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	2628	168.0
Town of Belleair FL	Town Hall - Interior	Restroom	8760	1	F-F32T8-4	Troffer-2X4-Paracube-Recessed	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Town Hall - Interior	Restroom	8760	6	INCAN-I40-1	Vanity-Medium-Open - no lens-Surface	40.0	Relamp	INSTALL NEW 6W LED A-LAMP	6		0	36.0
Town of Belleair FL	Town Hall - Interior	Restroom	8760	1	F-F32T8-2	Vapor Tight-1X4-Prismatic-Surface	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	24.0
Town of Belleair FL	Town Hall - Interior	Briefing Room 1	8760	1	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1	SWITCH MOUNT OCCUPANCY SE... (1)	2628	36.0
Town of Belleair FL	Town Hall - Interior	Briefing Room 2	8760	1	F-F32T8-3	Troffer-2X4-Prismatic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1	SWITCH MOUNT OCCUPANCY SE... (1)	2628	36.0
Town of Belleair FL	Town Hall - Interior	Records Room	8760	2	F-F32T8-2	Wrap-1X4-Prismatic-Surface	55.0	Retrofit	RETROFIT W/ (2) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	2628	48.0
Town of Belleair FL	Town Hall - Exterior	Parking Area	4380	8	MH-MH100-1	Gooseneck-Medium-Clear-Pole Single	125.0	Retrofit	RETROFIT W/ NEW 16.5W LED RETROFIT LAMP - BYPASS BALLAST	8		0	132.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	14	CFL-CFQ22W-1	Square-Circline-Frosted-Surface	22.0	Replace	INSTALL NEW 10W LED CANOPY FIXTURE	14		0	140.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	3	MH-MH175-1	Wallpack-Mogul-Clear-Surface	210.0	Replace	INSTALL NEW 55W LED WALL PACK	3		0	165.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	1	MH-MH175-1	Security-Mogul-Clear-Surface	210.0	Replace	INSTALL NEW 45W LED AREA LIGHTER W/ PHOTOCELL	1		0	45.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	3	CFL-CFS15W-1	4-in Can-Medium-Open - no lens-Recessed	15.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	3		0	25.5
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	1	CFL-CFS15W-1	Flood-R30-Clear-Surface	15.0	Relamp	INSTALL NEW 12.5W PAR30 LED LAMP	1		0	12.5
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	8	CFL-CFS23W-1	Flood-PAR38-Clear-Surface	23.0	Relamp	INSTALL NEW 17W PAR38 LED LAMP	8		0	136.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	2	LED-L17-1	Flood-PAR38-Clear-Surface	17.0	Do Nothing	Do Nothing	2		0	34.0
Town of Belleair FL	Town Hall - Exterior	Building Exterior	4380	6	MH-MH70-1	Flood-Medium-Clear-Ground	88.0	Replace	INSTALL NEW 18W LED FLOOD LIGHT	6		0	108.0
Town of Belleair FL	Town Hall - Exterior	Exterior Electrical Room	500	2	LED-L9-1	Keyless-Medium-Open - no lens-Surface	9.0	Do Nothing	Do Nothing	2		0	18.0
Town of Belleair FL	Town Hall - Exterior	Exterior Mechanical Room near Police	500	1	F-F32T8-4	Wrap-1X4-Prismatic-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' TLED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Town Hall - Exterior	Exterior Mechanical Room	500	2	INCAN-I100-1	Keyless-Medium-Open - no lens-Surface	100.0	Relamp	INSTALL NEW 8.5W LED A-LAMP	2		0	17.0

ECM Number: ECM 5.1

ECM Title: Daylighting

Existing Conditions:

The back hallway of Town Hall and the Town Manager's do not have access to any natural light and employees would benefit from a natural light source.

Proposed ECM:

Install Daylighting System provided by Solatube for Hallway and Town Manager Office.

The Solatube is a tubular daylighting device that captures natural light at the rooftop and transfers it into building interiors where daylighting has rarely been possible. These systems feature patented optical technologies that deliver highly predictable light levels, allowing them to be used in commercial daylighting design applications similar to traditional lighting equipment.

The Solatube selectively redirects, reflects, and delivers the visible spectrum of daylight to interior spaces. At the same time, it filters out infrared wavelengths to reduce daytime cooling loads. It also prevents harmful ultraviolet light from entering the building, which can damage interiors and fade furniture and fabrics. In addition, the design reduces glare and minimizes shifting patterns of light for a consistent light distribution pattern.

When sunlight is allowed to enter a building through Solatube Daylighting Systems, the people occupying it tend to be happier, healthier, and more productive. Research has shown that daylighting improves productivity, increases employee retention, reduces absenteeism, and improves student test scores.

750 Model 21" Units; (2) SolaMaster Series Solatube 750DS-C (21" Daylighting system) for closed ceiling. Each Solatube unit shall consist of the following:

- Acrylic Outer Dome and Polycarbonate Inner Dome (Florida Product Approved)
- 11" Self-flashing curb (To be delivered ahead of time for roofer to install and "boot" into existing membrane roof, DS counter flashing included for curb)
- (1) extension tube (Max. run 60")
- Top and bottom angle adapter kit
- Optiview Diffuser

ECM Number: ECM-6

ECM Title: Building Envelope

Existing Conditions:

Infiltration of unconditioned air and exfiltration of condition air will lead to higher energy costs. Town Hall had not received a building envelope analysis or envelope modifications at any time in recent memory of staff. Air leakage is evident upon inspection. Several key areas of the building have been identified as energy inefficient.

Air leakage is defined as, “the uncontrolled migration of conditioned air through the building envelope”. Caused by pressure differences due to wind, chimney (or stack) effect and mechanical systems it has been shown to represent the single largest source of heat loss or gain through the building envelopes of nearly all types of buildings. Tests carried out by the National Research Council of Canada on High Rise Commercial and Residential Buildings, Schools, Supermarkets and Houses have shown levels as high as 20% or 30% of heat loss could be attributed to Air Leakage. Typical savings however tend to be in the 5% to 15% range. Beyond energy savings, uncontrolled air leakage can affect the comfort of occupants’ air quality through ingress of contaminants from outside and the imbalance of mechanical systems, along with the structural integrity of the building envelope through moisture migration. Control of air leakage involves the sealing of gaps cracks and holes using appropriate materials such as Fire Retardant, Poly Urethane Foam, caulks, and appropriate weather stripping materials. The goal is to create a continuous plane of ‘air-tightness’ to completely encompass the Building Envelope and to “compartmentalize” components of the building in order to equalize pressure differences.

Proposed ECM:

ABM proposes to weather-strip and seal openings in the building to help reduce or eliminate infiltration and exfiltration of air.

- Weather-strip and seal exterior doors.
- Seal exterior windows.
- Seal roof and wall joints with two-part foam.

The utilized caulks carry a 50 year warranty from the manufacturer. If properly placed and applied in areas with typical/standard exposures to UV, etc., the material will perform well for the expected life.

The door sealing materials consist of a heavy metal aluminum carrier, and strip of Q-lon which is a formed & angled sponge wrapped in vinyl. It is applied to the door frames, secured with screws, and caulked for added durability and air sealing through the carrier. This is a very long life material, and provided it's not physically cut or damaged, it is expected to last 10-20 years.

The sweeps utilize a double fin film seal between a set of brushes, also embedded in a heavy aluminum carrier. The material is typically placed under the kick plate of the door, and secured in the same manner as the rest of the door seal. Due to brushing the ground, the sweep protects the film to keep the seal tight.

ECM Number: ECM 6.1

ECM Title: Roofing & Skylight

Existing Conditions:

The roofing systems on the low slope roofs of Belleair Town Hall are in Fair to poor condition. Several deficiencies that could contribute to water leakage were observed, including seam failure near perimeter and improperly flashed curbs around skylights, A/C units, and other small penetrations. The roofs range from 17-22 years old and are at the end of their lifecycle.

- Roof surface is covered with a modified bitumen. Failing seams were seen throughout entire roof
- Poorly Flashed curbs and penetrations are noticed throughout the entirety of the roof.
- Granules missing from bitumen exposing fiberglass throughout the entire roof.
- The roof surface has adequate positive drainage towards the internal Drains, gutters, and scuppers.

Core Sample Revealed:

- 1 roofing systems
- 3/4” Modified Bitumen
- 1/2” cover board
- 1/2” ISO
- 1”-4” of Lightweight concrete
- Wood decking
- No moisture was observed below the roof membrane within core sample.

The adequacy of the existing Drainage system of the water from the low roof was evaluated using the procedures outlined in the Architectural Manual published by the Sheet Metal and Air conditioning contractors National Association (SMACNA). The procedures in this manual have been recognized in the roofing industry as the standard.

Our Analysis was performed on the low slope roof. A roof area factor of 1.2 was used to calculate the design area. Using rainfall design values for 10-years and 100-year storms for the area, the results indicated that the existing drainage system have sufficient capacity to drain the water from the roof surface.

The permanently covered skylight was previously determined to be leaking.

Proposed ECM:

TPO Reroof W/Skylight Replacement

- Power wash entire roof surface
- Fully adhere .060 Mil fleece back TPO over the existing modified bitumen roof system in accordance with the manufacturers specifications, using CR-20 “spatter pattern” method.
- Install .060 mil TPO at the base of the parapet wall and terminate with aluminum termination bar in accordance with manufacturer specification
- Install new metal drip edge where metal drip edge existed.
- Flash all curbs and penetrations in accordance with the manufacturers specifications
- Install 6 new drain inserts in internal drains and flash in accordance with manufacturer specifications

Skylight Replacement

- Remove skylight structure and roof flashing
- Replace any damaged underlayment.
- Install new 4’x8’ foot skylight.
- Remove and replace damaged wood beams and trim. New wood on interior to be painted to match color and finish as surrounding surfaces.
- Install new skylight per manufactures specifications.

Warranty

20 Year Labor; 20 Year Material

Upon completion, Hicks Roofing, Inc. will provide the owner with a warranty from the manufacturer for the materials, and a warranty covering workmanship from the actual installation date to be issued by Hicks Roofing, Inc. All warranties shall be subject to the terms and conditions on the warranty documents. The term of the warranties shall be outlined in the Executive Summary in this proposal. Annual maintenance plan must be executed to comply with the requirements of all warranties.

ECM Number: ECM-8

ECM Title: Electrical Panels

Existing Conditions:

Upon initial inspection, ABM was notified that the electrical panel in the south electrical room had been “bypassed” when the new AC units were installed on the roof. This panel is adjacent to the ladder to the roof. ABM subsequently tested this panel and found that it was actually active and energized with more than 50A service.

The panel was mounted to alleviate the immediate safety concern, but a thorough investigation identified various code violations and issues with the outdated electrical infrastructure.

