In Partnership with

Energy Evaluation
For
Town of Carver Middle / High School

60 South Meadow Road
Carver, MA 02330-1200

Proposal # 005122

Prepared by:

RISE Engineering a Division of Thielsch Engineering

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➢ ENERGY SAVINGS SUMMARY

ELECTRIC ENERGY SAVINGS ANALYSIS

	EXISTING KW	PROPOSED KW	SAVED KW	EXISTING KWH	PROPOSED KWH	SAVED KWH	PERCENT SAVINGS
HOT WATER PUMP #1	14.76	5.76	9.0	33,345	13,019	20,326	61%
HOT WATER PUMP #2	14.76	5.76	9.0	33,345	13,019	20,326	61%
Gym Lighting	32.81	26.66	6.2	118,116	62,384	55,732	52%
TOTALS	47.57	32.42	15.1	184,806	88,422	96,384	61%

➢ INTRODUCTION

Carver Middle / High School serves approximately 600 children in grades 6-12. This building is unique due to the separation of the grades ie. 2 Gyms, Cafeteria etc.. RISE

GAS ENERGY SAVINGS ANALYSIS

	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
BOILER REPLACEMENT	76,945	65,737	11,208	15%
HOT WATER TANK REPLACEMENT	7,152	4,517	2,635	37%
GYM #1 CO2 CONTROL	9,763	8,233	1,530	16%
GYM #2 C02 CONTROL	10,577	8,913	1,664	16%
GYM #1 DESTRATIFICATION FANS	8,233	6,569	1,664	20%
GYM #2 DESTRATIFICATION FANS	8,913	7,249	1,664	19%
GYM #1 MOTION CONTROL	6,569	5,930	639	10%
GYM #2 MOTION CONTROL	7,249	6,592	657	9%
TOTALS	84,097	70,254	21,661	16%

ENGINEERING A DIVSION OF THIELSCH ENGINEERING did an Energy Efficiency Analysis and found a number of opportunities to save both electrical and gas energy.

ENERGY SAVINGS OPPORTUNITIES

GYM # 1 and 2
There are several opportunities for energy savings in the gymnasiums

Lighting in the Gym
There is an opportunity to save energy in the gym by changing the existing metal halide lighting over to the new more energy efficient T5 lighting c/w sensors for occupancy. This new lighting provides for instant on/off with no re-strike time along with increased light levels over the life of the lamps.

- **CO^2 CONTROL (Demand Control Ventilation)**

Why measure carbon dioxide?
Most Heating, Ventilating, and Air Conditioning systems (HVAC) re-circulate a significant portion of the indoor air to maintain comfort and reduce energy costs associated with heating or cooling outside air. It's virtually impossible for the occupants and building operators to judge the mixture of recirculated and outside air coming out of an air supply duct. Current technology now allows easy and relatively inexpensive measurement of carbon dioxide (CO^2) as an "*indicator*" to help ensure that ventilation systems are delivering the recommended minimum quantities of outside air to the building's occupants.

What is carbon dioxide?
Carbon dioxide is a natural component of the air on this planet. The amount of CO^2 in a given air sample is commonly expressed as parts-per-million (ppm)—the number of molecules of carbon dioxide per million molecules. The outdoor air in most locations contains about 350 ppm carbon dioxide. Higher outdoor CO^2 concentrations can be found near vehicle traffic areas, industry, and sources of combustion.

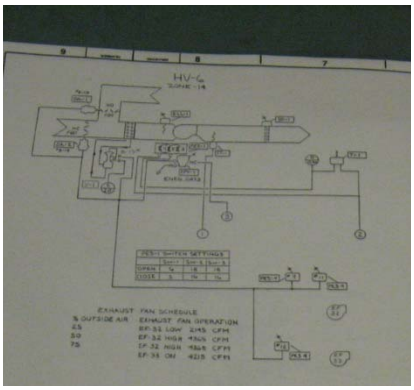
Where indoor concentrations are elevated (compared to the outside air) the source is usually the building's occupants. People exhale carbon dioxide—the average adult's breath contains about 35,000 to 50,000 ppm of CO^2 (100 times higher than outdoor air). Without adequate ventilation to dilute and remove the CO^2 continuously generated by the occupants, CO^2 concentrations will rise.

How much CO^2 is too much?
The concentrations of CO2 found in most schools and offices are usually well below the 5,000 ppm occupational safety standard (time-weighted average for a 10-hour workday within a 40-hour workweek) for an industrial workplace. While levels below 5,000 ppm are considered to pose no serious health impacts, experience indicates that individuals in schools and offices with elevated CO^2 concentrations tend to report drowsiness, lethargy, and a general sense of stale air. Researchers are looking for linkages between elevated CO^2 concentrations and reduced productivity and achievement.

What are the guidelines and standards for ventilation?
Various codes and standards define ventilation rates for schools and office spaces. The most widely accepted standard is the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 62–1989. Some state and local codes have adopted the ASHRAE ventilation requirements.

According to ASHRAE Standard 62-1989, classrooms should be provided with 15 cubic feet per minute (cfm) of outside air per person, and offices with 20 cfm outside air per person. Ventilation rates for other indoor spaces are also specified. Standard 62 is currently being revised, so future rates may be different.

Using CO^2 as an indicator of ventilation, ASHRAE has recommended indoor CO2 concentrations be maintained at—or below—1,000 ppm in schools and 800 ppm in offices. Clearly, the outdoor CO^2 concentration directly impacts the indoor concentration. Therefore, it is critical to measure outdoor CO^2 levels when assessing indoor concentrations. ASHRAE recommends indoor CO^2 levels not exceed the outdoor concentration by more than about 600 ppm.
The following table illustrates the relationship between outside air ventilation rates and the resultant indoor CO^2 levels, assuming an outdoor CO^2 of 350 ppm.



	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
GYM #1 CO^2 CONTROL	9,763	8,233	1,530	16%
GYM #2 $C0^2$ CONTROL	10,577	8,913	1,664	16%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
GYM #1 CO^2 CONTROL	$ 14,835	$ -	$ 14,835	$ 1,836	12%	8.1
GYM #2 $C0^2$ CONTROL	$ 13,800	$ -	$ 13,800	$ 1,836	13%	7.5

➢ DESTRATIFICATION FANS

When a gym, manufacturing building or other large area is heated, warm air rises to the ceiling while heavier cool air remains at the floor level. This process – called stratification - can significantly impact a facility's energy performance by forcing heating systems to work harder to maintain the desired temperature at floor-level work stations while heat is lost through the facility roof. A simple solution is to install paddle or ducted ceiling fans to bring the warm air back down to floor level. This process of mixing and redistributing heat is called destratification fans can save up to 15% heating costs.

