

ATTACHMENT A

**City of Manchester Phase one HPS Cobra Head Replacement With LED
Cobra Heads**

City of Manchester HPS Cobra Head Replacement With LED Cobra Heads

4/29/2014

Streetlight Conversion Project - B/C Calculation Worksheet

Measure Life used (100,000 hours)

20

1. Streetlight Inventory					2. Good Faith Estimate using estimate LED Fixture pricing.				
Conversion Project	Qty	Wattage	Lumens	Typical Cost of HPS/MH to Re-Lamp	Lumen Output	Wattage	Fixture Code	Annual kWh Savings (4345 hours)	Lifetime kWh Savings (4345 hours)
50W HPS -> 25W LED	5,040	58	4,000	\$17.68	2,529	25	Fixture A	722,660	14,453,208
70W HPS -> 25W LED	1,168	87	6,300	\$17.31	2,529	25	Fixture A	314,648	6,292,950
100W HPS -> 42W LED	868	127	9,500	\$17.35	3,819	42	Fixture B	320,574	6,411,482
150W HPS -> 53W LED	481	189	16,000	\$17.72	4,000	53	Fixture C	284,233	5,684,650
250W HPS -> 101W LED	646	305	27,500	\$19.72	4,000	101	Fixture D	572,601	11,452,030
400W HPS -> 168W LED	240	466	50,000	\$21.53	4,000	168	Fixture E	310,754	6,215,088
Total number of fixtures	8,443								
Total HPS - LED Conversions KWH savings								2,525,470	50,509,408

LED Conversion "Worst Case" Bid Results Scenario 1

Conversion Project	Qty	Wattage	Lumens	Typical Cost of HPS/MH to Re-Lamp	Lumen Output	Wattage	Fixture Code	Annual kWh Savings (4345 hours)	Lifetime kWh Savings (4345 hours)
50W HPS -> 25W LED	1,278	58	4,000	\$17.68	2,529	31	Fixture A	148,540	2,970,807
70W HPS -> 25W LED	934	87	6,300	\$17.31	2,529	31	Fixture A	226,343	4,526,864
100W HPS -> 42W LED	694	127	9,500	\$17.35	3,819	53	Fixture B	224,779	4,495,580
150W HPS -> 53W LED	385	189	16,000	\$17.72	4,000	66	Fixture C	205,233	4,104,652
250W HPS -> 101W LED	517	305	27,500	\$19.72	4,000	126	Fixture D	401,382	8,027,648
400W HPS -> 168W LED	192	466	50,000	\$21.53	4,000	210	Fixture E	213,565	4,271,309
Total Number of Cobra Head Fixtures	4,000								
Total HPS -> LED conversions KWH savings								1,419,843	28,396,860

City of Manchester Notes

Worse Case scenario assumptions: Reduced qty of fixtures (47%), increased fixtures cost (20%), increased LED wattage (25%).

PSNH Notes:

PSNH Incentive estimate based on \$100/LED fixture and capped at \$400,000 for City of Manchester Streetlight conversion project.

ENERGY EFFICIENT OUTDOOR LIGHTING
DELIVERY SERVICE RATE EOL

AVAILABILITY

Subject to the Terms and Conditions of the Tariff of which it is a part, this unmetered rate is available to any federal, state, county, municipal or other governmental unit, or department or agency of the government. Service under this rate is for delivery and maintenance of street and area lighting service provided to Customers to fixtures utilizing luminaires and brackets for high pressure sodium, metal halide, light emitting diode ("LED") or other energy efficient technology accepted by the Company, for which the Customer has paid the installed cost of fixtures and brackets. It is available at the Customer's option to those Customers who sign a Service Agreement to receive all of their street and area lighting service requirements under Rate EOL where feasible.:

Customers choosing to convert from service under Outdoor Lighting Delivery Service Rate OL to service under Rate EOL must:

(a) contributed to the Company the installed remaining unexpired life of currently installed cost for all new high pressure sodium and metal halide luminaires fixtures and brackets placed into service under this rate which the Customer wishes to remain in service on the date that service under this rate is initiated;

(b) furnished light emitting diode (LED) fixtures, or other lighting technologies, accepted by the Company, and contributed to the Company the installation costs of these fixtures, contribute to the Company the cost of removal and remaining unexpired life of any incandescent, mercury or fluorescent street and area lighting fixtures and brackets as of the date that such fixtures are removed and replaced with energy efficient lighting technology in accordance with this Rate Schedule;

(c) contributed to the Company the remaining unexpired life of existing high pressure sodium vapor and metal halide luminaires and brackets which the customer wishes to remain in service on the date that service under this rate is initiated, and pay the Company the installed cost for all new high pressure sodium and metal halide fixtures and brackets placed into service under this rate, and;

