LEVEL II ENERGY AUDIT

A Bureau Veritas Group Company

Sacramento City Unified School District
5735 47th Avenue
Sacramento, California 95824

DLR Group
1050 20th Street, Suite 250
Sacramento, California 95959

ZERO NET ENERGY ASHRAE LEVEL II AUDIT

HIRAM JOHNSON HIGH SCHOOL
6879 14th Avenue
Sacramento, California 95820

PREPARED BY:
EMG / A Bureau Veritas Company
10461 Mill Run Circle, Suite 1100
Owings Mills, Maryland 21117
800.733.0660
www.emgcorp.com

EMG CONTACT:
Kaustubh Anil Chabukswar
Program Manager
800.733.0660 x7512
kachabukswar@emgcorp.com

EMG PROJECT #:

136988.19R000-059.268

DATE OF REPORT:

October 25, 2019

ONSITE DATE:

September 30, 2019

TABLE OF CONTENTS

Certification **1**
1. .. Executive Summary **2**
1.1. Energy Conservation Measures 3
2. .. Introduction **8**
3. .. Facility Overview and Existing Conditions **9**
3.1. Building Occupancy and Point of Contact 9
3.2. Building Heating, Ventilating and Air-Conditioning (HVAC) 9
3.3. Lighting 10
4. .. Utility Analysis **11**
4.1. Electricity 11
4.2. Natural Gas 14
4.3. Water and Sewer 16
5. .. Renewable Energy Discussions **18**
5.1. Rooftop Solar Photovoltaic Feasibility 18
6. .. Operations and Maintenance Plan **20**
7. .. Appendices **22**

Appendix A: GLOSSARY OF TERMS
Appendix B: MECHANICAL EQUIPMENT INVENTORY
Appendix C: LIGHTING SYSTEM SCHEDULE
Appendix D: ECM CHECKLIST
Appendix E: ECM CALCULATIONS
Appendix F: SOLAR PV

Certification

EMG has completed an Energy Audit of Hiram Johnson High School located at 6879 14th Avenue in Sacramento, California. EMG visited the site on September 30, 2019.

The assessment was performed at the Client's request using methods and procedures consistent with ASHRAE Level II Energy Audit and using methods and procedures as outlined in EMG's Proposal.

This report has been prepared for and is exclusively for the use and benefit of the Client identified on the cover page of this report. The purpose for which this report shall be used shall be limited to the use as stated in the contract between the client and EMG.

This report, or any of the information contained therein, is not for the use or benefit of, nor may it be relied upon by any other person or entity, for any purpose without the advance written consent of EMG. Any reuse or distribution without such consent shall be at the client's or recipient's sole risk, without liability to EMG.

Estimated installation costs are based on EMG's experience on similar projects and industry standard cost estimating tools including *RS Means and Whitestone Cost Lab*. In developing the installed costs, EMG also considered the area correction factors for labor rates for Sacramento, California. Since actual installed costs may vary widely for particular installation based on labor and material rates at time of installation, EMG does not guarantee installed cost estimates and shall in no event be liable should actual installed costs vary from the estimated costs herein. We strongly encourage the owner to confirm these cost estimates independently. EMG does not guarantee the costs savings estimated in this report. EMG shall in no event be liable should the actual energy savings vary from the savings estimated herein.

EMG certifies that EMG has no undisclosed interest in the subject property and that EMG's employment and compensation are not contingent upon the findings or estimated costs to remedy any deficiencies due to deferred maintenance and any noted component or system replacements.

Any questions regarding this report should be directed to Kaustubh Anil Chabukswar at 800.733.0660, ext. 7512.

Prepared by: Konnye Zavala
Energy Auditor
Project Manager

Reviewed by:

Al Diefert
Technical Report Reviewer
For
Kaustubh Anil Chabukswar, CEM CRM
Program Manager

1. Executive Summary

The purpose of this Energy Audit is to provide Sacramento City Unified School District and Hiram Johnson High School with a baseline of energy usage and the relative energy efficiency of the facility and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, support performance contracting, justify a municipal bond funded improvement program, or as a basis for replacement of equipment or systems.

BLDG #	STRUCTURES ASSESSED	BUILDING TYPE	EMG CALCULATED AREA (SF)	ESTIMATED OCCUPANCY
1	Building 001	Building	35494	702
2	Building 002	Building	5992	119
3	Building 003	Building	5982	118
4	Building 004	Building	5974	118
5	Building 005	Building	5841	116
6	Building 006	Building	5821	115
7	Building 007	Building	5472	108
8	Building 008	Building	5807	115
9	Building 009	Building	5827	115
10	Building 010	Building	6950	138
11	Building 011	Building	17876	354
12	Building 012	Building	6267	124
13	Building 013	Building	4400	87
14	Building 014	Building	40347	798
15	Building 015	Building	10276	203
16	Building 016A	Building	25259	500
17	Building 016B	Building	7688	152
18	P01	Modular	7680	152
19	P02	Modular	9600	190
20	P03	Modular	7680	152

The study included a review of the building's construction features, historical energy and water consumption and costs, review of the building envelope, HVAC equipment, heat distribution systems, lighting, and the building's operational and maintenance practices.

1.1. Energy Conservation Measures

EMG has identified seven Energy Conservation Measures (ECMs) for this property. The savings for each measure is calculated using standard engineering methods followed in the industry, and detailed calculations for ECM are provided in Appendix for reference. A 10% discount in energy savings was applied to account for the interactive effects amongst the ECMs. In addition to the consideration of the interactive effects, EMG has applied a 15% contingency to the implementation costs to account for potential cost overruns during the implementation of the ECMs.

The following table summarizes the recommended ECMs in terms of description, investment cost, energy consumption reduction, and cost savings.

Summary of Financial Information for Recommended Non-Renewable Energy Conservation Measures

ITEM	ESTIMATE
Net Initial ECM Investment *(Current Dollars Only)*	$ 348,378 *(In Current Dollars)*
Estimated Annual Cost Savings *(Current Dollars Only)*	$99,813 *(In Current Dollars)*
ECM Effective Payback	3.49 years
Estimated Annual Energy Savings	19.53 %
Estimated Annual Energy Utility Cost Savings *(Excluding Water)*	24.49 %
Estimated Annual Water Cost Saving	9.28 %

Solar Photovoltaic (PV) Screening for Hiram Johnson High School

SOLAR ROOFTOP PHOTOVOLTAIC ANALYSIS	
Estimated Number of Panels	1,746
Estimated KW Rating	550 KW
Potential Annual kWh Produced	847,954 kWh
% of Current Electricity Uses	48.2%
FINANCIAL SUMMARY	
Investment Cost	$1,925,000
Estimated Energy Cost Savings	$148,392
Payback without Incentives	13.0 Years
Incentive Payback but without SRECs	7.8 Years
Payback with All Incentives	7.8 Years

Key Metrics to Benchmark the Subject Property's Energy Usage Profile

- Building Site Energy Use Intensity - The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.
- Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

- Building Cost Intensity - This metric is the sum of all energy use costs in dollars per unit of gross building area.
- Greenhouse Gas Emissions - Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

SITE ENERGY USE INTENSITY (EUI)	RATING
Current Site Energy Use Intensity (EUI)	63 kBtu/ft^2
Post ECM Site Energy Use Intensity (EUI)	51 kBtu/ft^2
SOURCE ENERGY USE INTENSITY (EUI)	**RATING**
Current Source Energy Use Intensity (EUI)	122 kBtu/ft^2
Post ECM Source Energy Use Intensity (EUI)	93 kBtu/ft^2
BUILDING COST INTENSITY (BCI)	**RATING**
Current Building Cost Intensity	$1.42 /ft^2
Post ECM Building Cost Intensity	$1.07 /ft^2

Summary of the Greenhouse Gas Reductions from Recommended Non-Renewable Energy Conservation Measures

The following table provides a summary of the projected Greenhouse Gas Emissions reductions as a result of the recommended Energy Conservation Measures:

GREENHOUSE GAS EMISSIONS REDUCTION	
Estimated Annual Thermal Energy Reduction	3014 MMbtu
Total CO_2 Emissions Reduced	235.13 MtCO_2/Yr
Total Cars Off the Road (Equivalent)*	43
Total Acres of Pine Trees Planted (Equivalent)*	53

**Equivalent reductions per DOE emissions calculation algorithms*

Zero Net Energy Analysis for Renewable and Non-Renewable Recommended Measures

ZERO NET ENERGY ANALYSIS	
Building Annual Net Energy Consumption	15,429,466 kBtu
Total Annual Energy Savings for Non-Renewable Energy Measures	3,014,108 kBtu
Total Annual Energy Savings from Renewable Energy Measures	2,893,219 kBtu
Net Energy Consumption from Grid Post Implementation	9,522,139 kBtu
% Energy Reduction (Renewable + Non- Renewable)	38%

Energy Conservation Measures Screening:

EMG screens ECMs using two financial methodologies. ECMs which are considered financially viable must meet both criteria.

1. Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates. ECMs with a payback period greater than the Expected Useful Life (EUL) of the project are not typically recommended, as the cost of the project will not be recovered during the lifespan of the equipment. These ECMs are recommended for implementation during future system replacement. At that time, replacement may be evaluated based on the premium cost of installing energy efficient equipment.

$$Simple\ Payback = \frac{Initial\ Cost}{Annual\ Savings}$$

2. Savings-to-Investment Ratio (SIR) – The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value over the estimated useful life (EUL) of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy efficiency recommendations should be based on a calculated SIR, with larger SIRs receiving a higher priority. A project is typically only recommended if SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

$$SIR = \frac{Present\ Value\ (Annual\ Savings, i\%, EUL)}{Initial\ Cost}$$

List of Recommended Energy Conservation Measures For Hiram Johnson High School

ECM #	Description of ECM	Projected Initial Investment	Estimated Annual Energy Savings		Estimated Annual Water Savings	Estimated Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Simple Payback	S.I.R.	Life Cycle Savings	Expected Useful Life (EUL)
			Natural Gas	Electricity								
		$	Therms	kWh	kgal	$	$	$	Years		$	Years
No/Low Cost Recommendations												
Totals for No/Low Cost Items		**$0**	**0**	**0**	**0**	**$0**	**$0**	**$0**	**#DIV/0!**			
Capital Cost Recommendations												
1	Upgrade Building Lighting to LED and Install Automatic Lighting Controls Location: Building Interior And Exterior	$187,087	0	221,879	0	$31,009	$9,702	$40,711	4.60	2.60	$298,913	15.00
2	Re-Commission The Building & Its Control Systems Location: Throughout Building	$109,575	14,148	263,668	0	$52,067	$0	$52,067	2.10	5.67	$511,993	15.00
3	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s) Location: Throughout Building	$2,539	0	2,466	0	$345	$0	$345	7.37	1.62	$1,575	15.00
4	Install Low Flow Faucet Aerators Location: Throughout Building	$2,163	0	78,876	335	$13,363	$0	$13,363	0.16	52.70	$111,829	10.00
5	Retrofit Apartment Tank Toilets to Dual Flush Location:	$1,574	0	0	633	$4,418	$0	$4,418	0.36	41.77	$64,150	20.00
Total For Capital Cost		**$302,937**	**14,148**	**566,888**	**968**	**$101,201**	**$9,702**	**$110,903**	**2.73**			
	Interactive Savings Discount @ 10%		-1,415	-56,689	-97	-$10,120	-$970	-$11,090				
	Total Contingency Expenses @ 15%	$45,441										
Total for Improvements		**$348,378**	**12,733**	**510,200**	**872**	**$91,081**	**$8,731**	**$99,813**	**3.49**			

In addition to the above measures, EMG has identified the following measure(s) but has not recommended as they fail to meet the above-mentioned financial criteria of SIR>1.0. Thus, EMG has classified the measure(s) as recommended for consideration.

List of Recommended For Consideration Energy Conservation Measures For Hiram Johnson High School

ECM #	Description of ECM	Initial Investment	Annual Energy Savings		Annual Water Savings	Cost Savings	Estimated Annual O&M Savings	Total Estimated Annual Cost Savings	Payback	S.I.R.	Life Cycle Savings	Expected Useful Life (EUL)
		$	Natural Gas	Electricity	kgal	$	$	$	Years		$	Years
1	Install Low Flow Tankless Restroom Fixtures Location: Throughout Building	$116,398	0	0	1,098	$7,658	$0	$7,658	15.20	0.79	-$24,972	15.00
2	Replace External Windows Location: Throughout Building	$30,374	4	1,695	0	$241	$2	$243	124.89	0.14	-$26,139	25.00
Total for Improvements		**$146,772**	**4**	**1,695**	**1,098**	**$7,899**	**$2**	**$7,902**	**18.57**			

2. Introduction

The purpose of this Energy Audit is to provide Hiram Johnson High School and Sacramento City Unified School District with a baseline of energy usage, the relative energy efficiency of the facility, and specific recommendations for Energy Conservation Measures. Information obtained from these analyses may be used to support a future application to an Energy Conservation Program, Federal and Utility grants towards energy conservation, as well as support performance contracting, justify a municipal bond-funded improvement program, or as a basis for replacement of equipment or systems.

The energy audit consisted of an onsite visual assessment to determine current conditions, itemize the energy consuming equipment (i.e. Boilers, Make-Up Air Units, DWH equipment); review lighting systems both exterior and interior; and review efficiency of all such equipment. The study also included interviews and consultation with operational and maintenance personnel. The following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

The following is a summary of the tasks and reporting that make up the Energy Audit portion of the report.

ENERGY AND WATER USING EQUIPMENT

- EMG has surveyed the common areas, office areas, rooms, maintenance facilities and mechanical rooms to document utility-related equipment, including heating systems, cooling systems, air handling systems and lighting systems.

BUILDING ENVELOPE

- EMG has reviewed the characteristics and conditions of the building envelope, checking insulation values and conditions. This review also includes an inspection of the condition of walls, windows, doors, roof areas, insulation and special use areas

RECOMMENDATIONS FOR ENERGY SAVINGS OPPORTUNITIES

- Based on the information gathered during the on-site assessment, the utility rates, as well as recent consumption data and engineering analysis, EMG has identified opportunities to save energy and provide probable construction costs, projected energy/utility savings and provide a simple payback analysis.

ANALYSIS OF ENERGY CONSUMPTION

- Based on the information gathered during the on-site assessment, EMG has conducted an analysis of the energy usage of all equipment, and identified which equipment is using the most energy and what equipment upgrades may be necessary. As a result, equipment upgrades, or replacements are identified that may provide a reasonable return on the investment and improve maintenance reliability.

ENERGY AUDIT PROCESS

- Interviewing staff and review plans and past upgrades
- Performing an energy audit for each use type
- Performing a preliminary evaluation of the utility system
- Analyzing findings, utilizing ECM cost-benefit worksheets
- Making preliminary recommendations for system energy improvements and measures
- Estimating initial cost and changes in operating and maintenance costs based on implementation of energy efficiency measures
- Ranking recommended cost measures, based on the criticality of the project and the largest payback

REPORTING

The EMG Energy Audit Report includes:

- A comprehensive study identifying all applicable Energy Conservation Measures (ECMs) and priorities, based on initial cost and payback
- A narrative discussion of building systems/components considered and a discussion of energy improvement options;
- A summary of ECMs including initial costs and simple paybacks, based on current utility rates and expected annual savings.

3. Facility Overview and Existing Conditions

3.1. Building Occupancy and Point of Contact

FACILITY SCHEDULE	
Hours of Operations / Week	40
Operational Weeks / Year	38
Estimated Facility Occupancy	1627
% of Male Occupants	813

POINT OF CONTACT	
Point of Contact Name	Richard Conn
Point of Contact Title	Plant Manager
Point of Contact – Contact Number	9168734719

3.2. Building Heating, Ventilating and Air-Conditioning (HVAC)

Description:

Heating and cooling are mainly provided by three rooftop packaged units. There are also wall mounted heat pumps for the modular buildings.

The Mechanical Equipment Schedule in Appendix E contains a summary of the HVAC Equipment at the property.

BUILDING CENTRAL HEATING SYSTEM	
Primary Heating System	Rooftop Packaged Units
Secondary Heating System	Heat pump System
Hydronic Distribution System	Four Pipe
Primary Heating Fuel	Natural Gas
Heating Mode Set-point	69 °F
Heating Mode- Set-back Temperature	53 °F

BUILDING COOLING SYSTEM	
Primary Cooling System	Rooftop Packaged Units
Secondary Cooling System	Split Systems
Hydronic Distribution System	Four Pipe

BUILDING COOLING SYSTEM	
Cooling Mode Set-point	68 °F
Cooling Mode- Set-back Temperature	93 °F

AIR DISTRIBUTION SYSTEM	
Building Ventilation	Central AHU w Fresh Air Intake
On-Demand Ventilation System in Use?	No
Energy Recovery Wheel / Enthalpy Wheel Exhaust Fans	No

DOMESTIC HOT WATER SYSTEM	
Primary Domestic Water Fuel	Natural Gas

3.3. Lighting

Description:

The lighting in the school building primarily consists of T8 linear fluorescent lamp fixtures in classrooms and hallways. The fixtures were observed to be operating on bi-level mode in the classrooms. The exterior lights were primarily High Intensity Discharge (HID) fixtures.

The detailed lighting schedule and the proposed LED alternative is provided in Appendix D

4. Utility Analysis

Establishing the energy baseline begins with an analysis of the utility cost and consumption of the building. Utilizing the historical energy data and local weather information, we evaluate the existing utility consumption and assign it to the various end-uses throughout the buildings. The Historical Data Analysis breaks down utilities by consumption, cost and annual profile.

This data is analyzed, using standard engineering assumptions and practices. The analysis serves the following functions:

- Allows our engineers to benchmark the energy and water consumption of the facilities against consumption of efficient buildings of similar construction, use and occupancy.
- Generates the historical and current unit costs for energy and water
- Provides an indication of how well changes in energy consumption correlate to changes in weather.
- Reveals potential opportunities for energy consumption and/or cost reduction. For example, the analysis may indicate that there is excessive, simultaneous heating and cooling, which may mean that there is an opportunity to improve the control of the heating and cooling systems.

By performing this analysis and leveraging our experience, our engineers prioritize buildings and pinpoint systems for additional investigation during the site visit, thereby maximizing the benefit of their time spent on-site and minimizing time and effort by the customer's personnel.

Based upon the utility information provided about the Sacramento City Unified School District, the following energy rates are utilized in determining existing and proposed energy costs.

Utility Rates used for Cost Analysis

ELECTRICITY (BLENDED RATE)	NATURAL GAS	WATER / SEWER
$0.14 /kWh	$ 1.08 /therm	$ 6.98 /kGal

The data analyzed provides the following information: 1) breakdown of utilities by consumption, 2) cost and annual profile, 3) baseline consumption in terms of energy/utility at the facility, 4) the Energy Use Index, or Btu/sq ft, and cost/sq ft. For multiple water meters, the utility data is combined to illustrate annual consumption for each utility type.

