

Annual Savings Report – School Performance Contracting Program

State of Ohio Standard Forms and Documents

Project Name Bridgeport EVSD

Date August 29, 2018

Project Number 1380

Project Summary	
School District Name	Bridgeport Exempted Village School District
State Project Number (SN)	1380
Total Project Cost (\$)	\$ 502,474
Length of Contract Term (years)	15
Projected Annual Savings (\$)	\$ 44,616
Construction Started / Completed	June 2015 – June 2016
Reporting Year (1, 2, or 3)	2
ESCO Name	Energy Optimizers USA
ESCO Guaranteed Annual Energy Savings (\$)	\$38,310
ESCO Address	7950 S. County Rd. 25 A Tipp City, OH 45371
ESCO Phone Number	(937) 877-1919
ESCO Contact Person	Shalini Kumaralingam
ESCO E-mail Address	skumar@energyoptusa.com

At a minimum, the following items must be included in the annual report to support the summary table above. Additional information may be included and the items below are in no order within your report.

Please check that the following are included in the report.

- ✓ Baseline utility tables (gas, electric, water/sewage, etc.) including rates
- ✓ Actual monthly utility data for the current year
- ✓ List of Adjustments from baseline to current year and the supporting documentation
- ✓ Adjusted utility tables for the current reporting year
- ✓ Conclusion as to whether the project has its savings projection
- ✓ Conclusion as to whether the project has met its guarantee (for projects approved after September 2013)
- ✓ In case of shortfall, what measures are proposed to remedy the shortfall (if applicable)

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1 Annual Savings Summary

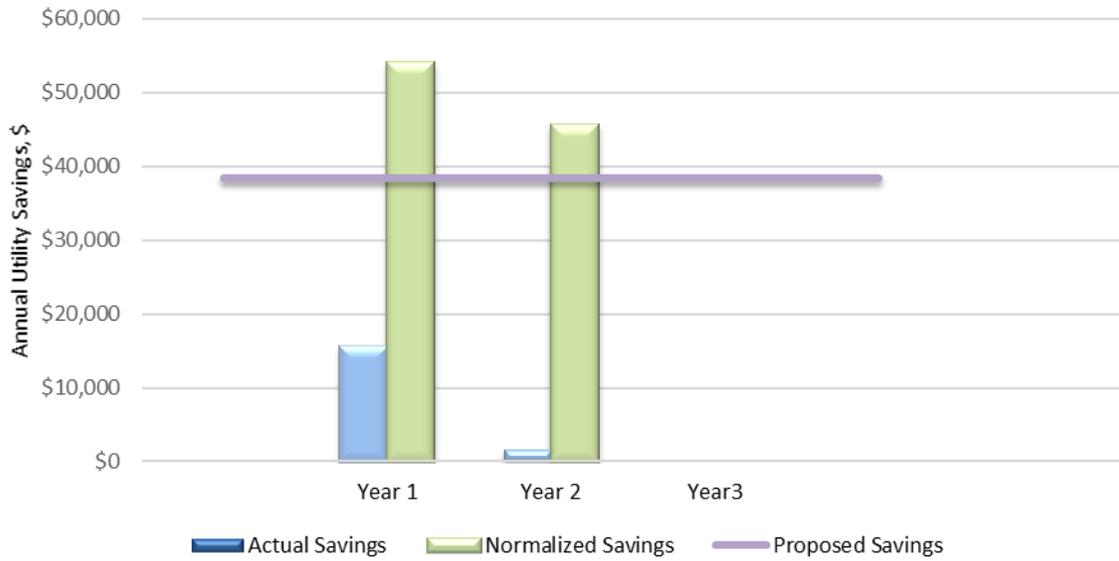
Below is a quick overview of the School Performance Contracting project completed at Bridgeport Exempted Village Schools.