(d) furnish any fixtures utilizing other lighting technologies accepted by the Company, and pay either the Company or a private line contractor, as described under the "Additional Requirements" Section below, for the installation of these fixtures contributed to the Company the remaining unexpired life of any other street and area lighting luminaires and brackets as of the date that such locations are converted to high pressure sodium vapor, metal halide, light emitting diode (LED), or other energy efficient lighting technology accepted by the Company in accordance with this Rate Schedule. It is available at the Customer's option to those Customers who sign a Service Agreement to receive such service and who receive all of their street and area lighting service requirements hereunder where feasible, except as specifically provided for hereinafter. Upon the Customer's request, the Company may utilize a fixed price estimate for the installed cost of all new luminaries and brackets placed into service under this rate. If the Customer enters into an agreement based upon the fixed price estimate, both the Customer and the Company will be bound by that fixed price estimate.

The Company will perform all installations, removals and maintenance of all lighting fixtures under this rate. The Company will hold title to all fixtures during the time they are installed.

All-night outdoor lighting service on an annual basis totaling approximately 4,345 hours of operation per year and midnight outdoor lighting service on an annual basis totaling approximately 2,005 hours of operation per year shall be provided for under this rate.

LIMITATIONS ON AVAILABILITY

The availability of this rate to any Customer is contingent upon the availability to the Company of personnel and/or other resources necessary to perform the conversion of existing luminaires fixtures in accordance with the time schedule specified in the Service Agreement.

ADDITIONAL REQUIREMENTS UNDER THE LED OPTION FOR TECHNOLOGIES OTHER THAN HIGH PRESSURE SODIUM OR METAL HALIDE

Customers taking service under the LED option will be responsible for procuring all LED fixtures utilizing technologies other than High Pressure Sodium or Metal Halide must be provided by the Customer for installation on the Company's facilities. Selected fixtures shall be reviewed and accepted in advance by the Company in advance of installation and must be compatible with existing line voltage, brackets and photoelectric controls, and must require no special tools or training to install and maintain.

Customers who are replacing existing fixtures with these technologies are responsible for the cost of removal and installation. Customers may choose to have this work completed by the Company or may opt to hire and pay a private line contractor to perform the work. Any private contractor shall have the all requisite training, certifications and insurance to safely perform the required installations, and shall be licensed by the State and accepted by the Company. Prior to commencement of work, the municipality must provide written certification of the qualifications to the Company. Contractors shall coordinate the installation work with the Company and submit a work plan subject to approval by the Company. The Customer shall bear all expenses related to the use of such labor, including any expenses arising from damage to the Company's electrical system caused by the contractor's actions, assumes responsibility for providing replacement fixtures in the event an installed fixture fails or sustains damage. The Company will hold title to the fixtures during the time they are installed.

SERVICE AGREEMENT

The Customer shall sign a Service Agreement governing the contribution for the remaining unexpired life of the existing street lighting luminaire fixtures and brackets, the contribution for the installed cost of the new luminaires fixtures and brackets, and the conversion of existing luminaires fixtures.

SERVICE DURING THE CONVERSION PERIOD

Service under this rate shall be implemented on a prorated basis, according to the number of luminaires fixtures which have been converted. Therefore, during the conversion period a portion of the Customer's street and area lighting requirements may be served under Outdoor Lighting Delivery Service Rate OL for those luminaires fixtures which have not yet been converted under this Rate.

MONTHLY RATES

Energy Charge:

Per Kilowatt-Hour

Transmission Charge 1.274¢

Stranded Cost Recovery..... 0.129356¢

In addition to the energy charges above, Customers shall be assessed a the monthly Distribution Rates shown below. The energy charge shall be applied to the monthly kilowatt-hours specified below for the applicable fixture and service option. For outdoor lighting charges which are billed in conjunction with service rendered under a metered Rate Schedule, the kilowatt-hours used for billing purposes shall be the amount specified for the calendar month in which the later meter read date occurred for service rendered under the metered Rate Schedule.

All-Night Service Option:

The monthly kilowatt-hours and distribution rates for each luminaire fixture served under the all-night service option are shown below.

