

Comprehensive Energy Audit

Amendment #1

**Prepared for
Wayne Township School
District**

December 16, 2013



AMERESCO 
Green • Clean • Sustainable

The following items and associated attachments are amended to the original Wayne Township School District Comprehensive Energy Audit dated October 17, 2013.

I. **ECM 1 – Lighting System Improvements – Ameresco will provide to RVA and include in the revised CEA the light level surveys of the sampled rooms and spaces and the existing and proposed fixture wattage table used to calculate the lighting system improvement energy savings.**

- A. Attachment 1.0 provides the measured existing lighting levels measured in foot-candles (fc)
- B. Attachments 2.0, 2.1 and 2.2 provide the existing and proposed measured fixture wattages used in the energy savings calculation
- C. The following are sample calculation to describe how lighting and lighting controls energy savings are derived. The following will describe the formula used to for Carter Elementary School. This formula can then be used to verify the savings for any line item from the lighting line by line located in Section C ECM1 and ECM 2 appendices.
- D. From ECM 1 Appendix I Energy Savings Calculations Carter Elementary School savings for all interior lighting system upgrades 60,264 kWh and 252.3 kW annually. For calculation purposes we will examine line 565 in the lighting system analysis to describe how the energy savings are derived. Line 565 states Classroom 11 has six 4 lamp 8 foot wrap fixture with energy efficient (34 watt) T12 lamps and standard magnetic ballast. The existing power consumption for a fixture with this configuration is 140 watts based on the provided lighting fixture energy consumption table provided for item III of this addendum. These fixtures will be replaced with six 2 lamp 8 foot wrap fixtures with energy efficient (28 watt) T8 lamps and electronic ballast with a high ballast factor. This fixture combination has a power draw of 64 watts. The basic formula for energy savings is as follows:
- E.

i. Lighting Energy and Demand Savings Calculation

$$S_o = [(q_e)(E)(h_e) - (q_p)(P)(h_p)] / (CF)$$
$$S = \sum S_o$$

Where:

- E = Existing energy consumption (Watts)
- P = Proposed energy consumption (Watts)
- h_e = Hours of operation existing (hr)
- h_p = Hours of operation proposed (hr)
- CF = conversion factor (1kW = 1000 Watts)
- q_e = Fixture quantity existing
- q_p = Fixture quantity proposed
- S_o = Initial savings not accounting for interactive effects on building heating and cooling (kWh)
- S = Total building energy savings (kWh)

$$S_o = [(q_e)(E)(h_e) - (q_p)(P)(h_p)] / (CF)$$

$$S_o = [(6)(140)(2,520) - (6)(64)(2,520)] / (1,000) = 1,149$$

- ii. In addition the interactive effects of the lighting on the building heating and cooling system must also be accounted for. A detailed description to calculate the interactive effects of the lighting improvement measure have been included in ECM 1 Appendix 1 Interactive Lighting Savings calculation notes at the bottom of the page.

iii. **The basic formula for Demand (kW) savings is as follows:**

$$D_o = [(q_e)(E) - (q_p)(P)] / (CF)$$

$$D = (\Sigma D_o)(mo)$$

Where:

- E = Existing energy consumption (Watts)
- P = Proposed energy consumption (Watts)
- CF = conversion factor (1kW = 1000 Watts)
- q_e = Fixture quantity existing
- q_p = Fixture quantity proposed
- D_o = Monthly demand savings (kW)
- D = Total Building Demand savings (kW)
- Mo = Months per year of demand savings

$$D_o = [(q_e)(E) - (q_p)(P)] / (CF)$$

$$D_o = [(6)(140) - (6)(64)] / (1,000) = 0.456 \text{ kW}$$

$$D = (22.94)(11) = 252.3$$

II. [ECM 2 – Lighting Controls – Ameresco will provide to RVA and include in the revised CEA the method \(formula\) of how they \(Ameresco\) calculated the savings for lighting controls](#)

- A. From ECM 2 Appendix I Energy Savings Calculations Carter Elementary School is savings for all lighting controls is 13,920 kWh. For calculation purposes we will examine line 565 and 566 in the lighting system analysis to describe how the energy savings are derived. Line 565 and 566 states Classroom 11 has nine controllable fixtures. The existing fixtures are to be replaced with nine 2 lamp 8 foot wrap fixture with energy efficient (28 watt) T8 lamps and electronic ballast with a high ballast factor. This fixture combination has a power draw of 64 watts. The basic formula for energy savings is as follows:

i. **Lighting Controls Savings Calculation**

$$S_o = (q_p)(P)(h_e - h_p) / (CF)$$

$$S = \Sigma S_o$$

Where:

P = Proposed energy consumption (Watts)

h_e = Hours of operation existing (hr)

h_p = Hours of operation proposed (hr)

CF = conversion factor (1kW = 1000 Watts)

q_p = Proposed quantity of controlled fixtures

S_o = Initial savings not accounting for interactive effects on building heating and cooling (kWh)

S = Total building energy savings (kWh)

$$S_o = (q_p)(P)(h_e - h_p)/(CF)$$

$$S_o = (9)(64)(2,520 - 1,765)/(1,000)$$

$$S_o = 435 \text{ kWh}$$

$$S = \sum S_o$$

$$S = 13,920 \text{ kWh}$$

- ii. In addition the interactive effects of the lighting controls on the building heating and cooling system must also be accounted for. A detailed description to calculate the interactive effects of the lighting controls measure have been included in ECM 2 Appendix 1 Interactive Lighting Savings calculation notes at the bottom of the page.

III. Energy Savings Plan Review Components – (e) - ***Include an assessment of risks involved in the successful implementation of the plan.*** Ameresco will provide to RVA and include in the revised CEA an assessment of the risks involved to successfully implement the Energy Savings Plan. This risk assessment should include an evaluation of risk at the ECM level and a risk determination (low, medium, high risk) for each ECM and a project risk assessment (low, medium, high risk) for the total project. The risk assessment should include a brief discussion of how the risk determination was made for each ECM and what strategies Ameresco will implement to mitigate any medium to high risk ECM's.

- A. The following paragraphs describe the general risk and proposed risk mitigation associated with each ECM and the overall Energy Savings Plan (ESP).

The risk assessment for each ECM in the project is believed to be low. Each ECM has been developed and reviewed collaboratively with the District, and potential minor items disclosed in the ECM technical write-ups. The final design will further the collaboration process, but due to the diligence performed during the development phase and the pricing carried the risk assessment of each is believed to be low. During construction, Ameresco will meet regularly with the District and the District's consultant to work around existing facility schedules and to adjust as needed for unexpected situations, which are expected to be minimal due to Ameresco's experience in implementing similar projects in K-12 facilities.

Two ECMs, Energy Management Systems and Replace Boilers, could be considered to have a higher level of risk associated with them due to their complexity and potential for hazardous material abatement. Ameresco has significant experience installing energy management systems in school facilities, and with proper training has had many successful experiences installing similar systems. Hazardous material abatement is possible for the boiler plant work, but to mitigate this potential Ameresco has carried allowances to cover this potential cost. Due to this and Ameresco's overall approach to constructing ESIP projects, we believe these ECMs have a low risk as the other ECMs do.

In that each of the ECMs would be considered low risk, the overall project would likewise be determined low risk. This determination was made because each of the ECMs being installed under the Wayne ESP has been installed countless times before by Ameresco. The savings calculation for each of these ECMs have been validated and verified by the many installations as well. The costs were determined by actual pricing obtained from contractors who walked the Wayne sites to verify existing conditions.

IV. Energy Savings Plan Review Components – (i) – ***Identify for plans developed by an energy services company, a description of, and cost estimates of an energy savings guarantee.*** Ameresco will provide to RVA and include in the revised CEA, an updated Guaranteed Energy Savings Table (see attached). Ameresco must state that it intends to guarantee the savings and provide Wayne with the differential in the event of a shortfall

A. Ameresco has included the updated Guaranteed Energy Savings Table as Attachment 3.0.

V. Energy Savings Plan Review Components – (k) – ***“The Plan is to provide for the calculation of energy savings for the purpose of determining that the energy savings resulting from the program will be sufficient to cover the cost of the program’s energy conservation measures,”*** - Ameresco will provide to RVA and include in the revised CEA a statement that Ameresco will be responsible for applying for all rebates and incentives and a Statement of Payback if the energy savings are not achieved.

A. Ameresco shall be responsible for all applications to federal, New Jersey, and utility rebate and incentive programs on the District's behalf.