	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
GYM #1 DESTRATIFICATION FANS	8,233	6,569	1,664	20%
GYM #2 DESTRATIFICATION FANS	8,913	7,249	1,664	19%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
GYM #1 DESTRATIFICATION FANS	$ 11,109	$ -	$ 11,109	$ 1,997	18%	5.6
GYM #2 DESTRATIFICATION FANS	$ 11,109	$ -	$ 11,109	$ 1,997	18%	5.6

➢ MOTION CONTROL

Install Motion Sensors for occupied / unoccupied Control.
Presently the gyms AHU's are controlled by the 7 day time clock for occupied / unoccupied control. The gym's utilization varies based on outdoor temperature and student schedule. Motion sensors will detect occupancy and turn on the AHU's. Minimum temperatures will be set such that during unoccupied time if the Gyms temp will not drop below a preset level.

	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
GYM #1 MOTION CONTROL	6,569	5,930	639	10%
GYM #2 MOTION CONTROL	7,249	6,592	657	9%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
GYM #1 MOTION CONTROL	$ 6,845	$ -	$ 6,845	$ 1,060	15%	6.5
GYM #2 MOTION CONTROL	$ 6,845	$ -	$ 6,845	$ 1,090	16%	6.3

➢ HOT WATER TANK

Carver's hot water system uses a 1.8 MBTU Boiler to heat a 4000 gallon storage tank. The boiler runs year round to provide hot water for the school. A circulation pump circulates water continuously so hot water is instant throughout the building. This system is very inefficient and oversized. We recommend using a commercial hot water tank with fast recovery, such as an AO Smith 400,000 BTU/Hr 130 gallon tank. Circulation pumps would remain.

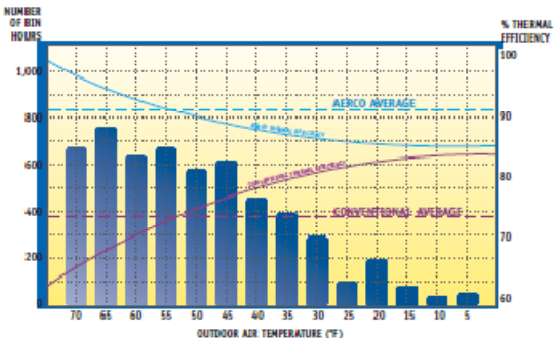
	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
HOT WATER TANK REPLACEMENT	7,152	4,517	2,635	37%

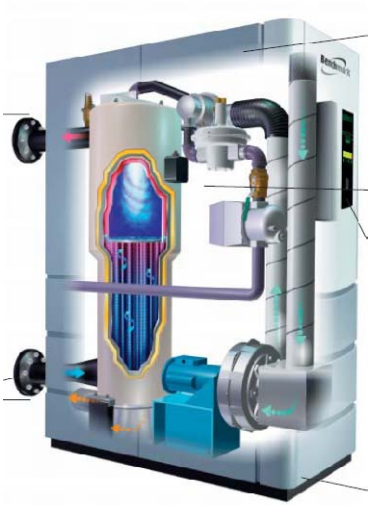
	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
HOT WATER TANK REPLACEMENT	$ 44,367	$ -	$ 44,367	$ 3,162	7%	14.0

➢ BOILERS

Boilers are original to the building and are not high efficiency. There are two 3.3MBTU boilers that can be converted to new AERCO high efficiency condensing boilers. We propose three 2.2 MBTU High Efficiency boilers that can stage up and have redundancy. Pricing is for a turnkey project including all materials, Labor for Demolition and disposal (The pricing does not consider asbestos abatement if necessary).

Pricing Includes:
Engineering
Demo and disposal of 2 old boilers
Install three 2.2 MBTU AERCO Boilers
Pipe installation and insulation
Controls
Startup and Commissioning

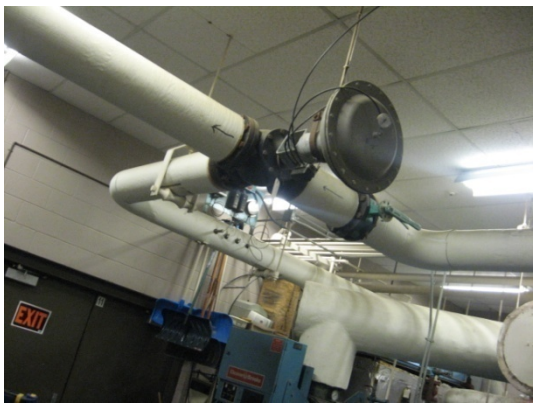




	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
BOILER REPLACEMENT	76,945	65,737	11,208	15%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
BOILER REPLACEMENT	$ 255,751	$ -	$ 255,751	$ 13,449	5%	19.0

➢ HEATING HOT WATER CIRCULATION PUMPS



The school building has one heating zone and water is pumped by two 20 HP hot water circulation pumps in a primary backup configuration. Hot water is controlled by 2 way valves located at each fan coil unit. Pressure off the header is maintained by a cross over valve located in the mechanical room near the pumps (see Picture).The motors are old and not energy efficient.

PROPOSED CASE

RISE Engineering a Division of Thielsch Engineering is recommending the installation of new Allen Bradley Variable Frequency Drives on both hot water circulation pumps. Both of the VFD's will be equipped with a 4-20ma input signal to interface with the pressure sensor. Both of the VFD's will be equipped with a 3% line reactor to help protect VFD from utility line disturbances and help reduce harmonics generated by the VFD. The motor replacements that RISE Engineering a Division of Thielsch Engineering is recommending are Baldor super E's and are compatible with this type of VFD.

The pressure sensor will monitor the header pressure and provide signal feedback to the VFD via a 4-20ma signal. The VFD will control the header pressure using an onboard PID loop controller, which will control the speed of the pump to maintain a constant header pressure.

The Baldor Super E Motors will replace existing old US motors. The motors are direct coupled to the pumps and will be laser aligned to insure proper operation.

	EXISTING KW	PROPOSED KW	SAVED KW	EXISTING KWH	PROPOSED KWH	SAVED KWH	PERCENT SAVINGS
HOT WATER PUMP #1	14.76	5.76	9.0	33,345	13,019	20,326	61%
HOT WATER PUMP #2	14.76	5.76	9.0	33,345	13,019	20,326	61%
TOTALS	14.76	5.76	9.0	66,690	26,038	40,652	61%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
HOT WATER PUMP #1	$ 11,741	$ -	$ 11,741	$ 3,354	29%	3.5

HOT WATER PUMP #2	$ 11,741	$ -	$ 11,741	$ 3,354	29%	3.5

➢ ENERGY MANAGEMENT SYSTEM

Energy management systems (EMS) conserve energy by adjusting operating hours and/or cycling equipment. EMS devices range from simple on/off time clocks controlling a single system, to sophisticated computerized controls that manage all the energy-consuming systems in a building.

