

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF)	
LOUISVILLE GAS AND ELECTRIC)	
COMPANY FOR AN ADJUSTMENT OF ITS)	
ELECTRIC AND GAS RATES, A)	
CERTIFICATE OF PUBLIC CONVENIENCE)	CASE NO. 2020-00350
AND NECESSITY TO DEPLOY ADVANCED)	
METERING INFRASTRUCTURE, APPROVAL)	
OF CERTAIN REGULATORY AND)	
ACCOUNTING TREATMENTS, AND)	
ESTABLISHMENT OF A ONE-YEAR)	
SURCREDIT)	

RESPONSE OF
LOUISVILLE GAS AND ELECTRIC COMPANY
TO
FIRST REQUEST FOR INFORMATION
OF THE LOUISVILLE/JEFFERSON COUNTY METRO GOVERNMENT
DATED JANUARY 8, 2021

FILED: JANUARY 22, 2021

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Kent W. Blake**, being duly sworn, deposes and says that he is Chief Financial Officer for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

K+W Blake

Kent W. Blake

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 20th day of January 2021.

Judy Schotter

Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Eileen L. Saunders**, being duly sworn, deposes and says that she is Vice President, Customer Services for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, and that she has personal knowledge of the matters set forth in the responses for which she is identified as the witness, and the answers contained therein are true and correct to the best of her information, knowledge and belief.


Eileen L. Saunders

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 20th day of January 2021.


Notary Public
Notary Public ID No. KYNP4577

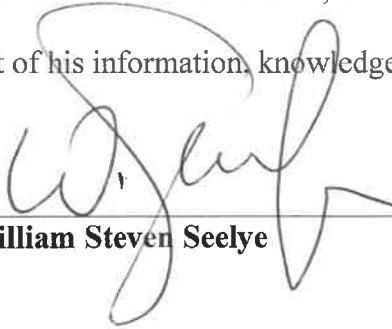
My Commission Expires:

April 1, 2024

VERIFICATION


COMMONWEALTH OF NORTH CAROLINA)
)
COUNTY OF BUNCOMBE)

The undersigned, **William Steven Seelye**, being duly sworn, deposes and states that he is a Principal of The Prime Group, LLC, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.



William Steven Seelye

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 16 day of January 2021.

 (SEAL)

Notary Public
Notary Public ID No. _____

My Commission Expires:

9/22/2025

Ryan Meagher
Notary Public
Henderson County, NC
My Commission Expires 9/22/25

VERIFICATION


COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **David S. Sinclair**, being duly sworn, deposes and says that he is Vice President, Energy Supply and Analysis for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.



David S. Sinclair

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 20th day of January 2021.



Notary Public
Notary Public, ID No. 603967

My Commission Expires:

July 11, 2022

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 1

Responding Witness: William Steven Seelye

- Q-1. Please refer to Exhibit WSS-4:
- a. Please provide a comprehensive breakdown of the Total Installed Cost for each LED lighting offering.
 - b. Please explain how LG&E or Mr. Seelye calculated the Fixed Carrying Charge.
 - c. Please explain the justification for the Fixed Carrying Charge.
 - d. Please provide all work papers supporting the estimated investment per unit for each type of LED fixture and underground pole.
- A-1.
- a. See the response to PSC 2-130(a).
 - b. See the response to PSC 2-130(b).
 - c. The Fixed Carrying Charge allows for the recovery of property taxes, income taxes, depreciation, and a rate of return.
 - d. See the response to PSC 2-130(a).

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
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Case No. 2020-00350

Question No. 2

Responding Witness: William Steven Seelye

- Q-2. Please refer to Exhibit WSS-5.
- a. Explain how the Company estimated the NBV for Poles.
 - b. Explain how the Company estimated the NBV for Fixtures.
 - c. Explain how and provide the calculation on how the Company determined the NBV per fixture.
 - d. Please provide detail to support the answer to “c”.
 - e. Please provide detail to support the “salvage portion” of conversion fee, which is identified as \$3.29 for KU and \$4.62 for LG&E.
 - f. Please provide detail to support the “revenue portion” of conversion fee, which is identified as \$1.72 for KU and \$2.46 for LG&E
 - g. What is the “salvage portion” and “revenue portion” of the Annual Conversion fee?
 - h. Please provide a breakdown of the remaining costs for both annual and monthly conversion fees.
 - i. Provide all work papers to support the information provided in Exhibit WSS-5.
- A-2.
- a. The Company uses current costs to calculate the total investment in fixtures and poles. The actual 2019 NBV (net book value after depreciation) is allocated between fixtures and poles based on the investment calculated using current cost.
 - b. See the response to part (a).

- c. See attached.
- d. See the response to part (c).
- e. The salvage portion of the charge, which is credited against plant, is calculated based on the depreciation portion of the carrying charge, which is the depreciation rate of 20% multiplied by the NBV per fixture divided by 12 months.
- f. The revenue portion is a component of the carrying charge rate excluding depreciation.
- g. The salvage portion represents the salvage value of the fixture, whereas the revenue portion is booked as revenue.
- h. The Companies have not performed the requested analysis.
- i. See the response to part (c).

LG&E Spend	Capital		Capital Total	OM	OM Total	Grand Total	Annual Non-Fix Maintenance
	NEW BUSINESS/STREET LIGHTING	REPAIR / REPLACE DEF ST LIGHTING	REPAIR / REPLACE DEF ST LIGHTING	REPAIR / REP DEF ST LIGHTING			
2017	1,828,434	3,011,604	4,840,037	404,389	404,389	5,244,426	\$ -
2018	2,095,470	3,355,516	5,450,986	405,462	405,462	5,856,448	\$ -
2019	1,770,328	4,040,698	5,811,026	490,130	490,130	6,301,156	\$ -
Forecasted Test Year	\$ 2,192,531	\$ 4,615,393	\$ 6,807,924	\$ 464,634	Average	\$ 7,272,558	\$ 5.25

Average bulb and PEC cost (burdened)	\$	14.16
Estimated labor cost / bulb (burdened)	\$	87.46
	\$	101.62
Average HID fixture cost (burdened)	\$	204.67
Estimated labor cost / bulb (burdened)	\$	120.85
	\$	325.51

LG&E	New Fixtures Installed	Fixtures replaced	Fix Replace Cost
2017	1265	387	\$ 325.51 \$ 125,974.02
2018	1467	387	\$ 325.51 \$ 125,974.02
2019	1125	971	\$ 325.51 \$ 316,074.36
Average	1286		

LGE	Total	OH Fixtures	UG Fixtures	Weighted average invest per unit		
	88,567	50,283	38,284	Avg OH Fix Invest per unit	\$	641.17
				57% Avg UG Fixture Invest Per unit	\$	459.01
				43% Avg pole invest per unit	\$	2,510.93
				Avg UG invest per unit	\$	2,969.93

Excess Facilities	Per Month	Estimated NBV	Calculated Present day NBV	2019 NBV	\$73,065,258.16
Excess Facilities	\$60,925	\$4,993,852.46	OH Fix	\$ 32,240,130.91	
Excess Facilities CIAC	\$6,355	\$1,222,115.38	UG Fix	\$ 17,572,596.37	
			Poles	\$ 98,386,464.86	66.39% Poles NBV
			Total	\$ 148,199,192.13	NBV / pole
			Total Fix	\$ 49,812,727.27	33.61% Fix NBV
					NBV / fix

LGE	New Bus Cap poles NBV	\$ 869,769.58	Annual Conversion Fee	\$ 84.99
LGE	Pole Replacement NBV per year	\$ 69.07	Monthly Conversion Fee	\$ 7.08

LGE	Pole Type	Present Day Invest Per Unit	# of Poles	Calculated Present day NBV	% of total calculated present day		New Bus NBV per pole type	Replacement NBV per year	Adjust Invest per unit	Annual Non-Fix Maintenance
					pole NBV	NBV per pole type				
	Post Top - Decorative Smooth	\$ 2,229.65	29,334	\$ 65,404,553.10	66.48%	\$ 32,245,793.57	\$ 578,198.34	\$ -	\$ 1,109.18	\$ -
	Post Top - Historic Fluted	\$ 2,764.04	807	\$ 2,230,580.28	2.27%	\$ 1,099,722.08	\$ 19,719.08	\$ -	\$ 1,375.23	\$ -
	Contemporary (Short)	\$ 2,518.52	825	\$ 2,077,779.00	2.11%	\$ 1,024,387.90	\$ 18,368.27	\$ -	\$ 1,253.31	\$ -
	Contemporary (Tall)	\$ 3,278.06	1,075	\$ 3,523,914.50	3.58%	\$ 1,737,362.53	\$ 31,152.59	\$ -	\$ 1,629.97	\$ -
	Cobra	\$ 3,775.51	5,706	\$ 21,543,060.06	21.90%	\$ 10,621,172.91	\$ 190,447.93	\$ -	\$ 1,878.32	\$ -
	Wood Pole (RLS Rates 900 & 958)	\$ 559.68	6,444	\$ 3,606,577.92	3.67%					
				\$ 2,510.93						
				\$ 37,747						
				\$ 259						
				\$ 7						
				\$ 7						
				\$ 10						
				\$ 50						
				\$ 333						

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 3

Responding Witness: John K. Wolfe

Q-3. Does KU, LG&E, or its corporate affiliates receive any form of rebates or reimbursement from LED manufactures, distributors, or retailers? If so, how and where is that revenue booked?

A-3. No.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 4

Responding Witness: John K. Wolfe

- Q-4. Does the Company track expenses for new installation separate from repairs and the type of repair be known (e.g. problem related to wiring, fixture, pole, etc.)? Why or why not?
- A-4. Yes. New installations are charged to a New Business Street lighting Budget. Repairs are charged to a capital or O&M Repair/Replace Defective Street lighting Budget. Expenses are tracked in this manner in order to distinguish new business work from repair work, capital work from O&M work, to aid in budgeting, and is a generally accepted good business practice.

LOUISVILLE GAS AND ELECTRIC COMPANY

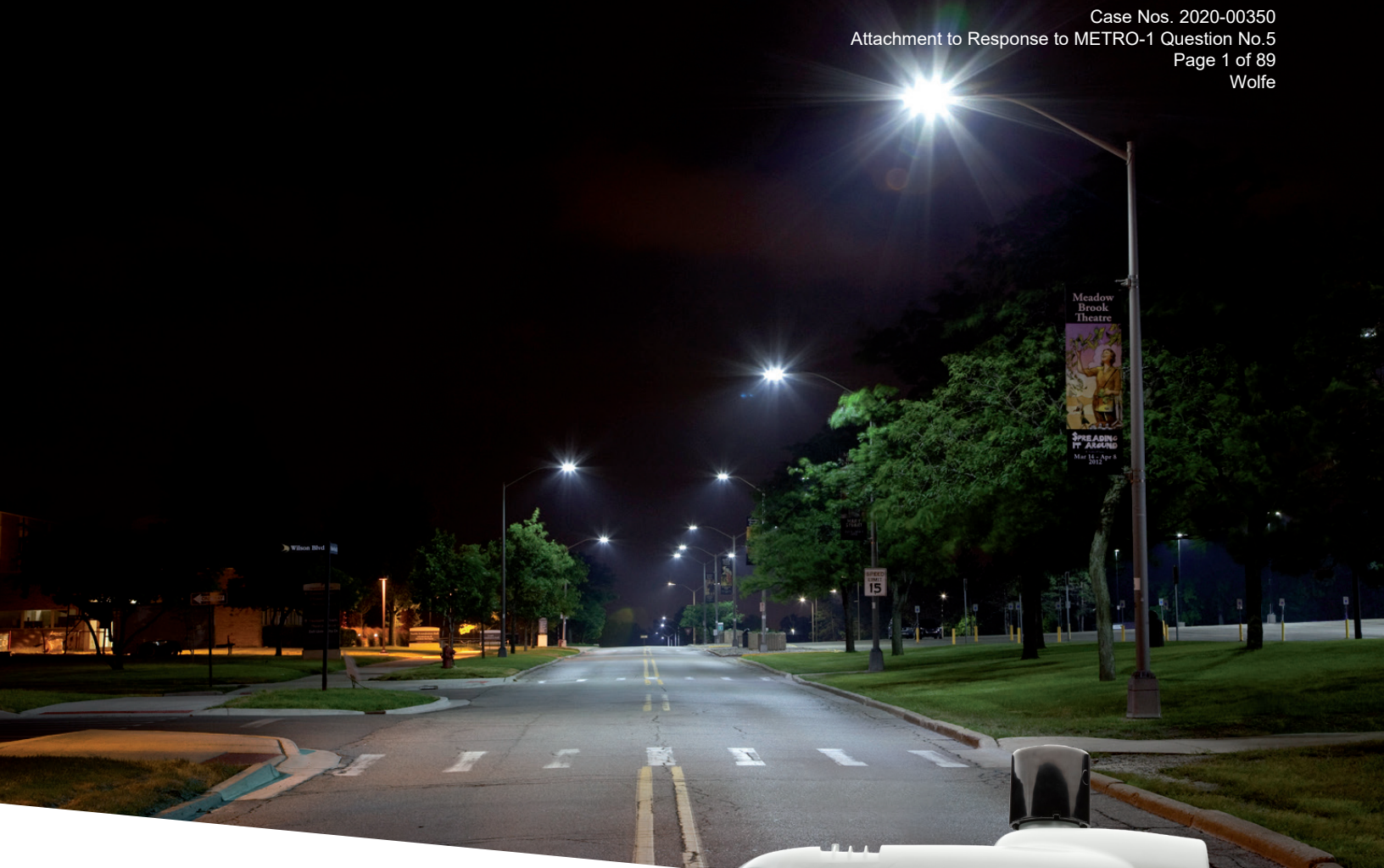
**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 5

Responding Witness: John K. Wolfe

- Q-5. For the period after September 2018 to the present, please provide any Company internal and external business plans, presentations, marketing material, feasibility studies, lighting conversion financial analyses, customer economic studies, conversion financial models, and correspondence to senior leadership as created or prepared by or for the Company as it relates to street lighting. Bookmark the following documents in your response:
- a. Technical specifications or metrics established by the Company that were used to select LED lighting types, such as lumen output, lumens-per-watt, warranty, L70, kelvin, etc.
 - b. Product data sheets for the new LED lighting offerings and LED equipment supply options.
- A-5. See attached.



GE Evolve™

LED Roadway Lighting

ERL1-ERLH-ERL2



current
powered by GE



GE Evolve™ LED Roadway Lighting ERL1-ERLH-ERL2



The **Evolve** LED Roadway Luminaire is optimized for customers requiring a LED solution for local, collector and major roadways. GE's unique reflective optics are designed to optimize application efficiency and minimize glare. The modern design incorporates the heat sink directly into the unit for heat transfer to prolong LED life. This reliable unit has a 100,000 hour design life, significantly reducing maintenance needs and expense over the life of the fixture. This efficient solution lowers energy consumption compared to a traditional HID fixture for additional operating cost savings.

Features:

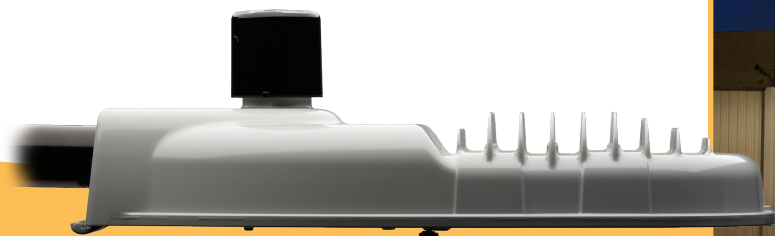
- Optimized roadway photometric distributions
- **Evolve™** light engine consisting of reflective technology designed to optimize application efficiency and minimize glare
- 70 CRI at 2700K, 3000K and 4000K typical.
- -40°C to 50°C UL Ambient Typical.
- ULOR = 0 (zero uplight)
- Designed & Assembled in USA

Applications:

- Local Roadways
- Collector Roadways
- Major Roadway/Streets



Compatible with **LightGrid™** Outdoor Wireless Control System



To learn more about **GE Evolve LED Roadway Lighting**, go to: www.currentbyge.com

GE Evolve™

LED Roadway Lighting

ERL1-ERLH-ERL2



Project name _____
Date _____
Type _____

Typical Specifications: ERL1-ERLH-ERL2

LED & Optical

- **Output Range:** 1900 – 30000 lm
- **Photometric Options:** Type II Narrow, Type II Wide, Type III, Type IV
- **System Efficacy:** 100 - 145 LPW
- **CCT:** 2700K, 3000K, 4000K; High brightness LEDs @ 70 CRI

Lumen Maintenance Tables

Projected Lxx per IES TM-21 at 25°C for reference:

ERL1 LUMEN OUTPUT CODES	LXX(10K)@HOURS		
	25,000 HR	50,000 HR	100,000 HR
02,03,04,05,06	L96	L95	L91
07,08,09	L95	L91	L84
10	L89	L80	L64

ERLH LUMEN OUTPUT CODES	LXX(10K)@HOURS		
	25,000 HR	50,000 HR	100,000 HR
10, 11	L97	L96	L94
13, 14	L95	L93	L88
15, 16	L94	L91	L85

ERL2 LUMEN OUTPUT CODES	LXX(10K)@HOURS		
	25,000 HR	50,000 HR	100,000 HR
16, 18, 19, 21, 23	L96	L94	L91
25, 27, 28	L95	L93	L88
30	L95	L93	L87

Note: Projected Lxx based on LM80 (10,000 hour testing). DOE Lighting Facts Verification Testing Tolerances apply to initial luminous flux and lumen maintenance measurements.

Electrical

- **Input Voltage:** 120-277 volt and 347-480 volt
- **Input Frequency:** 50/60Hz
- **Power Factor (PF)*:** >90%
- **Total Harmonic Distortion (THD)*:** <20%

*Power factor and THD tolerance exceptions: ERL1 "02" Lumen output: PF and THD within tolerances above only at 120 volt. ERL1 "03" Lumen output: @120 volt PF~0.89; @ 480 volt THD~26% ERL1 "04" Lumen output: @480 volt THD~22%

Ratings

- **Surge Protection:** per ANSI C136.2-2015: (Driver Internal):
 - 6kV/3kA "Basic: (120 Strikes)" - Standard on ERL1 (02-06)
 - 10kV/5kA "Enhanced: (40 Strikes)" - Standard on ERL1 (07 - 10), ERLH, ERL2
- **(Additional Separate Secondary SPD)**
 - 10kV/5kA "Enhanced: (40 Strikes)" - Option "R"
 - 20kV/10kA "Elevated" (40 Strikes) - Option "T"
- **Safety:** UL/cUL Listed. UL 1598 listed, suitable for wet locations (UL)%(UL)
- **Environmental:** Compliant with the materials restrictions of RoHS
- **EMI:** Title 47 CFR Part 15 Class A
- **Vibration:** 3G per ANSI C136.31-2010
- **LM-79 testing** in accordance with IESNA Standards
- **Std. Optical enclosure** rated per ANSI C136.25-2009:
 - ERL1/ERLH/ERL2 = IP65, Optional: IP66

Operating Temperature:

PRODUCT ID	LUMEN OUTPUT	AMBIENT READING
ERL1	02-10	-40°C to 50°C
ERLH	10-11, 13	-40°C to 50°C
ERLH	14-16	-40°C to 45°C
ERL2	16-28	-40°C to 50°C
ERL2	30	-40°C to 45°C

Delayed start may be experienced < -35°C

Construction & Finish

- **Housing:**
 - Die Cast Enclosure
 - Casting-integral heat sink for maximum heat transfer
- **Lensing:** Impact resistant tempered glass, standard
- **Paint:** Corrosion resistant polyester powder painted, minimum 2.0 mil. thickness.
 - Standard Colors: Dark Bronze, Black, & Gray
 - RAL & custom colors available
 - Optional coastal finish available.
- **Weight:** 12.4lbs (5.6kg) – 24lbs (10.9kg)

Warranty

- **System Warranty:** 5 Year Standard, 10 Year Optional

Controls

- **Dimming:**
 - Standard: 0-10V; Optional: DALI (120-277V Only)
- **Sensors:**
 - Photo electric sensors (PE) available.
- LightGrid™ compatible

Mounting

- Slipfitter with +/- 5 degree of adjustment for leveling.
- Integral die cast mounting pipe stop.
- Adjustable for 1.25 in. or 2 in. mounting pipe.

Suggested HID Replacement Lumen Levels

- ~4,000–5,000 lumens to replace 100W HPS Cobra-head
- ~7,000–8,800 lumens to replace 150W HPS Cobra-head
- ~8,500–11,500 lumens to replace 200W HPS Cobra-head
- ~11,500–14,000 lumens to replace 250W HPS Cobra-head
- ~21,000–30,000 lumens to replace 400W HPS Cobra-head

Note: Actual replacement lumens may vary based upon mounting height, pole spacing, design criteria, etc.

PREVIOUS	DESCRIPTION	CURRENT	DESCRIPTION
A1, B1	Extra Narrow/Narrow Asymmetric	A3	Type II Narrow
C1, E1	Asymmetric Short/Medium	B3	Type II Wide
D1, G1	Asymmetric Forward/Extra Wide	C3	Type III
F1	Asymmetric Wide	D3	Type IV
		E3	Type II Enhanced Back Light

**The information above is designed to provide a guideline to select the correct luminaire for a roadway application. The best and most accurate way to ensure the proper design is do a lighting layout Utilizing AGI.

GE Evolve™ LED Roadway Lighting

ERL1-ERLH-ERL2



Project name _____
 Date _____
 Type _____

ERL 1

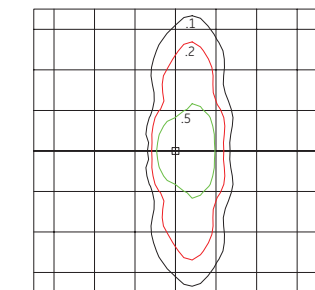
PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION*	CCT	CONTROLS	COLOR	OPTIONS
E = Evolve R = Roadway L = Local 1 = Single Module	0 = 120-277V* 1 = 120 2 = 208 3 = 240 4 = 277 5 = 480 D = 347 H = 347-480* * Not available with Fusing. Must choose a discrete voltage with F option.	02* 03< 04< 05< 06 07 08 09 10 See Table *120V only, not compatible with 0-10V dimming. < See Note Under Controls Column	A3 = Type II Narrow B3 = Type II Wide C3 = Type III D3 = Type IV E3 = Type II Enhanced Back Light See Table *Nominal IES Type classing subject to typical variation, individual units may differ.	27 = 2700K <> 30 = 3000K 40 = 4000K <> Select 2700K or 3000K CCT for IDA approved units.	A = ANSI C136.41 7-pin D = ANSI C136.41 7-pin with Shorting Cap E = ANSI C136.41 7-pin with non-Dimming PE Control.* *PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. < If dimming the 03 - 05 lumen output using a control supplied from a source other than GE call 1-888-694-3533, then select Option 2 at the prompt for assistance. NOTE: Dimming controls wired for 0-10V standard unless DALI option "U" requested.	GRAY = Gray BLCK = Black DKBZ = Dark Bronze	A = 4 Bolt Slipfitter † F = Fusing G = Internal Bubble Level I = IP66 Optical L = Tool-Less Entry R = Secondary 10kV/5kA SPD U = DALI Programmable +^ X = Single Package # Y = Coastal Finish * XXX = Special Options † Contact manufacturer for Lead-Time. # "X" option provides single pack box per fixture. Std Packaging = 20 units per Magna pak container. * Recommended for installations within 750 ft. from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^ Not available in 347V, 480V or 347-480V for Lumen Output Levels 07, 08, 09, and 10.

LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING			IES FILE NUMBER						
		4000K	3000K	2700K	120-277V	347-480V	4000K	3000K	2700K	120-277V	3000K	347-480V	120-277V	2700K	347-480V
02	A3	2000	1900	1900	14	N/A	B1-U0-G1	B1-U0-G1	B1-U0-G1	ERL1_02A340 -120VIES	N/A	ERL1_02A330 -120VIES	N/A	ERL1_02A327 -120VIES	N/A
	B3						B1-U0-G1	B1-U0-G1	ERL1_02B340 -120VIES	N/A	ERL1_02B330 -120VIES	N/A	ERL1_02B327 -120VIES	N/A	
	C3						B1-U0-G1	B1-U0-G1	ERL1_02C340 -120VIES	N/A	ERL1_02C330 -120VIES	N/A	ERL1_02C327 -120VIES	N/A	
	D3						B0-U0-G1	B0-U0-G1	ERL1_02D340 -120VIES	N/A	ERL1_02D330 -120VIES	N/A	ERL1_02D327 -120VIES	N/A	
	E3						B1-U0-G1	B1-U0-G1	ERL1_02E340 -120VIES	N/A	ERL1_02E330 -120VIES	N/A	ERL1_02E327 -120VIES	N/A	
03	A3	3000	2900	2800	22	26	B1-U0-G1	B1-U0-G1	B1-U0-G1	ERL1_03A340 -120-277VIES	ERL1_03A340 -347-480VIES	ERL1_03A330 -120-277VIES	ERL1_03A330 -347-480VIES	ERL1_03A327 -120-277VIES	ERL1_03A327 -347-480VIES
	B3						B1-U0-G1	B1-U0-G1	ERL1_03B340 -120-277VIES	ERL1_03B340 -347-480VIES	ERL1_03B330 -120-277VIES	ERL1_03B330 -347-480VIES	ERL1_03B327 -120-277VIES	ERL1_03B327 -347-480VIES	
	C3						B1-U0-G1	B1-U0-G1	ERL1_03C340 -120-277VIES	ERL1_03C340 -347-480VIES	ERL1_03C330 -120-277VIES	ERL1_03C330 -347-480VIES	ERL1_03C327 -120-277VIES	ERL1_03C327 -347-480VIES	
	D3						B1-U0-G1	B1-U0-G1	ERL1_03D340 -120-277VIES	ERL1_03D340 -347-480VIES	ERL1_03D330 -120-277VIES	ERL1_03D330 -347-480VIES	ERL1_03D327 -120-277VIES	ERL1_03D327 -347-480VIES	
	E3						B1-U0-G1	B1-U0-G1	ERL1_03E340 -120-277VIES	ERL1_03E340 -347-480VIES	ERL1_03E330 -120-277VIES	ERL1_03E330 -347-480VIES	ERL1_03E327 -120-277VIES	ERL1_03E327 -347-480VIES	
04	A3	4000	3900	3800	31	34	B1-U0-G1	B1-U0-G1	B1-U0-G1	ERL1_04A340 -120-277VIES	ERL1_04A340 -347-480VIES	ERL1_04A330 -120-277VIES	ERL1_04A330 -347-480VIES	ERL1_04A327 -120-277VIES	ERL1_04A327 -347-480VIES
	B3						B1-U0-G1	B1-U0-G1	ERL1_04B340 -120-277VIES	ERL1_04B340 -347-480VIES	ERL1_04B330 -120-277VIES	ERL1_04B330 -347-480VIES	ERL1_04B327 -120-277VIES	ERL1_04B327 -347-480VIES	
	C3						B1-U0-G1	B1-U0-G1	ERL1_04C340 -120-277VIES	ERL1_04C340 -347-480VIES	ERL1_04C330 -120-277VIES	ERL1_04C330 -347-480VIES	ERL1_04C327 -120-277VIES	ERL1_04C327 -347-480VIES	
	D3						B1-U0-G1	B1-U0-G1	ERL1_04D340 -120-277VIES	ERL1_04D340 -347-480VIES	ERL1_04D330 -120-277VIES	ERL1_04D330 -347-480VIES	ERL1_04D327 -120-277VIES	ERL1_04D327 -347-480VIES	
	E3						B1-U0-G1	B1-U0-G1	ERL1_04E340 -120-277VIES	ERL1_04E340 -347-480VIES	ERL1_04E330 -120-277VIES	ERL1_04E330 -347-480VIES	ERL1_04E327 -120-277VIES	ERL1_04E327 -347-480VIES	
05	A3	5000	4900	4700	39	43	B1-U0-G1	B1-U0-G1	B1-U0-G1	ERL1_05A340 -120-277VIES	ERL1_05A340 -347-480VIES	ERL1_05A330 -120-277VIES	ERL1_05A330 -347-480VIES	ERL1_05A327 -120-277VIES	ERL1_05A327 -347-480VIES
	B3						B1-U0-G1	B1-U0-G1	ERL1_05B340 -120-277VIES	ERL1_05B340 -347-480VIES	ERL1_05B330 -120-277VIES	ERL1_05B330 -347-480VIES	ERL1_05B327 -120-277VIES	ERL1_05B327 -347-480VIES	
	C3						B1-U0-G2	B1-U0-G2	ERL1_05C340 -120-277VIES	ERL1_05C340 -347-480VIES	ERL1_05C330 -120-277VIES	ERL1_05C330 -347-480VIES	ERL1_05C327 -120-277VIES	ERL1_05C327 -347-480VIES	
	D3						B1-U0-G1	B1-U0-G1	ERL1_05D340 -120-277VIES	ERL1_05D340 -347-480VIES	ERL1_05D330 -120-277VIES	ERL1_05D330 -347-480VIES	ERL1_05D327 -120-277VIES	ERL1_05D327 -347-480VIES	
	E3						B2-U0-G2	B1-U0-G1	ERL1_05E340 -120-277VIES	ERL1_05E340 -347-480VIES	ERL1_05E330 -120-277VIES	ERL1_05E330 -347-480VIES	ERL1_05E327 -120-277VIES	ERL1_05E327 -347-480VIES	
06	A3	6000	5800	5700	47	52	B2-U0-G2	B2-U0-G2	B2-U0-G2	ERL1_06A340 -120-277VIES	ERL1_06A340 -347-480VIES	ERL1_06A330 -120-277VIES	ERL1_06A330 -347-480VIES	ERL1_06A327 -120-277VIES	ERL1_06A327 -347-480VIES
	B3						B1-U0-G2	B1-U0-G2	ERL1_06B340 -120-277VIES	ERL1_06B340 -347-480VIES	ERL1_06B330 -120-277VIES	ERL1_06B330 -347-480VIES	ERL1_06B327 -120-277VIES	ERL1_06B327 -347-480VIES	
	C3						B1-U0-G2	B1-U0-G2	ERL1_06C340 -120-277VIES	ERL1_06C340 -347-480VIES	ERL1_06C330 -120-277VIES	ERL1_06C330 -347-480VIES	ERL1_06C327 -120-277VIES	ERL1_06C327 -347-480VIES	
	D3						B1-U0-G2	B1-U0-G2	ERL1_06D340 -120-277VIES	ERL1_06D340 -347-480VIES	ERL1_06D330 -120-277VIES	ERL1_06D330 -347-480VIES	ERL1_06D327 -120-277VIES	ERL1_06D327 -347-480VIES	
	E3						B2-U0-G2	B2-U0-G2	ERL1_06E340 -120-277VIES	ERL1_06E340 -347-480VIES	ERL1_06E330 -120-277VIES	ERL1_06E330 -347-480VIES	ERL1_06E327 -120-277VIES	ERL1_06E327 -347-480VIES	
07	A3	7000	6800	6600	58	B2-U0-G2	B2-U0-G2	B2-U0-G2	ERL1_07A340 .IES		ERL1_07A330 .IES		ERL1_07A327 .IES		
	B3					B1-U0-G2	B1-U0-G2	ERL1_07B340 .IES		ERL1_07B330 .IES		ERL1_07B327 .IES			
	C3					B1-U0-G2	B1-U0-G2	ERL1_07C340 .IES		ERL1_07C330 .IES		ERL1_07C327 .IES			
	D3					B1-U0-G2	B1-U0-G2	ERL1_07D340 .IES		ERL1_07D330 .IES		ERL1_07D327 .IES			
	E3					B2-U0-G2	B2-U0-G2	ERL1_07E340 .IES		ERL1_07E330 .IES		ERL1_07E327 .IES			
08	A3	8000	7800	7600	71	B2-U0-G2	B2-U0-G2	B2-U0-G2	ERL1_08A340 .IES		ERL1_08A330 .IES		ERL1_08A327 .IES		
	B3					B2-U0-G2	B2-U0-G2	ERL1_08B340 .IES		ERL1_08B330 .IES		ERL1_08B327 .IES			
	C3					B1-U0-G2	B1-U0-G2	ERL1_08C340 .IES		ERL1_08C330 .IES		ERL1_08C327 .IES			
	D3					B1-U0-G2	B1-U0-G2	ERL1_08D340 .IES		ERL1_08D330 .IES		ERL1_08D327 .IES			
	E3					B2-U0-G2	B2-U0-G2	ERL1_08E340 .IES		ERL1_08E330 .IES		ERL1_08E327 .IES			
09	A3	9000	8800	8500	84	B2-U0-G2	B2-U0-G2	B2-U0-G2	ERL1_09A340 .IES		ERL1_09A330 .IES		ERL1_09A327 .IES		
	B3					B2-U0-G2	B2-U0-G2	ERL1_09B340 .IES		ERL1_09B330 .IES		ERL1_09B327 .IES			
	C3					B1-U0-G2	B1-U0-G2	ERL1_09C340 .IES		ERL1_09C330 .IES		ERL1_09C327 .IES			
	D3					B1-U0-G2	B1-U0-G2	ERL1_09D340 .IES		ERL1_09D330 .IES		ERL1_09D327 .IES			
	E3					B2-U0-G2	B2-U0-G2	ERL1_09E340 .IES		ERL1_09E330 .IES		ERL1_09E327 .IES			
10	A3	9800	9600	9250	97	B2-U0-G2	B2-U0-G2	B2-U0-G2	ERL1_10A340 .IES		ERL1_10A330 .IES		ERL1_10A327 .IES		
	B3					B2-U0-G2	B2-U0-G2	ERL1_10B340 .IES		ERL1_10B330 .IES		ERL1_10B327 .IES			
	C3					B2-U0-G2	B2-U0-G2	ERL1_10C340 .IES		ERL1_10C330 .IES		ERL1_10C327 .IES			
	D3					B1-U0-G2	B1-U0-G2	ERL1_10D340 .IES		ERL1_10D330 .IES		ERL1_10D327 .IES			
	E3					B2-U0-G2	B2-U0-G2	ERL1_10E340 .IES		ERL1_10E330 .IES		ERL1_10E327 .IES			