B. The project economics and associated paybacks are included in Section D of the audit report.

Attachment 1.0 Sample Light Readings

Sample Representative Light Level Readings

Line	Building Name	Location	Fl	Pre Fixture Description	Pre Fixture Style	Pre Qty	Pre Watts	Pre kW	Representative FC Reading
1	George Washington-Middle School	Classroom 201	2	4L4' T12 34w EE/EEMAG-8'	wrap	3	140	0.4	18-45
3	George Washington-Middle School	Classroom 202	2	4L4' T12 34w EE/EEMAG-8'	wrap	3	140	0.4	18-45
5	George Washington-Middle School	Classroom 203	2	4L4' T12 34w EE/EEMAG-8'	wrap	3	140	0.4	18-45
38	George Washington-Middle School	Classroom 221A	2	3L4' T12 34w EE/EEMAG	trof acrylic dbl switch	6	110	0.7	55
53	George Washington-Middle School	Classroom 211	2	6L4' T8 32w/EL-8'	indirect	9	180	1.6	63
102	George Washington-Middle School	Cafeteria 134 East Hall Seating Area	1	4L4' T12 34w EE/EEMAG	trof acr	24	140	3.4	15-62
110	George Washington-Middle School	Classroom 120	1	3L4' T12 34w EE/EEMAG	trof acrylic dbl switch	12	110	1.3	55
131	George Washington-Middle School	Gym Main	1	400W METAL HALIDE	high bay	36	455	16.4	38-73
235	George Washington-Middle School	Library Media Center Staff	1	4L4' T12 34w EE/EEMAG	trof acr	19	140	2.7	38-65
281	Packanack-Elementary School	Classroom 23	1	4L4' T8 32w/EL-8'	wrap	9	112	1.0	60
297	Packanack-Elementary School	Cafeteria Seating Area	1	4L4' T8 32w/EL	wrap	4	112	0.4	31-45
321	Packanack-Elementary School	Classroom 15	1	3L4' T8 32w/EL	trof acr	7	88	0.6	15-40
375	Packanack-Elementary School	Gym Main	1	4L4' T5 HO/EL	wrap	12	234	2.8	55-70
392	Theunis Dey-Elementary School	Classroom 2D	1	4L4' T8 32w/EL	trof acr	12	112	1.3	82
405	Theunis Dey-Elementary School	Office Open Main	1	3L4' T8 32w/EL	trof parabolic	6	88	0.5	45
407	Theunis Dey-Elementary School	Office Principal	1	4L4' T8 32w/EL	trof acr	4	112	0.4	70
424	Theunis Dey-Elementary School	Classroom 13	1	4L4' T12 34w EE/EEMAG-8'	wrap	4	140	0.6	15- 52
472	Theunis Dey-Elementary School	Gym Main	1	2L4' T8 32w/EL	box acr 1' wide	48	60	2.9	25-47
483	Theunis Dey-Elementary School	Cafeteria Multipurpose	1	150W METAL HALIDE	lowbay	17	190	3.2	5-15
565	Randall Carter-Elementary School	Classroom 11	1	4L4' T12 34w EE/EEMAG-8'	wrap	6	140	0.8	61
633	Randall Carter-Elementary School	Classroom 1	1	4L4' T12 34w EE/EEMAG	trof acr	29	140	4.1	31-70
638	Randall Carter-Elementary School	Classroom 4	1	3L4' T8 32w/EL	trof acr	9	88	0.8	48-52
721	Board of Ed Administration	Conference 2	2	4L4' T12 34w EE/EEMAG	trof acr	6	140	0.8	100
783	Ryerson-Elementary School	Classroom 11	1	4L4' T12 34w EE/EEMAG-8'	old wrap	3	140	0.4	45
813	Ryerson-Elementary School	Classroom 16	1	4L4' T12 34w EE/EEMAG-8'	old wrap	3	140	0.4	48
830	Ryerson-Elementary School	Classroom 5	1	4L4' T8 32w/EL-8'	old wrap	3	112	0.3	42
847	Ryerson-Elementary School	Classroom 24	1	4L4' T8 32w/EL	trof acr	11	112	1.2	85
874	Ryerson-Elementary School	Cafeteria Seating Area	1	4L4' T12 34w EE/EEMAG	trof acr	20	140	2.8	35
892	Ryerson-Elementary School	Office Reading Rom	1	4L4' T12 34w EE/EEMAG	trof acr	6	140	0.8	100
893	Ryerson-Elementary School	Library	1	4L4' T8 32w/EL	trof acr	25	112	2.8	95
915	James Fallon-Elementary School	Gym Main	1	400W METAL HALIDE	high bay	16	455	7.3	15-25
926	James Fallon-Elementary School	Classroom 42	1	2x18W COMPACT HARDWIRED/EL	can rec 9"	4	38	0.2	55
937	James Fallon-Elementary School	Classroom 39	1	3L4' T8 32w/EL	trof para dbl switch	9	88	0.8	55-85
1082	Lafayette-Elementary School	Classroom 23	1	3L4' T12 34w EE/EEMAG	trof acrylic dbl switch	12	110	1.3	57
1086	Lafayette-Elementary School	Classroom 20	1	4L4' T12 34w EE/EEMAG-8'	old wrap narrow	8	140	1.1	48
1098	Lafayette-Elementary School	Gym Main	1	4L4' T12 34w EE/EEMAG	old wrap	40	140	5.6	12-15
1196	John F. Kennedy-Elementary School	Classroom 12	2	4L4' T12 34w EE/EEMAG-8'	old wrap	3	140	0.4	25-51
1224	John F. Kennedy-Elementary School	Classroom 102B	1	3L4' T12 34w EE/EEMAG	trof acrylic dbl switch	6	110	0.7	70

Sample Representative Light Level Readings

Line	Building Name	Location	Fl	Pre Fixture Description	Pre Fixture Style	Pre Qty	Pre Watts	Pre kW	Representative FC Reading
1322	Wayne Valley-High School	Classroom 223	2	4L4' T12 34w EE/EEMAG-8'	old wrap	15	140	2.1	18-32
1333	Wayne Valley-High School	Classroom 221	2	6L4' T8 32w/EL-8'	indirect	9	180	1.6	58
1612	Wayne Valley-High School	Gym Small	1	400W METAL HALIDE	high bay	40	455	18.2	15-40
1697	Wayne Valley-High School	Classroom 136	1	4L4' T12 34w EE/EEMAG-8'	old wrap	8	140	1.1	18-35
1754	Wayne Valley-High School	Gym Main	1	400W METAL HALIDE	high bay	74	455	33.7	65
1762	Wayne Valley-High School	Classroom 168	1	4L4' T8 32w/EL	trof para dbl switch	9	112	1.0	45
1817	Wayne Valley-High School	Library	1	4L4' T12 34w EE/EEMAG	trof acr	110	140	15.4	52-85
1862	Albert Payson Terhune-Elementary School	Classroom 21	1	4L4' T12 34w EE/EEMAG-8'	wrap	6	140	0.8	22-28
1874	Albert Payson Terhune-Elementary School	Classroom 17	1	4L4' T12 34w EE/EEMAG-8'	wrap	9	140	1.3	18-35
1932	Albert Payson Terhune-Elementary School	Gym Multipurpose	1	150W METAL HALIDE	lowbay	17	190	3.2	12-18
1982	Pines Lake-Elementary School	Classroom 32	1	3L4' T12 34w EE/EEMAG	trof acrylic dbl switch	12	110	1.3	31-55
2009	Pines Lake-Elementary School	Gym Main	1	400W METAL HALIDE	high bay	8	455	3.6	55
2113	Anthony Wayne-Middle School	Classroom 222	2	3L4' T8 32w/EL	trof para dbl switch	10	88	0.9	45
2157	Anthony Wayne-Middle School	Classroom 202	2	3L4' T8 32w/EL	trof para dbl switch	12	88	1.1	35
2254	Anthony Wayne-Middle School	Gym Main	1	400W METAL HALIDE	indirect	16	455	7.3	25
2348	Anthony Wayne-Middle School	Library	1	6L4' T8 32w/EL-8'	indirect/direct dbl switch	45	180	8.1	45
2361	Wayne Hills-High School	Classroom 235	2	4L4' T8 32w/EL-8'	wrap	4	112	0.4	40-60
2445	Wayne Hills-High School	Classroom 276	2	2L4' T8 32w/EL	trof acr	4	60	0.2	45-65
2508	Wayne Hills-High School	Classroom 256	2	4L4' T8 32w/EL-8'	wrap	4	112	0.4	75
2722	Wayne Hills-High School	Classroom 113	1	4L4' T8 32w/EL-8'	wrap	7	112	0.8	68
2763	Wayne Hills-High School	Cafeteria Seating Area	1	6L4' T8 32w/EL	circle	36	180	6.5	15-22
2975	Wayne Hills-High School	Cafeteria Seating Area	1	3L4' T8 32w/EL	trof acr	12	88	1.1	48
3162	Schuyler-Colfax-Middle School	Classroom 103	1	4L4' T12 34w EE/EEMAG-8'	old wrap	9	140	1.3	40
3228	Schuyler-Colfax-Middle School	Gym Main	1	400W METAL HALIDE	square recessed	46	455	20.9	40
3235	Schuyler-Colfax-Middle School	Gym 128 Aux	1	4L4' T12 34w EE/EEMAG	old wrap	24	140	3.4	30
3236	Schuyler-Colfax-Middle School	Gym 129 Aux	1	4L4' T12 34w EE/EEMAG	old wrap	24	140	3.4	30