The existing EMS is a pneumatic control system that utilizes 7 day time clocks for occupied /unoccupied control. There are a total of 19 zones controlled by this system. The system is older and should eventually be upgraded even though the existing system is mostly operational. The system has zone control panels located throughout the building. RISE Engineering a Division of Thielsch Engineering found leaks in some of the units; however they do appear to be running properly. The system basically controls occupied and occupied timing. There were no identifiable control strategies employed to reset supply air temperature set points or the heating hot water loop temperature. A new EMS is recommended for additional energy savings however the cost of a new EMS system may be cost prohibitive. Depending on the level of the system that is deployed; install costs could vary from $100K to $300K or more. An interim recommendation would be to do a complete recommissioning of the existing system. This would cost be approximately $10K-$20K and would have a high return on investment.

NEW EMS CONTROL FEATURES

Temperature/Time Optimization:
These systems provide for the control of multiple functions and more sophisticated control of temperature setback/set forward. Inside and outside air temperature are monitored and used accordingly to vary the time of startup or setback of heating and/or air conditioning. These systems achieve additional savings by using the least amount of energy to produce comfortable conditions during occupancy.

Depending on the complexity of the system, an economizer cycle can also be incorporated. By controlling air dampers, this cycle brings outside air into the cooling system whenever possible.

Demand Control Systems:
With these systems, all of the functions of temperature/time optimization and time clock controls are incorporated in a system that also controls electricity demand by cycling pre-selected loads on and off as demand approaches preset limits.

Typical interruptible loads are heating, ventilation and air conditioning (HVAC) systems; air compressor motors; and manufacturing processes that can readily be interrupted or delayed. In addition to generating energy savings by shutting off unnecessary loads, these systems reduce monthly peak demand charges on electric bills. Demand control systems

provide for a large number of control and monitoring points. They also incorporate features such as the ability to monitor fire and burglar alarms, log internal environmental conditions, record equipment run time, duty cycles, and track energy use.

- **RECOMMISSIONING**

Recommissioning is essentially the same process as commissioning, but applied to existing building's HVAC, controls, and electrical systems. When standardized maintenance and energy management procedures fail to fix chronic building problems, recommissioning provides a systematic approach for discovering and solving them. Recommissioning entails the examination of actual building equipment, systems operation and maintenance procedures for comparison to intended or design operation and maintenance procedures.

Building recommissioning can offer surprising paybacks. A detailed assessment of the costs and benefits of tuning up buildings was conducted based on a survey of results from more than 40 tune-up projects. Results from the study confirmed that recommissioning can typically translate into energy savings of 5 to 15 percent.

Some of the equipment to be recommissioned would include.
68 Exhaust Fans
5 Packaged AC Units
Classroom Unit Ventilators
Core Classroom Sanyo AC Units
Fin Tube Radiation Units
Fan Coil Units

Recommissioning should be done after the energy measures are completed.
Typical Costs are $10K to $20K however is dependent on equipment condition and cost will vary

- **KITCHEN HOOD MAKE UP AIR**

There appears to be some issues regarding Kitchen make up air and the hood operation. This should be further investigated.

Gym Lighting

RISE Engineering is proposing the removal of the existing metal halide lighting and replacing it with high efficiency T8 lighting complete with lens covers as well as lens guarding. The new T8 lighting solution will provide a more uniform light distribution, provide longer lamp life as well as allow for better control of the space.

Gym Lighting

	EXISTING KW	PROPOSED KW	SAVED KW	EXISTING KWH	PROPOSED KWH	SAVED KWH	PERCENT SAVINGS
Gym Lighting	32.81	26.66	6.2	118,116	62,384	55,732	52%
TOTALS	32.81	32.81	6.2	118,116	118,122	55,732	52%

	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
Gym Lighting	$ 40,991.88	$ -	$ 40,991.88	$ 10,032	24.19%	3.9

SCOPE OF WORK

RISE ENGINEERING A DIVSION OF THIELSCH ENGINEERING INC will provide a turnkey installation including all material, labor and engineering to implement a VFD retrofit for the circulation pumps. The scope also includes Evaluation, Utility Rebate Submittals, Procurement, Project Management, Installation, Startup, Calibration, Debug, Documentation and Training.

ENERGY SAVINGS SUMMARY

GAS ENERGY SAVINGS ANALYSIS				
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- See attached spreadsheet for calculation details.

Gym Lighting

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➢ COST BENEFIT ANALYSIS

Note	Electric Savings Summary					
Lighting savings includes $ 987 from net heating savings,and $ 387 from Maint savings	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
HOT WATER PUMP #1	$ 11,741		$ 11,741	$ 3,659	31%	3.2
HOT WATER PUMP #2	$ 11,741		$ 11,741	$ 3,659	31%	3.2
GYM Lighting	$ 40,992		$ 40,992	$ 11,406	28%	3.6
Total NSTAR Electric Incentive		$ 28,916				
TOTALS	$ 64,474	$ 28,916	$ 35,558	$ 18,723	53%	1.9
	GAS Savings Summary					
	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
BOILER REPLACEMENT	$ 255,751	$ 16,476	$ 239,276	$ 13,449	6%	17.8
HOT WATER TANK REPLACEMENT	$ 44,367	$ 3,873	$ 40,494	$ 3,162	8%	12.8
GYM #1 DESTRATIFICATION FANS	$ 11,109	$ 2,446	$ 8,663	$ 1,997	23%	4.3
GYM #2 DESTRATIFICATION FANS	$ 11,109	$ 2,446	$ 8,663	$ 1,997	23%	4.3
GYM #1 CO2 CONTROL	$ 14,835	$ 2,249	$ 12,586	$ 1,836	15%	6.9
GYM #2 C02 CONTROL	$ 13,800	$ 2,446	$ 11,354	$ 1,836	16%	6.2
GYM #1 MOTION CONTROL	$ 6,845	$ 2,532	$ 4,313	$ 1,060	25%	4.1
GYM #2 MOTION CONTROL	$ 6,845	$ 2,532	$ 4,313	$ 1,090	25%	4.0
Total NSTAR Gas Incentive		$ 35,000				
TOTALS	$ 364,661	$ 49,650	$ 315,011	$ 26,427	8%	11.9

NSTAR Electric only Financing Option			NSTAR GAS Project			
	Monthly Payment	Est. Monthly Savings		Total Project Cost	NSTAR Gas Incentive	Cust. Project Cost
24 Month Financing @ 0% interest	$ 1,481.57	$ 1,560.26	Gas Project	$ 364,661.00	$ 34,999.55	$ 329,661.45

NSTAR Off Bill Financing

NSTAR Electric offers off bill financing to their customers. This allows the customers to move forward with a project with no up-front capital investment

RISE Engineering a Division of Thielsch Engineering, Inc Payment Terms

RISE Engineering will require the following payment schedule on any portion of this project that is not being financed through NSTAR Electric.