4.1. Electricity

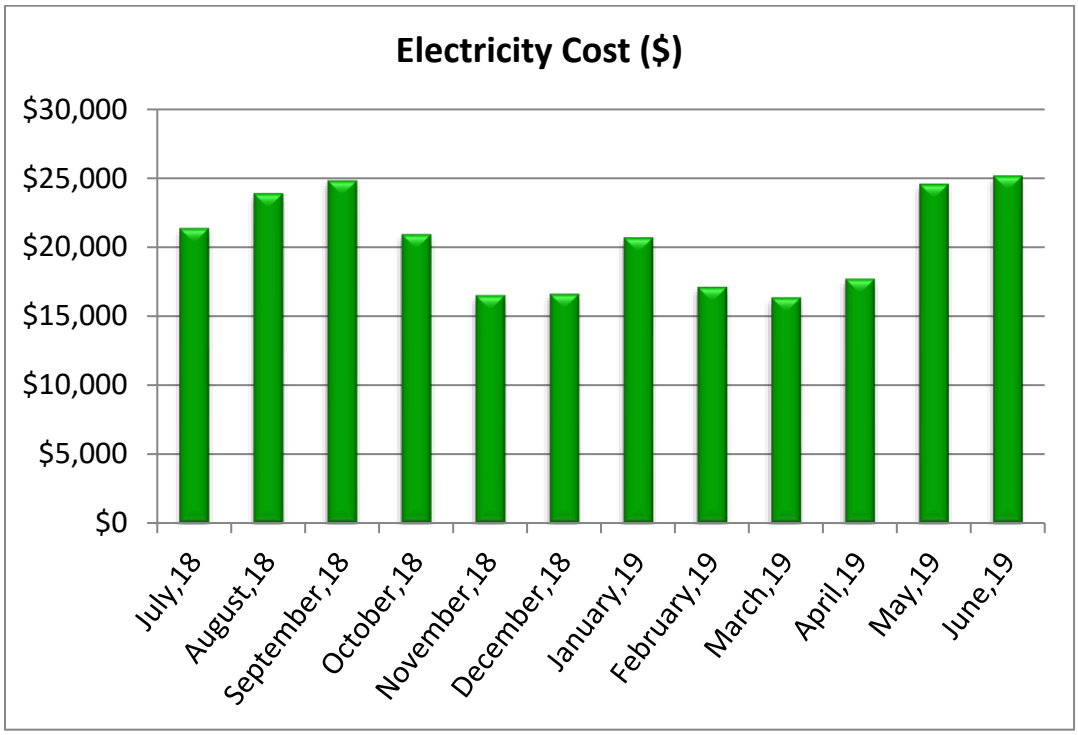
PGE satisfies the electricity requirements for the facility. The primary end uses for electric utility compromises of lighting, cooling, office/school equipment, and appliances in the break room.

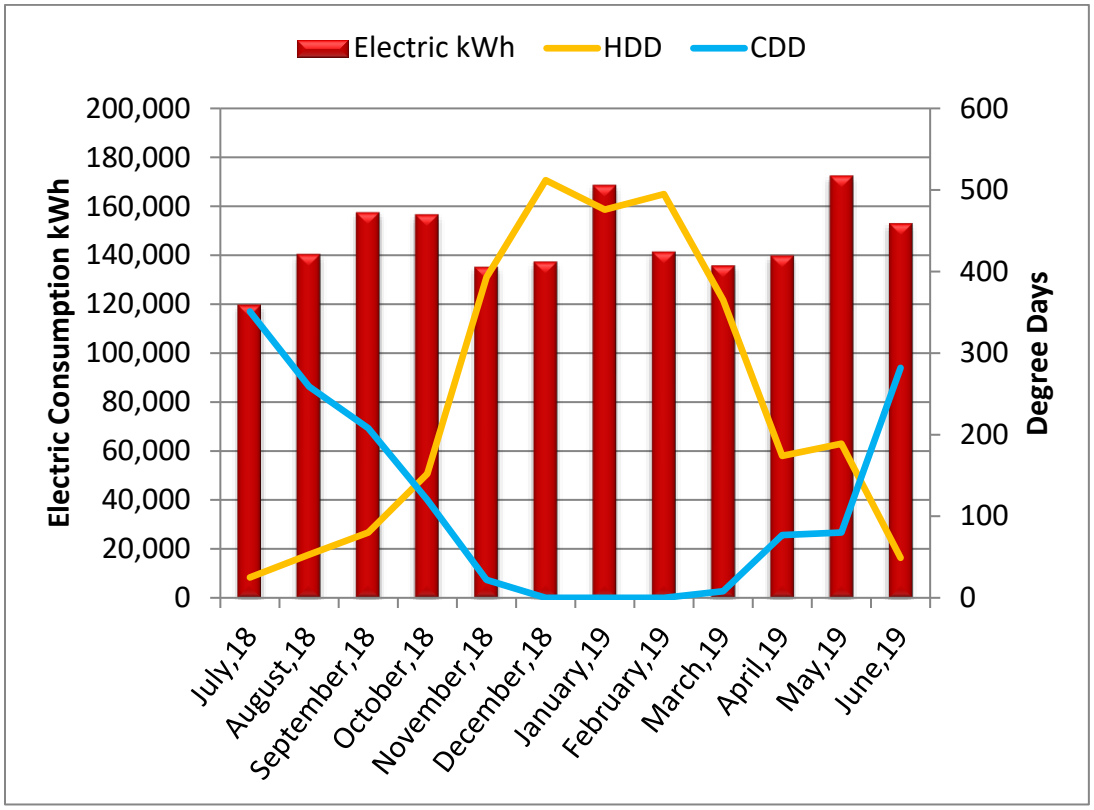
The table below provides the electric use for the period of twelve continuous months.

Electric Consumption and Cost Data

BILLING MONTH	CONSUMPTION (KWH)	UNIT COST/KWH	TOTAL COST
July,18	119,713	$0.18	$21,358
August,18	140,387	$0.17	$23,886
September,18	157,470	$0.16	$24,824
October,18	156,621	$0.13	$20,925
November,18	135,154	$0.12	$16,494
December,18	137,292	$0.12	$16,599
January,19	168,661	$0.12	$20,693

BILLING MONTH	CONSUMPTION (KWH)	UNIT COST/KWH	TOTAL COST
February,19	141,347	$0.12	$17,107
March,19	135,770	$0.12	$16,331
April,19	139,838	$0.13	$17,691
May,19	172,493	$0.14	$24,578
June,19	153,040	$0.16	$25,175
Total/average	1,757,786	$0.14	$245,661


Electricity Cost ($)
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
$0
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19


Electric kWh
HDD
CDD
Electric Consumption kWh
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
600
500
400
300
200
100
0
Degree Days
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19

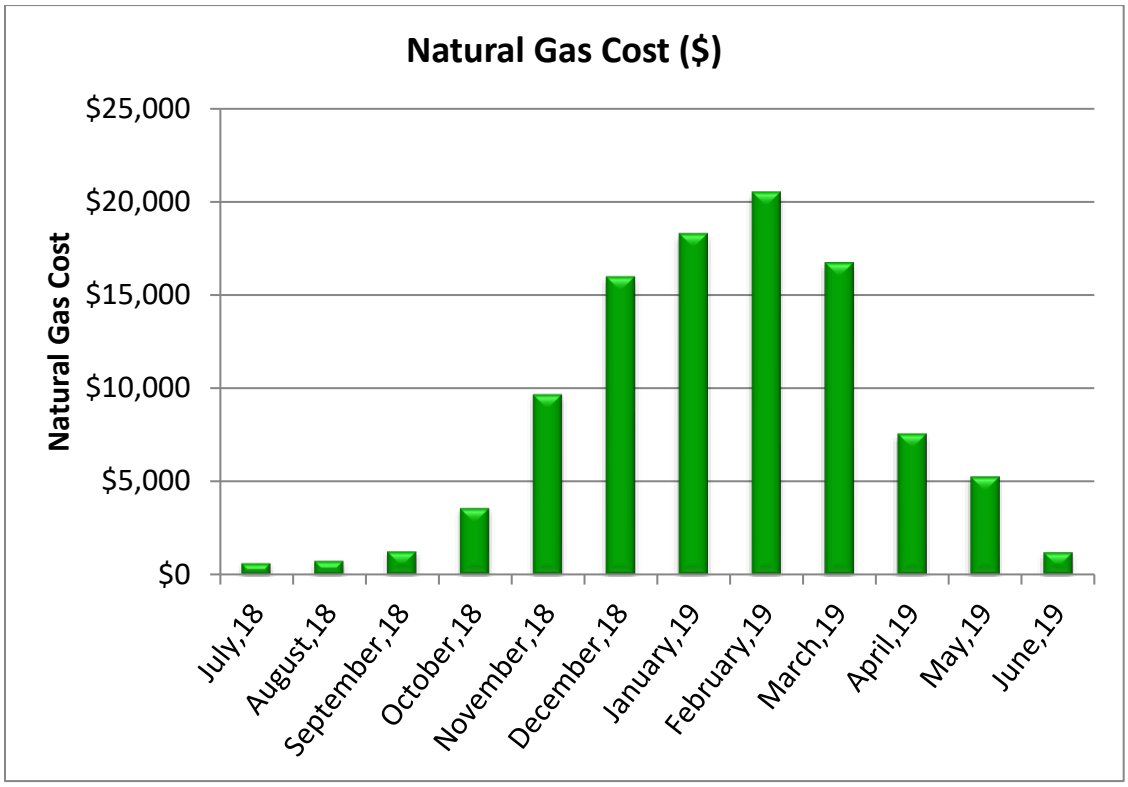
4.2. Natural Gas

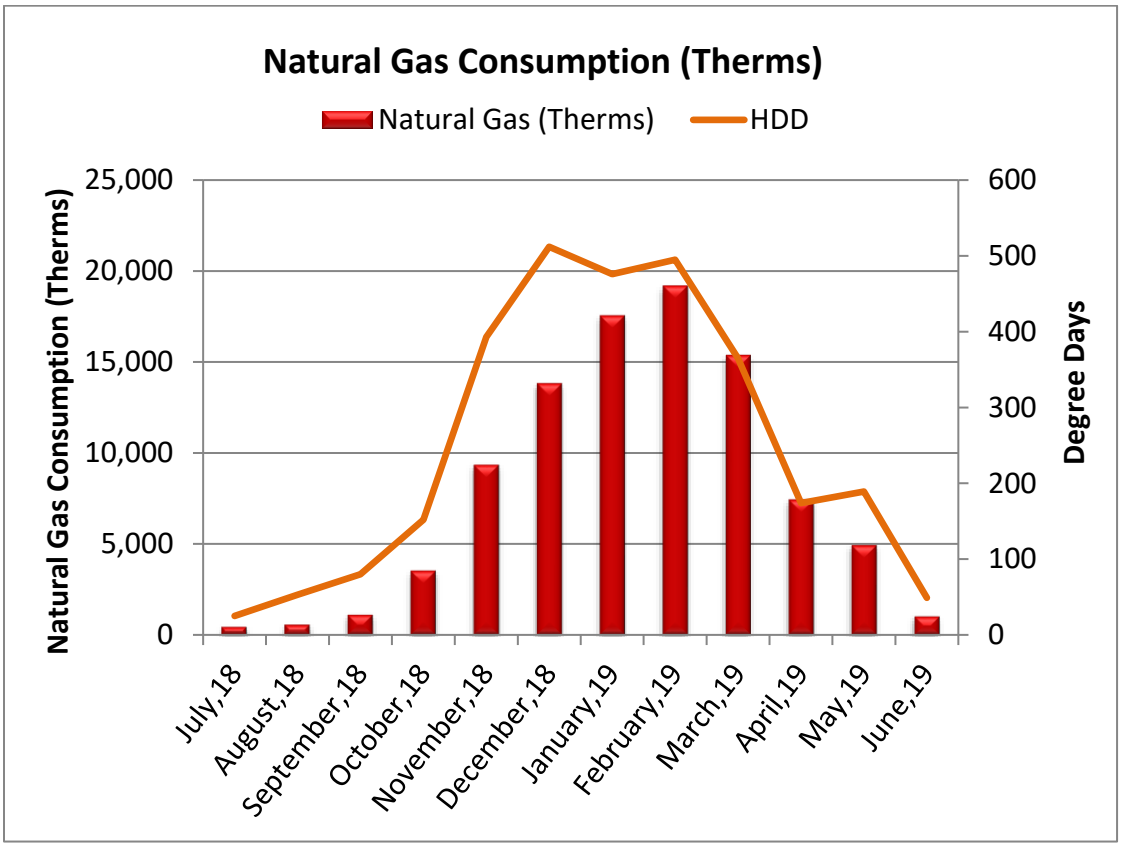
Spurr Gas satisfies the natural gas requirements of the facility. The primary end use of natural gas is for building heating, domestic water heating, and cooking in the cafeteria.

The analysis of the 12 months of consumption is provided below.

Natural Gas Consumption and Cost Data

BILLING MONTH	CONSUMPTION (THERMS)	UNIT COST/THERM	TOTAL COST
July,18	429	$1.44	$616
August,18	551	$1.34	$738
September,18	1,100	$1.13	$1,249
October,18	3,526	$1.01	$3,567
November,18	9,350	$1.03	$9,668
December,18	13,833	$1.16	$15,991
January,19	17,563	$1.04	$18,296
February,19	19,203	$1.07	$20,533
March,19	15,387	$1.09	$16,748
April,19	7,436	$1.02	$7,569
May,19	4,934	$1.07	$5,268
June,19	1,006	$1.20	$1,209
Total/average	94,319	$1.08	$101,450


Natural Gas Cost ($)
Natural Gas Cost
$25,000
$20,000
$15,000
$10,000
$5,000
$0
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19

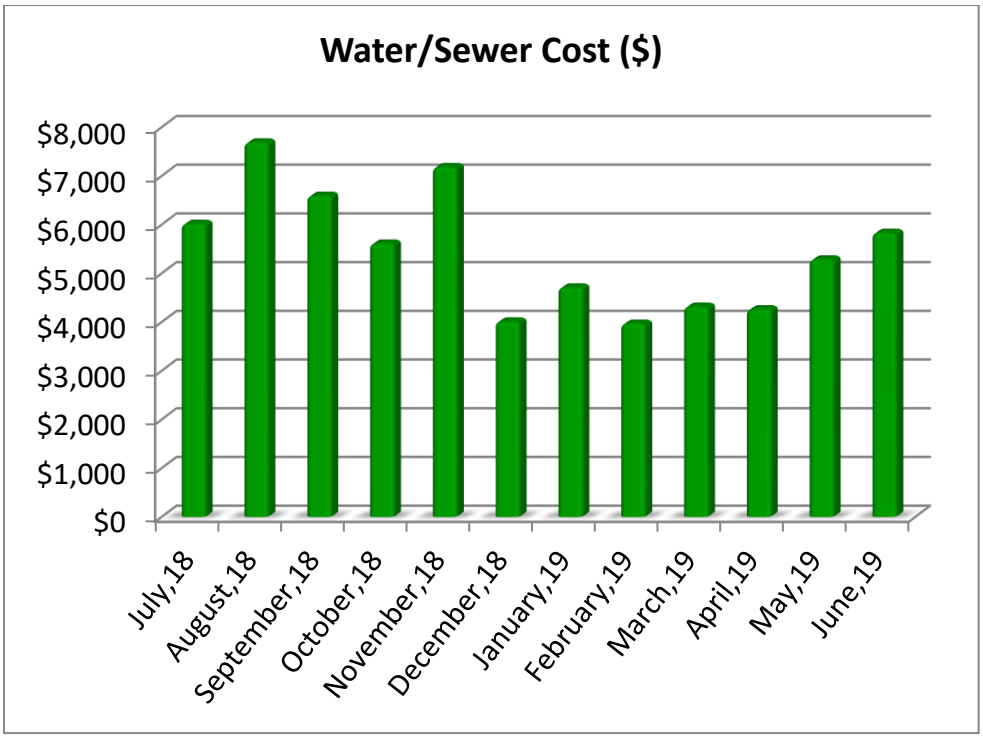

Natural Gas Consumption (Therms)
Natural Gas (Therms)
HDD
Natural Gas Consumption (Therms)
Degree Days
25,000
20,000
15,000
10,000
5,000
0
600
500
400
300
200
100
0
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19

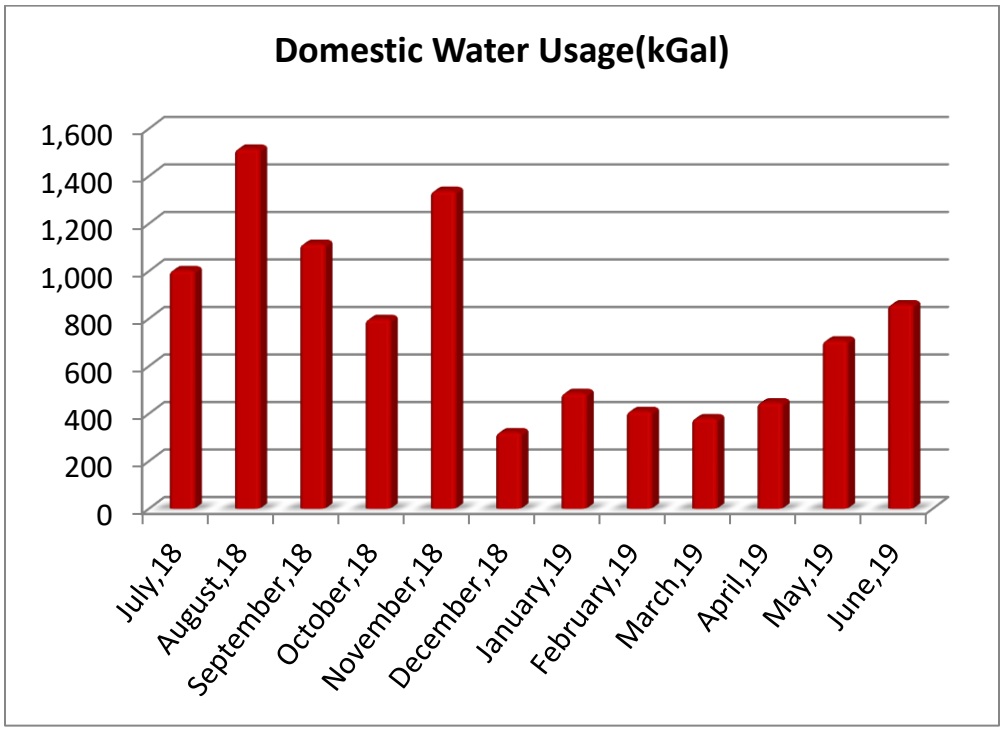
4.3. Water and Sewer

The City of Sacramento satisfies the water requirements for the facility. The primary end use of water is the plumbing fixtures such as staff showers, water closets, and lavatories. The table below provides the twelve continuous months' worth of consumption and cost for water in kGal for the facility.

Water and Sewer Consumption and Cost Data

BILLING MONTH	CONSUMPTION (KGAL)	UNIT COST/KGAL	TOTAL COST
July,18	1,004	$6.00	$6,020
August,18	1,516	$5.07	$7,690
September,18	1,115	$5.92	$6,596
October,18	799	$7.03	$5,615
November,18	1,338	$5.37	$7,186
December,18	322	$12.47	$4,015
January,19	487	$9.67	$4,714
February,19	411	$9.65	$3,970
March,19	381	$11.35	$4,319
April,19	447	$9.53	$4,265
May,19	708	$7.47	$5,289
June,19	860	$6.78	$5,835
Total/average	9,389	$6.98	$65,514


Water/Sewer Cost ($)
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19


Domestic Water Usage(kGal)
1,600
1,400
1,200
1,000
800
600
400
200
0
July,18
August,18
September,18
October,18
November,18
December,18
January,19
February,19
March,19
April,19
May,19
June,19

5. Renewable Energy Discussions

5.1. Rooftop Solar Photovoltaic Feasibility

Solar Energy Feasibility

A photovoltaic array is a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells. The cells convert solar energy into direct current electricity via the photovoltaic effect. The power that one module can produce is seldom enough to meet requirements of a home or a business, so the modules are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can plug into the existing infrastructure to power lights, motors, and other loads. The modules in a PV array are usually first connected in series to obtain the desired voltage; the individual strings are then connected in parallel to allow the system to produce more current. Solar arrays are typically measured by the peak electrical power they produce, in watts, kilowatts, or even megawatts.

When determining if a site is suitable for a solar application, two basic considerations must be evaluated:

- At minimum, the sun should shine upon the solar collectors from 9 AM to 3 PM. If less, the application may still be worthwhile, but the benefit will be less.
- The array should face south and be free of any shading from buildings, trees, rooftop equipment, etc. If the array is not facing directly south, there will be a penalty in transfer efficiency, reducing the overall efficiency of the system.