Bridgeport EVSD	Benchmark	Proposed		Actual Post-Project			Normalized Post-Project		
	Consumption & Costs	Consumption & Costs	Savings	Consumption & Costs	Savings	% Change to Benchmark	Consumption & Costs	Normalized Savings	% Change to Benchmark
Electric									
Annual Usage, <i>kWh</i>	1,631,700	1,278,507	353,193	1,239,000	392,700	-24.1%	1,220,170	411,530	-25.2%
Annual Cost, \$	\$158,045	\$123,835	\$34,210	\$158,259	(\$214)	0.1%	\$114,360	\$43,685	-27.6%
Fuel									
Annual Usage, <i>MMBtu</i>	5,807	5,094	712	5,004	803	-13.8%	5,473	334	-5.8%
Annual Cost, \$	\$33,421	\$29,321	\$4,100	\$31,606	\$1,815	-5.4%	\$31,498	\$1,923	-5.8%
Total Annual Utility Cost	\$191,466	\$153,156	\$38,310	\$189,865	\$1,601	-0.8%	\$145,858	\$45,608	-23.8%
Weather									
Cooling Degree Days, <i>CDD</i>	771			948			23.0%		
Heating Degree Days, <i>HDD</i>	6,264			5,707			-8.9%		

*Normalized savings are adjusted for pricing, weather conditions, and major facility changes to ensure an “apples to apples” comparison with benchmark data.

**HDD/CDD – Are a measurement of heating and cooling loads and are defined as the amount of degrees per day that the average temperature deviates from 65 F. For example, a cold day with an average temperature of 20 F would have 45 degree-days for that day (65 F – 20 F).

Bridgeport Exempted Village Schools



	OFCC Approved Savings	Guaranteed Savings	Actual Savings	Normalized Savings
Electric	\$ 34,853	\$ 34,210	\$ (214)	\$ 43,685
Natural Gas	\$ 5,620	\$ 4,100	\$ 1,815	\$ 1,923
Total Savings	\$ 40,473	\$ 38,310	\$ 1,601	\$ 45,608

The School has met its savings!

2 Introduction

The Reconciliation Report is meant to highlight the energy savings due to the School Energy Performance Contracting Project for Bridgeport Exempted Village Schools. There is a slight difference in the initial submittal savings versus the guaranteed savings due to the adjustments in detailed engineering calculations as well as what the true savings are compared to what we guarantee. The implementation of the energy savings measures was completed in June 2016. This report details energy savings only; operations and maintenance savings have not been tabulated.

2.1 Energy Savings Summary

It was anticipated that the School Performance Contracting Project would save the district \$38,310 in energy per year. In the second year of post-project energy data considered, it has been calculated that the district saved \$45,608 in energy!

Reconciliation Report – Energy Savings Summary

OFCC Approved Savings	Guaranteed Savings	Actual Savings	Normalized Savings
Electric \$ 34,853	\$ 34,210	\$ (214)	\$ 43,685
Natural Gas \$ 5,620	\$ 4,100	\$ 1,815	\$ 1,923
Total Savings \$ 40,473	\$ 38,310	\$ 1,601	\$ 45,608

Note: The table above only includes Energy Savings; it does not include Operations and Maintenance Savings.

3 Project Adjustments

Energy Optimizers USA, has access to the School's Building Automation System (BAS). Looking into the controls there seems to be a few issues but are not taken into account because the School is meeting its savings.

4 Savings Calculations

We at Energy Optimizers, USA find that the most accurate and reliable way of calculating the savings is Option C which is to compare energy usage data from after the project to data from before the project. Energy data from the time period after the project has been completed, or the “post-project period” is measured against the energy data from before the project started, the baseline or benchmark time period. These two time periods are:

Benchmark Time Period: November 2013 – October 2014
 Post-Project Time Period: July 2017 – June 2018

4.1 Normalized Savings

4.1.1 Need for Normalization

Due to fluctuations in weather and prices in energy, the amount of money spent on energy can change drastically from year-to-year. In order to compare “apples to apples,” normalizing the data for the same weather and energy cost baseline is necessary. For example, if the price of electricity increases from \$0.10/unit to \$0.12/unit from one year to the next, and the owner uses 10% less energy, the overall cost will still increase because of the increased cost per unit.

Normalization is accomplished by adjusting the savings figures by a ratio of the benchmark heating or cooling demand and the post-project heating or cooling demand. Also, the benchmark energy cost rate is multiplied by the energy saved. These two steps remove the variables of weather and energy cost from the savings figures so that they are comparable to the anticipated savings. In turn, this allows us to determine the accurate amount of energy that was saved due to the School Performance Contracting project.

