



Public Utilities Commission

Application to Commit Energy Efficiency/Peak Demand Reduction Programs (Mercantile Customers Only)

Case No.: 14-0763-EL-EEC

Mercantile Customer: Mapleton Board of Education

Electric Utility: Ohio Edison Company

Program Title or
Description: Lighting Retrofit and Building Automation

Rule 4901:1-39-05(F), Ohio Administrative Code (O.A.C.), permits a mercantile customer to file, either individually or jointly with an electric utility, an application to commit the customer's existing demand reduction, demand response, and energy efficiency programs for integration with the electric utility's programs. The following application form is to be used by mercantile customers, either individually or jointly with their electric utility, to apply for commitment of such programs in accordance with the Commission's pilot program established in Case No. 10-834-EL-POR

Completed applications requesting the cash rebate reasonable arrangement option (Option 1) in lieu of an exemption from the electric utility's energy efficiency and demand reduction (EEDR) rider will be automatically approved on the sixty-first calendar day after filing, unless the Commission, or an attorney examiner, suspends or denies the application prior to that time. Completed applications requesting the exemption from the EEDR rider (Option 2) will also qualify for the 60-day automatic approval so long as the exemption period does not exceed 24 months. Rider exemptions for periods of more than 24 months will be reviewed by the Commission Staff and are only approved up the issuance of a Commission order.

Complete a separate application for each customer program. Projects undertaken by a customer as a single program at a single location or at various locations within the same service territory should be submitted together as a single program filing, when possible. Check all boxes that are applicable to your program. For each box checked, be sure to complete all subparts of the question, and provide all requested additional information. Submittal of incomplete applications may result in a suspension of the automatic approval process or denial of the application.

Any confidential or trade secret information may be submitted to Staff on disc or via email at ee-pdr@puc.state.oh.us.

Section 1: Mercantile Customer Information

Name:Mapleton Board of Education

Principal address:635 County Road 801, Ashland Ohio, 44805

Address of facility for which this energy efficiency program applies:635 County Road 801, Ashland Ohio, 44805

Name and telephone number for responses to questions:Dan Russomanno, 419-945-2188

Electricity use by the customer (check the box(es) that apply):

- ☒ The customer uses more than seven hundred thousand kilowatt hours per year at the above facility. (Please attach documentation.)
- ☐ The customer is part of a national account involving multiple facilities in one or more states. (Please attach documentation.)

Section 2: Application Information

A) The customer is filing this application (choose which applies):

- ☐ Individually, without electric utility participation.
- ☒ Jointly with the electric utility.

B) The electric utility is: Ohio Edison Company

C) The customer is offering to commit (check any that apply):

- ☐ Energy savings from the customer's energy efficiency program. (Complete Sections 3, 5, 6, and 7.)
- ☐ Capacity savings from the customer's demand response/demand reduction program. (Complete Sections 4, 5, 6, and 7.)
- ☒ Both the energy savings and the capacity savings from the customer's energy efficiency program. (Complete all sections of the Application.)

Section 3: Energy Efficiency Programs

A) The customer's energy efficiency program involves (check those that apply):

- ☒ Early replacement of fully functioning equipment with new equipment.
(Provide the date on which the customer replaced fully functioning equipment, and the date on which the customer would have replaced such equipment if it had not been replaced early. Please include a brief explanation for how the customer determined this future replacement date (or, if not known, please explain why this is not known)). **If Checked, Please see Exhibit 1 and Exhibit 2**
- ☐ Installation of new equipment to replace equipment that needed to be replaced. The customer installed new equipment on the following date(s):
_____.
- ☐ Installation of new equipment for new construction or facility expansion. The customer installed new equipment on the following date(s):
_____.
- ☐ Behavioral or operational improvement.

B) Energy savings achieved/to be achieved by the energy efficiency program:

- 1) If you checked the box indicating that the project involves the early replacement of fully functioning equipment replaced with new equipment, then calculate the annual savings [(kWh used by the original equipment) - (kWh used by new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: 305,011 kWh

- 2) If you checked the box indicating that the customer installed new equipment to replace equipment that needed to be replaced, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by the higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: _____ kWh

Please describe any less efficient new equipment that was rejected in favor of the more efficient new equipment. **Please see Exhibit 1 if applicable**

- 3) If you checked the box indicating that the project involves equipment for new construction or facility expansion, then calculate the annual savings [(kWh used by less efficient new equipment) - (kWh used by higher efficiency new equipment) = (kWh per year saved)]. Please attach your calculations and record the results below:

Annual savings: _____ kWh

Please describe the less efficient new equipment that was rejected in favor of the more efficient new equipment. **Please see Exhibit 1 if applicable**

- 4) If you checked the box indicating that the project involves behavioral or operational improvements, provide a description of how the annual savings were determined.

Section 4: Demand Reduction/Demand Response Programs

A) The customer's program involves (check the one that applies):

- ☒ Coincident peak-demand savings from the customer's energy efficiency program.
- ☐ Actual peak-demand reduction. (Attach a description and documentation of the peak-demand reduction.)
- ☐ Potential peak-demand reduction (check the one that applies):
 - ☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a tariff of a regional transmission organization (RTO) approved by the Federal Energy Regulatory Commission.
 - ☐ The customer's peak-demand reduction program meets the requirements to be counted as a capacity resource under a program that is equivalent to an RTO program, which has been approved by the Public Utilities Commission of Ohio.

B) On what date did the customer initiate its demand reduction program?

10/31/13

C) What is the peak demand reduction achieved or capable of being achieved (show calculations through which this was determined):

27 kW

Section 5: Request for Cash Rebate Reasonable Arrangement (Option 1) or Exemption from Rider (Option 2)

Under this section, check the box that applies and fill in all blanks relating to that choice.

Note: If Option 2 is selected, the application will not qualify for the 60-day automatic approval. All applications, however, will be considered on a timely basis by the Commission.

A) The customer is applying for:

☐ Option 1: A cash rebate reasonable arrangement.

OR

☒ Option 2: An exemption from the energy efficiency cost recovery mechanism implemented by the electric utility.

OR

☐ Commitment payment

B) The value of the option that the customer is seeking is:

Option 1: A cash rebate reasonable arrangement, which is the lesser of (show both amounts):

☐ A cash rebate of \$____. (Rebate shall not exceed 50% project cost. Attach documentation showing the methodology used to determine the cash rebate value and calculations showing how this payment amount was determined.)

Option 2: An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider.

☐ An exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for ____ months (not to exceed 24 months). (Attach calculations showing how this time period was determined.)

OR

☐ A commitment payment valued at no more than \$____. (Attach documentation and calculations showing how this payment amount was determined.)

OR

- ☒ Ongoing exemption from payment of the electric utility's energy efficiency/peak demand reduction rider for an initial period of 24 months because this program is part of the customer's ongoing efficiency program. (Attach documentation that establishes the ongoing nature of the program.) In order to continue the exemption beyond the initial 24 month period, the customer will need to provide a future application establishing additional energy savings and the continuance of the organization's energy efficiency program.)

Section 6: Cost Effectiveness

The program is cost effective because it has a benefit/cost ratio greater than 1 using the (choose which applies):

- ☐ Total Resource Cost (TRC) Test. The calculated TRC value is: _____(Continue to Subsection 1, then skip Subsection 2)
- ☒ Utility Cost Test (UCT) . The calculated UCT value is: **See Exhibit 3** (Skip to Subsection 2.)

Subsection 1: TRC Test Used (please fill in all blanks).

The TRC value of the program is calculated by dividing the value of our avoided supply costs (generation capacity, energy, and any transmission or distribution) by the sum of our program overhead and installation costs and any incremental measure costs paid by either the customer or the electric utility.

The electric utility's avoided supply costs were _____.

Our program costs were _____.

The incremental measure costs were _____.

Subsection 2: UCT Used (please fill in all blanks).

We calculated the UCT value of our program by dividing the value of our avoided supply costs (capacity and energy) by the costs to our electric utility (including administrative costs and incentives paid or rider exemption costs) to obtain our commitment.

Our avoided supply costs were **See Exhibit 3**

The utility's program costs were **See Exhibit 3**

The utility's incentive costs/rebate costs were **See Exhibit 3**

Section 7: Additional Information

Please attach the following supporting documentation to this application:

- Narrative description of the program including, but not limited to, make, model, and year of any installed and replaced equipment.
- A copy of the formal declaration or agreement that commits the program or measure to the electric utility, including:
 - 1) any confidentiality requirements associated with the agreement;
 - 2) a description of any consequences of noncompliance with the terms of the commitment;
 - 3) a description of coordination requirements between the customer and the electric utility with regard to peak demand reduction;
 - 4) permission by the customer to the electric utility and Commission staff and consultants to measure and verify energy savings and/or peak-demand reductions resulting from your program; and,
 - 5) a commitment by the customer to provide an annual report on your energy savings and electric utility peak-demand reductions achieved.
- A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results. Additionally, identify and explain all deviations from any program measurement and verification guidelines that may be published by the Commission.



Public Utilities Commission

Application to Commit
Energy Efficiency/Peak Demand
Reduction Programs
(Mercantile Customers Only)

Case No.: 14-0763-EL-EEC

State of Ohio :

Dan Russomanno, Affiant, being duly sworn according to law, deposes and says that:

1. I am the duly authorized representative of:

Mapleton Board of Education

[insert customer or EDU company name and any applicable name(s) doing business as]

2. I have personally examined all the information contained in the foregoing application, including any exhibits and attachments. Based upon my examination and inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete.