Attachment 2.0 Retrofit Codes

Massachusetts Device Codes and Rated Lighting System Wattage Table

for Massachusetts Customers

2011 Retrofit Program

January 01, 2011



Device Codes and Rated Lighting System Wattage Table

BX	Biax /Twin Tube Lamp	EE	Energy-Efficient Lamp	STD	Standard Ballast or Lamp
HW	Hard Wire Fixture	ELIG	Electronic Ballast	HO	High Output Lamp
EEMAG	Energy-Efficient Magnetic	LPF	Low Power Ballast Factor < 0.80	VHO	Very High Output Lamp
		HPF	High Power Ballast Factor > 1.0		

Existing Lighting Systems

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>	<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
Incandescent Lamps			Halogen/Quartz Lamps		
1I0015	15W INC	15	1T0035	35W HALOGEN LAMP	35
1I0020	20W INC	20	1T0040	40W HALOGEN LAMP	40
1I0025	25W INC	25	1T0042	42W HALOGEN LAMP	42
1I0034	34W INC	34	1T0045	45W HALOGEN LAMP	45
1I0036	36W INC	36	1T0047	47W HALOGEN LAMP	47
1I0040	40W INC	40	1T0050	50W HALOGEN LAMP	50
1I0042	42W INC	42	1T0052	52W HALOGEN LAMP	52
1I0045	45W INC	45	1T0055	55W HALOGEN LAMP	55
1I0050	50W INC	50	1T0060	60W HALOGEN LAMP	60
1I0052	52W INC	52	1T0072	72W HALOGEN LAMP	72
1I0054	54W INC	54	1T0075	75W HALOGEN LAMP	75
1I0055	55W INC	55	1T0090	90W HALOGEN LAMP	90
1I0060	60W INC	60	1T0100	100W HALOGEN LAMP	100
1I0065	65W INC	65	1T0150	150W HALOGEN LAMP	150
1I0067	67W INC	67	1T0200	200W HALOGEN LAMP	200
1I0069	69W INC	69	1T0250	250W HALOGEN LAMP	250
1I0072	72W INC	72	1T0300	300W HALOGEN LAMP	300
1I0075	75W INC	75	1T0350	350W HALOGEN LAMP	350
1I0080	80W INC	80	1T0400	400W HALOGEN LAMP	400
1I0085	85W INC	85	1T0425	425W HALOGEN LAMP	425
1I0090	90W INC	90	1T0500	500W HALOGEN LAMP	500
1I0093	93W INC	93	1T0750	750W HALOGEN LAMP	750
1I0100	100W INC	100	1T0900	900W HALOGEN LAMP	900
1I0120	120W INC	120	1T1000	1000W HALOGEN LAMP	1000
1I0125	125W INC	125	1T1200	1200W HALOGEN LAMP	1200
1I0135	135W INC	135	1T1500	1500W HALOGEN LAMP	1500
1I0150	150W INC	150			
1I0200	200W INC	200	Mercury Vapor (MV)		
1I0300	300W INC	300	1V0040S	40W MERCURY	50
1I0448	448W INC	448	1V0050S	50W MERCURY	75
1I0500	500W INC	500	1V0075S	75W MERCURY	95
1I0750	750W INC	750	1V0100S	100W MERCURY	120
1I1000	1000W INC	1000	1V0175S	175W MERCURY	205
1I1500	1500W INC	1500	1V0250S	250W MERCURY	290
			1V0400S	400W MERCURY	455
			1V0700S	700W MERCURY	775
			1V1000S	1000W MERCURY	1075
			2V0400S	2/400W MERCURY	880
Low Voltage Halogen Fixture (includes Transformer)			Low Pressure Sodium (LPS)		
1R0020	20W LV HALOGEN FIXT	30	1L0035S	35W LPS	60
1R0025	25W LV HALOGEN FIXT	35	1L0055S	55W LPS	85
1R0035	35W LV HALOGEN FIXT	45	1L0090S	90W LPS	130
1R0042	42W LV HALOGEN FIXT	52	1L0135S	135W LPS	180
1R0050	50W LV HALOGEN FIXT	60	1L0180S	180W LPS	230
1R0065	65W LV HALOGEN FIXT	75			
1R0075	75W LV HALOGEN FIXT	85			

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>	<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
High Pressure Sodium (HPS)			Two Foot T8 / T12 Systems		
1H0035S	35W HPS	45	1F20SSS	F20T12/HPF(1)	32
1H0050S	50W HPS	65	1F80BXE	1L2' F80BXE/ELIG	90
1H0070S	70W HPS	90	1F55BXE	1L2' F55BX/ELIG	56
1H0100S	100W HPS	130	2F17SSE	2L2' 17W T8/ELIG	37
1H0150S	150W HPS	190	2F17SSL	2L2' 17W T8/ELIG LOW POWER	27
1H0200S	200W HPS	240	2F17SSM	2L2' 17W T8/EEMAG	45
1H0225S	225W HPS	275	2F20SSS	F20T12/HPF(2)	56
1H0250S	250W HPS	295	2F24HSS	2L2' 24 T12HO/STD/STD	85
1H0310S	310W HPS	350	2F40BXE	2L2' F40BX/ELIG	72
1H0360S	360W HPS	435	2F50BXE	2L2' F50BX/ELIG	108
1H0400S	400W HPS	460	2F55BXE	2L2'55BXE/ELIG	112
1H0600S	600W HPS	675	3F17SSE	3L2' 17W T8/ELIG	53
1H0750S	750W HPS	835	3F17SSL	3L2' 17W T8/ELIG LOW POWER	39
1H1000S	1000W HPS	1085	3F20SSS	F20T12/HPF(3)	78
Metal Halide (MH)			3F40BXE	3L2' F40BX/ELIG	102
1M0032S	32W METAL HALIDE	40	3F50BXE	3L2' F50BX/ELIG	162
1M0050S	50W METAL HALIDE	65	3F55BXE	3L2' F55BX/ELIG	168
1M0070S	70W METAL HALIDE	95	4F17SSE	4L2' 17W T8/ELIG	62
1M0100S	100W METAL HALIDE	120	4F36BXE	4L2' F36BX/ELIG	148
1M0150S	150W METAL HALIDE	190	4F40BXE	4L2' F40BX/ELIG	144
1M0175S	175W METAL HALIDE	205	4F40BXH	4L 40W T5 (Std.) HIGH LMN	170
1M0250S	250W METAL HALIDE	295	4F50BXE	4L2' F50BX/ELIG	216
1M0360S	360W METAL HALIDE	430	4F55BXE	4L2' F55BX/ELIG	224
1M0400S	400W METAL HALIDE	455	5F40BXE	5L2' F40BX/ELIG	190
1M0750S	750W METAL HALIDE	825	5F50BXE	5L2' F50BX/ELIG	270
1M1000S	1000W METAL HALIDE	1075	5F55BXE	5L2' F55BX/ELIG	280
1M1500S	1500W METAL HALIDE	1615	6F36BXE	6L2' F36BX/ELIG	212
1M1800S	1800W METAL HALIDE	1875	6F40BXE	6L2' F40BX/ELIG	204
Pulse Start Metal Halide Lamp/Ballast			6F50BXE	6L2' F50BX/ELIG	324
1M0100P	100W MH CWA	128	6F55BXE	6L2' F55BX/ELIG	336
1M0100R	100W MH LINEAR	118	8F36BXE	8L2' F36BX/ELIG	296
1M0150P	150W MH CWA	190	8F40BXE	8L2' F40BX/ELIG	288
1M0150R	150W MH LINEAR	172	8F50BXE	8L2' F50BX/ELIG	432
1M0175P	175W MH CWA	208	8F55BXE	8L2' F55BX/ELIG	448
1M0175R	175W MH LINEAR	190	9F36BXE	9L2' F36BX/ELIG	318
1M0200P	200W MH CWA	232	9F40BXE	9L2' F40BX/ELIG	306
1M0200R	200W MH LINEAR	218	9F50BXE	9L2' F50BX/ELIG	486
1M0250P	250W MH CWA	288	9F55BXE	9L2' F55BX/ELIG	504
1M0250R	250W MH LINEAR	265	12F40BE	12L2' F40BX/ELIG	408
1M0300P	300W MH CWA	342	12F50BE	12L2' F50BX/ELIG	648
1M0300R	300W MH LINEAR	324	12F55BE	12L2' F55BX/ELIG	672
1M0320P	320W MH CWA	365	Three Foot T8 / T12 Systems		
1M0320R	320W MH LINEAR	345	1F30SEM	1L3' 30W T12 EE/EEMAG	38
1M0350P	350W MH CWA	400	1F30SES	1L3' 30W T12 EE/STD	42
1M0350R	350W MH LINEAR	375	1F30SSS	1L3' 30W T12 STD/STD	46
1M0400P	400W MH CWA	455	1F25SSE	1L3' 25W T8/ELIG	24
1M0400R	400W MH LINEAR	430	2F30SEE	2L3' 30W T12 EE/ELIG	49
1M0450P	450W MH CWA	508	2F30SEM	2L3' 30W T12 EE/EEMAG	66
1M0450R	450W MH LINEAR	480	2F30SES	2L3' 30W T12 EE/STD	73
1M0750P	750W MH CWA	815	2F30SSS	2L3' 30W T12 STD/STD	80
1M0750R	750W MH LINEAR	805	2F25SSE	2L3' 25W T8/ELIG	47
1M1000P	1000W MH CWA	1080	2F25SSM	2L3' 25W T8/EEMAG	65
			3F30SSS	3L3' 30W T12 STD/STD	140