25% Down Payment due at the time of order	$ 82,415.25
25% Due upon arrival of Boilers to job site	$ 82,415.25
25% Due upon arrival of remainder of equipment to job site	$82,415.25
15% Due upon completion of installation	$ 49,449.15
10% Due upon completion of commissioning and start up	$ 32,966.15

*See RISE Engineering Contract for all remaining terms and conditions.

➢ ENVIRONMENTAL IMPACT

Saving electrical energy helps our environment by reducing the greenhouse gases that are emitted to our atmosphere, from the burning of the fossil fuels that create our electricity and heat our buildings. This is an estimate of the green house gas emissions saved by this energy conservation measure.

ENVIRONMENTAL IMPACT	
THERMS SAVED	21,661
KWH SAVED	96,384
GREEN HOUSE GAS IMPACT	
CO^2 EMISSIONS REDUCED (Lbs)	388,372
$N^2 0$ EMISSIONS REDUCED (Lbs)	0.36
NH4 EMISSIONS REDUCED (Lbs)	0.65
EQUILIVANT SAVINGS	
Cars Removed From The Road	34
Homes Removed	8
Computers Removed	96
# of trees saved	374
Acres of forest preserved from deforestation	1.23

➢ WARRANTY

12 months on material

NSTAR Rebate Calculations

Customer: Carver MS & HS
Address 60 S Meadow Rd
Carver, MA 02330

Account# 1374-601-0027

Balance Point	60
Fuel Cost	$ 1.20

Existing Boiler Efficiency		
OA (F)		Eff (%)
20		75
65		75

Condensing Boiler Efficiency	
OA (F)	Eff (%)
20	86
65	94

Baseline Temp	55
Therms/heating Degree Hour	0.415
Total therms committed to other	5600
Base Therms per hour	0.6
Base Therms Adjusted for efficiency	0.5

76945 76943 2

Weather Data							Base	Standard Boilers		Condensing Boilers			Cost Savings	
Temp Range				Occ	Deg.	Heating	Therms	Eff	Fuel Use	Eff	Fuel Use	Fuel Saving	Fuel Cost	Savings
From	To	Avg	WB	Hours	fr. Base	deg hrs		%	Therms	%	Therms	Therms	$/Therm	$
90	95	91	75	3.29				75%	0	94%	0	0	$ 1.20	$ -
85	90	87	72	45.09				75%	0	94%	0	0	$ 1.20	$ -
80	85	82	67	162.16				75%	0	94%	0	0	$ 1.20	$ -
75	80	77	66	349.85				75%	0	94%	0	0	$ 1.20	$ -
70	75	72	64	564.81				75%	0	94%	0	0	$ 1.20	$ -
65	70	67	61	725.47				75%	0	94%	0	0	$ 1.20	$ -
60	65	62	57	810.24				75%	0	94%	0	0	$ 1.20	$ -
55	60	58	52	755.52				75%	0	93%	0	0	$ 1.20	$ -
50	55	53	47	711.27	7.00	4,979	341	75%	3210	92%	2617	593	$ 1.20	$ 711.71
45	50	47	42	678.70	13.00	8,823	325	75%	5316	91%	4381	935	$ 1.20	$ 1,121.61
40	45	42	38	698.23	18.00	12,568	335	75%	7401	90%	6167	1,233	$ 1.20	$ 1,480.15
35	40	37	33	764.83	23.00	17,591	367	75%	10223	89%	8615	1,608	$ 1.20	$ 1,929.67
30	35	33	29	765.07	27.00	20,657	367	75%	11919	88%	10158	1,761	$ 1.20	$ 2,112.95
25	30	28	24	572.10	32.00	18,307	274	75%	10496	87%	9048	1,448	$ 1.20	$ 1,737.22
20	25	23	19	418.50	37.00	15,485	201	75%	8836	86%	7705	1,130	$ 1.20	$ 1,356.17
15	20	18	15	316.83	42.00	13,307	152	75%	7566	86%	6598	968	$ 1.20	$ 1,161.24
10	15	13	10	216.84	47.00	10,191	104	75%	5778	86%	5039	739	$ 1.20	$ 886.84
5	10	8	6	126.66	52.00	6,586	61	75%	3725	86%	3249	477	$ 1.20	$ 571.81
0	5	3	1	50.68	57.00	2,889	24	75%	1631	86%	1422	209	$ 1.20	$ 250.32
-5	0	-2	-4	19.75	62.00	1,225	9	75%	690	86%	602	88	$ 1.20	$ 105.93
-10	-5	-7	-9	4.01	67.00	269	2	75%	151	86%	132	19	$ 1.20	$ 23.21
-15	-10	-11	-12	0.10	71.00	7	0	75%	4	86%	3	1	$ 1.20	$ 0.61
Totals				8760	HDhrs	132,884			76945		65,737	11,208		$ 13,449.45
									$ 92,333.82		$ 78,884.37	$ 13,449.45		

Please Note: This spreadsheet is not for general use and is the property of Action Energy LLC.
All savings estimates and rebates must be considered estimated until reviewed and approved by the utility.