Dan Russomanno, Treasurer
Signature of Affiant & Title

Sworn and subscribed before me this 5th day of June, 2014 Month/Year

Paula L. Arnes
Signature of official administering oath

Paula L. Arnes, AP Coordinator
Print Name and Title

My commission expires on 10/26/18

Project No.	Project Name	Narrative description of your program including, but not limited to, make, model, and year of any installed and replaced equipment:	Description of methodologies, protocols and practices used in measuring and verifying project results	What date would you have replaced your equipment if you had not replaced it early? Also, please explain briefly how you determined this future replacement date.	Please describe the less efficient new equipment that you rejected in favor of the more efficient new equipment.
1	HS Lighting Retrofit	The High School Gym is currently served by 30 High Bay Metal Halide fixtures. These fixtures will be removed and replaced with 30 new 6-lamp T8 High-Bay 32-W fixtures with reflectors. The new fixtures will also be wired in a way that provides multiple levels of lighting. The Middle School Gym is currently served by 24 Metal Halide Gum Drop fixtures. These fixtures will be removed and replaced with 24 new 6-lamp T8 High-Bay 32-W fixtures with reflectors. The new fixtures will also be wired in a way that provides multiple levels of lighting. The Library is currently served by 14 Metal Halide dome fixtures. These fixtures will be removed and replaced with 12 new 4-lamp T8 High-Bay 32-W fixtures with reflectors. The new fixtures will also be wired in a way that provides multiple levels of lighting. The Industrial and Agricultural shops in the Middle School are currently served by Low Bay Metal Halide. The Metal Halide fixtures in the agricultural	Lighting inventory was performed with pre & post ECM fixture consumption and demand utilized in school. Specified retrofits and replacements of the existing fixtures. Electrical Usage (kWh) = (Number of fixtures x watts per fixture x Operating hours); Electrical Demand (kWd) = (Number of fixtures x watts per fixture) ; Electrical Energy Cost = (kWh x \$/kwh) ; Existing KWh - Retrofit KWh = Savings. See attached documentation for details. Calculations based on physical assessment of operational factors and commonly accepted usage assumptions.	N/A	N/A
2	HS Building Automation System Upgrade	Upgrade to the BAS will include the following: This project will include providing and installing new Automated Logic WebCTRL (ALC) components for control and monitoring of the systems outlined below. This system will be an upgrade of the current building automation system and is intended to enhance the District's control of all major HVAC components in the High School and Middle School. This upgrade will give the District a single ALC platform for control of the High School, Middle School, and Elementary. All exterior lighting in the High/Middle School and the Elementary will be added to the building automation system. This will allow for a reduction in the total run times of the exterior lights. Mapleton High School has a large exhaust fan in the gymnasium that operates on the same circuit as AHU-2. Whenever this Air handler is on the exhaust fan also turns on. A calculation was performed to	To calculate energy savings for Mapleton High/Middle School due to building automation upgrades. All major pieces of mechanical equipment were inventoried and had an energy baseline established. The baseline was used to create a model that behaved in a similar way to the existing facility. Once an adequate baseline for each piece of equipment had been established, various operational parameters were changed to identify energy savings opportunities. Savings opportunities in the following equipment schedules include demand control ventilation (outside air reduction), reduced run times, VFD's where applicable (an example VFD calculation is shown in the following section), increased efficiency due to lowered or raised zone temperature set points and many other control	N/A	N/A
3	MS Lighting Retrofit	The Elementary gym is currently served by 16 Metal Halide Gum Drop fixtures. These fixtures will be removed and replaced with 16 new 6-lamp T8 High-Bay 32-W fixtures with reflectors. The gym also has four, 4-foot vapor T8 fixtures. These will have new 25 W T8 lamps and electronic ballasts installed. The Library is currently served by 12 Metal Halide fixtures. These fixtures will be removed and replaced with 12 new 4-lamp T8 High-Bay 32-W fixtures with reflectors. The remaining lights in the library will have new lamps and ballasts installed. The cafeteria is currently served by Metal Halide fixtures as well as T8 lay-in fixtures. The Metal Halide fixtures will be removed and replaced with 6 lamp T8 High Bay fixtures.	Lighting inventory was performed with pre & post ECM fixture consumption and demand utilized in school. Specified retrofits and replacements of the existing fixtures. Electrical Usage (kWh) = (Number of fixtures x watts per fixture x Operating hours); Electrical Demand (kWd) = (Number of fixtures x watts per fixture) ; Electrical Energy Cost = (kWh x \$/kwh) ; Existing KWh - Retrofit KWh = Savings. See attached documentation for details. Calculations based on physical assessment of operational factors and commonly accepted usage assumptions.	N/A	N/A
4	MS Building Automation Upgrade	Where applicable, all components required to integrate the systems into the existing ALC building automation system will also be provided and installed. Work includes (2) Motorized Pressure Relief Dampers, (1) Air Handler Supply Fan VFD, (1) Air Handler Energy Recovery Wheel Repair, (1) Exterior Lighting Panel Control (1) Boiler System Tune up Remove and replace current barometric dampers at the end of the hallways in wing A and C with new motorized pressure relief dampers and modulating actuators. Professionally cap and insulate 6 other barometric relief dampers. Remove and replace existing inlet guide vane system and controls on AHU-3 (AreaB) with variable frequency drive. Replace the transformer powering the wheel in AHU-2 (Area C). Troubleshoot and make any other necessary repairs to the control circuit of the wheel. Provide and install a new ALC Control Module for control of Exterior	Exterior Lighting Control -Lighting inventory was performed with pre & post ECM fixture consumption and demand utilized in school. Specified retrofits and replacements of the existing fixtures. Electrical Usage (kWh) = (Number of fixtures x watts per fixture x Operating Existing hours). New Electrical Usage kWh=(Number of fixtures x watts per fixture x New Reduced hours). VFD on AHU 3 Electrical Usage (kWh) = Motor BHPx Operating hours x .746. New kWh Usage= Motor BHP x Motor Speed ^3x Operating hours x.746. Electrical Energy Cost = (kWh x \$/kwh) ; Existing KWh - Retrofit KWh = Savings.	N/A	N/A

Exhibit 2

Customer Legal Entity Name: Mapleton Board of Education

Site: Ashland

Principal Address: 635 County Highway 801

	Unadjusted Usage, kwh (A)	Weather Adjusted Usage, kwh (B)	Weather Adjusted Usage with Energy Efficiency Addbacks, kwh (C)	Note 1
2012	1,528,360	1,528,360	1,528,360	
2011	1,375,760	1,375,760	1,375,760	
2010	1,309,960	1,309,960	1,309,960	
Average	1,404,693	1,404,693	1,404,693	

Project Number	Project Name	In-Service Date	Project Cost \$	KWh Saved/Year Counting towards Utility compliance	KWh Saved/Year (D) eligible for incentive	Utility Peak Demand Reduction Contribution, KW	Commitment Payment \$
1	HS Lighting Retrofit	10/31/2013	\$51,280	37,638	37,638	21	
2	HS Building Automation System Upgrade	10/31/2014	\$482,070	229,388	229,388	-	
3	MS Lighting Retrofit	10/13/2014	\$19,620	9,523	9,523	6	
4	MS Building Automation Upgrade	10/31/2014	\$42,067	28,462	28,462	-	
				-	-	-	
				-	-	-	
				-	-	-	
Total				305,011	305,011	27	\$0

Docket No. 14-0763

Site: 635 County Highway 801

Savings as percent of usage 21.7% Note 2

= Total (D) divided by Average (C)

Customer Eligible Exemption Period: 136 Month(s) Note 3

Notes

(1) Customer's usage is adjusted to account for the effects of the energy efficiency programs included in this application. When applicable, such adjustments are prorated to the in-service date to account for partial year savings.

(2) Savings as a percent of usage is equal to the of total project savings (D) divided by the 3 year average Weather Adjusted Usage with Energy Efficiency Addbacks (C).

(3) Customer exemption determined by savings percentage in relation to energy efficiency schedule as set forth in O.R.C. 4928.66(A)(1)(a).

(4) The exemption period reflects the maximum potential exemption period. NOTE: The FirstEnergy Utilities cannot guarantee the length of the exemption period that will ultimately be approved by the Commission.

Exhibit 3 Utility Cost Test

UCT = Utility Avoided Costs / Utility Costs

Project	Total Annual Savings, MWh (A)	Utility Avoided Cost \$/MWh (B)	Utility Avoided Cost \$ (C)	Utility Cost \$ (D)	Cash Rebate \$ (E)	Administrator Variable Fee \$ (F)	Total Utility Cost \$ (G)	UCT (H)
1	38	\$ 308	\$ 11,603	\$ 1,013	\$1,412	\$376	\$ 2,800	4.1
2	229	\$ 308	\$ 70,716	\$ 1,013	\$13,763	\$2,294	\$ 17,070	4.14
3	10	\$ 308	\$ 2,936	\$ 1,013	\$357	\$95	\$ 1,465	2.00
4	28	\$ 308	\$ 8,774	\$ 1,013	\$1,708	\$285	\$ 3,005	2.92
Total	305	\$ 308	94,029	4,050	\$17,240	\$3,050	24,340	3.9

Notes

(A) From Exhibit 2, = kWh saved / 1000

(B) This value represents avoided energy costs (wholesale energy prices) from the Department of Energy, Energy Information Administration's 2009 Annual Energy Outlook (AEO) low oil prices case. The AEO represents a national average energy price, so for a better representation of the energy price that Ohio customers would see, a Cinergy Hub equivalent price was derived by applying a ratio based on three years of historic national average and Cinergy Hub prices. This value is consistent with avoided cost assumptions used in EE&PDR Program Portfolio and Initial Benchmark Report, filed Dec 15, 2009 (See Section 8.1, paragraph a).

(C) = (A) * (B)

(D) Represents the utility's costs incurred for self-directed mercantile applications for applications filed and applications in progress. Includes incremental costs of legal fees, fixed administrative expenses, etc.

(E) This is the amount of the cash rebate paid to the customer for this project.

(F) Based on approximate Administrator's variable compensation for purposes of calculating the UCT, actual compensation may be less.

(G) = (D) + (E) + (F)

(H) = (C) / (G)

Mapleton Board of Education ~ Ashland
Docket No. 14-0763

Site: 635 County Highway 801

Lighting Form

Lighting Inventory Form

Magdalen School

20.09

Lighting Zone 2

Instructions: Please use one line for each feature type in a room or area.

For existing or proposed control, choose OCC for Occupancy Sensor, DAY for photosensor, HI-Lo for hi-level sensors or NONE for none. Controls in spaces where existing controls exist do not qualify.