4.1.2 Usage Dependency

The first step is separating each respective energy usage by two or three categories, namely Weather-dependent, Occupancy-dependent, and/or Independent use. The percentages will allow the energy usage that is dependent on the weather to be normalized with respect to changes in weather from year to year. The independent portion is separated so it is not normalized for weather or occupancy. These percentages for the district are displayed in the table below.

Energy Usage Dependence Percentages

Pre - Project						
Bridgeport EVSD	Electric			Natural Gas		
	Ind %	Wea %	Occ %	Ind %	Wea %	Occ %
Bridgeport K-12	86.9%	9.3%	3.8%	3.8%	96.2%	0.0%
Post - Project						
Bridgeport EVSD	Electric			Natural Gas		
	Ind %	Wea %	Occ %	Ind %	Wea %	Occ %
Bridgeport K-12	91.9%	8.1%	0.0%	4.1%	95.9%	0.0%

The following was assumed if the R² value of the regression model was below 0.75.

Criteria	Electric			Natural Gas		
	Ind %	Wea %	Occ %	Ind %	Wea %	Occ %
Building with Cooling	79.0%	21.0%	0.0%	8.0%	92.0%	0.0%
Building without Cooling	98.0%	2.0%	0.0%	7.7%	92.3%	0.0%

4.1.3 Weather Differences

To adjust for differences in weather, it is necessary to determine the annual heating and cooling demand. Energy Optimizers, USA chooses to use heating degree days (HDD) and cooling degree days (CDD) for this measurement, as degree days are a great representation of the typical heating/cooling requirements for a building.

For example, the process of calculating the annual heating degree days is:

When the average outdoor air temperature (T_{oa}) is less than the balance point temperature (T_{bal} - the outdoor air temperature at which heating/cooling is initiated), calculate the difference between the balance point temperature and average outdoor air temperature.

Sum that difference up for all days in the given year.

This equates to the heating degree days per year, and gives us an estimate of the annual heating energy use for a given location and balance temperature. The calculation for heating degree days is represented in the equation below; the process is nearly identical for cooling degree days.

$$\text{Heating Degree Days} = \sum_{i=1}^{365} (T_{bal} - T_{oa,i})$$

The heating and cooling degree days for the both time periods are displayed in the table below.

Weather Data	Baseline	Post Project	% Change to Baseline
Cooling Degree Days CDD	771	948	23.0%
Heating Degree Days HDD	6,264	5,707	-8.9%

Using the heating and cooling degree days for each time period, as well as the Baseline Energy Signature breakdown from the initial analysis of the district's energy use, we were able to determine how much of the total energy was used for heating or cooling the facility. The percentage breakdown allows us to adjust the weather dependent portion of the usage with the ratio of heating/cooling degree days of the two time periods, which enables us to calculate the normalized post-project savings. This, in turn, will allow us to see how well the project has performed in comparison to the anticipated savings.

4.1.4 Electricity

Now that the heating and cooling degree days have been determined, it is possible to normalize the energy savings to determine just how much energy and money the School Performance Contracting project saved the district. To adjust for the electricity cost per unit change from the benchmark to the post-project time frame, we will multiple the weather normalized savings by the benchmark electricity cost per unit. The calculations and results are displayed below.

Non-Weather Normalized Electricity Usage Calculations

Non-Weather Normalized Data			
Electricity Usage Data	Baseline	Post-Project	Change from Baseline
Annual kWh Usage	1,631,700	1,239,000	-24.1%
Annual kWh Cost	\$158,045	\$158,259	\$214
Average Cost per kWh	\$0.097	\$0.128	31.9%
Annual kW Usage (Demand)	4,968	3,697	-25.6%
Rate Structure: Cost per kW; Cost per kWh	\$7.69	\$0.08	
Electrical kBtu/SqFt	44.20	33.56	-24.1%

Weather Normalized Electricity Usage Calculations

Weather Normalized Data			
Electricity Usage Data	Baseline	Post-Project	Change from Baseline
Independent kWh Usage	1,479,952	1,138,145	-23.1%
Weather-Dependent kWh Usage	151,748	100,855	-33.5%
Electrical kWh/CDD	196.82	106.39	-45.9%
Weather Normalized kWh	1,631,700	1,220,170	-25.2%
Total Electrical kWh/CDD	2,116	1,287	-39.2%

4.1.5 Natural Gas

The same process that was completed to ascertain the normalized electricity savings has been executed for the natural gas side of the savings venture. The calculations and savings associated are shown below.