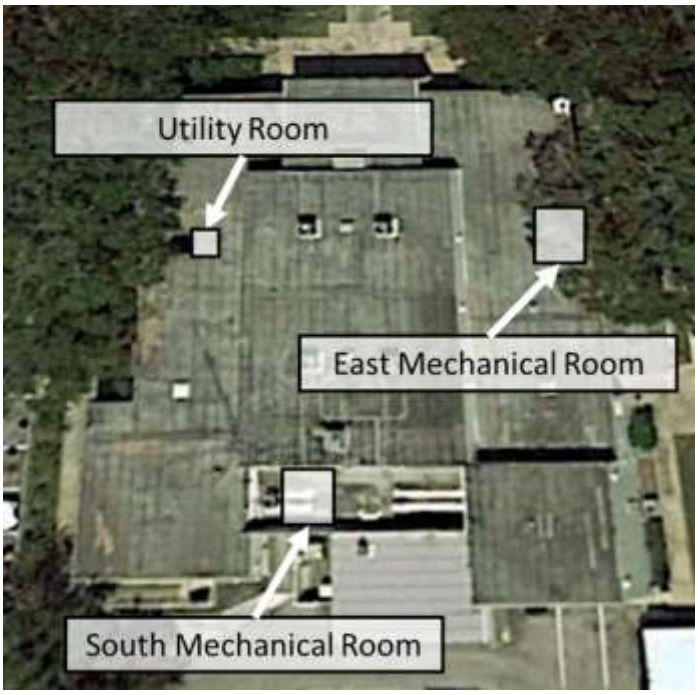


Figure 1 - South Mechanical Room

Figure 2: South Mechanical Room Mounted Panel

The three electrical Main Distribution Panels (MDP) have several NEC code and OSHA violations, are obsolete, not supported for parts, and have deteriorated/corroded enclosures.

NEC Violations!

South Mechanical Room

- Exposed and energized conductors and parts.

The cover is unattached and leaning against the panel.

- Pull Box not listed and rated for the application. Exposed conductors and not sealed.

Figure 3 - South Mechanical Room

NFPA70e Safety and Hazardous Conditions

- Lack of annual maintenance.
- Labeling missing or inaccurate.
- No NFPA70e Arc Flash Compliance.

Utility Room

Figure 4 - South Mechanical Room

- NEC 110.26; Minimum 30 inch Clearance in front of enclosures.
- Flammables, clutter.

South Mechanical Room


ON
OFF

General Issues:

- Age of Equipment: The existing (3) main PanelBoards are 35+ years old.

  Parts.

  Reliability.

- Maintenance annually, NFPA70b.

Proposed ECM:

This project will remove the panels and install new MDP's and bring the panels into NEC 2017 and local code compliance.

- Remove and install new OEM supported MDP's.
- Bring electrical rooms into code compliance.
- Establish required maintenance routines.

Procedures and Planning:

- Obtain Authorization To Proceed.
- Perform detailed specifications and engineering. Specifications and data collection (1) 8Hr day. Engineering and Arc Flash calculations. (6 weeks)
- Order equipment -6 week Lead Time.
- Pre Install assembly.

Demolition and Install (3) MDPs. Power Outage Required. (3) 12hr shifts (Non-Normal Business Hours to minimize operations disruptions for town.

Procedure and Planning (Continued) Acceptance Testing.
NETA Section 7 ATS-2017

Specification Section	Equipment Description	Covered/Included Tasks	Exceptions and Excluded Tasks
NETA/ANSI 7.1	(3) Switchgear and Switchboard Assemblies	Visual, Mechanical, Electrical Tests	Optional Tests Excluded
NETA/ANSI 7.3.2	(9) Cables, Low-Voltage, 600-Volt Maximum	Visual, Mechanical, Electrical Tests	Optional Tests Excluded
NETA/ANSI 7.5.1	(11) Switches, Air, Low-Voltage	Visual, Mechanical, Electrical Tests	Optional Tests Excluded
NETA/ANSI 7.16.1	(14) Motor Starters, Low-Voltage	Visual, Mechanical, Electrical Tests	Optional Tests Excluded
NETA/ANSI 7.13.1	Grounding System	Visual, Mechanical, Electrical Tests	Optional Tests Excluded
NETA/ANSI 9	Thermographic		Optional Tests Excluded
NETA/ANSI 8	System Functioning and Commissioning		Optional Tests Excluded
NETA/ANSI 6	Power System Studies – Arc Flash		Optional Tests Excluded

Expected Test Results from above; NETA Section 7 consists of sections specific to each particular type of equipment. Within those sections there are, typically, four main bodies of information:

A. Visual and Mechanical Inspection

B. Electrical Tests

C. Test Values – Visual and Mechanical

D. Test Values – Electrical

- Labeling; Install Equipment labels per NFPA 70e and NFPA 79.
- Review installation and OEM manuals.
- Review arc flash compliance and any recommendations for mitigation.

EQUIPMENT LIST		
Description	Equipment Type	QTY
Switchboard (1) Main & (8) Disc.	Panel board (<600V)	1
Main Dicsonnect	LV Disconnect Switch <400A	1
Fusible Disc #1	LV Disconnect Switch <400A	1
Fusible Disc #2	LV Disconnect Switch <400A	1
Fusible Disc #3	LV Disconnect Switch <400A	1
Fusible Disc #4	LV Disconnect Switch <400A	1
Fusible Disc #5	LV Disconnect Switch <400A	1
Fusible Disc #6	LV Disconnect Switch <400A	1
Fusible Disc #7	LV Disconnect Switch <400A	1
Fusible Disc #8	LV Disconnect Switch <400A	1
AC Local Disconnect	LV Disconnect Switch <400A	1
Main Disconnect	LV Wall Mtd Disc Switch, <400A	1
Fusbile Disconnect	LV Wall Mtd Disc Switch, <400A	1
Fusbile Disconnect	LV Wall Mtd Disc Switch, <400A	1
Fusbile Disconnect	LV Wall Mtd Disc Switch, <400A	1
Panel	LV Wall Mtd Disc Switch, <400A	1
Fusible Disconnect	LV Wall Mtd Disc Switch, <400A	1
Fusbile Disconnect	LV Wall Mtd Disc Switch, <400A	1
Breaker	Molded Case Bkr <200A Primary Inj	1
Switchboard (1) Main & (10) Disc.	Panel board (<600V)	1
Main Dicsonnect	LV Disconnect Switch <400A	1
Fusible Disc #1, Fans	LV Disconnect Switch <400A	1
Fusible Disc #2	LV Disconnect Switch <400A	1
Fusible Disc #3	LV Disconnect Switch <400A	1
Fusible Disc #4	LV Disconnect Switch <400A	1
Fusible Disc #5	LV Disconnect Switch <400A	1
Fusible Disc #6	LV Disconnect Switch <400A	1
Fusible Disc #7	LV Disconnect Switch <400A	1
Fusible Disc #8	LV Disconnect Switch <400A	1
Fusible Disc #9	LV Disconnect Switch <400A	1
Fusible Disc #10, East AC#1	LV Disconnect Switch <400A	1
Switchboard (1) Main & (4) Disc.	Panel board (<600V)	1
Main Dicsonnect	LV Disconnect Switch <400A	1
Fusible Disc #1	LV Disconnect Switch <400A	1
Fusible Disc #2, Air Handler	LV Disconnect Switch <400A	1
Fusible Disc #3	LV Disconnect Switch <400A	1
Fusible Disc #4, Condenser	LV Disconnect Switch <400A	1

FIGURE 1, LIFE CYCLE ASSESSMENT

GENERAL COMMENTS:
The Belleair Town Hall building is located in the Town of Belleair and is a single floor structure
Electrical infrastructure is various ages 1960's and 1980's gear. Building is brick and wood frame. Wood framing is original installation
There is no evidence of any required mainteance on the electrical switchgear nor Arc flash labels.
There are exposed and energized conductors in the South Mechanical room as well as significant clutter and flammable.

*NOTE: OVERALL RATING =A+B+C+D+E

LEGEND:
A= HISTORICAL EXPERIENCE
B= EXISTING CONDITIONS
C= AGE vs. EXPECTED LIFE
D= AMBIENT CONDITIONS
E= LOADING

RATING SYSTEM:
3 = HIGH RISK
2 = MODERATE RISK
1 = LOW RISK

COMPONENT	Service	Date	Voltage/ Size	MFG.	Type Frame	Location	PRODUCTION IMPACT(H/M/L)	Loading	PARAMETERS A	B	C	D	E	OVERALL RATING*	Comments
Average Risk														**10.78**	
East Mechanical Room															
Switchboard (1) Main & (8) Disc.	AC Units	Pre-1970's	208Y/120V	Westinghouse	200A	East Wall	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Main Dicsonnect	FDP	Pre-1970's	208Y/120V	Westinghouse	200A	Bottom Feed	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible. Could not open.
Fusible Disc #1	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1srt Row Left	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #2	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1st Row Right	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #3	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	2nd Row Left	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #4	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	2nd Row Right	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #5	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	4th Row Left	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #6	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	4th Row Right	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #7	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	6th Row Left	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #8	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	6th Row Right	H		1	3	3	2	1	**10**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
AC Local Disconnect	AC Compressor Outside	1980's	208Y/120V	SqD	15A	Outside East			1	2	3	2	1	**9**	
Cummings Diesel Generator Set	Public Safety Bldg	?	208Y/120V	Cummings	125KW	Outside South	H		1	1	2	2	1	**7**	200A Main. Prior service found energized conductors taped behind the wall. Open accesible to non qualified persons in public hallway

FIGURE 2, LIFE CYCLE ASSESSMENT

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COMPONENT	Service	Date	Voltage/ Size	MFG.	Type Frame	Location	PRODUCTION IMPACT(H/M/L)	Loading	PARAMETERS A	B	C	D	E	OVERALL RATING*	Comments
South Mechanical Room														15	Exposed J-Box/Piull Box not rated, NEC access violations, Clutter, flammables, exposed energized switchgear
Main Disconnect		1980's	208/120	SqD		Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Fusbile Disconnect	Panel E Kithcen	Pre-1970's	208/120V	Westinghouse	200A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Fusbile Disconnect	Mech Room	Pre-1970's	208/120V	Westinghouse	200A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Fusbile Disconnect	AC Fire Dept.	Pre-1970's	208/120V	Westinghouse	200A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Panel	??	Pre-1970's	208/120V		100A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Fusible Disconnect	AC Panel	Pre-1970's	208/120V	Westinghouse	60A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Fusbile Disconnect	Fire Dept Cooking	Pre-1970's	208/120V	SqD	100A	Wall Mount			1	3	3	3	1	11	NEC Violation 48" Access Boundary
Breaker		1980's	208/120V	SqD	30A	Wall Mount			3	3	1	3	1	11	NEC Violation 48" Access Boundary

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1 = LOW RISK

ABM Building Value

COMPONENT	Service	Date	Voltage/ Size	MFG.	Type Frame	Location	PRODUCTION IMPACT(H/M/L)	Loading	PARAMETERS A	B	C	D	E	OVERALL RATING*	Comments
Switchboard (1) Main & (10) Disc.								Measured 40 amps each phase						15	NEC 110.2 Listed and Labeled Equipment can be used for electrical. NEC 312.5 Exposed and Energized conductors. Panel cover off.
Main Dicsonnect	FDP	Pre-1970's	208Y/120V	Westinghouse	400A	Bottom Feed	H		1	3	3	3	1	11	Sec. 110-26 of the National Electrical Code (NEC): 1) at least a 3-ft clearance in front of all electrical equipment; 2) a 30 in.-wide working space in front of equipment operating at 600V or less;
Fusible Disc #1, Fans	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1srt Row Left	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #2	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1st Row Right	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #3	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	3rd Row Left	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #4	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	3rd Row Right	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #5	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	5th, Left	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #6	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	5th Row Right	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #7	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	6th Row Left	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.