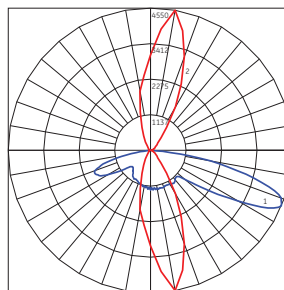
Photometrics: Evolve™ LED Streetlight (ERL1)

ERL1
 Type II Narrow
 (05A340)

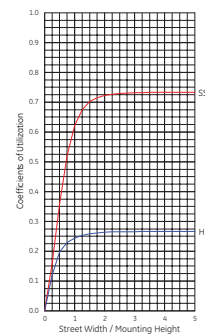
5,000 Lumens
 4000K
 ERL1_05A340____.IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade

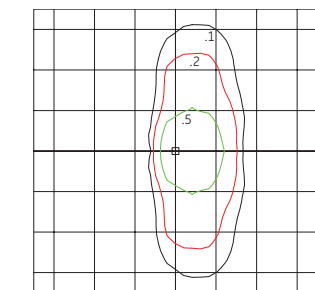


— Vertical plane through horizontal angle of Max. Cd at 80°
 — Horizontal cone through vertical angle of Max. Cd at 67°

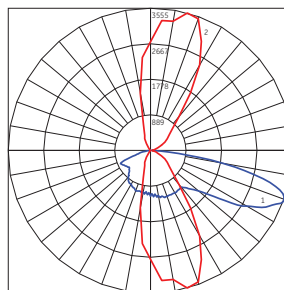


ERL1
 Type II Wide
 (05B340)

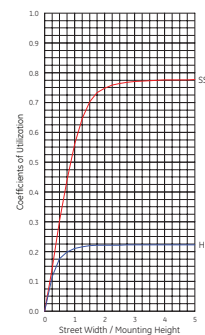
5,000 Lumens
 4000K
 ERL1_05B340____.IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade

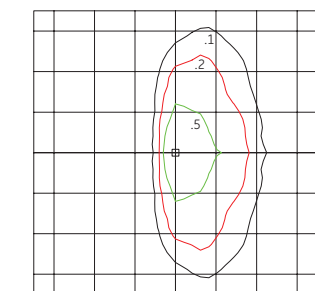


— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 69°

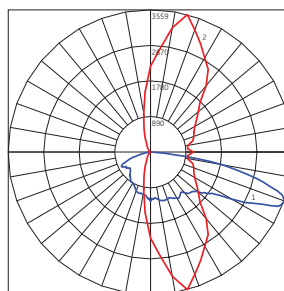


ERL1
 Type III
 (05C340)

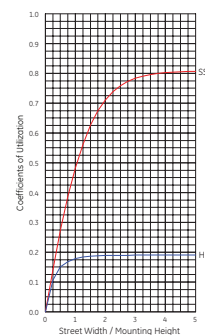
5,000 Lumens
 4000K
 ERL1_05C340____.IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade

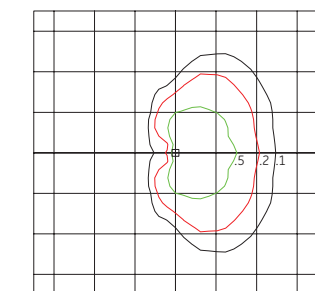


— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 70°

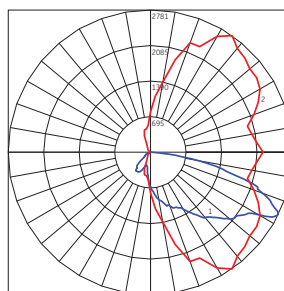


ERL1
 Type IV
 (05D340)

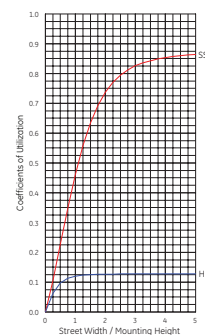
5,000 Lumens
 4000K
 ERL1_(05D340)____.IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade

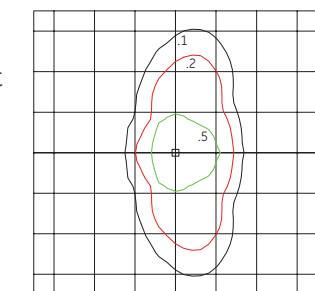


— Vertical plane through horizontal angle of Max. Cd at 55°
 — Horizontal cone through vertical angle of Max. Cd at 64°

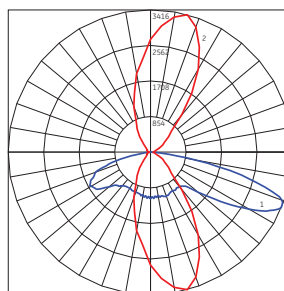


ERL1
 Type II Enhanced Back Light
 (05E340)

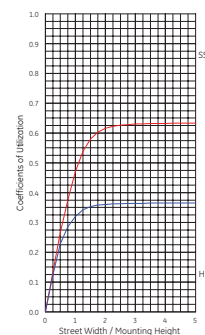
5,000 Lumens
 4000K
 ERL1_(05E340)____.IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 67°



GE Evolve™ LED Roadway Lighting ERL1-ERLH-ERL2



Project name _____
 Date _____
 Type _____

E R L H

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION*	CCT	CONTROLS	COLOR	OPTIONS
E = Evolve R = Roadway L = Local H = High Output	0 = 120-277V* 1 = 120 2 = 208 3 = 240 4 = 277 5 = 480 D = 347 H = 347-480*	10 11 13 14 15 16 See Table	A3 = Type II Narrow B3 = Type II Wide C3 = Type III D3 = Type IV E3 = Type II Enhanced Back Light See Table *Nominal IES Type classing subject to typical variation, individual units may differ.	30 = 3000K< 40 = 4000K < Select 3000K CCT for IDA approved units.	A = ANSI C136.41 7-pin D = ANSI C136.41 7-pin with Shorting Cap E = ANSI C136.41 7-pin with non-Dimming PE Control.* *PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. NOTE: Dimming controls wired for 0-10V standard unless DALI option "U" requested.	GRAY = Gray BLCK = Black DKBZ = Dark Bronze	A = 4 Bolt Slipfitter † F = Fusing G = Internal Bubble Level I = IP66 Optical L = Tool-Less Entry R = Secondary 10kV/5kA SPD U = DALI Programmable +^ X = Single Package # Y = Coastal Finish * XXX = Special Options † Contact manufacturer for Lead-Time. # "X" option provides single pack box per fixture. Std Packaging = 20 units per Magna pak container. * Recommended for installations within 750 ft. from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^ Not available in 347V, 480V or 347-480V.

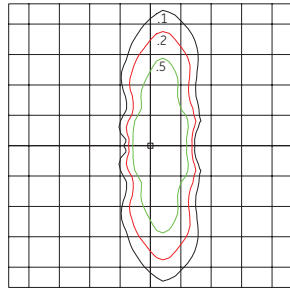
LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING		IES FILE NUMBER	
		4000K	3000K	120-277V	347-480V	4000K	3000K	4000K	3000K
10	A3	10000	9600	82	82	B2-U0-G2	B2-U0-G2	ERLH_10A340	ERLH_10A330
	B3					B2-U0-G2	ERLH_10B340	ERLH_10B330	
	C3					B2-U0-G2	ERLH_10C340	ERLH_10C330	
	D3					B1-U0-G3	B1-U0-G2	ERLH_10D340	ERLH_10D330
	E3					B3-U0-G3	B3-U0-G3	ERLH_10E340	ERLH_10E330
11	A3	11500	11000	98	98	B3-U0-G3	B2-U0-G2	ERLH_11A340	ERLH_11A330
	B3					B2-U0-G2	ERLH_11B340	ERLH_11B330	
	C3					B2-U0-G3	ERLH_11C340	ERLH_11C330	
	D3					B1-U0-G3	B1-U0-G2	ERLH_11D340	ERLH_11D330
	E3					B3-U0-G3	B3-U0-G3	ERLH_11E340	ERLH_11E330
13	A3	13000	12500	111	111	B3-U0-G3	B3-U0-G3	ERLH_13A340	ERLH_13A330
	B3					B2-U0-G3	ERLH_13B340	ERLH_13B330	
	C3					B2-U0-G3	ERLH_13C340	ERLH_13C330	
	D3					B2-U0-G3	ERLH_13D340	ERLH_13D330	
	E3					B3-U0-G3	B3-U0-G3	ERLH_13E340	ERLH_13E330
14	A3	14000	13400	122	122	B3-U0-G3	B3-U0-G3	ERLH_14A340	ERLH_14A330
	B3					B2-U0-G3	ERLH_14B340	ERLH_14B330	
	C3					B2-U0-G3	ERLH_14C340	ERLH_14C330	
	D3					B2-U0-G3	ERLH_14D340	ERLH_14D330	
	E3					B3-U0-G3	B3-U0-G3	ERLH_14E340	ERLH_14E330
15	A3	15000	14400	136	136	B3-U0-G3	B3-U0-G3	ERLH_15A340	ERLH_15A330
	B3					B2-U0-G3	ERLH_15B340	ERLH_15B330	
	C3					B2-U0-G3	ERLH_15C340	ERLH_15C330	
	D3					B2-U0-G3	ERLH_15D340	ERLH_15D330	
	E3					B3-U0-G3	B3-U0-G3	ERLH_15E340	ERLH_15E330
16	A3	16000	15300	149	149	B3-U0-G3	B3-U0-G3	ERLH_16A340	ERLH_16A330
	B3					B3-U0-G3	ERLH_16B340	ERLH_16B330	
	C3					B2-U0-G3	ERLH_16C340	ERLH_16C330	
	D3					B2-U0-G3	ERLH_16D340	ERLH_16D330	
	E3					B3-U0-G3	B3-U0-G3	ERLH_16E340	ERLH_16E330

Photometrics: Evolve™ LED Streetlight (ERLH)

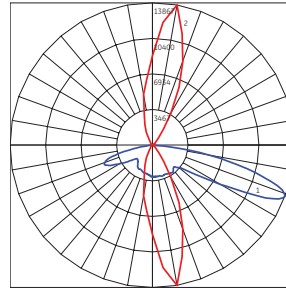
ERLH

Type II Narrow
 (13A340)

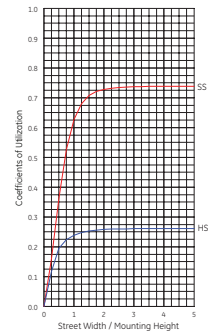
13,000 Lumens
 4000K
 ERLH_13A340__IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



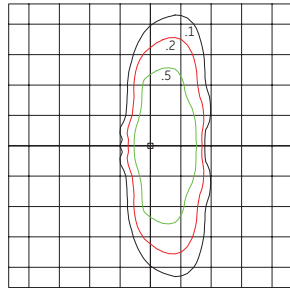
— Vertical plane through horizontal angle of Max. Cd at 80°
 — Horizontal cone through vertical angle of Max. Cd at 69°



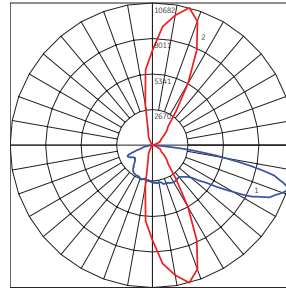
ERLH

Type II Wide
 (13B340)

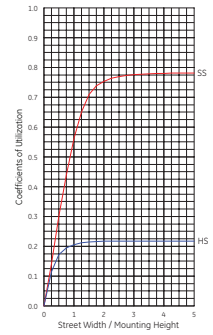
13,000 Lumens
 4000K
 ERLH_13B340__IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



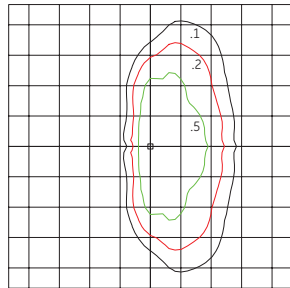
— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 72°



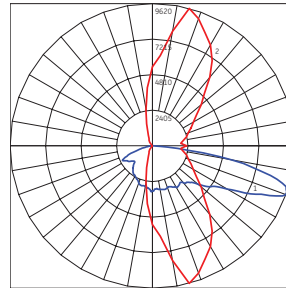
ERLH

Type III
 (13C340)

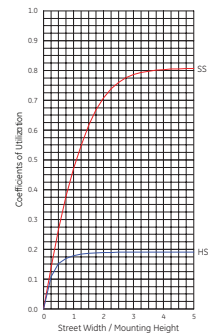
13,000 Lumens
 4000K
 ERLH_13C340__IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



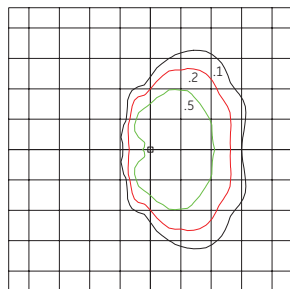
— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 71°



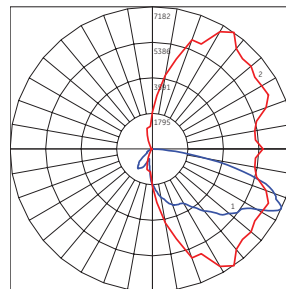
ERLH

Type IV
 13D340

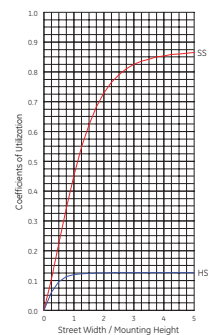
13,000 Lumens
 4000K
 ERLH_13D340__IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



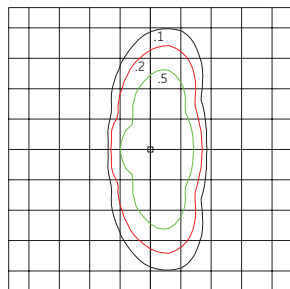
— Vertical plane through horizontal angle of Max. Cd at 55°
 — Horizontal cone through vertical angle of Max. Cd at 65°



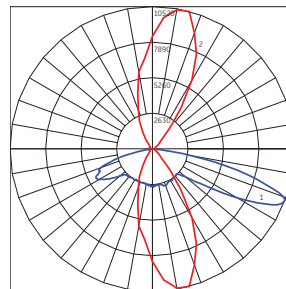
ERLH

Type II Enhanced Back Light
 13E340

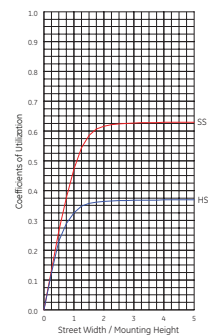
13,000 Lumens
 4000K
 ERLH_13E340__IES



Grid Distance in Units of Mounting Height at 30'
 Initial Footcandle Values at Grade



— Vertical plane through horizontal angle of Max. Cd at 75°
 — Horizontal cone through vertical angle of Max. Cd at 69°



GE Evolve™ LED Roadway Lighting

ERL1-ERLH-ERL2



Project name _____
 Date _____
 Type _____

ERL2

PROD. ID	VOLTAGE	LUMEN OUTPUT	DISTRIBUTION*	CCT	CONTROLS	COLOR	OPTIONS
E = Evolve R = Roadway L = Local 2 = Double Module	0 = 120-277V* 1 = 120 2 = 208 3 = 240 4 = 277 5 = 480 D = 347 H = 347-480*	16 18 19 21 23 25 27 28 30	A3 = Type II Narrow B3 = Type II Wide C3 = Type III D3 = Type IV E3 = Type II Enhanced Back Light See Table	30 = 3000K <> 40 = 4000K <> Select 3000K CCT for IDA approved units.	A = ANSI C136.41 7-pin D = ANSI C136.41 7-pin with Shorting Cap E = ANSI C136.41 7-pin with non-Dimming PE Control.* *PE Control Only available for 120-277V or 480V Discrete. Not available for 347-480V or 347V Discrete. NOTE: Dimming controls wired for 0-10V standard unless DALI option "U" requested.	GRAY = Gray BLCK = Black DKBZ = Dark Bronze	A = 4 Bolt Slipfitter † F = Fusing G = Internal Bubble Level I = IP66 Optical L = Tool-Less Entry R = Secondary 10kV/5kA SPD U = DALI Programmable ^ Y = Coastal Finish * XXX = Special Options † Contact manufacturer for Lead-Time. * Recommended for installations within 750 ft. from the coast. Contact Factory for Lead-Time. + Compatible with LightGrid 2.0 nodes. ^ Not available in 347V, 480V or 347-480V.

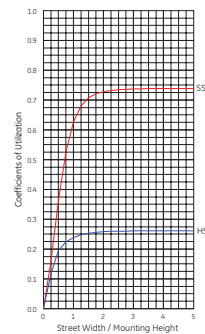
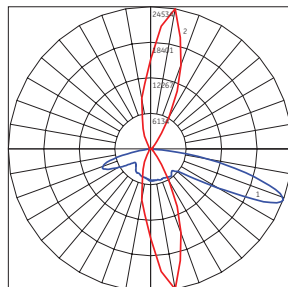
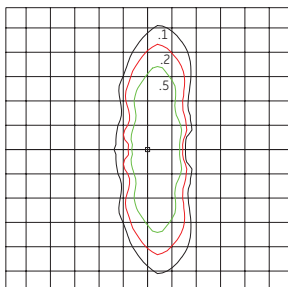


LUMEN OUTPUT	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING		IES FILE NUMBER							
		4000K	3000K	120-277V	347-480V	4000K	3000K	4000K		3000K		347-480V			
								120-277V	4000K	347-480V	120-277V	3000K	347-480V		
16	A3	16000	15300	120	120	B3-U0-G3	B3-U0-G3	ERL2_16A340	.IES			ERL2_16A330	.IES		
	B3					B3-U0-G3	B3-U0-G3	ERL2_16B340	.IES			ERL2_16B330	.IES		
	C3					B2-U0-G3	B2-U0-G3	ERL2_16C340	.IES			ERL2_16C330	.IES		
	D3					B2-U0-G3	B2-U0-G3	ERL2_16D340	.IES			ERL2_16D330	.IES		
	E3					B3-U0-G3	B3-U0-G3	ERL2_16E340	.IES			ERL2_16E330	.IES		
18	A3	18000	17300	140	140	B3-U0-G3	B3-U0-G3	ERL2_18A340	.IES			ERL2_18A330	.IES		
	B3					B3-U0-G3	B3-U0-G3	ERL2_18B340	.IES			ERL2_18B330	.IES		
	C3					B2-U0-G3	B2-U0-G3	ERL2_18C340	.IES			ERL2_18C330	.IES		
	D3					B2-U0-G3	B2-U0-G3	ERL2_18D340	.IES			ERL2_18D330	.IES		
	E3					B3-U0-G3	B3-U0-G3	ERL2_18E340	.IES			ERL2_18E330	.IES		
19	A3	19000	18200	149	149	B3-U0-G3	B3-U0-G3	ERL2_19A340	.IES			ERL2_19A330	.IES		
	B3					B3-U0-G3	B3-U0-G3	ERL2_19B340	.IES			ERL2_19B330	.IES		
	C3					B3-U0-G3	B2-U0-G3	ERL2_19C340	.IES			ERL2_19C330	.IES		
	D3					B2-U0-G3	B2-U0-G3	ERL2_19D340	.IES			ERL2_19D330	.IES		
	E3					B3-U0-G3	B3-U0-G3	ERL2_19E340	.IES			ERL2_19E330	.IES		
21	A3	21000	20100	174	177	B3-U0-G3	B3-U0-G3	ERL2_21A340	-120-277V/IES	ERL2_21A340	-347-480V/IES	ERL2_21A330	-120-277V/IES	ERL2_21A330	-347-480V/IES
	B3					B3-U0-G3	B3-U0-G3	ERL2_21B340	-120-277V/IES	ERL2_21B340	-347-480V/IES	ERL2_21B330	-120-277V/IES	ERL2_21B330	-347-480V/IES
	C3					B3-U0-G4	B3-U0-G3	ERL2_21C340	-120-277V/IES	ERL2_21C340	-347-480V/IES	ERL2_21C330	-120-277V/IES	ERL2_21C330	-347-480V/IES
	D3					B2-U0-G3	B2-U0-G3	ERL2_21D340	-120-277V/IES	ERL2_21D340	-347-480V/IES	ERL2_21D330	-120-277V/IES	ERL2_21D330	-347-480V/IES
	E3					B3-U0-G3	B3-U0-G3	ERL2_21E340	-120-277V/IES	ERL2_21E340	-347-480V/IES	ERL2_21E330	-120-277V/IES	ERL2_21E330	-347-480V/IES
23	A3	23000	22100	194	196	B3-U0-G3	B3-U0-G3	ERL2_23A340	-120-277V/IES	ERL2_23A340	-347-480V/IES	ERL2_23A330	-120-277V/IES	ERL2_23A330	-347-480V/IES
	B3					B3-U0-G3	B3-U0-G3	ERL2_23B340	-120-277V/IES	ERL2_23B340	-347-480V/IES	ERL2_23B330	-120-277V/IES	ERL2_23B330	-347-480V/IES
	C3					B3-U0-G4	B3-U0-G4	ERL2_23C340	-120-277V/IES	ERL2_23C340	-347-480V/IES	ERL2_23C330	-120-277V/IES	ERL2_23C330	-347-480V/IES
	D3					B2-U0-G4	B2-U0-G4	ERL2_23D340	-120-277V/IES	ERL2_23D340	-347-480V/IES	ERL2_23D330	-120-277V/IES	ERL2_23D330	-347-480V/IES
	E3					B4-U0-G4	B3-U0-G3	ERL2_23E340	-120-277V/IES	ERL2_23E340	-347-480V/IES	ERL2_23E330	-120-277V/IES	ERL2_23E330	-347-480V/IES
25	A3	25000	24000	214	214	B3-U0-G3	B3-U0-G3	ERL2_25A340	.IES			ERL2_25A330	.IES		
	B3					B3-U0-G3	B3-U0-G3	ERL2_25B340	.IES			ERL2_25B330	.IES		
	C3					B3-U0-G4	B3-U0-G4	ERL2_25C340	.IES			ERL2_25C330	.IES		
	D3					B2-U0-G4	B2-U0-G4	ERL2_25D340	.IES			ERL2_25D330	.IES		
	E3					B4-U0-G4	B4-U0-G4	ERL2_25E340	.IES			ERL2_25E330	.IES		
27	A3	27000	25900	237	237	B3-U0-G3	B3-U0-G3	ERL2_27A340	.IES			ERL2_27A330	.IES		
	B3					B3-U0-G4	B3-U0-G4	ERL2_27B340	.IES			ERL2_27B330	.IES		
	C3					B3-U0-G4	B3-U0-G4	ERL2_27C340	.IES			ERL2_27C330	.IES		
	D3					B2-U0-G4	B2-U0-G4	ERL2_27D340	.IES			ERL2_27D330	.IES		
	E3					B4-U0-G4	B4-U0-G4	ERL2_27E340	.IES			ERL2_27E330	.IES		
28	A3	28000	26900	251	251	B3-U0-G3	B3-U0-G3	ERL2_28A340	.IES			ERL2_28A330	.IES		
	B3					B3-U0-G4	B3-U0-G4	ERL2_28B340	.IES			ERL2_28B330	.IES		
	C3					B3-U0-G4	B3-U0-G4	ERL2_28C340	.IES			ERL2_28C330	.IES		
	D3					B2-U0-G4	B2-U0-G4	ERL2_28D340	.IES			ERL2_28D330	.IES		
	E3					B4-U0-G4	B4-U0-G4	ERL2_28E340	.IES			ERL2_28E330	.IES		
30	A3	30000	28800	278	278	B4-U0-G4	B4-U0-G4	ERL2_30A340	.IES			ERL2_30A330	.IES		
	B3					B3-U0-G4	B3-U0-G4	ERL2_30B340	.IES			ERL2_30B330	.IES		
	C3					B3-U0-G4	B3-U0-G4	ERL2_30C340	.IES			ERL2_30C330	.IES		
	D3					B2-U0-G4	B2-U0-G4	ERL2_30D340	.IES			ERL2_30D330	.IES		
	E3					B4-U0-G4	B4-U0-G4	ERL2_30E340	.IES			ERL2_30E330	.IES		

Photometrics: Evolve™ LED Streetlight (ERL2)

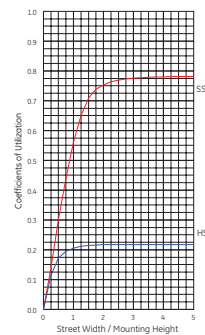
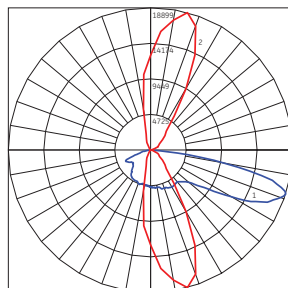
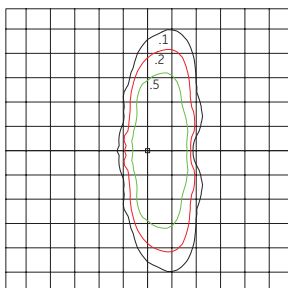
ERL2
 Type II Narrow
 (23A340)

23,000 Lumens
 4000K
 ERL2_23A340___.IES



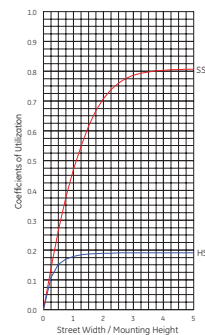
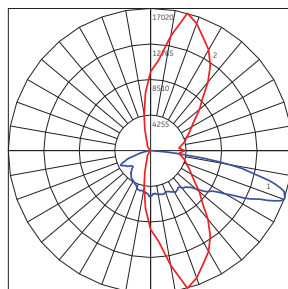
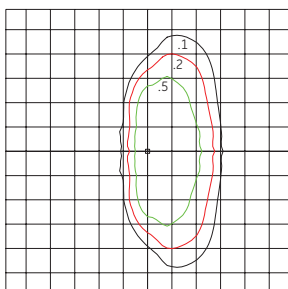
ERL2
 Type II Wide
 (23B340)

23,000 Lumens
 4000K
 ERL2_23B340___.IES



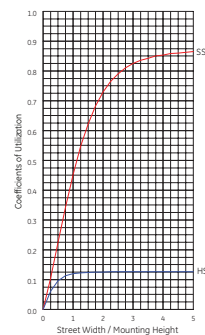
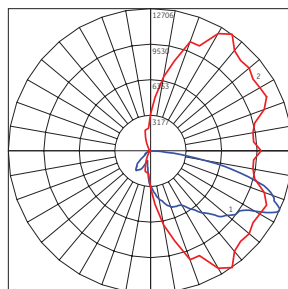
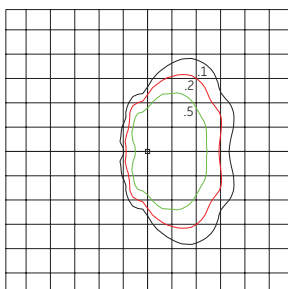
ERL2
 Type III
 (23C340)

23,000 Lumens
 4000K
 ERL2_23C340___.IES



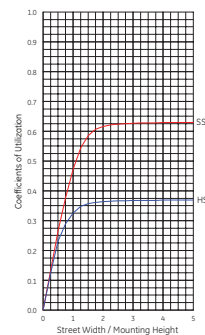
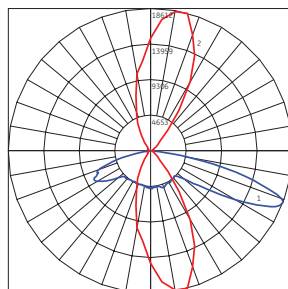
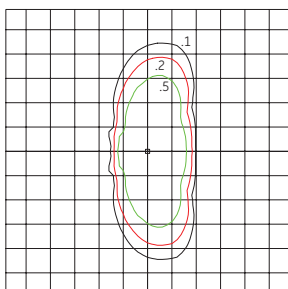
ERL2
 Type IV
 (23D340)

23,000 Lumens
 4000K
 ERL2_23D340___.IES



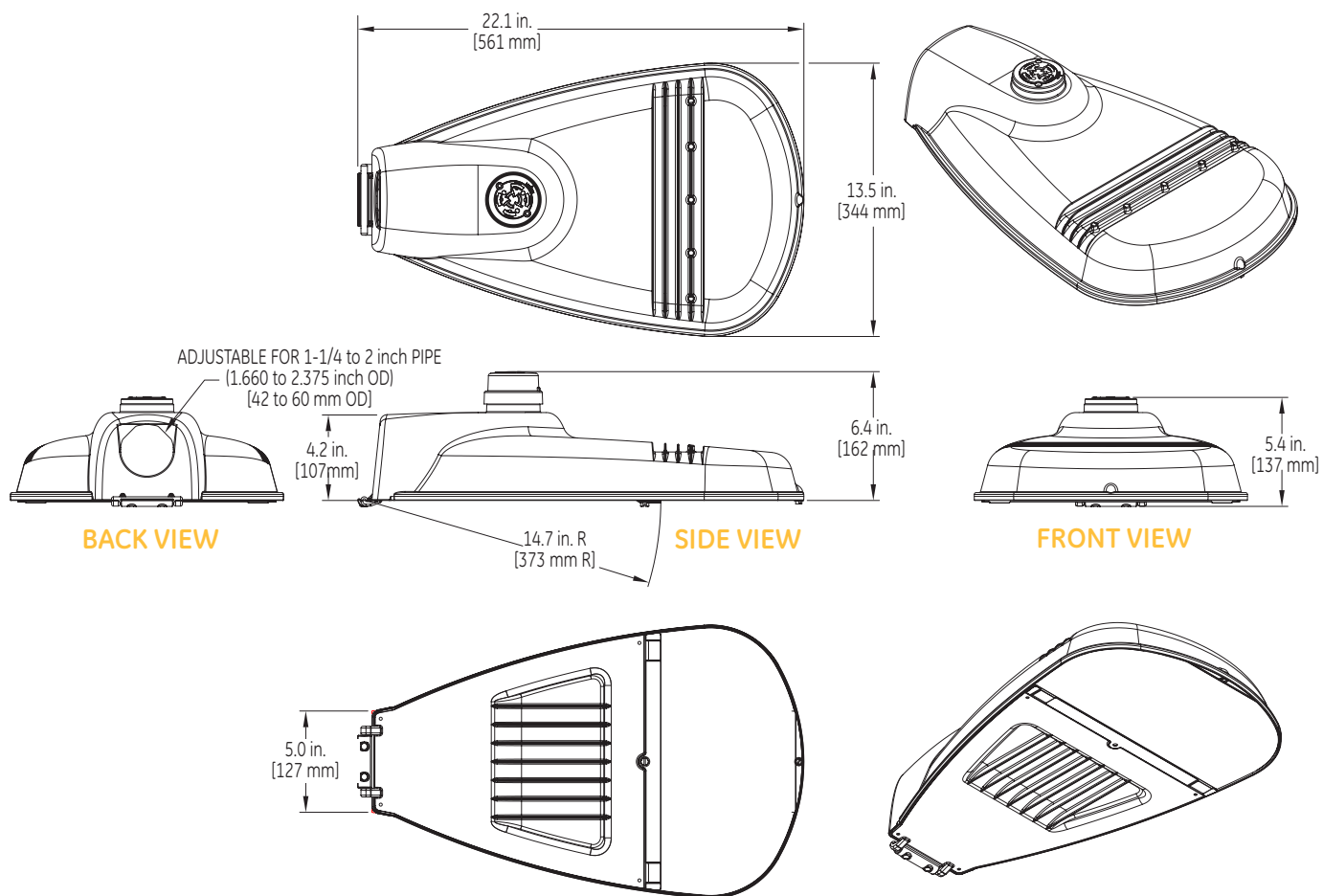
ERL2
 Type II Enhanced Back Light
 (23E340)

23,000 Lumens
 4000K
 ERL2_23E340___.IES



GE Evolve™ LED Roadway Lighting ERL1-ERLH-ERL2

Product Dimensions: Evolve™ LED Streetlight (ERL1)



DATA

- Approximate net weight: 12.4 lbs (5.6kgs) -15.5 lbs (7.0kgs) with XFMR
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