Non-Weather Normalized Natural Gas Usage Calculations

Non-Weather Normalized Data			
Heating Fuel Usage Data	Baseline	Post-Project	Change from Baseline
Annual MMBtu Usage	5,807	5,004	-13.8%
Annual MMBtu Cost	\$33,421	\$31,606	(\$1,815)
Average Cost per MMBtu	\$5.76	\$6.32	9.7%
Heating Fuel kBtu/SqFt	46.09	39.72	-13.8%

Weather Normalized Natural Gas Usage Calculations

Weather Normalized Data			
Heating Fuel Usage Data	Baseline	Post-Project	Change from Baseline
Independent MMBtu Usage	221	205	-7.0%
Weather-Dependent MMBtu Usage	5,586	4,799	-14.1%
Heating Fuel MMBtu/HDD	0.89	0.84	-5.7%
Weather Normalized MMBtu	5,807	5,473	-5.8%
Total Heating Fuel MMBtu/HDD	0.93	0.96	3.4%

4.1.6 Savings Summary

Total Summarized Savings

OFCC Approved Savings	Guaranteed Savings	Actual Savings	Normalized Savings
Electric \$ 34,853	\$ 34,210	\$ (214)	\$ 43,685
Natural Gas \$ 5,620	\$ 4,100	\$ 1,815	\$ 1,923
Total Savings \$ 40,473	\$ 38,310	\$ 1,601	\$ 45,608

5 Operation and Maintenance Savings

Bridgeport Exempted Village Schools approves that Energy Optimizers, USA has met the guaranteed operations and maintenance savings of \$12,430.

6 Proposed Measures for Shortfall in Savings

This project does not include any shortfalls.

The School has met its savings!

7 Appendices

7.1 District Reconciliation Analysis

Bridgeport EVSD



District Summary

Reconciliation Report: HVAC, Weather and Price Normalized

Baseline Energy Use Time Period: November 2013 - October 2014

Post-Project Energy Use Time Period: July 2017 - June 2018

Note: Energy savings figures only reflect (12) months of post-project data.

Weather Data	Cooling Degree Days (CDD)	Baseline: 771	Post Project: 948	Difference from Baseline: 23.0%
Weather Stn. Location: Wheeling, WV	Heating Degree Days (HDD)	Baseline: 6,264	Post Project: 5,707	Difference from Baseline: -8.9%

ENERGY USAGE COMPARISON

Electricity Usage Data

Non-Weather Normalized Data				Weather Normalized Data			
Electricity Usage Data	Baseline	Post-Project	Change from Baseline	Electricity Usage Data	Baseline	Post-Project	Change from Baseline
Annual kWh Usage	1,631,700	1,239,000	-24.1%	Independent kWh Usage	1,479,952	1,138,145	-23.1%
Annual kWh Cost	\$158,045	\$158,259	\$214	Weather-Dependent kWh Usage	151,748	100,855	-33.5%
Average Cost per kWh	\$0.097	\$0.128	31.9%	Electrical kWh/CDD	196.82	106.39	-45.9%
Annual kW Usage (Demand)	4,968	3,697	-25.6%	Weather Normalized kWh	1,631,700	1,220,170	-25.2%
Rate Structure: Cost per kW; Cost per kWh	\$7.69	\$0.08		Total Electrical kWh/CDD	2,116	1,287	-39.2%
Electrical kBtu/SqFt	44.20	33.56	-24.1%				

Heating Fuel Usage Data

Non-Weather Normalized Data				Weather Normalized Data			
Heating Fuel Usage Data	Baseline	Post-Project	Change from Baseline	Heating Fuel Usage Data	Baseline	Post-Project	Change from Baseline
Annual MMBtu Usage	5,807	5,004	-13.8%	Independent MMBtu Usage	221	205	-7.0%
Annual MMBtu Cost	\$33,421	\$31,606	(\$1,815)	Weather-Dependent MMBtu Usage	5,586	4,799	-14.1%
Average Cost per MMBtu	\$5.76	\$6.32	9.7%	Heating Fuel MMBtu/HDD	0.89	0.84	-5.7%
Heating Fuel kBtu/SqFt	46.09	39.72	-13.8%	Weather Normalized MMBtu	5,807	5,473	-5.8%
				Total Heating Fuel MMBtu/HDD	0.93	0.96	3.4%