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A= HISTORICAL EXPERIENCE
B= EXISTING CONDITIONS
C= AGE vs. EXPECTED LIFE
D= AMBIENT CONDITIONS
E= LOADING

RATING SYSTEM:
3 = HIGH RISK
2 = MODERATE RISK
1 = LOW RISK

COMPONENT	Service	Date	Voltage/ Size	MFG.	Type Frame	Location	PRODUCTION IMPACT(H/M/L)	Loading	PARAMETERS A	B	C	D	E	OVERALL RATING*	Comments
Fusible Disc #8	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	6th Row Right	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #9	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	7th Row Right	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #10, East AC#1	Safety Sw	Pre-1970's	208Y/120V	Westinghouse	200A	8th Row	H		1	3	3	3	1	11	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.

FIGURE 3, LIFE CYCLE ASSESSMENT

GENERAL COMMENTS:
The Belleair Town Hall building is located in the Town of Belleair and is a single floor structure
Electrical infrastructure is various ages 1960's and 1980's gear. Building is brick and wood frame. Wood framing is original installation
There is no evidence of any required mainteance on the electrical switchgear nor Arc flash labels.
There are exposed and energized conductors in the South Mechanical room as well as significant clutter and flammable.

*NOTE: OVERALL RATING =A+B+C+D+E

LEGEND:
A= HISTORICAL EXPERIENCE
B= EXISTING CONDITIONS
C= AGE vs. EXPECTED LIFE
D= AMBIENT CONDITIONS
E= LOADING

RATING SYSTEM:
3 = HIGH RISK
2 = MODERATE RISK
1 = LOW RISK

COMPONENT	Service	Date	Voltage/ Size	MFG.	Type Frame	Location	PRODUCTION IMPACT(H/M/L)	Loading	PARAMETERS A	B	C	D	E	OVERALL RATING*	Comments
Utility Room Main Bldg															
Switchboard (1) Main & (4) Disc.	AC Units	Pre-1970's	208Y/120V	Westinghouse	200A	South Wall			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Main Dicsonnect	FDP	Pre-1970's	208Y/120V	Westinghouse	200A	Bottom Feed			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #1	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1srt Row Left			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #2, Air Handler	FDP Twin	Pre-1970's	208Y/120V	Westinghouse	30A	Top 1st Row Right			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #3	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	2nd Row Left			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.
Fusible Disc #4, Condenser	FDP Twin w/ Mstarter	Pre-1970's	208Y/120V	Westinghouse	30A	2nd Row Right			1	3	3	3	1	**11**	Beyond expected life. Parts obsoleted. No mainteenace history. No Arc Flash. Grounding not visible.

Dimmit Community Center

Estimated Community Center Energy

Current Costs	**$32,358**
Current $/SF	**$2.07**
Post-ABM Costs	**$20,517**
Post-ABM $/SF	**$1.31**

ECM Number: ECM-3

ECM Title: Controls

Existing Conditions:

The HVAC controls at the Dimmit Community Center were comprised of a QBC Controller and utilized some Johnson Controls and Distech devices in the units. As service related issues mounted, staff experienced frustration identifying the accountable party and in many instances where the Air Conditioning was not functioning properly, vendors were pointing fingers at one another.

This led to extended delays getting the air conditioning repaired, inefficient use of staff time and citizen complaints as temperatures increased with the air conditioning not working.

Ultimately, the existing system was bypassed due to the various failures and inability of vendors to maintain the control system in proper working order. Currently, a simple switch and conventional type thermostats are controlling the 6 units cooling the gym. All systems will run 24 hours a day, 7 days a week as if the building had normal occupancy without proper “set back” controls.

Gym units are being controlled by individual thermostats. Note the gym air grilles at the top of the photo. All of these grilles will be replaced with gym specific grilles.

Proposed ECM:

ABM proposes to replace the existing control system with a new, BacNet DDC, open protocol, user friendly, graphics based system. Temperature/humidity sensors will be installed in the areas served by the air conditioning systems. These sensors will report to the main controller that will allow an authorized operator to monitor and control the related equipment. The main controller will be a computer-based program with the following:

- Graphics based display
- Occupancy / Vacancy scheduling
- Night set back program

ABM will provide and install controls on the HVAC Systems. ABM will also provide and install room temp/humid sensors. Humidity levels will be maintained to protect the hardwood flooring in the gym. Night setback during unoccupied hours will be implemented. ABM will also provide and install a digital, programmable thermostat for Split System #1 that takes care of the Yoga room.

ECM Number: ECM-4 & ECM-17

ECM Title: HVAC Upgrades & Commissioning

Existing Conditions:

The HVAC systems at the Dimmitt Community Center are comprised of 10 systems.

Tag	Grade	Manufacturer	Install Date	Tons	ASHRAE Life Expectancy	Remaining Useful Life	% Useful Life	Projected Replacement Year
CU 1	**D**	**Carrier**	**2005**	**2**	**15**	**3**	**20%**	**2018**
AHU 1	**D**	**Carrier**	**2006**		**15**	**4**	**27%**	**2018**
RTU 1	B	Carrier	2013	10	**15**	11	73%	2028
RTU 2	A	ICP	2016	10	**15**	14	93%	2031
RTU 3	**D**	**Carrier**	**2006**	**7.5**	**15**	**4**	**27%**	**2018**
RTU 4*	**D**	**Carrier**	**2005**	**6**	**15**	**3**	**20%**	**N/A***
RTU 5*	**D**	**Carrier**	**2005**	**6**	**15**	**3**	**20%**	**N/A***
RTU 6	**D**	**Carrier**	**2006**	**7.5**	**15**	**4**	**27%**	**2018**
RTU 7	B	ICP	2011	6	**15**	9	60%	2026
RTU 8	**C**	**Carrier**	**2006**	**6**	**15**	**4**	**27%**	**2018**
RTU 9	B	Carrier	2014	6	**15**	12	80%	2029
HEF 1	**C**	**Greenheck**	**2006**		**15**	**4**	**27%**	**2018**
TEF-1A	**D**	**Greenheck**	**2006**		**15**	**4**	**27%**	**2018**
TEF-1B	**D**	**Greenheck**	**2006**		**15**	**4**	**27%**	**2018**

*RTU 4 & 5 will be removed, but not replaced, in the proposed scope of work

There are currently 6 Roof Top Units serving the Gym, RTUs 1-6 on the equipment list and as can be seen in the image above. The units are currently manually controlled, as described in the controls section. The space can be sufficiently cooled and dehumidified under most circumstances by RTU's 1 & 2, both ten (10) ton units. If additional capacity is needed for heavy load situations, RTU's 3 and 6 can handle the additional load.

Examples of deteriorated condenser coils that effect the energy consumption and efficiency of the equipment. Also note the drain line on the roof. These will be cleaned up and proper stands will be installed on all units.

This is the kitchen exhaust fan that attaches to the hood over the range. It is not used very much and it is in fair condition. ABM will be recommissioning this fan so it can provide years of trouble free service.

These are the two bathroom / locker room exhaust fans. They are in poor condition and will be replaced by higher efficiency exhaust fans.

Proposed ECM:

ABM proposes to replace two of the six gym systems with new equipment of equal capacity. Units 1 & 2 are new and will be recommissioned, Units 4 & 5 are not needed and due to age and deterioration will be removed from the roof and the electric and curbs will be capped. The 2 backup gym units (RTU 3 & 6) are beyond useful life and will be replaced. Humidity is a key factor in the gym space due to the hardwood floors and as such, humidity will be the first factor in the controls programming for this area.

Split system # 1 which takes care of the Yoga room will be completely replaced and a new digital, programmable thermostat will be installed for this system.

Rooftop units 7 & 8 are deteriorating and will be replaced. RTU 9 is newer and will be recommissioned.

Additionally, the air conditioners tasked with bringing outside air into the building will have Global Plasma Systems installed to limit the amount of fresh air needed.

All air conditioning equipment will be started, tested, and checked for efficient operation according to the manufacturer's requirements.

The kitchen exhaust fan will be recommissioned and be available for use as needed. New belts, contactor, bearings, etc. will be replaced as needed during the recommissioning. Both of the locker room exhaust fans will be replaced due to age and condition. New high-efficiency fans will be installed, started, and checked for proper operation.

All equipment removed will be disposed of following the EPA guidelines for hazardous wastes.

ECM Number: ECM-5

ECM Title: Lighting Upgrades (LED)

Existing Conditions:

The existing lighting system at the Community Center contains an assortment of linear fluorescent (LF), Compact fluorescent (CFL) and Metal Halide (MH) technology. There are no existing occupancy based lighting controls. The current light levels are within *Illuminating Engineering Society* (IES) recommended ranges.

Note: The metal halide (MH) lamps in the gyms are highly inefficient and have long "warm up" times that causes staff to turn them on well before the gyms are being used. The existing metal halide fixtures are also showing signs of "color shift" which is common as MH lamps degrade. The MH lamps have a short average rated life of 20,000 hrs. When these high reach lamps fail, the cost and labor time is high as town staff must secure a lift to replace lamps.

Proposed ECM:

The new lighting will be a complete LED upgrade. The gyms and exteriors will be converted to brand new LED fixtures. The existing linear fluorescent and CFL fixtures with be retrofitted with new LED lamps and drivers. This will impact not only energy costs, it will significantly reduce maintenance costs, improve light quality and eliminate toxic materials from the lighting system, as all existing lamps contain mercury and must be disposed of through a hazardous waste recycling facility per EPA requirements.