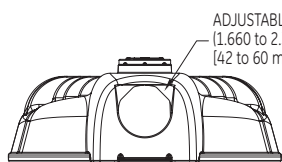
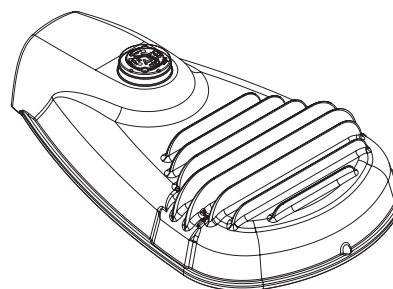
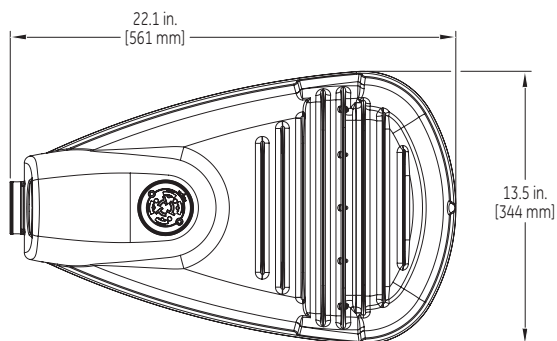
GE Evolve™

LED Roadway Lighting

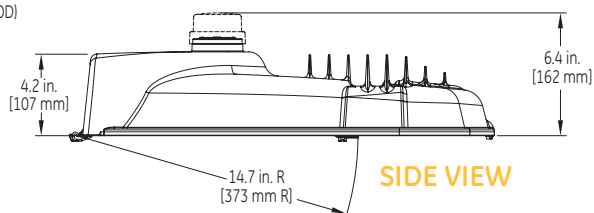
ERL1-ERLH-ERL2

Product Dimensions:

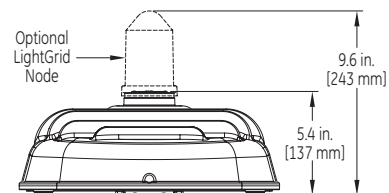
Evolve™ LED Streetlight (ERLH)



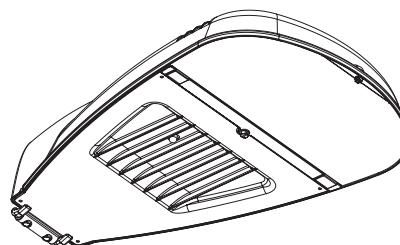
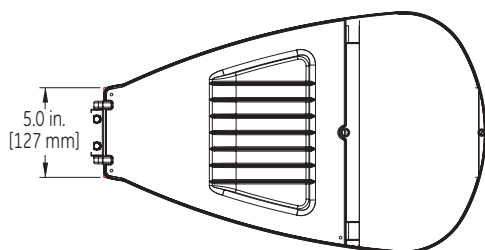
BACK VIEW



SIDE VIEW



FRONT VIEW

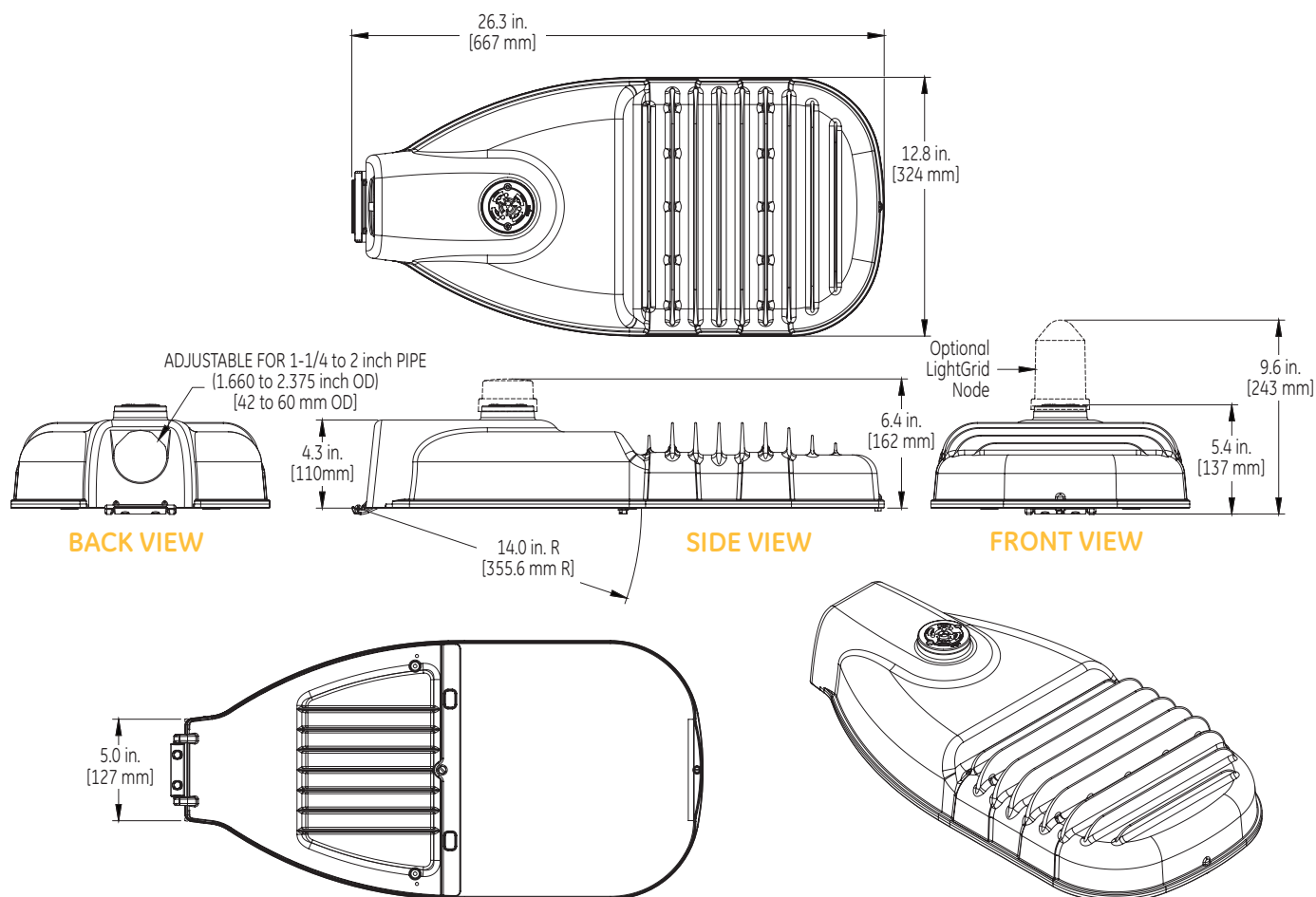


DATA

- Approximate net weight: 15.15 lbs (6.9 kgs) - 2 Bolt Slipfitter
- Approximate net weight: 15.85 lbs (7.2 kgs) - 4 Bolt Slipfitter
- Effective Projected Area (EPA): 0.5 sq ft max (0.046 sq m)

GE Evolve™ LED Roadway Lighting ERL1-ERLH-ERL2

Product Dimensions: Evolve™ LED Streetlight (ERL2)



DATA

- Approximate net weight: 24.0 lbs (10.9 kgs)
 Contact manufacturer for specific configuration weight.
- Effective Projected Area (EPA): 0.57 sq ft max (0.053 sq m)



GE Evolve™

LED Flood & Spot L

EFM1



current
powered by GE



GE Evolve™ LED Flood & Spot Lighting EFM1

The **GE Evolve™ LED Medium Output Flood Light** is our mid-lumen solution to efficiently illuminate building façade, flag poles, billboard signage and many more traditional flood applications. Designed to replace up to 250W HPS and 250-400W Metal Halide flood lights, the EFM1 provides significant operating cost benefits over the life of each fixture with reduced energy consumption and a long rated life that virtually eliminates ongoing maintenance expenses.



Features:

- 70 CRI at 3000K, 4000K and 5000K
- L89@100K hrs per IES TM-21*
- Distributions: 6x5, 6x6, 7x6, 7x7, Type III, 20° Spot
- 120-277 VAC and 347-480 VAC available
- DALI compatible
- Mounting options: Trunnion, Knuckle Slipfitter, & Knuckle Wall Mount
- UL/cUL listed, suitable for wet locations
- Complies with the material restrictions of RoHS

Applications:

- Building façade, flag poles, utility and industrial spaces, billboard signage, roadways, general site lighting, and many more traditional flood applications.

NOTE: The Type III distribution is ideal for building facade and billboard signage.

*S2 T3 distributions not L89 rated



Compatible with **LightGrid™** Outdoor Wireless Control System

Also available in 20° Spot optical distribution as pictured here →



To learn more about **GE Evolve LED Flood Lighting**, go to: www.currentbyge.com

GE Evolve™ LED Flood & Spot Lighting EFM1



Project name _____
 Date _____
 Type _____

Typical Specifications:

LED & Optical

- Evolve™ light engine consisting of reflective technology designed to optimize application efficiency.
- Impact resistant tempered flat glass protects the optics and minimizes dirt accumulation.
- **Efficacy:** Rated LPW 104-167 (See Table)
- LM-79 tests and reports in accordance with IESNA standards
- 70CRI at 3000K, 4000K, 5000K
- **Distributions:** 6x5, 6x6, 7x6, 7x7, Type III, 20° Spot

Electrical

- 120-277 VAC and 347-480 VAC available.
- System power factor is >90% and THD <20%.
- ANSI C136.41 7-pin dimming receptacle, standard.
- Photo electric sensors (PE) available for all voltages and ordered seperately.
- Light Grid compatible
- **Dimming:**
 - 0-10V continuous dimming
 - DALI digital dimming (120-277V)
- Surge Protection per ANSI C136.2-2015.
 - 6kV/3kA Standard
 - 10kV/5kA Optional
 - 20kV/10kA Optional (contact manufacturer for availability)
- Daintree compatible Motion Sensor (K1, S1 Mount Option)

Ratings

- UL cUL listed, suitable for wet locations.
- IP66 otical enclosure per ANSI C136.25-2013
- Temperature Rated -40°C to +50°C
- Complies with the material restrictions of RoHS

Construction & Finish

- **Housing:**
 - Die cast aluminum housing with slim design.
 - Integral heat sink and light engine, ensuring maximum heat transfer and prolonged LED life.
 - 3G vibration level per ANSI C136.31-2010.
- **Paint:** Corrosion resistant polyester powder painted, minimum 2.0 mil. thickness.
 - Standard Colors: Dark Bronze, Black, White & Gray
 - RAL & custom colors available
- **Weight:** 25 lbs. (11.34kg)

Lumen Maintenance EFM101

- Projected Lxx per IES TM-21 at 25°C for reference:

OPTICAL CODES	DISTRIBUTION	LXX(10K)@HOURS		
		25,000 HR	50,000 HR	100,000 HR
AA, BB, CC	T3 & S2	L93	L87	L75

OPTICAL CODES	DISTRIBUTION	LXX(10K)@HOURS		
		25,000 HR	50,000 HR	100,000 HR
AA, BB, CC, DD	65, 66, 76, & 77	L96	L93	L89

Note: Projected Lxx based on LM80 (10,000 hour testing). DOE Lighting Facts Verification Testing Tolerances apply to initial luminous flux and lumen maintenance measurements.

Mounting

Option K

- K1=Knuckle Slipfitter for 1.9 in-2.3 in OD Tenon with wires exiting tenon.
- K2=Knuckle Slipfitter for 1.9 in-2.3 in OD Tenon, external 3ft #14/3 power cable

Option S

- S1 = Knuckle Slipfitter for 1.9 in – 3.0 in. OD Tenon with wires exiting tenon.
- S2 = Knuckle Slipfitter for 1.9 in – 3.0 in. OD Tenon, with external 3ft #14/3 power cable

Option V

- V1=Knuckle Wall Mount with wires exiting tenon.

Option T

- T1=Trunnion, with external 3ft #14/3 power cable.

Warranty

- **System Warranty:** 5 Year Standard

Accessories

- Top & Side Visor
- Vandal Shield
- Wire Guard
- Barn Door Assembly

GE Evolve™

LED Flood & Spot Lighting

EFM1



Project name _____
 Date _____
 Type _____

Ordering Number Logic

E FM1 01

PROD. ID	GEN.	VOLTAGE	OPTIC CODE	DISTRIBUTION*	CRI	CCT	DIMMING	CONTROLS	MOUNTING	FINISH	OPTIONS
E = Evolve FM = Flood Medium 1 = Standard	01 = 1st Gen	0 = 120-277V* 1 = 120V 2 = 208V 3 = 240V 4 = 277V 5 = 480V D = 347V H = 347-480V* *Not available with fusing	AA = 5,000lm BB = 10,000lm CC = 15,000lm DD = 20,000lm	65 = NEMA 6x5 66 = NEMA 6x6 76 = NEMA 7x6 77 = NEMA 7x7 (80° Wide Flood) T3 = Type 3/ Facade/Billboard* S2 = 20° Spot* *Not available with optical code DD	7 = 70 (min)	30 = 3000K 40 = 4000K 50 = 5000K	A = ANSI C1 36.41 7-Pin Receptacle** D = No Receptacle, with external dimming 18/2 3ft cable* N = No PE receptacle & non-dimmable* P = ANSI 7-pin receptacle with external dimming 18/2 3ft cable** +Unrestricted aiming angle **All units with option A and P have Restricted Aiming Angle. See page 8.	A = No Control D = Shorting Cap* See below ordering logic for dimming PE and standard PE control options. Light Grid also available. Must order separately. *Can only be ordered with dimming option A or P	K1 = Knuckle Slipfitter for 1.9 in-2.3 in. OD Tenon* S1 = Knuckle Slipfitter for 1.9 in-3.0 in. OD Tenon* K2 = Knuckle Slipfitter for 1.9 in-2.3 in OD Tenon with external 3ft #14/3 power cable S2 = Knuckle Slipfitter for 1.9 in-3.0 in. OD Tenon with external 3ft #14/3 power cable V1 = Knuckle Wall Mount* T1 = Trunnion with external 3ft #14/3 power cable. *Supplied with leads	GRAY = Gray BLACK = Black DKBZ = Dark Bronze WHITE = White	F = Fusing< H = Daintree enabled motion sensor# ^ L = Tool-Less Entry R = 10kV/5kA Enhanced Surge Protection T = 20kV/10kA Surge Protection> U = DALI Dimming +# V = 3-Position Terminal Block XXX = Special Options + Compatible with LightGrid 2.0 nodes. # Not available in 347V-480V ^ Only available in mount K1 or S1 < Dimming and Fusing not available with Optical Code AA for distributions "T3" and "S2" > Check manufacturer for availability NOTE: Options F, R, T, and V not available with optical code AA with voltage 347 - 480 and distributions 65, 66, 76, and 77.

OPTICAL CODE	DIST. CODE	OPTICAL DIST./NEMA CLASS	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		3000K		IES FILE NUMBER			
			3000K	5000K	120-277V	347-480V	120-277V	5000K	5000K			
AA	77	7X7	4900	5000	30	32	EFM101_AA77730_120-277VIES	EFM101_AA77740_347-480VIES	EFM101_AA77740_120-277VIES	EFM101_AA77750_347-480VIES	EFM101_AA77750_120-277VIES	EFM101_AA77750_347-480VIES
BB	77	7X7	9800	10000	64	64	EFM101_BB77730_IES		EFM101_BB77740_IES		EFM101_BB77750_IES	
CC	77	7X7	14700	15000	96	96	EFM101_CC77730_IES		EFM101_CC77740_IES		EFM101_CC77750_IES	
DD	77	7X7	20400	20900	146	146	EFM101_DD77730_IES		EFM101_DD77740_IES		EFM101_DD77750_IES	
AA	76	7X6	4700	4800	30	32	EFM101_AA76730_120-277VIES	EFM101_AA76740_347-480VIES	EFM101_AA76740_120-277VIES	EFM101_AA76750_347-480VIES	EFM101_AA76750_120-277VIES	EFM101_AA76750_347-480VIES
BB	76	7X6	9500	9700	64	64	EFM101_BB76730_IES		EFM101_BB76740_IES		EFM101_BB76750_IES	
CC	76	7X6	14300	14600	96	96	EFM101_CC76730_IES		EFM101_CC76740_IES		EFM101_CC76750_IES	
DD	76	7X6	19900	20400	146	146	EFM101_DD76730_IES		EFM101_DD76740_IES		EFM101_DD76750_IES	
AA	66	6X6	4700	4800	30	32	EFM101_AA66730_120-277VIES	EFM101_AA66740_347-480VIES	EFM101_AA66740_120-277VIES	EFM101_AA66750_347-480VIES	EFM101_AA66750_120-277VIES	EFM101_AA66750_347-480VIES
BB	66	6X6	9400	9600	64	64	EFM101_BB66730_IES		EFM101_BB66740_IES		EFM101_BB66750_IES	
CC	66	6X6	14200	14500	96	96	EFM101_CC66730_IES		EFM101_CC66740_IES		EFM101_CC66750_IES	
DD	66	6X6	19700	20200	146	146	EFM101_DD66730_IES		EFM101_DD66740_IES		EFM101_DD66750_IES	
AA	65	6X5	4400	4500	30	32	EFM101_AA65730_120-277VIES	EFM101_AA65740_347-480VIES	EFM101_AA65740_120-277VIES	EFM101_AA65750_347-480VIES	EFM101_AA65750_120-277VIES	EFM101_AA65750_347-480VIES
BB	65	6X5	8900	9100	64	64	EFM101_BB65730_IES		EFM101_BB65740_IES		EFM101_BB65750_IES	
CC	65	6X5	13400	13700	96	96	EFM101_CC65730_IES		EFM101_CC65740_IES		EFM101_CC65750_IES	
DD	65	6X5	18700	19100	146	146	EFM101_DD65730_IES		EFM101_DD65740_IES		EFM101_DD65750_IES	
AA*	T3	Type 3	6400	6600	50	50	EFM101_AAT3730_IES		EFM101_AAT3740_IES		EFM101_AAT3750_IES	
BB	T3	Type 3	10200	10500	88	88	EFM101_BBT3730_IES		EFM101_BBT3740_IES		EFM101_BBT3750_IES	
CC	T3	Type 3	14700	15000	141	141	EFM101_CCT3730_IES		EFM101_CCT3740_IES		EFM101_CCT3750_IES	
AA*	S2	20° Spot	7100	7300	50	50	EFM101_AAS2730_IES		EFM101_AAS2740_IES		EFM101_AAS2750_IES	
BB	S2	20° Spot	11300	11600	88	88	EFM101_BBS2730_IES		EFM101_BBS2740_IES		EFM101_BBS2750_IES	
CC	S2	20° Spot	16300	16700	141	141	EFM101_CCS2730_IES		EFM101_CCS2740_IES		EFM101_CCS2750_IES	

*Dimming not available

GE Evolve™

LED Flood & Spot Lighting

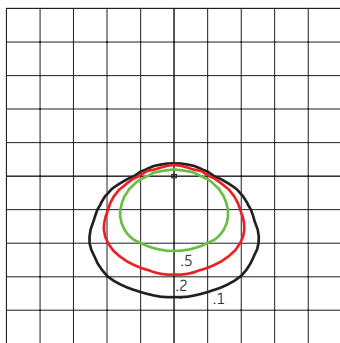
EFM1

Photometrics:

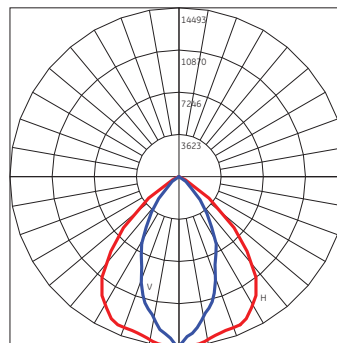
Evolve™ LED Flood Light (EFM1)

EFM1
 NEMA 6x5

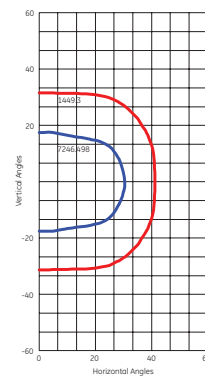
19,100 Lumens
 4000K
 EFM101_DD65740_-



Grid Distance in Units of Mounting Height at 35°
 Tilt is 45°. Initial Footcandle Values at Grade

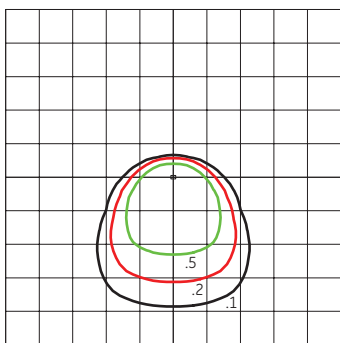


— Vertical angle of Max Cd. at -2.5°
 — Horizontal angle of Max Cd. at 2.5°

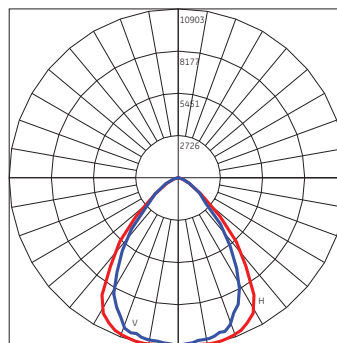


EFM1
 NEMA 6x6

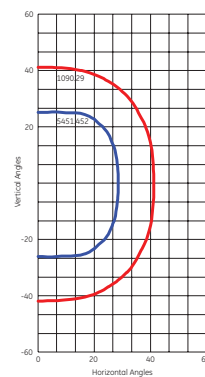
20,200 Lumens
 4000K
 EFM101_DD66740_-



Grid Distance in Units of Mounting Height at 35°
 Tilt is 45°. Initial Footcandle Values at Grade

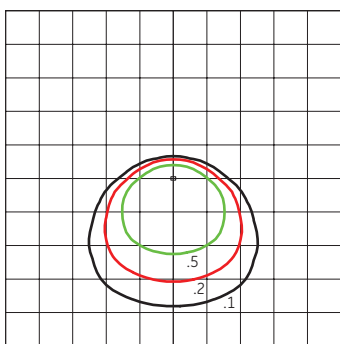


— Vertical angle of Max Cd. at -5°
 — Horizontal angle of Max Cd. at 2.5°

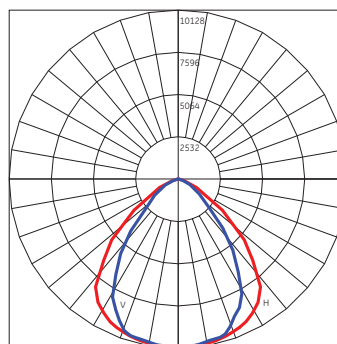


EFM1
 NEMA 7x6

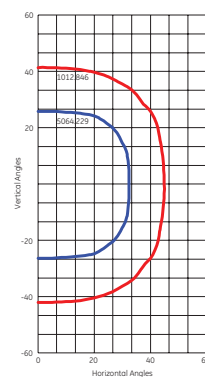
20,400 Lumens
 4000K
 EFM101_DD76740_-



Grid Distance in Units of Mounting Height at 35°
 Tilt is 45°. Initial Footcandle Values at Grade



— Vertical angle of Max Cd. at -2.5°
 — Horizontal angle of Max Cd. at 2.5°



GE Evolve™

LED Flood & Spot Lighting

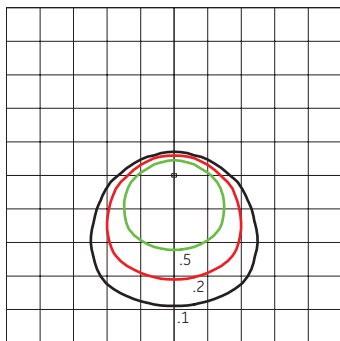
EFM1

Photometrics:

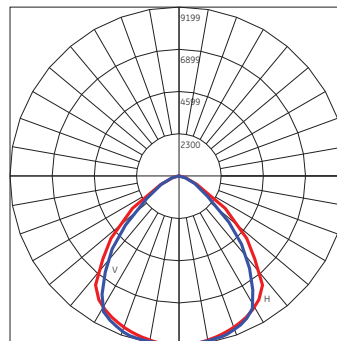
Evolve™ LED Flood Light (EFM1)

EFM1
 NEMA 7x7

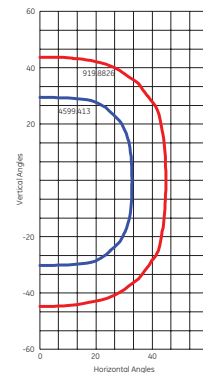
20,900 Lumens
 4000K
 EFM101_DD77740_-



Grid Distance in Units of Mounting Height at 35'
 Tilt is 45°. Initial Footcandle Values at Grade

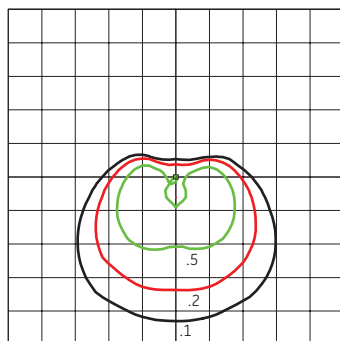


— Vertical angle of Max Cd. at -7.5°
 — Horizontal angle of Max Cd. at 5°

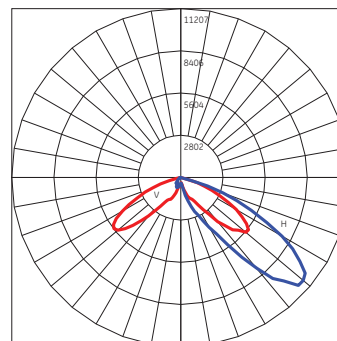


EFM1
 TYPE III
 FACADE/BILLBOARD

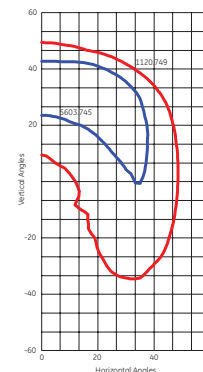
15,000 Lumens
 4000K
 EFM101_CCT3740_-



Grid Distance in Units of Mounting Height at 35'
 Tilt is 25°. Initial Footcandle Values at Grade

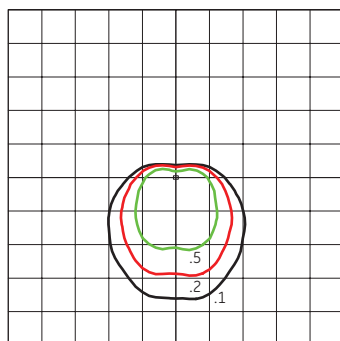


— Vertical angle of Max Cd. at 47.5°
 — Horizontal angle of Max Cd. at 15°

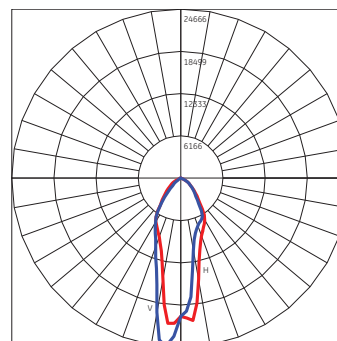


EFM1
 20° SPOT

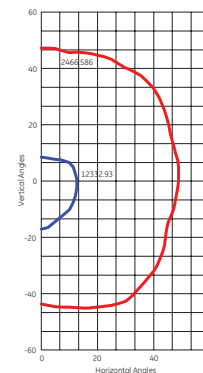
16,700 Lumens
 4000K
 EFM101_CCS2740_-



Grid Distance in Units of Mounting Height at 35'
 Tilt is 45°. Initial Footcandle Values at Grade



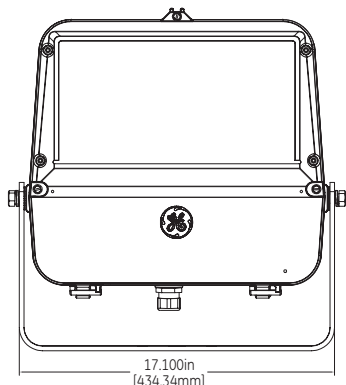
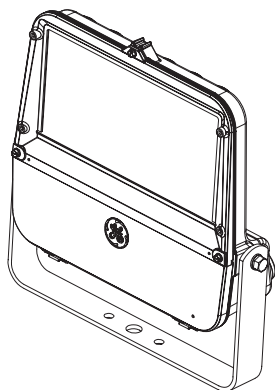
— Vertical angle of Max Cd. at -5°
 — Horizontal angle of Max Cd. at 0°



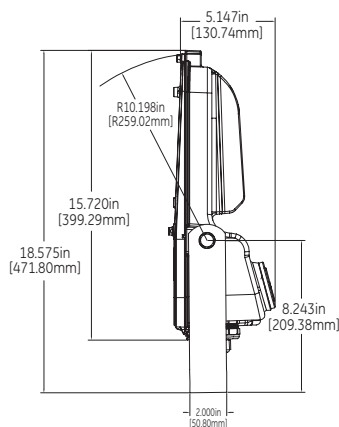
GE Evolve™ LED Flood & Spot Lighting EFM1

Product Dimensions: Evolve™ LED Flood Light (EFM1)

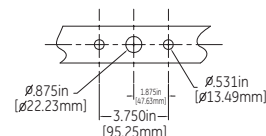
TRUNNION MOUNT



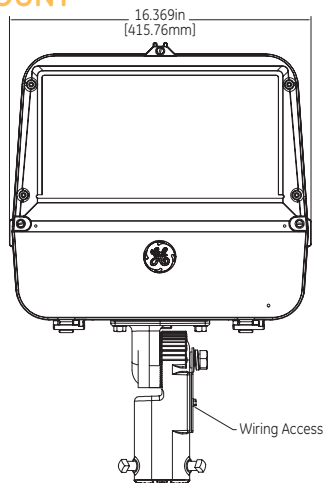
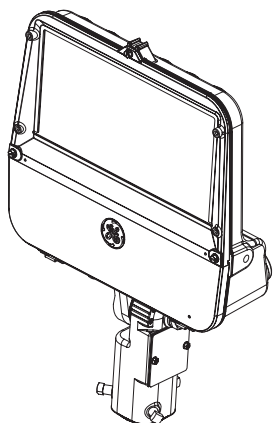
FRONT VIEW



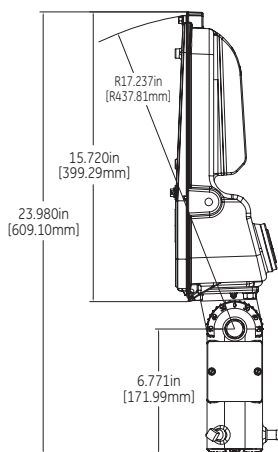
SIDE VIEW



KNUCKLE SLIPFITTER MOUNT

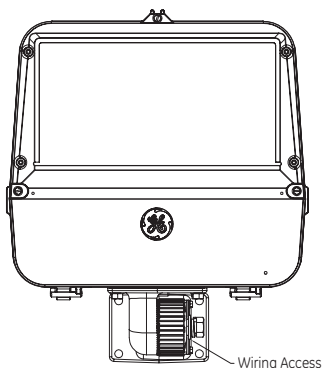
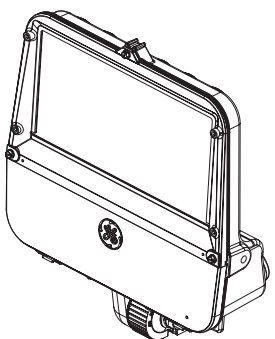


FRONT VIEW

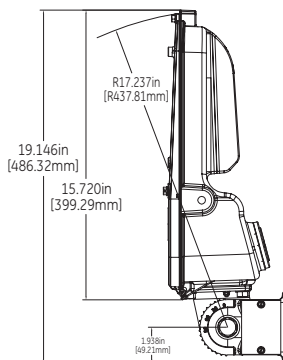


SIDE VIEW

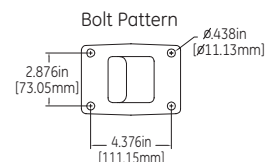
KNUCKLE WALL MOUNT



FRONT VIEW



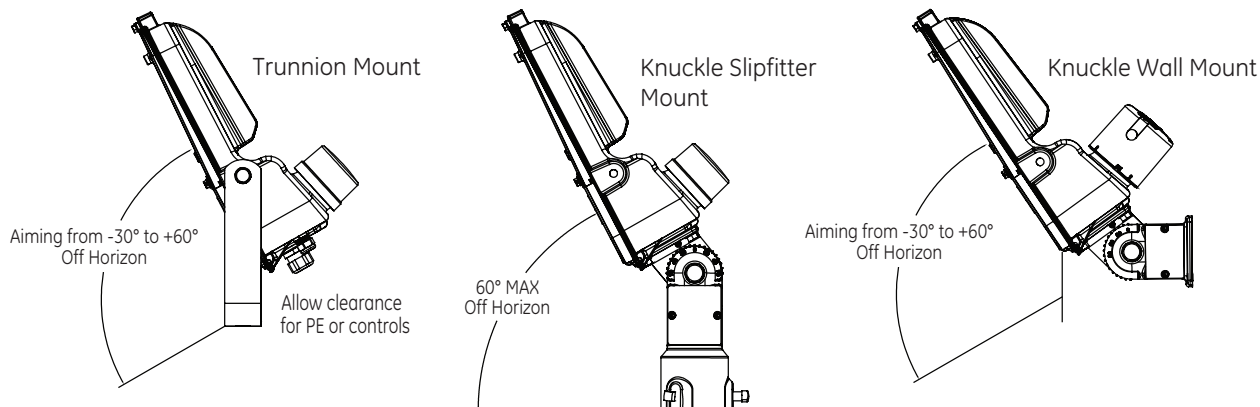
SIDE VIEW



GE Evolve™ LED Flood & Spot Lighting EFM1

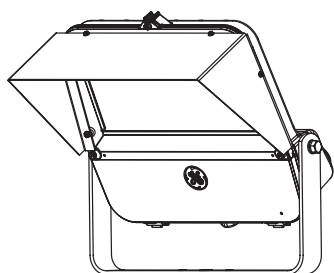
Product Dimensions: Evolve™ LED Flood Light (EFM1)

EFM1 - PE Aiming Restrictions



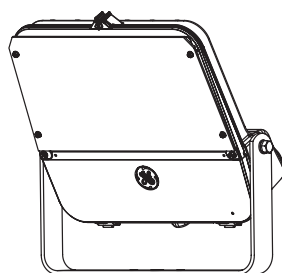
DATA	• Approximate Weight: 25 lbs. (11.34 kg)
	• Effective Projected Area:
	- 0° aim (vertical glass) 1.96 sq. ft.
	- 45° aim 1.22 sq. ft.
	- Side profile (all aims) 0.73 sq. ft.
- 90° (downward) aim 0.79 sq. ft.	