[illegible]

Lighting Form

[illegible]

Project Estimated Annual Savings Summary

Lighting

Estimated Annual kWh Savings (kWh Impact)	37,638
Total Change in Connected Load	20.91
Demand Savings (kW Impact)	20.91
Annual Estimated Cost Savings	\$3,387.42
Annual Operating Hours (Equipment Full Load Hours)	1,800
Interior Lighting Incentive @ \$0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	\$1,881.90
Exterior Lighting Incentive @ \$0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	\$0.00
Total retrofit CFL Incentive @ \$1/screw-in CFL lamp; \$15/hard-wired CFL lamp (includes all retrofit CFLs, both interior and exterior)	\$0.00
Total retrofit LED Exit Incentive @ \$10/exit sign	\$0.00
Total Lighting Controls Incentive @ \$25/occupancy sensor and \$25/daylight sensor (includes all Lighting Controls, both interior and exterior)	\$0.00
Total Calculated Incentive Amount	\$1,881.90
Total Fixture Quantity excluding retrofit CFLs and LED Exit Signs	79
Total Lamp Quantity for retrofit Screw-In CFLs	0
Total Lamp Quantity for retrofit Hard-Wired CFLs	0
Total Fixture Quantity for retrofit LED Exit Signs	0
Total Quantity for Occupancy Sensors	0

Total Quantity for Daylight Sensors	0
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Please briefly describe how you estimated your coincidence factor (CF) and applicant equivalent full-load hours (EFLH) for facility type "Other" indicated on the Lighting Form tab

Mapleton High/Middle School
Proposed HVAC Shedule

Mapleton HS/MS Scheduling														
Fall/Spring														
			M-F			Sat			Sun			Event		
Unit	Unit Name	Area	On		Off	On		Off	On		Off	On		Off
1	Unit Vents	Classrooms	7:00	to	15:00	-	to	-	-	to	-	Varies	to	Varies
2	AH -1 - HS	Kitchen/Classrooms	7:00	to	15:00	-	to	-	-	to	-	Varies	to	Varies
3	AH -2 - HS	Library/Commons	7:00	to	15:00	-	to	-	-	to	-	Varies	to	Varies
4	AH -3 - HS	HS-Offices	7:00	to	16:30	-	to	-	-	to	-	Varies	to	Varies
5	AH -4 - HS	HS-Gym	7:00	to	20:00	8:00	to	20:00	8:00	to	20:00	Varies	to	Varies
6	AH-1-MS	MS-Gym	7:00	to	18:00	8:00	to	20:00	-	to	-	Varies	to	Varies
7	AH-2-MS	Ag. Shop	7:00	to	15:00	-	to	-	-	to	-	Varies	to	Varies
8	AH-3-MS	Ind. Shop	7:00	to	15:00	-	to	-	-	to	-	Varies	to	Varies
9	RT-1-MS	MS-Offices	7:00	to	16:30	-	to	-	-	to	-	Varies	to	Varies
10	AH-1	Training Room	7:00	to	20:00	8:00	to	20:00	-	to	-	Varies	to	Varies
11				to			to			to		Varies	to	Varies
12				to			to			to		Varies	to	Varies

Mapleton HS/MS Scheduling														
Summer														
			M-F			Sat			Sun			Event		
Unit	Unit Name	Area	On		Off	On		Off	On		Off	On		Off
1	Unit Vents	Classrooms	-	to	-	-	to	-	-	to	-	Varies	to	Varies
2	AH -1 - HS	Kitchen/Classrooms	-	to	-	-	to	-	-	to	-	Varies	to	Varies
3	AH -2 - HS	Library/Commons	-	to	-	-	to	-	-	to	-	Varies	to	Varies
4	AH -3 - HS	HS-Offices	8:00	to	16:30	-	to	-	-	to	-	Varies	to	Varies
5	AH -4 - HS	HS-Gym	10:00	to	15:00	10:00	to	15:00	10:00	to	15:00	Varies	to	Varies
6	AH-1-MS	MS-Gym	10:00	to	15:00	10:00	to	15:00	-	to	-	Varies	to	Varies
7	AH-2-MS	Ag. Shop	-	to	-	-	to	-	-	to	-	Varies	to	Varies
8	AH-3-MS	Ind. Shop	-	to	-	-	to	-	-	to	-	Varies	to	Varies
9	RT-1-MS	MS-Offices	8:00	to	16:30	-	to	-	-	to	-	Varies	to	Varies
10	AH-1	Training Room	10:00	to	15:00	10:00	to	15:00	-	to	-	Varies	to	Varies
11				to			to			to		Varies	to	Varies
12				to			to			to		Varies	to	Varies

*Note: These times represent when the system is in an occupied mode

Lighting Form

Lighting Inventory Form

Applicant Name:	Mapleton School
Facility Name:	Elementary School
Date:	
Electric Data (Volts):	90.09
Lighting Zone (interior only):	Lighting Zone 2

Instructions: Please use one line for each fixture type in a room or area.
For existing or proposed control, choose OCC for Occupancy Sensor, DAY for photosensor, HI-Lo for hi-level sensors or NONE for none. Controls in spaces where existing controls exist do not qualify.

[illegible]

Lighting Form

[illegible]

Project Estimated Annual Savings Summary

Lighting

Estimated Annual kWh Savings (kWh Impact)	9,523
Total Change in Connected Load	5.95
Demand Savings (kW Impact)	5.95
Annual Estimated Cost Savings	\$857.07
Annual Operating Hours (Equipment Full Load Hours)	1,600
Interior Lighting Incentive @ \$0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	\$476.16
Exterior Lighting Incentive @ \$0.05/kWh (excluding retrofit CFLs, sensors, or LED exit signs)	\$0.00
Total retrofit CFL Incentive @ \$1/screw-in CFL lamp; \$15/hard-wired CFL lamp (includes all retrofit CFLs, both interior and exterior)	\$0.00
Total retrofit LED Exit Incentive @ \$10/exit sign	\$0.00
Total Lighting Controls Incentive @ \$25/occupancy sensor and \$25/daylight sensor (includes all Lighting Controls, both interior and exterior)	\$0.00
Total Calculated Incentive Amount	\$476.16
Total Fixture Quantity excluding retrofit CFLs and LED Exit Signs	44
Total Lamp Quantity for retrofit Screw-In CFLs	0
Total Lamp Quantity for retrofit Hard-Wired CFLs	0
Total Fixture Quantity for retrofit LED Exit Signs	0
Total Quantity for Occupancy Sensors	0

Total Quantity for Daylight Sensors	0
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Please briefly describe how you estimated your coincidence factor (CF) and applicant equivalent full-load hours (EFLH) for facility type "Other" indicated on the Lighting Form tab

Section 13 – Energy Savings Calculations

Mapleton Local Schools
Executive Summary
May 17, 2012

Building Name	Total Kw Before	Total Watts Before	Total Kw After	Total Watts After	Total KWH Used/before	KWH savings	Total Yearly Energy Savings	Project Cost	Pay-back
High/Middle School	36.270	36270	16.188	16188	65286.0	36147.6	\$ 3,115.00	\$ 56,978.00	
<i>Estimated First Energy rebate incentive</i>									
Elementary School	13.640	13640	7.704	7704	21824.0	9497.6	\$ 903.0	\$ 21,800.00	
<i>Estimated First Energy rebate incentive</i>									
Operational Savings							\$ 2,500.00		
Totals	49.910	49,910	23.892	23,892	87,110.0	45,645.2	\$ 6,518.00	\$ 78,778.00	12.1

This project includes all material and labor for a complete installation of all proposed areas outlined in the detailed lighting walk through.

MHS -01 Lighting Upgrades
HS/MS Lighting Survey

PROJECT NAME: MAPLETON HIGH SCHOOL & MIDDLE SCHOOL
LIGHTING SURVEY DATA SHEET

PAGE 1

Building Area	Fixture Type	No.of	No.of	Qty	Proposed	Fixture	Total	KW	Fixture	Total	KW	Annual	Annual	KWH	KWH	KWH	Control	Light	Current	Annual
		Lamps	Lamps			Watts	Watts		Watts	Watts		Hours	Hours							
		Curr.	Prop.			Before	Before	Before	After	After	After	Before	After	Used	Savings	Rate		Level	Cost	Savings
HS LIBRARY (OLD)	MH DOME	1		14	***REMOVE***	460	6440	6.440		0	0.000	1800		11592.0	11592.0	0.0900		43	1043.28	1043.28
HS LIBRARY (NEW)	T8 HIGH BAY		4	12	NEW 4-LAMP T8 HIGH BAY W/REFLECTOR 32W		0	0.000	147	1764	1.764		1800	0.0	-3175.2	0.0900			0.00	-285.77
JR HIGH SCHOOL GYM	MH GUM DROP	1	6	24	NEW 6-LAMP T8 HIGH BAY W/REFLECTOR 32W	460	11040	11.040	222	5328	5.328	1800	1800	19872.0	10281.6	0.0900		25	1788.48	925.34
JR HS AGRICULTURE SHOP	MH LB	1	6	7	NEW 6-LAMP T8 HIGH BAY W/REFLECTOR 32W	460	3220	3.220	222	1554	1.554	1800	1800	5796.0	2998.8	0.0900		12	521.64	269.89
JR HS INDUSTRIAL SHOP	MH LB	1	4	6	NEW 4-LAMP T8 HIGH BAY W/REFLECTOR 32W	295	1770	1.770	147	882	0.882	1800	1800	3186.0	1598.4	0.0900			286.74	143.86
HIGH SCHOOL GYM	MH HB	1	6	30	NEW 6-LAMP T8 HIGH BAY W/REFLECTOR 32W	460	13800	13.800	222	6660	6.660	1800	1800	24840.0	12852.0	0.0900			2235.60	1156.68
HID BALLAST RECYCLING				44	HID BALLAST RECYCLING		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
HID LAMP RECYCLING				44	HID LAMP RECYCLING		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
MATERIAL DISPOSAL				1	MATERIAL DISPOSAL		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
PROJECT MANAGEMENT				1	PROJECT MANAGEMENT		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
TOTAL							36270	36.270		16188	16.188			65286.0	36147.6				5875.74	3253.28

MES - 01 Lighting Upgrades
ES Lighting Survey

PROJECT NAME: MAPLETON ELEMENTARY SCHOOL
LIGHTING SURVEY DATA SHEET

PAGE 1

		No.of	No.of			Fixture	Total			Fixture	Total	Annual	Annual							
		Lamps	Lamps			Watts	Watts	KW	Watts	Watts	KW	Hours	Hours	KWH	KWH	KWH		Light	Current	Annual
Building Area	Type	Curr.	Prop.	Qty	Proposed	Before	Before	Before	After	After	After	Before	After	Used	Savings	Rate	Control	Level	Cost	Savings
GYMNASIUM	MH GUM DROP	1	6	16	NEW 6-LAMP T8 HIGH BAY W/REFLECTOR 32W	295	4720	4.720	222	3552	3.552	1600	1600	7552.0	1868.8	0.0900		69	679.68	168.19
LIBRARY	2X2L MH	1	4	12	NEW 4-LAMP T8 HIGH BAY W/REFLECTOR 32W LAY-IN	295	3540	3.540	148	1776	1.776	1600	1600	5664.0	2822.4	0.0900		35	509.76	254.02
CAFETERIA	2X2L MH	1	4	12	NEW 6-LAMP T8 HIGH BAY W/REFLECTOR 32W	295	3540	3.540	148	1776	1.776	1600	1600	5664.0	2822.4	0.0900			509.76	254.02
MAIN LOBBY	PENDANT	1		4	NEW HO CFL LAMP	460	1840	1.840	150	600	0.600	1600	1600	2944.0	1984.0	0.0900			264.96	178.56
HID BALLAST RECYCLING				44	HID BALLAST RECYCLING		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
HID LAMP RECYCLING				44	HID LAMP RECYCLING		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
MATERIAL DISPOSAL				1	MATERIAL DISPOSAL		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
PROJECT MANAGEMENT				1	PROJECT MANAGEMENT		0	0.000		0	0.000			0.0	0.0	0.0900			0.00	0.00
TOTAL							13640	13.640		7704	7.704			21824.0	9497.6				1964.16	854.78

MHS -02 Building Automation Upgrades AHU Control

To calculate energy savings for Mapleton High/Middle School due to building automation upgrades. All major pieces of mechanical equipment were inventoried and had an energy baseline established. The baseline was used to create a model that behaved in a similar way to the existing facility. Once an adequate baseline for each piece of equipment had been established, various operational parameters were changed to identify energy savings opportunities. Savings opportunities in the following equipment schedules include demand control ventilation (outside air reduction), reduced run times, VFD's where applicable (an example VFD calculation is shown in the following section), increased efficiency due to lowered or raised zone temperature set points and many other control strategies that are presented in Section 14C Sequence of Operations.