SOLAR PV QUESTIONNAIRE	RESPONSE
Does the property have a south, east, or west facing roof or available land of more than 250 square feet per required Solar Array Panel?	**Yes**
Is the area free from any shading such as trees, buildings, equipment etc throughout the whole day?	**Yes**
Can the panels be mounted at an incline of roughly 25-45 degrees? (equal to latitude of property)	**Yes**
Is the property in an area with acceptable average monthly sunlight levels?	**Yes**
Has the roofing been replaced within the past 3-5 years?	**Yes**
Is the roof structure sufficient to hold solar panels?	**Needs Additional Study**
Is the property located in a state eligible for net metering?	**Yes**

A solar feasibility analysis of the Hiram Johnson High School site has resulted in the building containing more than sufficient amount of roof area for solar electricity generation. The analysis through the use of National Renewable Energy Laboratory's solar photovoltaic software assisted in calculating the potential electricity generated from the allocated land and roof area set for solar photovoltaic installment. The allocated roof area was through looking at the roof and surrounding areas at a bird's eye view. Also detailed in the report are incentives and rebates that can potentially bring down the installation cost of the ECMs and result in a higher return on investment and quicker payback period.

The approach taken in the solar photovoltaic (PV) roof analysis begins with surveying the roof and determine areas on the roof where solar PV panels can potentially be installed.

1) Conducting a preliminary sizing of solar PV panels on the roofs and on the ground and its potential electricity production for its first year of installment using the National Renewable Energy Laboratory (NREL) PV WATTS Version 2 Software.

2) Calculate energy and cost savings for the site as a sole proprietor of the system capable of collecting state, local, and federal tax credits and incentives and interconnecting and selling the renewable energy electrical production to the building.

SOLAR ROOFTOP PHOTOVOLTAIC ANALYSIS	
Estimated Number of Panels	1,746
Estimated KW Rating	550 KW

SOLAR ROOFTOP PHOTOVOLTAIC ANALYSIS	
Potential Annual kWh Produced	847,954 kWh
% of Current Electricity Uses	48.2%
FINANCIAL SUMMARY	
Investment Cost	$1,925,000
Estimated Energy Cost Savings	$148,392
Payback without Incentives	13.0 Years
Incentive Payback but without SRECs	7.8 Years
Payback with All Incentives	7.8 Years

A photovoltaic array is a linked collection of photovoltaic modules, which are in turn made of multiple interconnected solar cells. The cells convert solar energy into direct current. Modules of cells are linked together to form an array. Most PV arrays use an inverter to convert the DC power produced by the modules into alternating current that can connect to existing AC infrastructure to power lights, motors, and other loads.

Cost of production has fallen years with increasing demand and through production and technological advances. The cost dropped from $8–10/watt in 1996 to $4–7/watt in 2006. The market is diversifying with new types of panels suited to unique installation methods including stick on sheets and PV spray coating. The solar PV cost used in the analysis was set at $7.0/Watt which includes design, construction, administration, and installation and maintenance cost throughout the life of the solar panels.

One breakthrough for PV is “Net Metering”. When more PV electric power is generated than is consumed on site, the electric service meter reverses to “sell” the excess power directly back onto the power grid. The economics of PV for commercial industrial installations become attractive when coupled with incentives from Federal and state agencies, as well utility companies.

A kilowatt-hour costing $0.15 might be valued at $0.30 when produced by PV and sent to the grid. The economics of PV for commercial industrial installations become attractive when coupled with incentives from Federal and state agencies, as well utility companies.

The low payback period is highly dependent on the marketing potential of selling Solar Renewable Certificates to electricity generated providers who are under state regulations to contain a certain percentage of their electricity generation derived from renewable energy such as wind and solar.

Solar facilities are encouraged to sell their SRECs on the market (either spot market or through long-term contracts). Utilities may use SRECs for compliance under the state RPS for the year in which they are generated. Utilities may purchase up to 10% more SRECs than they require for compliance and "bank" those surplus SRECs for compliance during the following two years. Any SRECs pricing can range from $300 - $450/MWh and can be sold across state borders to other utility providers looking to purchase SRECs. EMG has selected to use the market value of $300/MWh minus 5% administrative fee in the analysis.

A number of states and corresponding electrical utility supplier are required under regulation to have a certain percentage of its electricity be produced by solar energy. To offset that they allow other utility companies to buy Renewable Energy Credits (REC) credit off their customers and facilities that produce their own solar energy. Typically, the national market, the utility market is $400 per MWh to Utility Suppliers for not meeting this standard percentage so these REC credits are sold for $350 per MWH. (1 REC credit = 1 MWH).

State charges these utility companies to meet their state compliance of 0.2% of the entire electricity consumption from solar energy by 2022 (from.005% in 2008 aggregated up to 0.2% by 2022). The REC credits correspond to these percentages as they aggregate each year.

6. Operations and Maintenance Plan

The quality of the maintenance and the operation of the facility's energy systems have a direct effect on its overall energy efficiency. Energy-efficiency needs to be a consideration when implementing facility modifications, equipment replacements, and general corrective actions. The following is a list of activities that should be performed as part of the routine maintenance program for the property.

Building Envelope		
	✓	Ensure that the building envelope has proper caulking and weather stripping.
	✓	Patch holes in the building envelope with foam insulation and fire rated caulk around combustion vents
	✓	Inspect building vents semiannually for bird infestation
	✓	Inspect windows monthly for damaged panes and failed thermal seals
	✗	Repair and adjust automatic door closing mechanisms as needed.
Heating and Cooling		
	✓	Pilots lights on furnaces and boilers be turned off in summer
	✓	All preventive maintenance should be performed on all furnaces and boilers, which would include cleaning of burners and heat exchanger tubes.
	✓	Ensure that the combustion vents exhaust outside the conditioned space and the vent dampers are functional
	✓	Ensure that the control valves are functioning properly before start of every season
	✗	Ensure steam traps are functional before start of each heating season
	✓	Ensure use of chemical treatment for boiler make up water
	✓	Ensure boiler outside temperature re-set is set to 55F
	✓	Ensure use of chemical treatment for Colling tower water to prevent corrosion
	✓	Ensure the duct work in unconditioned space is un-compromised and well insulated
	✓	Duct cleaning is recommended every 10 years. This should include sealing of ducts using products similar to 'aero-seal'
	✓	Ensure use of economizer mode is functional and used
	✓	Ensure that the outside air dampers actuators are operating correctly
	✓	Ensure air coils in the AHU and FCA's are pressure washed annually
	✓	Return vents should remain un-obstructed and be located centrally
	✗	Temperature settings reduced in unoccupied areas and set points seasonally adjusted.
	✓	Evaporator coils and condenser coils should be regularly cleaned to improve heat transfer
	✗	Refrigerant pipes should be insulated with a minimum of ¾" thick Elastomeric Rubber Pipe Insulation
	✗	Ensure refrigerant pressure is maintained in the condensers
	✓	Change air filters on return vents seasonally. Use only filters with 'Minimum Efficiency Rating Value'(MERV) of 8
Central Domestic Hot Water Heater		
	✗	Never place gas fired water heaters adjacent to return vents so as to prevent flame roll outs
	✓	Ensure the circulation system is on timer to reduce the losses through re-circulation
	✗	Ensure all hot water pipes are insulated with fiberglass insulation at all times
	✓	Replacement water heater should have Energy Factor (EF)>0.9
	✓	Tank-type water heaters flushed monthly

Lighting Improvements

✓	Utilize bi-level lighting controls in stairwells and hallways.
✓	Use LED replacement lamps
✓	Clean lighting fixture reflective surfaces and translucent covers.
✓	Ensure that timers and/or photocells are operating correctly on exterior lighting
✓	Use occupancy sensors for offices and other rooms with infrequent occupancy

Existing Equipment and Replacements

✓	Ensure that refrigerator and freezer doors close and seal correctly
✗	Ensure kitchen and bathroom exhaust outside the building and the internal damper operates properly
✗	Ensure that bathroom vents exhaust out
✓	Office/ computer equipment either in the “sleep” or “off” mode when not used

7. Appendices

APPENDIX A: Glossary of Terms

APPENDIX B: Mechanical Equipment Inventory

APPENDIX C: Lighting System Schedule

APPENDIX D: ECM Checklist

APPENDIX E: ECM Calculations

APPENDIX F: Solar PV

APPENDIX A:
Glossary of Terms

Glossary of Terms and Acronyms

ECM – Energy Conservation Measures are projects recommended to reduce energy consumption. These can be No/Low cost items implemented as part of routine maintenance or Capital Cost items to be implemented as a capital improvement project.

Initial Investment – The estimated cost of implementing an ECM project. Estimates typically are based on R.S. Means Construction cost data and Industry Standards.

Annual Energy Savings – The reduction in energy consumption attributable to the implementation of a particular ECM. These savings values do not include the interactive effects of other ECMs.

Cost Savings – The expected reduction in utility or energy costs achieved through the corresponding reduction in energy consumption by implementation of an ECM.

Simple Payback Period –The number of years required for the cumulative value of energy or water cost savings less future non-fuel or non-water costs to equal the investment costs of the building energy or water system, without consideration of discount rates.

EUL – Expected Useful Life is the estimated lifespan of a typical piece of equipment based on industry accepted standards.

RUL – Remaining Useful Life is the EUL minus the effective age of the equipment and reflects the estimated number of operating years remaining for the item.

SIR - The savings-to-investment ratio is the ratio of the present value savings to the present value costs of an energy or water conservation measure. The numerator of the ratio is the present value of net savings in energy or water and non-fuel or non-water operation and maintenance costs attributable to the proposed energy or water conservation measure. The denominator of the ratio is the present value of the net increase in investment and replacement costs less salvage value attributable to the proposed energy or water conservation measure. It is recommended that energy-efficiency recommendations be based on a calculated SIR, with larger SIRs receiving a higher priority. A project typically is recommended only if the SIR is greater than or equal to 1.0, unless other factors outweigh the financial benefit.

Life Cycle Cost - The sum of the present values of (a) **I**nvestment costs, less salvage values at the end of the study period; (b) Non-fuel operation and maintenance costs: (c) Replacement costs less salvage costs of replaced building systems; and (d) Energy and/or water costs.

Life Cycle Savings – The sum of the estimated annual cost savings over the EUL of the recommended ECM, expressed in present value dollars.

Building Site Energy Use Intensity - The sum of the total site energy use in thousands of Btu per unit of gross building area. Site energy accounts for all energy consumed at the building location only not the energy consumed during generation and transmission of the energy to the site.

Building Source Energy Use Intensity – The sum of the total source energy use in thousands of Btu per unit of gross building area. Source energy is the energy consumed during generation and transmission in supplying the energy to your site.

Building Cost Intensity - This metric is the sum of all energy use costs in dollars per unit of gross building area.

Greenhouse Gas Emissions - Although there are numerous gases that are classified as contributors to the total for Greenhouse Emissions, the scope of this energy audit focuses on carbon dioxide (CO_2). Carbon dioxide enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

APPENDIX B:
Mechanical Equipment Inventory

D10 CONVEYING

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493534	D1011	**Elevator**	2500 LB	Hiram Johnson High School / P02 Classrooms X04-X08	P02-Building exterior	Allweiler AG	SUP 140-43	6962 Y28	2015	00264109	
2	1493552	D1011	**Elevator Controls**	1 CAR	Hiram Johnson High School / P02 Classrooms X04-X08	P02-Building exterior	Pheonix	3000	000329TJ	2003	00264108	

D20 PLUMBING

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493327	D2021	**Backflow Preventer**	1.5 INCH	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Wilkins Zurn	975XL	953700	1992	19007877	
2	1493481	D2021	**Backflow Preventer**	6 INCH	Hiram Johnson High School / Site	Site	Ames	4000	4F10071	1992	19007779	
3	1493698	D2021	**Backflow Preventer**	6 INCH	Hiram Johnson High School / Site	Site	Zurn Wilkins	975	B30523	2000	00264095	
4	1493310	D2023	**Domestic Boiler**	1825 MBH	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Teledyne Laars	AP 1825 IN 09 C B P C LW	C00H09480	2000	19007906	
5	1493385	D2023	**Domestic Boiler**	399 MBH	Hiram Johnson High School / 015 Cafeteria	015-M011-Mechanical room	Laars Heating Systems	VW0400CN12CBACX	B01CB001	2001	00264072	
6	1493326	D2023	**Domestic Boiler** [Boiler 1]	801 - 1400 MBH	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Portman Boiler Co. Inc.	XWL453P	E382	2016	19007099	
7	1493371	D2023	**Domestic Circulation Pump**	.5 HP	Hiram Johnson High School / 015 Cafeteria	015-M011-Mechanical room	Armstrong	810119MF-003	No tag/plate found	2018	00264073	
8	1493631	D2023	**Domestic Circulation Pump**	.5 HP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Bell & Gossett	M49	189105	2009		
9	1493600	D2023	**Domestic Circulation Pump**	.5 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Armstrong	816032-000	1110	2010	00264075	
10	1493664	D2023	**Domestic Circulation/Booster Pump**	30 HP	Hiram Johnson High School / Site	Site	Berkeley Pump Co.	821/2TPM	Illegible	1999	00264097	
11	1493605	D2023	**Water Heater**	100 GAL	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Rheem	G100-80N	RRLN0212D03551	2012	00264093	
12	1493619	D2023	**Water Heater**	100 GAL	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Rheem	G100-80N	RRLN0212D03550	2012	00264094	
13	1493392	D2023	**Water Heater**	100 GAL	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	A. O. Smith	T 197 824	AH83-01994-824	1994	19007091	
14	1493546	D2023	**Water Heater**	16 - 29 GAL	Hiram Johnson High School / 014 Gymnasium	14A-Z014	American Appliance MFG.	ES22S	A 853211676	2002	19007791	
15	1493616	D2023	**Water Heater**	30 GAL	Hiram Johnson High School / 001 A Wing, B Wing	01B-Z001	State Industries, Inc.	P63020LS	E02112790	2002	19007952	
16	1486020	D2023	**Water Heater**	6 GAL	Hiram Johnson High School / 014 Gymnasium	Restrooms	State Industries, Inc.	P6610MSK0	001517726		19007834	
17	1486026	D2023	**Water Heater**	6 GAL	Hiram Johnson High School / 014 Gymnasium	Restrooms	State Industries, Inc.	P6610MSK0	E01117002		19007835	
18	1486117	D2023	**Water Heater**	75 GAL	Hiram Johnson High School / 014 Gymnasium	14D-M001 Restrooms	A. O. Smith	BT 80 230	MF00-0950072-230	2000	19007919	
19	1493452	D2023	**Water Storage Tank**	120 GAL	Hiram Johnson High School / 015 Cafeteria	015-M011-Mechanical room	Rheem / Ruud	ST120	A481507339	2015	00264074	
20	1493439	D2023	**Water Storage Tank**	150 GAL	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Purex Triton	No tag/plate found	No tag/plate found	2002	19007932	
21	1493470	D2023	**Water Storage Tank**	400 GAL	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Stark	No tag/plate found	No tag/plate found	2000	19007861	
22	1493630	D2091	**Air Compressor**	2 HP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Ingersoll Rand	242-5C	No tag/plate found	1967	19007096	
23	1493658	D2091	**Air Compressor**	2 HP	Hiram Johnson High School / 012 S Wing E	012-N11A	Champion	R10SR, 2HP, SIMPLEX	R0002170	2000	19007090	
24	1493478	D2091	**Air Compressor**	2 HP	Hiram Johnson High School / 015 Cafeteria	015-M011-Mechanical room	Copeland	Z73 WC	A134634	1957	00264071	2

D30 HVAC

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493383	D3021	**Boiler** [Boiler 1]	4000 MBH	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Cleaver-Brooks	FLX 700	BT 7446	2000	00264087	
2	1493380	D3021	**Boiler** [Boiler 2]	4000 MBH	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Cleaver-Brooks	FLX 700	BT 7447	2000	00264086	
3	1493304	D3022	**Chemical Feed System**		Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Chemtrol	No tag/plate found	No tag/plate found	2000	19007850	2
4	1493563	D3022	**Expansion Tank** [NLA-1400]	1400 GAL	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Wessels Company	22011400	4509	2001	00264089	
5	1493440	D3022	**Expansion Tank** [NLA-600]	600 GAL	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Wessels Company		66004	2001	00264088	
6	1493496	D3031	**Chiller**	10 - 20 TON	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Dunham-Bush	PCS200-40Q	67H-0093	1967	19007098	
7	1493407	D3031	**Chiller**	21 - 30 TON	Hiram Johnson High School / 16B Music Building	016-Roof	Carrier	30GX-106MY-630VF-1	1400F90949	2000	19007778	
8	1493697	D3031	**Chiller** [Chiller 1]	30 TON	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Carrier	30GXR301-A-640KZ	3900F34755	2000	00264076	
9	1493682	D3031	**Chiller** [Chiller 2]	30 TON	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Carrier	30GXR301-A-640KZ	3900F34765	2000	00264077	
10	1493537	D3032	**Condensing Unit** [CU-1]	5 TON	Hiram Johnson High School / 001 A Wing, B Wing	01A-Roof	Carrier	38TRA036---331--	1301E00997	2000	19007784	
11	1493683	D3032	**Condensing Unit** [CU-2]	5 TON	Hiram Johnson High School / 001 A Wing, B Wing	01A-Roof	Carrier	38TRA060---331--	4700E00266	2001	19007785	
12	1493491	D3032	**Condensing Unit** [CU-3]	5 TON	Hiram Johnson High School / 001 A Wing, B Wing	01A-Roof	Carrier	38TRA060---331--	1201E02610	2001	19007814	
13	1493662	D3032	**Condensing Unit** [CU-4]	5 TON	Hiram Johnson High School / 001 A Wing, B Wing	01A-Roof	Carrier	38TRA060---331--	1201E02618	2001	19007786	
14	1493575	D3032	**Condensing Unit/Heat Pump**	2 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Mitsubishi Electric	MXZ-3C24NA2	7YU19583A	2007	19007895	
15	1493398	D3032	**Condensing Unit/Heat Pump**	4 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X105-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264110	