EFM1 - Accessories



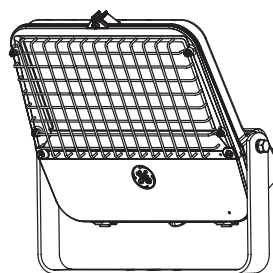
Top And Side Visor

Ordering Logic:
 TSVGGRAY-EFM
 TSVBLCK-EFM
 TSVDBKZ-EFM
 TSVWHITE-EFM



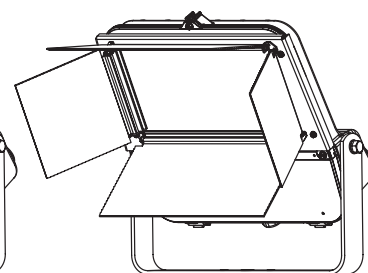
Vandal Shield

Ordering Logic:
 VAN-EFM



Wire Guard

Ordering Logic:
 WG-EFM



Barn Doors

Ordering Logic:
 BDAGRAY-EFM
 BDABLCK-EFM
 BDADKBZ-EFM
 BDAWHITE-EFM

GE Evolve™ LED Flood & Spot Lighting EFM1

Accessories

Evolve™ LED Flood Light (EFM1)

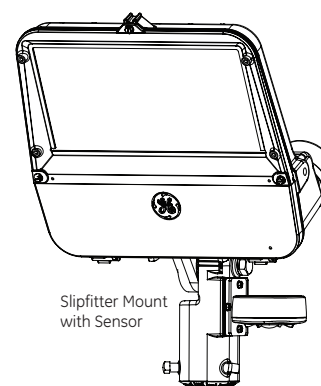
PE Accessories (to be ordered separately)

SAP Number	Part Number	Description
93029237	PED-MV-LED-7	ANSI C136.41 Dimming PE, 120-277V
93029238	PED-347-LED-7	ANSI C136.41 Dimming PE, 347V
93029239	PED-480-LED-7	ANSI C136.41 Dimming PE, 480V

SAP Number	Part Number	Description
28299	PECOTL	STANDARD 120-277V
28294	PEC5TL	STANDARD 480V
80436	PECDTL	STANDARD 347V
73251	SCCL-PECTL	Shorting cap

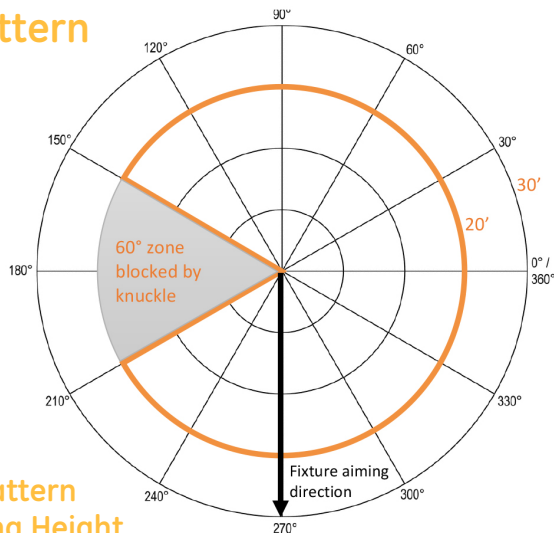
H-Motion Sensing Option

- Intended for applications, between 15-30 ft. mounting height. (4.57-9.14m). For mounting heights exceeding 30 ft., remote mounted sensors are recommended.
- Provides a coverage area radius for walking motion of 15-20 ft. (4.57-6.10m).
- Provides 300° of coverage (~60° is blocked by the knuckle).
- Standard factory settings:
 - 10% output when unoccupied, 100% output occupied.
 - Knuckle mounted PE Sensor.
 - 10 minute post-occupancy time delay, 5 minute dimming ramp-down.
- Fixture power increase of 1W expected with sensor use.



Note: Standard options may be reprogrammed in the field. Reprogramming instructions included in product shipment.

Sensor Pattern



Sensing Pattern
 30 ft. Mounting Height



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Evolve™ LED Flood Lighting

EFH1



current
powered by GE



Product Features

The GE Evolve™ LED High Output Flood Light is our brightest solution to efficiently illuminate building façade, flag poles, billboard signage and many more traditional flood applications. Designed to replace 250W-400W HPS and 400W-1000W Metal Halide flood lights, the EFH1 provides significant operating cost benefits over the life of each fixture with reduced energy consumption and a long rated life that virtually eliminates ongoing maintenance expenses.

Applications

- Site, area, and general lighting applications utilizing advanced LED reflective optical system.



Housing

- Die-cast aluminum housing.
- Slim architectural design incorporates an integral heat sink and light engine, ensuring maximum heat transfer, long LED life.
- Meets 2G vibration with knuckle mount and 3G with trunnion mount.

Optical System

- Evolve™ light engine consisting of reflective technology designed to optimize application efficiency and minimize glare.
- LM-79 tests and reports are performed in accordance with IESNA standards.
- 70 CRI at 3000K, 4000K and 5000K typical
- NEMA Distributions: 6x5, 6x6, 7x6 and 7x7.

Ratings

-   listed, suitable for wet locations.
- IP66 optical enclosure per ANSI C136.25-2009
- Temperature Rated at -40°C to +50°C
- Complies with the material restrictions of RoHS.



DLC Premium qualified models available. Please refer to <http://www.designlights.org/QPL> for complete information.

Lumen Maintenance

Ambient Temp.	Optical Code	Projected ¹		Calculated ²	
		25K Hour	50K Hour	88K Hour	100K Hour
5°C (41°F)	AA, BB, CC, DD, EE	0.964	0.945	0.918	0.910
10°C (50°F)		0.961	0.940	0.909	0.900
15°C (59°F)		0.958	0.934	0.899	0.888
20°C (68°F)		0.954	0.927	0.887	0.875
25°C (77°F)		0.950	0.920	0.875	0.861
35°C (95°F)		0.926	0.885	0.827	0.809
40°C (104°F)		0.914	0.863	0.790	0.768

Note: Based on 10,000 hours LM-80 data. For details, see http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/luminaires/ENERGY_STAR_Final_Lumen_Maintenance_Guidance.pdf.

¹ In accordance with IESNA TM-21-11, Projected Values represent interpolated values based on time durations that are within six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip.

² In accordance with IESNA TM-21-11, Calculated Values represent time durations that exceed six times (6X) the IESNA LM-80-08 total test duration (in hours) for the device under testing (DUT) i.e. the packaged LED chip.

Mounting

Option K

- K1 = Knuckle Slipfitter for 1.9 in. - 2.3 in. OD Tenon, with wires exiting tenon.
- K2 = Knuckle Slipfitter for 1.9 in. - 2.3 in. OD Tenon, external 3ft #14/3 power cable.

Option S

- S1 = Knuckle Slipfitter for 1.9 in. - 3.0 in. (48-76mm) OD Tenon.
- S2 = Knuckle Slipfitter for 1.9 in. - 3.0 in. (48-76mm) OD Tenon, with external 3ft #14/3 power cable.

Option V

- V1 = Knuckle Wall Mount. Lead wires exiting tenon.

Option T

- T1 = Trunnion, with external 3ft #14/3 power cable.

Finish

- Corrosion resistant polyester powder painted, minimum 2.0 mil. thickness.
- Standard colors: Dark Bronze, Black, White and Gray.
- RAL & custom colors available.

Electrical

- 120-277 VAC and 347-480 VAC available.
- System power factor is >90% and THD <20%.
- ANSI C136.41 PE Socket Standard. Light Grid compatible.
- Dimming:
 - 0-10V continuous dimming standard.
 - DALI digital dimming available. Contact manufacturer.
- DALI compatible drivers available in 120-277 VAC.
- Surge Protection; per ANSI C136.2-2015.
 - - 6kV/3kA "Basic" surge protection, standard.
 - - 10kV/5kA "Enhanced" surge protection, optional.
- EMI: Title 47 CFR Part 15 Class A

Warranty

- 5yr standard warranty

Accessories

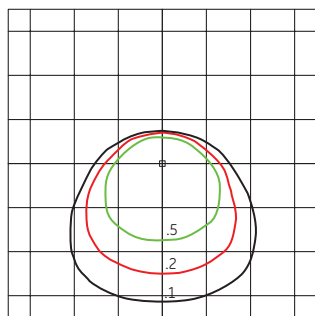
- Top & Side Visor
- Wire Guard
- Vandal Shield
- Barn Door Assembly

Photometrics

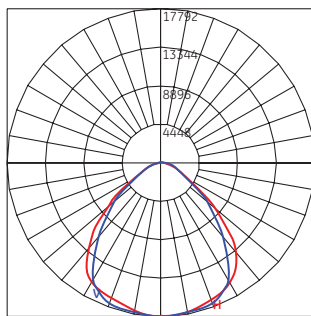
Evolve™ LED High Output Flood Light (EFH1)

77-EE

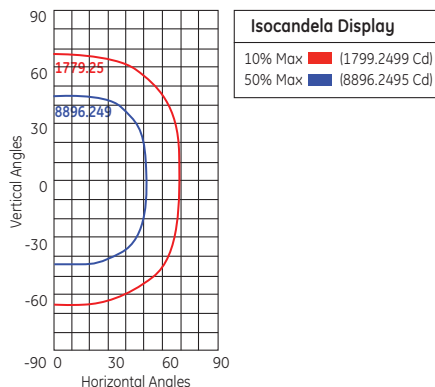
38,700 Lumens, 4000K (EFH101_EE77740_ies)



Grid Distance in Units of Mounting Height at 35° and 45° Tilt Initial Footcandle Values at Grade

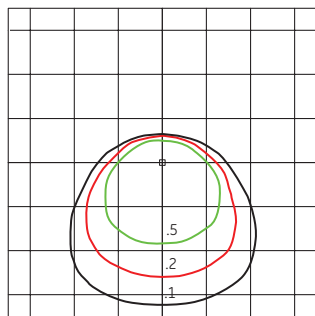


— Vertical Axel Candela Distribution
 — Horizontal Axel Candela Distribution

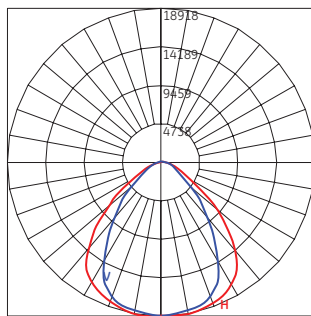


76-EE

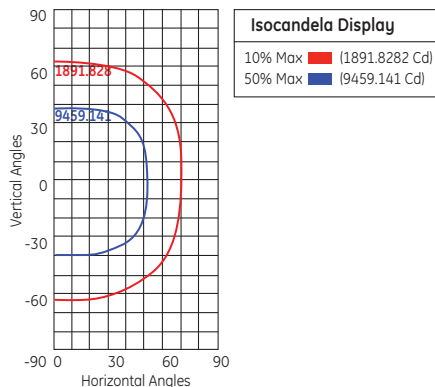
37,800 Lumens, 4000K (EFH101_EE76740_ies)



Grid Distance in Units of Mounting Height at 35° and 45° Tilt Initial Footcandle Values at Grade

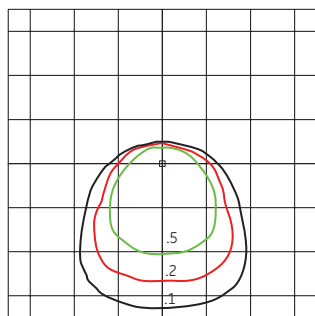


— Vertical Axel Candela Distribution
 — Horizontal Axel Candela Distribution

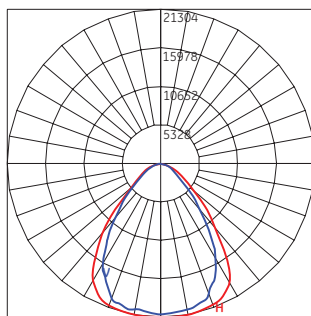


66-EE

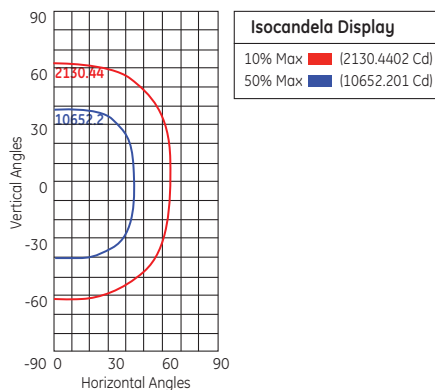
37,400 Lumens, 4000K (EFH101_EE66740_ies)



Grid Distance in Units of Mounting Height at 35° and 45° Tilt Initial Footcandle Values at Grade

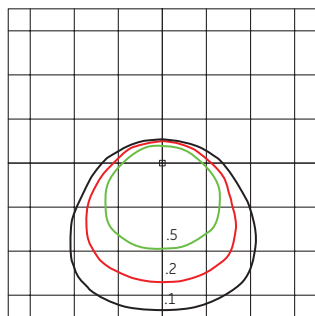


— Vertical Axel Candela Distribution
 — Horizontal Axel Candela Distribution

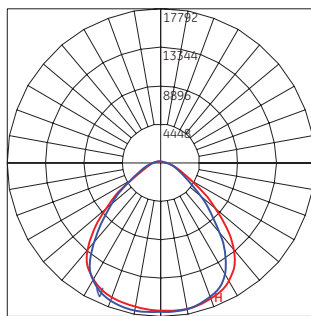


65-EE

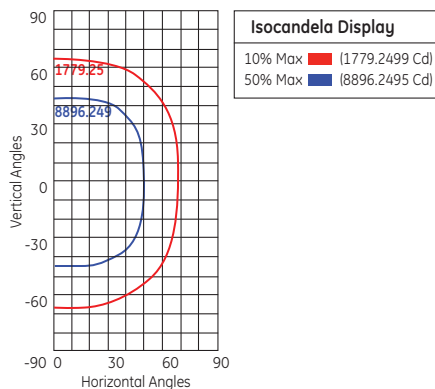
35,500 Lumens, 4000K (EFH101_EE65740_ies)



Grid Distance in Units of Mounting Height at 35° and 45° Tilt Initial Footcandle Values at Grade



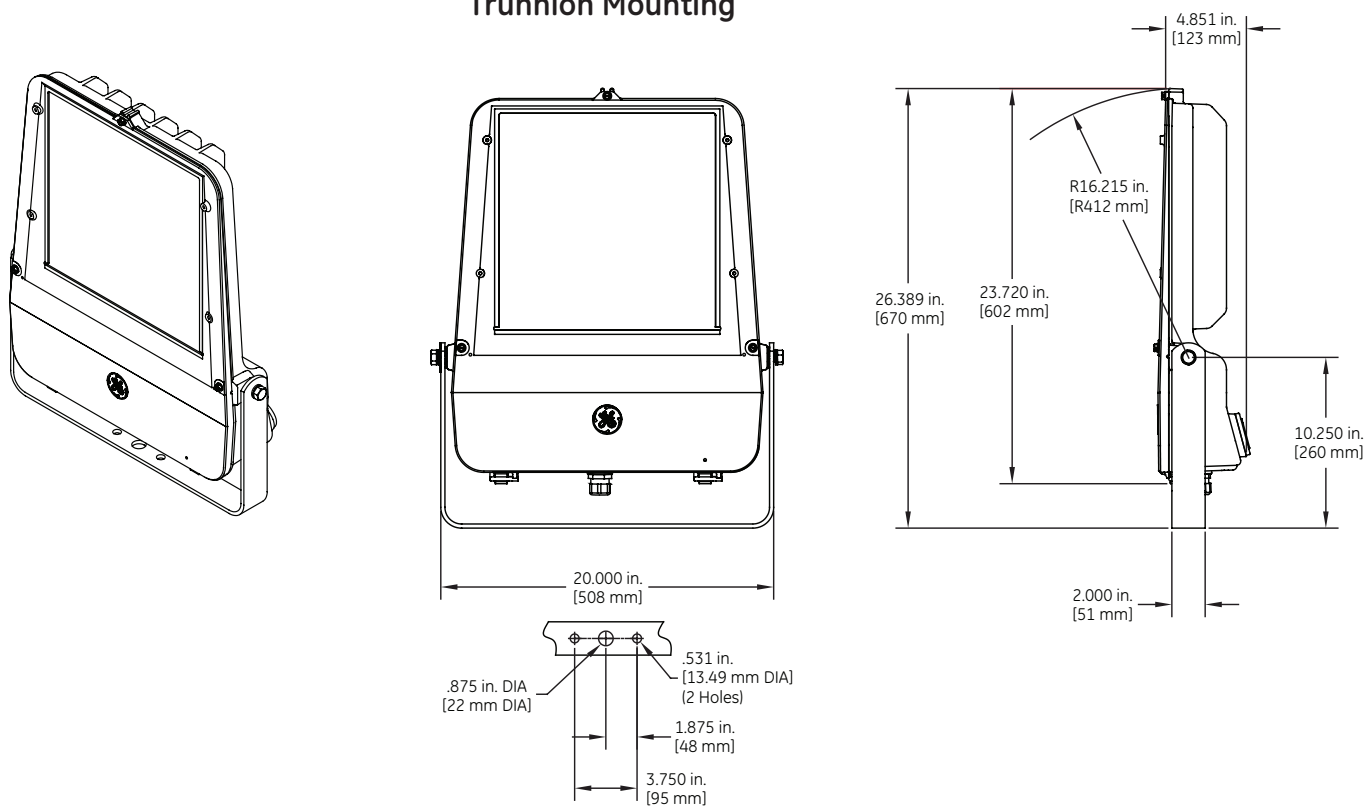
— Vertical Axel Candela Distribution
 — Horizontal Axel Candela Distribution



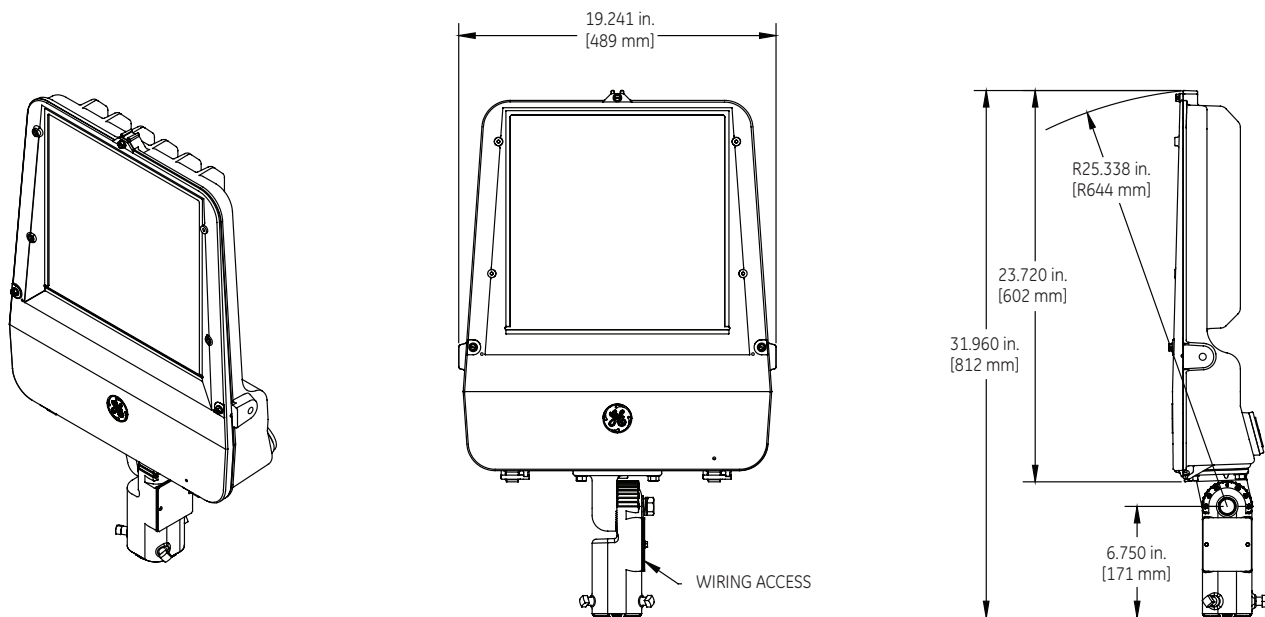
Product Dimensions

Evolve™ LED High Output Flood Light (EFH1)

Trunnion Mounting



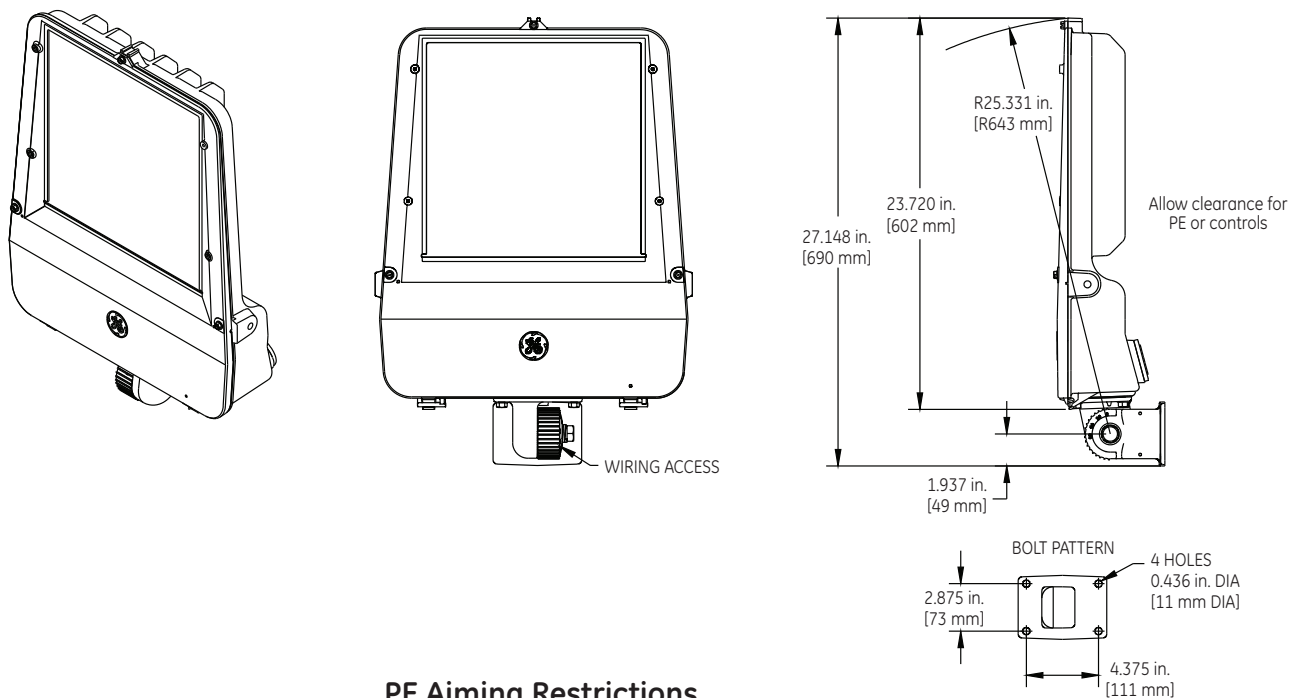
Slipfitter Mounting



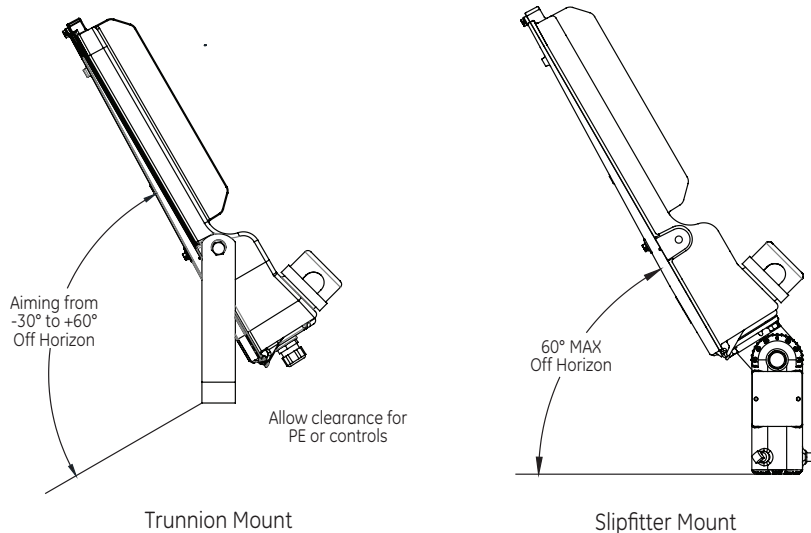
Product Dimensions

Evolve™ LED High Output Flood Light (EFH1)

Wall Mounting



PE Aiming Restrictions

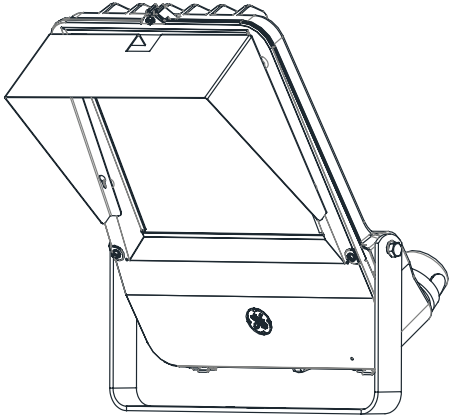


DATA

- Approximate net weight: 35 lbs (15.9 kgs)
- Effective Projected Area:
 - Vertical 3.51 sq ft (0.33 sq M) (aimed at horizon)
 - Tilted 1.79 sqft (0.17 sq M) (aimed down 45 degrees)

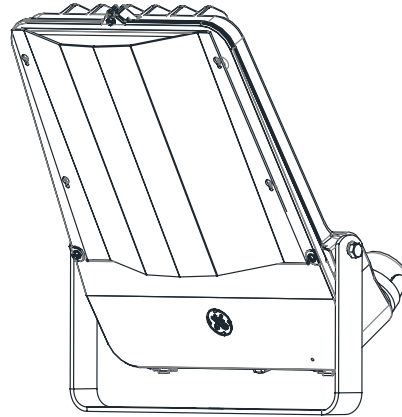
Accessories

Evolve™ LED High Output Flood Light (EFH1)



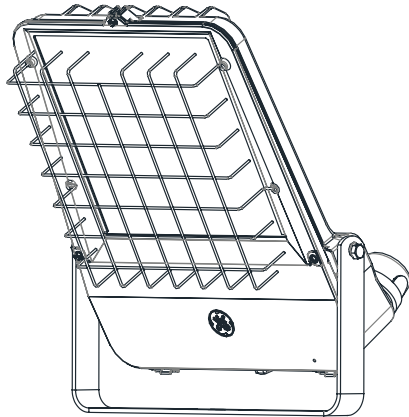
Top And Side Visor

Ordering Logic: TSVGGRAY-EFH
TSVBLCK-EFH
TSVDKBZ-EFH
TSVWHITE-EFH



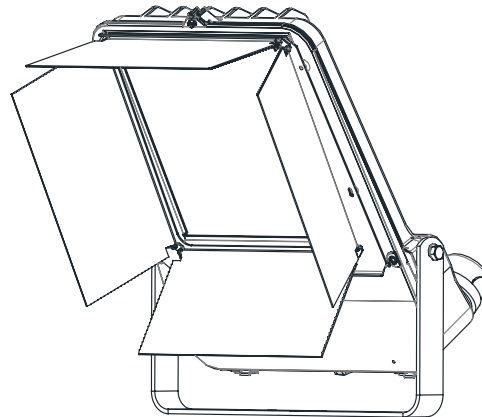
Vandal Shield

Ordering Logic: VAN-EFH



Wire Guard

Ordering Logic: WG-EFH



Barn Doors

Ordering Logic: BDAGRAY-EFH
BDABLCK-EFH
BDADKBZ-EFH
BDAWHITE-EFH



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OLP3107 (Rev 02/20/17)

DESCRIPTION

The Lexington AF24 LED outdoor luminaire displays the old-fashioned charm of traditional lantern-type post top lighting, enhancing any setting with distinctive styling. As a decorative luminaire, the Lexington LED tastefully complements the architectural and environmental design of parks and roadways. It's patented AccuLED Optics™ technology delivers uniform and efficient illumination to pedestrian and roadway applications.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction

TOP: Hinged die-cast aluminum top with cupola cover. SCREWS: Captive retaining screw. HOUSING: Die-cast aluminum base housing. Standard color is black. Other finish colors available. Consult your Streetworks representative. 1" ANSI wattage/source label.

Optics

Choice of four patented, high efficiency AccuLED Optics™ technology manufactured from injection-molded acrylic. Optics are precisely designed to shape the light output, maximizing efficiency and application spacing. AccuLED Optics technology, creates consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT and minimum 70 CRI. Optional 3000K (70CRI) and 2700K (80 CRI). For the ultimate level of spill light control, an optional house-side shield accessory can be field or factory installed. Optics are IP66 enclosure rated. Offered open sided as a standard with four lens options.

Electrical

LED drivers mount to die-cast aluminum back housing for optimal heat sinking, operation efficacy, and prolonged life. Standard drivers feature electronic universal voltage (120-277V 50/60Hz), greater than 0.9 power factor, less than 20% harmonic distortion, and is suitable for operation in -40°C to 40°C ambient environments. 10 kV/10 kA common and differential mode and 10 kV MOV surge protection available.

Mounting

Self-aligning pole-top fitter fits 2-3/8" and 3" O.D. tenons. Square headed 1-1/4" polymer coated mounting bolts.

Finish

Cast components finished in a Super durable black TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Optional colors include: bronze, grey and white. RAL and custom color matches available.

Warranty

Five-year warranty.

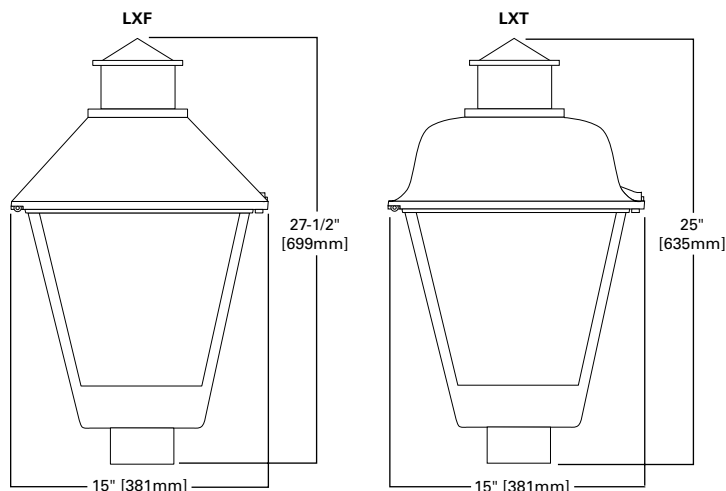


**LXF/LXT
LEXINGTON LED**

AF24
LED

DECORATIVE POST TOP
LUMINAIRE

DIMENSIONS



CERTIFICATION DATA

UL/cUL Listed
ISO 9001
IP66 Rated Optics
LM79 / LM80 Compliant

ENERGY DATA

Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120-277V 50/60Hz
-30°C Minimum Temperature
40°C Ambient Temperature Rating

EPA

Effective Projected Area: (Sq. Ft.)
1.7

SHIPPING DATA

Approximate Net Wt:
20.8 lbs. (9.4 kgs.)