Air Handler Baseline Use																								
Basic Unit Info							Return Specs	Exhaust Specs		School Year Scheduling				Summer Scheduling				Energy Consumption per Year						
										M-F		Sa-Su		M-F		Sa-Su		Heating MCF/yr		Cooling kWh/yr		Supply Fan	Exhaust Fan	
Name	Location	CFM	Min. OA	Supply HP	Supply RPM	Control	Return	Exhaust	HP	CFM	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Occupied	Unoccupied	Occupied	Unoccupied	kWh	kWh
AHU-1	Kitchen/Classrooms	22734	6200	34.39	1961	VFD	No	Yes	3.16	6350	5	16	8	15	8	15	0	0	729.00	53.67	59636.73	6357.93	56531.92	6448.17
AHU-2	Library/Commons	15815	2100	17.45	1791	VFD	No	Yes	5.44	9280	5	16	8	15	8	15	0	0	246.92	18.18	20199.54	2153.49	21136.42	0.00
AHU-3	HS-Offices	3221	375	3.3	1461	VFD	No	No	0	0	5	16.5	8	15	8	15	0	0	44.09	3.25	3607.06	384.55	11420.79	3496.70
AHU-4	HS-Gym	20240	1850	11.29	1390	Constant	No	Yes	3.66	4600	5	20	5	20	8	15	0	0	217.52	16.02	17794.83	1897.13	42431.75	8537.60
AHU-1 pII	MS-Gym	17170	2375	20	1723	VFD	No	Yes	0	0	5	16	8	15	8	15	0	0	279.25	20.56	22844.71	2435.50	22531.68	0.00
AHU-2 pII	Ag. Shop	2252	351	1.26	981	Constant	No	No	0	0	5	16	8	15	8	15	0	0	41.27	3.04	3376.21	359.94	2116.21	0.00
AHU-3 pII	Ind. Shop	2844	351	1.6	823	Constant	No	No	0	0	5	16	8	15	8	15	0	0	41.27	3.04	3376.21	359.94	2149.80	0.00
RTU-1	MS-Offices	1818	229	1.42	1068	Constant	No	No	0	0	5	16.5	8	15	8	15	0	0	26.93	1.98	2202.71	234.83	2149.80	0.00

Air Handler Proposed Use																										
										School Year Scheduling					Summer Scheduling				Energy Consumption per Year							
Basic Unit Info							Return Specs		Exhaust Specs			M-F		Sa-Su			M-F		Sa-Su		Heating MCF/yr		Cooling kWh/yr		Fan Power	Exhaust Fan
Name	Location	CFM	Min. OA	Supply HP	Supply RPM	Control	Return	Exhaust	HP	CFM	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Start	Stop	Occupied	Unoccupied	Occupied	Unoccupied	kWh	kWh
AHU-1	Kitchen/Classrooms	22734	5270	34.39	1961	VFD	No	Yes	3.16	6350	7	15	0	0	0	0	0	0	0	0	210.698	23.647	15067.676	4395.794	38743.23	1396.03
AHU-2	Library/Commons	15815	1785	17.45	1791	VFD	No	Yes	5.44	9280	7	15	0	0	0	0	0	0	0	0	71.366	8.010	5103.568	1488.898	19658.89	0.00
AHU-3	HS-Offices	3221	318.75	3.3	1461	VFD	No	No	0	0	7	16.5	0	0	8	16.5	0	0	0	0	12.744	1.430	911.351	265.875	7435.46	0.00
AHU-4	HS-Gym	20240	1572.5	11.29	1390	VFD	No	Yes	3.66	4600	7	20	8	20	10	15	10	15	62.870	7.056	4496.000	1311.648	12719.14	3664.20		
AHU-1 pII	MS-Gym	17170	2018.75	20	1723	VFD	No	Yes	0	0	7	18	8	20	10	15	10	15	167.120	18.756	5771.892	1683.873	22531.68		0.00	
AHU-2 pII	Ag. Shop	2252	298.35	1.26	981	Constant	No	No	0	0	7	15	0	0	0	0	0	0	0	0	37.224	1.225	853.025	248.859	2116.21	0.00
AHU-3 pII	Ind. Shop	2844	298.35	1.6	823	Constant	No	No	0	0	7	15	0	0	0	0	0	0	0	0	37.224	1.225	853.025	248.859	2149.80	0.00
RTU-1	MS-Offices	1818	194.65	1.42	1068	Constant	No	No	0	0	7	16.5	0	0	8	16.5	0	0	0	0	16.114	1.808	556.532	162.361	2149.80	0.00

MHS -02 Building Automation Upgrades

VAV, CUH, UV Control

Baseline Zone Use																			
Unit Description				Air Flow			Supply HP	Supply Temps		School Operating Hours					Zone Use				
				Heating	Cooling			Cooling SA	Heating SA	Start	Stop	Start	Stop	Length	Gas (MCF)		Electric (kWh)		
Unit Code	Unit Type	Served By:	Room	Min. CFM	Max. CFM	Min. CFM	M-F								Sa-Su		Weeks	Occupied	Unocc
VAV-1-1	VAV	AHU-1	80	135	265	0	0	55	110	5	16	8	15	38	12.07	0.89	0.00	0.00	0.00
VAV-6-2	VAV	AHU-1	Kitchen	1410	2730	160	0	55	110	5	16	8	15	38	126.11	9.29	0.00	0.00	0.00
VAV-4-1	VAV	AHU-1	042-043	610	1210	400	0	55	110	5	16	8	15	38	54.56	4.02	0.00	0.00	0.00
VAV-1-1	VAV	AHU-1	45	135	255	80	0	55	110	5	16	8	15	38	12.07	0.89	0.00	0.00	0.00
VAV-5-2	VAV	AHU-1	44	1080	1980	630	0	55	110	5	16	8	15	38	96.60	7.11	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	68	525	1020	410	0	55	110	5	16	8	15	38	46.96	3.46	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	049-048	780	1570	540	0	55	110	5	16	8	15	38	69.76	5.14	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	67	530	1040	400	0	55	110	5	16	8	15	38	47.40	3.49	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	052-053	770	1540	520	0	55	110	5	16	8	15	38	68.87	5.07	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	Corridor 066	675	1270	550	0	55	110	5	16	8	15	38	60.37	4.45	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	55	620	1240	540	0	55	110	5	16	8	15	38	55.45	4.08	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	65	540	1050	410	0	55	110	5	16	8	15	38	48.30	3.56	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	64	500	1040	415	0	55	110	5	16	8	15	38	44.72	3.29	0.00	0.00	0.00
VAV-2-2	VAV	AHU-1	-	210	420	0	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	57	620	1240	540	0	55	110	5	16	8	15	38	55.45	4.08	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	62	510	1030	410	0	55	110	5	16	8	15	38	45.61	3.36	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	60	530	980	400	0	55	110	5	16	8	15	38	47.40	3.49	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	71	380	763	15	0	55	110	5	16	8	15	38	33.99	2.50	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	81	280	550	150	0	55	110	5	16	8	15	38	25.04	1.84	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	Auditorium	840	1660	800	0	55	110	5	16	8	15	38	75.13	5.53	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 W Upper	1010	2016	950	0	55	110	5	16	8	15	38	90.34	6.65	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 E Upper	940	1904	950	0	55	110	5	16	8	15	38	84.07	6.19	0.00	0.00	0.00
VAV-4-2	VAV	AHU-2	Stage	790	1590	50	0	55	110	5	16	8	15	38	70.66	5.20	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	Office 093-88	210	410	90	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00
VAV-6-2	VAV	AHU-2	89	1140	2220	700	0	55	110	5	16	8	15	38	101.96	7.51	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 W	820	1630	810	0	55	110	5	16	8	15	38	73.34	5.40	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	086-092	310	620	30	0	55	110	5	16	8	15	38	27.73	2.04	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	90	150	310	90	0	55	110	5	16	8	15	38	13.42	0.99	0.00	0.00	0.00
VAV-3-2	VAV	AHU-2	094 Corridor	320	615	0	0	55	110	5	16	8	15	38	28.62	2.11	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	037-036	210	425	65	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	023-027	370	705	60	0	55	110	5	16	8	15	38	33.09	2.44	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	022-032	1330	2760	350	0	55	110	5	16	8	15	38	118.96	8.76	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	033-030	210	410	60	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00
VAV-1-1	VAV	AHU-3	29	160	300	90	0	55	110	5	16	8	15	38	14.31	1.05	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	28	210	415	65	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00
VAV-2-2	VAV	AHU-3	Corridor 013	315	610	0	0	55	110	5	16	8	15	38	28.17	2.07	0.00	0.00	0.00