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>	<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
Three Foot T8 / T12 Systems (cont)			Four Foot T12 Systems (cont)		
3F30SES	3L3' 30W T12 EE/STD	127	4F40SEM	4L4' EE/EEMAG	140
3F25SSE	3L3' 25W T8/ELIG	68	4F40SES	4L4' EE/STD	160
4F25SSE	4L3' 25W T8/ELIG	88	4F40SSE	4L4' STD/ELIG	144
Four Foot F48 T12 Systems			4F40SSM	4L4' STD/EEMAG	172
1F48SES	1L4' F48T12EE/STD	50	4F40SSS	4L4' STD/STD	188
1F48SSS	1L4' F48T12/STD	60	6F40SSS	6L4' STD/STD	282
2F48SES	2L4' F48T12EE/STD	82	Four Foot T8 Systems		
2F48SSS	2L4' F48T12/STD	102	1F32SSE	1L4' T8/ELIG	30
3F48SES	3L4' F48T12EE/STD	132	1F32SSL	1L4 T8/ELIG LOW POWER	26
3F48SSS	3L4' F48T12/STD	162	1F32SSM	1L4' T8/EEMAG	37
4F48SES	4L4' F48T12EE/STD	164	2F32SSE	2L4' T8/ELIG	60
4F48SSS	4L4' F48T12/STD	204	2F32SSH	2L4' T8/ELIG HIGH LMN	78
Four Foot F48HO T12 Systems			2F32SSL	2L4 T8/ELIG LOW PWR	52
1F48HES	1L4' F48HO/EE/STD	80	2F32SSM	2L4' T8/EEMAG	70
1F48HSS	1L4' F48HO/STD/STD	85	3F32SSE	3L4' T8/ELIG	88
2F48HES	2L4' F48HO/EE/STD	135	3F32SSH	3L4' T8/ELIG HIGH LMN	112
2F48HSS	2L4' F48HO/STD/STD	145	3F32SSL	3L4 T8/ELIG LOW POWER	76
3F48HES	3L4' F48HO/EE/STD	215	3F32SSM	3L4' T8/EEMAG	107
3F48HSS	3L4' F48HO/STD/STD	230	4F32SSE	4L4' T8/ELIG	112
4F48HES	4L4' F48HO/EE/STD	270	4F32SSH	4L4' T8/ELIG HIGH LMN	156
4F48HSS	4L4' F48HO/STD/STD	290	4F32SSL	4L4 T8/ELIG LOW PWR	98
Four Foot F48VHO T12 Systems			4F32SSM	4L4' T8/EEMAG	140
1F48VES	1L4' F48VHO/EE/STD	123	5F32SSE	5L4' T8/ELIG	148
1F48VSS	1L4' F48VHO/STD/STD	138	5F32SSH	5L4' T8/ELIG HIGH LMN	190
2F48VES	2L4' F48VHO/EE/STD	210	6F32SSE	6L4' T8/ELIG	174
2F48VSS	2L4' F48VHO/STD/STD	240	8F32SSH	8L4' T8/ELIG HIGH LMN	312
3F48VES	3L4' F48VHO/EE/STD	333	Five Foot T8 / T12 Systems		
3F48VSS	3L4' F48VHO/STD/STD	378	1F40HSE	1L5' HO/STD/ELIG	59
4F48VES	4L4' F48VHO/EE/STD	420	1F60HSM	1L5' HO/STD/EEMAG	90
4F48VSS	4L4' F48VHO/STD/STD	480	1F60SSM	1L5'/STD/EEMAG	73
Four Foot T12 Systems			1F60TSM	1L5' T10HO/STD/EEMAG	135
1F40SEE	1L4' EE/ELIG	38	2F40HSE	2L5' HO/STD/ELIG	123
1F40SEM	1L4' EE/EEMAG	40	2F40TSE	2L5'T8/ELIG	68
1F40SES	1L4' EE/STD	50	2F60HSM	2L5' HO/STD/EEMAG	178
1F40SSE	1L4' STD/ELIG	46	2F60SSM	2L5'/STD/EEMAG	122
1F40SSM	1L4' STD/EEMAG	50	3F40TSE	3L5'T8/ELIG	106
1F40SSS	1L4' STD/STD	57	Six Foot T12 & T12HO Systems		
2F40SEE	2L4' EE/ELIG	60	1F72HSE	1L6' T8HO/ELIG	80
2F40SEM	2L4' EE/EEMAG	70	1F72HSS	1L6' F72HO/STD/STD	113
2F40SES	2L4' EE/STD	80	1F72SSM	1L6' STD/EEMAG	80
2F40SSE	2L4' STD/ELIG	72	1F72SSS	1L6' STD/STD	95
2F40SSM	2L4' STD/EEMAG	86	2F72HSE	2L6'T8 HO/ELIG	160
2F40SSS	2L4' STD/STD	94	2F72HSM	2L6' F72HO/STD/EEMAG	193
3F40SEE	3L4' EE/ELIG	90	2F72HSS	2L6' F72HO/STD	195
3F40SEM	3L4' EE/EEMAG	110	2F72SSM	2L6' STD/EEMAG	135
3F40SES	3L4' EE/STD	130	2F72SSS	2L6' STD/STD	173
3F40SSE	3L4' STD/ELIG	110	Eight Foot T12HO Systems		
3F40SSM	3L4' STD/EEMAG	136	1F96HES	1L8' HO/EE/STD	125
3F40SSS	3L4' STD/STD	151	1F96HSS	1L8' HO/STD/STD	135
4F40SEE	4L4' EE/ELIG	120	2F96HEE	2L8' HO/EE/ELIG	170

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
Eight Foot T12HO Systems (cont)		
2F96HEM	2L8' HO/EE/EEMAG	207
2F96HES	2L8' HO/EE/STD	227
2F96HSE	2L8' HO/STD/ELIG	195
2F96HSM	2L8' HO/STD/EEMAG	237
2F96HSS	2L8' HO/STD/STD	257
3F96HES	3L8' HO/EE/STD	352
3F96HSS	3L8' HO/STD/STD	392
4F96HEE	4L8' HO/EE/ELIG	340
4F96HEM	4L8' HO/EE/EEMAG	414
4F96HES	4L8' HO/EE/STD	454
4F96HSE	4L8' HO/STD/ELIG	390
4F96HSM	4L8' HO/STD/EEMAG	474
4F96HSS	4L8' HO/STD/STD	514

Eight Foot T12VHO Systems		
1F96VES	1L8' VHO/EE/STD	200
1F96VSS	1L8' VHO/STD/STD	230
2F96VES	2L8' VHO/EE/STD	390
2F96VSS	2L8' VHO/STD/STD	450
3F96VES	3L8' VHO/EE/STD	590
3F96VSS	3L8' VHO/STD/STD	680
4F96VES	4L8' VHO/EE/STD	780
4F96VSS	4L8' VHO/STD/STD	900

Eight Foot T8 Systems		
1F59SSE	1L8' T8/ELIG	60
1F80SSE	1L8' T8 HO/ELIG	85
2F59SSE	2L8' T8/ELIG	109
2F59SSL	2L8' T8/ELIG LOW PWR	100
2F80SSE	2L8' T8 HO/ELIG	160