Our proposed scope will include:

- Replacement of (7) exterior wall mounted MH fixtures with new LED wall pack fixtures.
- Retrofit of (16) exterior CFL fixtures to LED
- Replacement of (30) Gym fixtures with new LED hibay fixtures (200,000 hour projected life and 5 year manufacturer's warranty)
- Retrofit (114) various linear fluorescent fixtures with new LED lamps and drivers
- Retrofit (31) various CFL fixtures with new LED lamps

All lamps and ballasts must be compatible and approved by the manufacturers. If unapproved materials are installed after ABM's installation of the lighting upgrade, damage may ensue and manufacturer's warranties may be void. By installing or incorporating unapproved materials, customer agrees and acknowledges assuming all responsibility and liability associated with doing so and will hold ABM harmless from liabilities resulting from such action, and customer acknowledge that all warranties provided by ABM are void.

Location	Area	Room	Burn	Qty	Fixture	Fixture Attributes	Existing Wattage	Action	Proposed	Qty	Control	Control Hrs Saved	Proposed Wattage
Town of Belleair FL	Recreation Center - Interior	Electrical Room Around Gym	500	1	F-F32T8-4	Industrial Strip-1X8-Open - no lens-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Recreation Center - Interior	Storage	500	3	F-F32T8-4	Industrial Strip-1X8-Open - no lens-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	3		0	168.0
Town of Belleair FL	Recreation Center - Interior	Storage	500	4	F-F32T8-4	Industrial Strip-1X8-Open - no lens-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	4		0	224.0
Town of Belleair FL	Recreation Center - Interior	Gym	3640	30	MH-MH400-1	Highbay-Mogul-Clear-Suspended	458.0	Replace	INSTALL NEW 138W LED HIGH BAY FIXTURE	30		0	4140.0
Town of Belleair FL	Recreation Center - Interior	Entrance	3640	6	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	6		0	204.0
Town of Belleair FL	Recreation Center - Interior	Storage	500	1	F-F32T8-4	Wrap-1X4-Prismatic-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	1		0	56.0
Town of Belleair FL	Recreation Center - Interior	Stairs	3640	6	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	6		0	204.0
Town of Belleair FL	Recreation Center - Interior	2nd Floor Fitness Area	3640	6	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	6		0	204.0
Town of Belleair FL	Recreation Center - Interior	2nd Floor Mechanical Room	500	2	F-F32T8-4	Industrial Strip-1X8-Open - no lens-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	2		0	112.0
Town of Belleair FL	Recreation Center - Interior	Reception and Hallway	3640	24	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	24		0	816.0
Town of Belleair FL	Recreation Center - Interior	Office 1	3640	4	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	4	SWITCH MOUNT OCCUPANCY SE... (1)	1092	136.0
Town of Belleair FL	Recreation Center - Interior	Office 2	3640	2	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	2	SWITCH MOUNT OCCUPANCY SE... (1)	1092	68.0
Town of Belleair FL	Recreation Center - Interior	Office 3	3640	3	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	3	SWITCH MOUNT OCCUPANCY SE... (1)	1092	102.0
Town of Belleair FL	Recreation Center - Interior	Game Room 1	3640	16	F-F32T8-3	Troffer-2X4-Parabolic-Recessed	80.0	Retrofit	RETROFIT W/ (3) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	16		0	576.0
Town of Belleair FL	Recreation Center - Interior	Game Room 2	3640	12	UFL-FU31T8/6-2	2X2-Troffer-Parabolic-Recessed	55.0	Retrofit	RETROFIT W/ (2) NEW 2' U6 TLED LAMPS AND NEW ELECTRONIC BALLAST	12		0	408.0
Town of Belleair FL	Recreation Center - Interior	Storage	500	2	F-F32T8-4	Wrap-1X4-Prismatic-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	2		0	112.0
Town of Belleair FL	Recreation Center - Interior	Storage	500	4	F-F32T8-4	Wrap-1X4-Prismatic-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	4		0	224.0
Town of Belleair FL	Recreation Center - Interior	Concession	3640	4	F-F32T8-4	Wrap-1X4-Prismatic-Surface	108.0	Retrofit	RETROFIT W/ (4) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	4		0	224.0
Town of Belleair FL	Recreation Center - Interior	Mens Restroom	3640	6	F-F32T8-2	Strip-1X4-Open - no lens-Surface	55.0	Retrofit	RETROFIT W/ (2) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	6		0	144.0
Town of Belleair FL	Recreation Center - Interior	Mens Restroom	3640	5	CFL-CF32W-2	Square-Plug-in 4 Pin-Open - no lens-Recessed	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	5		0	105.0
Town of Belleair FL	Recreation Center - Interior	Womens Restroom	3640	8	F-F32T8-2	Strip-1X4-Open - no lens-Surface	55.0	Retrofit	RETROFIT W/ (2) NEW 4' T LED LAMPS AND NEW ELECTRONIC BALLAST	8		0	192.0
Town of Belleair FL	Recreation Center - Interior	Womens Restroom	3640	5	CFL-CF32W-2	Square-Plug-in 4 Pin-Open - no lens-Recessed	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	5		0	105.0
Town of Belleair FL	Recreation Center - Exterior	Exterior	4380	2	CFL-CF32W-2	Decorative-Plug-in 4 Pin-Frosted-Wall-Vertical	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	2		0	42.0
Town of Belleair FL	Recreation Center - Exterior	Exterior	4380	4	CFL-CF32W-1	Wall Wash-Plug-in 4 Pin-Frosted-Wall	32.0	Do Nothing	Do Nothing	4		0	128.0
Town of Belleair FL	Recreation Center - Exterior	Exterior	4380	5	MH-MH175-1	Wallpack-Mogul-Clear-Wall	210.0	Replace	INSTALL NEW 55W LED WALL PACK	5		0	275.0
Town of Belleair FL	Recreation Center - Exterior	Exterior	4380	14	CFL-CF32W-2	10-in Can-Plug-in 4 Pin-Open - no lens-Recessed	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	14		0	294.0
Town of Belleair FL	Recreation Center - Exterior	Exterior	4380	2	MH-MH70-1	Wallpack-Medium-Frosted-Wall	88.0	Replace	INSTALL NEW 30W LED WALL PACK	2		0	60.0
Town of Belleair FL	Recreation Center - Exterior	Exterior Janitor	500	6	CFL-CF32W-2	Square-Plug-in 4 Pin-Open - no lens-Recessed	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	6		0	126.0
Town of Belleair FL	Recreation Center - Exterior	Exterior Restrooms	3640	6	CFL-CF32W-2	Square-Plug-in 4 Pin-Open - no lens-Recessed	64.0	Relamp	INSTALL (2) NEW 10.5W PL LED LAMPS - HORIZONTAL	6	SWITCH MOUNT OCCUPANCY SE... (2)	1092	126.0

ECM Number: ECM-6

ECM Title: Building Envelope

Existing Conditions:

There is a crack in the stairwell that must be sealed.

Infiltration of unconditioned air and exfiltration of condition air will lead to higher energy costs. The Dimmitt Community Center had not previously received a building envelope analysis or envelope modifications. Air leakage is evident upon inspection.

Air leakage is defined as, “the uncontrolled migration of conditioned air through the building envelope”. Caused by pressure differences due to wind, chimney (or stack) effect and mechanical systems it has been shown to represent the single largest source of heat loss or gain through the building envelopes of nearly all types of buildings. Tests carried out by the National Research Council of Canada on High Rise Commercial and Residential Buildings, Schools, Supermarkets and Houses have shown levels as high as 20% or 30% of heat loss could be attributed to Air Leakage. Typical savings however tend to be in the 5% to 15% range. Beyond energy savings, uncontrolled air leakage can affect the comfort of occupants’ air quality through ingress of contaminants from outside and the imbalance of mechanical systems, along with the structural integrity of the

building envelope through moisture migration. Control of air leakage involves the sealing of gaps cracks and holes using appropriate materials such as Fire Retardant, Poly Urethane Foam, caulks, and appropriate weather stripping materials. The goal is to create a continuous plane of 'air-tightness' to completely encompass the Building Envelope and to "compartmentalize" components of the building in order to equalize pressure differences.

Proposed ECM:

The crack in the stairwell will be sealed.

The exterior doors will be weather-stripped. The windows need to be caulked at the perimeter.

- Ext. Door(s) to be weather-stripped & sealed – 14 Doors
- Window(s) to be sealed, 1 line at perimeter – 10 Windows

The utilized caulks carry a 50 year warranty from the manufacturer. If properly placed and applied in areas with typical/standard exposures to UV, etc., the material will perform well for the expected life.

The door sealing materials consist of a heavy metal aluminum carrier, and strip of Q-lon which is a formed & angled sponge wrapped in vinyl. It is applied to the door frames, secured with screws, and caulked for added durability and air sealing through the carrier. This is a very long life material, and provided it's not physically cut or damaged, it is expected to last 10-20 years.

The sweeps utilize a double fin film seal between a set of brushes, also embedded in a heavy aluminum carrier. The material is typically placed under the kick plate of the door, and secured in the same manner as the rest of the door seal. Due to brushing the ground, the sweep protects the film to keep the seal tight.

Public Works – John J. Osborne Building

Estimated Public Works Energy*

Current Costs*	**$**
Current $/SF*	**$**
Post-ABM Costs*	**$**
Post-ABM $/SF*	**$**

**Electricity fed from Water Treatment Facility and not independently metered.*

ECM Number: ECM-3

ECM Title: Controls

Existing Conditions:

The HVAC controls at the Public Works are comprised of 3 conventional type thermostats. One thermostat for each system. All of the existing thermostat control is performed at the device by anyone who may have access.

Proposed ECM:

ABM proposes to replace the existing thermostats with new, Web based thermostats. These new thermostats will have the capability for remote monitoring. This can be accomplished by most smart devices. These thermostats will also allow for remote scheduling and temperature set point adjustment and will have the following features:

- Occupancy / Vacancy scheduling
- Night set back program
- Remote temperature adjustments

ABM will provide and install communicating thermostats on all 3 units with network connection.

Sample of a web-based thermostat pictured above.

ECM Number: ECM-17

ECM Title: Commissioning

Existing Conditions:

The HVAC systems in the Public Works Building are comprised three split systems that serve the entire facility and 2 mini-split systems that control the bathrooms by the service bays. All of these systems are 2 years old and are in good condition.

Tag	Grade	Manufacturer	Install Date	Tons	ASHRAE Life Expectancy	Remaining Useful Life	% Useful Life	Projected Replacement Year
IM 1	A	Hoshizaki	2015	2	15	13	87%	2030
MS1	A	Mitsubishi	2015	1	15	13	87%	2030
MS2	A	Mitsubishi	2015	0.75	15	13	87%	2030
SS1	A	Trane	2015	5	15	13	87%	2030
SS2	A	Trane	2015	5	15	13	87%	2030
SS3	A	Trane	2015	3	15	13	87%	2030

Proposed ECM:

ABM proposes to re-commission the existing units. This includes cleaning and adjusting the units based on manufacturers' recommendations and completing a re-commissioning report.