Unit Description				Air Flow			Supply HP	Supply Temps		School Operating Hours					Zone Use					
				Heating	Cooling			Cooling SA	Heating SA	Start	Stop	Start	Stop	Length	Gas (MCF)		Electric (kWh)			
Unit Code	Unit Type	Served By:	Room	Min. CFM	Max. CFM	Min. CFM				M-F	Sa-Su	Weeks	Occupied	Unocc	Occupied	Unocc	Mech.			
VAV-2-1	VAV	AHU-3	15	260	510	90		0	55	110	5	16	8	15	38	23.25	1.71	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	016-019	290	585	60		0	55	110	5	16	8	15	38	25.94	1.91	0.00	0.00	0.00
VAV-1-2	VAV	AHU-3	Corridor	150	310	0	0	55	110	5	16	8	15	38	13.42	0.99	0.00	0.00	0.00	
VAV-3-2 phll	VAV	AHU-1 pII	159,161,162,139	210	684	210	0	55	110	5	16	8	15	38	18.78	1.38	0.00	0.00	0.00	
VAV-6-2 phll	VAV	AHU-1 pII	161,138	1191	4114	1191	0	55	110	5	16	8	15	38	106.52	7.84	0.00	0.00	0.00	
VAV-5-2 phll	VAV	AHU-1 pII	161,141E,W	471	1640	471	0	55	110	5	16	8	15	38	42.13	3.10	0.00	0.00	0.00	
VAV-6-2 phll	VAV	AHU-1 pII	161,138	1210	3951	1210	0	55	110	5	16	8	15	38	108.22	7.97	0.00	0.00	0.00	
VAV-6-2 phll	VAV	AHU-1 pII	161,138	1178	3976	1178	0	55	110	5	16	8	15	38	105.36	7.76	0.00	0.00	0.00	
VAV-3-2 phll	VAV	AHU-1 pII	161	247	843	247	0	55	110	5	16	8	15	38	22.09	1.63	0.00	0.00	0.00	
VAV-2-2 phll	VAV	AHU-1 pII	191,142	129	419	129	0	55	110	5	16	8	15	38	11.54	0.85	0.00	0.00	0.00	
VAV-3-2 phll	VAV	AHU-1 pII	191,185,149,186	185	621	185	0	55	110	5	16	8	15	38	16.55	1.22	0.00	0.00	0.00	
VAV-2-2 phll	VAV	RTU-1	144	106	261	106	0	55	110	5	16	8	15	38	9.48	0.70	0.00	0.00	0.00	
VAV-1-2 phll	VAV	RTU-1	145	59	206	59	0	0	110	0	0	0	0	38	5.28	0.39	0.00	0.00	0.00	
VAV-2-2 phll	VAV	RTU-1	183	106	298	106	0	0	110	0	0	0	0	38	9.48	0.70	0.00	0.00	0.00	
VAV-1-2 phll	VAV	RTU-1	153	62	200	62	0	0	110	0	0	0	0	38	5.55	0.41	0.00	0.00	0.00	
VAV-1-2 phll	VAV	RTU-1	143	59	195	59	0	0	110	0	0	0	0	38	5.28	0.39	0.00	0.00	0.00	
VAV-2-2 phll	VAV	RTU-1	154	60	205	60	0	0	110	0	0	0	0	38	5.37	0.40	0.00	0.00	0.00	
VAV-2-2 phll	VAV	RTU-1	156	101	518	101	0	0	110	0	0	0	0	38	9.03	0.67	0.00	0.00	0.00	
UV-1	Unit Vent	-	MS Classrooms	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-2	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-3	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-3	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-3	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-3	Unit Vent	-	"	1000	1000	1000	0.166667	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	553.78	
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-5	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-5	Unit Vent	-	"	1000	1000	1000	0.25	55	110	5	16	0	0	38	41.40	3.81	831.68	727.48	830.68	
UV-6	Unit Vent	-	"	1250	1250	1250	0.5	55	110	5	16	0	0	38	51.76	4.76	1039.60	909.35	1661.35	
UV-6	Unit Vent	-	"	1250	1250	1250	0.5	55	110	5	16	0	0	38	51.76	4.76	1039.60	909.35	1661.35	

[illegible]

Proposed Zone Use																			
Unit Description				Air Flow			Supply HP	Supply Temps		School Operating Hours					Zone Use				
				Heating	Cooling			Cooling SA	Heating SA	Start	Stop	Start	Stop	Length	Gas (MCF)		Electric (kWh)		
Unit Code	Unit Type	Served By:	Room	Min. CFM	Max. CFM	Min. CFM				M-F		Sa-Su		Weeks	Occupied	Unocc	Occupied	Unocc	Mech.
VAV-1-1	VAV	AHU-1	80	135	265	0	0	55	110	7	15	0	0	38	10.14	0.82	0.00	0.00	0.00
VAV-6-2	VAV	AHU-1	Kitchen	1410	2730	409.5	0	55	110	7	15	0	0	38	105.89	8.56	0.00	0.00	0.00
VAV-4-1	VAV	AHU-1	042-043	610	1210	181.5	0	55	110	7	15	0	0	38	45.81	3.70	0.00	0.00	0.00
VAV-1-1	VAV	AHU-1	45	135	255	38.25	0	55	110	7	15	0	0	38	10.14	0.82	0.00	0.00	0.00
VAV-5-2	VAV	AHU-1	44	1080	1980	297	0	55	110	7	15	0	0	38	81.11	6.55	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	68	525	1020	153	0	55	110	7	15	0	0	38	39.43	3.19	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	049-048	780	1570	235.5	0	55	110	7	15	0	0	38	58.58	4.73	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	67	530	1040	156	0	55	110	7	15	0	0	38	38.94	3.22	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	052-053	770	1540	231	0	55	110	7	15	0	0	38	56.57	4.67	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	Corridor 066	675	1270	190.5	0	55	110	7	15	0	0	38	49.59	4.10	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	55	620	1240	186	0	55	110	7	15	0	0	38	45.55	3.76	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	65	540	1050	157.5	0	55	110	7	15	0	0	38	39.67	3.28	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	64	500	1040	156	0	55	110	7	15	0	0	38	36.73	3.03	0.00	0.00	0.00
VAV-2-2	VAV	AHU-1	-	210	420	63	0	55	110	7	15	0	0	38	15.43	1.27	0.00	0.00	0.00
VAV-4-2	VAV	AHU-1	57	620	1240	186	0	55	110	7	15	0	0	38	45.55	3.76	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	62	510	1030	154.5	0	55	110	7	15	0	0	38	37.47	3.09	0.00	0.00	0.00
VAV-3-2	VAV	AHU-1	60	530	980	147	0	55	110	7	15	0	0	38	38.94	3.22	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	71	380	763	114.45	0	55	110	7	15	0	0	38	27.92	2.31	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	81	280	550	82.5	0	55	110	7	15	0	0	38	20.57	1.70	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	Auditorium	840	1660	249	0	55	110	7	15	0	0	38	61.71	5.10	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 W Upper	1010	2016	302.4	0	55	110	7	15	0	0	38	74.20	6.13	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 E Upper	940	1904	285.6	0	55	110	7	15	0	0	38	70.59	5.70	0.00	0.00	0.00
VAV-4-2	VAV	AHU-2	Stage	790	1590	238.5	0	55	110	7	15	0	0	38	59.33	4.79	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	Office 093-88	210	410	61.5	0	55	110	7	15	0	0	38	15.77	1.27	0.00	0.00	0.00
VAV-6-2	VAV	AHU-2	89	1140	2220	333	0	55	110	7	15	0	0	38	85.61	6.92	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	038 W	820	1630	244.5	0	55	110	7	15	0	0	38	61.58	4.98	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	086-092	310	620	93	0	55	110	7	15	0	0	38	23.28	1.88	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	90	150	310	46.5	0	55	110	7	15	0	0	38	11.26	0.91	0.00	0.00	0.00
VAV-3-2	VAV	AHU-2	094 Corridor	320	615	92.25	0	55	110	7	15	0	0	38	24.03	1.94	0.00	0.00	0.00
VAV-2-1	VAV	AHU-2	037-036	210	425	63.75	0	55	110	7	15	0	0	38	15.77	1.27	0.00	0.00	0.00
VAV-3-1	VAV	AHU-2	023-027	370	705	105.75	0	55	110	7	15	0	0	38	27.79	2.25	0.00	0.00	0.00
VAV-5-2	VAV	AHU-2	022-032	1330	2760	414	0	55	110	7	15	0	0	38	99.88	8.07	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	033-030	210	410	61.5	0	55	110	7	15	0	0	38	15.77	1.27	0.00	0.00	0.00
VAV-1-1	VAV	AHU-3	29	160	300	45	0	55	110	7	15	0	0	38	12.02	0.97	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	28	210	415	62.25	0	55	110	7	15	0	0	38	15.77	1.27	0.00	0.00	0.00
VAV-2-2	VAV	AHU-3	Corridor 013	315	610	91.5	0	55	110	7	15	0	0	38	23.66	1.91	0.00	0.00	0.00

Unit Description				Air Flow			Supply HP	Supply Temps		School Operating Hours					Zone Use				
				Heating	Cooling			Cooling SA	Heating SA	Start	Stop	Start	Stop	Length	Gas (MCF)		Electric (kWh)		
Unit Code	Unit Type	Served By:	Room	Min. CFM	Max. CFM	Min. CFM											M-F	Sa-Su	Weeks
VAV-2-1	VAV	AHU-3	15	260	510	76.5	0	55	90	7	15	0	0	38	19.53	1.58	0.00	0.00	0.00
VAV-2-1	VAV	AHU-3	016-019	290	585	87.75	0	55	90	7	15	0	0	38	21.78	1.76	0.00	0.00	0.00
VAV-1-2	VAV	AHU-3	Corridor	150	310	46.5	0	55	90	7	15	0	0	38	11.26	0.91	0.00	0.00	0.00
VAV-3-2 phll	VAV	AHU-1 pll	159,161,162,139	210	684	102.6	0	55	90	7	15	0	0	38	15.77	1.27	0.00	0.00	0.00
VAV-6-2 phll	VAV	AHU-1 pll	161,138	1191	4114	617.1	0	55	90	7	15	0	0	38	89.44	7.23	0.00	0.00	0.00
VAV-5-2 phll	VAV	AHU-1 pll	161,141E,W	471	1640	246	0	55	90	7	15	0	0	38	35.37	2.86	0.00	0.00	0.00
VAV-6-2 phll	VAV	AHU-1 pll	161,138	1210	3951	592.65	0	55	90	7	15	0	0	38	90.87	7.34	0.00	0.00	0.00
VAV-6-2 phll	VAV	AHU-1 pll	161,138	1178	3976	596.4	0	55	90	7	15	0	0	38	88.47	7.15	0.00	0.00	0.00
VAV-3-2 phll	VAV	AHU-1 pll	161	247	843	126.45	0	55	90	7	15	0	0	38	18.55	1.50	0.00	0.00	0.00
VAV-2-2 phll	VAV	AHU-1 pll	191,142	129	419	62.85	0	55	90	7	15	0	0	38	9.69	0.78	0.00	0.00	0.00
VAV-3-2 phll	VAV	AHU-1 pll	191,185,149,186	185	621	93.15	0	55	90	7	15	0	0	38	13.89	1.12	0.00	0.00	0.00
VAV-2-2 phll	VAV	RTU-1	144	106	261	39.15	0	55	90	7	15	0	0	38	7.96	0.64	0.00	0.00	0.00
VAV-1-2 phll	VAV	RTU-1	145	59	206	30.9	0	0	90	0	0	0	0	38	4.43	0.36	0.00	0.00	0.00
VAV-2-2 phll	VAV	RTU-1	183	106	298	44.7	0	0	90	0	0	0	0	38	7.96	0.64	0.00	0.00	0.00
VAV-1-2 phll	VAV	RTU-1	153	62	200	30	0	0	90	0	0	0	0	38	4.66	0.38	0.00	0.00	0.00
VAV-1-2 phll	VAV	RTU-1	143	59	195	29.25	0	0	90	0	0	0	0	38	4.43	0.36	0.00	0.00	0.00
VAV-2-2 phll	VAV	RTU-1	154	60	205	30.75	0	0	90	0	0	0	0	38	4.51	0.36	0.00	0.00	0.00
VAV-2-2 phll	VAV	RTU-1	156	101	518	77.7	0	0	90	0	0	0	0	38	7.59	0.61	0.00	0.00	0.00
UV-1	Unit Vent	-	MS Classrooms	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-1	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-2	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-3	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-3	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-3	Unit Vent	-	"	1000	1000	1000	0.1666667	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	461.59
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-4	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-5	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-5	Unit Vent	-	"	1000	1000	1000	0.25	55	110	7	15	0	0	38	25.51	3.22	117.55	496.99	692.38
UV-6	Unit Vent	-	"	1250	1250	1250	0.5	55	110	7	15	0	0	38	31.88	4.03	146.94	621.24	1384.77
UV-6	Unit Vent	-	"	1250	1250	1250	0.5	55	110	7	15	0	0	38	31.88	4.03	146.94	621.24	1384.77