Lamp Nominal Light Output Distribution	Power Rating Watts	Monthly KWH per Luminaire Fixture												Monthly Rate
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<u>High Pressure Sodium:</u>														
4,000	50	27	23	22	19	16	16	16	18	21	23	24	27	\$8.26
5,800	70	40	34	32	29	24	23	24	27	31	35	37	40	8.26
9,500	100	59	50	47	42	35	34	35	39	46	51	53	59	10.15
16,000	150	88	74	70	62	53	51	53	59	68	76	79	88	11.16
30,000	250	142	120	113	101	85	82	85	95	110	123	128	142	11.16
50,000	400	217	183	173	154	130	126	130	144	168	188	196	217	11.52
130,000	1,000	510	430	408	362	306	296	306	340	395	442	460	510	21.86
<u>Metal Halide:</u>														
5,000	70	41	35	33	29	25	24	25	28	32	36	37	41	\$8.57
8,000	100	56	47	45	40	34	33	34	38	44	49	51	56	11.33
13,000	150	88	74	71	63	53	51	53	59	68	77	80	88	12.09
13,500	175	96	81	77	68	57	56	57	64	74	83	87	96	12.75
20,000	250	134	113	107	95	80	78	80	89	104	116	121	134	12.95
36,000	400	209	176	167	149	126	122	126	140	162	181	189	209	13.32
100,000	1,000	502	423	402	356	301	292	301	335	389	435	454	502	23.73

LEDs and other technologies accepted by the Company:

	Per Fixture	Per Watt
Monthly Distribution Rates	\$8.5033	0.0139050
	0	0

Monthly KWH per Luminaire Fixture will be calculated to the nearest whole (1.0) KWH as follows:

Total Fixture Wattage divided by 1,000 times the monthly hours of operation below

Monthly Hours of Operation											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
46	39				27	27		36	40		
5	2	372	330	279	0	9	310	0	3	420	465

Midnight Service Option:

The monthly kilowatt-hours and distribution rates for each fixture/luminaire served under the midnight service option are shown below.

Lamp Nominal Light Power Output Rating Distribution	Lumens Watts	Monthly KWH per Luminaire												Monthly Fixture Rate
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<u>High Pressure Sodium:</u>														
4,000	50	14	11	9	10	7	6	6	7	9	11	13	14	\$8.26
5,800	70	20	16	13	15	11	9	9	11	13	16	20	21	8.26
9,500	100	30	23	20	21	16	13	14	16	19	24	28	31	10.15
16,000	150	44	34	29	31	24	20	21	24	28	35	42	47	11.16
30,000	250	71	56	47	51	38	32	33	38	46	57	69	76	11.16
50,000	400	109	85	72	77	58	49	51	58	70	87	105	116	11.52
130,000	1,000	255	200	170	181	136	115	119	136	165	204	246	272	21.86
<u>Metal Halide:</u>														
5,000	70	20	16	14	15	11	9	10	11	13	17	20	22	\$8.57
8,000	100	28	22	19	20	15	13	13	15	18	23	27	30	11.33
13,000	150	44	34	30	31	24	20	21	24	28	36	43	47	12.09
13,500	175	48	38	32	34	25	22	22	26	31	38	47	51	12.75
20,000	250	67	52	45	48	36	30	31	36	43	54	65	71	12.95
36,000	400	104	82	70	74	56	47	49	56	68	84	101	111	13.32
100,000	1,000	251	196	167	178	134	114	117	134	162	201	243	268	23.73

LED's and other technologies accepted by the Company:

	Per Fixture	Per Watt
Monthly Distribution Rates	\$8.50330	\$0.01390500

Monthly KWH per Luminaire Fixture will be calculated to the nearest whole (1.0) KWH as follows:
Total Fixture Wattage divided by 1,000 times the monthly hours of operation below

Monthly Hours of Operation											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
233	182	155	165	124	105	108	124	150	186	225	248

LEAP YEAR ADJUSTMENT TO ENERGY

During any leap year, the energy (Kilowatt-hour) usage during the month of February for all fixtures shall be increased by 3.6 percent for the purpose of determining total energy charges under this rate.

MAINTENANCE

The Company shall exercise reasonable diligence to insure that all lamps are burning and shall make replacements promptly when notified of outages. However, the Company shall not

be required to perform any replacements or maintenance except during regular working hours.

For high pressure sodium and metal halide fixtures, Lamp replacement, if applicable, maintenance and cleaning of lighting fixtures and any maintenance that may be specific to a specific technology, will normally be performed on a periodic basis in accordance with generally accepted utility practices and consistent with any manufacturer's recommendations.

For fixtures utilizing technologies other than high pressure sodium or metal halide, the Company will be responsible for correcting PSNH system voltage problems at no charge to the eCustomer. When the Company responds to a report of a non-working fixture not related to voltage, the Customer will be assessed a per-fixture per-visit charge to replace photoelectric controls or to remove an otherwise non-working fixture and return it to the Customer.