Eight Foot T12 Systems		
1F96SEE	1L8' EE/ELIG	60
1F96SES	1L8' EE/STD	83
1F96SSE	1L8' STD/ELIG	70
1F96SSS	1L8' STD/STD	100
2F96SEE	2L8' EE/ELIG	109
2F96SEM	2L8' EE/EEMAG	123
2F96SES	2L8' EE/STD	138
2F96SSE	2L8' STD/ELIG	134
2F96SSM	2L8' STD/EEMAG	158
2F96SSS	2L8' STD/STD	173
3F96SES	3L8' EE/STD	221
3F96SSS	3L8' STD/STD	273
4F96SEE	4L8' EE/ELIG	218
4F96SEM	4L8' EE/EEMAG	246
4F96SES	4L8' EE/STD	276
4F96SSE	4L8' STD/ELIG	268
4F96SSM	4L8' STD/EEMAG	316
4F96SSS	4L8' STD/STD	346

Proposed Lighting Systems

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>	<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
LED Exit Signs			Compact Fluorescents (CFL's) (cont)		
1E0002	2.0 WATT LED	2	4C0042E	4/42W COMPACT HW ELIG	188
1E0003	3.0 WATT LED	3	6C0026E	6/26W COMPACT HW ELIG	162
1E0005	5.0 WLED	5	6C0032E	6/32W COMPACT HW ELIG	228
1E0005C	0.5 WATT LEC	0.5	6C0042E	6/42W COMPACT HW ELIG	282
1E0008	8.0 WLED	8	8C0026E	8/26W COMPACT HW ELIG	216
1E0015	1.5 WATT LED	1.5	8C0032E	8/32W COMPACT HW ELIG	304
1E0105	10.5 WATT LED	10.5	8C0042E	8/42W COMPACT HW ELIG	376
Compact Fluorescents (CFL's)			T5 Systems		
2C0007S	2/7W COMPACT HW	18	1F21SSE	1L3' 21W T5/ELIG	24
1C0005S	5W COMPACT HW	7	1F28SSE	1L4' 28W T5/ELIG	32
1C0007S	7W COMPACT HW	9	1F39HSE	1L3' 39W T5HO/ELIG	42
1C0009S	9W COMPACT HW	11	1F54HSE	1L4' 54W T5HO/ELIG	59
1C0011S	11W COMPACT HW	13	1F14SSE	1L2' 14W T5/ELIG	16
1C0013S	13W COMPACT HW	15	2F14SSE	2L2' 14W T5/ELIG	32
1C0018E	18W COMPACT HW ELIG	20	1F24HSE	1L2' 24W T5HO/ELIG	29
1C0018S	18W COMPACT HW	20	2F24HSE	2L2' 24W T5HO/ELIG	52
1C0022S	22W COMPACT HW	24	3F24HSE	3L4' T5HO/ELIG	80
1C0023E	1/23W COMPACT HW ELIG	25	2F21SSE	2L3' 21W T5/ELIG	47
1C0026E	26W COMPACT HW ELIG	28	2F28SSE	2L4' 28W T5/ELIG	63
1C0026S	26W COMPACT HW	28	2F39HSE	2L3' 39W T5HO/ELIG	85
1C0028S	28W COMPACT HW	30	2F54HSE	2L4' 54W T5HO/ELIG	117
1C0032E	32W COMPACT HW ELIG	34	3F54HSE	3L4' 54W T5HO/ELIG	177
1C0032S	32W CIRCLINE HW	34	4F54HSE	4L4' 54W T5HO/ELIG	234
1C0042E	1/42W COMPACT HW ELIG	48	5F54HSE	5L4' 54W T5HO/ELIG	294
1C0044S	44W CIRCLINE HW	46	6F54HSE	6L4' 54W T5HO/ELIG	351
1C0057E	1/57W COMPACT HW ELIG	65	8F54HSE	8L4' 54W T5HO/ELIG	468
1C2232S	22/32W CIRCLINE HW	58	10F54HSE	10L4' 54W T5HO/ELIG	585
1C2D10E	10W 2D COMPACT HW ELIG	12	Two Foot High Efficient T8 Systems		
1C2D16E	16W 2D COMPACT HW ELIG	18	1F17ESL	1L2' 17W T8EE/ELEE LOW PWR	14
1C2D21E	21W 2D COMPACT HW ELIG	22	1F17ESN	1L2' 17W T8EE/ELEE	17
1C2D28E	28W 2D COMPACT HW ELIG	28	1F17ESH	1L2' 17W T8EE/ELEE HIGH PWR	20
1C2D38E	38W 2D COMP.HW ELIG	36	1F28BXE	1L2' F28BX/ELIG	32
1C3240S	32/40W CIRCLINE HW	80	2F17ESL	2L2' 17W T8EE/ELEE LOW PWR	27
2C0005S	2/5W COMPACT HW	14	2F17ESN	2L2' 17W T8EE/ELEE	32
2C0009S	2/9W COMPACT HW	22	2F17ESH	2L2' 17W T8EE/ELEE HIGH PWR	40
2C0011S	2/11W COMPACT HW	26	2F28BXE	2L2' F28BX/ELIG	63
2C0013E	2/13W COMPACT HW ELIG	28	3F17ESL	3L2' 17W T8EE/ELEE LOW PWR	39
2C0013S	2/13W COMPACT HW	30	3F17ESN	3L2' 17W T8EE/ELEE	46
2C0018E	2/18W COMP. HW ELIG	40	3F17ESH	3L2' 17W T8EE/ELEE HIGH PWR	61
2C0026E	2/26W COMP. HW ELIG	54	3F28BXE	3L2' F28BX/ELIG	94
2C0032E	2/32W COMPACT HW ELIG	68	Three Foot High Efficient T8 Systems		
2C0042E	2/42W COMPACT HW ELIG	100	1F25ESL	1L3' 25W T8EE/ELEE LOW PWR	21
3C0009S	3/9W COMPACT HW	33	1F25ESN	1L3' 25W T8EE/ELEE	24
3C0013S	3/13W COMPACT HW	45	1F25ESH	1L3' 25W T8EE/ELEE HIGH PWR	30
3C0018E	3/18W COMPACT HW ELIG	60	2F25ESL	2L3' 25W T8EE/ELEE LOW PWR	40
3C0026E	3/26W COMPACT HW ELIG	82	2F25ESN	2L3' 25W T8EE/ELEE	45
3C0032E	3/32W COMPACT HW ELIG	114	2F25ESH	2L3' 25W T8EE/ELEE HIGH PWR	60
3C0042E	3/42W COMPACT HW ELIG	141	3F25ESL	3L3' 25W T8EE/ELEE LOW PWR	58
4C0018E	4/18W COMPACT HW ELIG	80	3F25ESN	3L3' 25W T8EE/ELEE	67
4C0026E	4/26W COMPACT HW ELIG	108	3F25ESH	3L3' 25W T8EE/ELEE HIGH PWR	90
4C0032E	4/32W COMPACT HW ELIG	152			