Data and assumptions in this spreadsheet are supplied by customer and has not been independently verfied.
Any Questions Regarding this spreadsheet please contact Bruce Shaffer at Action Energy 508-837-6594 bruce@actionenergyusa.com

Hot water Tank Savings

Month	Therms	System Eff	Therms @ 100%	Cost/Therm	Cost to heat	New Heater Eff	Proposed Therms	Proposed Cost	Therms Saved	$ Saved
Jan	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
Feb	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
Mar	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
apr	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
may	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
Jun	416	60%	249.6	1.2	$ 499.20	95%	262.7	$ 315.28	153.3	$ 183.92
July	470	60%	282	1.2	$ 564.00	95%	296.8	$ 356.21	173.2	$ 207.79
Aug	514	60%	308.4	1.2	$ 616.80	95%	324.6	$ 389.56	189.4	$ 227.24
sept	560	60%	336	1.2	$ 672.00	95%	353.7	$ 424.42	206.3	$ 247.58
Oct	642	60%	385.2	1.2	$ 770.40	95%	405.5	$ 486.57	236.5	$ 283.83
Nov	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
Dec	650	60%	390	1.2	$ 780.00	95%	410.5	$ 492.63	239.5	$ 287.37
Totals	7152		4291.2		$ 8,582.40		4517.1	$ 5,420.46	2634.9	$ 3,161.94

COST BENEFIT ANALYSIS						
	PROJECT COST	REBATE	CUSTOMER COST	ENERGY $ SAVED	ROI	YTPB
BOILER REPLACEMENT	$ 255,751	$ -	$ 255,751	$ 13,449	5%	19.0
HOT WATER TANK REPLACEMENT	$ 44,367	$ -	$ 44,367	$ 3,162	7%	14.0
GYM #1 DESTRATIFICATION FANS	$ 11,109	$ -	$ 11,109	$ 1,997	18%	5.6
GYM #2 DESTRATIFICATION FANS	$ 11,109	$ -	$ 11,109	$ 1,997	18%	5.6
GYM #1 CO2 CONTROL	$ 14,835	$ -	$ 14,835	$ 1,836	12%	8.1
GYM #2 C02 CONTROL	$ 13,800	$ -	$ 13,800	$ 1,836	13%	7.5
GYM #1 MOTION CONTROL	$ 6,845	$ -	$ 6,845	$ 1,060	15%	6.5
GYM #2 MOTION CONTROL	$ 6,845	$ -	$ 6,845	$ 1,090	16%	6.3
HOT WATER PUMP #1	$ 11,741	$ -	$ 11,741	$ 3,659	31%	3.2
HOT WATER PUMP #2	$ 11,741	$ -	$ 11,741	$ 3,659	31%	3.2
TOTALS	$ 388,143	$ -	$ 388,143	$ 33,744	9%	11.5

GAS ENERGY SAVINGS ANALYSIS				
	EXISTING THERMS	PROPOSED THERMS	SAVED THERMS	PERCENT SAVINGS
BOILER REPLACEMENT	76,945	65,737	11,208	15%
HOT WATER TANK REPLACEMENT	7,152	4,517	2,635	37%
GYM #1 CO2 CONTROL	9,763	8,233	1,530	16%
GYM #2 C02 CONTROL	10,577	8,913	1,664	16%
GYM #1 DESTRATIFICATION FANS	8,233	6,569	1,664	20%
GYM #2 DESTRATIFICATION FANS	8,913	7,249	1,664	19%
GYM #1 MOTION CONTROL	6,569	5,930	639	10%
GYM #2 MOTION CONTROL	7,249	6,592	657	9%
TOTALS	135,401	113,740	21,661	16%

ELECTRIC ENERGY SAVINGS ANALYSIS							
	EXISTING KW	PROPOSED KW	SAVED KW	EXISTING KWH	PROPOSED KWH	SAVED KWH	PERCENT SAVINGS
HOT WATER PUMP #1	14.76	5.76	9.0	33,345	13,019	20,326	61%
HOT WATER PUMP #2	14.76	5.76	9.0	33,345	13,019	20,326	61%
TOTALS	14.76	5.76	9.0	66,690	26,038	40,652	61%

ENVIRONMENTAL IMPACT

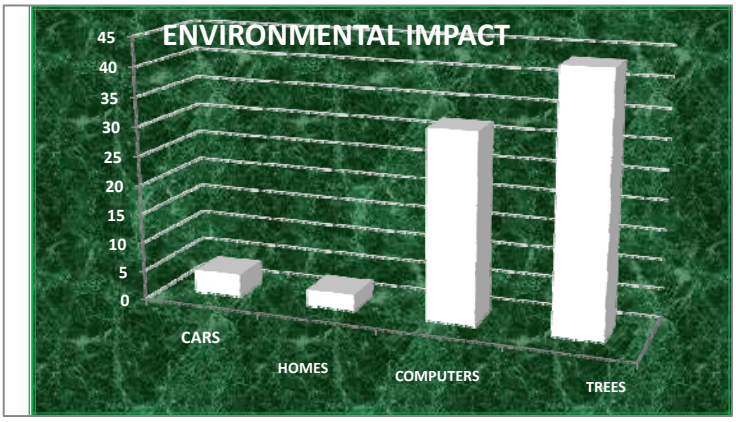
THERMS SAVED	21,661
KWH SAVED	26,038

GREEN HOUSE GAS IMPACT

CO^2 EMISSIONS REDUCED (Lbs)	289,887
N^20 EMISSIONS REDUCED (Lbs)	0.10
NH4 EMISSIONS REDUCED (Lbs)	0.17

EQUILIVANT SAVINGS

Cars Removed From The Road	25
Homes Removed	2
Computers Removed	26
# of trees saved	279
Acres of forest preserved from deforestation	0.92



Gym Hours	7AM	9PM
Hours/day	13	
heating days	120	
Total Heating Hours	1560	
Standard Hours	4853	
Hours Ratio	0.321450649	
Estimated Therms	6569	
HDH	54,677	
Therms/HDH	0.12	

Oct 15th May 15th

180days- 60# of non heating days

Carver Gym #1

EXISTING										PROPOSED							
OAT	Room Temp	Flow (CFM)	HDH	Therms	Deta T	BTU's/hr	Total HRS	heating hours	BTU's	Temp Set Back	Set Back Delta T	BTU's/Hr	BTU's	% Un Occupied	Proposed BTU's	Saved BTU's	
90	70	12,645		0	-20												
85	70	12,645		0	-15												
80	70	12,645		0	-10												
75	70	12,645		0	-5												
70	70	12,645		0	0												
65	70	12,645		0	5												
60	70	12,645		0	10												
55	70	12,645		0	15												
50	70	12,645	10,302	1238	20	273,132	641	206	56,278,812	10	10	136,566	28,139,406	30%	47,836,990	8,441,822	When heating is required
45	70	12,645	9,967	1197	25	341,415	689	221	75,616,423	10	15	204,849	45,369,854	30%	66,542,452	9,073,971	
40	70	12,645	8,885	1067	30	409,698	691	222	91,003,102	10	20	273,132	60,668,735	30%	81,902,792	9,100,310	
35	70	12,645	10,902	1310	35	477,981	969	311	148,884,236	10	25	341,415	106,345,883	30%	136,122,730	12,761,506	
30	70	12,645	7,503	901	40	546,264	778	250	136,614,402	10	30	409,698	102,460,801	30%	126,368,322	10,246,080	
25	70	12,645	4,131	496	45	614,547	514	165	101,538,917	10	35	477,981	78,974,714	30%	94,769,656	6,769,261	
20	70	12,645	1,659	199	50	682,830	258	83	56,630,006	10	40	546,264	45,304,005	30%	53,232,206	3,397,800	
15	70	12,645	1,128	136	55	751,113	234	75	56,498,308	10	45	614,547	46,225,888	30%	53,416,582	3,081,726	
10	70	12,645	148	18	60	819,396	46	15	12,116,187	10	50	682,830	10,096,823	30%	11,510,378	605,809	
5	70	12,645	53	6	65	887,679	33	11	9,416,385	10	55	751,113	7,967,710	30%	8,981,782	434,602	
0	70	12,645	-	0	70												
			54,677	6569		5,804,055	Total BTU's		744,596,778				531,553,818		680,683,890	63,912,888	
							Therms		7,445.97						6,806.84	639.13	