16	1493623	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X206-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264117	
17	1493486	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X106-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264112	
18	1493303	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X103-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40438	2000	00264127	
19	1493553	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X201-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40429	2000	00264122	
20	1493444	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X107-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40427	2000	00264113	
21	1493566	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X105-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40432	2000	00264111	
22	1493639	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X200-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264123	
23	1493653	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X108-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40417	2000	00264114	
24	1493349	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X202-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264121	
25	1493507	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X207-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40418	2000	00264116	
26	1493591	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X109-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264132	
27	1493357	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X210-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264130	
28	1493690	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X205-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40416	2000	00264118	
29	1493408	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X204-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264119	
30	1493319	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X110-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL 40434	2000	00264133	
31	1493497	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X102-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264126	
32	1493549	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X212-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40437	2000	00264128	
33	1493582	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X209-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264131	
34	1493604	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X111-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2002	00264134	
35	1493394	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X211-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264129	
36	1493670	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X203-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40431	2000	00264120	
37	1493504	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-X112-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40440	2002	00264135	
38	1493423	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P02 Classrooms X04-X08	P02-X208-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40422	2000	00264115	
39	1493418	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X100-Classrooms	Marvair	VAI60HPA05BII-2000 98	Inaccessible	2000	00264124	
40	1493524	D3032	**Condensing Unit/Heat Pump**	5 TON	Hiram Johnson High School / P01 Classrooms X00-X03	P01-X101-Classrooms	Marvair	VAI60HPA05BII-2000 98	CL40441	2000	00264125	
41	1493441	D3032	**Heat Pump** [HPO-1]	3 TON	Hiram Johnson High School / 001 A Wing, B Wing	01B-Roof	Carrier	38YCC036---551--	2602E16491	2002	19007789	
42	1493565	D3041	**Air Handler (AHU)** [AC Unit 1]	36600 CFM	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Air Fan Engineering Co.	WMZ 231	1998.1	1968	19007097	
43	1493328	D3041	**Air Handler (AHU)** [AH-3]	2401 - 4000 CFM	Hiram Johnson High School / 16B Music Building	016-Roof	Temtrol	WF-RDV4	79999	1995	19007991	
44	1493603	D3041	**Air Handler (AHU)** [AH-4]	2401 - 4000 CFM	Hiram Johnson High School / 16B Music Building	016-Roof	Temtrol	WF-RDV5	80000	2000	19007990	
45	1493583	D3041	**Air Handler (AHU)** [AH-5]	2401 - 4000 CFM	Hiram Johnson High School / 16B Music Building	016-Roof	Temtrol	WF-RDV4	80001	2000	19007891	
46	1493560	D3041	**Air Handler (AHU)** [AH-6]	2401 - 4000 CFM	Hiram Johnson High School / 16B Music Building	016-Roof	Temtrol	WF-RDV4	80002	1980	19007882	
47	1493599	D3041	**Make-Up Air Unit**	2000 - 6000 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	Reznor	No tag/plate found	No tag/plate found	2000	19007999	
48	1493612	D3041	**Unit Ventilator**	100 CFM	Hiram Johnson High School / 013 ROTC	013-O010-Classrooms	Carrier	40UVC3DBAAAN0100QA	W001059153	2010	19007282	
49	1493393	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O225-Classroom	Carrier	40UV100	W001060086	2000	19007955	
50	1493513	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 012 S Wing E	012-0S12A	Carrier	40UV100	W001059156	2000	19007083	
51	1493651	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O224-Classroom	Carrier	40UV100	W001060082	2000	19007929	
52	1493596	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O224-Classroom	Carrier	40UV100	W001060083	2000	19007637	
53	1493598	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O225-Classroom	Carrier	40UV100	W001060081	2000	19007227	
54	1493369	D3041	**Unit Ventilator**	1000 CFM	Hiram Johnson High School / 013 ROTC	013-O010-Classrooms	Carrier	40UV100	W001059154	2010	19007888	
55	1493656	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 011 S Wing W	011-O0N3-Classroom				2010		3
56	1493673	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O221-Classroom	Carrier	40UV125	W001060072	2000	19007839	
57	1493615	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 012 S Wing E	012-N11A				2000		3
58	1493396	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 011 S Wing W	011-N001-Classroom	Inaccessible	Inaccessible	Inaccessible	2010		3
59	1493434	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O220-Classroom	Carrier	40UV125	W001060075	2000	19007871	
60	1493701	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O223-Classroom	Carrier	40UV125	W001060076	2000	19007838	
61	1493559	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O222-Classroom	Carrier	40UV125	W001060080	2000	19007844	
62	1493501	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O223-Classroom	Carrier	40UV125	W001060077	2000	19007840	
63	1493703	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O223-Classroom	Carrier	40UV125	W001060078	2000	19007837	
64	1493594	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O222-Classroom	Carrier	40UV125	W001060079	2000	19007843	
65	1493648	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 011 S Wing W	011-O0S2-Classroom	Inaccessible	Inaccessible	Inaccessible	2010		2

66	1493461	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 011 S Wing W	011-O05E-Classrooms	Carrier	40UV125	W001059155	2010	19007086	
67	1493308	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O222-Classroom	Carrier	40UV125	No tag/plate found	2000	19007845	
68	1493660	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 011 S Wing W	011-O0N4-Classroom				2010		3
69	1493544	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O220-Classroom	Carrier	40UV125	W001060069	2000	19007856	
70	1493621	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O221-Classroom	Carrier	40UV125	W001060074	2000	19007905	
71	1493433	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O221-Classroom	Carrier	40UV125	W001060073	2000	19007836	
72	1493450	D3041	**Unit Ventilator**	1250 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O220-Classroom	Carrier	40UV125	W001060070	2000	19007870	
73	1493364	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O208-Classrooms	Carrier	40UV150	W001060064	2010	19007846	
74	1493318	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O211-Classrooms	Carrier	40UV150	W001060067	2010	19007989	
75	1493437	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O201-Classrooms	Carrier	40UV150	W001060057	2010	19007855	
76	1493489	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O200-Classrooms	Carrier	40UV150	W001060056	2010	19007873	
77	1493453	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O203-Classrooms	Carrier	40UV150	W001060059	2010	19007904	
78	1493353	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O202-Classrooms	Carrier	40UV150	W001060058	2010	19007872	
79	1493421	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O210-Classrooms	Carrier	40UV150	No tag/plate found	2010	19007842	
80	1493338	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O207-Classrooms	Carrier	40UV150	W001060063	2010	19007996	
81	1493346	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O205-Classrooms	Carrier	40UV150	W001060061	2010	19007937	
82	1493626	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O206-Classrooms	Carrier	40UV150	W001060062	2010	19007939	
83	1493587	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O212-Classrooms	Carrier	40UV150	W001060068	2010	19007783	
84	1493692	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O204-Classrooms	Carrier	40UV150	W001060060	2010	19007938	
85	1493521	D3041	**Unit Ventilator**	1500 CFM	Hiram Johnson High School / 001 A Wing, B Wing	01A-O209-Classrooms	Carrier	40UV150	W001060065	2010	19007841	
86	1493315	D3041	**Unit Ventilator**	500 CFM	Hiram Johnson High School / 013 ROTC	013-S009-Office	Carrier	4OUV500	W001059152	2010	19007886	
87	1493590	D3041	**Unit Ventilator**	500 CFM	Hiram Johnson High School / 013 ROTC	013-S009-Office	Carrier	4OUV500	Inaccessible	2010	19007887	
88	1493557	D3042	**Exhaust Fan**	100 - 1000 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	ILG Industries	No tag/plate found	No tag/plate found	2000	19007894	
89	1493499	D3042	**Exhaust Fan**	100 CFM	Hiram Johnson High School / 006 F Wing E	006-Roof	Penn Ventilator Company	AT1C		2000		
90	1493425	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 005 F Wing W	005-Roof	Carnes	CL101A	65830	1999	19007832	
91	1493574	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	JennAir	100 CR	No tag/plate found	2000	19007917	
92	1493671	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 014 Gymnasium	014-Roof	Penn Ventilator Company	AT10	No tag/plate found	2010	19007901	
93	1493500	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 005 F Wing W	005-Roof	Carnes	CL101A	65829	1999	19007833	
94	1493554	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 005 F Wing W	005-Roof	Carnes	CL101A	65830	1999	19007827	
95	1493309	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 005 F Wing W	005-Roof	Carnes	CL101A	65830	1999	19007774	
96	1493675	D3042	**Exhaust Fan**	1000 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	Penn Ventilator Company	AT10	No tag/plate found	2000	19007896	
97	1493528	D3042	**Exhaust Fan**	1001 - 2000 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	ILG Industries	No tag/plate found	No tag/plate found	2000	19007902	
98	1493377	D3042	**Exhaust Fan**	1500 CFM	Hiram Johnson High School / 013 ROTC	013-Roof	Carnes	CL151B	7583	2010	19007780	
99	1493602	D3042	**Exhaust Fan**	2400 CFM	Hiram Johnson High School / 012 S Wing E	012-Roof	JennAir	241 CK A	No tag/plate found	2000	19007798	
100	1493593	D3042	**Exhaust Fan**	2500 CFM	Hiram Johnson High School / 014 Gymnasium	014-Roof				2010		9
101	1493321	D3042	**Exhaust Fan**	400 CFM	Hiram Johnson High School / 013 ROTC	013-Roof	Carnes	CL51X	65827	2000		
102	1493586	D3042	**Exhaust Fan**	500 CFM	Hiram Johnson High School / 008 D Wing E	008-Roof	Carnes	CL51X	65827	2005	19007246	
103	1493324	D3042	**Exhaust Fan**	500 CFM	Hiram Johnson High School / 014 Gymnasium	014-Roof				2010		7
104	1493436	D3042	**Exhaust Fan**	5000 CFM	Hiram Johnson High School / 16B Music Building	016-Roof				2000		
105	1493355	D3042	**Exhaust Fan**	600 CFM	Hiram Johnson High School / 008 D Wing E	008-Roof	No tag/plate found	No tag/plate found	No tag/plate found	2004	19007825	
106	1493686	D3042	**Exhaust Fan**	900 CFM	Hiram Johnson High School / 012 S Wing E	012-Roof	Carnes	CL91A	7563	2000		
107	1493541	D3042	**Exhaust Fan**	900 CFM	Hiram Johnson High School / 008 D Wing E	008-Roof	Carnes	CL91A	7581	2005	19007824	
108	1493404	D3042	**Exhaust Fan**	900 CFM	Hiram Johnson High School / 008 D Wing E	008-Roof	Carnes	CL91A	7581	2005	19007801	
109	1493687	D3042	**Exhaust Fan**	900 CFM	Hiram Johnson High School / 008 D Wing E	008-Roof	JennAir	Illegible	Illegible	2004	19007823	
110	1493419	D3042	**Exhaust Fan** [HEF-1]	1800 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	Greenheck	CUBE-180HP-20-G	02B28009	2002	19007900	
111	1493360	D3042	**Exhaust Fan** [HEF-2]	1800 CFM	Hiram Johnson High School / 015 Cafeteria	015-Roof	Greenheck	CUBE-180P 20-G	02B28010	2002	19007899	
112	1493649	D3042	**Exhaust Fan** [REF-1]	1200 CFM	Hiram Johnson High School / 014 Gymnasium	014-Roof	Greenheck	GB-091-4-X	13695246 1405	2013	19007884	
113	1493661	D3044	**Distribution Pump** [HWP-3]	10 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Bell & Gossett	Illegible	Illegible	2001	00264082	
114	1493416	D3044	**Distribution Pump** [HWP-4]	10 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Bell & Gossett	Illegible	Illegible	2001	00264083	
115	1493655	D3045	**Distribution Pump**	3 HP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Bell & Gossett	1531-3AB63/8-BF	CH-1333	2013	19007100	

116	1493429	D3045	**Distribution Pump** [CHWP-1]	7.5 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	No tag/plate found	No tag/plate found	No tag/plate found	2001	00264090	
117	1493681	D3045	**Distribution Pump** [CHWP-2]	7.5 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	No tag/plate found	No tag/plate found	No tag/plate found	2001	00264091	
118	1493460	D3045	**Distribution Pump** [CHWP-3]	40 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Bell & Gossett	Illegible	Illegible	2001	00264084	
119	1493335	D3045	**Distribution Pump** [CHWP-4]	40 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Bell & Gossett	Illegible	Illegible	2001	00264085	
120	1493634	D3051	**Unit Heater**	13 - 36 MBH	Hiram Johnson High School / 014 Gymnasium	14A-G003-Weight room	Modine Manufacturing			2001		2
121	1493510	D3051	**Unit Heater**	13 - 36 MBH	Hiram Johnson High School / 014 Gymnasium	14A-G012-Orthopedic room	Modine Manufacturing			2002		
122	1493320	D3051	**Unit Heater**	13 - 36 MBH	Hiram Johnson High School / 014 Gymnasium	14A-Z014	Modine Manufacturing			2002		2
123	1493679	D3052	**Heat Pump**	2 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-Building exterior	Bard Manufacturing Company	WH241-A04XX4XXX EHWH02-A04	140F00146871-02	2000	00264103	
124	1493391	D3052	**Heat Pump**	3.5 TON	Hiram Johnson High School / P03 Classrooms X09-X12	P03-Building exterior	Bard Manufacturing Company	WH421-A04XX4XXX EHWH02-A04	140F001468770-02	2000	00264105	
125	1493650	D3052	**Packaged Unit (RTU)**	17.5 TON	Hiram Johnson High School / 001 A Wing, B Wing	001-Roof	Carrier	J18ZJN30G4C1BCD3C1	N1K8197631	2018	19007777	
126	1493427	D3052	**Packaged Unit (RTU)**	4 TON	Hiram Johnson High School / 012 S Wing E	012-Roof	Carrier	Illegible	Illegible	1998	19007804	
127	1493424	D3052	**Packaged Unit (RTU)**	4 TON	Hiram Johnson High School / 012 S Wing E	012-Roof	Carrier	Illegible	Illegible	1998	19007799	
128	1493547	D3052	**Packaged Unit (RTU)**	5 TON	Hiram Johnson High School / 011 S Wing W	011-Roof	Carrier	48HD007-531--	4798G20547	1998	19007796	
129	1493316	D3052	**Packaged Unit (RTU)**	8 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Johnson Controls	ZXG08D4B3AB1A123A2	N1E8758390	2018	19007903	
130	1493387	D3052	**Packaged Unit (RTU)**	8 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Johnson Controls	ZXG08D4B3AB1A123A2	N1M8339527	2018	19007889	
131	1493480	D3052	**Packaged Unit (RTU)** [AC-1]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0301G30395	2001	19007933	
132	1493511	D3052	**Packaged Unit (RTU)** [AC-1]	2 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Carrier	48GS-018040301-	2602G30707	2002	19007940	
133	1493462	D3052	**Packaged Unit (RTU)** [AC-1]	5 TON	Hiram Johnson High School / 010 Library	010-Roof	Carrier	48HJD007---531--	1200G20324	2000	19007787	
134	1493443	D3052	**Packaged Unit (RTU)** [AC-1]	6 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	AAON, Inc.	RQ-006-3-V-HA02-232	201406-AYGF08123	2014	19007881	
135	1493363	D3052	**Packaged Unit (RTU)** [AC-10]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0301G30396	2001	19007636	
136	1493657	D3052	**Packaged Unit (RTU)** [AC-2]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G34141	2001	19007634	
137	1493448	D3052	**Packaged Unit (RTU)** [AC-2]	4 TON	Hiram Johnson High School / 010 Library	010-Roof	Carrier	48HJD007---531--	0201G20407	2001	19007788	
138	1493466	D3052	**Packaged Unit (RTU)** [AC-2]	4 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Carrier	48TFD005-611-	2602G40121	2002	19007898	
139	1493677	D3052	**Packaged Unit (RTU)** [AC-3]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G30465	2001	19007633	
140	1493646	D3052	**Packaged Unit (RTU)** [AC-3]	7.5 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Carrier	48TMD008-A-601--	2502G30857	2002	19007890	
141	1493584	D3052	**Packaged Unit (RTU)** [AC-4]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G30463	2001	19007631	
142	1493607	D3052	**Packaged Unit (RTU)** [AC-5]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G30464	2001	19007897	
143	1493502	D3052	**Packaged Unit (RTU)** [AC-6]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G34142	2001	19007982	
144	1493704	D3052	**Packaged Unit (RTU)** [AC-6]	6 - 7.5 TON	Hiram Johnson High School / 015 Cafeteria	015-Roof	Carrier	48TMD008-A-601--	2502G40572	2002	19007893	
145	1493532	D3052	**Packaged Unit (RTU)** [AC8]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G34144	2001	19007960	
146	1493694	D3052	**Packaged Unit (RTU)** [AC-8]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0201G34143	2001	19007961	
147	1493378	D3052	**Packaged Unit (RTU)** [AC-9]	10 TON	Hiram Johnson High School / 014 Gymnasium	014-Roof	Carrier	48HJD012--661--	0301G30397	2001	19007635	
148	1493633	D3052	**Packaged Unit (RTU)** [AH-7]	3 TON	Hiram Johnson High School / 013 ROTC	013-Roof	American Standard Inc.	YHC033A3ELA000000	606101479L	2006	19007781	
149	1493506	D3052	**Packaged Unit (RTU)** [C-1]	4 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287883	2018	19007909	
150	1493300	D3052	**Packaged Unit (RTU)** [C-10]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297047	2018	19007883	
151	1493518	D3052	**Packaged Unit (RTU)** [C-12]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297044	2018	19007911	
152	1493388	D3052	**Packaged Unit (RTU)** [C-13]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297042	2018	19007885	
153	1493514	D3052	**Packaged Unit (RTU)** [C-14]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297036	2018	19007376	
154	1493446	D3052	**Packaged Unit (RTU)** [C-2]	4 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287881	2018	19007981	
155	1493463	D3052	**Packaged Unit (RTU)** [C-3]	5 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297041	2018	19007912	
156	1493465	D3052	**Packaged Unit (RTU)** [C-4]	5 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297049	2018	19007980	
157	1493428	D3052	**Packaged Unit (RTU)** [C-5]	5 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297046	2018	19007979	
158	1493550	D3052	**Packaged Unit (RTU)** [C-6]	5 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297050	2018	19007931	
159	1493420	D3052	**Packaged Unit (RTU)** [C-7]	5 TON	Hiram Johnson High School / 002 C Wing W	002-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297048	2018	19007907	
160	1493516	D3052	**Packaged Unit (RTU)** [C-8]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297045	2018	19007908	
161	1493597	D3052	**Packaged Unit (RTU)** [C-9]	5 TON	Hiram Johnson High School / 009 C Wing E	009-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297043	2018	19007910	
162	1493570	D3052	**Packaged Unit (RTU)** [D-1A]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297037	2018	19007278	
163	1493435	D3052	**Packaged Unit (RTU)** [D-1B]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297038	2018	19007277	
164	1493376	D3052	**Packaged Unit (RTU)** [D-2]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297035	2018	19007275	
165	1493588	D3052	**Packaged Unit (RTU)** [D-3]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297039	2018	19007276	