Water Treatment Operations

Estimated Water Treatment Plant Energy

Current Costs	**$ 46,441**
Current $/SF	**$ 3.31**
Post- ABM Costs	**$ 46,229**
Post - ABM $/SF	**$ 3.30**

Variable Frequency Drive Energy

Current Costs	**$**
Current $/SF	**$**
Post- ABM Costs	**($ 1,636)**
Post - ABM $/SF	**$**

ECM Number: ECM-3

ECM Title: Controls

Existing Conditions:

The HVAC controls at the Water Treatment Plant are comprised of two conventional type thermostats, one for each system. All of the existing thermostat control is performed at the device by anyone who may have access.

Proposed ECM:

ABM proposes to replace the existing thermostats with new, Web based thermostats. These new thermostats will have the capability for remote monitoring. This can be accomplished by any smart device. These thermostats will also allow for remote scheduling and temperature set point adjustment and will have the following features:

- Occupancy / Vacancy scheduling
- Night set back program
- Remote temperature adjustments

ABM will provide and install communicating thermostats on both units with network connection.

Sample of a web-based thermostat pictured above.

ECM Number: ECM-17

ECM Title: Commissioning

Existing Conditions:

The HVAC systems in the Public Works Building are comprised two (2) split systems that serve the entire facility. Both systems are in good condition.

Tag	Grade	Manufacturer	Install Date	Tons	ASHRAE Life Expectancy	Remaining Useful Life	% Useful Life	Projected Replacement Year
CU 1	A		2016	3	15	14	93%	2031
AHU 1	A	Trane			15			2031
CU 2	B	Carrier	2013	4	15	11	73%	2028
AHU 2	B	Carrier			15			2028

Proposed ECM:

ABM proposes to re-commission the existing units. This includes cleaning and adjusting the units based on manufacturers' recommendations and completing a re-commissioning report.

ECM Number: ECM-6

ECM Title: Building Envelope

Existing Conditions:

Infiltration of unconditioned air and exfiltration of condition air will lead to higher energy costs. The Water Treatment Plant had not performed a building envelope analysis or envelope modifications. Air Leakage was found during audit.

Air leakage is defined as, “the uncontrolled migration of conditioned air through the building envelope”. Caused by pressure differences due to wind, chimney (or stack) effect and mechanical systems it has been shown to represent the single largest source of heat loss or gain through the building envelopes of nearly all types of buildings. Tests carried out by the National Research Council of Canada on High Rise Commercial and Residential Buildings, Schools, Supermarkets and Houses have shown levels as high as 20% or 30% of heat loss could be attributed to Air Leakage. Typical savings however tend to be in the 5% to 15% range. Beyond energy savings, uncontrolled air leakage can affect the comfort of occupants’ air quality through ingress of contaminants from outside and the imbalance of mechanical systems, along with the structural integrity of the building envelope through moisture migration. Control of air leakage involves the sealing of gaps cracks and holes using appropriate materials such as Fire Retardant, Poly Urethane Foam, caulks, and appropriate weather stripping materials. The goal is to create a continuous plane of ‘air-tightness’ to completely encompass the Building Envelope and to “compartmentalize” components of the building in order to equalize pressure differences.

Proposed ECM:

The exterior doors should be weather-stripped. The windows need to be caulked at the perimeter.

- Exterior Doors to be weather-stripped & sealed – 5 Doors
- Windows to be sealed, 1 line at perimeter – 6 Windows

The utilized caulks carry a 50 year warranty from the manufacturer. If properly placed, and applied in areas with typical/standard exposures to UV, etc., the material will perform well for the expected life.

The door sealing materials consist of a heavy metal aluminum carrier, and strip of Q-lon which is a formed & angled sponge wrapped in vinyl. It is applied to the door frames, secured with screws, and caulked for added durability and air sealing through the carrier. This is a very long life material, and provided it's not physically cut or damaged, it is expected to last 10-20 years.

The sweeps utilize a double fin film seal between a set of brushes, also embedded in a heavy aluminum carrier. The material is typically placed under the kick plate of the door, and secured in the same manner as the rest of the door seal. Due to brushing the ground, the sweep protects the film to keep the seal tight.

ECM Number: ECM-20

ECM Title: Variable Frequency Drives (VFDs)

Existing Conditions:

Currently there are not any flow control devices on the town's 7 well pumps other than the outlet valves. This is causing premature wear on the pumps and motors, excessive town labor resources and higher energy costs.

Well #	HP	Volts	Phase	Manufacturer	Pump Size	Pump HP	Pump Flow	Pump Maker	Install Date	Amp Draw	MegOhms	GPS Coordinates	Powered From
2	10	460	3	Hitachi	6	7.9	300	National	1998	12.21	0.27	N 27 56.0976 W 082 48.0592	WTP
3	10	230	3	Hitachi	6	7.9	300	National	1997	24.18	464	N 27 56.1097 W 082 48.2423	Town Hall
5	7.50	230	3	Grundfos	6	7.9	300	Grundfos	2017			N 27 56.1761 W 082 48.1498	Own Meter
6	10	460	3	Hitachi	6	7.9	300	National	2001	12.7	127	N 27 56.0729 W 082 48.1517	WTP
7	15	460	3	Hitachi	6	7.9	300		2001	18.58	276	N 27 55.6670 W 082 48.1210	Own Meter
9	10	460	3	Hitachi	6	7.9	300	Goulds	1997	12.95	543	N 27 55.9122 W 082 48.0475	WTP
10	4	460	3	Hitachi	6	7.9	300	Goulds	2000	8.1	85.5	N 27 56.4470 W 082 48.0200	Own Meter

Proposed ECM:

ABM along with our electrical partner will install 7 properly sized Mitsubishi Variable Frequency Drive (VFD) units with bypasses at each of the 7 well pumps. These VFD's will be installed on the existing metal frame work located at the sites and will be tied into the starters and pumps by a licensed electrician with ABM oversight. Final adjustments will be made with the input from the Water Department regarding Gallons per Minute (GPM) flow rates that are desired. Training will be provided on the use of these VFD's. There are a few well pumps that show low insulation reading on the windings. The VFD's installed on these pump motors can cause additional stress to these windings and cause motor failure. ABM will not be responsible for any motor failures on existing well pump motors.

ECM Number: ECM 20.1

ECM Title: Well Pump Control Integration

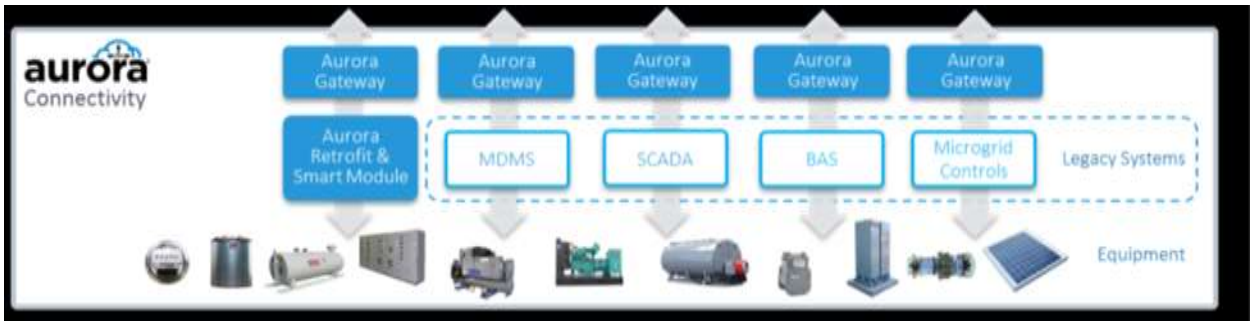
Existing Conditions:

Currently there is no connectivity to the 7 well pumps, leading to significant costs associated with over time as employees must respond directly to each well site to determine if pumps are running and flow rates, (GPM).

Proposed ECM:

Integrate with variable-frequency drives (VFDs) for on/off control and monitoring to well pumps at seven sites (one per site) throughout the Town of Belleair. Each site will receive one Blue Pillar gateway panel for communication between the VFD and the Blue Pillar Aurora Platform. Interfaces for the gateway panel include 120 VAC transformer to be plugged into a receptacle, and RS-485 communication wiring to be connected to the gateway panel and the VFD. Each gateway will connect to the cloud-hosted Blue Pillar Aurora platform via cellular.

Data streams to be monitored and controlled at each VFD are on/off status and VFD power output setpoint. Data will be visualized in the user interface in the form of a table for each VFD. Control buttons for on/off control will be provided in the user interface. Customer-defined alarms will be configured to notify users of specific conditions for each VFD.

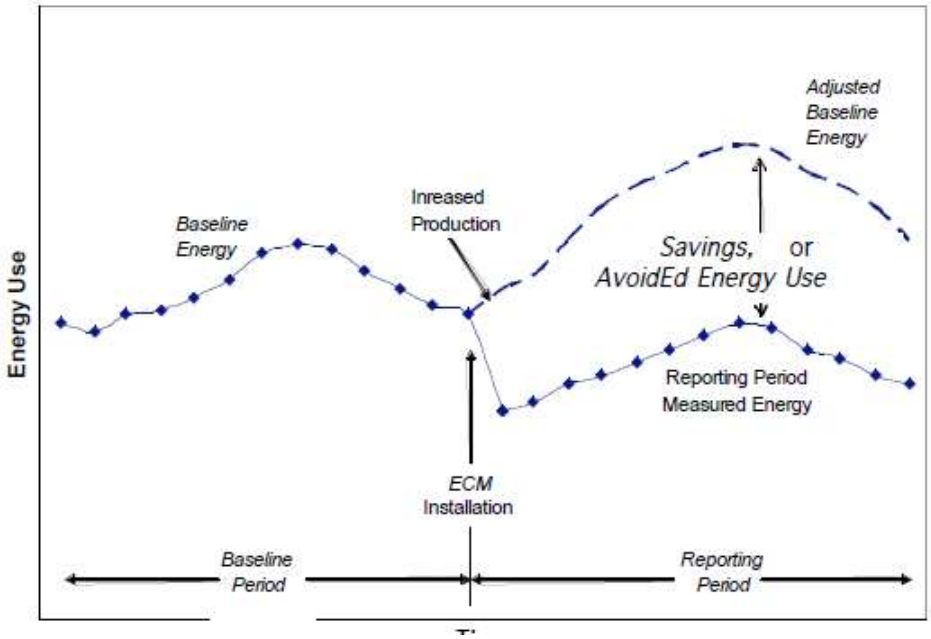


Unlike traditional industrial automation solutions on the market today, the Aurora Gateway requires zero development. You will not need to hire systems integrators to make the solution work. Instead, the Aurora Gateway is pre-configured to create a secure, best-fit-network out-of-the-box eliminating lengthy customized SCADA development products and onsite programming that weighed down traditional approaches.