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>	<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
Four Foot T8 High Efficient / Reduce Wattage Systems			Eight Foot T8 Systems		
1F25EEH	1L4' 25W T8EE/ELEE HIGH PWR	30	1F59SSE	1L8' T8/ELIG	60
1F25EEE	1L4' 25W T8EE/ELEE	22	1F80SSE	1L8' T8 HO/ELIG	85
1F25EEL	1L4' 25W T8EE/ELEE LOW PWR	19	2F59SSE	2L8' T8/ELIG	109
2F25EEH	2L4' 25W T8EE/ELEE HIGH PWR	57	2F59SSL	2L8' T8/ELIG LOW PWR	100
2F25EEE	2L4' 25W T8EE/ELEE	43	2F80SSE	2L8' T8 HO/ELIG	160
2F25EEL	2L4' 25W T8EE/ELEE LOW PWR	37			
3F25EEH	3L4' 25W T8EE/ELEE HIGH PWR	86	LED Lighting Fixtures		
3F25EEE	3L4' 25W T8EE/ELEE	64	1L002	2 WATT LED	2
3F25EEL	3L4' 25W T8EE/ELEE LOW PWR	57	1L003	3 WATT LED	3
4F25EEH	4L4' 25W T8EE/ELEE HIGH PWR	111	1L004	4 WATT LED	04
4F25EEE	4L4' 25W T8EE/ELEE	86	1L005	5 WATT LED	05
4F25EEL	4L4' 25W T8EE/ELEE LOW PWR	75	1L006	6 WATT LED	06
1F28EEH	1L4' 28W T8EE/ELEE HIGH PWR	33	1L007	7 WATT LED	07
1F28EEE	1L4' 28W T8EE/ELEE	24	1L008	8 WATT LED	08
1F28EEL	1L4' 28W T8EE/ELEE LOW PWR	22	1L009	9 WATT LED	09
2F28EEH	2L4' 28WT8EE/ELEE HIGH PWR	64	1L010	10 WATT LED	10
2F28EEE	2L4' 28W T8EE/ELEE	48	1L011	11 WATT LED	11
2F28EEL	2L4' 28W T8EE/ELEE LOW PWR	42	1L012	12 WATT LED	12
3F28EEH	3L4' 28W T8EE/ELEE HIGH PWR	96	1L013	13 WATT LED	13
3F28EEE	3L4' 28W T8EE/ELEE	72	1L014	14 WATT LED	14
3F28EEL	3L4' 28W T8EE/ELEE LOW PWR	63	1L015	15 WATT LED	15
4F28EEH	4L4' 28W T8EE/ELEE HIGH PWR	126	1L016	16 WATT LED	16
4F28EEE	4L4' 28W T8EE/ELEE	94	1L017	17 WATT LED	17
4F28EEL	4L4' 28W T8EE/ELEE LOW PWR	83	1L018	18 WATT LED	18
1F30EEH	1L4' 30W T8EE/ELEE HIGH PWR	36	1L019	19 WATT LED	19
1F30EEE	1L4' 30W T8EE/ELEE	26	1L020	20 WATT LED	20
1F30EEL	1L4' 30W T8EE/ELEE LOW PWR	24	1L021	21 WATT LED	21
2F30EEH	2L4' 30WT8EE/ELEE HIGH PWR	69	1L022	22 WATT LED	22
2F30EEE	2L4' 30W T8EE/ELEE	52	1L023	23 WATT LED	23
2F30EEL	2L4' 30W T8EE/ELEE LOW PWR	45	1L024	24 WATT LED	24
3F30EEH	3L4' 30W T8EE/ELEE HIGH PWR	103	1L025	25 WATT LED	25
3F30EEE	3L4' 30W T8EE/ELEE	77	1L026	26 WATT LED	26
3F30EEL	3L4' 30W T8EE/ELEE LOW PWR	68	1L027	27 WATT LED	27
4F30EEH	4L4' 30W T8EE/ELEE HIGH PWR	133	1L028	28 WATT LED	28
4F30EEE	4L4' 30W T8EE/ELEE	101	1L029	29 WATT LED	29
4F30EEL	4L4' 30W T8EE/ELEE LOW PWR	89	1L030	30 WATT LED	30
1F32EEH	1L4' 32W T8EE/ELEE HIGH PWR	38	1L031	31 WATT LED	31
1F32EEE	1L4' 32W T8EE/ELEE	28	1L032	32 WATT LED	32
1F32EEL	1L4' 32W T8EE/ELEE LOW PWR	25	1L033	33 WATT LED	33
2F32EEH	2L4' 32W T8EE/ELEE HIGH PWR	73	1L034	34 WATT LED	34
2F32EEE	2L4' 32W T8EE/ELEE	53	1L035	35 WATT LED	35
2F32EEL	2L4' 32W T8EE/ELEE LOW PWR	47	1L036	36 WATT LED	36
3F32EEH	3L4' 32W T8EE/ELEE HIGH PWR	109	1L037	37 WATT LED	37
3F32EEE	3L4' 32W T8EE/ELEE	82	1L038	38 WATT LED	38
3F32EEL	3L4' 32W T8EE/ELEE LOW PWR	72	1L039	39 WATT LED	39
4F32EEH	4L4' 32W T8EE/ELEE HIGH PWR	141	1L040	40 WATT LED	40
4F32EEE	4L4' 32W T8EE/ELEE	107	1L041	41 WATT LED	41
4F32EEL	4L4' 32W T8EE/ELEE LOW PWR	95	1L042	42 WATT LED	42
6F32EEH	6L4' 32W T8EE/ELEE HIGH PWR	218	1L043	43 WATT LED	43
6F32EEE	6L4' 32W T8EE/ELEE	168	1L044	44 WATT LED	44
6F32EEL	6L4' 32W T8EE/ELEE LOW PWR	146	1L045	45 WATT LED	45
			1L046	46 WATT LED	46

<u>Device Code</u>	<u>Device Description</u>	<u>Rated Watts</u>
LED Lighting Fixtures (cont)		
1L047	47 WATT LED	47
1L048	48 WATT LED	48
1L049	49 WATT LED	49
1L050	50 WATT LED	50
1L055	55 WATT LED	55
1L060	60 WATT LED	60
1L070	70 WATT LED	70
1L073	73 WATT LED	73
1L075	75 WATT LED	75
1L080	90 WATT LED	90
1L085	85 WATT LED	85
1L090	90 WATT LED	90
1L095	95 WATT LED	95
1L100	100 WATT LED	100
1L116	116 WATT LED	116
1L120	120 WATT LED	120
1L125	125 WATT LED	125
1L130	130 WATT LED	130
1L135	135 WATT LED	135
1L140	140 WATT LED	140
1L145	145 WATT LED	145
1L150	150 WATT LED	150
1L155	155 WATT LED	155
1L160	160 WATT LED	160
1L165	165 WATT LED	165
1L170	170 WATT LED	170
1L175	175 WATT LED	175
1L180	180 WATT LED	180
1L185	185 WATT LED	185
1L190	190 WATT LED	190
1L200	200 WATT LED	200
1L210	210 WATT LED	210
1L220	220 WATT LED	220
1L240	240 WATT LED	240
Electronic Metal Halide Lamps		
1M0150E	150W METAL HALIDE EB	160
1M0200E	200W METAL HALIDE EB	215
1M0250E	250W METAL HALIDE EB	270
1M0320E	320W METAL HALIDE EB	345
1M0350E	350W METAL HALIDE EB	375
1M0400E	400W METAL HALIDE EB	430
1M0450E	400W METAL HALIDE EB	480
MH Track Lighting		
1M0020E	20W MH SPOT	25
1M0025E	25W MH SPOT	25
1M0035E	35W MH SPOT	44
1M0039E	39W MH SPOT	47
1M0050E	50W MH SPOT	60
1M0070E	70W MH SPOT	80
1M0100E	100W MH SPOT	111
1M0150E	150W MH SPOT	162

Attachment 2.1 Retrofit Code Descriptions

Fixture Codes, Wattages, and Descriptions

FIXTURE CODE	APPLIES TO	WATTS	DESCRIPTION
1E0003	existing	3	3 WATT LED
12-9F32SSE	existing	264	9L4' T8 32w/EL-12'
1C0013S	existing	15	13W COMPACT HARDWIRED
1C0018S	existing	20	18W COMPACT HARDWIRED
1C0022S	existing	24	22W CIRCLELINE HARDWIRED
1C0023E	existing	24	23W COMPACT HARDWIRED/EL
1C0023SI	existing	23	23W COMPACT SCREWIN
1C0026S	existing	28	26W COMPACT HARDWIRED
1C0028S	existing	30	28W COMPACT HARDWIRED
1C0032S	existing	34	32W CIRCLELINE HARDWIRED
1C0032SI	existing	32	32W COMPACT SCREWIN
1C0042S	existing	44	42W COMPACT HARDWIRED
1C0072SI	existing	72	72W COMPACT SCREWIN
1C2232S	existing	58	22W & 32W CIRCLELINE HARDWIRED
1F17SSE	existing	17	1L2' T8 17w/EL
1F20SSS	existing	32	1L2' T12 20w STD/STD
1F24HSE	existing	29	1L2' 24W T5HO/EL
1F32SSE	existing	30	1L4' T8 32w/EL
1F40BXE	existing	46	1L2' F40 BIAX/EL
1F40SEM	existing	40	1L4' T12 34w EE/EEMAG
1F72SSS	existing	95	1L6' T12 55w STD/STD
1H0035S	existing	45	35W HI PRESSURE SODIUM
1H0050S	existing	65	50W HI PRESSURE SODIUM
1H0070S	existing	90	70W HI PRESSURE SODIUM
1H0100S	existing	130	100W HI PRESSURE SODIUM
1H0150S	existing	190	150W HI PRESSURE SODIUM
1H0250S	existing	295	250W HI PRESSURE SODIUM
1H0400S	existing	460	400W HI PRESSURE SODIUM
1I0025	existing	25	25W INCANDESCENT
1I0040	existing	40	40W INCANDESCENT
1I0050	existing	50	50W INCANDESCENT
1I0052	existing	52	52W INCANDESCENT
1I0060	existing	60	60W INCANDESCENT
1I0090	existing	90	90W INCANDESCENT
1I0100	existing	100	100W INCANDESCENT
1I0150	existing	150	150W INCANDESCENT
1I0250	existing	250	250W INCANDESCENT
1I0300	existing	300	300W INCANDESCENT
1M0050S	existing	65	50W METAL HALIDE
1M0100S	existing	120	100W METAL HALIDE
1M0150S	existing	190	150W METAL HALIDE
1M0175S	existing	205	175W METAL HALIDE
1M0250S	existing	295	250W METAL HALIDE
1M0400S	existing	455	400W METAL HALIDE
1M1000S	existing	1075	1000W METAL HALIDE
1R0050	existing	60	50W LO VOLT INC HALOGEN
1V0250S	existing	290	250W MERCURY VAPOR
2C0013S	existing	30	2x13W COMPACT HARDWIRED
2C0018E	existing	38	2x18W COMPACT HARDWIRED/EL
2C0026E	existing	54	2x26W COMPACT HARDWIRED/EL