POWER AND LUMENS

Light Engine	AF24-20	AF24-30	AF24-40	AF24-50	AF24-60	AF24-70	AF24-80	AF24-90	AF24-100	
Nominal Power (Watts)	21	31	40	54	64	74	83	94	96	
Wattage Label	20	30	40	50	60	70	80	90	100	
Current (A) @120V	0.18	0.26	0.34	0.45	0.53	0.62	0.70	0.78	0.80	
Current (A) @277V	-	0.12	0.15	0.21	0.24	0.28	0.31	0.35	0.35	
Current (A) @347V	-	0.10	0.13	0.16	0.19	0.22	0.24	0.28	0.28	
Current (A) @480V	-	0.07	0.09	0.13	0.14	0.17	0.18	0.21	0.21	
Optics										
T2U	4000K	2,432	3,413	4,420	5,700	6,587	7,386	8,074	8,704	8,814
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3
	3000K	2,153	3,021	3,913	5,046	5,831	6,538	7,147	7,705	7,802
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2
T3	4000K	2,415	3,389	4,389	5,660	6,540	7,334	8,017	8,643	8,752
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2
	3000K	2,138	3,000	3,885	5,011	5,789	6,492	7,097	7,651	7,747
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2
SL3	4000K	2,337	3,279	4,247	5,477	6,329	7,097	7,758	8,364	8,469
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2
	3000K	2,069	2,903	3,760	4,849	5,602	6,282	6,867	7,403	7,497
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2	B1-U0-G2
T4W	4000K	2,405	3,375	4,371	5,637	6,513	7,304	7,984	8,608	8,716
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2
	3000K	2,129	2,988	3,869	4,990	5,766	6,465	7,067	7,619	7,715
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2
5WQ	4000K	2,550	3,578	4,634	5,976	6,905	7,743	8,464	9,125	9,240
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2
	3000K	2,257	3,167	4,102	5,290	6,112	6,854	7,492	8,077	8,179
	BUG Rating	B2-U0-G1	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B3-U0-G2	B3-U0-G2	B3-U0-G2

LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
10°C	1.02
15°C	1.01
25°C	1.00
40°C	0.99
50°C	0.96

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (50,000 hours)	TM-21 Lumen Maintenance (75,000 hours)	TM-21 Lumen Maintenance (100,000 hours)	Theoretical L70 (Hours)	Theoretical L70 (Hours)
25°C-50°C	>91%	>87%	>83%	>204,000	> 450,000

ORDERING INFORMATION

Sample Number: LXF-AF24-20-D-U-T2U-10MSP-4N7-BK

Product Family ¹	Light Engine ²	Wattage Bucket	Driver	Voltage	Distribution
LXF=Lexington LXT=Lexington w/Traditional Top	AF24=24 LED Light Engine	20=20W ³ 30=30W 40=40W 50=50W 60=60W 70=70W 80=80W 90=90W 100=100W	D=Dimming (0-10V) 5LTD=DALI ⁴	U=Universal (120-277V) 2=120V ³ 8=480V ⁵ 9=347V	T2U=Type II Urban T3=Type III SL3=Type III w/ Spill Control T4W=Type IV Wide 5WQ=Type V Square Wide
Options (Add as Suffix)		Color	Accessories (Order Separately)		
10K=10kV UL 1499 Surge Protection Device 10MSP=10kV MOV Surge Protection Device 7030=70 CRI / 3000K CCT ⁶ 8027=80 CRI / 2700K CCT ⁶ 4=NEMA Photocontrol Receptacle ⁷ 4N7=NEMA 7-PIN Photocontrol Receptacle A=White Refractive Lens Panels CL=Clear Lens FL=Frosted Lens TL=Textured Lens S=Snap Latches for Tool-less Light Replacement J=Factory Installed Ladder Rest HSS=House Side Shield ⁸ HA=High Ambient ⁹		BK=Black BZ=Bronze AP=Grey WH=White	TA1BK=Decorative Ladder Rest for Field Installation (Black) OA/RA1013=Photocontrol Shorting Cap OA/RA1014=NEMA Photocontrol - 120V OA/RA1016=NEMA Photocontrol - Multi-Tap OA1223=10kV Surge Module Replacement HS-LX-24=Field Installed LX House Side Shield for AF24 ⁸		

- NOTES:**
- Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
 - Standard 4000K CCT and nominal 70 CRI.
 - AF24-20 only available in 120V only.
 - Only available in universal voltage, not available with AF24-90, AF24-100.
 - Only for use with 480V Wye systems. Per NEC, not for use with ungrounded systems, impedance grounded systems or corner grounded systems (commonly known as Three Phase Three Wire Delta, Three Phase High Leg Delta and Three Phase Corner Grounded Delta systems).
 - Use dedicated IES files for 3000K and 2700K when performing layouts. These files are published on the Lexington product page on the website.
 - If "4" selected, dimming functionality not available, leads will be capped.
 - HSS not available with 5WQ or SL3 distribution.
 - HA not available with AF24-100 if paired with HSS option.

Streetworks

DESCRIPTION

Compliments roadways, parks, pedestrian walkways, and residential streets. The Utility LED Acorn illuminates and delights communities with superior LED lumen performance in a traditional, easy-to-service design that replaces 100W HPS fixtures.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction

Heavy-duty cast aluminum housing and removable door. ANSI C136.31 testing compliance prevents damage from installation generated vibration. A single quarter turn fastener on the removable door provides tool-less access to wiring compartment.

Optics

GLOBE: 9" Visual Comfort textured acrylic globe is standard. Available in asymmetric or symmetric distributions. Offered standard in 4000K CCT and minimum 70 CRI.

Electrical

120-277V 50/60Hz operation. 10kV/10kA common - and differential mode surge protection available. Thermal management transfers heat rapidly away from the LED source for optimal efficiency and light output. Ambient operating temperature from -40°C to 40°C. Standard three-position tunnel type compression terminal block.

Controls

0-10V dimming driver standard. Photocontrol and After Hours Dim accessories available. Refer to control options section.

Mounting

Post top mount fits 3" O.D. tenon. Secured by square head 3/8" stainless steel mounting bolts.

Warranty

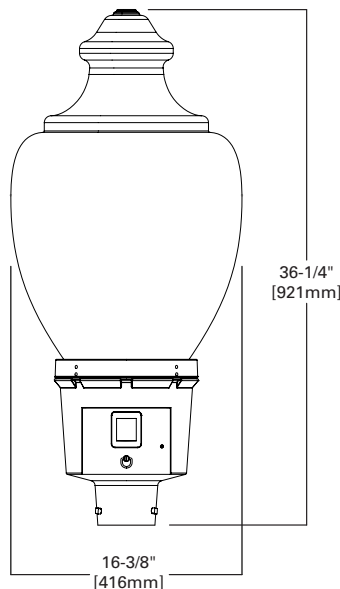
Standard five-year warranty. Optional ten-year warranty, please see your Eaton Streetworks sales representative for more information.



ULA UTILITY LED ACORN

DECORATIVE POST TOP
LUMINAIRE

DIMENSIONS



CERTIFICATION DATA

UL/cUL Listed for Fixture Mounting
Heights 12 ft and greater
ANSI C136.31/C136.15
3G Vibration Rated
ISO 9001
RoHS Compliant
IP66 Rated Optics

ENERGY DATA

Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120-277V 50/60Hz
-30°C Minimum Temperature
40°C Ambient Temperature Rating

EPA

Effective Projected Area: (Sq. Ft.) 1.72

SHIPPING DATA

Approximate Net Wt:
16 lbs. (7.3 kgs.)

POWER AND LUMENS

Light Engine	A3	A4	A5	A6	A7	A8	A9	
Nominal Power (Watts)	21	29	36	44	55	56	71	
Wattage Label	20	30	40	40	60	60	70	
Current (a) @120V	178 mA	244 mA	309 mA	379 mA	462 mA	471 mA	618 mA	
Current (a) @277V	90 mA	128 mA	158 mA	192 mA	235 mA	240 mA	271 mA	
Optics								
SYM	4000K	3,295	4,070	4,998	5,951	7,032	8,423	9,549
	BUG Rating	B1-U5-G2	B1-U5-G3	B1-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3
	3000K	3,183	3,931	4,828	5,748	6,793	8,136	9,224
	BUG Rating	B1-U5-G2	B1-U5-G2	B1-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3
	2700K	3,024	3,735	4,586	5,461	6,453	7,729	8,762
	BUG Rating	B1-U5-G2	B1-U5-G2	B1-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3	B2-U5-G3

Light Engine	A3	A4	A5	A6	A7	A8	A9	
Nominal Power (Watts)	21	30	37	46	56	57	71	
Wattage Label	20	30	40	50	60	60	70	
Current (a) @120V	182 mA	250 mA	314 mA	390 mA	475 mA	480 mA	618 mA	
Current (a) @277V	81 mA	118 mA	144 mA	173 mA	212 mA	214 mA	271 mA	
Optics								
ASYM	4000K	3,122	3,866	4,687	5,488	6,357	7,989	9,057
	BUG Rating	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G4	B1-U5-G4
	3000K	3,016	3,734	4,527	5,301	6,140	7,717	8,749
	BUG Rating	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G4	B1-U5-G4
	2700K	2,865	3,548	4,301	5,036	5,833	7,331	8,311
	BUG Rating	B1-U5-G2	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B1-U5-G3	B2-U5-G3

LUMEN MAINTENANCE

Light Engine	Ambient Temperature	TM-21 Lumen Maintenance (60,000 hours)	Theoretical L70 (Hours)
ULA-A8-D-U-ASYM	40°C	>73%	71,000
ULA-A5-D-U-ASYM	40°C	>85%	139,000

LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
10°C	1.02
15°C	1.01
25°C	1.00
40°C	0.99
50°C	0.96

ORDERING INFORMATION

Sample Number: ULA-A5-D-U-ASYM-VM-9-7030-4N7-10MSP-W-BK

Product Family ¹	Light Engine	Driver	Voltage	Distribution	Globe
ULA=Utility LED Acorn	A3 A4 A5 A6 A7 A8 A9	D=Dimming 5LTD=DALI	U=Universal (120-277V)	SYM=Symmetric ASYM=Asymmetric	VM-9=Visual Comfort / Milky Globe, 9" Neck VM-8=Visual Comfort / Milky Globe, 8" Neck
Options (Add as Suffix)			Color		Accessories (Order Separately)
7030=70 CRI / 3000K ² 7027=70 CRI / 2700K ² 4=NEMA Photocontrol Receptacle (Internal Mount) ³ 4N7=NEMA 7-PIN Photocontrol Receptacle (Internal Mount) ³ 10K=10kV UL 1449 Surge Protective Device 10MSP=10kV MOV Surge Protective Device NPC=NEMA Photocontrol - Multi-Tap PSC=Photocontrol Shorting Cap HSS=House Side Shield 180 Degree Cutoff ⁴ W=20' #10 Leads HA=High Ambient ⁵			AP=Grey BK=Black BZ=Bronze WH=White GN=Green		OA/RA1016=NEMA Photocontrol - Multi-Tap OA/RA1013=Photocontrol Shorting Cap OA1223=10kV/10kA UL 1449 Surge Module Replacement ULA-HSS=Field Install House Side Shield 180 Degree Cutoff ⁴

NOTES:

- Customer is responsible for engineering analysis to confirm pole and fixture compatibility for all applications. Refer to our white paper WP513001EN for additional support information.
- Use dedicated IES files for various CCTs and CRIs when performing layouts. These files are published on the Utility LED Acorn luminaire product page on the website.
- Total height of photocontrol/node cannot exceed 4.3".
- Applicable for asymmetric distribution.
- Not available with A8 light engine.



Eaton
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.eaton.com/lighting

Specifications and dimensions subject to change without notice.



GE Evolve™
LED Area Lighting
EALS-03 & EALP-03



current
powered by GE



Product Features

The **EAL Area Light** luminaires offer a wide range of optical patterns, color temperatures, lumen packages, and mounting configurations to optimize area light applications, as well as provide versatility in lighting design within the same form-factor. They are ideal for commercial property site-lighting applications such as retail and commercial exteriors. The EALS (standard) area light has a lumen range from 7,500-30,000 lumens. The EALP (premium) offers a similar lumen range of 25,000 to 70,000 lumens but with higher LPW and better lumen maintenance.

Both the **EALS-03** and **EALP-03** feature our innovative, highly flexible Universal Mounting Arm option, which provides installers the ability to mount the EAL fixtures on both round and square poles of multiple sizes. In addition, it features both in-line and offset bolt patterns which enable it to easily be affixed to the majority of the bolt patterns one would encounter in the field.

Applications

- Site and area light applications such as parking lots, retail exteriors, commercial exteriors, roadways and other general lighting applications

Housing

- Slim architectural design incorporates an integral heat sink and light engine, ensuring maximum heat transfer, and long LED life.
- Die cast aluminum housing
- 3G vibration per ANSI C136.31-2010

LED & Optical Assembly

- LM-79 tests and reports in accordance with IESNA standards
- Upward Light Output Ratio (ULOR) = 0 (horizontal orientation)
- 70CRI at 3000K, 4000K and 5000K
- Distributions: II, III, IV, V



Lumen Maintenance

- Projected Lxx per IES TM-21 at 25 °C for reference:

EALS03 Optical code	Lxx (10k) @ Hours		
	25,000 hr	50,000 hr	100,000 hr
C2, C3, C4, C5, D2, D3, D4, D5	L95	L92	L86
F5, H2, H3, H4, H5	L95	L92	L86
F2, F3, F4, J2, J3, J4, J5	L94	L89	L81
K2, K3, K4, K5	L94	L89	L81


EALP03 Optical code	Lxx (10k) @ Hours		
	25,000 hr	50,000 hr	100,000 hr
J5, K2, K3, K4, K5	L97	L96	L94
L2, L3, L4, L5, M2, M3, M4, M5	L97	L96	L94
J2, J3, J4, N2, N3, N4, N5	L94	L91	L84
P2, P3, P4, P5, Q2, Q3, Q4, Q5	L94	L91	L84

Note: 1) Projected Lxx based on LM80 (10,000 hour testing). 2) DOE Lighting Facts Verification Testing Tolerances apply to initial luminous flux and lumen maintenance measurements

Lumen Ambient Temperature Factors:

Ambient Temp (°C)	Initial Flux Factor
10	1.02
20	1.01
25	1.00
30	0.99
40	0.98

 DLC Standard qualified models available. Please refer to <http://www.designlights.org/QPL> for complete information.

 DLC Premium qualified models available. Please refer to <http://www.designlights.org/QPL> for complete information.

Ratings

- eUL Listed
- UL 1598 Listed Suitable for Wet Locations
- IP65 optical enclosure per ANSI C136.25-2013
- Operating Temperature -40°C to +40°C (maximum of +35°C for 570W)
- California Title 24 compliant (w/ "H" motion sensor option)

Mounting

Option C1: Integral Slipfitter for 1.25"-2" Pipe (1.66 in. OD-2.378 in. OD) supplied with leads. +/- 5 deg adjustment for leveling.

Option D1: Universal Mounting Arm, fitted for round or square pole mounting supplied with 16/3 3ft cable.

Option K1: Knuckle Slipfitter for 1.9 in.-2.3 in. OD Tenon with leads. Restricted aiming angle 0° to +45°.

Option S1: Knuckle Slipfitter for 2.3 in.- 3.0 in OD Tenon with leads. Restricted aiming angle 0° to +45°.

Option V1: Knuckle Wall Mount with leads. Restricted aiming angle 0° to +45°.

Finish

- Corrosion resistant polyester powder paint, minimum thickness 2.0 mil.
- Standard colors: Black, Dark Bronze, Aluminum, Gray & White.
- RAL & custom colors available.
- Optional coastal finish available.

Electrical

- 120-277 VAC and 347-480 VAC available.
- System power factor is >90% and THD <20%.
- ANSI C136.41 7-pin dimming receptacle, standard.
- ANSI photo electric sensors (PE) available for all voltages.
- LightGrid™ compatible.
- Dimming/Occupancy:
 - Standard: 0-10V; Optional: DALI (120-277V, excluding 400 watts and above)
 - Externally wired 0-10V dimming (optional)
 - DALI digital dimming. Contact manufacturer for availability.
 - Standalone dimming occupancy sensor with ambient light sensor, option code "H".
 - Daintree occupancy sensor available.
- Surge Protection tested per ANSI C136.2-2015.
 - 6kV/3kA "Basic" surge protection, standard.
 - 10kV/5kA "Enhanced" surge protection optional.

Warranty

- 5 Year Standard

Accessories

- Photoelectric Controls (see page 10)
- Light Shields (see Data Sheet OLP 3120 Shielding for EAL Area Light Fixtures)

Ordering Number Logic

Evolve™ LED Area Light (EALS-03)



E ALS 03 7

PROD. ID	GENERATION	VOLTAGE	OPTICAL DISTRIBUTION CODE	CRI	CCT	DIMMING	CONTROLS	MOUNTING ARM	COLOR	OPTIONS
----------	------------	---------	---------------------------	-----	-----	---------	----------	--------------	-------	---------

E = Evolve
AL = Area Light
S = Standard

03 = 3rd Generation

0 = 120-277*
1 = 120
2 = 208
3 = 240
4 = 277
5 = 480
D = 347
H = 347-480*
 *Not available with Fusing.
 Must choose a decrest voltage with F Option

SM = Symmetric Medium
SW = Symmetric Wide
SH = Symmetric High Angle
AF = Asymmetric Forward
AH = Asymmetric High Angle
AW = Asymmetric Wide
AN = Asymmetric Narrow/Auto

7 = 70 (min)

30 = 3000K
40 = 4000K
50 = 5000K
 ◊Select 3000K CCT for IDA Approved units

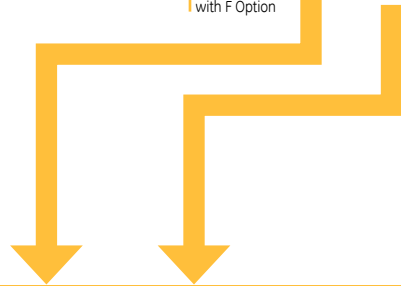
N = Dimming thru PE receptacle
D = External Dimming 18/2-3ft cable
X = Non-dimmable*
 All constructions supplied with ANSI C136.41 7-pin Receptacle
 *Required for Cx Optical Codes. Not available for other optical codes.
Note: Standard dimming 0-10V

A = ANSI 7-pin PE receptacle (no control)
D = ANSI 7-pin PE receptacle with shorting cap provided
Note: See accessories section on page 10 for PE Control ordering

C1 = Integral Slipfitter for 1.25" - 2" Pipe (1.66in. OD - 2.378in. OD)*
D1 = Universal Mounting Arm, fitted for round or square pole mounting**
K1 = Knuckle Slipfitter for 1.9 in - 2.3in. OD Tenon***
S1 = Knuckle Slipfitter for 2.3in. - 3.0in OD Tenon***
V1 = Knuckle Wall Mount***
 * Supplied with 3FT leads
 ** Supplied with 3FT #14/3 power cable
 *** Restricted Aiming Angle 0° to +45°

GRAY = Gray
BLCK = Black
DKBZ = Dark Bronze
WHITE = White

F = Fusing
H = Motion Sensor (Sensor Switch)
H2 = Motion Sensor (Daintree)
J = cUL/Canada
L = Tool-Less Entry
R = Enhanced Surge Protection (10kV/5kA)
S1 = Rotated Left †
S2 = Rotated Right †
T = Elevated Surge Protection (20kV/10kA)
U = DALI dimming ^+
V = 3-Position Terminal Block Y = Coastal Finish
XXX = Special Options
 * Contact Manufacturer for availability
 + Compatible with LightGrid 2.0 nodes
 ^ Not compatible at 347-480V or with motion sensor control
 † For aimed left or right light distribution orientation, as assembled in manufacturing. Not applicable for Symmetric Distributions.
Note: H2 option not available at 370V-480V

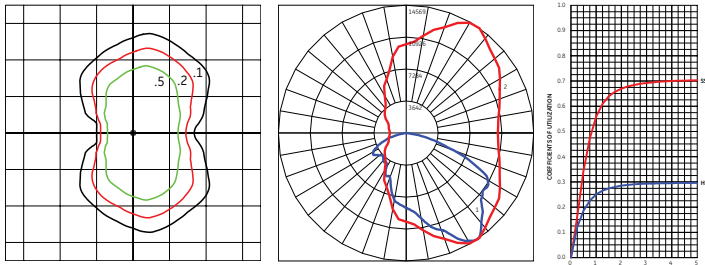


TYPE	OPTICAL CODE	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER		
			3000K	4000K & 5000K	120-277V & 347-480V	3000K B-U-G	4000 & 5000K B-U-G	IES FILE NUMBER 3000K	IES FILE NUMBER 4000K	IES FILE NUMBER 5000K
Type V	C5	Symmetric Medium (SM)	7300	7500	46	B3-U0-G1	B3-U0-G1	EALS03_C5SM730_IES	EALS03_C5SM740_IES	EALS03_C5SM750_IES
	D5	Symmetric Medium (SM)	9800	10000	64	B3-U0-G1	B3-U0-G1	EALS03_D5SM730_IES	EALS03_D5SM740_IES	EALS03_D5SM750_IES
	F5	Symmetric Medium (SM)	14700	15000	101	B4-U0-G2	B4-U0-G2	EALS03_F5SM730_IES	EALS03_F5SM740_IES	EALS03_F5SM750_IES
	H5	Symmetric Medium (SM)	19600	20000	140	B4-U0-G2	B4-U0-G2	EALS03_H5SM730_IES	EALS03_H5SM740_IES	EALS03_H5SM750_IES
	J5	Symmetric Medium (SM)	24500	25000	186	B4-U0-G2	B4-U0-G2	EALS03_J5SM730_IES	EALS03_J5SM740_IES	EALS03_J5SM750_IES
	K5	Symmetric Medium (SM)	29400	30000	239	B5-U0-G3	B5-U0-G3	EALS03_K5SM730_IES	EALS03_K5SM740_IES	EALS03_K5SM750_IES
	C5	Symmetric Wide (SW)	7300	7500	46	B2-U0-G1	B2-U0-G1	EALS03_C5SW730_IES	EALS03_C5SW740_IES	EALS03_C5SW750_IES
	D5	Symmetric Wide (SW)	9800	10100	64	B3-U0-G1	B3-U0-G1	EALS03_D5SW730_IES	EALS03_D5SW740_IES	EALS03_D5SW750_IES
	F5	Symmetric Wide (SW)	14700	15100	101	B3-U0-G2	B3-U0-G2	EALS03_F5SW730_IES	EALS03_F5SW740_IES	EALS03_F5SW750_IES
	H5	Symmetric Wide (SW)	19700	20200	140	B4-U0-G2	B4-U0-G2	EALS03_H5SW730_IES	EALS03_H5SW740_IES	EALS03_H5SW750_IES
	J5	Symmetric Wide (SW)	24600	25200	186	B4-U0-G2	B4-U0-G2	EALS03_J5SW730_IES	EALS03_J5SW740_IES	EALS03_J5SW750_IES
	K5	Symmetric Wide (SW)	29600	30300	239	B5-U0-G2	B5-U0-G2	EALS03_K5SW730_IES	EALS03_K5SW740_IES	EALS03_K5SW750_IES
	C5	Symmetric High Angle (SH)	7000	7200	46	B3-U0-G1	B3-U0-G1	EALS03_C5SH730_IES	EALS03_C5SH740_IES	EALS03_C5SH750_IES
	D5	Symmetric High Angle (SH)	9400	9600	64	B3-U0-G2	B3-U0-G2	EALS03_D5SH730_IES	EALS03_D5SH740_IES	EALS03_D5SH750_IES
	F5	Symmetric High Angle (SH)	14200	14500	101	B4-U0-G2	B4-U0-G2	EALS03_F5SH730_IES	EALS03_F5SH740_IES	EALS03_F5SH750_IES
H5	Symmetric High Angle (SH)	18900	19300	140	B4-U0-G2	B4-U0-G2	EALS03_H5SH730_IES	EALS03_H5SH740_IES	EALS03_H5SH750_IES	
J5	Symmetric High Angle (SH)	23600	24100	186	B5-U0-G3	B5-U0-G3	EALS03_J5SH730_IES	EALS03_J5SH740_IES	EALS03_J5SH750_IES	
K5	Symmetric High Angle (SH)	28400	29000	239	B5-U0-G3	B5-U0-G3	EALS03_K5SH730_IES	EALS03_K5SH740_IES	EALS03_K5SH750_IES	
Type IV	C4	Asymmetric Forward (AF)	7300	7500	50	B1-U0-G2	B1-U0-G2	EALS03_C4AF730_IES	EALS03_C4AF740_IES	EALS03_C4AF750_IES
	D4	Asymmetric Forward (AF)	9800	10000	70	B2-U0-G2	B2-U0-G2	EALS03_D4AF730_IES	EALS03_D4AF740_IES	EALS03_D4AF750_IES
	F4	Asymmetric Forward (AF)	14700	15000	116	B2-U0-G2	B2-U0-G2	EALS03_F4AF730_IES	EALS03_F4AF740_IES	EALS03_F4AF750_IES
	H4	Asymmetric Forward (AF)	19600	20000	140	B3-U0-G3	B3-U0-G3	EALS03_H4AF730_IES	EALS03_H4AF740_IES	EALS03_H4AF750_IES
	J4	Asymmetric Forward (AF)	24500	25000	186	B3-U0-G3	B3-U0-G3	EALS03_J4AF730_IES	EALS03_J4AF740_IES	EALS03_J4AF750_IES
	K4	Asymmetric Forward (AF)	29400	30000	239	B3-U0-G4	B3-U0-G4	EALS03_K4AF730_IES	EALS03_K4AF740_IES	EALS03_K4AF750_IES
	C4	Asymmetric High Angle (AH)	7000	7200	50	B2-U0-G2	B2-U0-G2	EALS03_C4AH730_IES	EALS03_C4AH740_IES	EALS03_C4AH750_IES
	D4	Asymmetric High Angle (AH)	9400	9600	70	B2-U0-G2	B2-U0-G2	EALS03_D4AH730_IES	EALS03_D4AH740_IES	EALS03_D4AH750_IES
	F4	Asymmetric High Angle (AH)	14200	14500	116	B3-U0-G3	B3-U0-G3	EALS03_F4AH730_IES	EALS03_F4AH740_IES	EALS03_F4AH750_IES
	H4	Asymmetric High Angle (AH)	18900	19300	140	B3-U0-G3	B3-U0-G4	EALS03_H4AH730_IES	EALS03_H4AH740_IES	EALS03_H4AH750_IES
J4	Asymmetric High Angle (AH)	23600	24100	186	B3-U0-G4	B3-U0-G4	EALS03_J4AH730_IES	EALS03_J4AH740_IES	EALS03_J4AH750_IES	
K4	Asymmetric High Angle (AH)	28400	29000	239	B3-U0-G4	B3-U0-G4	EALS03_K4AH730_IES	EALS03_K4AH740_IES	EALS03_K4AH750_IES	
Type III	C3	Asymmetric Wide (AW)	7300	7500	50	B2-U0-G1	B2-U0-G1	EALS03_C3AW730_IES	EALS03_C3AW740_IES	EALS03_C3AW750_IES
	D3	Asymmetric Wide (AW)	9800	10100	70	B2-U0-G2	B2-U0-G2	EALS03_D3AW730_IES	EALS03_D3AW740_IES	EALS03_D3AW750_IES
	F3	Asymmetric Wide (AW)	14700	15100	116	B2-U0-G2	B2-U0-G2	EALS03_F3AW730_IES	EALS03_F3AW740_IES	EALS03_F3AW750_IES
	H3	Asymmetric Wide (AW)	19700	20200	140	B3-U0-G2	B3-U0-G3	EALS03_H3AW730_IES	EALS03_H3AW740_IES	EALS03_H3AW750_IES
	J3	Asymmetric Wide (AW)	24600	25200	186	B3-U0-G3	B3-U0-G3	EALS03_J3AW730_IES	EALS03_J3AW740_IES	EALS03_J3AW750_IES
K3	Asymmetric Wide (AW)	29600	30300	239	B3-U0-G3	B3-U0-G3	EALS03_K3AW730_IES	EALS03_K3AW740_IES	EALS03_K3AW750_IES	
Type II	C2	Asymmetric Narrow/Auto (AN)	7300	7500	50	B2-U0-G2	B2-U0-G2	EALS03_C2AN730_IES	EALS03_C2AN740_IES	EALS03_C2AN750_IES
	D2	Asymmetric Narrow/Auto (AN)	9800	10100	70	B2-U0-G2	B2-U0-G2	EALS03_D2AN730_IES	EALS03_D2AN740_IES	EALS03_D2AN750_IES
	F2	Asymmetric Narrow/Auto (AN)	14700	15100	116	B3-U0-G3	B3-U0-G3	EALS03_F2AN730_IES	EALS03_F2AN740_IES	EALS03_F2AN750_IES
	H2	Asymmetric Narrow/Auto (AN)	19700	20200	140	B3-U0-G3	B3-U0-G3	EALS03_H2AN730_IES	EALS03_H2AN740_IES	EALS03_H2AN750_IES
	J2	Asymmetric Narrow/Auto (AN)	24600	25200	186	B3-U0-G3	B3-U0-G3	EALS03_J2AN730_IES	EALS03_J2AN740_IES	EALS03_J2AN750_IES
K2	Asymmetric Narrow/Auto (AN)	29600	30300	239	B3-U0-G3	B3-U0-G3	EALS03_K2AN730_IES	EALS03_K2AN740_IES	EALS03_K2AN750_IES	

Photometrics

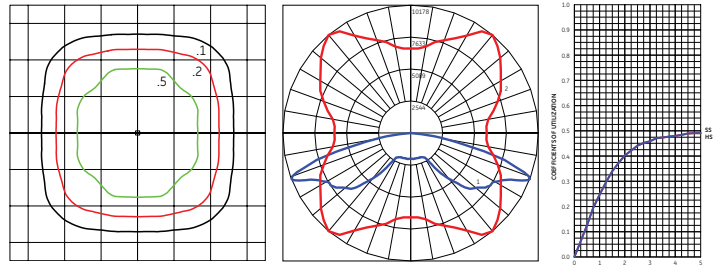
Evolve™ LED Area Light (EALS-03)

EALS Type II - Asymmetric Narrow/Auto
30,300 Lumens, 5000K (EALS03_K2AN750__IES)



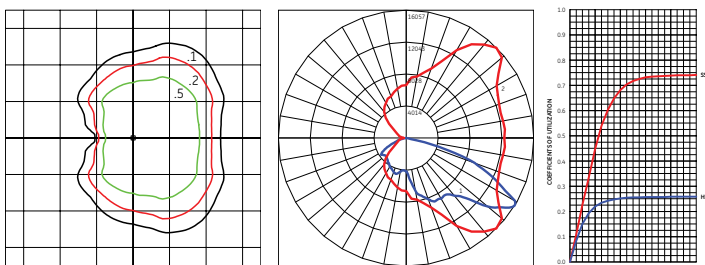
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 55°
 — Vertical plane through horizontal angle of 34°

EALS Type VS - Symmetric High Angle
29,000 Lumens, 5000K (EALS03_K5SH750__IES)



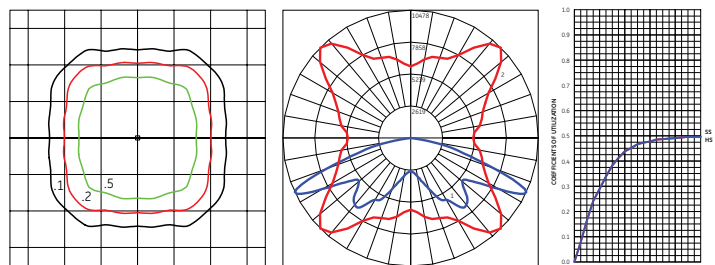
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 50°
 — Vertical plane through horizontal angle of 69°

EALS Type III - Asymmetric Wide
30,300 Lumens, 5000K (EALS03_K3AW750__IES)



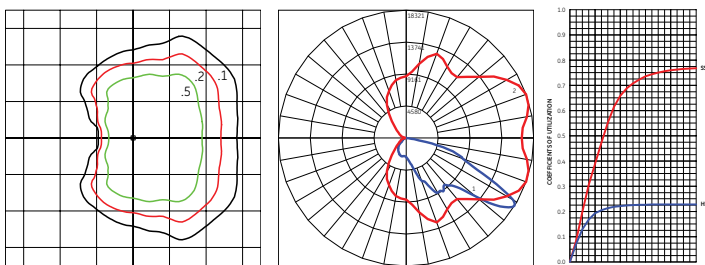
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 45°
 — Vertical plane through horizontal angle of 58°

EALS Type VS - Symmetric Medium
30,000 Lumens, 5000K (EALS03_K5SM750__IES)



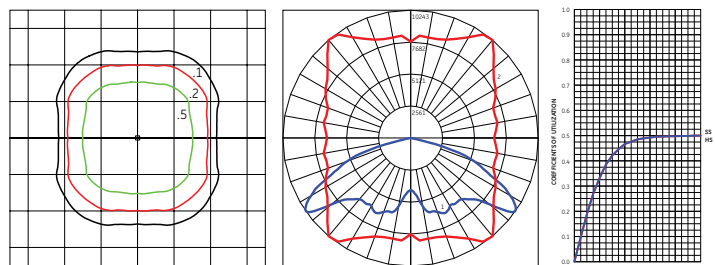
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 45°
 — Vertical plane through horizontal angle of 65°

EALS Type IV - Asymmetric Forward
30,000 Lumens, 5000K (EALS03_K4AF750__IES)