Measurement and Verification

Measurement & Verification Options

The diagram below showcases the concept behind the measurement & verification procedure (i.e.-demonstrate the savings to Town of Belleair).



M&V approaches are divided into two general types: retrofit isolation and whole-facility. Retrofit isolation methods look only at the affected equipment or system independent of the rest of the facility; whole-facility methods consider the total energy use and de-emphasize specific equipment performance. There are four options for verification of savings:

Option A	**Partially Measured Retrofit Isolation**
	End-use measurements, some stipulations
Option B	**Retrofit Isolation**
	Complete end-use measurements
Option C	**Whole Building**
	Utility bill comparison
Option D	**Calibrated Simulation**
	Computer modeled building savings

One primary difference in these approaches is where the boundary of the energy conservation measure is drawn. All energy used within the boundary must be considered. Options A and B are retrofit isolation methods; Option C is a whole-facility method; Option D can be used as either, but is usually applied as a whole-facility method.

The choice of an option has the following considerations:

- Boundary of impact – specific device consumption or whole facility/ sub facility
- Saving Potential Vs Investment in M&V
- Operating Cycle – constant change or periodic variation in savings
- Adjustments can be simple (Retrofit Isolation) or complex (whole facility)

Based on Operational Energy Conservation Measures identified and considerations stated above, the most efficient and applicable option(s) will be chosen from the above. The following is a brief overview of the measurement and verification methodologies applicable to the improvement measures. ABM shall apply these methodologies, as more fully detailed in the guidelines and standards of the International Measurement and Verification Protocol (IPMVP) and/or the Federal Energy Management Program (FEMP)

OPTION A – Retrofit Isolation with Key Parameter Measurement

M&V Option A involves a retrofit or system level M&V assessment. The approach is intended for retrofits where key performance factors (e.g., end-use capacity, demand, power) or operational factors (e.g., lighting operational hours, cooling ton-hours) can be spot- or short-term-measured during the baseline and post-installation periods. Any factor not measured is estimated based on assumptions, analysis of historical data, or manufacturer's data.

All end-use technologies can be verified using Option A. However, the accuracy of this option is generally inversely proportional to the complexity of the measure. Thus, the savings from a simple lighting retrofit will typically be more accurately estimated with Option A than the savings from a more complicated chiller retrofit.

Properly applied, an Option A approach:

- Ensures that baseline conditions have been properly defined
- Confirms that the proper equipment/systems were installed and that they have the potential to generate predicted savings
- Verifies that the installed equipment/systems continue to have the capacity to yield the predicted savings during the term of the Agreement

Option A can be applied when identifying that the potential to generate savings is the most critical M&V issue, including situations where:

- The magnitude of savings is low for the entire project or a portion of the project to which Option A is applied.
- The risk of not achieving savings is low.
- The independent variables that drive energy use are not difficult or expensive to measure, and are not expected to change.
- Interactive effects can be reasonably estimated or ignored
- Long-term measurements are not warranted
- The agency is willing to accept some uncertainty

OPTION B – Retrofit Isolation with All Parameter Measurement

M&V Option B is a retrofit isolation or system-level approach. The approach is intended for retrofits with performance factors (e.g., end-use capacity, demand, power) and operational factors (lighting operational hours, cooling ton-hours) that can be measured at the component or system level and where long-term performance needs to be verified. It is similar to Option A, but uses periodic or continuous metering of all energy quantities, or all parameters needed to calculate energy, during the performance period. This approach provides the greatest accuracy in the calculation of savings, but increases the performance-period M&V cost.

The Option B approach ensures the same items as Option A, but also:

- Determines energy savings using periodic or continuous measurement of energy use or all parameters needed to calculate energy use during the term of the Agreement.

Option B is typically used when any or all of these conditions apply:

- When energy savings values per individual measure are desired
- When interactive effects can be estimated using methods that do not involve long-term measurements
- When the independent variables that affect energy use are not complex and excessively difficult or expensive to monitor
- When operational data on the equipment is available through control systems
- When sub-meters already exist that record the energy use of subsystems under consideration (e.g., a separate sub-meter for heating ventilation and air-conditioning (HVAC) systems)

ABM will use the listed M&V protocols per ECM as shown in the table below.

ECM	M&V Option
Lighting Upgrades	A
VFD on Pumps	A
HVAC Equipment Upgrades	A
Building Envelope Upgrades	A

On-Going Professional Support and Training

Numerous failures of existing equipment can be attributed to lack of or improper maintenance. Repairs have also been a challenge as Belleair outsources services to multiple vendors, none of whom are capable of servicing the quantity and diversity of the installed HVAC equipment and controls. In many instances, a vendor would show up only to recommend another vendor to diagnose and repair the problem. This has led to inefficient use of staff time along with frustration without a single point of accountability.

By implementing a proactive preventive maintenance program, the town will ensure the equipment performs at peak efficiency, protecting the annual energy savings and the integrity of all the HVAC and control assets. According to the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE), the number-one way for a facility to sustain energy savings is through a structured maintenance program.

ABM has customized a Guaranteed Professional Maintenance program that will provide on-going HVAC support services, funded from the savings documented in this program. We recommend ABM takes over full service and responsibility for the installed HVAC systems for Belleair.

A preventive maintenance program is vital in minimizing energy consumption and a major factor in overall life-cycle cost of the mechanical systems in the town's infrastructure. It is critical that the maintenance work be performed on a fixed schedule and should reflect the unique characteristics of the buildings and accommodate future changes to a facility. This key component of accountability within ABM's energy savings performance contracting program is the development of a co-authored, long-term maintenance and training action plan. A good maintenance program assures equipment will last longer, operate properly, and use less energy.

ABM requires all HVAC systems to be properly maintained at a specified level. When effective maintenance is not incorporated into the program and into facility operations, anticipated savings, and maximum equipment life are not likely to be attained.

As part of the project, ABM will create operating and maintenance manuals that include warranty information, submittals, parts lists, recommended service intervals, and more.

We fully understand the vital role on-going support and training has in achieving energy savings, in addition to its relationship to meeting the requirements of a building and its comfort systems. We recognize that training can easily be the forgotten energy savings measure. Experience has shown us that the manner in which the energy systems are operated can cause up to a 20% variation in the energy usage. It is critical that Belleair's staff understand the operating procedures for the new equipment and their role in maintaining savings. Consequently, ABM will involve your facility staff members over the course of the program, gathering their input through the study, design, and construction phases to ensure that they are both knowledgeable and committed to the critical success factors of the energy savings performance contracting program.

We intend to team with the town staff to ensure that maximum savings and equipment lifespans are achieved. Our training will include a structured program on each technology installed.

Financial Summary

As part of the audit process, we have reviewed current utility spending, repair and maintenance costs, the capital plan and its five year impact, plus the mounting deferred maintenance liability facing the Town of Belleair.

Additional financial information contained in this section, including construction costs, cash flow analysis and savings projections have been developed in a collaborative effort with the Town of Belleair. All financial figures have been reviewed and accepted by the staff with the oversight of the Town Manager.

Program Costs

The costs associated with the recommended program are broken down into two components, project (construction) costs, and annual performance services. The Construction Costs are to be paid as the construction phase of the program is completed. Performance Services are annual costs to maintain the facilities. As previously described, HVAC systems need to be properly maintained at specified levels to maintain the Savings Guarantee that will be provided with the program. The Performance Services include Measurement & Verification, Guaranteed HVAC Preventative Maintenance and Well Pump Monitoring, Licensing & Cell Fees.

Construction Costs

The total cost of all items recommended in the project component is $786,852:

ECM	Facility	Description of Deliverable	
Base Scope	Town Hall Recreation Center Public Works Water Treatment Operations	HVAC Controls, Equipment, GPS, Coating and Re-commissioning LED Lighting and Lighting Controls, Building Envelope Well Pump VFDs, Monitoring and Control	$557,505
Option Add	Town Hall	Re-roof and Skylight	$148,840
Option Add	Town Hall	Electrical Panel Replacements and Safety Labeling	$ 80,506
		Total	**$786,852**

Performance Services Costs

Annual Performance Services consists of three components, the Measurement and Verification of the Energy Savings, the Guaranteed HVAC Preventative Maintenance and Repair, plus the Managed Well Pump Services. The total first year cost of all performance services is $ 39,052. The program designed by ABM includes the Guaranteed HVAC Preventative Maintenance and Repair Service for the first 5 years and the M&V for the first 3 years. Managed Well Pump Services will continue for 5 years including: software licensing, managed web based services, technical support, and cellular fees.

Year	Measurement and Verification	HVAC Maintenance & Repair	Managed Well Pump Services	Total
1	$1,432	$28,320	$9,300	$39,052
2	$1,461	$28,886	$9,486	$39,833
3	$1,490	$29,463	$9,675	$40,628
4		$30,052	$9,868	$39,920
5		$30,653	$10,065	$40,718
6				
7				
8				
9				
10				
11				
12				

Funding Sources

ABM has identified four independent funding sources that can be incorporated into an Energy Savings Performance Contract that will meet F.S. 489.145 Guidelines: Energy Savings, Operation and Maintenance Savings, Revenue Enhancements and Identified Capital Savings. The table below includes the F.S. 489.145 compliant savings of the recommended upgrades.

Year	Energy, Water or Wastewater Savings (Escalated at 2%)	Operation and Maintenance Savings (Escalated at 2%)	Identified Capital Savings	Total Annual Savings
0				
1	$20,464	$44,209	$54,000	$118,673
2	$20,873	$45,093	$54,000	$119,966
3	$21,291	$45,995	$54,000	$121,286
4	$21,717	$46,915	$54,000	$122,632
5	$22,151	$47,853	$54,000	$124,004
6	$22,594	$48,810	$54,000	$125,404
7	$23,046	$49,787	$54,000	$126,832
8	$23,507	$50,782	$54,000	$128,289
9	$23,977	$51,798	$54,000	$129,775
10	$24,456	$52,834	$54,000	$131,290
11	$24,946	$53,891	$54,000	$132,836
12	$25,444	$54,968	$54,000	$134,413
Total	**$274,465**	**$592,935**	**$648,000**	**$1,515,400**

Energy Savings

The First Year Energy Savings of $20,464 is achieved with the incorporation of all upgrades recommended with this program and will be measured and verified according to the agreed upon Measurement and Verification (M&V) Plan as described earlier in this document.