Savings Summary

Proposed Savings - Unit	Proposed Savings - \$	Proposed Savings 12 Months	Bill to Bill Savings by Unit	Bill to Bill Savings - \$	Normalized Savings - Unit	Normalized Savings - \$
Electrical Savings - kWh	353,193	\$34,210	\$34,210	392,700	-\$214	\$43,685
Heating Fuel Savings - MMBtu	712	\$4,100	\$4,100	803	\$1,815	\$1,923

TOTAL SAVINGS:

Anticipated Savings 12 Months	\$38,310	Bill to Bill Comparison Savings	\$1,601	Total Normalized Savings	\$45,608
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7.2 District Utility Analysis

Bridgeport EVSD



District Summary

Post Project Period July 2017 - June 2018

FACILITY LOCATION NAME	FACILITY SIZE (S.F.)	ANNUAL ELECTRIC		ANNUAL KW	COST/ KWH	KBTU/ SF	ANNUAL FUEL (Total)		COST/ MMBTU	KBTU/ SF	TOTAL	TOTAL	TOTAL
		KWH	COST				MMBTU	COST (Total)			ANNUAL COST	KBTU/SF	\$/SF
1 Bridgeport K-12	126,000	1,239,000	\$ 158,259	3696.9	\$ 0.128	33.56	5,004	\$ 31,606	\$ 6.32	39.72	\$ 189,865	73.28	\$ 1.51
District Totals		1,239,000	\$ 158,259	3696.9	\$ 0.128	33.56	5,004	\$ 31,606	\$ 6.32	39.72	\$ 189,865	73.28	\$ 1.51

Baseline Period November 2013 - October 2014

FACILITY LOCATION NAME	FACILITY SIZE (S.F.)	ANNUAL ELECTRIC		ANNUAL KW	COST/ KWH	KBTU/ SF	ANNUAL FUEL (Total)		COST/ MMBTU	KBTU/ SF	TOTAL	TOTAL	TOTAL
		KWH	COST				MMBTU	COST (Total)			ANNUAL COST	KBTU/SF	\$/SF
1 Bridgeport K-12	126,000	1,631,700	\$ 158,045	4968.0	\$ 0.097	44.20	5,807	\$ 33,421	\$ 5.76	46.09	\$ 191,466	90.28	\$ 1.52
District Totals		1,631,700	\$ 158,045	4968.0	\$ 0.097	44.20	5,807	\$ 33,421	\$ 5.76	46.09	\$ 191,466	90.28	\$ 1.52

Weather Normalized Utility Summary

Weather Normalized Totals Post Project	126,000	978,810	\$ 125,025	\$ 0.128	7.77	26.51	400	\$ 2,528	\$ 6.32	3.18	\$ 127,553	29.69	\$ 1.01
Weather Normalized Totals Baseline	126,000	1,289,043	\$ 124,856	\$ 0.097	10.23	34.92	465	\$ 2,674	\$ 5.76	3.69	\$ 127,529	38.60	\$ 1.01

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Total
2017 - 2018 - Heating Degree Days	678	1,092	1,181	729	914	573	51	35	15	43	116	280	5,707
2013 - 2014 - Heating Degree Days	767	949	1,312	1,092	938	399	190	39	43	34	132	369	6,264
2017 - 2018 - Cooling Degree Days	2	0	0	5	0	22	166	186	237	162	113	55	948
2013 - 2014 - Cooling Degree Days	1	0	0	0	0	24	84	176	186	182	100	18	771