ELECTRICITY SAVINGS

Existing	
HP	6
KW	3.8
Hours of operation	1560
KWH	5928

Proposed	
KW	3.8
Hours	1092
KWH	4149.6

Saved	
KWH	1778.4

Gym Hours	7AM	8PM
Hours/day	13	
heating days	120	
Total Heating Hours	1560	
Standard Hours	4853	
Hours Ratio	0.32145065	
Therms	7249	
HDH	54,677	
Therms/HDH	0.13	

Oct 15th May 15th

180days- 60# of non heating days

Carver Gym #2

EXISTING										PROPOSED						
OAT	Room Temp	Flow (CFM)	HDH	Therms	Deta T	BTU's/hr	Total HRS	heating hours	BTU's	Temp Set Back	t Back Delta	BTU's/Hr	BTU's	% Un Occupied	Proposed BTU's	Saved BTU's
90	70	13,000		0	-20											
85	70	13,000		0	-15											
80	70	13,000		0	-10											
75	70	13,000		0	-5											
70	70	13,000		0	0											
65	70	13,000		0	5											
60	70	13,000		0	10											
55	70	13,000		0	15											
50	70	13,000	10,302	1366	20	280,800	641	206	57,858,802	10	10	140,400	28,929,401	30%	49,179,982	8,678,820
45	70	13,000	9,967	1321	25	351,000	689	221	77,739,304	10	15	210,600	46,643,582	30%	68,410,587	9,328,716
40	70	13,000	8,885	1178	30	421,200	691	222	93,557,954	10	20	280,800	62,371,970	30%	84,202,159	9,355,795
35	70	13,000	10,902	1445	35	491,400	969	311	153,064,063	10	25	351,000	109,331,473	30%	139,944,286	13,119,777
30	70	13,000	7,503	995	40	561,600	778	250	140,449,761	10	30	421,200	105,337,320	30%	129,916,029	10,533,732
25	70	13,000	4,131	548	45	631,800	514	165	104,389,555	10	35	491,400	81,191,876	30%	97,430,252	6,959,304
20	70	13,000	1,659	220	50	702,000	258	83	58,219,856	10	40	561,600	46,575,885	30%	54,726,664	3,493,191
15	70	13,000	1,128	150	55	772,200	234	75	58,084,461	10	45	631,800	47,523,650	30%	54,916,217	3,168,243
10	70	13,000	148	20	60	842,400	46	15	12,456,341	10	50	702,000	10,380,284	30%	11,833,524	622,817
5	70	13,000	53	7	65	912,600	33	11	9,680,743	10	55	772,200	8,191,398	30%	9,233,940	446,804
0	70	13,000	-	0	70											
			54,677	7249		5,967,000	Total BTU's		765,500,840				546,476,840		699,793,640	65,707,200
							Therms		7,655.01						6,997.94	657.07

ELECTRICITY SAVINGS

Existing	
HP	6
KW	3.9
Hours of operation	1560
KWH	6084

Proposed	
KW	3.9
Hours	1092
KWH	4258.8

Saved	
KWH	1825.2

Length	100	
Width	60	
Height	20	
CUBIC Feet	120000	
Roof Sq ft	6000	
fans effective Sq	40000	
# Fans Required	3	
Roof Heat Trans Value	0.8	Estimated
Roof Area	6000	
Temp difference roof to floor	20	F
Hours	1560	
heating efficiency	90%	
BTU's Saved	166400000	
Therms	1664	
Therm Cost	1.2	
$ saved	$ 1,997	

Use destratification fan to improve air circulation

Over head heating, and process waste heat can migrate to the ceiling area of a plant and create a temperature difference demanding additional heating of the floor area of a plant This is typical of plants with ceilings greater than 15 feet. The use of destratification fans or other methods to improve interior air circulation can reduce heating costs.
Industry standards for destratification using 10,000 CFM circulating fans show that a fan can destratify 40,000 ft^3 of building space in 15 minutes.
The number of fans required is found by **FN = BV / FV, FN** is number of fans, **BV** is building volume, ft^3, **FV** is volume of air moved per fan.
Destratification will reduce the temperature at the roof, and thus the heat lost through heat transmission from the roof.

$$AES = \frac{U \times A \times DT \times HY}{\eta}$$

Customer	Carver Schools
Tag Name	Hot Water Pump #1
Date	3/13/2009
ECM Measure	VFD & Motor Retrofit
Hours of Operation	2259
Number Of Pumps	1
Audit ID#	
Utility	NSTAR
Voltage	460
Transformer Size	1000 KVA
Location	Mechanical Room

Indicates the number of pumps either 1= Primary, or 2=Primary and Backup

Base Case

Motor Info

Motor Manf	Cat #	HP	Efficiency	Voltage	RPM	Frame	Times Rewound	Insulation Class	Rewind Adj Eff	Enclosure
US Motor	E660A	20	0.875	230/460	1760	256T	0	B	0.88	OPSB

Pump Information

Pump Manf	GPM	Type	Head	Pump EFF	Cal'd BHP	Cal'd kW
Armstrong	650	End suction	60	65%	15.15	14.76

Motor loading
76%

KW	14.8
Head In Feet	60
Head in PSI	
Heating Y/N	y
Cooling Y/N	n
Reset Temp	55 F
Base KW	12.9 KW removing exisiting motor eff

Proposed Case

Replace Motor Y/N	y						
Motor Manf	Cat #	HP	Efficiency	Voltage	RPM	Frame	Enclosure
Baldor	EM2515T	20	0.93	230/460	1760	256T	ODP