Facility	Energy Savings
Town Hall	$ 6,775
Recreation Center	$ 11,841
Public Works	$
Water Treatment Operations	$ 1,848
Total	**$ 20,464**

Operation and Maintenance Savings

The First Year Operation and Maintenance Savings of $100,387 is achieved with the incorporation of all upgrades recommended with this program. This use of Stipulated Savings has been agreed upon with Town Staff for inclusion into the program.

Savings Item	Cost Savings
HVAC Repair / Maintenance	$ 30,000
Lighting Labor/Bulbs	$ 2,109
Utility Hours Well Pumps	$ 12,100
Total	**$ 44,209**

Identified Capital Savings

These are the costs the town would avoid by implementing the program presented in this document.

Description	Annual Capital Contributions
CERF (HVAC)	$ 25,000
Roof & Skylight	$ 14,000
Electrical Panels	$ 8,000
Well Pump Control	$ 7,000
Total	**$ 54,000**

Cash Flow Analysis

At the request of the customer, ABM has developed the two different cash flow models below, one with financing the Construction Costs and the other with the entire project paid for without financing as a cash purchase.

Financed Solution

Using the values previously described in this section, the following table and illustration outlines the cash flow of a financed solution assuming a tax exempt municipal lease (using 3% interest) on a purchase price of $786,852.

Year	Guaranteed Savings	Performance Services	Financed Payments	Net Savings	Cumulative Savings
1	$118,673	$ 39,052	$ 78,323	$ 1,298	$ 1,298
2	$119,082	$ 39,833	$ 78,323	$ 926	$ 2,224
3	$119,500	$ 40,628	$ 78,323	$ 549	$ 2,773
4	$119,926	$ 39,920	$ 78,323	$ 1,683	$ 4,456
5	$120,360	$ 40,718	$ 78,323	$ 1,319	$ 5,775
6	$120,803	$ -	$ 78,323	$ 42,480	$ 48,255
7	$121,255	$ -	$ 78,323	$ 42,932	$ 91,187
8	$121,716	$ -	$ 78,323	$ 43,393	$134,580
9	$122,186	$ -	$ 78,323	$ 43,863	$178,443
10	$122,665	$ -	$ 78,323	$ 44,342	$222,785
11	$123,155	$ -	$ 78,323	$ 44,832	$267,617
12	$123,653	$ -	$ 78,323	$ 45,330	$312,947

ABM Industries Incorporated

A Trusted Facilities Provider

Electrical & lighting, energy solutions, facilities engineering, HVAC & mechanical, janitorial, landscape & turf, mission critical solutions, and parking – ABM Industries (NYSE: ABM) provides these comprehensive, custom facility solutions in urban, suburban, and rural areas to properties of all sizes through stand-alone or integrated solutions. With revenues of approximately $5.1 billion, we have become a leading provider of facility solutions since being founded in San Francisco, CA in 1909. Now headquartered in New York City, ABM operates through our subsidiaries, confident in the expertise of over 130,000 employees in 350+ offices across the United States and various international locations.

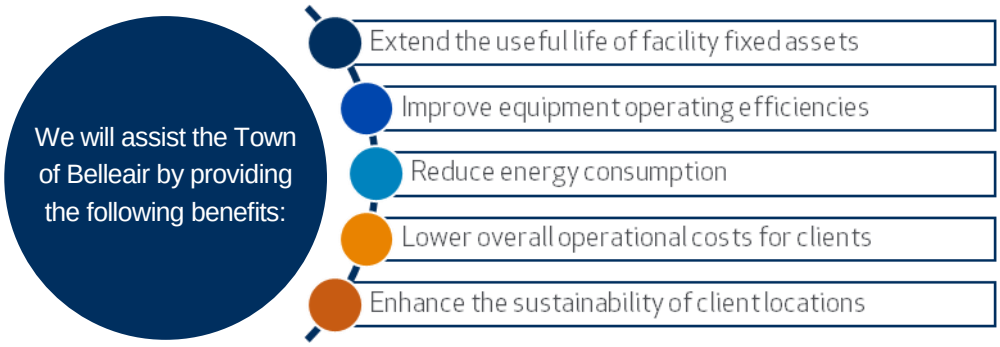
Over ABM's 100+ year history, we have developed an outstanding reputation in the marketplace. Our brand continues to stand for excellence as we strive to find new ways of Building Value for our clients. Over the past year, ABM launched our 2020 Vision -- a bold initiative that transformed our business from a company organized by service lines to a company organized by industry, aligning us more closely with our clients and allowing us to continue to be a highly-valued partner.

We recently restructured ABM into eight different Industry Groups. In addition to our ABM UK unit, these include:

We have established a consistent and reliable operational platform with three goals in mind – increase service quality, improve onsite management and service effectiveness, and impact how we respond to specific requirements in our clients' facilities. This allows us to better understand our clients and deliver facility solutions unique to their industry challenges, goals, and opportunities.

ABM Technical Solutions

ABM Technical Solutions, a division of ABM Industries Inc., provides custom energy and other maintenance and repair services for clients in the public and private sectors. Our Technical Solutions Group is divided into HVAC & Mechanical, Electrical & Lighting, Electrical Power & Mission Critical, and Bundled Energy Solutions.



We provide Comprehensive Facility Services to over 20,000 building systems nationally. The Comprehensive Facility Services program is performance-based and custom-designed to fit the Building Owner's long-term (life-cycle) cost of operation. This life cycle cost evaluation includes initial installation, functional requirements and needs, maintenance, and energy costs to operate your facility.

We base our planned service programs on many years of industry knowledge, exceptional technical skills, and professional application of the latest technologies and methods. These programs allow us to consistently deliver quality services in a responsive manner at a fair value.

ABM Technical Solutions Capabilities

HVAC & Mechanical

- Professional Engineering Support Services
- Programs Management
- Upgrades for Energy Consumption
- Direct Digital Controls
- Sheet Metal Service In-House
- Plumbing and Piping Services
- Process Piping
- Testing and Balancing - Air and Water
- Commissioning - System Start-Ups
- Tenant Space Build Out
- Mechanical Systems Fabrication & Installation
- Energy Management
- Mechanical Design-Build Construction
- Building Automation
- Performance Contracting
- Remote Alarm Monitoring
- C.F.C. Refrigerant Changeovers
- Indoor Air Quality Programs
- Building Operation and Maintenance
- Mechanical Systems Maintenance
- Facilities Management
- Chiller Services

Electrical & Lighting

- Electrical Troubleshooting/Repair
- Thermal Imaging
- Interior Lighting Maintenance
- Exterior Lighting Maintenance
- Electrical Service Upgrades
- Landscape Lighting
- Group Relamping
- Ultrasonic Pole Inspection
- Emergency/Exit Lighting
- Traditional and Digital (LED) Sign Repair
- Fixture (LED) and Pole Upgrade/Replacement
- Energy/Rebate Program Administration
- Electrical & Lighting Design/Engineering
- Turnkey Electric Vehicle Charging Stations

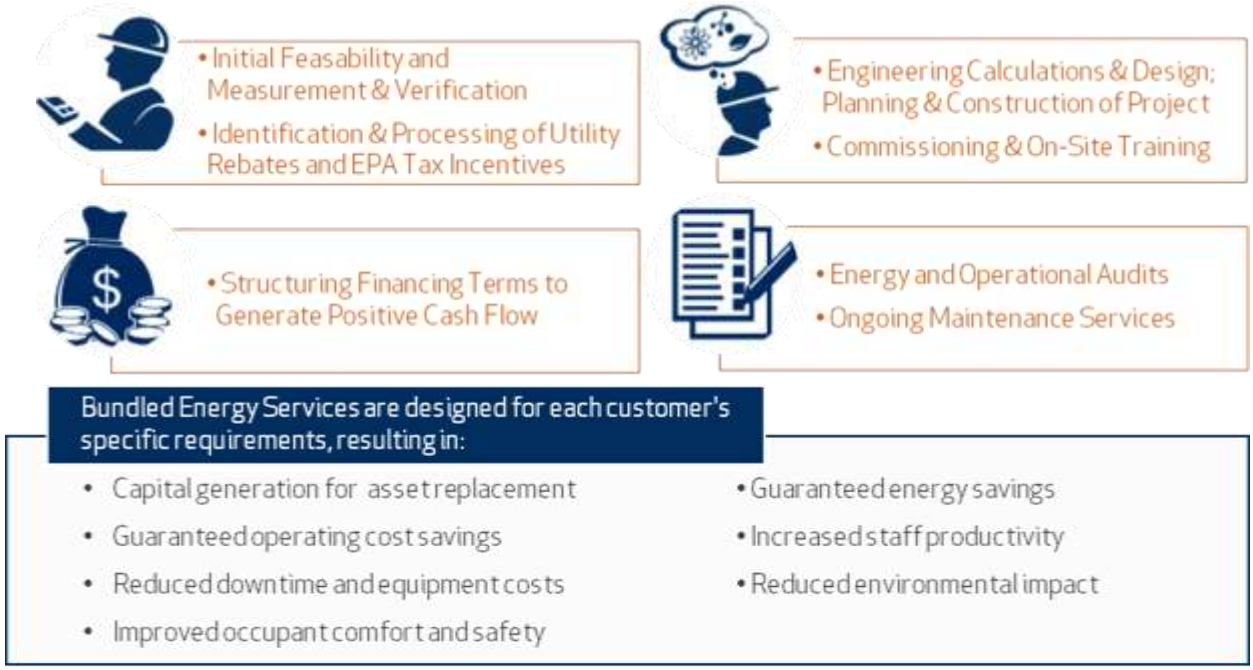
Electrical Power

- NFPA 70E Compliance Programs
- Acceptance Testing & Commissioning
- Engineering Services
- Reliability and Acceptance Testing & Maintenance
- Arc Flash Protection Programs
- Power Quality Solutions
- Life Extension, Modernization & Overhaul Services and Solutions
- Customized Training Programs
- Maintenance and solutions of electrical distribution systems from 480 volts to high voltage
- Start-Up and Commissioning
- Acceptance Testing
- Electrical Maintenance Programs
- EV charger installation & services
- Mission Critical and 24/7 Facility Service

Bundled Energy Solutions

Our Bundled Energy Solutions offering is a high-efficiency conservation, facility modernization, and technical service program that addresses both the facility upgrades and funding needs of cities, counties, k-12 schools, and government buildings. This program assists our clients by providing a cost-effective way to make necessary energy and infrastructure improvements.

ABM's Bundled Energy Solutions include:



Our strong financial backing has allowed us to make strategic partnerships with many premier financial institutions that focus on lending to the guaranteed energy savings performance contracting market. We have secured millions of dollars' worth of energy projects and have financed projects from a multitude of different markets. These relationships have strengthened over the years due to ABM's continued success, driven by meeting project schedule requirements, little to no cost overruns, and meeting or exceeding guaranteed savings.