Fixture Codes, Wattages, and Descriptions

FIXTURE CODE	APPLIES TO	WATTS	DESCRIPTION
2F17SSE	existing	33	2L2' T8 17w/EL
2F20SSS	existing	56	2L2' T12 20w STD/STD
2F25SSE	existing	47	2L3' T8 25w/EL
2F28EEE	existing	48	2L4' T8 28w/ELEE
2F32SSE	existing	60	2L4' T8 32w/EL
2F40BXE	existing	72	2L2' F40 BIAX/EL
2F40SEM	existing	70	2L4' T12 34w EE/EEMAG
2F48HES	existing	135	2L4' F48 T12 55w HO EE/STD
2F54HSE	existing	117	2L4' T5 HO/EL
2F96HSE	existing	195	2L8' T12 110w HO STD/EL
2F96SEM	existing	123	2L8' T12 60w EE/EEMAG
2FB31SSE	existing	58	2L4' T8 U 1.5"/EL
2FB32SSE	existing	60	2L4' T8 32w U/EL
2FB40SEM	existing	70	2L4' T12 34w U EE/EEMAG
2I0020	existing	40	2x20 INCANDESCENTS
2I0040	existing	80	2x40W INCANDESCENTS
2I0060	existing	120	2x60W INCANDESCENTS
2I0100	existing	200	2x100W INCANDESCENTS
2I0150	existing	300	2x150W INCANDESCENTS
3C0013S	existing	45	3x13W COMPACT HARDWIRED
3F17SSE	existing	47	3L2' T8 17w/EL
3F20SSS	existing	78	3L2' T12 20w STD/STD
3F32SSE	existing	88	3L4' T8 32w/EL
3F40BXE	existing	102	3L2' F40 BIAX/EL
3F40SEM	existing	110	3L4' T12 34w EE/EEMAG
3FB31SSE	existing	85	3L4' T8 U 1.5" /EL
3I0060	existing	180	3x60W INCANDESCENTS
4F20SSS	existing	112	4L2' T12 20w STD/STD
4F32SSE	existing	112	4L4' T8 32w/EL
4F40SEM	existing	140	4L4' T12 34w EE/EEMAG
4F54HSE	existing	234	4L4' T5 HO/EL
6F20SSS	existing	168	6L2' T12 20w STD/STD
6F32SSE	existing	180	6L4' T8 32w/EL
6F40BXE	existing	204	6L2' F40 BIAX/EL
6F40SEM	existing	210	6L4' T12 34w EE/EEMAG
8-2F28EEE	existing	48	2L4' T8 28w/ELEE-8'
8-2F32SSE	existing	60	2L4' T8 32w/EL-8'
8-2F40SEM	existing	70	2L4' T12 34w EE/EEMAG-8'
8-2F54HSE	existing	117	2L4' T5 HO/EL-8'
8-4F32SSE	existing	112	4L4' T8 32w/EL-8'
8-4F40SEM	existing	140	4L4' T12 34w EE/EEMAG-8'
8-6F32SSE	existing	180	6L4' T8 32w/EL-8'
8-6F40SEM	existing	210	6L4' T12 34w EE/EEMAG-8'
8F32SSE	existing	224	8L4' T8 32w/EL
8F40SEM	existing	280	8L4' T12 34w EE/EEMAG
1C0011SI	replacements	11	11W COMPACT SI
1C0023SI	replacements	23	23W COMPACT SI
1E0003K	replacements	3	3 WATT LED/KIT
1E0003NXB	replacements	3	3 WATT LED/NEW EXIT BATTERY

Fixture Codes, Wattages, and Descriptions

FIXTURE CODE	APPLIES TO	WATTS	DESCRIPTION
1E0010SI	replacements	10	10 WATT LED SI
1E0011SI	replacements	11	11 WATT LED SI
1E0012K	replacements	12	12 WATT LED/KIT
1E0013N	replacements	13	13 WATT LED/NEW
1E0020N	replacements	20	20 WATT LED/NEW
1E0021SI	replacements	21	21 WATT LED SI
1E0022K	replacements	22	22 WATT LED/KIT
1E0025N	replacements	25	25 WATT LED/NEW
1E0026N	replacements	26	26 WATT LED/NEW
1E0046N	replacements	46	46 WATT LED/NEW
1E0049N	replacements	49	49 WATT LED/NEW
1E0050N	replacements	50	50 WATT LED/NEW
1E0070N	replacements	70	70 WATT LED/NEW
1E0113N	replacements	113	113 WATT LED/NEW
1E0133N	replacements	133	133 WATT LED/NEW
1E0138N	replacements	138	138 WATT LED/NEW
1E0172N	replacements	172	172 WATT LED/NEW
1E0222N	replacements	222	222 WATT LED/NEW
1E0231N	replacements	231	231 WATT LED/NEW
1F15ESLN	replacements	14	1L2' T8 15w/ELEE LO/NEW
1F15ESNSK	replacements	17	1L2' T8 15w/ELEE/STRIP KIT
1F28EESK	replacements	24	1L4' T8 28w/ELEE/STRIP KIT
1F28EEHN	replacements	33	1L4' T8 28w/ELEE HI/NEW
1F28EEL	replacements	22	1L4' T8 28w/ELEE LO
1F28EELN	replacements	22	1L4' T8 28w/ELEE LO/NEW
1F28EELSK	replacements	22	1L4' T8 28w/ELEE LO/STRIP KIT
1F40BXE28W	replacements	32	1L2' F40BIAX/EL28W
2F15ESHR	replacements	33	2L2' T8 15w/ELEE HI/RFL
2F15ESL	replacements	27	2L2' T8 15w/ELEE LO
2F15ESLN	replacements	24	2L2' T8 15w/ELEE LO/NEW
2F15ESNR	replacements	28	2L2' T8 15w/ELEE/RFL
2F21ESNN-6	replacements	45	2L3' T8 21w/ELEE/NEW-6'
2F28EEEN	replacements	48	2L4' T8 28w/ELEE/NEW
2F28EEER	replacements	48	2L4' T8 28w/ELEE/RFL
2F28EEHN	replacements	64	2L4' T8 28w/ELEE HI/NEW
2F28EEHN-8	replacements	64	2L4' T8 28w/ELEE HI/NEW-8'
2F28EEHR	replacements	64	2L4' T8 28w/ELEE HI/RFL
2F28EEL	replacements	42	2L4' T8 28w/ELEE LO
2F28EEL-8	replacements	42	2L4' T8 28w/ELEE LO-8'
2F28EELN	replacements	42	2L4' T8 28w/ELEE LO/NEW
2F28EELN-8	replacements	42	2L4' T8 28w/ELEE LO/NEW-8'
2F28EELR	replacements	42	2L4' T8 28w/ELEE LO/RFL
2F28EELSK-8	replacements	42	2L4' T8 28w/ELEE LO/STRIP KIT-8'
2F40BXE28W	replacements	63	2L2' F40BIAX/EL28W
3F15ESL	replacements	39	3L2' T8 15w/ELEE LO
3F28EEL	replacements	63	3L4' T8 28w/ELEE LO
3F28EELx2B	replacements	64	3L4' T8 28w/ELEE LO (1L&2L BAL)
3F40BXE28W	replacements	94	3L2' F40BIAX/EL28W

Fixture Codes, Wattages, and Descriptions

FIXTURE CODE	APPLIES TO	WATTS	DESCRIPTION
4F15ESL	replacements	54	4L2' T8 15w/ELEE LO
4F28EEEN	replacements	94	4L4' T8 28w/ELEE/NEW
4F28EEEN-8	replacements	94	4L4' T8 28w/ELEE/NEW-8'
4F28EEHN-8	replacements	126	4L4' T8 28w/ELEE HI/NEW-8'
4F28EEHSK-8	replacements	126	4L4' T8 28w/ELEE HI/STRIP KIT-8'
4F28EEHSRK-8	replacements	126	4L4' T8 28w/ELEE HI/STRIP RFL KIT-8'
4F28EEL	replacements	83	4L4' T8 28w/ELEE LO
4F28EEL-8	replacements	83	4L4' T8 28w/ELEE LO-8'
4F28EELN-8	replacements	83	4L4' T8 28w/ELEE LO/NEW-8'
4F28EELSK-8	replacements	83	4L4' T8 28w/ELEE LO/STRIP KIT-8'
6F15ESL	replacements	78	6L2' T8 15w/ELEE LO
6F28EEL	replacements	126	6L4' T8 28w/ELEE LO
6F28EEL-8	replacements	126	6L4' T8 28w/ELEE LO-8'
8F28EEL	replacements	166	8L4' T8 28w/ELEE LO
9F28EEL-12	replacements	189	9L4' T8 28w/ELEE LO-12'