Unit Description				Air Flow			Supply HP	Supply Temps		School Operating Hours					Zone Use				
				Heating	Cooling			Cooling SA	Heating SA	Start	Stop	Start	Stop	Length	Gas (MCF)		Electric (kWh)		
Unit Code	Unit Type	Served By:	Room	Min. CFM	Max. CFM	Min. CFM				M-F	Sa-Su	Weeks	Occupied	Unocc	Occupied	Unocc	Mech.		
CH-1	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-
CH-2	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-
CH-2	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-
CH-2	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-
CH-2	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-
CH-2	Cabinet Heater	-	-	400	400	400	0.05	-	90	0	0	0	0	38	6.223	2.114	-	-	-

MHS -02 Building Automation Upgrades AHU VFD Control

Where applicable, VFD savings were identified using the following calculation. This example shows the results for AHU-3 in the High School. The same calculation was used for AHU – 3 in the Elementary. This unit is being upgraded from an Inlet Guide Vane System to a VFD and the results are shown in the summary table at the end of this section.

AHU-3 Sf

Hour of Operation	5549
RPM Motor	1750
Horsepower	3.3
%load HP	0.8
Efficiency	0.9
Drive Efficiency	0.03

Drive Frequency	Hours Ran	RPM Before	Brake HP	RPM with VFD	HP with VFD	kWh Constant Fan	kWh VFD
10%	27.75	1750.00	2.93	175.00	0.00	60.71	0.06
20%	27.75	1750.00	2.93	350.00	0.02	60.71	0.49
30%	443.92	1750.00	2.93	525.00	0.08	971.42	26.23
40%	638.14	1750.00	2.93	700.00	0.19	1396.41	89.37
50%	860.10	1750.00	2.93	875.00	0.37	1882.12	235.26
60%	1387.25	1750.00	2.93	1050.00	0.63	3035.67	655.71
70%	998.82	1750.00	2.93	1225.00	1.01	2185.68	749.69
80%	554.90	1750.00	2.93	1400.00	1.50	1214.27	621.71
90%	55.49	1750.00	2.93	1575.00	2.14	121.43	88.52
100%	554.90	1750.00	2.93	1750.00	3.02	1214.27	1250.70
Totals:	5549					12142.69	7435.46

MHS -02 Building Automation Upgrades Exhaust Fan

Mapleton High School has a large exhaust fan in the gymnasium that operates on the same circuit as AHU-2. Whenever this Air handler is on the exhaust fan also turns on. A calculation was performed to identify the energy savings associated with operating the fan through a VFD and only operating it to equalize building pressure.

Energy Consumption per CFM per Year

4.5	Constant	
1	Air flow	CFM
26	enthalpy in	Btu/lbF
80	Temp Heating	F
0.9	Efficiency	
1.085	Constant	
3.56	kWh	
0.27	MCF	

Exhaust Fan Baseline								
Unit	CFM	MCF/cfm	kWh/cfm	Control	Heating Hours	Cooling Hours	MCF	kWh
EF-4	13992	0.27	3.56	Constant	3549.7	1097.2	1793.5	6243.0
Exhaust Fan Proposed								
Unit	CFM	MCF/cfm	kWh/cfm	Control	Heating Hours	Cooling Hours	MCF	kWh
EF-4	13992	0.27	3.56	VFD	3549.69	1097.19	1040.01	3833.2

**MHS - 02 and MES - 02 Building Automation Upgrades
Exterior Lighting Control**

As mentioned in section 10 all exterior lighting in the High/Middle School and the Elementary will be added to the building automation system. This will allow for a reduction in the total run times of the exterior lights. The calculation below shows the energy savings associated with the run time reduction.

Baseline Operation						
Building	Total Exterior Watts	Days of Operation	Hours of Operation	Dimming Hours	Dimming Watt Reduction	Usage (kWh)
HS/MS.	30640	220	11	0	0	74148.8
Elem.	23825	220	11	0	0	57656.5

Proposed BAS Intregation						
Building	Total Exterior Watts	Days of Operation	Hours of Operation	Dimming Hours	Dimming Watt Reduction	Usage (kWh)
HS/MS.	30640	220	6	0	0	40444.8
Elem.	23825	220	6	0	0	31449

MES - 02 Building Automation Upgrades

Barometric Damper Retrofit

The elementary currently has 8 large barometric dampers to relieve building pressure. These dampers are un-insulated and are easily pulled open by wind. This causes an unnecessary amount of infiltration into the building and cooling of the plenum air. To fix this issue 6 dampers will be closed and insulated, two will remain but have electronic actuators installed so they can be integrated into the building automation system. The energy savings associated with this retrofit is shown below.

Damper Insulation Savings	
Ta (F) = outside air temp	25
Tf (F) = space temperature	70
Tw (F) = temperature of damper	65
Htw (ft) = height damper	2.67
Lw (ft) = length damper	2.67
ew = emissivity deamper	0.7
Tilt angle (B)	90
Current System	
Area Damper (Ad)	7.11
$L^3 dT$	758.5
$hw \text{ (Btu/hr-ft}^2\text{-F)} = .29(dT(\sin B)/L)^{.25} \text{ or } .19(dT(\sin B))^{.33}$	7.32
$Q_{\text{conv,d}} \text{ (btu/hr)} = hwAw(Tw-Ta)$	2083.30
Total Yearly Heat Loss (MCF)	113.05

MES - 02 Building Automation Upgrades

Heat Recovery Wheel Repair

Currently the Elementary School has a heat recovery wheel that is not in operation. After investigating the wheel it was found that the main transformer that powers it needs replaced. The calculation provided below shows the energy savings associated with properly operating the heat recovery wheel.

Cooling							
Supply Air	Outside Air	% Air	Supply Air	Return Air	Balance Point Occ	Balance Point Unocc	Efficiency
CFM	CFM	CFM	Temp	Temp	Temp	Temp	kW/ton
17,200	3,440	0.2	50	75	65	70	1

Heating							
Supply Air	Outside Air	% Air	Supply Air	Return Air	Balance Point Occ	Balance Point Unocc	Efficiency
CFM	CFM	CFM	Temp	Temp	Temp	Temp	
17,200	2,202	0.128	80	75	65	60	0.85

Heating Results	
Occupied Heat Btu	313,963,376.6
Heat MCF	314.0
Total Heating Usage	314.0

Cooling Results	
Cooling kWh	12,795.3
Total Cooling	12,795.3

Usage with Heat Wheel	
Heat Wheel Btu	205,223,667
Heat MCF	205
Heat Wheel Usage	0.9
Heat Wheel Efficiency	0.745
Usage Heat Wheel System	205

Usage with Cooling Wheel	
Occupied Cooling Wheel Btu	12,468.9
Cooling Wheel Usage	0.9
Total Cooling	12,468.9

Savings		
	MCF	kWh
Heat Wheel Savings	100	294

Notes: This savings is based on occupied run time only

Building Automation Upgrades Summary

MHS – 02 Building Automation Upgrades High/Middle School Upgrades

Unit	MCF Savings	kWh Savings
AHU-1	548.33	69372.02
AHU-2	185.72	17238.09
AHU-3	33.16	10296.42
AHU-4	163.61	48470.32
AHU-1 pII	113.94	17824.45
AHU-2 pII	5.86	2634.27
AHU-3 pII	5.86	2634.27
RTU-1	10.99	1718.65
VAV Boxes	403.08	0.00
Unit Vents	354.46	23029.12
Cab. Heaters	17.134	0.00
Exhaust Fans	753.45	2409.80
Exterior Lighting	0	33704.00
Totals:	2596	229331

MES – 02 Building Automation Upgrades Elementary School Upgrades

Unit	MCF Savings	kWh Savings
Damper Retrofit	113	0
Wheel Repair	100	0
IGV to VFD Upgrade	0	2255
Exterior Lighting	0	26207
Totals:	213	28462

MHS – 03 Campus Technology Upgrades

As part of the energy conservation project the District would like to upgrade 100 Cathode Ray Tube (CRT) monitors to new LCD monitors. Energy Savings for this upgrade were found using the calculation provided below.