166	1493401	D3052	**Packaged Unit (RTU)** [D-4]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297034	2018	19007267	
167	1493313	D3052	**Packaged Unit (RTU)** [D-5]	5 TON	Hiram Johnson High School / 003 D Wing W	003-Roof	Johnson Controls	JA5ZJP08B4A1BCA3A2	N1L8297040	2018	19007273	
168	1493509	D3052	**Packaged Unit (RTU)** [D-6A]	3 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1L8287828	2018	19007279	
169	1493314	D3052	**Packaged Unit (RTU)** [D-6B]	4 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287879	2018	19007270	
170	1493447	D3052	**Packaged Unit (RTU)** [D-7A]	3 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1L8287829	2018	19007269	
171	1493402	D3052	**Packaged Unit (RTU)** [D-7B]	4 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287878	2018	19007271	
172	1493613	D3052	**Packaged Unit (RTU)** [D-8A]	3 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1L8287830	2018	19007268	
173	1493693	D3052	**Packaged Unit (RTU)** [D-8B]	4 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287882	2018	19007272	
174	1493526	D3052	**Packaged Unit (RTU)** [D-9A]	4 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8275385	2018	19007822	
175	1493512	D3052	**Packaged Unit (RTU)** [D-9B]	4 TON	Hiram Johnson High School / 008 D Wing E	008-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1L8287880	2018	19007245	
176	1493628	D3052	**Packaged Unit (RTU)** [E-1A]	4 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130695	2018	19007830	
177	1493299	D3052	**Packaged Unit (RTU)** [E-1B]	4 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130705	2018	19007794	
178	1493415	D3052	**Packaged Unit (RTU)** [E-2A]	3 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1H8125977	2018	19007792	
179	1493348	D3052	**Packaged Unit (RTU)** [E-2B]	4 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130698	2018	19007803	
180	1493573	D3052	**Packaged Unit (RTU)** [E-3A]	3 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1H8125976	2018	19007802	
181	1493302	D3052	**Packaged Unit (RTU)** [E-3B]	4 TON	Hiram Johnson High School / 004 E Wing W	004-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130694	2018	19007826	
182	1493311	D3052	**Packaged Unit (RTU)** [E-4A]	3 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1H8125973	2018	19007812	
183	1493538	D3052	**Packaged Unit (RTU)** [E-4B]	4 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130697	2018	19007795	
184	1493312	D3052	**Packaged Unit (RTU)** [E-5A]	3 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JA3ZJP06B4A1BCA3A1	N1H8125975	2018	19007821	
185	1493535	D3052	**Packaged Unit (RTU)** [E-5B]	4 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130703	2018	19007807	
186	1493368	D3052	**Packaged Unit (RTU)** [E-6A]	3 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JZJP06B4A1BCA1	N1H8125974	2018	19007819	
187	1493508	D3052	**Packaged Unit (RTU)** [E-6B]	4 TON	Hiram Johnson High School / 007 E Wing E	007-Roof	Johnson Controls	JA4ZJP06B4A1BCA3A1	N1H8130696	2018	19007820	
188	1493384	D3052	**Packaged Unit (RTU)** [F-1]	5 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	J5ZJP08B4A1BC1	N1H8130709	2018	19007808	
189	1493654	D3052	**Packaged Unit (RTU)** [F-2]	5 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	JA5ZJP08B4A1BC1	N1H8130708	2018	19007818	
190	1493705	D3052	**Packaged Unit (RTU)** [F-3A]	3 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	JA3ZJP06B4A1BCA3A1	N1H8125971	2018	19007776	
191	1493339	D3052	**Packaged Unit (RTU)** [F-3B]	4 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	JA4ZJP06B4A1BCA3A1	N1H8130700	2018	19007829	
192	1493365	D3052	**Packaged Unit (RTU)** [F-4A]	5 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	J5ZJP08B4A1BC1	N1H8125969	2018	19007775	
193	1493414	D3052	**Packaged Unit (RTU)** [F-4B]	5 TON	Hiram Johnson High School / 005 F Wing W	005-Roof	Johnson Controls Unitary Products	JA4ZJP06B4A1BCA3A1	N1H8130701	2018	19007831	
194	1493610	D3052	**Packaged Unit (RTU)** [F-5A]	3 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA3ZJP06B4A1BCA3A1	N1H8125970	2018	19007364	
195	1493684	D3052	**Packaged Unit (RTU)** [F-5B]	4 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA4ZJP06B4A1BCA3A1	N1H8130699	2018	19007331	
196	1493464	D3052	**Packaged Unit (RTU)** [F-6A]	3 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA3ZJP06B4A1BCA3A1	N1H8125972	2018	19007375	
197	1493317	D3052	**Packaged Unit (RTU)** [F-6B]	4 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA4ZJP06B4A1BCA3A1	N1H8130704	2018	19007285	
198	1493531	D3052	**Packaged Unit (RTU)** [F-7A]	3 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA3ZJP06B4A1BCA3A1	N1H8125968	2018	19007284	
199	1493564	D3052	**Packaged Unit (RTU)** [F-7B]	4 TON	Hiram Johnson High School / 006 F Wing E	006-Roof	Johnson Controls Unitary Products	JA4ZJP06B4A1BCA3A1	N1H8130702	2018	19007248	
200	1493629	D3052	**Packaged Unit (RTU)** [PHP-]	2 TON	Hiram Johnson High School / 011 S Wing W	011-Roof	Carrier	50HS-018--301	4600G40394	2000	19007806	
201	1493409	D3052	**Packaged Unit (RTU)** [PHP-1]	2 TON	Hiram Johnson High School / 011 S Wing W	011-Roof	Carrier	50HS-018--301	4900G44034	2000	19007828	
202	1493359	D3052	**Packaged Unit (RTU)** [PHP-1]	2 TON	Hiram Johnson High School / 012 S Wing E	012-Roof	Carrier	50HS-018---301--	3400G40483	2000	19007805	
203	1493459	D3052	**Packaged Unit (RTU)** [PHP-1]	2 TON	Hiram Johnson High School / 011 S Wing W	011-Roof	Carrier	50HS-018--301	4900G44035	2000	19007797	
204	1493533	D3052	**Packaged Unit (RTU)** [PHP-1]	2 TON	Hiram Johnson High School / 012 S Wing E	012-Roof	Carrier	50HS-018---301--	3400G40487	2000	19007800	

D40 FIRE PROTECTION

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1486054	D4031	**Fire Extinguisher**	LBS	Hiram Johnson High School / 010 Library	010-Throughout building						
2	1485852	D4031	**Fire Extinguisher**		Hiram Johnson High School / 015 Cafeteria	015-Throughout building						3
3	1485809	D4031	**Fire Extinguisher**		Hiram Johnson High School / 013 ROTC	013-Throughout building						
4	1486101	D4031	**Fire Extinguisher**		Hiram Johnson High School / 005 F Wing W	005-Throughout building						
5	1486063	D4031	**Fire Extinguisher**		Hiram Johnson High School / 001 A Wing, B Wing	001-Throughout building						16
6	1493606	D4031	**Fire Extinguisher**		Hiram Johnson High School / P03 Classrooms X09-X12	Classrooms				2015		8
7	1485794	D4031	**Fire Extinguisher**		Hiram Johnson High School / P01 Classrooms X00-X03	Classrooms				2019		8
8	1485778	D4031	**Fire Extinguisher**		Hiram Johnson High School / P03 Classrooms X09-X12	Classrooms				2019		8
9	1485947	D4031	**Fire Extinguisher**		Hiram Johnson High School / 014 Gymnasium	014-Throughout building						3

10	1485991	D4031	**Fire Extinguisher**	Hiram Johnson High School / 002 C Wing W	002-Throughout building				5
11	1486087	D4031	**Fire Extinguisher**	Hiram Johnson High School / 16A Auditorium	16A-Throughout building				4
12	1485862	D4031	**Fire Extinguisher**	Hiram Johnson High School / 16B Music Building	16B-Throughout building				
13	1485999	D4031	**Fire Extinguisher**	Hiram Johnson High School / 008 D Wing E	008-Throughout building				5
14	1485959	D4031	**Fire Extinguisher**	Hiram Johnson High School / 012 S Wing E	012-Throughout building				3
15	1485997	D4031	**Fire Extinguisher**	Hiram Johnson High School / 003 D Wing W	003-Throughout building				5
16	1485824	D4031	**Fire Extinguisher**	Hiram Johnson High School / 011 S Wing W	011-Throughout building				3
17	1485981	D4031	**Fire Extinguisher**	Hiram Johnson High School / 009 C Wing E	Classrooms				6
18	1485784	D4031	**Fire Extinguisher**	Hiram Johnson High School / P02 Classrooms X04-X08	Classrooms			2019	10

D50 ELECTRICAL

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493474	D5012	**Building/Main Switchboard**	1200 AMP	Hiram Johnson High School / 001 A Wing, B Wing	01B-M001-Mechanical room	Cutler-Hammer	No tag/plate found	E-054823	2005	19007230	
2	1493389	D5012	**Building/Main Switchboard**	1600 AMP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Cutler-Hammer	No tag/plate found	MSF01792	2000	19007095	
3	1493689	D5012	**Building/Main Switchboard**	2500 AMP	Hiram Johnson High School / 013 ROTC	013-M002-Mechanical room	Cutler-Hammer	No tag/plate found	MSF01792	2001	19007232	
4	1493685	D5012	**Building/Main Switchboard** [DP1]	800 AMP	Hiram Johnson High School / Site	Site	Square D	SAD800R	F-L84852	1992	00264099	
5	1493334	D5012	**Building/Main Switchboard** [DPN2]	600 AMP	Hiram Johnson High School / P03 Classrooms X09-X12	P03-Building exterior	Industrial Electric	049557-003	D-789320	2001	00264104	
6	1493490	D5012	**Building/Main Switchboard** [DPN3]	600 AMP	Hiram Johnson High School / P02 Classrooms X04-X08	P02-Building exterior	Industrial Electric			2000	00264107	
7	1493475	D5012	**Building/Main Switchboard** [DPN4]	600 AMP	Hiram Johnson High School / P02 Classrooms X04-X08	P02-Building exterior	Industrial Electric			2000	00264106	
8	1493306	D5012	**Building/Main Switchboard** [MSBH]	4000 AMP	Hiram Johnson High School / Site	Site	Industrial Electric	049557-001	D-984011	2001	00264100	
9	1493601	D5012	**Building/Main Switchboard** [MSBL]	600 AMP	Hiram Johnson High School / Site	Site	Industrial Electric	049557-002	D-789709	2001	00264102	
10	1485898	D5012	**Building/Main Switchboard**	3000 AMP	Hiram Johnson High School / Site	Site	Cutler-Hammer	MSF01792	No tag/plate found	2000	00262065	
11	1493696	D5012	**Main Distribution Panel**	200 AMP	Hiram Johnson High School / 005 F Wing W	005-Roof	Eaton	No tag/plate found	No tag/plate found	2018	19007945	
12	1493581	D5012	**Main Distribution Panel** [ACC1]	400 AMP	Hiram Johnson High School / 002 C Wing W	002-Roof	Eaton	No tag/plate found	No tag/plate found	2018	19007958	
13	1493691	D5012	**Main Distribution Panel** [ACC2]	200 AMP	Hiram Johnson High School / 009 C Wing E	009-Roof	Eaton	SSR0919836-009	No tag/plate found	2018	19007986	
14	1493632	D5012	**Main Distribution Panel** [ACD1]	400 AMP	Hiram Johnson High School / 003 D Wing W	003-Roof	Cutler-Hammer	No tag/plate found	No tag/plate found	2018	19007959	
15	1493343	D5012	**Main Distribution Panel** [ACD2]	200 AMP	Hiram Johnson High School / 008 D Wing E	008-Roof	Eaton	No tag/plate found	No tag/plate found	2018	19007915	
16	1493589	D5012	**Main Distribution Panel** [ACE2]	200 AMP	Hiram Johnson High School / 007 E Wing E	007-Roof	Eaton	Inaccessible	Inaccessible	2018	19007944	
17	1493638	D5012	**Main Distribution Panel** [ACF1]	400 AMP	Hiram Johnson High School / 009 C Wing E	009-Roof	Eaton	No tag/plate found	SSR0919836-001	2018	19007994	
18	1493358	D5012	**Main Distribution Panel** [ACF2]	200 AMP	Hiram Johnson High School / 005 F Wing W	005-Roof	Eaton	No tag/plate found	No tag/plate found	2018	19007995	
19	1493375	D5012	**Main Distribution Panel** [DBM]	1200 AMP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Cutler-Hammer	PRL4B	MDF01792	2000	19007793	
20	1493332	D5012	**Main Distribution Panel** [HD]	400 AMP	Hiram Johnson High School / 003 D Wing W	003-O0D3-Building exterior	Eaton	No tag/plate found	No tag/plate found	2001	19007228	
21	1493451	D5012	**Main Distribution Panel** [M]	400 AMP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Cutler-Hammer	PRL3A	FJ 811383	2001	00264092	
22	1493592	D5012	**Main Distribution Panel** [PNL K-3]	400 AMP	Hiram Johnson High School / 015 Cafeteria	015-M011-Mechanical room	Delta	Inaccessible	3074	1958	00264070	
23	1493469	D5012	**Motor Control Center w/ Main Breaker**	800 AMP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	General Electric	60419 A/C	DJ A1A2T1 75C242375-1	1967	19007101	
24	1493666	D5012	**Secondary Transformer**	300 kVA	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Cutler-Hammer	V48M28B33R	J00I3185	2000	19007813	
25	1493548	D5012	**Secondary Transformer**	45 kVA	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Square D	45T3H	No tag/plate found	2000	19007993	
26	1493438	D5012	**Secondary Transformer**	45 kVA	Hiram Johnson High School / 013 ROTC	013-M002-Mechanical room	Cutler-Hammer	V48M28B45R	J00K3927	2000	19007233	
27	1493527	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 004 E Wing W	004-O0E4-Building exterior	Cutler-Hammer	V48M28B75R	J00K1129	2000	19007639	
28	1493635	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 011 S Wing W	011-O0S3-Building exterior	Cutler-Hammer	V48M28B75R	J00K4149	2000	19007087	
29	1493301	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 006 F Wing E	006-O0F6-Building exterior	Cutler-Hammer	V48M28B75R	J00K1892	2000	19007094	
30	1493579	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 005 F Wing W	005-O0F3-Building exterior	Cutler-Hammer	V48M28B75R	J00K1029	2000	19007638	
31	1493614	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 001 A Wing, B Wing	01B-M001-Mechanical room	MGM Transformer Company	HT75A3B2SH	0201-75Y-150-3	2001	19007231	
32	1493445	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 012 S Wing E	012-0S10-Building exterior	MGM Transformer Company	HT112A3B2SH	0004-112Y-741-5	2004	19007082	
33	1493645	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 011 S Wing W	011-N001-Classroom	Cutler-Hammer	V48M28B45R	J00K1907	2000	19007809	
34	1493347	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 008 D Wing E	008-O0D9-Building exterior	Cutler-Hammer	Inaccessible	Inaccessible	2001	19007103	
35	1493329	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 011 S Wing W	011-O0S4-Building exterior	Cutler-Hammer	V48M28B75R	J00K4091	2000	19007088	
36	1493457	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 001 A Wing, B Wing	001-J027	Cutler-Hammer	V48M28B75R	J01E1495	2001	19007853	
37	1493667	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 008 D Wing E	008-O0D7-Building exterior	Cutler-Hammer	V48M28B75R	J01E1650	2001	19007104	
38	1493699	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 014 Gymnasium	Gymnasium	Cutler-Hammer	V48M28B45R	J00K3966	2000	19007810	
39	1493706	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 001 A Wing, B Wing	01B-M001-Mechanical room	Cutler-Hammer	V48M28B75R	J01F00135	2001	19007229	

40	1493585	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 011 S Wing W	011-O0N4-Classroom	Inaccessible	Inaccessible	Inaccessible	1999		
41	1493571	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 011 S Wing W	011-O0S2-Classroom	Cutler-Hammer	V48M28B75R	J00K3761	2000	19007811	
42	1493688	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 002 C Wing W	002-O0C7-Building exterior	Cutler-Hammer	V48M28B75R	J01C0815	2001	19007102	
43	1493495	D5012	**Secondary Transformer**	75 kVA	Hiram Johnson High School / 014 Gymnasium	Gymnasium	Cutler-Hammer	V48M28B45R	J00K3908	2000	19007815	
44	1493637	D5012	**Secondary Transformer**	750 kVA	Hiram Johnson High School / Site	Site	MGM Transformer Company	AD370-V0188	00-08-10191	2001	00264101	
45	1493625	D5012	**Secondary Transformer** [T1]	300 kVA	Hiram Johnson High School / Site	Site	Cutler-Hammer	V48M28T33K	J02M05476	2002	00264098	
46	1493472	D5012	**Transfer Switch**	200 AMP	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Zenith	15R-0002		1967		
47	1493620	D5012	**Variable Frequency Drive (VFD)** [CHWP-3]	40 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	MagneTek	GPD506V-B052	1W0157036490013	2001	00264078	
48	1493362	D5012	**Variable Frequency Drive (VFD)** [CHWP-4]	40 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	MagneTek	GPD506V-B052	1W0157036490015	2001	00264079	
49	1493305	D5012	**Variable Frequency Drive (VFD)** [HWP-3]	15 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Yaskawa	CIMR-E7U47P5	1W07X2069250002	2001	00264080	
50	1493484	D5012	**Variable Frequency Drive (VFD)** [HWP-4]	15 HP	Hiram Johnson High School / 013 ROTC	013-B001-Boiler room	Danfoss	VLT	No tag/plate found	2001	00264081	
51	1485825	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 011 S Wing W	Building exterior						19
52	1486112	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						8
53	1486114	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						8
54	1485819	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 013 ROTC	Building exterior						2
55	1485789	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / P02 Classrooms X04-X08	Building exterior						16
56	1485951	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						4
57	1493352	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / P03 Classrooms X09-X12	Building exterior				2010		16
58	1486036	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						2
59	1486029	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						
60	1485791	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / P01 Classrooms X00-X03	Building exterior						16
61	1486051	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 010 Library	Building exterior						6
62	1485973	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 001 A Wing, B Wing	001-Building exterior						21
63	1485783	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / P03 Classrooms X09-X12	Building exterior						16
64	1485902	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / Site	Site						132
65	1486042	D5022	**Light Fixture**	100 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						7
66	1486090	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 16A Auditorium	Building exterior						
67	1485796	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / P01 Classrooms X00-X03	Building exterior						5
68	1485899	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / Site	Site						2
69	1485777	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / P03 Classrooms X09-X12	Building exterior						2
70	1485904	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / Site	Site						27
71	1486019	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 014 Gymnasium	Building exterior						2
72	1485841	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 015 Cafeteria	Building exterior						
73	1485846	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 015 Cafeteria	Building exterior						4
74	1485901	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / Site	Site						4
75	1486091	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 16A Auditorium	Building exterior						
76	1485787	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / P02 Classrooms X04-X08	Building exterior						2
77	1493515	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 015 Cafeteria	015-Building Exterior				2010		4
78	1485900	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / Site	Site						4
79	1485872	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 16B Music Building	Building exterior						2
80	1493390	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 015 Cafeteria	015-Building Exterior				2010		2
81	1486094	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 16A Auditorium	Building exterior						6
82	1485814	D5022	**Light Fixture**	250 WATT	Hiram Johnson High School / 013 ROTC	Building exterior						
83	1493354	D5022	**Light Fixture**	400 WATT	Hiram Johnson High School / P03 Classrooms X09-X12	Building exterior				2010		6
84	1493569	D5037	**Fire Alarm Control Panel**		Hiram Johnson High School / 001 A Wing, B Wing	001-J027	Notifier	No tag/plate found	No tag/plate found	2010	19007782	
85	1493517	D5092	**Emergency Light**	250	Hiram Johnson High School / 015 Cafeteria	015-Building Exterior						6
86	1485964	D5092	**Emergency Light**		Hiram Johnson High School / 012 S Wing E	012-Throughout building						2
87	1486003	D5092	**Emergency Light**		Hiram Johnson High School / 008 D Wing E	008-Throughout building						8
88	1485829	D5092	**Emergency Light**		Hiram Johnson High School / 011 S Wing W	Office						
89	1486009	D5092	**Emergency Light**		Hiram Johnson High School / 014 Gymnasium	014-Throughout building						8

90	1485957	D5092	**Emergency Light**		Hiram Johnson High School / 014 Gymnasium	014-Throughout building						16
91	1486033	D5092	**Emergency Light**		Hiram Johnson High School / 014 Gymnasium	014-Throughout building						6
92	1485995	D5092	**Emergency Light**		Hiram Johnson High School / 003 D Wing W	003-Throughout building						2
93	1485850	D5092	**Emergency Light**		Hiram Johnson High School / 015 Cafeteria	015-Throughout building						2
94	1486067	D5092	**Emergency Light**		Hiram Johnson High School / 001 A Wing, B Wing	001-Throughout building						2
95	1486053	D5092	**Emergency Light**		Hiram Johnson High School / 010 Library	010-Throughout building						2
96	1485867	D5092	**Emergency Light**		Hiram Johnson High School / 16B Music Building	16B-Throughout building						3
97	1486088	D5092	**Emergency Light**		Hiram Johnson High School / 16A Auditorium	16A-Throughout building						13
98	1493350	D5092	**Emergency Light**		Hiram Johnson High School / 015 Cafeteria	015-Throughout building				2015		
99	1493542	D5092	**Exit Sign Light Fixture**		Hiram Johnson High School / 015 Cafeteria	015-Throughout building				2015		6
100	1493482	D5092	**Generator**	10 kW	Hiram Johnson High School / 16A Auditorium	16A-B001-Boiler room	Kohler	10R82 18503C	284777	1984	19007093	