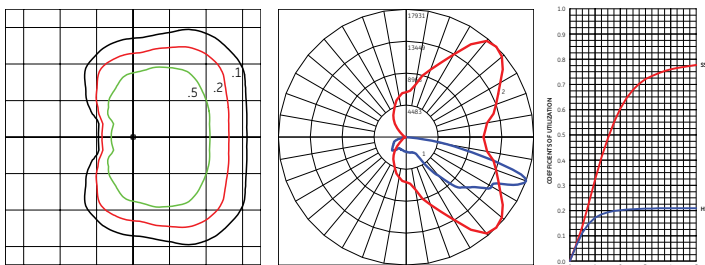
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 20°
 — Vertical plane through horizontal angle of 58°

EALS Type VS - Symmetric Wide
30,300 Lumens, 5000K (EALS03_K5SW750__IES)



Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 50°
 — Vertical plane through horizontal angle of 55°

EALS Type IV - Asymmetric High Angle
29,000 Lumens, 5000K (EALS03_K4AH750__IES)



Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 45°
 — Vertical plane through horizontal angle of 70°



Ordering Number Logic

Evolve™ LED Area Light (EALP-03)

EALP 03 7

PROD. ID	GENERATION	VOLTAGE	OPTICAL DISTRIBUTION CODE	CRI	CCT	DIMMING	CONTROLS	MOUNTING ARM	COLOR	OPTIONS
----------	------------	---------	---------------------------	-----	-----	---------	----------	--------------	-------	---------

E = Evolve
AL = Area Light
P = Premium

03 = 3rd Generation

0 = 120-277*
1 = 120
2 = 208
3 = 240
4 = 277
5 = 480
D = 347
H = 347-480*
 *Not available with Fusing.
 Must choose a discreet voltage with F Option

SM = Symmetric Medium
SW = Symmetric Wide
SH = Symmetric High Angle
AF = Asymmetric Forward
AH = Asymmetric High Angle
AW = Asymmetric Wide
AN = Asymmetric Narrow/Auto

7 = 70 (min)

30 = 3000K
40 = 4000K
50 = 5000K
 <Select 3000K CCT for IDA Approved units

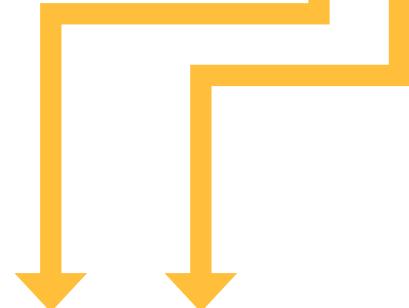
N = Dimming thru PE receptacle
D = External Dimming 18/2-3ft cable
X = Non-dimmable*
 All constructions supplied with ANSI C136.41 7-pin Receptacle
 *Required for Cx Optical Codes. Not available for other optical codes.
Note: Standard dimming 0-10V

A = ANSI 7-pin PE receptacle (no control)
D = ANSI 7-pin PE receptacle with shorting cap provided
Note: See accessories section on page 10 for PE Control ordering

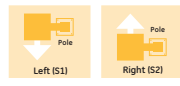
C1 = Integral Slip-fitter 2" Pipe (2.378 in. OD)*
D1 = Universal Mounting Arm, fitted for round or square pole mounting**
K1 = Knuckle Slipfitter for 1.9 in. - 2.3in. OD Tenon***
S1 = Knuckle Slipfitter for 2.3in. - 3.0in OD Tenon***
V1 = Knuckle Wall Mount***
 * Supplied with leads
 ** Supplied with 16/3 ft cable
 *** Restricted Aiming Angle 0° to +45°

GRAY = Gray
BLCK = Black
DKBZ = Dark Bronze
WHITE = White

F = Fusing
H = Motion Sensor (Sensor Switch)
H2 = Motion Sensor (Daintree)
J = cUL/Canada
L = Tool-Less Entry
R = Enhanced Surge Protection (10kV/5kA)
S1 = Rotated Left †
S2 = Rotated Right †
T = Elevated Surge Protection (20kV/10kA)
U = DALI dimming ^+
V = 3-Position Terminal Block V = Coastal Finish
XXX = Special Options



* Contact Manufacturer for availability
 + Compatible with LightGrid 2.0 nodes
 ^ Not compatible at 347-480V, with motion sensor controls, or above 400W.
 † For aimed left or right light distribution orientation, as assembled in manufacturing. Not applicable for Symmetric Distributions.
Note: H option not available for 470W and above configurations.
Note: H2 option not available at 370V-480V



TYPE	OPTICAL CODE	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE		BUG RATING		IES FILE NUMBER 3000K	IES FILE NUMBER 4000K	IES FILE NUMBER 5000K
			3000K	4000K & 5000K	120-277V & 347-480V	3000K B-U-G	4000 & 5000K B-U-G				
Type V	J5	Symmetric Medium (SM)	23600	25000	172	B4-U0-G2	B4-U0-G2	EALP03_J5SM730_IES	EALP03_J5SM740_IES	EALP03_J5SM750_IES	
	K5	Symmetric Medium (SM)	28300	30000	212	B5-U0-G3	B5-U0-G3	EALP03_K5SM730_IES	EALP03_K5SM740_IES	EALP03_K5SM750_IES	
	L5	Symmetric Medium (SM)	33000	35000	263	B5-U0-G3	B5-U0-G3	EALP03_L5SM730_IES	EALP03_L5SM740_IES	EALP03_L5SM750_IES	
	M5	Symmetric Medium (SM)	37800	40000	305	B5-U0-G3	B5-U0-G4	EALP03_M5SM730_IES	EALP03_M5SM740_IES	EALP03_M5SM750_IES	
	N5	Symmetric Medium (SM)	47200	50000	400	B5-U0-G4	B5-U0-G4	EALP03_N5SM730_IES	EALP03_N5SM740_IES	EALP03_N5SM750_IES	
	P5	Symmetric Medium (SM)	56700	60000	470	B5-U0-G4	B5-U0-G4	EALP03_P5SM730_IES	EALP03_P5SM740_IES	EALP03_P5SM750_IES	
	Q5	Symmetric Medium (SM)	66100	70000	570	B5-U0-G5	B5-U0-G5	EALP03_Q5SM730_IES	EALP03_Q5SM740_IES	EALP03_Q5SM750_IES	
	J5	Symmetric Wide (SW)	23600	25000	172	B4-U0-G2	B4-U0-G2	EALP03_J5SW730_IES	EALP03_J5SW740_IES	EALP03_J5SW750_IES	
	K5	Symmetric Wide (SW)	28300	30000	212	B5-U0-G2	B5-U0-G2	EALP03_K5SW730_IES	EALP03_K5SW740_IES	EALP03_K5SW750_IES	
	L5	Symmetric Wide (SW)	33000	35000	263	B5-U0-G2	B5-U0-G2	EALP03_L5SW730_IES	EALP03_L5SW740_IES	EALP03_L5SW750_IES	
	M5	Symmetric Wide (SW)	37800	40000	305	B5-U0-G2	B5-U0-G2	EALP03_M5SW730_IES	EALP03_M5SW740_IES	EALP03_M5SW750_IES	
	N5	Symmetric Wide (SW)	47200	50000	400	B5-U0-G3	B5-U0-G3	EALP03_N5SW730_IES	EALP03_N5SW740_IES	EALP03_N5SW750_IES	
	P5	Symmetric Wide (SW)	56700	60000	470	B5-U0-G3	B5-U0-G3	EALP03_P5SW730_IES	EALP03_P5SW740_IES	EALP03_P5SW750_IES	
	Q5	Symmetric Wide (SW)	66100	70000	570	B5-U0-G4	B5-U0-G4	EALP03_Q5SW730_IES	EALP03_Q5SW740_IES	EALP03_Q5SW750_IES	
	J5	Symmetric High Angle (SH)	22700	24100	172	B5-U0-G3	B5-U0-G3	EALP03_J5SH730_IES	EALP03_J5SH740_IES	EALP03_J5SH750_IES	
	K5	Symmetric High Angle (SH)	27400	29000	212	B5-U0-G3	B5-U0-G3	EALP03_K5SH730_IES	EALP03_K5SH740_IES	EALP03_K5SH750_IES	
	L5	Symmetric High Angle (SH)	31900	33800	263	B5-U0-G4	B5-U0-G4	EALP03_L5SH730_IES	EALP03_L5SH740_IES	EALP03_L5SH750_IES	
	M5	Symmetric High Angle (SH)	36400	38600	305	B5-U0-G4	B5-U0-G4	EALP03_M5SH730_IES	EALP03_M5SH740_IES	EALP03_M5SH750_IES	
	N5	Symmetric High Angle (SH)	45600	48300	400	B5-U0-G4	B5-U0-G5	EALP03_N5SH730_IES	EALP03_N5SH740_IES	EALP03_N5SH750_IES	
	P5	Symmetric High Angle (SH)	54800	58000	470	B5-U0-G5	B5-U0-G5	EALP03_P5SH730_IES	EALP03_P5SH740_IES	EALP03_P5SH750_IES	
Q5	Symmetric High Angle (SH)	63800	67600	570	B5-U0-G5	B5-U0-G5	EALP03_Q5SH730_IES	EALP03_Q5SH740_IES	EALP03_Q5SH750_IES		

Type IV, Type III and Type II Claims Table for EALP-03 continued on Page 6

Ordering Number Logic

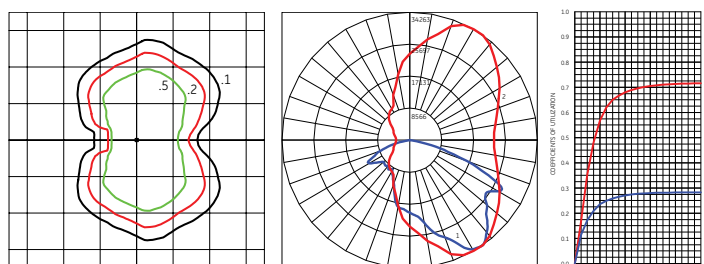
Evolve™ LED Area Light (EALP-03)

TYPE	OPTICAL CODE	DISTRIBUTION	TYPICAL INITIAL LUMENS		TYPICAL SYSTEM WATTAGE	BUG RATING		IES FILE NUMBER 3000K	IES FILE NUMBER 4000K	IES FILE NUMBER 5000K
			3000K	4000K & 5000K	120-277V & 347-480V	3000K B-U-G	4000 & 5000K B-U-G			
Type IV	J4	Asymmetric Forward (AF)	23600	25000	200	B3-U0-G3	B3-U0-G4	EALP03_J4AF730_IES	EALP03_J4AF740_IES	EALP03_J4AF750_IES
	K4	Asymmetric Forward (AF)	28300	30000	212	B3-U0-G4	B3-U0-G4	EALP03_K4AF730_IES	EALP03_K4AF740_IES	EALP03_K4AF750_IES
	L4	Asymmetric Forward (AF)	33000	35000	263	B3-U0-G4	B3-U0-G4	EALP03_L4AF730_IES	EALP03_L4AF740_IES	EALP03_L4AF750_IES
	M4	Asymmetric Forward (AF)	37800	40000	305	B4-U0-G4	B4-U0-G5	EALP03_M4AF730_IES	EALP03_M4AF740_IES	EALP03_M4AF750_IES
	N4	Asymmetric Forward (AF)	47200	50000	400	B4-U0-G5	B4-U0-G5	EALP03_N4AF730_IES	EALP03_N4AF740_IES	EALP03_N4AF750_IES
	P4	Asymmetric Forward (AF)	56700	60000	470	B4-U0-G5	B4-U0-G5	EALP03_P4AF730_IES	EALP03_P4AF740_IES	EALP03_P4AF750_IES
	Q4	Asymmetric Forward (AF)	66100	70000	570	B4-U0-G5	B4-U0-G5	EALP03_Q4AF730_IES	EALP03_Q4AF740_IES	EALP03_Q4AF750_IES
	J4	Asymmetric High Angle (AH)	22700	24100	200	B3-U0-G4	B3-U0-G4	EALP03_J4AH730_IES	EALP03_J4AH740_IES	EALP03_J4AH750_IES
	K4	Asymmetric High Angle (AH)	27400	29000	212	B3-U0-G4	B3-U0-G5	EALP03_K4AH730_IES	EALP03_K4AH740_IES	EALP03_K4AH750_IES
	L4	Asymmetric High Angle (AH)	31900	33800	263	B4-U0-G5	B4-U0-G5	EALP03_L4AH730_IES	EALP03_L4AH740_IES	EALP03_L4AH750_IES
	M4	Asymmetric High Angle (AH)	36400	38600	305	B4-U0-G5	B4-U0-G5	EALP03_M4AH730_IES	EALP03_M4AH740_IES	EALP03_M4AH750_IES
	N4	Asymmetric High Angle (AH)	45600	48300	400	B4-U0-G5	B4-U0-G5	EALP03_N4AH730_IES	EALP03_N4AH740_IES	EALP03_N4AH750_IES
P4	Asymmetric High Angle (AH)	54800	58000	470	B4-U0-G5	B4-U0-G5	EALP03_P4AH730_IES	EALP03_P4AH740_IES	EALP03_P4AH750_IES	
Q4	Asymmetric High Angle (AH)	63800	67600	570	B5-U0-G5	B5-U0-G5	EALP03_Q4AH730_IES	EALP03_Q4AH740_IES	EALP03_Q4AH750_IES	
Type III	J3	Asymmetric Wide (AW)	23600	25000	200	B3-U0-G3	B3-U0-G3	EALP03_J3AW730_IES	EALP03_J3AW740_IES	EALP03_J3AW750_IES
	K3	Asymmetric Wide (AW)	28300	30000	212	B3-U0-G3	B3-U0-G3	EALP03_K3AW730_IES	EALP03_K3AW740_IES	EALP03_K3AW750_IES
	L3	Asymmetric Wide (AW)	33000	35000	263	B3-U0-G3	B4-U0-G3	EALP03_L3AW730_IES	EALP03_L3AW740_IES	EALP03_L3AW750_IES
	M3	Asymmetric Wide (AW)	37800	40000	305	B4-U0-G3	B4-U0-G4	EALP03_M3AW730_IES	EALP03_M3AW740_IES	EALP03_M3AW750_IES
	N3	Asymmetric Wide (AW)	47200	50000	400	B4-U0-G4	B4-U0-G4	EALP03_N3AW730_IES	EALP03_N3AW740_IES	EALP03_N3AW750_IES
	P3	Asymmetric Wide (AW)	56700	60000	470	B5-U0-G4	B5-U0-G4	EALP03_P3AW730_IES	EALP03_P3AW740_IES	EALP03_P3AW750_IES
	Q3	Asymmetric Wide (AW)	66100	70000	570	B5-U0-G5	B5-U0-G5	EALP03_Q3AW730_IES	EALP03_Q3AW740_IES	EALP03_Q3AW750_IES
Type II	J2	Asymmetric Narrow/Auto (AN)	23800	25200	200	B3-U0-G3	B3-U0-G3	EALP03_J2AN730_IES	EALP03_J2AN740_IES	EALP03_J2AN750_IES
	K2	Asymmetric Narrow/Auto (AN)	28600	30300	212	B3-U0-G3	B3-U0-G3	EALP03_K2AN730_IES	EALP03_K2AN740_IES	EALP03_K2AN750_IES
	L2	Asymmetric Narrow/Auto (AN)	33300	35300	263	B4-U0-G4	B4-U0-G4	EALP03_L2AN730_IES	EALP03_L2AN740_IES	EALP03_L2AN750_IES
	M2	Asymmetric Narrow/Auto (AN)	38100	40400	305	B4-U0-G4	B4-U0-G4	EALP03_M2AN730_IES	EALP03_M2AN740_IES	EALP03_M2AN750_IES
	N2	Asymmetric Narrow/Auto (AN)	47700	50500	400	B4-U0-G4	B4-U0-G4	EALP03_N2AN730_IES	EALP03_N2AN740_IES	EALP03_N2AN750_IES
	P2	Asymmetric Narrow/Auto (AN)	57200	60600	470	B4-U0-G4	B4-U0-G4	EALP03_P2AN730_IES	EALP03_P2AN740_IES	EALP03_P2AN750_IES
	Q2	Asymmetric Narrow/Auto (AN)	66800	70700	570	B5-U0-G5	B5-U0-G5	EALP03_Q2AN730_IES	EALP03_Q2AN740_IES	EALP03_Q2AN750_IES

Photometrics

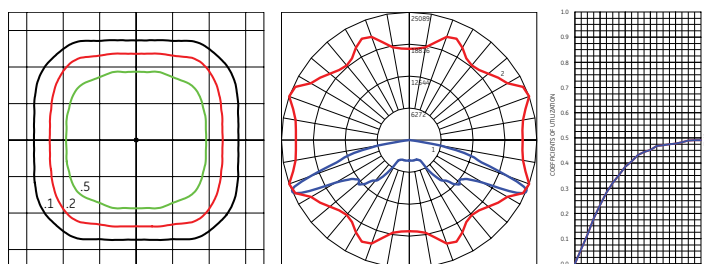
Evolve™ LED Area Light (EALP-03)

EALP Type II - Asymmetric Narrow/Auto
 70,700 Lumens, 5000K (EALP03_Q2AN750__IES)



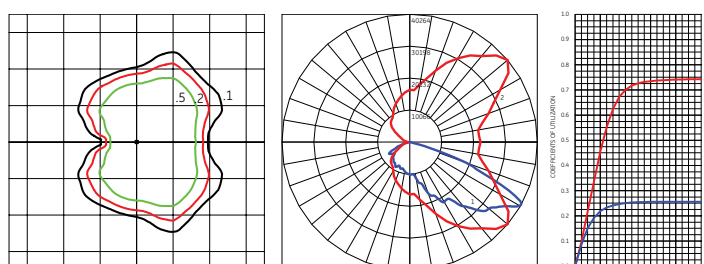
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 60°
 — Vertical plane through horizontal angle of 35°

EALP Type VS - Symmetric High Angle
 67,600 Lumens, 5000K (EALP03_Q5SH750__IES)



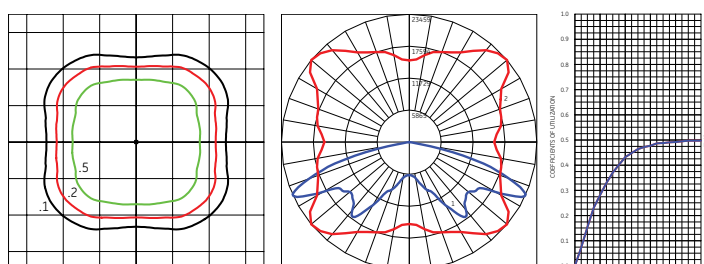
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 20°
 — Vertical plane through horizontal angle of 66°

EALP Type III - Asymmetric Wide
 70,000 Lumens, 5000K (EALP03_Q3AW750__IES)



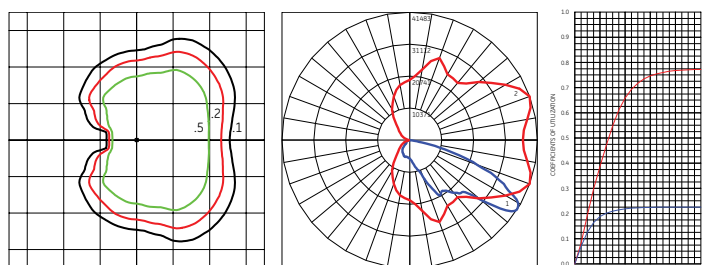
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 40°
 — Vertical plane through horizontal angle of 61°

EALP Type VS - Symmetric Medium
 70,000 Lumens, 5000K (EALP03_Q5SM750__IES)



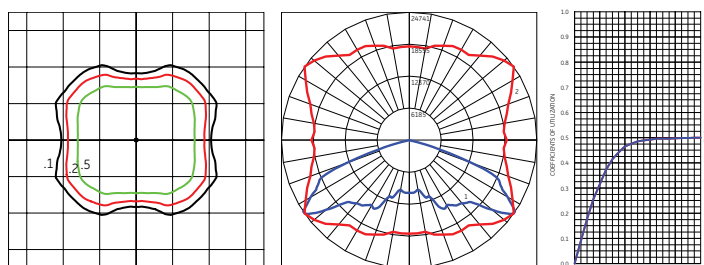
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 40°
 — Vertical plane through horizontal angle of 65°

EALP Type IV - Asymmetric Forward
 70,000 Lumens, 5000K (EALP03_Q4AF750__IES)



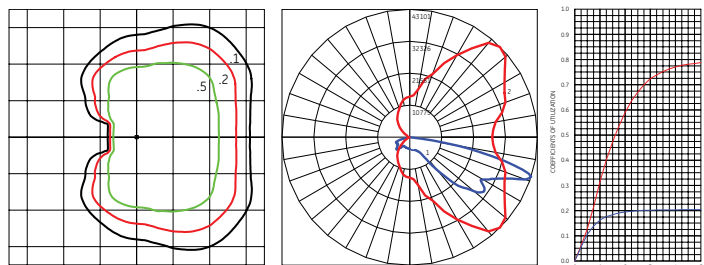
Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 20°
 — Vertical plane through horizontal angle of 57°

EALP Type VS - Symmetric Wide
 70,000 Lumens, 5000K (EALP03_Q5SW750__IES)



Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 35°
 — Vertical plane through horizontal angle of 56°

EALP Type IV - Asymmetric High Angle
 67,700 Lumens, 5000K (EALP03_Q4AH750__IES)

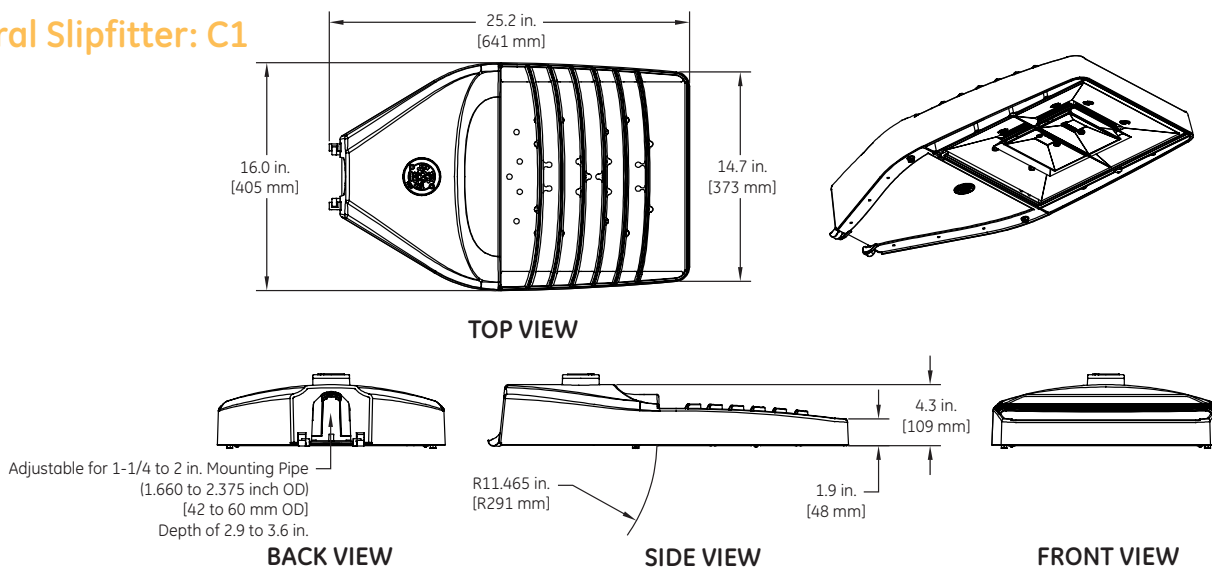


Grid Distance in Units of Mounting Height at 40' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at 45°
 — Vertical plane through horizontal angle of 72°

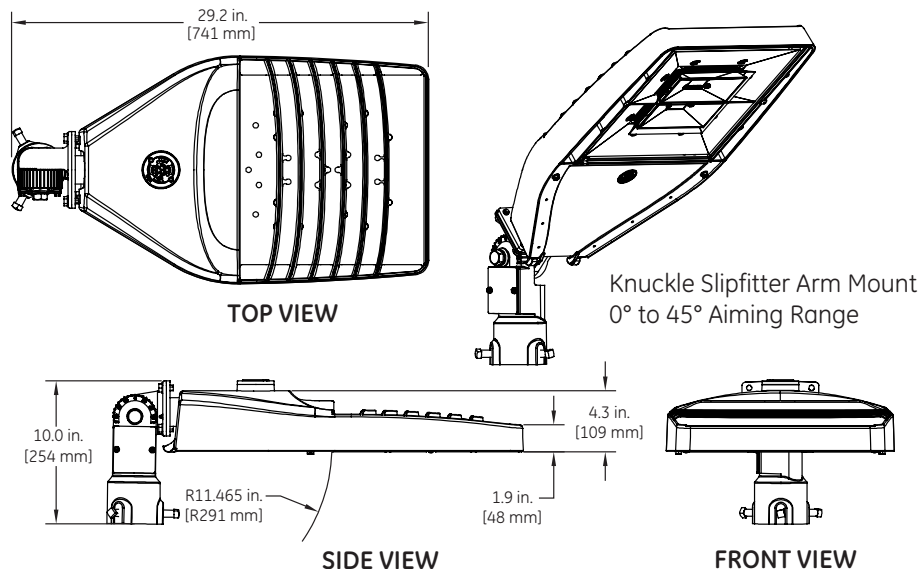
Product Dimensions

Evolve™ LED Area Light (EALS-03 & EALP-03)

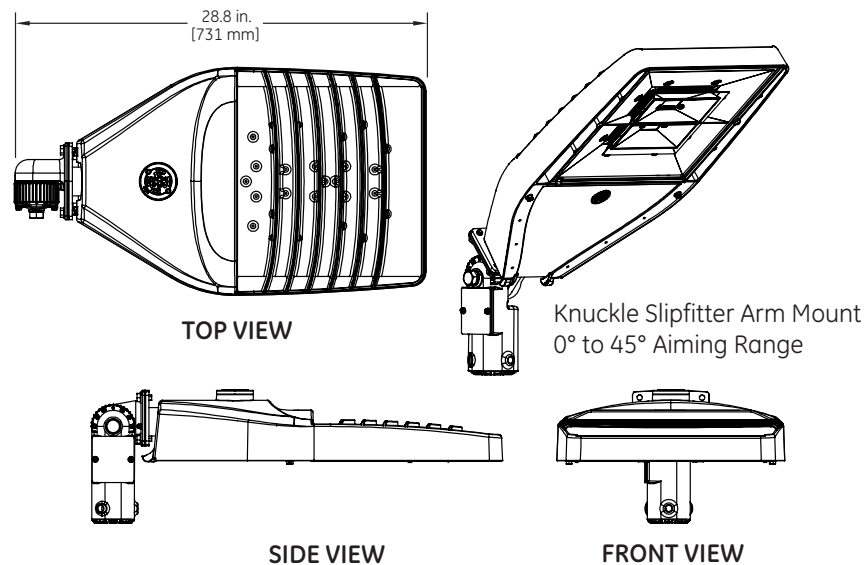
Integral Slipfitter: C1



Knuckle Slipfitter: S1



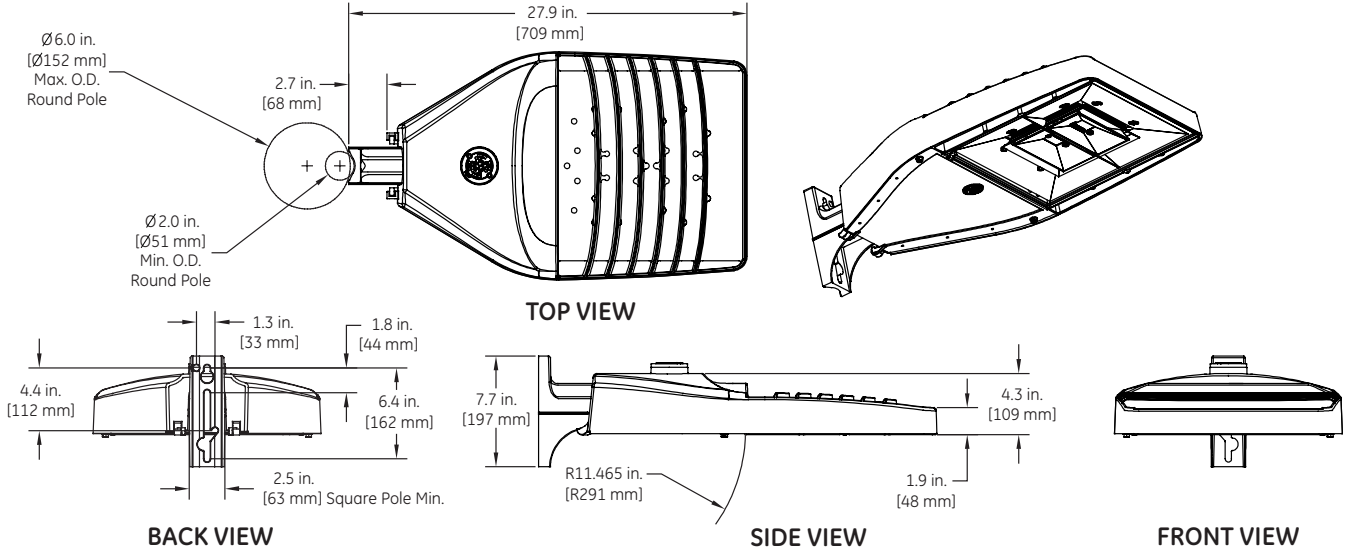
Knuckle Slipfitter: K1



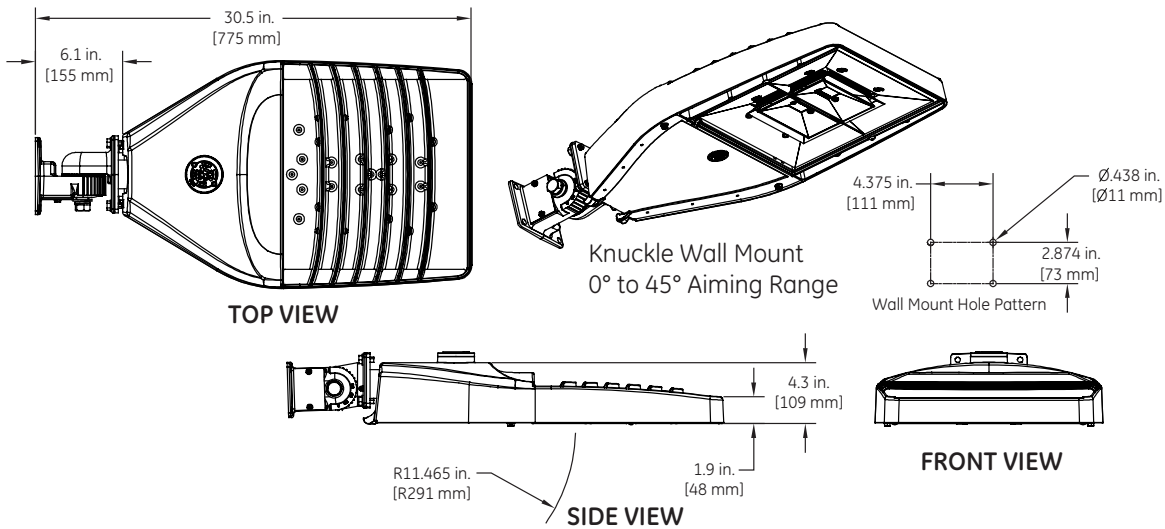
Product Dimensions

Evolve™ LED Area Light (EALS-03 & EALP-03)

Universal Mounting Arm: D1



Knuckle Wall Mount: V1



DATA

- Approximate Net Weight: 27 lbs (12.2 kg)
- Effective Projected Area:
 - Knuckle Slipfitter S1, K1 45° aim, EPA = 2.45
 - Knuckle Slipfitter S1, K1 downward aim, EPA = 0.73
 - Universal Arm Mount D1, EPA = 0.54 - Knuckle Wall Mount V1, 45° aim, EPA = 0.77 sq ft min and 1.43 sq ft max
 - Integral Slipfitter C1, EPA = 0.63

Accessories

Evolve™ LED Area Light (EALS-03 & EALP-03)

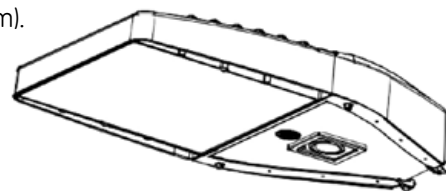
PE Accessories (to be ordered separately)

SAP Number	Part Number	Description
93029237	PED-MV-LED-7	ANSI C136.41 Dimming PE, 120-277V
93029238	PED-347-LED-7	ANSI C136.41 Dimming PE, 347V
93029239	PED-480-LED-7	ANSI C136.41 Dimming PE, 480V

SAP Number	Part Number	Description
28299	PEC0TL	STANDARD 120-277V
28294	PEC5TL	STANDARD 480V
80436	PECDTL	STANDARD 347V
73251	SCCL-PECTL	Shorting cap

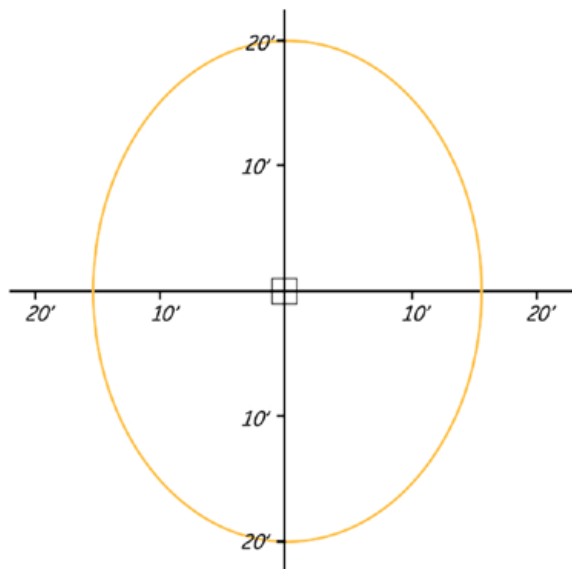
H-Motion Sensing Option

- Intended for applications, between 15-30 ft. mounting height. (4.57-9.14m). For mounting heights exceeding 30 ft., pole mounted sensors are recommended.
- Provides a coverage area radius for walking motion of 15-20 ft. (4.57-6.10m).
- Provides 270° of coverage (~90° is blocked by the pole).
- Standard factory settings:
 - 50% output when unoccupied, 100% output occupied.
 - Integral PE Sensor.
 - 5 minute post-occupancy time delay, 5 minute dimming ramp-down.
- Fixture power increase of 1W expected with sensor use.