New KW	13.9
%KW Committed to Head	20%
KW Committed to head	2.8
Available KW	11.1 KW avilable to apply affinity laws
VFD Efficiency	97% See note on I83
Line Reactor Efficiency	97%

Summer		Existing			Proposed					Savings
% Flow	Hours of Operation	GPM	KW	KWH	GPM	RPM	KW	KW wVFD and LR	KWH	KWH Saved
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
80%	0	650	14.8	0	520	1408	8.5	9.0	0	0
70%	0	650	14.8	0	455	1232	6.6	7.0	0	0
60%	0	650	14.8	0	390	1056	5.2	5.5	0	0
50%	0	650	14.8	0	325	880	4.2	4.4	0	0
40%	0	650	14.8	0	260	704	3.5	3.7	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
Totals	0			0					0	0

Winter		Existing			Proposed					Savings
% Flow	Hours of Operation	GPM	KW	KWH	GPM	RPM	KW	KW wVFD and LR	KWH	KWH Saved
50%	320	650	14.8	4724	325	880	4.2	4.4	1417	3307
50%	317	650	14.8	4682	325	880	4.2	4.4	1404	3277
55%	318	650	14.8	4695	358	968	4.6	4.9	1564	3131
60%	446	650	14.8	6584	390	1056	5.2	5.5	2455	4130
65%	358	650	14.8	5287	423	1144	5.8	6.2	2219	3068
70%	237	650	14.8	3493	455	1232	6.6	7.0	1657	1836
75%	119	650	14.8	1753	488	1320	7.5	7.9	942	811
80%	108	650	14.8	1590	520	1408	8.5	9.0	969	621
85%	21	650	14.8	313	553	1496	9.6	10.2	216	97
90%	15	650	14.8	224	585	1584	10.9	11.6	176	49
100%	0	650	14.8	0	650	1760	13.9	14.8	0	0
Totals	2259			33345					13019	20326

Totals	Summer	Winter	ADJ KW Summer	ADJ KW Winter
Existing KW	0.00	14.76		14.8
Proposed KW	0.00	5.76	0.0	5.8
Existing KWH	0	33345		
Proposed KWH	0	13019		
KW Saved	0.00	9.00	0.0	9.0
KWH Saved	0	20326.1		
Avg KW Saved	9.0	9.0	9.0	
KWH Saved	20326			

Cost Of Energy	
KW	
KWH	0.180

$ Saved	
KW	$ -
KWH	$ 3,658.70
Total Saved	$ 3,658.70

Avg Temp		Total Hours	% cool Flow	Adj Cooling Hours	% Heat Flow	Heating Adj Hrs
97	0	0	0%	0	0%	0
92	0	7	0%	3.2	0%	0
87	0	73	0%	33.6	0%	0
82	0	252	0%	116	0%	0
77	0	387	0%	178	0%	0
72	0	707	0%	325	0%	0
67	0	690	0%	318	0%	0
62	0	970	0%	446	0%	0
55	0	821	0%	378	0%	0
52	0	641	0%	295	50%	320
47	0	689	0%	0	50%	317
42	0	691	0%	0	55%	318
37	0	969	0%	0	60%	446
32	0	778	0%	0	65%	358
27	0	514	0%	0	70%	237
22	0	258	0%	0	75%	119
17	0	234	0%	0	80%	108
12	0	46	0%	0	85%	21
7	0	33	0%	0	90%	15
2	0	0	0%		100%	0
		8760		1798		2258

Cooling	Heating
100%	0%
90%	0%
85%	0%
80%	0%
75%	0%
70%	0%
65%	0%
60%	0%
55%	0%
50%	50%
0%	50%
0%	55%
0%	60%
0%	65%
0%	70%
0%	75%
0%	80%
0%	85%
0%	90%
0%	100%
	0%

NSTAR Rebates

HP	Rebate
5	$ 2,000
7.5	$ 2,300
10	$ 2,400
15	$ 2,900
20	$ 3,600
25	$ 4,100
30	$ 5,100
0	$ -
40	$ 5,600
50	$ 5,900
60	$ 8,600
75	$ 9,600
100	$ 10,200

VFD And Motor

HP	Rebate
5	$ 2,000
7.5	$ 2,300
10	$ 2,400
15	$ 2,900
20	$ 3,600
25	$ 4,100
30	$ 5,100
0	$ -
40	$ 5,600
50	$ 5,900
60	$ 8,600
75	$ 9,600
100	$ 10,200

VFD Only

HP	Rebate
5	$1,700
7.5	$1,900
10	$2,100
15	$2,300
20	$2,600
25	$3,100
30	$3,500
0	$ -
40	$3,800
50	$4,500
60	$5,500
75	$6,000
100	$7,000

Customer	Carver Schools
Tag Name	Hot Water Pump #1
Date	3/13/2009
ECM Measure	VFD & Motor Retrofit
Hours of Operation	2259
Number Of Pumps	1
Audit ID#	
Utility	NSTAR
Voltage	460
Transformer Size	1000 KVA
Location	Mechanical Room

Indicates the number of pumps either 1= Primary, or 2=Primary and Backup

Base Case

Motor Info

Motor Manf	Cat #	HP	Efficiency	Voltage	RPM	Frame	Times Rewound	Insulation Class	Rewind Adj Eff	Enclosure
US Motor	E660A	20	0.875	230/460	1760	256T	0	B	0.88	OPSB

Pump Information

Pump Manf	GPM	Type	Head	Pump EFF	Cal'd BHP	Cal'd kW
Armstrong	650	End suction	60	65%	15.15	14.76

Motor loading
76%

KW	14.8	
Head In Feet	60	
Head in PSI		
Heating Y/N	y	
Cooling Y/N	n	
Reset Temp	55	F
Base KW	12.9	KW removing exisiting motor eff

Proposed Case

Replace Motor Y/N	y						
Motor Manf	Cat #	HP	Efficiency	Voltage	RPM	Frame	Enclosure
Baldor	EM2515T	20	0.93	230/460	1760	256T	ODP

New KW	13.9	
%KW Committed to Head	20%	
KW Committed to head	2.8	
Available KW	11.1	KW avilable to apply affinity laws
VFD Efficiency	97%	See note on I83
Line Reactor Efficiency	97%	