E10 EQUIPMENT

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493520	E1028	**Defibrillator (AED)**		Hiram Johnson High School / 015 Cafeteria	015-Cafeteria				2015		
2	1493695	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Garland	No tag/plate found	110S230000629	2011	19007239	
3	1493483	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Southbend	SLGS/22SC	15L28318	2015	00264062	
4	1493665	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Garland	No tag/plate found	1103230000630	2011	19007238	
5	1493379	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Southbend	SLSG/22SC	15B10937	2015	19007237	
6	1493417	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Southbend	SLGS/22SC	15B10937	2015	19007236	
7	1493400	E1093	**Commercial Convection Oven, Single**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Southbend	SLGS/22S	15L28313	2015	00264061	
8	1493595	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	H137UA12C	KAE-J74471-1196	2013	00264063	
9	1493455	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	Kitchen	Thermaduke	4 SR	No tag/plate found	2000	19007220	
10	1493572	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	5495 039	EJF-K5017C	2010	00264065	
11	1493668	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	Kitchen	Thermaduke	4 SR	No tag/plate found	2000	19007216	
12	1493643	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	H137SUA12D	CBG-J415319-22	2015	19007207	
13	1493556	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	H137UA120	JAE-J70122-14	2007	19007244	
14	1493678	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	Kitchen	Thermaduke	4 SR	No tag/plate found	2000	19007215	
15	1493351	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	H137SUA12D	DBF-J382092-7	2010	00264066	
16	1493642	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	Kitchen	Thermaduke	4 SR	No tag/plate found	2000	19007221	
17	1493373	E1093	**Commercial Food Warmer**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Cres Cor	H137SUA12D	DBF-J381300-6	2013	00264064	
18	1493663	E1093	**Commercial Freezer, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Beverage-Air Corporation	SM58N-W	12902405	2012	19007208	
19	1493356	E1093	**Commercial Freezer, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Storage	True Manufacturing Co	TS-49F	8384294	2015	00264067	
20	1493412	E1093	**Commercial Freezer, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Storage	True Manufacturing Co	TS-49F	8476114	2015	00264068	
21	1493374	E1093	**Commercial Freezer, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Storage	True Manufacturing Co	TS-49F	3198119	2002	00264069	
22	1493471	E1093	**Commercial Freezer, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Manitowoc	No tag/plate found	No tag/plate found	2009	19007205	
23	1493405	E1093	**Commercial Freezer, 3-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Traulsen	ALT 3-32 WUT	C43181-5K	2004	19007240	
24	1493529	E1093	**Commercial Freezer, 3-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	True Manufacturing Co	TS-72F	8509850	2015	19007206	
25	1493336	E1093	**Commercial Icemaker, Freestanding**		Hiram Johnson High School / 001 A Wing, B Wing	01B-Z001	Manitowoc	Inaccessible	Inaccessible	2000	19007954	
26	1493307	E1093	**Commercial Icemaker, Freestanding**		Hiram Johnson High School / 014 Gymnasium	Kitchen	Manitowoc	IY0454A-161	1101307522	2011	19007817	
27	1493331	E1093	**Commercial Icemaker, Freestanding**		Hiram Johnson High School / 014 Gymnasium	14A-Z014	Manitowoc	SY0304A	110554702	2005	19007790	
28	1493624	E1093	**Commercial Icemaker, Freestanding**		Hiram Johnson High School / 015 Cafeteria	015-S005	Manitowoc	QY0454A	010161839	2001	19007211	
29	1493370	E1093	**Commercial Mixer, Freestanding**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Hobart	H-600 T	11-189-278	2011	19007235	
30	1493456	E1093	**Commercial Range/Oven, 4-Burner w/ Griddle**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Montague			2000	19007202	
31	1493700	E1093	**Commercial Range/Oven, 4-Burner w/ Griddle**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Montague			2000	19007243	
32	1493442	E1093	**Commercial Refrigerator, 1-Door Reach-In**		Hiram Johnson High School / 014 Gymnasium	Kitchen	True Manufacturing Co	GDM-26	4951206	2007	19007816	
33	1493640	E1093	**Commercial Refrigerator, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-S005	True Manufacturing Co	GDM-418L-60-HC-LD	8977261	2017	19007212	
34	1493395	E1093	**Commercial Refrigerator, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-S005	True Manufacturing Co	GDM-418L-60-HC-LD	8969845	2015	19007210	
35	1493617	E1093	**Commercial Refrigerator, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Kitchen	True Manufacturing Co	TS-49	8789693	2016	19007241	
36	1493622	E1093	**Commercial Refrigerator, 2-Door Reach-In**		Hiram Johnson High School / 001 A Wing, B Wing	01B-Z001	Imbera	VRD43	6741301 42	2006	19007928	
37	1493702	E1093	**Commercial Refrigerator, 2-Door Reach-In**		Hiram Johnson High School / 015 Cafeteria	015-Breakroom	True Manufacturing Co	TS-49	7472713	2012	19007201	

38	1493337	E1093	**Commercial Refrigerator, 2-Door Reach-In**	Hiram Johnson High School / 001 A Wing, B Wing	01B-Z001	True Manufacturing Co	T-49	1-3276753	2002	19007953
39	1493498	E1093	**Commercial Refrigerator, 2-Door Reach-In**	Hiram Johnson High School / 015 Cafeteria	015-Kitchen	True Manufacturing Co	TS-49	8760491	2016	19007242
40	1493578	E1093	**Commercial Steam Kettle**	Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Groen	HFP/2-2	3093HCF-MS	1993	19007203
41	1493659	E1093	**Commercial Steamer, Freestanding**	Hiram Johnson High School / 015 Cafeteria	015-Kitchen	ACCUTEMP	SNHB-11-00	6408	2008	19007234
42	1493340	E1093	**Commercial Walk-In Refrigerator**	Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Hussman	No tag/plate found	No tag/plate found	2002	19007204
43	1493519	E1093	**Commercial Walk-In Refrigerator**	Hiram Johnson High School / 015 Cafeteria	015-Kitchen	Hussman	No tag/plate found	No tag/plate found	2002	19007209
44	1493576	E1093	**Commercial Warmer/Warming Drawers, Set of 4**	Hiram Johnson High School / 015 Cafeteria	015-S005	Toastmaster	No tag/plate found	No tag/plate found	2000	19007214
45	1493487	E1093	**Commercial Warmer/Warming Drawers, Set of 4**	Hiram Johnson High School / 015 Cafeteria	015-S005	Toastmaster	No tag/plate found	No tag/plate found	2000	19007213

F10 OTHER

Index	ID	UFCode	Component	Capacity	Building	Location Detail	Manufacturer	Model	Serial	Dataplate Yr	Barcode	Qty
1	1493382	F1041	**Circulation Pump**	5	Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	PacFab	011590 CMK-50	00-188232	1997	19007892	
2	1493539	F1041	**Circulation Pump**		Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	Sta-Rite	P6E6G-208L	Inaccessible	2009	19007860	
3	1493344	F1041	**Circulation Pump**		Hiram Johnson High School / 014 Gymnasium	14C-M001-Pool room	No tag/plate found	No tag/plate found	No tag/plate found	1997	19007849	

APPENDIX C:
Lighting System Schedule

											Lamp Details				Fixture Details				Existing Consumption	
Line No.	Building Name	Interior/ Exterior	Floor	Space Type	Room No.	Additional Area Description	LUX	Control Quantity	Existing Control	Technology	Sub-Technology	Lamp Type	Total Lamps	Fixture Type	Fixture Quantity	24x7 Fixture Count	Fixture Height	Annual Hours	Existing Annual kWh
1	HS	Interior		CLASSROOM	X112	3L 10F	200	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	30	2x4 Prism Troffer	10	0	8	2,280	2,189
2	HS	Interior		STORAGE	S1	3L 2F	-	5	Light Switch	Linear Fluorescent	T8	4' 32W T8	30	2x4 Prism Troffer	10	0	8	722	693
3	HS	Interior		CLASSROOM	X111	3L 12F cs	200	24	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	864	2x4 Prism Troffer	288	0	8	2,280	63,037
4	HS	Interior		RESTROOM	T0c	3L 4F	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	30	2x4 Prism Troffer	10	0	8	2,280	2,189
5	HS	Interior		ESTROOM - PRIVAT	T003	3L 1F	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	950	182
6	HS	Interior		ESTROOM - PRIVAT	T002	3L 2F washer	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	950	182
7	HS	Interior		CLASSROOM	X101	3L 8F	-	1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	24	2x4 Prism Troffer	8	0	8	2,280	1,751
8	HS	Interior		OFFICE	C101	3L 2F	-	4	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	24	2x4 Prism Troffer	8	0	8	2,280	1,751
9	HS	Interior		CLASSROOM	O10	3L 12F	-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	36	2x4 Prism Troffer	12	0	8	2,280	2,627
10	HS	Interior		OFFICE	S9	2L 2F ws	180	6	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	24	1x4 Prism Troffer	12	0	8	2,280	1,751
11	HS	Interior		HALLWAY	H7	2L 2F	-	1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	2,280	292
12	HS	Interior		OFFICE	I4		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	30	2x4 Prism Troffer	15	0	8	2,280	2,189
13	HS	Interior		OFFICE	I4		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	2	2x4 Prism Troffer	1	0	8	2,280	146
14	HS	Interior		STORAGE	S3	2L 4F cs	-	1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	8	2x4 Prism Troffer	4	0	8	722	185
15	HS	Interior		ESTROOM - PRIVAT	T1	2L 1F	-	16	Light Switch	Linear Fluorescent	T8	4' 32W T8	32	1x4 Prism Troffer	16	0	8	950	973
16	HS	Interior		OFFICE	S5	3L 4F	-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	72	2x4 Prism Troffer	24	0	8	2,280	5,253
17	HS	Interior		CLASSROOM	N1		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	36	2x4 Prism Troffer	12	0	8	2,280	2,627
18	HS	Interior		CLASSROOM	N1		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	48	2x4 Prism Troffer	16	0	8	2,280	3,502
19	HS	Interior		CLASSROOM	N4	3L 12 28F cs	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	36	2x4 Prism Troffer	12	0	8	2,280	2,627
20	HS	Interior		CLASSROOM	N4	3L 12 28F cs	-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	84	2x4 Prism Troffer	28	0	8	2,280	6,129
21	HS	Interior		STORAGE	S1	2L 1F ws	-	47	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	94	1x4 Prism Troffer	47	0	8	722	2,172
22	HS	Interior		OPEN OFFICE	N3		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	27	2x4 Prism Troffer	9	0	8	2,280	1,970
23	HS	Interior		OPEN OFFICE	N3		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	18	2x4 Prism Troffer	6	0	8	2,280	1,313
24	HS	Interior		CLASSROOM	Airforce		-	1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	84	2x4 Prism Troffer	28	0	8	2,280	6,129
25	HS	Interior		CLASSROOM	O05E	3L 9F	-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	27	2x4 Prism Troffer	9	0	8	2,280	1,970
26	HS	Interior		HALLWAY	O5	3L 4 2F	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	2x4 Prism Troffer	4	0	8	2,280	876
27	HS	Interior		STORAGE	C5	3L 1F ws	-	2	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	722	139
28	HS	Interior		HALLWAY	O5	3L 4 2F	-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	2,280	438
29	HS	Interior		JANITORIAL	S4		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	64	1x4 Parabolic Troffer	32	0	8	722	1,479
30	HS	Interior		MECHANICAL	B1		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	16	1x4 Parabolic Troffer	8	0	8	1,596	817
31	HS	Interior		CAFETERIA	Cafeteria		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	180	2x4 Prism Troffer	60	0	8	2,280	13,133
32	HS	Interior		CAFETERIA	Cafeteria		-	2	Light Switch	CFL	CFL - 4 Pin	CFL42	15	Wallpack-Horizontal	15	0	8	2,280	1,436
33	HS	Interior		CAFETERIA	D006		-	2	Light Switch	CFL	CFL - 4 Pin	CFL42	13	Wallpack-Horizontal	13	0	8	2,280	1,245
34	HS	Interior		KITCHEN	K9		-	4	Light Switch	CFL	CFL - 4 Pin	CFL42	30	Wallpack-Horizontal	30	0	8	1,900	2,394
35	HS	Interior		KITCHEN	K9		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	88	2x4 Prism Troffer	22	0	8	1,900	5,350
36	HS	Interior		KITCHEN	S5		-	1	Light Switch	CFL	CFL - 4 Pin	CFL42	3	Wallpack-Horizontal	3	0	8	1,900	239
37	HS	Interior		KITCHEN	S5		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	2x4 Prism Troffer	2	0	8	1,900	243
38	HS	Interior		KITCHEN	M1		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	90	2x4 Prism Troffer	30	0	8	1,900	5,472
39	HS	Interior		HALLWAY	H5		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Prism Troffer	6	0	8	2,280	876
40	HS	Interior		CLASSROOM	OM2	3L 25F	250	1	Wall-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	75	2x4 Prism Troffer	25	0	8	2,280	5,472
41	HS	Interior		RESTROOM	T1	2L 2F cs	-	5	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	20	1x4 Prism Troffer	10	0	8	2,280	1,459
42	HS	Interior		HALLWAY	F1		-	1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	42	1x4 Prism Troffer	21	0	8	2,280	3,064
43	HS	Interior		HALLWAY	Ticket booth		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	12	Vanity-Indirect	6	0	8	2,280	876
44	HS	Interior		HALLWAY	Ticket booth		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	2	1x4 Prism Troffer	1	0	8	2,280	146
45	HS	Interior		GYMNASIUM	G1		-	16	Light Switch	Linear Fluorescent	T12	4' 34W T12	76	Industrial	38	0	8	2,280	5,892
46	HS	Interior		GYMNASIUM	G1		-	16	Light Switch	Linear Fluorescent	T12	4' 34W T12	144	Industrial	36	0	8	2,280	11,163
47	HS	Interior		GYMNASIUM	G1		-	16	Light Switch	Linear Fluorescent	T12	4' 34W T12	30	2x4 Prism Troffer	15	0	8	2,280	2,326
48	HS	Interior		GYMNASIUM	G2		-	12	Light Switch	Linear Fluorescent	T12	4' 34W T12	50	Industrial	25	0	8	2,280	3,876
49	HS	Interior		GYMNASIUM	G2		-	12	Light Switch	Linear Fluorescent	T12	4' 34W T12	104	Industrial	26	0	8	2,280	8,062
50	HS	Interior		GYMNASIUM	G2		-	12	Light Switch	Linear Fluorescent	T12	4' 34W T12	16	2x4 Prism Troffer	8	0	8	2,280	1,240
51	HS	Interior		CLASSROOM	Ns10	3L 20F	-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	60	2x4 Prism Troffer	20	0	8	2,280	4,651
52	HS	Interior		OPEN OFFICE	S10A	3L 10 10F	-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	30	2x4 Prism Troffer	10	0	8	2,280	2,326
53	HS	Interior		OPEN OFFICE	S10A	3L 10 10F	-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	30	2x4 Prism Troffer	10	0	8	2,280	2,326
54	HS	Interior		CLASSROOM	O25	3L 12F	-	15	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	540	2x4 Prism Troffer	180	0	8	2,280	41,861
55	HS	Interior		CLASSROOM	O223	3L 24F	-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	288	2x4 Parabolic Troffer	96	0	8	2,280	21,012

56	HS	Interior		CLASSROOM	OC14	2L 12F led	-	14	Ceiling-Mounted Sensor	LED	-	-	336	2x4 Indirect Troffer	168	0	8	2,280	-
57	HS	Interior		STORAGE	Cc11	2L 2F led	-	1	Ceiling-Mounted Sensor	LED	-	-	4	2x4 Indirect Troffer	2	0	8	722	-
58	HS	Interior		RESTROOM	T1	2L 3F	-	8	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	48	1x4 Prism Troffer	24	0	8	2,280	3,502
59	HS	Interior		OPEN OFFICE	C1	2L 10F led	-	1	Ceiling-Mounted Sensor	LED	-	-	20	2x2 Indirect Troffer	10	0	8	2,280	-
60	HS	Interior		CLASSROOM	Od1	2L 20F led	-	1	Ceiling-Mounted Sensor	LED	-	-	40	2x4 Indirect Troffer	20	0	8	2,280	-
61	HS	Interior		CLASSROOM	Od6	2L 16F led	-	4	Ceiling-Mounted Sensor	LED	-	-	128	2x4 Indirect Troffer	64	0	8	2,280	-
62	HS	Interior		CLASSROOM	Od9b		-	1	Ceiling-Mounted Sensor	Linear Fluorescent	T8	4' 32W T8	6	2x4 Indirect Troffer	2	0	8	2,280	438
63	HS	Interior		CLASSROOM	Ns11		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	48	2x4 Prism Troffer	16	0	8	2,280	3,721
64	HS	Interior		CLASSROOM	Ns11		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	48	2x4 Prism Troffer	16	0	8	2,280	3,721
65	HS	Interior		OFFICE	Cs11	2L 1F ws	-	3	Wall-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	6	1x4 Prism Troffer	3	0	8	2,280	465
66	HS	Interior		CLASSROOM	S2A		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	36	2x4 Prism Troffer	12	0	8	2,280	2,791
67	HS	Interior		CLASSROOM	S2A		-	2	Ceiling-Mounted Sensor	Linear Fluorescent	T12	4' 34W T12	18	2x4 Prism Troffer	6	0	8	2,280	1,395
68	HS	Interior		HALLWAY	H6		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	2,280	438
69	HS	Interior		HALLWAY	H6		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	2	1x4 Prism Troffer	1	0	8	2,280	146
70	HS	Interior		CLASSROOM	G8	2L 8F	-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	16	1x4 Prism Troffer	8	0	8	2,280	1,167
71	HS	Interior		CLASSROOM	G7		-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	2,280	584
72	HS	Interior		CLASSROOM	G7		-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	2,280	584
73	HS	Interior		CLASSROOM	G7		-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	2,280	584
74	HS	Interior		STORAGE	1		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Prism Troffer	6	0	8	722	277
75	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	2,280	584
76	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	116	1x4 Prism Troffer	58	0	8	2,280	8,463
77	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Prism Troffer	6	0	8	2,280	876
78	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Prism Troffer	6	0	8	2,280	876
79	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	24	1x4 Prism Troffer	12	0	8	2,280	1,751
80	HS	Interior		LOCKER ROOM	H10		-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	2,280	292
81	HS	Interior		OFFICE	C5		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	2,280	292
82	HS	Interior		STORAGE	G12	2L 8F	-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	16	1x4 Prism Troffer	8	0	8	722	370
83	HS	Interior		STORAGE	Z14	2L 4F	-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	722	185
84	HS	Interior		CLASSROOM	G3		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	10	1x4 Prism Troffer	5	0	8	2,280	730
85	HS	Interior		CLASSROOM	G3		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	10	1x4 Prism Troffer	5	0	8	2,280	730
86	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	27	2x4 Prism Troffer	9	0	8	2,280	1,970
87	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	27	2x4 Prism Troffer	9	0	8	2,280	1,970
88	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	27	2x4 Prism Troffer	9	0	8	2,280	1,970
89	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	2,280	438
90	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	6	2x4 Prism Troffer	2	0	8	2,280	438
91	HS	Interior		STORAGE	Z3	2L 2 2 2F	-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	722	92
92	HS	Interior		STORAGE	Z3	2L 2 2 2F	-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	722	92
93	HS	Interior		STORAGE	Z3	2L 2 2 2F	-	3	Light Switch	Linear Fluorescent	T8	4' 32W T8	4	1x4 Prism Troffer	2	0	8	722	92
94	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	24	1x4 Prism Troffer	12	0	8	2,280	1,751
95	HS	Interior		LIBRARY	Hx		-	6	Light Switch	Linear Fluorescent	T8	4' 32W T8	28	Strip Fixture	28	0	8	2,280	2,043
96	HS	Interior		STORAGE	S1	2L 2F	-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	16	1x4 Prism Troffer	8	0	8	722	370
97	HS	Interior		CLASSROOM	Counselor		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	44	2x4 Prism Troffer	22	0	8	2,280	3,210
98	HS	Interior		CLASSROOM	Counselor		-	2	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	1x4 Prism Troffer	4	0	8	2,280	584
99	HS	Interior		RESTROOM	1b	2L 2F	-	5	Light Switch	Linear Fluorescent	T8	4' 32W T8	20	1x4 Prism Troffer	10	0	8	2,280	1,459
100	HS	Interior		HALLWAY	Auditorium		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	28	2x4 Prism Troffer	7	0	8	2,280	2,043
101	HS	Interior		STORAGE	S8	1L 2F	-	4	Light Switch	Linear Fluorescent	T8	4' 32W T8	8	Strip Fixture	8	0	8	722	185
102	HS	Interior		AUDITORIUM	Auditorium		-	1	Light Switch	CFL	CFL - Screw-in	CFL18	138	Recessed Can-hor 10"	138	0	8	760	1,888
103	HS	Interior		AUDITORIUM	Auditorium		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	17	Strip Fixture	17	0	8	760	413
104	HS	Interior		AUDITORIUM	Auditorium		-	1	Light Switch	Incan/H/MR	Incan	I150-A21	6	High hat	6	0	8	760	684
105	HS	Interior		AUDITORIUM	Auditorium		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	48	1x4 Parabolic Troffer	24	0	8	760	1,167
106	HS	Interior		STORAGE	Z14		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Prism Troffer	6	0	8	722	277
107	HS	Interior		STORAGE	Contols		-	3	Light Switch	Incan/H/MR	Incan	I15-A19	3	Wallpack-Horizontal	3	0	8	722	32
108	HS	Interior		OPEN OFFICE	C1		-	1	Ceiling-Mounted Sensor	LED	-	-	4	2x2 Parabolic Troffer	2	0	8	2,280	-
109	HS	Interior		OPEN OFFICE	C1		-	1	Ceiling-Mounted Sensor	LED	-	-	6	2x2 Parabolic Troffer	3	0	8	2,280	-
110	HS	Interior		OFFICE	C2	2L 4F led	-	3	Ceiling-Mounted Sensor	LED	-	-	24	2x2 Parabolic Troffer	12	0	8	2,280	-
111	HS	Interior		OFFICE	C7	2L 2F led	-	1	Ceiling-Mounted Sensor	LED	-	-	4	2x4 Parabolic Troffer	2	0	8	2,280	-
112	HS	Interior		OPEN OFFICE	C2	2L 6F led	-	2	Ceiling-Mounted Sensor	LED	-	-	24	2x2 Parabolic Troffer	12	0	8	2,280	-
113	HS	Interior		OPEN OFFICE	Z8		-	1	Ceiling-Mounted Sensor	LED	-	-	2	2x4 Parabolic Troffer	1	0	8	2,280	-
114	HS	Interior		HALLWAY	H11		-	1	Ceiling-Mounted Sensor	LED	-	-	6	2x4 Parabolic Troffer	3	0	8	2,280	-
115	HS	Interior		OPEN OFFICE	C		-	1	Ceiling-Mounted Sensor	LED	-	-	8	2x2 Parabolic Troffer	4	0	8	2,280	-