Note: Standard options may be reprogrammed in the field. Reprogramming instructions included in product shipment.

Sensor Pattern



**Sensing Pattern Area Fixture
 Up to 30 ft. Mounting Height**

Mounting Information

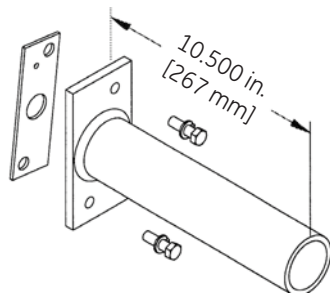
Evolve™ LED Area Light (EALS-03 & EALP-03)

Mounting Options for Integral Slipfitter - (Mounting Arm C1)

Order separately

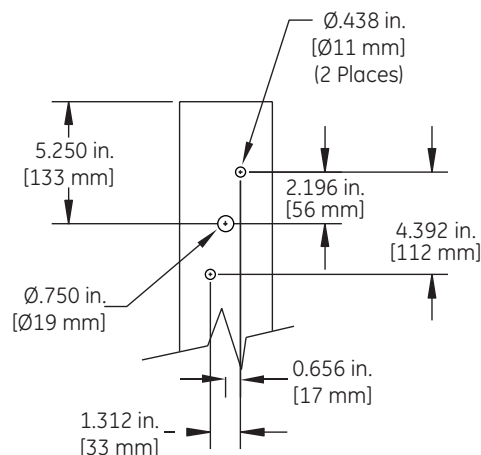
SQUARE POLE MOUNTING ARM

3.5 TO 4.5-inch (89 to 114mm) SQUARE
 (WILL ALLOW 4 FIXTURES PER POLE @ 90 DEGREES.)



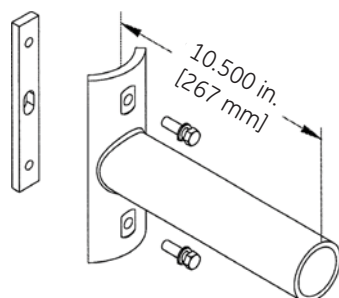
ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
SPA-EAMT10BLCK "Black"
SPA-EAMT10DKBZ "Dark Bronze"
SPA-EAMT10WHTE "White"
SPA-EAMT10GRAY "Gray"

SQUARE POLE MOUNTING DRILLING TEMPLATE



ROUND POLE MOUNTING ARM DRILLING TEMPLATE

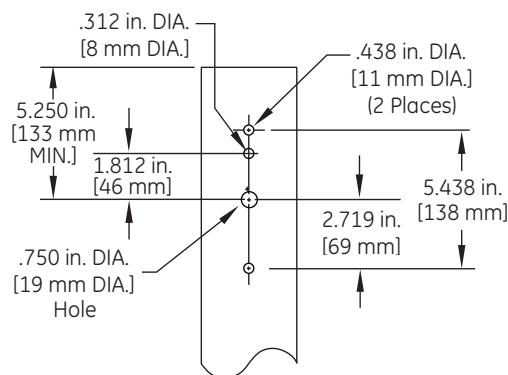
3.5 TO 4.5-inch (89 to 114mm) OD
 (WILL ALLOW 4 FIXTURES PER POLE @ 90 DEGREES.)



ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
RPA-EAMT10BLCK "Black"
RPA-EAMT10DKBZ "Dark Bronze"
RPA-EAMT10WHTE "White"
RPA-EAMT10GRAY "Gray"

ROUND POLE MOUNTING DRILLING TEMPLATE

3.5 TO 4.5-inch (89 to 114mm) OD
 round pole mounting arm



Wall Mounting Bracket Adapter Plate

ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
WMB-EAMT06

***NOTE:** For Wall Mounting, order luminaire with mounting arm: C1 = Slipfitter 2" Pipe (2.378 in. OD) supplied with leads.

Other mounting patterns are available for retrofit installations.
 Contact manufacturing for other available mounting patterns.



Evolve[®]

Compact Low Wattage Area Light
EACL



GE current
a Daintree company

Product Features

Current's EAL Series of Area Light Luminaires offer a wide range of optical patterns, color temperatures, lumen packages, and mounting configurations to optimize area light applications, as well as provide versatility in lighting design within the same form factor.

The new Compact Low Wattage Area Light (EACL) expands the range of lumen packages down to 3,000 Lumens to meet the needs of applications requiring lower lumens. The EACL is an ideal cost effective solution for smaller Commercial and Retail exterior applications requiring between 3,000 and 20,000 Lumens.

The EACL features our innovative highly flexible Universal Mounting Arm option, which provides installers the ability to mount EAL fixtures on both round and square poles of multiple sizes. In addition, it features both in-line and offset bolt patterns allowing it to easily be affixed to the majority of bolt patterns one would find in the field.

Applications

- Site and area light applications such as parking lots, retail exteriors, commercial exteriors, and other general spaces.

Housing

- Slim architectural design incorporates an integral heat sink and light engine, ensuring maximum heat transfer, and long LED life.
- Die cast aluminum housing
- 3G vibration per ANSI C136.31-2018

LED & Optical Assembly

- LM-79 tests and reports in accordance with IESNA standards
- Upward Light Output Ratio (ULOR) = 0 (horizontal orientation)
- 70 CRI at 3000K, 4000K and 5000K
- Distributions: II, III, IV

Lumen Maintenance

- Projected Lxx per IES TM-21 at 25 °C for reference:



EACL01 OPTICAL CODE	LXX(10K)@HOURS		
	25,000 HR	50,000 HR	60,000 HR
A2, A3, A4, B2, B3, B4, C2, C3, C4 D2, D3, D4, E2, E3, E4, F2, F3, F4	L94	L90	L88
H2,H3, H4	L97	L96	L96

NOTES: Projected Lxx based on LM80 (10,000 hour testing). Accepted industry tolerances apply to initial luminous flux and lumen maintenance measurements.

Lumen Ambient Temperature Factors:

Ambient Temp (°C)	Initial Flux Factor
10	1.02
20	1.01
25	1.00
30	0.99
40	0.98

Ratings

- IP66 optical enclosure per ANSI C136.25-2013
- Operating Temperature -40°C to +50°C
-  cUL Listed
-  UL 1598 Listed Suitable for Wet Locations

Mounting

Option C1 (Standard)

- Integral Slipfitter for 1.25"-2" Pipe (1.66in. OD-2.378in. OD) supplied with leads. +/- 5 deg adjustment for leveling.

Option D1

- Universal Mounting Arm, fitted for round or square pole mounting supplied with 16/3 3ft cable.

Option K1

- Knuckle Slipfitter for 1.9 in. -2.3 in. OD Tenon with leads. Restricted aiming angle 0° to +45°.

Option S1

- Knuckle Slipfitter for 2.3in. - 3.0in OD Tenon with leads. Restricted aiming angle 0° to +45°.

Option V1

- Knuckle Wall Mount with leads. Restricted aiming angle 0° to +45°.

Finish

- Corrosion resistant polyester powder paint, minimum thickness 2.0 mil.
- Standard colors: Black, Dark Bronze, Gray & White.
- RAL & custom colors available.
- Optional coastal finish available.

Electrical

- 120-277 VAC and 347-480 VAC available.
- System power factor is ≥90% and THD ≤20%.*
- ANSI C136.41 7-pin dimming receptacle, optional.
- ANSI photo electric sensors (PE) for all voltages, optional.
- Dimming/Occupancy:
 - Externally wired 0-10V dimming, optional.
 - Standalone dimming occupancy sensor available
 - Daintree occupancy sensor available.
- Surge Protection per ANSI C136.2-2015.
 - 6kV/3kA "Basic" surge protection, standard.
 - 10kV/5kA "Enhanced" surge protection optional.

* System PF and THD specified at rated watts

Warranty

- 5 Year Standard

Accessories

- See Page 7 for PE Controls and Light Shield Information

Ordering Number Logic

Evolve® Compact Low Wattage Area Light (EACL)



Project name _____

Date _____

Type _____

EACL 01 **7** **C1**

PROD. ID	GENERATION	VOLTAGE	OPTICAL CODE	DISTRIBUTION	CRI	CCT	DIMMING	CONTROLS	MOUNTING ARM	COLOR	OPTIONS
E = Evolve AC = Compact Area Light L = Low Wattage	01 = 1st Generation	0 = 120-277* H = 347-480* 1 = 120 2 = 208 3 = 240 4 = 277 5 = 480 D = 347 * Not available with Fusing. Must choose a discrete voltage with F Option.	AF = Asymmetric Forward AW = Asymmetric Wide AN = Asymmetric Narrow/Auto	7 = 70 (min)	30 = 3000K 40 = 4000K 50 = 5000K	N = Dimming thru PE receptacle D = External Dimming 18/2-3ft cable X = Non-Dimmable Note: Standard dimming 0-10V	1 = None A = ANSI 7-pin PE receptacle (no control) D = ANSI 7-pin PE receptacle with shorting cap provided	C1 = Integral Slip-fitter for 1.25"- 2" Pipe (1.66in. OD - 2.378 in. OD)* Note: C1 Comes Standard D1 = Universal Mounting Arm, fitted for round or square pole mounting** K1 = Knuckle Slipfitter for 1.9 in - 2.3in. OD Tenon* ++ S1 = Knuckle Slipfitter for 2.3in. - 3.0in OD Tenon* ++ V1 = Knuckle Wall Mount* ++ * Supplied with 3ft leads ** Supplied with 16/3 3ft cable ++ Restricted Aiming Angle 0° to +45°	GRAY = Gray BLCK = Black DKBZ = Dark Bronze WHTE = White	F = Fusing H1 = Motion Sensor (Sensor Switch) H2 = Motion Sensor w/LightGrid J = cUL/Canada L = Tool-Less Entry R = Enhanced Surge Protection (10kV/5kA) U = DALI dimming+ ^ V = 3-Position Terminal Block Y = Coastal Finish XXX = Special Options + Compatible with LightGrid Wireless Control System Nodes ^ Not compatible with motion sensor control	

	OPTICAL CODE	DISTRIBUTION	TYPICAL INITIAL SYSTEM				BUG RATING		IES FILE NUMBER			IES FILE NUMBER		IES FILE NUMBER	
			LUMENS	WATTAGE	3000K	4000K & 5000K	3000K	4000K & 5000K	3000K	4000K	5000K	3000K	4000K	5000K	
TYPE IV	A4	Asymmetric Forward (AF)	2900	3000	21	23	B1-UO-G1	B1-UO-G1	EACL01_A4AF730_-120-277VIES	EACL01_A4AF730_-347-480VIES	EACL01_A4AF740_-120-277VIES	EACL01_A4AF740_-347-480VIES	EACL01_A4AF750_-120-277VIES	EACL01_A4AF750_-347-480VIES	
	B4		4900	5000	36	38	B1-UO-G1	B1-UO-G1	EACL01_B4AF730_-120-277VIES	EACL01_B4AF730_-347-480VIES	EACL01_B4AF740_-120-277VIES	EACL01_B4AF740_-347-480VIES	EACL01_B4AF750_-120-277VIES	EACL01_B4AF750_-347-480VIES	
	C4		7300	7500	55		B1-UO-G2	B1-UO-G2	EACL01_C4AF730_IIES		EACL01_C4AF740_IIES		EACL01_C4AF750_IIES		
	D4		9800	10000	73		B2-UO-G2	B2-UO-G2	EACL01_D4AF730_IIES		EACL01_D4AF740_IIES		EACL01_D4AF750_IIES		
	E4		12200	12500	95		B2-UO-G2	B2-UO-G2	EACL01_E4AF730_IIES		EACL01_E4AF740_IIES		EACL01_E4AF750_IIES		
	F4		14700	15000	122		B2-UO-G2	B2-UO-G2	EACL01_F4AF730_IIES		EACL01_F4AF740_IIES		EACL01_F4AF750_IIES		
	H4	19000	20000	153		B3-UO-G3	B3-UO-G3	EACL01_H4AF730_IIES		EACL01_H4AF740_IIES		EACL01_H4AF750_IIES			
TYPE III	A3	Asymmetric Wide (AW)	2900	3000	21	23	B1-UO-G1	B1-UO-G1	EACL01_A3AW730_-120-277VIES	EACL01_A3AW730_-347-480VIES	EACL01_A3AW740_-120-277VIES	EACL01_A3AW740_-347-480VIES	EACL01_A3AW750_-120-277VIES	EACL01_A3AW750_-347-480VIES	
	B3		4900	5100	36	38	B1-UO-G1	B1-UO-G1	EACL01_B3AW730_-120-277VIES	EACL01_B3AW730_-347-480VIES	EACL01_B3AW740_-120-277VIES	EACL01_B3AW740_-347-480VIES	EACL01_B3AW750_-120-277VIES	EACL01_B3AW750_-347-480VIES	
	C3		7400	7600	55		B1-UO-G2	B1-UO-G2	EACL01_C3AW730_IIES		EACL01_C3AW740_IIES		EACL01_C3AW750_IIES		
	D3		9900	10200	73		B2-UO-G2	B2-UO-G2	EACL01_D3AW730_IIES		EACL01_D3AW740_IIES		EACL01_D3AW750_IIES		
	E3		12400	12700	95		B2-UO-G2	B2-UO-G2	EACL01_E3AW730_IIES		EACL01_E3AW740_IIES		EACL01_E3AW750_IIES		
	F3		14900	15300	122		B2-UO-G2	B2-UO-G2	EACL01_F3AW730_IIES		EACL01_F3AW740_IIES		EACL01_F3AW750_IIES		
	H3	19300	20400	153		B3-UO-G2	B3-UO-G2	EACL01_H3AW730_IIES		EACL01_H3AW740_IIES		EACL01_H3AW750_IIES			
TYPE II	A2	Asymmetric Narrow/Auto (AN)	2900	3000	21	23	B1-UO-G1	B1-UO-G1	EACL01_A2AN730_-120-277VIES	EACL01_A2AN730_-347-480VIES	EACL01_A2AN740_-120-277VIES	EACL01_A2AN740_-347-480VIES	EACL01_A2AN750_-120-277VIES	EACL01_A2AN750_-347-480VIES	
	B2		4900	5000	36	38	B1-UO-G1	B1-UO-G1	EACL01_B2AN730_-120-277VIES	EACL01_B2AN730_-347-480VIES	EACL01_B2AN740_-120-277VIES	EACL01_B2AN740_-347-480VIES	EACL01_B2AN750_-120-277VIES	EACL01_B2AN750_-347-480VIES	
	C2		7300	7500	55		B2-UO-G1	B2-UO-G2	EACL01_C2AN730_IIES		EACL01_C2AN740_IIES		EACL01_C2AN750_IIES		
	D2		9800	10100	73		B2-UO-G2	B2-UO-G2	EACL01_D2AN730_IIES		EACL01_D2AN740_IIES		EACL01_D2AN750_IIES		
	E2		12300	12600	95		B2-UO-G2	B2-UO-G2	EACL01_E2AN730_IIES		EACL01_E2AN740_IIES		EACL01_E2AN750_IIES		
	F2		14700	15100	122		B3-UO-G2	B3-UO-G3	EACL01_F2AN730_IIES		EACL01_F2AN740_IIES		EACL01_F2AN750_IIES		
	H2	19100	20200	153		B3-UO-G3	B3-UO-G3	EACL01_H2AN730_IIES		EACL01_H2AN740_IIES		EACL01_H2AN750_IIES			

Photometrics

Evolve® Compact Low Wattage Area Light (EACL)

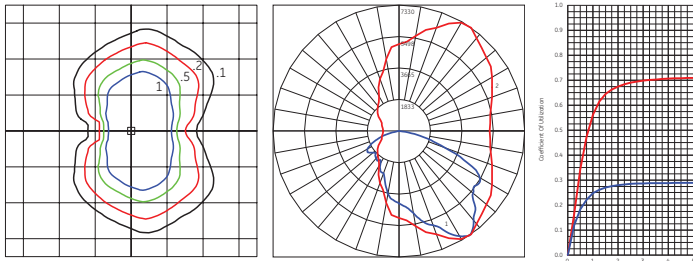


Project name _____

Date _____

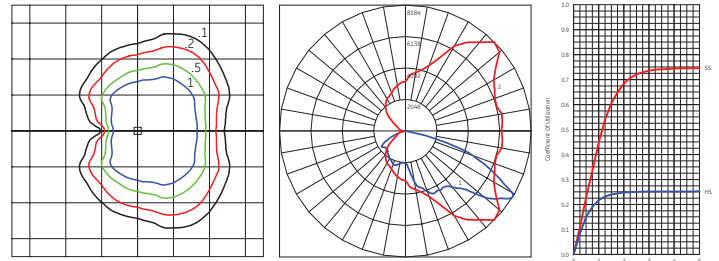
Type _____

EACL Type II - Very Short
15,100 Lumens (EACL01_F2AN750__IES)



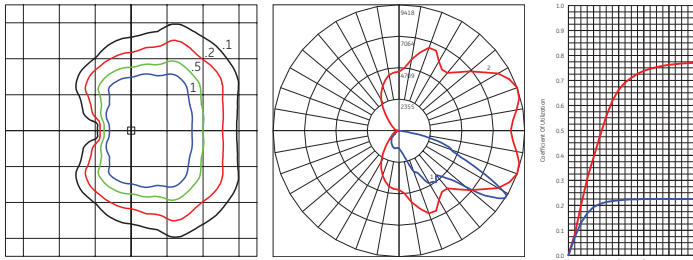
Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

EACL Type III - Short
15,300 Lumens (EACL01_F3AW750__IES)



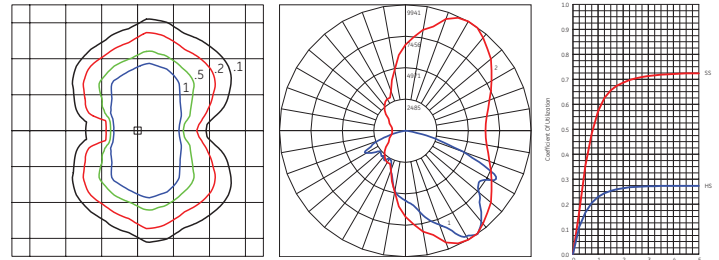
Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

EACL Type III - Very Short
15,000 Lumens (EACL01_F4AF750__IES)



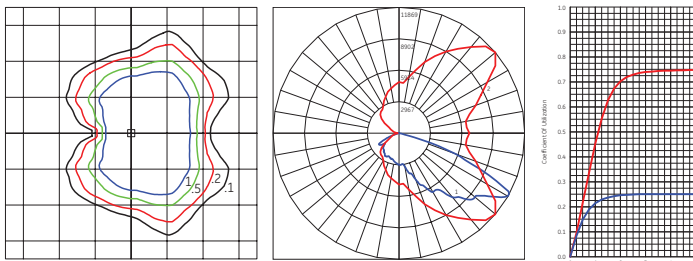
Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

EACL Type II - Very Short
20,200 Lumens (EACL01_H2AN750__IES)



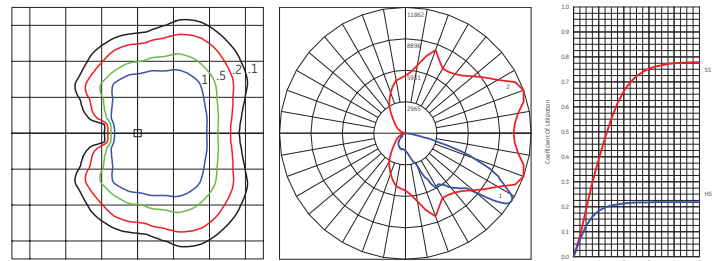
Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

EACL Type III - Short
20,400 Lumens (EACL01_H3AW750__IES)



Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

EACL Type IV - Very Short
20,000 Lumens (EACL01_H4AF750__IES)



Grid Distance in Units of Mounting Height at 20' Initial Footcandle Values at Grade
 — Vertical plane through horizontal angle of maximum candlepower at XX°
 — Vertical plane through horizontal angle of XX°

Product Dimensions

Evolve® Compact Low Wattage Area Light (EACL)

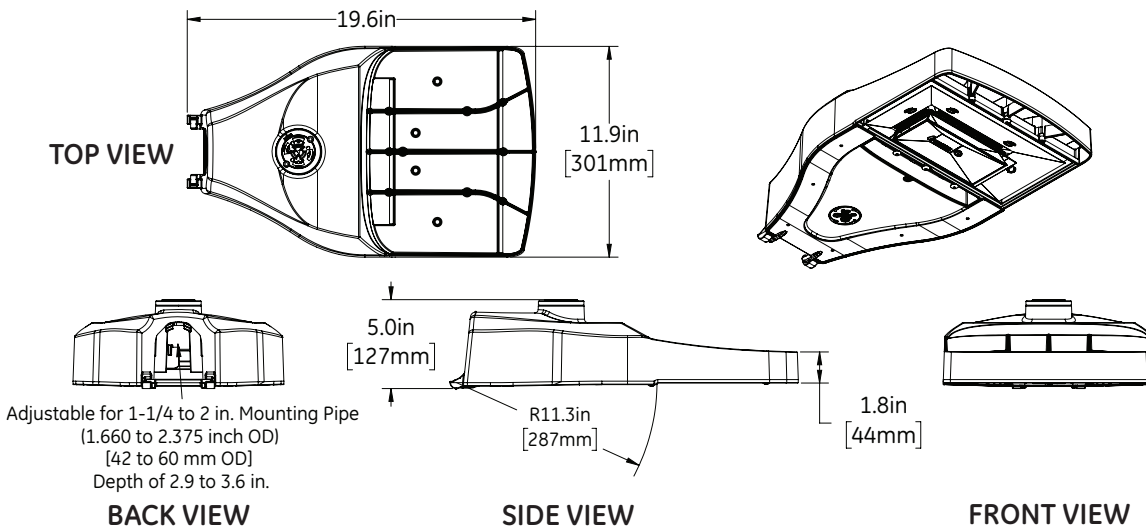


Project name _____

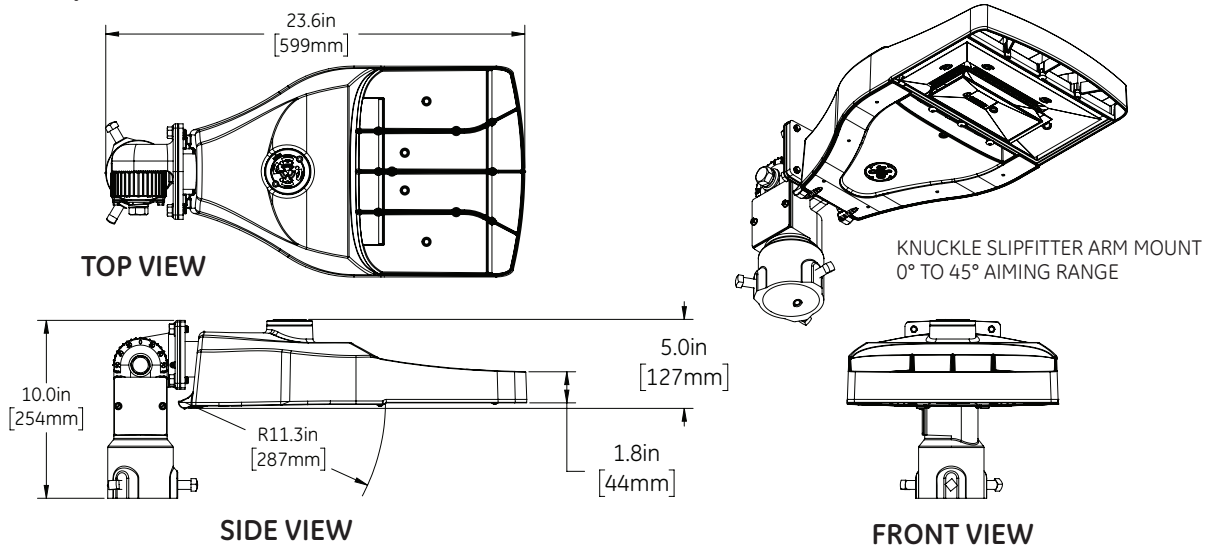
Date _____

Type _____

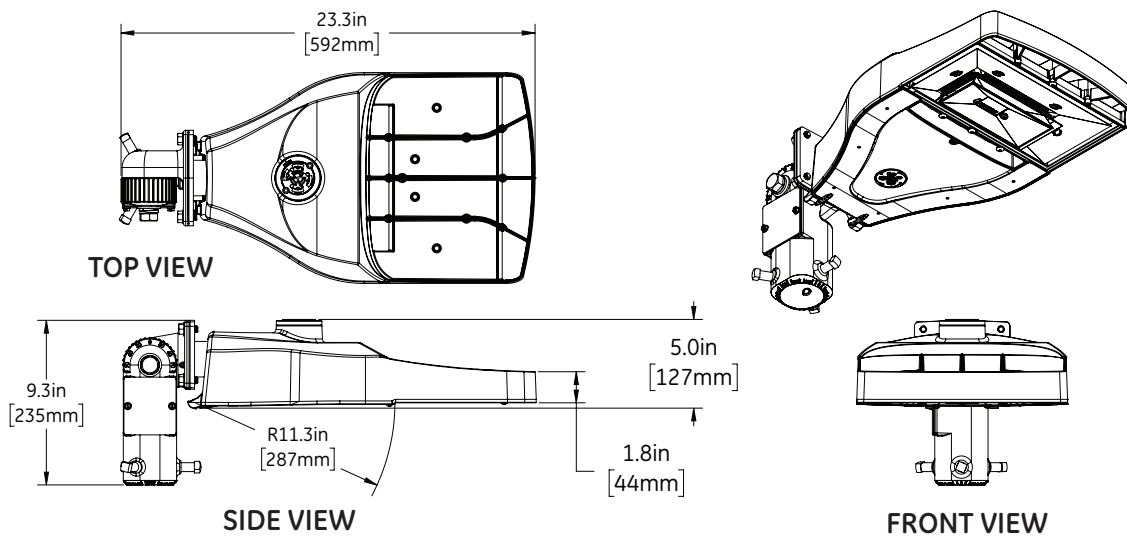
Integral Slipfitter: C1



Knuckle Slipfitter: S1



Knuckle Slipfitter: K1



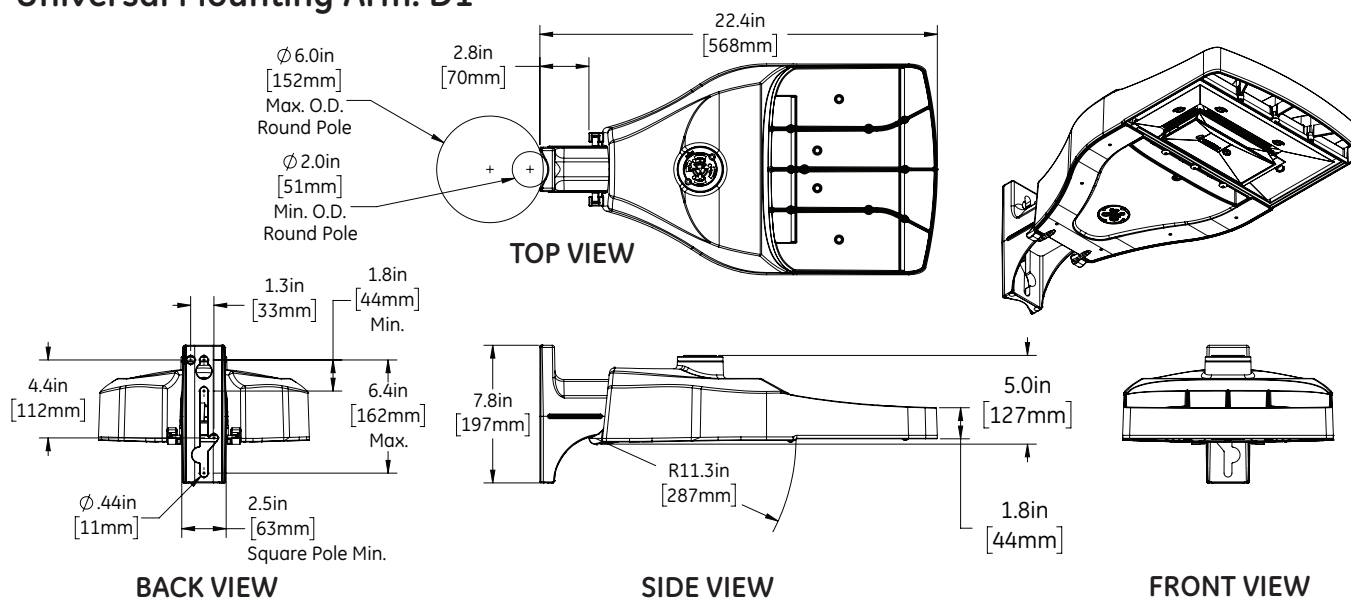
Product Dimensions

Evolve® Compact Low Wattage Area Light (EACL)

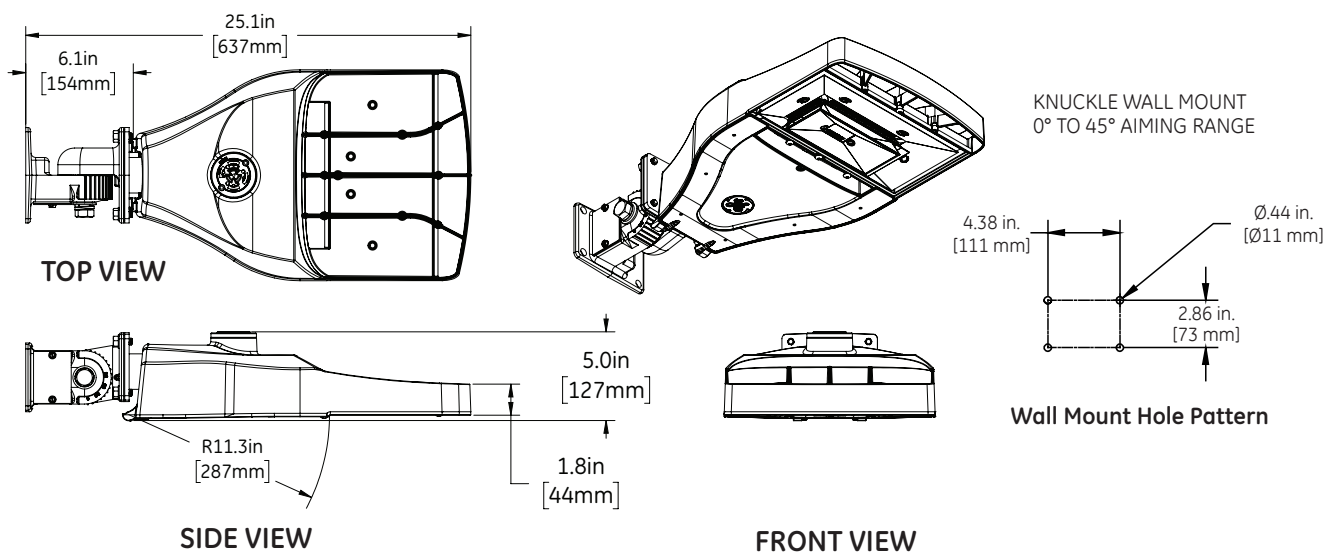


Project name _____
 Date _____
 Type _____

Universal Mounting Arm: D1



Knuckle Wall Mount: V1



DATA

- Net Weight: 18 lbs (8.16 kg) Max depending on configuration
- Effective Projected Area (EPA):
 - Integral Slipfitter C1, EPA = 0.31 Min/0.37 Max
 - Universal Arm Mount D1, EPA = 0.31 Min / 0.52 Max
 - Knuckle Slipfitter S1, K1 downward aim, EPA = 0.46 Min / 0.56 Max
 - Knuckle Slipfitter S1, K1 45° aim, EPA = 0.56 Min / 1.03 Max

Accessories

Evolve® Compact Low Wattage Area Light (EACL)



Project name _____
 Date _____
 Type _____

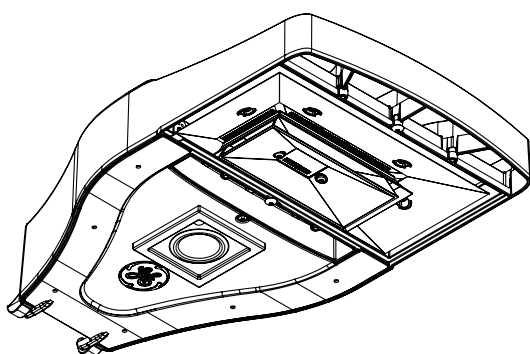
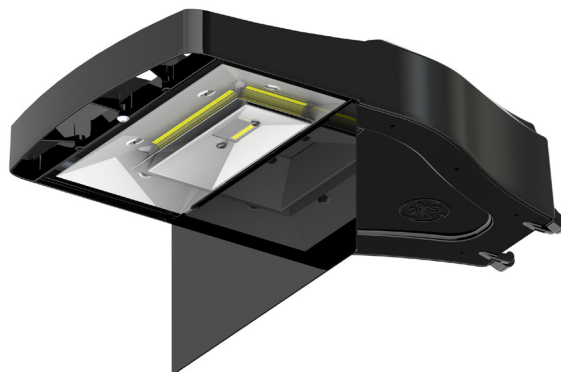
PE Accessories (to be ordered separately)

SAP Number	Part Number	Description
93029237	PED-MV-LED-7	ANSI C136.41 Dimming PE, 120-277V
93029238	PED-347-LED-7	ANSI C136.41 Dimming PE, 347V
93029239	PED-480-LED-7	ANSI C136.41 Dimming PE, 480V

SAP Number	Part Number	Description
28299	PECOTL	STANDARD 120-277V
28294	PEC5TL	STANDARD 480V
80436	PECDTL	STANDARD 347V
73251	SCCL-PECTL	Shorting cap

Back Light Shield

Shield Orientation	Cutoff Distance	Shield Order Logic
Back	Long	ELS-EAC-RBL-BLCK

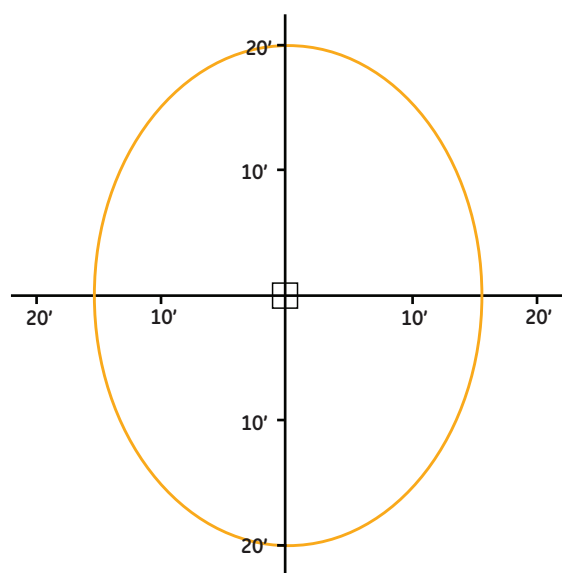


H-Motion Sensing Option

- Intended for applications, between 15-30 ft. mounting height. (4.57-9.14m). For mounting heights exceeding 30 ft., pole mounted sensors are recommended.
- Provides a coverage area radius for walking motion of 15-20 ft. (4.57-6.10m).
- Provides 270° of coverage (~90° is blocked by the pole).
- Standard factory settings:
 - 50% output when unoccupied, 100% output occupied.
 - Integral PE Sensor.
 - 5 minute post-occupancy time delay, 5 minute dimming ramp-down.
- Fixture power increase of 1W expected with sensor use.