Summer		Existing			Proposed					Savings
% Flow	Hours of Operation	GPM	KW	KWH	GPM	RPM	KW	KW w/VFD and LR	KWH	KWH Saved
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
80%	0	650	14.8	0	520	1408	8.5	9.0	0	0
70%	0	650	14.8	0	455	1232	6.6	7.0	0	0
60%	0	650	14.8	0	390	1056	5.2	5.5	0	0
50%	0	650	14.8	0	325	880	4.2	4.4	0	0
40%	0	650	14.8	0	260	704	3.5	3.7	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
30%	0	650	14.8	0	195	528	3.1	3.3	0	0
0%	0	650	14.8	0	0	0	2.8	3.0	0	0
Totals	0			0					0	0

Winter		Existing			Proposed					Savings
% Flow	Hours of Operation	GPM	KW	KWH	GPM	RPM	KW	KW w/VFD and LR	KWH	KWH Saved
50%	320	650	14.8	4724	325	880	4.2	4.4	1417	3307
50%	317	650	14.8	4682	325	880	4.2	4.4	1404	3277
55%	318	650	14.8	4695	358	968	4.6	4.9	1564	3131
60%	446	650	14.8	6584	390	1056	5.2	5.5	2455	4130
65%	358	650	14.8	5287	423	1144	5.8	6.2	2219	3068
70%	237	650	14.8	3493	455	1232	6.6	7.0	1657	1836
75%	119	650	14.8	1753	488	1320	7.5	7.9	942	811
80%	108	650	14.8	1590	520	1408	8.5	9.0	969	621
85%	21	650	14.8	313	553	1496	9.6	10.2	216	97
90%	15	650	14.8	224	585	1584	10.9	11.6	176	49
100%	0	650	14.8	0	650	1760	13.9	14.8	0	0
Totals	2259			33345					13019	20326

Totals	Summer	Winter	ADJ KW Summer	ADJ KW Winter
Existing KW	0.00	14.76		14.8
Proposed KW	0.00	5.76	0.0	5.8
Existing KWH	0	33345		
Proposed KWH	0	13019		
KW Saved	0.00	9.00	0.0	9.0
KWH Saved	0	20326.1		
Avg KW Saved	9.0	9.0	9.0	
KWH Saved	20326			

Cost Of Energy	
KW	
KWH	0.180

$ Saved	
KW	$ -
KWH	$ 3,658.70
Total Saved	$ 3,658.70

Avg Temp		Total Hours	% cool Flow	Adj Cooling Hours	% Heat Flow	Heating Adj Hrs
97		0	0%	0	0%	0
92		7	0%	3.2	0%	0
87		73	0%	33.6	0%	0
82		252	0%	116	0%	0
77		387	0%	178	0%	0
72		707	0%	325	0%	0
67		690	0%	318	0%	0
62		970	0%	446	0%	0
55		821	0%	378	0%	0
52		641	0%	295	50%	320
47		689	0%	0	50%	317
42		691	0%	0	55%	318
37		969	0%	0	60%	446
32		778	0%	0	65%	358
27		514	0%	0	70%	237
22		258	0%	0	75%	119
17		234	0%	0	80%	108
12		46	0%	0	85%	21
7		33	0%	0	90%	15
2		0	0%		100%	0
		8760		1798		2259

Cooling	Heating
100%	0%
90%	0%
85%	0%
80%	0%
75%	0%
70%	0%
65%	0%
60%	0%
55%	0%
50%	50%
0%	50%
0%	55%
0%	60%
0%	65%
0%	70%
0%	75%
0%	80%
0%	85%
0%	90%
0%	100%
	0%

RISE ENGINEERING

Town of Carver Middle / High School
60 South Meadow Rd.
Carver, MA 02330-1200
David Siedentopf

																	Sensor		SAVINGS		COSTS		
Line Item	Building	Floor	Room Number / Description	Room Name	Fixture Type	Existing Fixture Type	Fixt. Qty	Existing Hours	Watts	kW	kWh	Proposed Fixture Type	Fixt Qty	Proposed Hours	Watts	kW	kWh	Sensor Model #	Sensor Qty	kW Saved	kWh Saved	Total Retrofit Cost	Total Sensor Cost	Total
1	High School	1	Carver	High School Gym	G1	320w Pulse Start High Bay	62	3,600	365	22.63	81,468	5 Lamp T5 HO Eco w/Sensors	62	2,340	310	19.22	44,975	ixture mou	62	3.41	36,493	$ 30,028.48	$ -	$ 30,028.48
2	High School	1	Carver	High School Wrestling Room	G2	1000w Mercury Vapor	2	3,600	1075	2.15	7,740	5 Lamp T5 HO Eco w/Sensors	2	2,340	310	0.62	1,451	ixture mou	2	1.53	6,289	$ 968.66	$ -	$ 968.66
3	Middle School	1	Carver	Middle School Gym	G1	320w Pulse Start High Bay	22	3,600	365	8.03	28,908	5 Lamp T5 HO Eco w/Sensors	22	2,340	310	6.82	15,959	ixture mou	22	1.21	12,949	$ 10,655.27	$ -	$ 10,655.27
4	0	0	0	0	0	0	0	0				0	0	0					0		0	$ -	$ -	$ -
476	0	0	0	0	0	0	0	0				0	0	0					0		0	$ -	$ -	$ -
			TOTALS				**86**			**32.81**	**118,116**		**86**			**26.66**	**62384.4**		**86**	**6.15**	**55,732**	**$ 41,652.41**	**$ -**	**$ 41,652.41**

RISE ENGINEERING
Division of Thielsch Engineering, Inc
1341 Elmwood Avenue
Cranston, Rhode Island 02910

Town of Carver Middle / High School
60 South Meadow Rd.
Carver, MA 02330-1200
David Siedentopf
(508) 361-4900

Proposal Summary

Estimated Current Lighting Load (Wattage)			32,810	Watts
Estimated Proposed Lighting Load (Wattage)			26,660	Watts
Estimated Lighting Load Savings (Wattage)			**6,150**	Watts
Estimated Current Lighting Usage (kWh)			118,116	kWh
Estimated Proposed Lighting Usage (kWh)			62,384	kWh
Estimated Lighting Usage Savings (kWh)			**55,732**	kWh
Estimated Current Annual Lighting Bill:	kWh * 0.18	$	21,261	
Estimated Proposed Annual Lighting Bill:	kWh * 0.18	$	11,229	
Estimated Proposed Annual Lighting Bill Savings:		**$**	**10,032**	
Estimated Total Job Cost		**$**	**40,991.88**	
Estimated Utility Incentive		**$**	**-**	
Estimated Customer Net Cost		**$**	**40,991.88**	
Maintenance Savings		**$**	**387**	
Net Heating and AC Savings		**$**	**948**	
Simple Payback (Customer Share/Bill Savings):	Years =		**3.6**	