117	HS	Exterior		CLASSROOM	Ext		-	1	Timer	Linear Fluorescent	T8	4' 32W T8	356	1x4 Prism Troffer	178	0	8	2,280	25,974
118	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS250	62	Shoebox Dual Head	31	0	8	2,280	35,340
119	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS200	2	Shoebox	2	0	8	2,280	912
120	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS1000	8	Shoebox Dual Head	4	0	8	2,280	18,240
121	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS150	10	Wallpack-Horizontal	10	0	8	2,280	3,420
122	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS125	25	Wallpack-Horizontal	25	0	8	2,280	7,125
123	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS250	9	Wallpack-Horizontal	9	0	8	2,280	5,130
124	HS	Exterior		CLASSROOM	Ext		-	1	Timer	HID	HPS	HPS1000	2	Wallpack-Horizontal	2	0	8	2,280	4,560
125	HS	Exterior		CLASSROOM	Ext		-	1	Timer	Linear Fluorescent	T8	4' 32W T8	78	1x4 Prism Troffer	39	0	8	2,280	5,691
126	HS	Interior		CLASSROOM	Student store		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	12	1x4 Parabolic Troffer	6	0	8	2,280	876
127	HS	Interior		MECHANICAL	M3		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	9	2x4 Prism Troffer	3	0	8	1,596	460
128	HS	Interior		MECHANICAL	M3		-	1	Light Switch	Linear Fluorescent	T8	4' 32W T8	15	2x4 Prism Troffer	5	0	8	1,596	766
	Totals												5,954		2,523			252,890	432,306

								Fixture Details						Existing Consumption				Proposed- Post Retrofit					
Line No.	Building Name	Interior/ Exterior	Floor	Space Type	Room No.	Additional Area Description	Existing Control	Control Quantity	Technology	Sub-Technology	Lamp- Fixture	Fixture Quantity	Total Lamps	Fixture Height	Annual Hours	Existing Annual kWh	ECM	ECM Type	Recommended Sensor	LED Lamp Retrofit	Annual Hours of Operation	Proposed Annual kWh	Annual Savings From LED Retrofit
																							kWh
1	HS	Interior		CLASSROOM	X112	3L 10F	Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	10	30	8	2,280	2,189	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,163	1,026
2	HS	Interior		STORAGE	S1	3L 2F	Light Switch	5	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	10	30	8	722	693	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	722	368	325
3	HS	Interior		CLASSROOM	X111	3L 12F cs	Ceiling-Mounted Sensor	24	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	288	864	8	2,280	63,037	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	33,489	29,549
4	HS	Interior		RESTROOM	T0c	3L 4F	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	10	30	8	2,280	2,189	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,163	1,026
5	HS	Interior		RESTROOM - PRIVATE	T003	3L 1F	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	950	182	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	950	97	86
6	HS	Interior		RESTROOM - PRIVATE	T002	3L 2F washer	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	950	182	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	950	97	86
7	HS	Interior		CLASSROOM	X101	3L 8F	Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	8	24	8	2,280	1,751	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	930	821
8	HS	Interior		OFFICE	C101	3L 2F	Ceiling-Mounted Sensor	4	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	8	24	8	2,280	1,751	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	930	821
9	HS	Interior		CLASSROOM	O10	3L 12F	Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	12	36	8	2,280	2,627	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	1,395	1,231
10	HS	Interior		OFFICE	S9	2L 2F ws	Wall-Mounted Sensor	6	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	12	24	8	2,280	1,751	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	930	821
11	HS	Interior		HALLWAY	H7	2L 2F	Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	2,280	292	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	155	137
13	HS	Interior		OFFICE	I4		Ceiling-Mounted Sensor	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	1	2	8	2,280	146	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	78	68
15	HS	Interior		RESTROOM - PRIVATE	T1	2L 1F	Light Switch	16	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	16	32	8	950	973	ECM	RB - Replace Bulb	Wall Mounted	4' 17W LED T8	950	517	456
17	HS	Interior		CLASSROOM	N1		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	12	36	8	2,280	2,627	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,395	1,231
19	HS	Interior		CLASSROOM	N4	3L 12 28F cs	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	12	36	8	2,280	2,627	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,395	1,231
21	HS	Interior		STORAGE	S1	2L 1F ws	Wall-Mounted Sensor	47	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	47	94	8	722	2,172	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	722	1,154	1,018
22	HS	Interior		OPEN OFFICE	N3		Ceiling-Mounted Sensor	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	9	27	8	2,280	1,970	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,047	923
24	HS	Interior		CLASSROOM	Airforce		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	28	84	8	2,280	6,129	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	3,256	2,873
25	HS	Interior		CLASSROOM	O05E	3L 9F	Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	9	27	8	2,280	1,970	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	1,047	923
26	HS	Interior		HALLWAY	O5	3L 4 2F	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	4	12	8	2,280	876	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	465	410
27	HS	Interior		STORAGE	C5	3L 1F ws	Wall-Mounted Sensor	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	722	139	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	722	74	65
28	HS	Interior		HALLWAY	O5	3L 4 2F	Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	2,280	438	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	233	205
32	HS	Interior		CAFETERIA	Cafeteria		Light Switch	2	CFL	CFL - 4 Pin	CFL42; Wallpack-Horizontal	15	15	8	2,280	1,436			Retain Existing Controls				
33	HS	Interior		CAFETERIA	D006		Light Switch	2	CFL	CFL - 4 Pin	CFL42; Wallpack-Horizontal	13	13	8	2,280	1,245			Retain Existing Controls				
34	HS	Interior		KITCHEN	K9		Light Switch	4	CFL	CFL - 4 Pin	CFL42; Wallpack-Horizontal	30	30	8	1,900	2,394			Retain Existing Controls				
35	HS	Interior		KITCHEN	K9		Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	22	88	8	1,900	5,350	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	1,900	2,842	2,508
36	HS	Interior		KITCHEN	S5		Light Switch	1	CFL	CFL - 4 Pin	CFL42; Wallpack-Horizontal	3	3	8	1,900	239			Retain Existing Controls				
37	HS	Interior		KITCHEN	S5		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	4	8	1,900	243	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	1,900	129	114
38	HS	Interior		KITCHEN	M1		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	30	90	8	1,900	5,472	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	1,900	2,907	2,565
39	HS	Interior		HALLWAY	H5		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	6	12	8	2,280	876	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	465	410
40	HS	Interior		CLASSROOM	OM2	3L 25F	Wall-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	25	75	8	2,280	5,472	ECM	RB - Replace Bulb	Wall Mounted	4' 17W LED T8	2,280	2,907	2,565
41	HS	Interior		RESTROOM	T1	2L 2F cs	Ceiling-Mounted Sensor	5	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	10	20	8	2,280	1,459	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	775	684
42	HS	Interior		HALLWAY	F1		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	21	42	8	2,280	3,064	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,628	1,436
45	HS	Interior		GYMNASIUM	G1		Light Switch	16	Linear Fluorescent	T12	4' 34W T12; Industrial	38	76	8	2,280	5,892	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	2,946	2,946
48	HS	Interior		GYMNASIUM	G2		Light Switch	12	Linear Fluorescent	T12	4' 34W T12; Industrial	25	50	8	2,280	3,876	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,938	1,938
49	HS	Interior		GYMNASIUM	G2		Light Switch	12	Linear Fluorescent	T12	4' 34W T12; Industrial	26	104	8	2,280	8,062	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	4,031	4,031
50	HS	Interior		GYMNASIUM	G2		Light Switch	12	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	8	16	8	2,280	1,240	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	620	620
52	HS	Interior		OPEN OFFICE	S10A	3L 10 10F	Ceiling-Mounted Sensor	2	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	10	30	8	2,280	2,326	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,163	1,163
53	HS	Interior		OPEN OFFICE	S10A	3L 10 10F	Ceiling-Mounted Sensor	2	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	10	30	8	2,280	2,326	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,163	1,163
54	HS	Interior		CLASSROOM	O25	3L 12F	Ceiling-Mounted Sensor	15	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	180	540	8	2,280	41,861	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	20,930	20,930
55	HS	Interior		CLASSROOM	O223	3L 24F	Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 2x4 Parabolic Troffer	96	288	8	2,280	21,012	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	11,163	9,850
56	HS	Interior		CLASSROOM	OC14	2L 12F led	Ceiling-Mounted Sensor	14	LED	-		168	336	8	2,280				Retain Existing Controls				
58	HS	Interior		RESTROOM	T1	2L 3F	Ceiling-Mounted Sensor	8	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	24	48	8	2,280	3,502	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,860	1,642
60	HS	Interior		CLASSROOM	Od1	2L 20F led	Ceiling-Mounted Sensor	1	LED	-		20	40	8	2,280				Retain Existing Controls				
62	HS	Interior		CLASSROOM	Od9b		Ceiling-Mounted Sensor	1	Linear Fluorescent	T8	4' 32W T8; 2x4 Indirect Troffer	2	6	8	2,280	438	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	233	205
64	HS	Interior		CLASSROOM	Ns11		Ceiling-Mounted Sensor	2	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	16	48	8	2,280	3,721	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,860	1,860
65	HS	Interior		OFFICE	Cs11	2L 1F ws	Wall-Mounted Sensor	3	Linear Fluorescent	T12	4' 34W T12; 1x4 Prism Troffer	3	6	8	2,280	465	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	233	233
66	HS	Interior		CLASSROOM	S2A		Ceiling-Mounted Sensor	2	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	12	36	8	2,280	2,791	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	1,395	1,395
67	HS	Interior		CLASSROOM	S2A		Ceiling-Mounted Sensor	2	Linear Fluorescent	T12	4' 34W T12; 2x4 Prism Troffer	6	18	8	2,280	1,395	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	2,280	698	698
68	HS	Interior		HALLWAY	H6		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	2,280	438	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	233	205
69	HS	Interior		HALLWAY	H6		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	1	2	8	2,280	146	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	78	68
70	HS	Interior		CLASSROOM	G8	2L 8F	Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	8	16	8	2,280	1,167	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	620	547
72	HS	Interior		CLASSROOM	G7		Light Switch	3	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	4	8	8	2,280	584	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	310	274
73	HS	Interior		CLASSROOM	G7		Light Switch	3	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	4	8	8	2,280	584	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	310	274
74	HS	Interior		STORAGE	1		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	6	12	8	722	277	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	147	130
76	HS	Interior		LOCKER ROOM	H10		Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	58	116	8	2,280	8,463	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	4,496	3,967
78	HS	Interior		LOCKER ROOM	H10		Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	6	12	8	2,280	876	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	465	410
79	HS	Interior		LOCKER ROOM	H10		Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	12	24	8	2,280	1,751	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	930	821
80	HS	Interior		LOCKER ROOM	H10		Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	2,280	292	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	155	137
81	HS	Interior		OFFICE	C5		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	2,280	292	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	155	137
82	HS	Interior		STORAGE	G12	2L 8F	Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	8	16	8	722	370	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	196	173
85	HS	Interior		CLASSROOM	G3		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	5	10	8	2,280	730	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	388	342
87	HS	Interior		LIBRARY	Hx		Light Switch	6	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	9	27	8	2,280	1,970	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	1,047	923
91	HS	Interior		LIBRARY	Hx		Light Switch	6	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	2	6	8	2,280	438	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	233	205
92	HS	Interior		STORAGE	Z3	2L 2 2 2F	Light Switch	3	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	722	92	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	49	43
93	HS	Interior		STORAGE	Z3	2L 2 2 2F	Light Switch	3	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	722	92	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	49	43
94	HS	Interior		STORAGE	Z3	2L 2 2 2F	Light Switch	3	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	2	4	8	722	92	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	49	43
95	HS	Interior		LIBRARY	Hx		Light Switch	6	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	12	24	8	2,280	1,751	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	930	821
97	HS	Interior		STORAGE	S1	2L 2F	Light Switch	4	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	8	16	8	722	370	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	722	196	173
98	HS	Interior		CLASSROOM	Counselor		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 2x4 Prism Troffer	22	44	8	2,280	3,210	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	1,705	1,505
99	HS	Interior		CLASSROOM	Counselor		Light Switch	2	Linear Fluorescent	T8	4' 32W T8; 1x4 Prism Troffer	4	8	8	2,280	584	ECM	RB - Replace Bulb	Ceiling Mounted	4' 17W LED T8	2,280	310	274
104	HS	Interior		AUDITORIUM	Auditorium		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; Strip Fixture	17	17	8	760	413	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	760	220	194
106	HS	Interior		AUDITORIUM	Auditorium		Light Switch	1	Linear Fluorescent	T8	4' 32W T8; 1x4 Parabolic Troffer	24	48	8	760	1,167	ECM	RB - Replace Bulb	Retain Existing Controls	4' 17W LED T8	760	620	547
109	HS	Interior		OPEN OFFICE	C1		Ceiling-Mounted Sensor	1	LED	-		2	4	8	2,280				Ceiling Mounted				
	Totals												5,954									202,507	221,879

APPENDIX D:
ECM Checklist

NA	In Place	Evaluate	ECM Description
✓			Add Reflective Coating To Exterior Windows
		✓	Replace External Windows
✓			Upgrade Insulation
	✓		Control External Air Leakage In Commercial Buildings
✓			Install Reflective Insulation Between Radiators And External Wall
	✓		Replace Existing Motors With High Efficiency Motors
	✓		Install On-Demand Ventilation on Air Handlers
	✓		Reduce HVAC Hours of Operation
	✓		Install Variable Frequency Drives (VFD)
✓			Install Outside Air Temperature Reset Controls For Hot Water Boilers
✓			Install Chilled Water Reset Control
	✓		Install Timers On Exhaust Fans
✓			Install Energy Savers on Vending, Snack Machines
	✓		Install Building Energy Management System and Replace Terminal Units
		✓	Re-Commission The Building & Its Control Systems
✓			Replace Inefficient Heating Plant
✓			Replace Inefficient Cooling Plant
✓			Replace Existing Air Conditioners with Energy Star Air Conditioners
✓			Replace Unit Electric Heaters with Natural Gas Fired Unit Heaters
	✓		Convert From Gas Pilot to Electronic Ignition for Boilers
	✓		Insulate Hot Water Pipes
	✓		Insulate Refrigerant Lines
	✓		Insulate Hot Surfaces And Tanks
	✓		Insulate Air Ducts
✓			Replace Defective Steam Traps
✓			Upgrade Electric Heating System To Heat Pumps
✓			Replace Inefficient Furnace System
	✓		Replace Rooftop Package Unit
✓			Install Energy Recovery Wheel on Air Handling Unit
✓			Replace Existing Water Heater With New Energy Efficient Units
		✓	Replace Incandescent/Halogen Lamps With Energy Efficient Lamps
		✓	Upgrade Inefficient Linear Fluorescent Lamps And Fixtures
	✓		Upgrade EXIT SIGNS With LED EXIT Signs
✓			Bilevel and Tandem Linear Fluorescent Lighting ECM
		✓	Replace High Intensity Discharge (HID) Lamps With Energy Efficienct Lamps
		✓	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)
✓			Replace Existing Freezers With High Efficiency Freezers
		✓	Install Low Flow Shower Heads
		✓	Install Low Flow Faucet Aerators
		✓	Install Low Flow Restroom Flush Tank Toilets
		✓	Install Low Flow Tankless Restroom Fixtures

APPENDIX E:
ECM Calculations

UIC	**Upgrade Building Lighting to LED and Install Automatic Lighting Controls**
EAL10	**Location: Building Interior and Exterior**

	No. of ECMs	No. of Fixtures	No. of Lamps	KWh Saved	Energy Cost Saving	O & M Savings
Upgrade Lighting to LED	108	2,012	5,140	221,879	$31,008.97	$9,701.62

Existing Technology	**Sub-Technology**	No. of ECMs	No. of Fixtures	No. of Lamps	KWh Saved	Energy Cost Saving	O & M Savings
CFL	CFL - 2 Pin	0	0	0	0	$0	$0
CFL	CFL - 4 Pin	0	0	0	0	$0	$0
CFL	CFL - Screw-in	0	0	0	0	$0	$0
Circiline	T9	0	0	0	0	$0	$0
Incan/H/MR	H	0	0	0	0	$0	$0
Incan/H/MR	Incan	0	0	0	0	$0	$0
Incan/H/MR	MR	0	0	0	0	$0	$0
HID	HPS	7	83	83	54,982	$7,684	$2,311
HID	MH	0	0	0	0	$0	$0
HID	MV	0	0	0	0	$0	$0
HID	QL	0	0	0	0	$0	$0
Linear Fluorescent	T8	86	1,508	1,508	118,990	$16,630	$6,354
Linear Fluorescent	T12	15	421	421	47,907	$6,695	$1,037
Linear Fluorescent	T8 U	0	0	0	0	$0	$0
Linear Fluorescent	T12 U	0	0	0	0	$0	$0
Linear Fluorescent	T5	0	0	0	0	$0	$0
Linear Fluorescent	T6	0	0	0	0	$0	$0
Linear Fluorescent	T10	0	0	0	0	$0	$0

Proposed Controls	No. of Controls		No. of Controls
Photo Sensor	0	Ceiling Mounted	130
Wall Mounted	23		

Initial Investment			**Equipment Rentals**	
Material Cost	$71,213.69		Scissor Lift 26' - Interior Spaces	$0.00
Labor Cost	$115,873.17		Bucket Truck - Exterior Spaces	$0.00
Local Electric Rate:	$0.14	$/kWh	Estimated Annual Energy Savings:	221,879
Hourly Labor Rate For Electrician:	$82.45		Estimated Annual Energy Cost Savings:	$31,009
Budgeted Initial Investment:	$187,087		Estimated Annual O&M Cost Savings:	$9,702
Estimated Return on Investment: *(Including O&M Savings)*	4.60	Years	Estimated Annual Cost Savings:	$40,711

UIC	Re-Commission The Building & Its Control Systems
EAC10	Location: Throughout Building

Enter the Total Area of The Facility	244,713	SqFt
Select the Type of Heating Fuel:	Natural Gas	*(Select)*
Estimated Annual Heating Fuel Consumption:	94,319	Therms
Is the Property Cooled?	Yes	*(Select)*
Estimated Annual Electrical Energy Consumed For Cooling:	1,757,786	kWh
Estimated Energy Savings From Re-Commissioning on Building Systems:	15%	*(Select)*
Estimated Heating Energy Saving Post Re-Commissioning:	14,148	Therms
Estimated Cooling Energy Saving Post Re-Commissioning:	263,668	kWh
Average Heating Fuel Rate Paid By The Property:	$1.08	$/Therm
Average Electrical Rate Paid By The Property:	$0.14	$/kWh
Annual Energy Cost Savings:	$52,067	$
Estimated Cost For Re-Commissioning The Facility: *(LBNL 2009 Report on Building Commissioning)*	$109,575	$
Simple Payback Period:	2.10	Yrs

Type of Recommendation — Capital Cost ECM Recommendation

ECM DESCRIPTION

The goal of commissioning of a facility is to ensure that the equipments in the facility are performing as per the desired standards or as per design standards. The role of commissioning in existing buildings is to identify the almost inevitable "drift" from where things should be and puts the things back on track. Based on the LBNL 2009 Report on Building Commissioning the average re-commissioning of existing buildings yielded atleast 16% of energy savings across the facility. This average has been developed based on over 643 buildings that were commissioned across United States in different climatic zones.