HS Computer Upgrade

Zone Parameters	
Rm:	115
Computers	35
% (On/Standby) Current	0.8
Heating Hours	1280
Cooling Hours	244
Current Cooling added kWh	461.33696
Current Heating added kWh	1886.6176
Proposed Cooling Use kWh:	89.90912
Proposed Heating Use kWh:	471.6544
Cooling Load Btu:	1574543.04
Heating Provided Btu:	6439025.87
Proposed Cooling:	306859.83
Proposed Heating	1609756.47

HVAC Savings	
Electric Cost:	\$0.09
Gas Cost:	\$8.04
Electric Cost \$/Btu	\$0.000026
Gas Cost \$/Btu	\$0.000008
Cooling COP	3.00
Heating Efficiency	0.90
Current Cooling Cost:	\$13.84
Current Electric Heat:	\$56.39
Proposed Cooling Cost:	\$2.70
Proposed Electric Heat:	\$42.45
Proposed Gas Heat:	\$42.30
HVAC Savings:	-\$17.21

Electric Savings	
Current Cost:	\$211.32
Proposed Cost:	\$50.54
Savings:	\$160.78

Total Project Savings:	\$143.57
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Zone Parameters	
Rm:	Rm 116
Computers	35
% (On/Standby) Current	0.8
Heating Hours	1200
Cooling Hours	244
Current Cooling added kWh	490.784
Current Heating added kWh	1881.6
Proposed Cooling Use kWh:	95.648
Proposed Heating Use kWh:	470.4
Cooling Load Btu:	1675045.79
Heating Provided Btu:	6421900.80
Proposed Cooling:	326446.62
Proposed Heating	1605475.20

HVAC Savings	
Electric Cost:	\$0.09
Gas Cost:	\$8.04
Electric Cost \$/Btu	\$0.000026
Gas Cost \$/Btu	\$0.000008
Cooling COP	3.00
Heating Efficiency	0.90
Current Cooling Cost:	\$14.72
Current Electric Heat:	\$56.24
Proposed Cooling Cost:	\$2.87
Proposed Electric Heat:	\$42.34
Proposed Gas Heat:	\$42.18
HVAC Savings:	-\$16.42

Electric Savings	
Current Cost:	\$213.51
Proposed Cost:	\$50.94
Savings:	\$162.57

Total Project Savings:	\$146.15
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Elementary Monitor Upgrade

Zone Parameters	
Rm:	ES Lab
Computers	30
% (On/Standby) Current	0.8
Heating Hours	1286
Cooling Hours	244
Current Cooling Use kWh	420.672
Current Heating Use kWh	1728.384
Proposed Cooling Use kWh:	81.984
Proposed Heating Use kWh:	432.096
Cooling Load Btu:	1435753.54
Heating Provided Btu:	5898974.59
Proposed Cooling:	279811.39
Proposed Heating	1474743.65

HVAC Savings	
Electric Cost:	\$0.09
Gas Cost:	\$8.04
Electric Cost \$/Btu	\$0.000026
Gas Cost \$/Btu	\$0.000008
Cooling COP	3.00
Heating Efficiency	0.90
Current Cooling Cost:	\$12.62
Current Electric Heat:	\$51.66
Proposed Cooling Cost:	\$2.46
Proposed Electric Heat:	\$38.89
Proposed Gas Heat:	\$38.75
HVAC Savings:	-\$15.81

Electric Savings	
Current Cost:	\$193.42
Proposed Cost:	\$46.27
Savings:	\$147.15

Total Project Savings:	\$131.34
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**MHS – 03 Campus Technology Upgrades
Monitor Savings Summary**

Savings Summary	
High School Savings	\$442.94
HS Electric Saved kWh	4921.58
Elementary Savings	\$131.34
Elem. Electric Saved kWh	1459.29

Mercantile Customer Project Commitment Agreement
Exemption Option

THIS MERCANTILE CUSTOMER PROJECT COMMITMENT AGREEMENT ("Agreement") is made and entered into by and between Ohio Edison Company, its successors and assigns (hereinafter called the "Company") and Mapleton Board of Education, its permitted successors and assigns (hereinafter called the "Customer") (collectively the "Parties" or individually the "Party") and is effective on the date last executed by the Parties as indicated below.

WITNESSETH

WHEREAS, the Company is an electric distribution utility and electric light company, as both of these terms are defined in R.C. § 4928.01(A); and

WHEREAS, Customer is a mercantile customer, as that term is defined in R.C. § 4928.01(A)(19), doing business within the Company's certified service territory; and

WHEREAS, R.C. § 4928.66 (the "Statute") requires the Company to meet certain annual energy efficiency and peak demand reduction ("EE&PDR") benchmarks; and

WHEREAS, when complying with certain EE&PDR benchmarks the Company may include the effects of mercantile customer-sited EE&PDR projects; and

WHEREAS, Customer has certain customer-sited demand reduction, demand response, or energy efficiency project(s) as set forth in attached Exhibit 1 (the "Customer Energy Project(s)") that it desires to commit to the Company for integration into the Company's Energy Efficiency & Peak Demand Reduction Program Portfolio Plan ("Company Plan") that the Company will implement in order to comply with the Statute; and

WHEREAS, the Customer, pursuant to and consistent with the Statute, desires to pursue exemption from paying charges included in the Company's then current cost recovery mechanism (hereinafter, "Rider DSE") as approved by the Public Utilities Commission of Ohio ("Commission") for recovery of the DSE2 costs associated with the Company Plan; and is committing the Customer Energy Project(s) as a result of such exemption.

WHEREAS, Customer's decision to commit its Customer Energy Project(s) to the Company for inclusion in the Company Plan has been reasonably encouraged by the possibility of an exemption; and

WHEREAS, in consideration of, and upon receipt of, said exemption, Customer has consented to committing the Customer Energy Project(s) to the Company and complying with all other terms and conditions set forth herein, including without limitation, the submission of an annual report on the energy savings and/or peak-demand reductions achieved by the Customer Energy Project(s).

NOW THEREFORE, in consideration of the mutual promises set forth herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties, intending to be legally bound, do hereby agree as follows:

1. **Customer Energy Projects.** Customer hereby commits to the Company and Company accepts for integration into the Company Plan the Customer Energy Project(s) set forth on attached Exhibit 1. Said commitment shall be for the life of the Customer Energy Project(s). Company will incorporate said project(s) into the Company Plan to the extent that such projects qualify. In so committing, and as evidenced by the affidavit attached hereto as Exhibit A, Customer

acknowledges that the information provided to the Company about the Customer Energy Project(s) is true and accurate to the best of its knowledge.

- a. By committing the Customer Energy Project(s) to the Company, Customer acknowledges and agrees that the Company shall control the use of the kWh and kW reductions resulting from said projects for purposes of complying with the Statute. By committing the Customer Energy Project(s), Customer has the ability to either:
 - i. Take ownership of the Energy Efficiency resource credits resulting from their Customer Energy Project(s) and may be able to bid - or sell - the Energy Efficiency resource credits into the market operated by the grid operator, PJM Interconnection, Inc. (PJM), provided several prerequisites are met; or
 - ii. Allow the Company to take ownership of the Energy Efficiency resource credits associated with their Customer Energy Project(s). The Company shall, at its sole discretion, aggregate said capacity into the PJM market through an auction. Any proceeds from any such bids accepted by PJM will be used to offset the costs charged to the Customer and other of the Company's customers for compliance with state mandated energy efficiency and/or peak demand requirements

Please indicate your preference as to the treatment of your Energy Efficiency resource credits:

- ☒ Customer would like to retain ownership of its Energy Efficiency resource credits.
- ☐ Customer assigns ownership of its Energy Efficiency resource credits to Company for purposes of bidding these credits into PJM.

- b. The Company acknowledges that some of Customer's Energy Projects contemplated in this paragraph may have been performed under certain other federal and/or state programs in which certain parameters are required to be maintained in order to retain preferential financing or other government benefits (individually and collectively as applicable, "Benefits"). In the event that the use of any such project by the Company in any way affects such Benefits, and upon written request from the Customer, Company will release said Customer's Energy Project(s) to the extent necessary for Customer to meet the prerequisites for such Benefits. Customer acknowledges that such release (i) may affect Customer's exemption benefits discussed in Article 3 below; and (ii) will not affect any of Customer's other requirements or obligations, including without limitation any reporting requirements, as set forth herein.
- c. Any future Customer Energy Project(s) committed by Customer shall be subject to a separate application and, upon approval by the Commission, said projects shall become part of this Agreement.
- d. Customer will provide Company or Company's agent(s) with reasonable assistance in the preparation of a joint application for approval of this Agreement ("Joint Application") that will be filed with the Commission, with such Joint Application being consistent with then current Commission requirements.
- e. Upon written request and reasonable advance notice, Customer will grant employees or authorized agents of either the Company or the Commission reasonable, pre-arranged access to the Customer Energy Project(s) for purposes of measuring and verifying energy savings and/or peak demand reductions resulting from the Customer Energy Project(s). It

is expressly agreed that consultants of either the Company or the Commission are their respective authorized agents.

2. **Joint Application to the Commission.** The Parties will submit the Joint Application using the Commission's standard "Application to Commit Energy Efficiency/Peak Demand Reduction Programs" in which they will seek the Commission's approval of (i) this Agreement; (ii) the commitment of the Customer Energy Project(s) for inclusion in the Company Plan; and (iii) the Customer's exemption from paying the DSE2 charge of the Company's Rider DSE.

The Joint Application shall include all information as set forth in the Commission's standard form which, includes without limitation:

- i. A narrative description of the Customer Energy Project(s), including but not limited to, make, model and year of any installed and/or replaced equipment;
- ii. A copy of this Agreement; and
- iii. A description of all methodologies, protocols, and practices used or proposed to be used in measuring and verifying program results.

3. **Customer Exemption and Annual Report.** Upon Commission approval of the request for exemption, the Company will exempt Customer from paying any Rider DSE charges consistent with any Commission directives as set forth in the Commission's Finding and Order approving the Joint Application. Such exempt status shall apply to those accounts identified by Customer that pertain to those Customer sites with one or more Customer Energy Project(s) approved for integration into the Company Plan by the Commission in the Joint Application.

- a. For purposes of this Agreement, a "site" shall be a single location with one or more facilities. As examples only, a site includes an industrial plant, a hospital complex or a university located on one or more parcels of land, provided that said parcels are contiguous.
- b. For purposes of this Agreement, an "account" shall be as defined by the Company through its normal business practices. Any account identified by Customer shall be eligible for exemption, provided that said account pertains to a specific site with at least one Customer Energy Project that qualifies Customer for exemption from paying Rider DSE charges.
- c. Any new accounts created at a site on which there is already an approved Customer Energy Project shall, at the option of the Customer, be included within the exemption granted under said project, and shall be included for purposes of calculating future eligibility for exemption under the project. Any such election shall become effective in the first billing cycle after March 15th following identification of said account in the annual report required under Section 3(d)(iii) below.
- d. Customer acknowledges and agrees that if it desires to pursue such exempt status, as evidenced in the Joint Application, Customer is obligated to provide to the Company an annual report on the energy savings and peak-demand reductions achieved by the Customer Energy Project(s) on a calendar year basis. Company shall provide Customer with such information as it may require, that is in Company's possession, for the purposes of preparing such report. Company shall provide a template for Customer to use in preparing the annual report and shall make available a designated Company representative to answer questions.