We have financed projects through:

- Municipal tax-exempt leases with non-appropriation clauses
- Operating leases (taxable and tax-exempt)
- Certificates of participation (COPs)
- Special purpose entities
- Standard capital leases

We are exploring the cost effective options for Build America Bonds and Energy Conservation Bonds which are backed by the U.S. Treasury. **Additionally, our current bonding limits are $70M on a single project and $250M aggregate.**

ABM Franchising Group

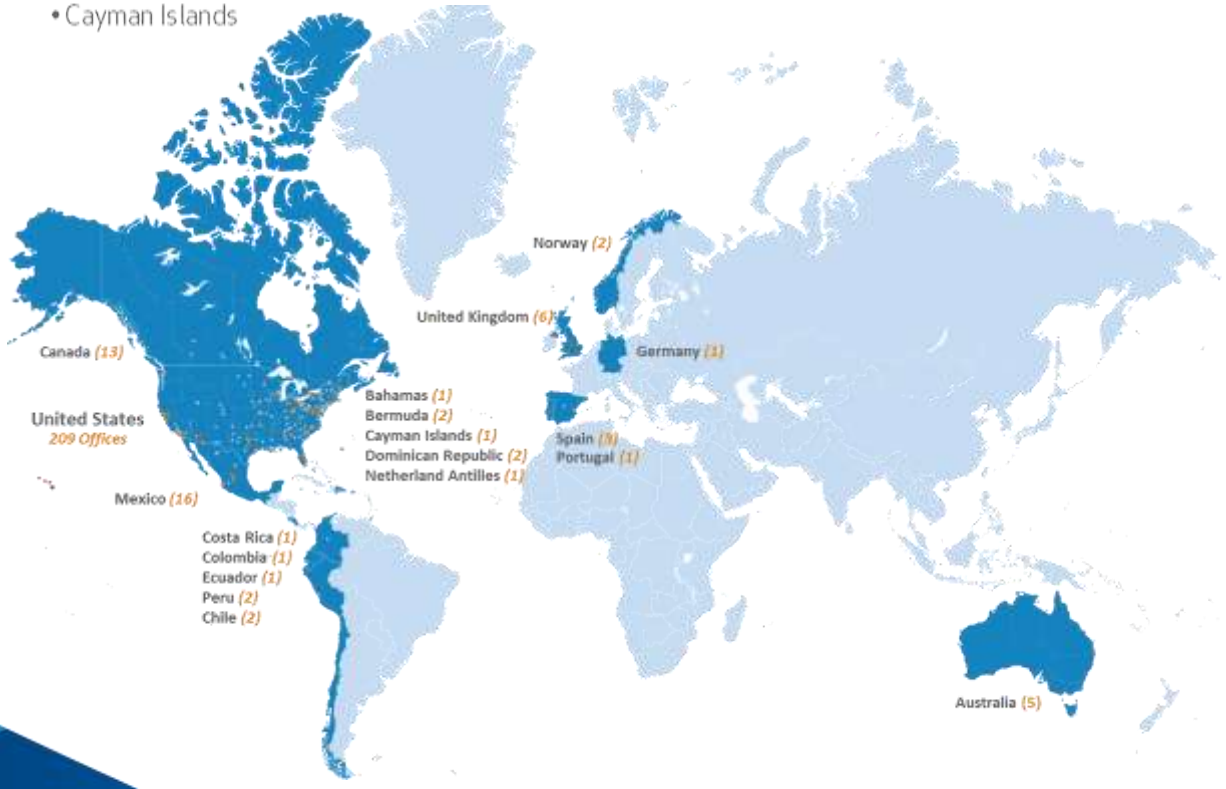
ABM Franchising Group, an operating unit of ABM, is a portfolio of franchise networks delivering comprehensive mechanical and electrical service and preventive maintenance solutions to clients across multiple markets.

ABM enters into Franchise Agreements with qualified, independent businesses, which grants contractors the right to use the Proprietary Marks and the Linc System® or the TEGG® System in a defined marketing territory in exchange for payment to ABM of an Initial Franchise Fee, on-going Monthly Royalty Fees, and other fees for services provided by ABM.

We bring solutions to clients in over 18 countries through our international franchise network of more than 240 mechanical and electrical contractors. We provide the same level of quality service and enhanced client experience through our franchise networks that you have come to expect from ABM. At the local level, every ABM company has the expertise, trained technicians, technical data, tools, equipment, and facilities to provide nothing less than total system service.

ABM Franchising Group has mechanical and electrical presence in:

- Australia
- Bahamas
- Bermuda
- Canada
- Cayman Islands
- Chile
- Colombia
- Costa Rica
- Dominican Republic
- Germany
- Mexico
- Netherland Antilles
- Norway
- Portugal
- Puerto Rico
- Spain
- United Kingdom



Associations and Certifications

Your dedicated ABM network team actively participates in the following associations and certifications:

- American Society of Heating, Refrigeration, and Air-Conditioning Engineers: ASHRAE
- ASHRAE Technical Committee 6.7 Solar Energy Utilization
- Member and Program Chair ASHRAE Technical Committee 2.8 Building Environmental Impacts and Sustainability
- United States Green Building Council: USGBC
- Association of Energy Engineers: AEE
- National Society of Professional Engineers: NSPE
- National Association of Energy Service Companies: NAESCO
- American Solar Energy Society: ASES
- International Solar Energy Society: ISES
- American Society of Mechanical Engineers: ASME
- American Society of Civil Engineers: ASCE
- Project Management Institute: PMI
- Zero Net Energy Alliance: ZNE
- ISNetworld Certification: ISN
- National Fire Protection Association: NFPA 70E and 70B Training and Certification
- Infrared Thermography Levels I&II Training and Certification: IRI and IRII
- National Institute for Certification in Engineering Technologies: NICET

ABM is a NETA accredited company with more than $50,000,000 in annual revenues in the Electrical Power Division. ABM Electrical Power Solutions was a founding member of the International Electrical Testing Association (NETA). NETA was established in 1972 to ensure the integrity of third-party electrical testing & certification. NETA is the standards developing organization for the American National Standards Institute (ANSI) and publishes Acceptance and Maintenance Testing Specifications. NETA certifies member companies and their technicians, and it is the highest accreditation possible in the industry.

Safety Record

Safety is intrinsic to ABM and our culture. Our people are our most important resource and we are committed to ensuring that they are provided with a safe and healthy working environment. To accomplish this, we provide routine and site-specific safety training, safe tools and equipment, and a dedicated staff of safety representatives.

ABM Building Solutions is one of the safest companies in the industry, and our safety record is consistently better than the national average.

YEAR	EMR	TRCR	DART	LTR
2016	0.85	3.2	1.24	0.36
2015	0.83	2.00	0.83	0.83
2014	0.82	3.57	2.17	1.86
2013	0.82	5.54	2.18	1.60
2012	0.79	3.72	1.97	1.97
2011	0.80	5.15	2.21	1.47

EMR – Experience Modifier Rate
Experience modifier or experience modification is a term used in the American insurance business and more specifically in workers' compensation insurance. It is the adjustment of annual premium based on previous loss experience. Usually three years of loss experience are used to determine the experience modifier for a workers' compensation policy
TRCR – Total Recordable Case Rate
A mathematical calculation that describes the number of recordable incident per 100 full-time employees in any given time frame.
DART – Days Away Restriction Transfer Rate
A mathematical calculation that describes the number of recordable incidents per 100 full time employees that resulted in lost or restricted days or job transfer due to work related injuries or illnesses.
LTR - Lost Time Rate
A mathematical calculation that describes the number of lost time cases per 100 full-time employees in any given time frame.

To achieve these results, we maintain an extensive safety program. All ABM field employees receive safety training upon hire that consists of a safety policy review, aerial lift training, and trade-specific hands-on training. All foremen receive, at a minimum, the OSHA 10-hour training class, first aid, and cardio-pulmonary resuscitation (CPR) training.

Our regional safety managers ensure every project meets our criteria for safety. They monitor safe production and provide regular reports that bring about learning opportunities and communication. Safety personnel also conduct safety audits at regular intervals to correct deficient items, coach staff on corrective measures, and issue formal reports. Safety coordinators confirm our foremen and field crews consistently maintain these high safety standards. In addition to weekly "toolbox talks," foremen conduct daily pre-task plans, inspect their areas daily for safety issues, and stretch-and-flex prior to daily work with their assigned crews.

Safety personnel also conduct safety audits at regular intervals to correct deficient items, coach staff on corrective measures, and issue formal reports. These reports reach all levels of the project management and executive leaders at ABM and are discussed as a "toolbox talk" topic with all field personnel.

The project manager will report all safety incidents, including near misses, within eight (8) hours to the project owner via phone or email. The division safety manager will investigate all safety incidents to determine root cause(s) of the accident. Training, process modifications, or tools are put in place to prevent similar accidents in the future. Lessons learned are developed and personnel is trained to prevent recurrence. These diligent efforts work towards ABM's goals of zero accidents and employee safety.

All ABM management is required to perform safety walks on job sites with all levels of employees. Vice Presidents and above are required to perform this duty a minimum of once per quarter. Managers and supervisors are required to perform these duties a minimum of once per month.

Items of inspection are based on the scope of work. These include, but are not limited to, everything from PPE usage, lock out/tag out usage, fall protection, NFPA 70E adherence, job hazards, and any other item that may affect the safety of our team members.

Background Checks

To ensure that ABM hires well-qualified individuals and maintains a safe and productive work environment, it is our policy to conduct pre-employment background and reference checks on all of our employees. Background checks may include verification of any information on the applicant's resume or application form.

Offers of employment are conditioned on receipt of an acceptable background check report. All background checks are conducted in compliance with the Federal Fair Credit Reporting Act, the Americans with Disabilities Act, and state and federal privacy and anti-discrimination laws. Reports are kept confidential and are only viewed by individuals involved in the hiring process. Our security department obtains a signed Release of Information to process background checks.

Background checks may include a criminal record check, although a criminal conviction does not automatically bar an applicant from employment. Additional checks such as a driving record or credit report may be made on applicants for particular job categories, if appropriate and job-related. Our investigations are inclusive of drug and alcohol infractions and criminal incidents. ABM cross-references more than 30 state and federal databases to verify that candidates are free of alcohol- and drug-related charges, have no misdemeanor convictions in the past five years that could affect the reputation of the program, and have never been declared mentally incompetent.

Our Company has a "No Tolerance" drug and alcohol policy for drug use/distribution and alcohol-related incidents. ABM will provide all personnel working under this contract with a statement regarding the policy, and personnel will take a pre-hire drug test. We will not consider for employment any candidate who fails the pre-hire screening.