Attachment 2.2 Device Description - Additional Information

Fixture Abbreviations Explained

ABBREVIATION	DETAILED MEANING	ADDITIONAL INFORMATION
BIAX	BIAX LAMP	GE trade name for their high-intensity compact fluorescent lamps, but used to describe all brands
CENTER	CENTERING KIT	new sockets & brackets used to adjust the lamp position during retrofit
COMPACT	COMPACT FLUORESCENT	applies to both plug-in and screw-base compact fluorescent lamps
CWA	CONSTANT WATTAGE AUTO (MH ONLY)	a type of metal halide pulse-start ballast
DIM	DIMMABLE	fixture is or will be on a dimmable circuit
WHIP	ELECTRICAL CONNECTING WIRE	used to tie ballasts together in adjacent fixtures
EL	ELECTRONIC BALLAST	ballasts operate fluorescent lamps, and magnetics have given way to electronic ballasts that are much more efficient
ELEE	ELECTRONIC BALLAST ENERGY EFFICIENT TYPE	applies to T8 only and is always used in conjunction with energy-efficient T8 lamps
/EEMAG	ENERGY EFFICIENT MAGNETIC BALLAST	applies to T12 only, introduced mid 1980's, often labeled with some reference to energy such as "wattmiser"
EE/	ENERGY EFFICIENT SERIES	the product being described is the "energy efficient" version of the same product
GANG	GANG	applies to controls, a gang indicates a switch or circuit
HW	HARD WIRED	applies to compact fluorescents in new fixtures or kits that an electrician must install, versus a screw-in base that anyone could install
HI	HI BALLAST FACTOR BALLAST	applies to T8 with electronic ballasts only, typically means 1.18-1.20 ballast factor
HO	HIGH OUTPUT	when applied to T12, is typically used in cold areas, high mountings, or for increased light levels.
HPS	HIGH PRESSURE SODIUM	when applied to T5, is typically for high mountings.
ICE	ICETRON INDUCTION	the 2nd most efficient type of HID lamp, it's light is typically described as "yellow"
INC	INCANDESCENT	Sylvania brand induction
IA	INCLUDED ABOVE	the common light bulb everyone is familiar with
IND	INDUSTRIAL	using the Scope of Work/Audit, reference the line above for more information
KIT	KIT	a strip style fixture with a reflector hood, typically found in shops, mechanical rooms, etc
F20, F32, F48, ETC	LAMP SIZE	a variety of kits, such as LED conversions for recessed exit signs
LED	LIGHT EMITTING DIODE	F means fluorescent. the number originally indicated wattage, but so many new products have been introduced over the years these designations are confusing
LINEAR	LINEAR	typically used in exit signs, traffic signals, decorative applications, recessed cans, new fixtures, etc
LO	LOW BALLAST FACTOR BALLAST	a type of metal halide pulse-start ballast
LV	LOW VOLTAGE	applies to T8 with electronic ballasts only, typically means .77 ballast factor
MERCURY	MERCURY VAPOR	a special type of incandescent used in decorative applications, it's rarely retrofitter
MH	METAL HALIDE	the least efficient type of HID lamp, it's light is typically described as "blueish white"
MINI	MINIATURE SIZE	the 3rd most efficient type of HID lamp, it's light is typically described as "white"
NEW	NEW FIXTURE	often applies to compact fluorescent screw ins
OCC	OCCUPANCY	a new fixture is being installed, with specifics further described in the fixture Style column
QL	QL INDUCTION	occupancy and vacancy sensors that control lights based on occupant usage
RFL	REFLECTOR	Philips brand induction
RELAMP ONLY	RELAMP ONLY	typically silver or white metal used in a troffer to increase efficiency, or a cone reflector on a compact fluorescent
SI	SCREW BASE LAMP	lamps are being replaced, typically with an energy efficient version, but ballasts have additional service life and will not be replaced
STD/	STANDARD EFFICIENCY LAMP	a compact fluorescent or LED lamp with a base that screws into a standard socket in an existing fixture
/STD	STANDARD EFFICIENCY MAGNETIC BALLAST	T12 only
STRIP KIT	STRIP CONVERSION KIT	applies to T12 only, assumed to contain PCB's unless labeled to contrary
STRIP RFL KIT	STRIP REFLECTOR KIT	new socket brackets and strip channel cover are used to adjust the lamp position during retrofit
TW	TANDEM WIRE	new socket brackets and strip channel cover/reflector are used to adjust the lamp position during retrofit
-8', -12', etc.	THE LENGTH OF THE FIXTURE BODY	pulling ballast leads through butted fixture bodies in order to utilize a single ballast
U	U SHAPED LAMP	Ex: -8' indicates the fixture body is 8' long, or has been wired into 8' lengths
VHO	VERY HIGH OUTPUT	applies to T12 and T8, can be various widths between legs such as 6", 3", 1.5"
W	WATT	applies mostly to T12 and is typically used when cold, mounting height, or light levels are primary issues. It's a very inefficient source.
X	X QUANTITY MULTIPLIER	wattage of the lamp. Actual system wattage may vary if a ballast or other transformer is used
		2x40 means dual 40w lamps in a single fixture

Attachment 3.0 - Guarantee Language

SECTION 6

Guarantee of Energy Savings.

- (a) Ameresco hereby represents and warrants to Customer that the amount of the Annual Energy Cost Savings (as defined in Attachment E) shall equal or exceed the “*Guaranteed Savings*” (as specified in Table 6(a) below), over the Term (the “*Guarantee of Energy Savings*”).

Table 6(a)

Year	Guaranteed Savings
1	\$732,394
2	\$749,145
3	\$766,282

For purposes of the Guarantee of Energy Savings, the following assumptions and provisions shall apply:

- (i) Calculation of the Annual Energy Cost Savings, inclusive of energy savings and operational and maintenance cost savings, shall be performed under, and governed by, the methods, formulas, and procedures described in Attachment E.
 - (ii) As it relates to the Annual Energy Cost Savings and the Guarantee of Energy Savings, the term “*year*” shall mean the consecutive twelve (12) month period beginning with the first day of the month following the date of the Final Delivery and Acceptance Certificate (the “*Anniversary Date*”), and each similar twelve (12) month period thereafter.
 - (iii) The unit prices, including the escalation thereof, to be used to calculate the Annual Energy Cost Savings for the purposes of the Guarantee of Energy Savings are described in Attachment E.
 - (iv) The Guarantee of Energy Savings herein is subject to Customer maintaining the Standards of Service and Comfort set forth in Attachment J and performing its maintenance, operating and other obligations under this Agreement. If Customer fails to perform, or fails to properly perform, its obligations under this Agreement or interferes with, or permits any person to take any action which, prevents the achievement of the Annual Energy Cost Savings under the Guarantee of Energy Savings, then Ameresco may equitably adjust the Annual Energy Cost Savings during the period wherein savings were affected to reflect the same. Ameresco’s rights in this Section shall not be in limitation of any other rights it possesses under this Agreement.
- (b) Ameresco will perform and submit to Customer a guarantee reconciliation (“*Guarantee Reconciliation*”) upon the later of (i) sixty (60) days after each Anniversary Date and (ii) thirty (30) days after Customer delivers to Ameresco all utility billing and other data necessary for Ameresco’s completion of the Guarantee Reconciliation. The Guarantee Reconciliation will include a calculation of the cumulative Annual Energy Cost Savings achieved in relation to the cumulative Guaranteed Savings for the period being reconciled.
 - (c) Ameresco hereby guarantees that if the cumulative Annual Energy Cost Savings realized by Customer as of any Anniversary Date, as detailed in the Guarantee Reconciliation, is less than the cumulative Guaranteed Savings as of such Anniversary Date, then Ameresco will pay to Customer that amount by which the cumulative Guaranteed Savings exceeds the cumulative Annual Energy Cost Savings, such payment to be made within thirty (30) days after the date of the Guarantee Reconciliation. Any such payments made by Ameresco shall be included in the cumulative Annual Energy Cost Savings total for purposes of future Guarantee Reconciliation calculations.