Thus EMG strongly recommends re-commissioning of all existing buildings in order to ensure that all the sensors, equipments and control systems are working as per the design conditions.

SUMMARY:

Initial Investment: $109,575 Simple Payback: 2.10 Years

Energy Cost Savings: $52,067

UIC	Replace Existing Refrigerator(s) With Energy Star Certified Refrigerator(s)
EAA1	Location: Throughout Building

Number of Refrigerators To Be Replaced	7 Qty	
Details of Existing Refrigerator:	2001-2008 Top Freezer 19.0-21.4 CuFt-671.25 kWh	
Estimated Annual Energy Consumption By The Existing Refrigerator:	671	kWh/Year
Proposed New Refrigerator:	Top Freezer 3.1 CuFt -319 kWh/Yr	
Estimated Proposed Annual Energy Consumption of The New Refrigerator:	319	kWh/Year
Annual Kwh Savings Per Unit (Kwh/year)	352	kWh
Total Annual Kwh Savings (Kwh/year)	2,466	kWh
Current Electrical Tariff ($/Kwh)	$0.14	$/kWh
Annual Cost Savings From All Refrigerators ($$)	$345	$$

Total Installation Cost Including, Eco Friendly Disposal Of Existing Refrigerator ($$)

No. of Units	Disposal Tax	Unit Cost	Total Cost	
7	$50	$193	$2,539	$$

Simple Return on Investment	7.37	Yrs

Note- *Average Life of a Refrigerator is 15 Years*

Type of Recommendation — Capital Cost ECM Recommendation

ECM DESCRIPTION:

One of the highest 'silent' energy consuming devices in any home/office is the refrigerator, which runs all year long. Having a low energy consuming refrigerator thus results in a considerable reduction in the annual energy costs. On an average a useful life of any refrigerator is approximately 19 years and hence EMG recommends replacing the current refrigerator at the end of its useful life with a new energy star certified low energy consuming refrigerator.

EMG strongly recommends replacing the existing older non energy star refrigerators with new energy efficient Energy Star Certified refrigerators of the appropriate type.

The expected useful life of new refrigerators is approximately 15 years.

Summary:

Initial Investment:	$2,539	Simple Payback:	7.37	Yrs
Annual Cost Savings:	$345			

UIC	Install Low Flow Faucet Aerators
EAP2-b	**Location**: Throughout Building

Property Type:	Commercial	Estimated No. of Operational Weeks	38
		Number of Occupied Days/Week (Max 7)	5

KITCHEN FAUCETS			BATHROOM FAUCETS		
Number of Occupants Affected By Retrofit	1,627		Number of Occupants Affected by Retrofit	1,627	
Do You Want To Replace Kitchen Faucets Aerators	Yes	*(Select)*	Do You Want To Replace Bathroom Faucets Aerators	Yes	*(Select)*
Total Number of Faucet Aerators To Be Replaced	62		Total Number of Faucet Aerators To Be Replaced	80	
Total Number of Faucets To Be Replaced:	0		Total Number of Faucets To Be Replaced:	0	
GPM of Existing Faucet Aerators	2.2	GPM	GPM of Existing Faucet Aerators	2.2	GPM
GPM of Proposed Faucet Aerator	1.5	GPM	GPM of Proposed Faucet Aerator	0.5	GPM
Estimated Number of Uses Per Day	4		Estimated Number of Uses Per Day	5	

Annual Water Savings From Installing Low Flow Aerators: 335.34 kGal

WATER & ENERGY SAVING CALCULATION			COST SAVING CALCULATION		
Select Type of Water Heater Fuel:	Electric	(Select)	Property Location in United States	North Central Localities	
Energy Factor of Domestic Hot Water Heater:	0.53	EF	Heating Fuel Tariff	$0.14	$/kWh
Hot Water Discharge Temperature at Faucet	110.00	°F	Water Tariff ($/1000 Gal)	$6.98	$/kGal
Equivalent Heating Fuel Savings:	78,876	kWh	Annual Cost Savings In Form of Water	$2,340	$
Savings Discounted by 15% to Account For Cold Water Use					
Annual Water Savings	335.34	kGal	Annual Energy Savings From Water Heater	$11,023	$

COST BENEFIT ANALYSIS					
Estimated Total Annual Cost Savings	$13,363	$$	Estimated Total Installation Cost	$2,163	$$
Simple Payback Period	0.16	Years	*Type of Recommendation*	Capital Cost ECM Recommendation	

ECM EXPLANATION:

By reducing the flow of water coming from the restroom faucets, aerators can generate energy savings at low cost and with easy installation. The savings generated would be in the form of reduced water and sewer costs and at the same time aerators would save energy by reducing the demand for hot water. The average faucet has a flow rate of about 2 to 4 GPM. Adding a screw-in faucet aerator reduces the flow to 0.5 to 1.5 GPM in the bathroom and 2.2 GPM in the kitchen. In addition to saving energy and water, the "foamier" water that comes from faucet aerators wets objects better than water from a faucet with no aerator, which tends to bounce off the object rather than thoroughly wetting it.

EMG recommends replacing the proposed faucet aerators with new low flow aerators as mentioned above. The proposed ECM shall also result in an annual energy saving in form of reduction in water heating bills.

Summary:

Initial Investment: $2,163 Estimated Annual Cost Savings: $13,363 Simple Payback Period (Yrs): 0.16

UIC	Retrofit Apartment Tank Toilets to Dual Flush
EAP3	Location:

EXISTING CONDITION

Total Occupants:	1,627	
Number of Water Closets To Be Replaced	10	
Number of Occupied Days Per Week (Max 7)	5	
Number of Occupied Weeks/Year (Max 52)	38	
Estimated Restroom Usage/Individual/Day	4	(Select)

5.05 flushes/person/day@American Water Works Association (AWWA)

PROPOSED RETROFIT/REPLACEMENT

Existing Gallons Per Flush Ratings For Water Closet Flushes	3.20	GPF
Replace or Retrofit Toilets With Dual Flush Toilets	Retrofit	

Replace

Proposed Toilet	0.8GPF -Floor Mount, 10" Rough-In	
GPF of Proposed New Low Flow Water Closet Fixture*	0.80	GPF

Retrofit

Dual Flush - Retrofit Setup Valve for Flush Tank Toilet	*Solid Waste(20%)*	3.20	GPF
**(Federal Law Requires All Flushes Not To Exceed 1.6 GPF)*	*Liquid Waste(80%)*	2.56	GPF

Water & Cost Saving Calculations

Water Savings By The Use of Low Flow Water Closet Flush Valves/Day	3,332.10	gal
Total Annual Water Savings in gallons	633.10	kgal

Cost Savings Calculations

Enter Water Tariff Rate ($/1000Gal)	$6.98	$$
Estimated Cost Savings From Water	$4,418	$$

Estimated Cost of Retrofit

Estimated Total Cost For Retrofit	$1,574	$$
Simple Pay Back Period	0.36	Yrs
Type of Recommendation	Capital Cost ECM Recommendation	

ECM EXPLANATION:

The highest water utilization at any home/office occurs in the restrooms. It is estimated that on an average a normal human being uses the restroom at least four times a day. Keeping with the global water conservation objectives, federal law prohibits use of any new water closet flushes over 1.6 GPF.

Existing toilets can be retrofitted with pressure-assisted flush technology to reduce the flush rate to 1.0 GPF or less. Though water efficient these toilets make considerable amount of noise as this involves release of pressurized air during the course of flushing. Thus making them unpopular among residential properties.

Thus EMG recommends replacing the existing high flow toilets with new low flow 1.28GPF rated flush tank toilets, which are comparatively more water efficient at the same time considerably quiter as compared to the pressure assisted technology retrofitted toilets.

Summary:

Initial Investment:	$1,574			
		Simple Payback:	0.36	Years
Annual Cost Savings:	$4,418			

UIC	Install Low Flow Tankless Restroom Fixtures
EAP4	Location: Throughout Building

ECM FOR DETERMINING WATER SAVINGS IN COMMERCIAL PROPERTIES

Number of Males	813	
Number of Females	814	
Number of Occupied Days Per Week (Max 7)	5	
Number of Occupied Weeks/Year (Max 52)	38	
Number of Urinals To Be Retrofitted	50	
Number of Water Closets To Be Retrofitted	83	
No. of Water Closets With Separate Flush Tank *(Typical Residential Type)*		
Estimated Restroom Usage/Individual/Day *Default is 4 Uses/Day For Residential/Office*	4 (Select)	

Urinal Water Savings

Do you Want To Make Any Changes To The Urinals?	Yes	
Estimated Existing Use of Urinal/Day/Man	80%	
Existing Gallons Per Flush Ratings For Urinal Flushes	1.00	GPF
Proposed Urinal	0.125 GPF -Wall Mount	
GPF of Proposed Urinal Flush Valve** ***(1992 EpACT Energy Act Mandates 1.0GPF Max on Urinals)*	0.125	GPF
Estimated Annual Water Savings From Urinal	432.52	kGal

Water Closet Water Savings

Tankless Water Closets

Do The Water Closet Need To Be Retrofitted?	*(Select)* Yes	
Existing Gallons Per Flush Ratings For Water Closet Flushes	1.60	GPF
Are The Existing Water Closet Being Replaced? *(if No; Then Only The Flush Valve Would Be Replaced With Dual Flush Retrofit Kit)*	*(Select)* No	
No. of Tankless Water Closets	83	
GPF of Proposed Dual Flush- Water Closet Valve* **(Federal Law Requires All Flushes Not To Exceed 1.6 GPF)*	*Solid Waste(20%)* 1.60	GPF
	Liquid Waste(80%) 0.48	GPF
Estimated Annual Water Savings From Male Users	110.72	kGal
Estimated Annual Water Savings From Female Users	554.30	kGal
Total Water Savings From Water Closets	665.03	kGal

Water & Cost Saving Calculations

Water Savings Calculation

Water Savings By The Use of Low Flow Water Closet Flush Valves/Yr	665.03	kgal
Water Savings By The Use of Low Flow Urinal Flush Valves/ Yr	432.52	kgal
Total Annual Water Savings in kgal	1097.54	kgal

Cost Savings Calculations

Enter Water Tariff Rate ($/1000Gal)	$6.98	$$
Estimated Cost Savings From Water	$7,658	$$

Estimated Cost of Retrofit

Cost For Replacing Existing Urinal Fixture With A Low Flow Fixture	$65,018 *(Includes Labor)*	$$
Cost For Replacing Existing Flush Valves With Low Flow - Dual Flush Valves ($80 Per Unit) *(Up For Liquid Waste And Down For Solid Waste)*	$51,381 *(Includes Labor)*	$$
Estimated Total Cost For Retrofit	$116,398	$$
Simple Pay Back Period	15.20	Yrs
Type of Recommendation	Capital Cost ECM Recommendation	

ECM EXPLANATION:

The highest water utilization at any home/office occurs in the restrooms. It is estimated that on an average a normal human being uses the restroom at least four times a day. Keeping with the global water conservation objectives, federal law prohibits use of any new water closet flushes over 1.6 GPF. At the same time the '1992 EpACT' mandates all new Urinals to have a maximum 1.0 GPF flush valves on urinals.

EMG recommends replacing all urinals above 1.0 GPF with a new 0.5 GPF or lesser urinals. At the same time EMG also recommends replacing all the water closets having a GPF rating of 1.6 and over with low flow water closet fixtures equipped with dual flush valves.

In case the property doesn't wish to replace the entire water closet fixtures, EMG recommends retrofitting all the tankless water closet flush fixtures with new dual flush fixtures that would result in a 30% water savings per flush for liquid wastes, while retaining the same flush rate for solid wastes.

SUMMARY:

Initial Investment:	$116,398	Simple Payback Period:	15.20 Yrs
Annual Cost Savings:	$7,658		

UIC	Replace External Windows
EAE2	Location: Throughout Building

ENTER EXISTING CONDITIONS

Existing and Proposed Window Properties

Total Sq.Ft window area:	756	sq.ft
Approximate number of windows:	37	
Total existing window area:	756	Sq.Ft
Select The Existing Window Type	Metal Frame & Double Glazing	*(Select)*
Existing U-value of window: (1/R)	0.87	Btu/ft².°F·h
ASHRAE Climatic Zone	Zone-3	
New U-value with Double pane Low E window: (1/R)	0.35	Btu/ft².°F·h
AHRAE 90.1 Recommended Value		

Existing & Proposed Air Leakage Through Windows

Insert Existing Estimated Air Change Rate/Hr (ACH 1):	0.75	
(Existing Air Changes Per Hour, 1.5 is very leaky and 0.35 ideal)		
Insert Proposed Estimated Air Change Rate/Hr (ACH 2):	0.35	
Estimated Space Volume Under Consideration	0.00	Cu. Ft
Is the Property Cooled ?	Yes	*(Select)*

WINTER

Select Type of Heating Fuel	Natural Gas	*(Select)*
Net heating plant & distribution system efficiency:	78.00	**%**
Annual Heating Hours:	2,963	HDD
Estimated Total Annual Input Heating Energy Savings By Replacing Windows	3.58	Therms
Estimated Total Annual Input Heating Energy Savings Achieved By Controlling Air Leakage Through Windows	0	Therms
Estimated Total Input Heating Fuel Savings From Replacing Windows	4	Therms

SUMMER

Select Type of Cooling Fuel:	Electric	*(Default)*
Cooling Plant Efficiency **(EER)**:	7.83	**EER**
Annual Cooling Hours:	1,407	CDD
Annual Total Input Cooling Fuel Savings During Summer Season By Replacing Windows	1,695	kWh
Estimated Total Annual Input Cooling Energy Savings Achieved By Controlling Air Leakage Through Windows	0	kWh
Estimated Total Input Cooling Fuel Savings From Replacing Windows	1,695	kWh

ENERGY & COST ANALYSIS

Insert Cost of Heating Fuel:	$1.08	$/Therm	Annual Heating Cost Savings:	$3.86	$$
Insert Cost of Cooling Fuel:	$0.14	$/kWh	Annual Cooling Cost Savings:	$236.94	$$
Total Annual Cost Savings	$243		Total Annual Cost Savings From Heating & Cooling:	$241	$$
Cost of window upgrade:	$30,374		Estimated Annual O&M Savings	$2	$
Simple payback:	124.89	**Yrs**	*Type of Recommendation*	Capital Cost ECM Recommendation	

ECM DESCRIPTION:

Windows play a major role in the energy use and comfort of an interior space. In the winter, heat in a room is lost when cold outside air infiltrates around the edges of windows. Heat also can be lost by conduction directly through the pane, even if the window fits tightly. Windows with insulated panes, such as those filled with Argon address this issue, while proper caulking and sealant address the infiltration issue. The cold drafts and the chilly windowpane make the room uncomfortable. Windows also can help to heat a room by letting the sun's rays enter. While this solar radiation is beneficial in the winter, it can be a major source of discomfort in hot, summer climates. Energy Star rated windows with Low-E glazing are designed to keep the solar heat gain minimized during the summer months. Choosing a replacement window that fits properly has the desired U-value, and proper glazing characteristics is critical to energy conservation through window upgrades.

Summary:

Initial Investment:	$30,374	Simple Payback	124.89 Yrs
Annual Energy Cost Savings:	$243		

APPENDIX F:
Solar PV

UIC	Install Fixed Tilt Solar Photovoltaic System
EAR-2	Details:

Select State: Northern California **Electric Rate:** $0.18 $/KWH Annual Electric Consumption: 1,757,786 KWh

Roof No.	Description	Number of Roofs	DC System Size Per Roof	PV System Sizing For All Roofs	Estimated Number of 315 Watt PV Panels:	Total Estimated Annual Electricity Generated/ Roof	Total Estimated Electricity Generated (All Roofs)	Total Cost Savings	Installation Cost: ($3.5/Watt)	Simple Pay Back Period without Incentives	One Time Potential Utility or State Incentives	One Time Potential Federal Incentives	Annual Potential Incentives and Rebates		Simple Pay Back Period with All Incentives
			kW	kW		kWh	kWh			Yrs		Dept. of Treasury Renewable Grant (30%)	Federal REPI Incentive	Solar Renewable Certificates (SRECS)-(~$0/MWH)	Years
												30%	$0.02	$0	
1	Building 1	1	55.90	56	177	86,192	86,192	$15,084	$195,650	13.0	$0	$58,695	$1,896	$0	7.8
2	Building 2	1	38	38	121	58,894	58,894	$10,306	$133,700	13.0	$0	$40,110	$1,296	$0	7.8
3	Building 3	1	44	44	140	67,835	67,835	$11,871	$154,000	13.0	$0	$46,200	$1,492	$0	7.8
4	Building 4	1	43	43	135	65,523	65,523	$11,467	$148,750	13.0	$0	$44,625	$1,442	$0	7.8
5	Building 5	1	74	74	236	114,704	114,704	$20,073	$260,400	13.0	$0	$78,120	$2,523	$0	7.8
6	Building 6	1	67	67	211	102,524	102,524	$17,942	$232,750	13.0	$0	$69,825	$2,256	$0	7.8
7	Building 7	1	159	159	506	245,595	245,595	$42,979	$557,550	13.0	$0	$167,265	$5,403	$0	7.8
8	Building 8	1	41	41	129	62,748	62,748	$10,981	$142,450	13.0	$0	$42,735	$1,380	$0	7.8
9	Building 9	1	29	29	90	43,939	43,939	$7,689	$99,750	13.0	$0	$29,925	$967	$0	7.8
10				0	0		0	$0	$0		$0	$0	$0	$0	
		9		**550**	**1,746**	**847,954.0**	**847,954**	**$148,392**	**$1,925,000**	**12.97**	**$0**	**$577,500**	**$18,655**	**$0**	**7.82**

Solar Rooftop Photovoltaic Analysis		
Total Number of Roofs	9	
Estimated Number of Panels	1,746	
Estimated KW Rating	550	KW
Potential Annual KWh Produced	847,954	KWh
% of Current Electricity Load	48.2%	

Financial Analysis		
Investment Cost	$1,925,000	
Estimated Energy Cost Savings	$148,392	
Potential Rebates	$577,500	
Potential Annual Incentives	$18,655	
Payback without Incentives	13.0	years
Incentive Payback but without SRECS	7.8	years
Payback with All Incentives	7.8	years