- i. Said report shall be submitted annually on or before January 31 of each year after Commission approval of the Joint Application.
- ii. Said report shall provide all information required under the Rules, and where the requirements of the Rules conflict with a requirement under this Agreement or the Joint Application, the requirements of the Rules shall control.
- iii. Said report shall, at a minimum, include the following information for each Customer Energy Project that has been approved by the Commission:
 - 1. A demonstration that the energy savings and peak-demand reductions associated with the Customer Energy Project(s) meet the total resource cost test or that the Company's avoided cost exceeds the cost to the Company for the Customer's program;
 - 2. A statement distinguishing programs implemented before and after January 1 of the current year;
 - 3. A quantification of the energy savings or peak-demand reductions for programs initiated prior to 2009 in the baseline period;
 - 4. A recognition that the Company's baselines have been increased by the amount of mercantile customer energy savings and demand reductions;
 - 5. A listing and description of the Customer Energy Projects that have been implemented, which provides the detail required by the Rules;
 - 6. An accounting of expenditures made by the mercantile customer for each program and its component energy savings and peak-demand reduction attributes; and
 - 7. A timeline showing when each Customer Energy Project went into effect and when the energy savings and peak-demand reductions occurred.
 - 8. Any other information reasonably necessary for the Company to (i) verify Customer's continued eligibility for exemption from paying Rider charges; and (ii) report in the Company's annual status report to the Commission the EE&PDR results related to each Customer Energy Project.
- e. Customer's exemption shall automatically terminate:
 - i. At the end of the exemption period as determined by the Commission
 - ii. Upon order of the Commission or pursuant to any Commission rule;
 - iii. If Customer fails to comply with the terms and conditions set forth in the Company's then current Rider DSE, or its equivalent, as amended from time to time by the Commission, within a reasonable period of time after receipt of written notice of such non-compliance;
 - iv. If it is discovered that Customer knowingly falsified any documents provided to the Company or the Commission in connection with this Agreement or the Joint Application. In such an instance, Company reserves the right to recover any

exempted rider charges from the date of approval of the Joint Application through the date said exemption is terminated; or

- v. If Customer fails to submit the annual report required in (d) above. In such an instance, Company reserves the right to recover any exempted rider charges from the date of approval of the Joint Application through the date said exemption is terminated. It is expressly agreed that this provision shall not apply should said report contain errors, provided that the submission of said report is made in good faith. It is further agreed that the Company will provide written notice of the date on which said report is due at least thirty (30) days prior thereto.
- f. Company reserves the right to recover from Customer any Rider DSE charges incurred by Customer after the date Customer's exemption terminates.

3. Termination of Agreement. This Agreement shall automatically terminate:

- a. If the Commission fails to approve this Agreement through the Joint Application;
- b. Upon order of the Commission; or
- c. At the end of the life of the last Customer Energy Project subject to this Agreement.

Customer shall also have an option to terminate this Agreement should the Commission not approve the Customer's exemption, provided that Customer provides the Company with written notice of such termination within ten days of either the Commission issuing a final appealable order or the Ohio Supreme Court issuing its opinion should the matter be appealed.

Customer acknowledges that if a Customer Project is withdrawn pursuant to Paragraph 1(b) of this Agreement, the exemption or a portion of such exemption may be affected. Should Customer elect to withdraw a project pursuant to Paragraph 1(b), Customer shall provide Company with reasonable assistance in preparing any documentation that may be required by the Commission and, upon reasonable request, shall provide documentation supporting the necessity to withdraw such project.

4. Confidentiality. Each Party shall hold in confidence and not release or disclose to any person any document or information furnished by the other Party in connection with this Agreement that is designated as confidential and proprietary ("Confidential Information"), unless: (i) compelled to disclose such document or information by judicial, regulatory or administrative process or other provisions of law; (ii) such document or information is generally available to the public; or (iii) such document or information was available to the receiving Party on a non-confidential basis at the time of disclosure.

- a. Notwithstanding the above, a Party may disclose to its employees, directors, attorneys, consultants and agents all documents and information furnished by the other Party in connection with this Agreement, provided that such employees, directors, attorneys, consultants and agents have been advised of the confidential nature of this information and through such disclosure are deemed to be bound by the terms set forth herein.
- b. A Party receiving such Confidential Information shall protect it with the same standard of care as its own confidential or proprietary information.
- c. A Party receiving notice or otherwise concluding that Confidential Information furnished by the other Party in connection with this Agreement is being sought under any provision

of law, to the extent it is permitted to do so under any applicable law, shall endeavor to: (i) promptly notify the other Party; and (ii) use reasonable efforts in cooperation with the other Party to seek confidential treatment of such Confidential Information, including without limitation, the filing of such information under a valid protective order.

- d. By executing this Agreement, Customer hereby acknowledges and agrees that Company may disclose to the Commission or its Staff any and all Customer information, including Confidential Information, related to a Customer Energy Project, provided that Company uses reasonable efforts to seek confidential treatment of the same.
5. **Taxes.** Customer shall be responsible for all tax consequences (if any) arising from the application of the exemption.
6. **Notices.** Unless otherwise stated herein, all notices, demands or requests required or permitted under this Agreement must be in writing and must be delivered or sent by overnight express mail, courier service, electronic mail or facsimile transmission addressed as follows:

If to the Company:

--.

FirstEnergy Service Company
76 South Main Street
Akron, OH 44308
Attn: Victoria Nofziger
Telephone: 330-384-4684
Fax: 330-761-4281
Email: vmnofziger@firstenergycorp.com

If to the Customer:

Mapleton Board of Education
635 County Road 801
Ashland, Ohio 44805
Attn: Dan Russomanno
Telephone: 419-945-2188
Fax:
Email: mapl_drussomanno@tccsa.net

or to such other person at such other address as a Party may designate by like notice to the other Party. Notice received after the close of the business day will be deemed received on the next business day; provided that notice by facsimile transmission will be deemed to have been received by the recipient if the recipient confirms receipt telephonically or in writing.

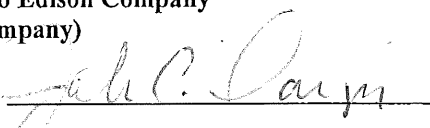
7. **Authority to Act.** The Parties represent and warrant that they are represented by counsel in connection with this Agreement, have been fully advised in connection with the execution thereof, have taken all legal and corporate steps necessary to enter into this Agreement, and that the undersigned has the authority to enter into this Agreement, to bind the Parties to all provisions herein and to take the actions required to be performed in fulfillment of the undertakings contained herein.
8. **Non-Waiver.** The delay or failure of either party to assert or enforce in any instance strict performance of any of the terms of this Agreement or to exercise any rights hereunder conferred, shall not be construed as a waiver or relinquishment to any extent of its rights to assert or rely upon such terms or rights at any later time or on any future occasion.
9. **Entire Agreement.** This Agreement, along with related exhibits, and the Company's Rider DSE, or its equivalent, as amended from time to time by the Commission, contains the Parties' entire understanding with respect to the matters addressed herein and there are no verbal or collateral representations, undertakings, or agreements not expressly set forth herein. No change in, addition to, or waiver of the terms of this Agreement shall be binding upon any of the Parties unless the same is set forth in writing and signed by an authorized representative of each of the Parties. In the event of any conflict between Rider DSE or its equivalent and this document, the latter shall prevail.
10. **Assignment.** Customer may not assign any of its rights or obligations under this Agreement without obtaining the prior written consent of the Company, which consent will not be unreasonably withheld. No assignment of this Agreement will relieve the assigning Party of any of its obligations under this Agreement until such obligations have been assumed by the assignee and all necessary consents have been obtained.
11. **Severability.** If any portion of this Agreement is held invalid, the Parties agree that such invalidity shall not affect the validity of the remaining portions of this Agreement, and the Parties further agree to substitute for the invalid portion a valid provision that most closely approximates the economic effect and intent of the invalid provision.

12. **Governing Law.** This Agreement shall be governed by the laws and regulations of the State of Ohio, without regard to its conflict of law provisions.

13. **Execution and Counterparts.** This Agreement may be executed in multiple counterparts, which taken together shall constitute an original without the necessity of all parties signing the same page or the same documents, and may be executed by signatures to electronically or telephonically transmitted counterparts in lieu of original printed or photocopied documents. Signatures transmitted by facsimile shall be considered original signatures.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed by their duly authorized officers or representatives as of the day and year set forth below.

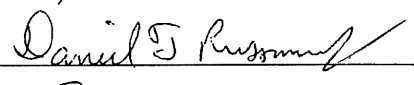
Ohio Edison Company
(Company)

By: 

Title: VP of Energy Efficiency

Date: 6-11-14

Mapleton Board of Education
(Customer)

By: 

Title: Treasurer

Date: 6-5-14

Affidavit of Mapleton Board of Education – Exhibit A

STATE OF OHIO)

)

SS:

COUNTY OF Ashland)

I, Dan Russomanno, being first duly sworn in accordance with law, deposes and states as follows:

1. I am the Treasurer of Mapleton Board of Education (“Customer”) As part of my duties, I oversee energy related matters for the Customer.
2. The Customer has agreed to commit certain energy efficiency projects to Ohio Edison Company (“Company”), which are the subject of the agreement to which this affidavit is attached (“Project(s)”).
3. In exchange for making such a commitment, the Company has agreed to provide Customer with a Rider Exemption (“Incentive”). This Incentive was a critical factor in the Customer’s decision to go forward with the Project(s) and to commit the Project(s) to the Company.
4. All information related to said Project(s) that has been submitted to the Company is true and accurate to the best of my knowledge.

FURTHER AFFIANT SAYETH NAUGHT.

Daniel Russomanno

Sworn to before me and subscribed in my presence this 5th day of June, 2014

Paula L. Ames
Notary

Paula L. Ames
Notary Public, State of Ohio
My Commission Expires 10/26/18

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

7/21/2014 11:20:18 AM

in

Case No(s). 14-0763-EL-EEC

Summary: Application to Commit Energy Efficiency/Peak Demand Reduction Programs of Ohio Edison Company and Mapleton Board of Education electronically filed by Ms. Jennifer M. Sybyl on behalf of Ohio Edison Company and Mapleton Board of Education