7.3 K-12 Utility Analysis

Bridgeport K-12

55707 Industrial Drive, Bridgeport, OH 43912	Facility Size	126,000
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Post Project Data	Electricity					Fuel				Summary	
	Meter Read Date	Energy (kWh)	Cost (\$)	Cost/kWh	Demand (kW billed)	Meter Read Date	Fuel (MMBtu)	Cost (\$)	Cost/MMBtu	Total (\$)	\$/SF
	11/25/17	98,400	\$12,561	\$ 0.128	316.5	11/01/17	256	\$1,716	\$ 6.70	\$14,277	\$ 0.11
	12/25/17	95,100	\$11,607	\$ 0.122	206.7	12/01/17	662	\$4,098	\$ 6.19	\$15,705	\$ 0.12
	01/25/18	111,900	\$14,294	\$ 0.128	329.4	01/01/18	940	\$5,754	\$ 6.12	\$20,048	\$ 0.16
	02/25/18	92,700	\$11,714	\$ 0.126	258.0	02/01/18	990	\$6,055	\$ 6.12	\$17,769	\$ 0.14
	03/25/18	84,300	\$10,942	\$ 0.130	246.9	03/01/18	737	\$4,546	\$ 6.17	\$15,488	\$ 0.12
	04/25/18	90,300	\$11,711	\$ 0.130	240.6	04/01/18	847	\$5,200	\$ 6.14	\$16,911	\$ 0.13
	05/16/18	94,200	\$13,513	\$ 0.143	364.5	05/01/18	427	\$2,709	\$ 6.34	\$16,222	\$ 0.13
	06/15/18	103,800	\$13,790	\$ 0.133	318.6	06/01/18	35	\$359	\$ 10.26	\$14,149	\$ 0.11
07/25/17	112,500	\$14,280	\$ 0.127	364.5	07/01/17	11	\$223	\$ 19.80	\$14,504	\$ 0.12	
08/25/17	114,300	\$13,695	\$ 0.120	316.8	08/01/17	3	\$60	\$ 19.43	\$13,755	\$ 0.11	
09/25/17	117,000	\$14,970	\$ 0.128	379.2	09/01/17	19	\$245	\$ 12.58	\$15,215	\$ 0.12	
10/25/17	124,500	\$15,181	\$ 0.122	355.2	10/01/17	76	\$640	\$ 8.44	\$15,821	\$ 0.13	
Totals	1,239,000	\$ 158,259	\$ 0.128	3,696.9		5,004.2	\$ 31,606	\$ 6.32	\$189,865	\$ 1.51	

Baseline Pre-Project Data	Electricity					Fuel				Summary	
	Meter Read Date	Energy (kWh)	Cost (\$)	Cost/kWh	Demand (kW billed)	Meter Read Date	Fuel (MMBtu)	Cost (\$)	Cost/MMBtu	Total (\$)	\$/SF
	11/13/2013	113,400	\$10,839	\$ 0.096	379.2	11/15/13	278.3	\$1,496	\$ 5.37	\$12,335	\$ 0.10
	12/16/2013	125,700	\$11,436	\$ 0.091	309.9	12/15/13	734.1	\$3,972	\$ 5.41	\$15,408	\$ 0.12
	1/17/2014	120,000	\$11,017	\$ 0.092	306.6	01/15/14	978.1	\$5,683	\$ 5.81	\$16,700	\$ 0.13
	2/17/2014	127,800	\$11,006	\$ 0.086	319.2	02/15/14	1,176.0	\$7,211	\$ 6.13	\$18,217	\$ 0.14
	3/18/2014	129,900	\$11,234	\$ 0.086	326.4	03/15/14	1,108.6	\$6,222	\$ 5.61	\$17,456	\$ 0.14
	4/16/2014	128,700	\$11,648	\$ 0.091	408.3	04/15/14	712.2	\$3,927	\$ 5.51	\$15,576	\$ 0.12
	5/16/2014	137,700	\$12,819	\$ 0.093	495.3	05/15/14	550.2	\$2,903	\$ 5.28	\$15,722	\$ 0.12
	6/17/2014	155,100	\$14,242	\$ 0.092	501.0	06/15/14	144.9	\$970	\$ 6.69	\$15,212	\$ 0.12
7/17/2014	165,600	\$14,489	\$ 0.087	408.9	07/15/14	17.9	\$182	\$ 10.15	\$14,670	\$ 0.12	
8/15/2014	137,100	\$15,407	\$ 0.112	405.0	08/15/14	14.4	\$156	\$ 10.82	\$15,562	\$ 0.12	
9/16/2014	171,000	\$19,348	\$ 0.113	577.8	09/15/14	24.8	\$221	\$ 8.92	\$19,570	\$ 0.16	
10/15/2014	119,700	\$14,559	\$ 0.122	530.4	10/15/14	67.3	\$479	\$ 7.11	\$15,037	\$ 0.12	
Totals	1,631,700	\$158,045	\$ 0.097	4,968.0		5,806.8	\$ 33,421	\$ 5.76	\$191,466	\$ 1.52	