	Per-Fixture Per-Visit
LED Maintenance Charge.....	\$95.00 plus cost of materials

MODIFICATION OF SERVICE OPTION

Municipal and state roadway lighting Customers may request a modification of service from the all-night service option to the midnight service option during the calendar months of January and February of each year, otherwise known as the open enrollment period. Requests received from municipal and state roadway lighting Customers after the open enrollment period shall be implemented during the subsequent open enrollment period, unless the Company determines that it is feasible and practicable to implement the request prior to the subsequent enrollment period. All other Customers may request a modification of service from the all-night service option to the midnight service option at any time. Customers requesting a modification of service from the all-night service option to the midnight service option are responsible to pay to the Company the installed cost of any additional equipment required to provide service under the midnight service option. The installed cost includes the cost of the additional equipment, labor, vehicles and overheads. The Customer is responsible to pay such costs prior to the installation of the equipment. If such a request is made concurrent with the Company's existing schedule for lamp replacement and maintenance, the Customer is responsible to pay to the Company the cost of any additional equipment required, including overheads. The Customer is responsible to pay such costs prior to the installation of the equipment.

Customers requesting a modification of service from the midnight service option to the all-night service option are responsible to pay to the Company the installation cost of the equipment required to provide service under the all-night service option. The installation cost includes the cost of labor, vehicles and overheads. The Customer is responsible to pay such costs prior to the installation of the equipment. If such a request is made concurrent with the Company's existing schedule for lamp replacement and maintenance, no additional costs are required to modify service from the midnight service option to the all-night service option.

The Company will utilize fixed price estimates per luminaire fixture for the installed cost, the additional equipment cost and the equipment installation cost and will update the fixed price estimates per luminaire fixture each year based upon current costs. In the event traffic control is required during a modification of service option or for equipment repair, the Customer is responsible to coordinate and to provide traffic control and to pay all costs associated with traffic control. The scheduling of work associated with the modification of a service option will be made at the Company's discretion with consideration given to minimizing travel and set-up time.

NEW INSTALLATIONS, EXTENSIONS AND REPLACEMENTS

No additional cost, other than a contribution for the installed cost of new luminaires fixtures and brackets as provided for herein, shall be assessed for luminaires fixtures and brackets which are attached to existing poles utilizing overhead secondary wiring. Any cost incurred in connection with the installation of lighting facilities which exceeds the cost of using

existing poles with overhead secondary wiring shall be borne by the Customer.

Except for the excess costs of underground facilities to be apportioned as set forth in the provisions for underground electric distribution facilities specified in the Company's "Requirements for Electric Service Connections", any cost incurred in connection with the installation of poles, transformers, wiring, or any other facilities or equipment used exclusively for lighting purposes shall be borne by the Customer. In such cases, the Company shall credit the Customer with the portion, if any, of the estimated cost of such facilities which would normally be allocated to lighting purposes.

Any cost incurred in connection with new installations, or with the replacement or removal of existing luminairesfixtures and/or brackets shall be borne by the Customer. Such costs shall include the installed cost of the new luminairesfixtures and/or brackets in the case of new installations and replacements, and the cost of removal of the existing luminairesfixtures and/or brackets, less any salvage value of such luminairesfixtures and/or brackets which are removed from service.

In the case of new installations, extensions and replacements which make use of underground conductors for supply and distribution and/or of standards or poles employed exclusively for lighting purposes, the Company reserves the right to require the Customer to furnish, own, and maintain such underground supply and distribution facilities and/or the standards or poles.

If the Company's right under the preceding paragraph is exercised and the Company thereby is relieved of the cost of installing the customary overhead wires and appurtenances and the customary dual purpose poles, the Company shall:

1. pay to the Customer the sum of the following:
 - a. the estimated saving in investment to the Company represented by the estimated cost of the customary overhead wires and appurtenances;
 - b. such portion, if any, of the estimated cost to the Company of the customary dual purpose poles as would normally be allocated to lighting purposes;
2. have the right, without payment of any charge, to attach its wires, fixturesbrackets, luminairesfixtures, transformers, and other equipment to the standards or poles owned by the Customer.

Should the standards or poles furnished, owned, and maintained by the Customer be located in a public highway, the Customer shall procure and furnish to the Company a license under the Public Laws of New Hampshire (R.S.A. Chapter 231) covering such interest as the Company may have in the standards or poles, including their wires, fixturesbrackets, luminairesfixtures, transformers, and other equipment.

For outdoor area lighting installations, the Customer shall provide without expense or cost to the Company, all permits, consents, or easements necessary for the erection, maintenance, and operation of the Company's facilities, including the right to cut and trim trees and bushes wherever necessary; and the Company shall not be required to move its facilities to another location on the Customer's premises unless the Customer shall bear the cost thereof. The Company reserves the right to restrict such installations under this Rate to areas which are easily accessible by service truck.

All poles, wires, fixtures, bracketsluminaires, transformers, and other equipment furnished by the Company shall be maintained by it and title to such shall in all cases remain vested in the Company.