Note: Standard options may be reprogrammed in the field. Reprogramming instructions included in product shipment.

Sensor Pattern



Sensing Pattern Area Fixture Up to 30 ft. Mounting Height

Mounting Information

Evolve® Compact Low Wattage Area Light (EACL)



Project name _____

Date _____

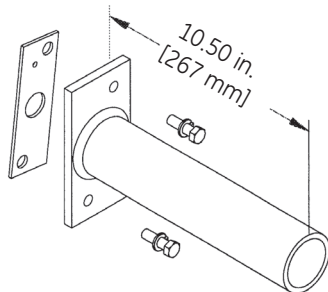
Type _____

Mounting Arms for Slipfitter

Order separately with Mounting Option C1 (Slipfitter)

SQUARE POLE MOUNTING ARM

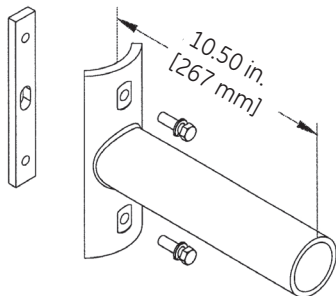
3.5 TO 4.5-inch (89 to 114mm) SQUARE
(WILL ALLOW 4 FIXTURES PER POLE @ 90 DEGREES.)



ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
SPA-EAMT10BLCK "Black"
SPA-EAMT10DKBZ "Dark Bronze"
SPA-EAMT10WHITE "White"
SPA-EAMT10GRAY "Gray"

ROUND POLE MOUNTING ARM

3.5 TO 4.5-inch (89 to 114mm) OD
(WILL ALLOW 4 FIXTURES PER POLE @ 90 DEGREES.)



ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
RPA-EAMT10BLCK "Black"
RPA-EAMT10DKBZ "Dark Bronze"
RPA-EAMT10WHITE "White"
RPA-EAMT10GRAY "Gray"

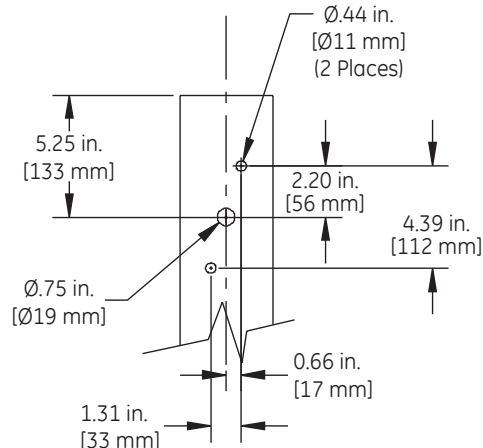
Wall Mounting Bracket Adapter Plate

ORDER SEPARATELY FROM FIXTURE AS CATALOG NUMBER
WMB-EAMT06

***NOTE: For Wall Mounting, order luminaire with mounting arm: C1 = Slipfitter 2" Pipe (2.378 in. OD) supplied with leads.**

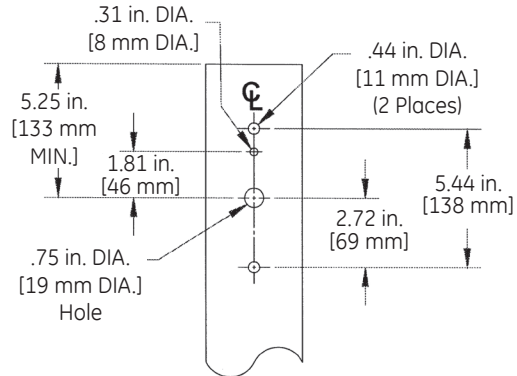
Other mounting patterns are available for retrofit installations.
 Contact manufacturing for other available mounting patterns.

SQUARE POLE MOUNTING DRILLING TEMPLATE

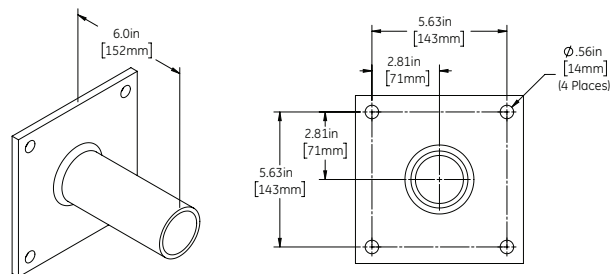


ROUND POLE MOUNTING DRILLING TEMPLATE

3.5 TO 4.5-inch (89 to 114mm) OD
 round pole mounting arm



WALL MOUNTING BRACKET HOLE PATTERN



DESCRIPTION

The Caretaker™ LED area and road luminaire combines high performance, low maintenance and easy installation in a simple, extremely economical package. Designed for years of worry-free operation, the Caretaker luminaire is the perfect area lighting solution for both full-cutoff needs or landmark applications where a highly visible light source is desired. The Caretaker luminaire is also ideal for municipal street lighting retrofits requiring superior optical performance and fast payback on capital.

Catalog #		Type	
Project			
Comments		Date	
Prepared by			

SPECIFICATION FEATURES

Construction

Single heavy-duty die-cast aluminum housing. Access to stamped aluminum door via a single captive screw (tool-less access option available) for easy maintenance and installation. Corrosion resistant hardware.

Optical

Precision molded optics are designed to shape the distribution, maximize efficiency, and application coverage in each T2, T3 and T5R distributions. Available in six lumen packages at 4000K CCT and minimum 70CRI standard. Optional 3000K / 70CRI, 5000K / 70CRI, and 2700K / 80CRI also available. Fully compatible with SR Acrylic refractor and ANSI/NEMA Standard refractor assembly. For spill light control, an optional house side shield can be installed over the T2 or T3 optic or the drop shield house side shield can be used in conjunction with the T5R or SR options. For zero upright compliant luminaires, the U0 option provides full cutoff with a spun aluminum shield.

Electrical

LED driver is standard universal voltage and 0-10V dimming with integrated 6kV surge protection. DALI compatible driver available. 10kV or 20kV additional surge protection available. Three position tunnel type compression terminal block standard. Luminaire is designed for efficient thermal management; heat is transferred away from the LEDs for optimal efficiency, light output, and life. Lumen maintenance of 92% at 50,000 hours.

Mounting

Two-bolt slipfitter for mounting on 1-1/4" to 2" standard pipe (1-5/8" to 2-3/8" O.D.). Also available with a bracket for mounting to wood poles, square poles, or walls without a pipe.

Controls

NEMA 3-PIN photocontrol receptacle standard. 7-PIN option available. An integrated dimming and occupancy sensor is a standalone control option available in bi-level dimming (MSP/DIM) operation.

Finish

Unfinished raw aluminum standard. Optional five-stage super TGIC polyester powder coat paint, 2.5-mil nominal thickness for superior protection against fade and wear. Consult your lighting representative at Cooper Lighting Solutions for a complete selection of standard colors. Coastal Construction option available.

Warranty

Standard five-year warranty. Optional ten-year warranty, please see your Cooper Lighting Solutions Streetworks sales representative for more information.



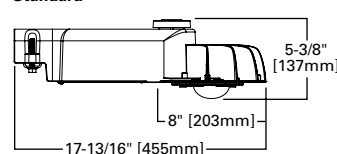
CRTK2 CARETAKER LED

Solid State LED

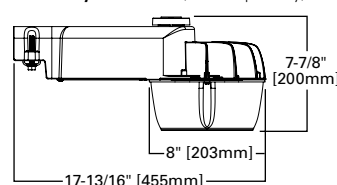
DUSK-TO-DAWN
AREA/ROADWAY LUMINAIRE

DIMENSIONS

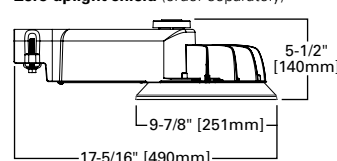
Standard



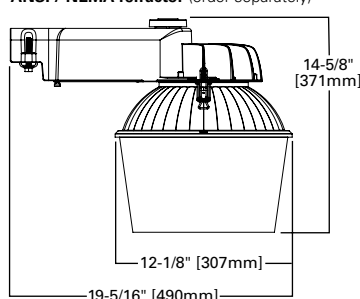
Small acrylic refractor (order separately)



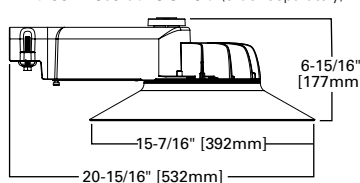
Zero upright shield (order separately)



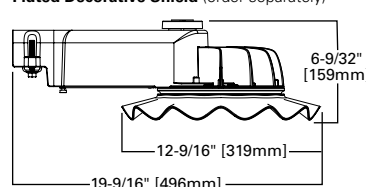
ANSI / NEMA refractor (order separately)



Hillbrook Decorative Shield (order separately)



Fluted Decorative Shield (order separately)



CERTIFICATION DATA

UL/cUL Wet Location Listed
ISO 9001
IP66 Rated (Optic)
3G Vibration Rated
LM79/LM80 Compliant
RoHS Compliant

ENERGY DATA

Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120-277V, 50/60Hz
-40°C Minimum Ambient
Temperature Rating
+40°C Maximum Ambient
Temperature Rating

EPA

Effective Projected Area (Sq. Ft.)
Standard: 0.49
Full Cutoff: 0.52
Small Acrylic Refractor: 0.58
ANSI/NEMA Refractor: 1.01

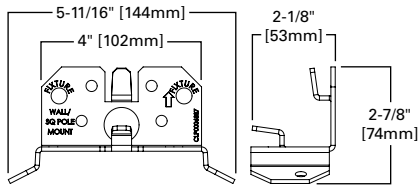
SHIPPING DATA

Approximate Net Weight:
7 - 8 lbs. (3.2 - 3.6 kgs.)

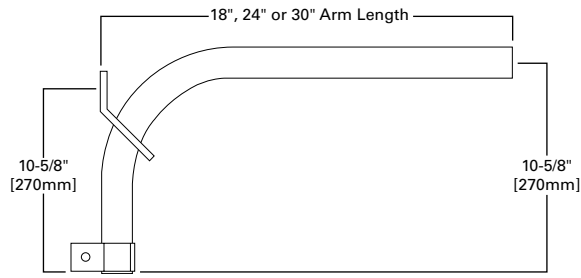
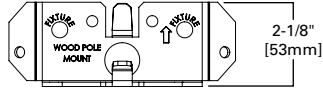
OPTIONAL WALL/POLE MOUNTING BRACKET

OPTIONAL WOOD POLE PIPE ARM CRTK2 CARETAKER LED

Wall Mount / Square Pole Mount



Pole Mount



CONTROL OPTIONS

0-10V (D)

This fixture is offered standard with 0-10V dimming driver(s). The dimming option provides 0-10V dimming wire leads for use with a lighting control panel or other control method.

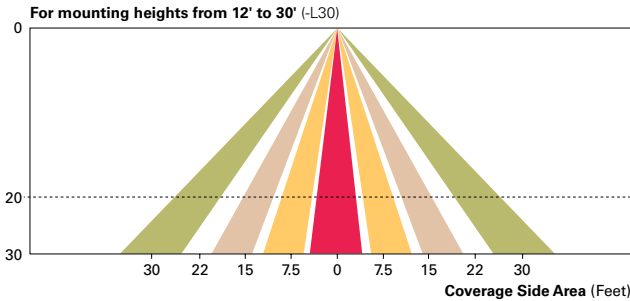
Photocontrol (4N7)

Photocontrol receptacles provide a flexible solution to enable dusk-to-dawn lighting by sensing light levels. Advanced control systems compatible with NEMA 7-PIN standards can be utilized with the 4N7 receptacle.

Dimming Occupancy Sensor (MSP/DIM-L30)

These sensors are factory installed in the luminaire housing. When the MSP/DIM-L30 sensor option is selected, the occupancy sensor is connected to a dimming driver and the entire luminaire dims when there is no activity detected. When activity is detected, the luminaire returns to full light output. The MSP/DIM sensor is factory preset to dim down to approximately 50 percent power with a time delay of five minutes.

These occupancy sensors includes an integral photocell that can be activated with the ISHH-01 accessory for dusk-to-dawn control or daylight harvesting — the factory preset is OFF. The ISHH-01 is a wireless tool utilized for changing the dimming level, time delay, sensitivity and other parameters. A variety of sensor lens are available to optimize the coverage pattern for mounting heights from 12'-30'.



POWER AND LUMENS (UNV)

CRTK2 CARETAKER LED

Light Engine		C013	C015	C016	C018	C01	C01H
Power (Watts)		20	29	41	50	60	71
Wattage Label		20	30	40	50	60	70
Input Current @ 120V (A)		0.17	0.25	0.35	0.42	0.50	0.59
Input Current @ 277V (A)		0.08	0.11	0.16	0.17	0.22	0.26
Optics							
T2	4000K Lumens	2,940	4,247	5,615	6,687	7,996	9,161
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G2	B2-G3-U2	B2-G3-U2	B2-G3-B2
	3000K Lumens	2,862	4,133	5,464	6,507	7,781	8,915
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G2	B2-G3-U2	B2-G3-U2	B2-G3-U2
T2-U0	4000K Lumens	2,940	4,246	5,614	6,685	7,994	9,159
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2
	3000K Lumens	2,861	4,132	5,463	6,506	7,779	8,913
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2
T3	4000K Lumens	2,851	4,118	5,445	6,485	7,554	8,884
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G1	B1-U3-G2	B1-U3-G2	B2-U3-G2
	3000K Lumens	2,775	4,008	5,299	6,311	7,546	8,645
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G1	B1-U3-G1	B1-U3-G2	B2-U3-G2
T3-U0	4000K Lumens	2,854	4,122	5,450	6,490	7,761	8,892
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2
	3000K Lumens	2,777	4,011	5,304	6,316	7,552	8,653
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2
T5R	4000K Lumens	3,103	4,481	5,925	7,056	8,438	9,667
	BUG Rating	B2-U2-G1	B3-U2-G1	B3-U2-G1	B3-U3-G2	B3-U3-G2	B4-U3-G2
	3000K Lumens	3,020	4,361	5,766	6,867	8,211	9,408
	BUG Rating	B2-U2-G1	B3-U2-G1	B3-U2-G1	B3-U2-G1	B3-U3-G2	B3-U3-G2
T5R-U0	4000K Lumens	3,127	4,515	5,971	7,110	8,502	9,741
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2
	3000K Lumens	3,043	4,394	5,810	6,919	8,274	9,479
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B3-U0-G2
T5R-SR	4000K Lumens	3,071	4,435	5,864	6,983	8,350	9,567
	BUG Rating	B2-U3-G1	B3-U3-G2	B3-U3-G2	B3-U3-G2	B3-U3-G3	B4-U3-G3
	3000K Lumens	2,988	4,316	5,706	6,795	8,126	9,310
	BUG Rating	B2-U3-G1	B3-U3-G2	B3-U3-G2	B3-U3-G2	B3-U3-G2	B4-U3-G3

POWER AND LUMENS (DALI)

CRTK2 CARETAKER LED

Light Engine		C013	C015	C016	C018	C01	C01H
Power (Watts)		23	33	43	53	60	75
Wattage Label		20	30	40	50	60	80
Input Current @ 120V (A)		0.20	0.28	0.36	0.45	0.50	0.63
Input Current @ 277V (A)		0.09	0.13	0.16	0.19	0.22	0.27
Optics							
T2	4000K Lumens	3,341	4,606	5,790	7,325	8,066	9,523
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G2	B2-G3-U2	B2-G3-U2	B2-G3-U2
	3000K Lumens	3,212	4,428	5,564	7,128	7,850	9,267
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G2	B2-G3-U2	B2-U3-G2	B2-G3-U2
T2-U0	4000K Lumens	3,341	4,605	5,788	7,323	8,065	9,521
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2
	3000K Lumens	3,211	4,427	5,564	7,126	7,848	9,265
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2
T3	4000K Lumens	3,240	4,467	5,614	7,103	7,822	9,235
	BUG Rating	B1-U2-G1	B1-U3-G1	B1-U3-G1	B1-U3-G2	B1-U3-G2	B2-U3-G2
	3000K Lumens	3,115	4,294	5,397	6,912	7,612	8,987
	BUG Rating	B1-U2-G1	B1-U2-G1	B1-U3-G1	B1-U3-G2	B1-U3-G2	B2-U3-G2
T3-U0	4000K Lumens	3,243	4,471	5,619	7,109	7,829	9,243
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2
	3000K Lumens	3,118	4,298	5,402	6,918	7,619	8,994
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2
T5R	4000K Lumens	3,526	4,861	6,109	7,730	8,512	10,049
	BUG Rating	B2-U2-G1	B3-U2-G1	B3-U2-G1	B3-U3-G2	B3-U3-G2	B4-U3-G2
	3000K Lumens	3,390	4,673	5,873	7,522	8,283	9,779
	BUG Rating	B2-U2-G1	B3-U2-G1	B3-U2-G1	B3-U3-G2	B3-U3-G2	B4-U3-G2
T5R-U0	4000K Lumens	3,553	4,898	6,156	7,789	8,577	10,126
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2
	3000K Lumens	3,415	4,708	5,918	7,579	8,347	9,854
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2
T5R-SR	4000K Lumens	3,489	4,810	6,046	7,649	8,424	9,945
	BUG Rating	B2-U3-G1	B3-U3-G2	B3-U3-G2	B3-U3-G2	B3-U3-G3	B4-U3-G3
	3000K Lumens	3,354	4,624	5,812	7,443	8,197	9,677
	BUG Rating	B2-U3-G1	B3-U3-G2	B3-U3-G2	B3-U3-G2	B3-U3-G3	B4-U3-G3

LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
10°C	1.02
15°C	1.01
25°C	1.00
40°C	0.99

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (50,000 Hours)	Theoretical L70 (Hours)
Up to 40°C	92.30%	>306,000

ORDERING INFORMATION

Product Family	Light Engine	Driver	Voltage	Distribution
CRTK2=Caretaker	C013 =1 LED, Approximately 30% Output C015 =1 LED, Approximately 50% Output C016 =1 LED, Approximately 60% Output C018 =1 LED, Approximately 80% Output C01 =1 LED, Full Output C01H =1 LED, High Lumen Output	D =Dimming (0-10V) 5LTD =DALI	U =Universal (120-277V)	T2 =Type II T3 =Type III T5R =Type V Round
Options (Add as Suffix)		Color	Accessories (Order Separately)	
7030 =70 CRI / 3000K 7050 =70 CRI / 5000K 8027 =80 CRI / 2700K SR =Small Acrylic Refractor (Factory Installed) TSR =Tool-less Small Acrylic Refractor (Factory Installed) U0 =Zero Uplight Shield ¹ TH =Tool-less Door Hardware 4N7 = NEMA 7-PIN Photocontrol Receptacle S =Shorting Cap MSP/DIM-L30 =Integrated Sensor for Dimming Operation, 12' - 30' Mounting Height ^{2,3} 10K =10kV UL 1449 Surge Protection Device 10MSP =10kV MOV Surge Protection Device 20K =20kV UL 1449 Surge Protection Device 20MSP =20kV MOV Surge Protection Device CC =Coastal Construction ⁴ V =(3) 5' #14 External Leads B18 =18" Wood Pole Pipe Arm B24 =24" Wood Pole Pipe Arm B30 =30" Wood Pole Pipe Arm WPBKT =Wall or Pole Mounting Bracket 5 =120V NEMA Photocontrol Included ⁸		A =Raw Aluminum AP =Grey	RMARROA5 =ANSI/NEMA Standard Refractor Assembly SR-CARETAKER =Small Acrylic Refractor U0-XX =Zero Uplight Shield ⁵ LLPC =Long-life Photocontrol LLPC-FO =Long-life Photocontrol (Fail Off) HSS-CRTK2 =Field Install House Side Shield ⁶ DS-HSS-CRTK2 =Drop Shield House Side Shield OA1226 =10kV Surge Module Replacement OA/RA1013 =Shorting Cap ISHH-01 =Integrated Sensor Programming Remote ⁷ HS-VERD =Verdeon House Side Shield ⁸ VGS-F/B =Vertical Glare Shield, Front/Back VGS-SIDE =Vertical Glare Shield, Side FS-XX =Fluted Decorative Shield ⁵ HB-XX =Hillbrook Bell Decorative Shield ⁵ TSR-CARETAKER =Tool-less Small Acrylic Refractor	

- NOTE:**
- U0 option not offered with SR option.
 - Integrated Sensor not available with 10K or 20K options or 5LTD driver.
 - MSP option in conjunction with C01H or C01 Light Engine only suitable up to 30°C ambient. All other Light Engines only suitable up to 35°C ambient.
 - Anti-corrosion treatment on external components, external screws/mounting bolts, and standard pipe clamp.
 - Replace XX with color.
 - Not for use on T5R optical distribution.
 - This tool enables adjustment to parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your lighting representative at Cooper Lighting Solutions for more information.
 - 120V input voltage only required.



Refractive globe with Lumilock LED engine GX4

RL32/RL52 Post top



Project: _____

Location: _____

Cat.No: _____

Type: _____

Lamps: _____ Qty: _____

Notes: _____

Whether you are looking to beautify or add a sense of security and well-being to your outdoor space, the highly configurable Hadco LED refractive post tops paired with the latest LumiLock light engine GX4 will definitely help you achieve your goals. A multitude of exterior luminaire styles allow you to create promenades and areas exuding timeless, historical charm both day and night. The configurable LED light engine GX4 is an ideal alternative to HID sources, providing you with significant energy savings, and more choices for light levels, optics and controls. Includes Service Tag, the innovative way to provide assistance throughout the life of the product.

Ordering guide

example: **RL32 B A A B 1 H W N R5 N A 5 N N N N SP2**

Series	Pod	Roof	Cage	Finial	Fastener	Finish	Optic	Pod Photo Control <i>(location inside of pod)</i>
RL32 Narrow Body Type 3	A Octagonal style B Round fitter with scalloped petals	A Victorian B Acorn	A Cage for narrow body globe (8 legs) B Cage for narrow body globe	A B C' D' E F G H N None	1 Hex head 2 Allen head	A Black B White G Verde H Bronze J Green	S Short W Wide	E 120 VAC Button Eye H 208/240/277 Button Eye R^{2,3} 3-Pin Receptacle N None
RL52 Narrow Body Type 5	C Fluted tapered hourglass D Smooth tapered hourglass G Tall round fluted H Round contemporary L Round fluted long T Decorative leaf w/scalloped petals	C Tall D Short	E Band for narrow body globe F Band for narrow body globe H Cage for narrow body globe (4 legs) N None					

Optional programs

Future Proof Photo Control	Color Temp	Voltage	Drive Current	Integral Control Options	Option 1	Option 2	Option 3	Surge Protection
R5 ^{3,4} 5-pin receptacle on the engine N None	W 3000K N 4000K	A 120-277 VAC B 347-480 VAC	2' 200mA 3 350mA 4' 450mA 5 530mA	<i>Dynadimmer</i> ^{5,8} DA 4 Hrs 25% Reduction DB 4 Hrs 50% Reduction DC 4 Hrs 75% Reduction DD 6 Hrs 25% Reduction DE 6 Hrs 50% Reduction DF 6 Hrs 75% Reduction DG 8 Hrs 25% Reduction DH 8 Hrs 50% Reduction DJ 8 Hrs 75% Reduction DL ⁵ DALI S ⁹ FAWS Switch N None	AST ⁵ Adjustable start up time N None	CLO ⁵ Constant light output N None	OTL ⁵ Over the life N None	SP1 10kV/10kA Surge Protector SP2 ⁶ 20kV/20kA Surge Protector
R7 ^{3,4} 7-pin receptacle on the engine N None								

1 Cannot be used with B roof.
 2 Twistlock photocell receptacle (R) only available in A, B, G, H, L and T pods.
 3 Use of photoelectric cell (pod photo control (R) only) or shorting cap is required to ensure proper illumination. When R, R5, R7 options are selected, product will ship with shorting cap(s) installed.
 4 Only available with A or B Clear Roof options. Not available with drive currents 4 or 5.
 5 Optional Dynadimmer dimming schedules, DALI, AST, CLO, and OTL not available with 347-480 VAC.

6 When SP2 option is selected, luminaire will be fitted with SP2 instead of SP1.
 7 Not available with B 347-480 voltage.
 8 Not available with R5 or R7.
 9 FAWS not available with CLO.



RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post top

LED Wattage and Lumen Values: 4000K

Ordering Code	Total LEDs	LED current (mA)	Average system watts ¹ (W)	Short			Wide		
				Delivered lumens ²	Efficacy (LPW)	BUG rating	Delivered lumens ²	Efficacy (LPW)	BUG rating
RL32, Acrylic Roof									
RL32xAxxxxxxNx2xxxxx	64	200	39	5170	131.6	B1-U5-G3	5105	129.9	B1-U5-G3
RL32xAxxxxxxNx3xxxxx	64	350	69	8729	126.5	B2-U5-G4	8619	124.9	B2-U5-G5
RL32xAxxxxxxNx4xxxxx	64	450	88	10663	121.7	B2-U5-G4	10529	120.2	B2-U5-G5
RL32xAxxxxxxNx5xxxxx	64	530	104	12399	118.9	B3-U5-G4	12243	117.4	B2-U5-G5
RL32, Metal Roof									
RL32xDxxxxxxNx2xxxxx	64	200	39	4383	111.5	B1-U3-G3	4111	104.6	B1-U3-G3
RL32xDxxxxxxNx3xxxxx	64	350	69	7399	107.2	B2-U4-G3	6940	100.6	B2-U3-G5
RL32xDxxxxxxNx4xxxxx	64	450	88	9039	103.3	B2-U4-G4	8478	96.9	B2-U4-G5
RL32xDxxxxxxNx5xxxxx	64	530	104	10510	100.9	B3-U5-G4	9859	94.6	B2-U4-G5
RL52, Acrylic Roof									
RL52xAxxxxxxNx2xxxxx	64	200	39	5149	132.0	B2-U5-G2	5038	129.2	B2-U5-G3
RL52xAxxxxxxNx3xxxxx	64	350	69	8653	126.3	B3-U5-G3	8499	124.1	B3-U5-G4
RL52xAxxxxxxNx4xxxxx	64	450	87	10543	121.3	B3-U5-G3	10524	121.1	B3-U5-G4
RL52xAxxxxxxNx5xxxxx	64	530	104	12268	118.1	B3-U5-G4	12192	117.3	B3-U5-G5
RL52, Metal Roof									
RL52xDxxxxxxNx2xxxxx	64	200	39	4339	111.0	B2-U3-G2	4035	103.2	B2-U3-G3
RL52xDxxxxxxNx3xxxxx	64	350	69	7325	106.8	B3-U4-G3	6811	99.3	B3-U3-G4
RL52xDxxxxxxNx4xxxxx	64	450	87	8948	102.9	B3-U4-G3	8321	95.6	B3-U3-G4
RL52xDxxxxxxNx5xxxxx	64	530	104	10405	100.4	B3-U4-G3	9675	93.4	B3-U4-G4

LED Wattage and Lumen Values: 3000K

Ordering Code	Total LEDs	LED current (mA)	Average system watts ¹ (W)	Short			Wide		
				Delivered lumens ²	Efficacy (LPW)	BUG rating	Delivered lumens ²	Efficacy (LPW)	BUG rating
RL32, Acrylic Roof									
RL32xAxxxxxxWx2xxxxx	64	200	39	4563	116.1	B1-U4-G3	4505	114.6	B1-U4-G3
RL32xAxxxxxxWx3xxxxx	64	350	69	7700	111.6	B2-U5-G3	7603	110.2	B2-U5-G4
RL32xAxxxxxxWx4xxxxx	64	450	88	9411	107.4	B2-U5-G4	9292	106.1	B2-U5-G5
RL32xAxxxxxxWx5xxxxx	64	530	104	10936	104.9	B2-U5-G4	10798	103.5	B2-U5-G5
RL32, Metal Roof									
RL32xDxxxxxxWx2xxxxx	64	200	39	3868	98.4	B1-U3-G3	3628	92.3	B1-U3-G3
RL32xDxxxxxxWx3xxxxx	64	350	69	6527	94.6	B2-U4-G3	6122	88.7	B2-U3-G4
RL32xDxxxxxxWx4xxxxx	64	450	88	7977	91.1	B2-U4-G4	7483	85.4	B2-U3-G5
RL32xDxxxxxxWx5xxxxx	64	530	104	9270	88.9	B2-U4-G4	8695	83.4	B2-U4-G5
RL52, Acrylic Roof									
RL52xAxxxxxxWx2xxxxx	64	200	39	4541	132.0	B2-U4-G2	4444	113.9	B2-U4-G3
RL52xAxxxxxxWx3xxxxx	64	350	69	7632	126.3	B3-U5-G3	7496	109.4	B3-U5-G3
RL52xAxxxxxxWx4xxxxx	64	450	87	9299	121.3	B3-U5-G3	9283	106.8	B3-U5-G4
RL52xAxxxxxxWx5xxxxx	64	530	104	10820	118.1	B3-U5-G3	10753	103.5	B3-U5-G4
RL52, Metal Roof									
RL52xDxxxxxxWx2xxxxx	64	200	39	3829	97.9	B2-U3-G2	3560	91.0	B2-U3-G3
RL52xDxxxxxxWx3xxxxx	64	350	69	6462	94.2	B3-U4-G3	6008	87.6	B3-U3-G3
RL52xDxxxxxxWx4xxxxx	64	450	87	7897	90.8	B3-U4-G3	7343	84.4	B3-U3-G4
RL52xDxxxxxxWx5xxxxx	64	530	104	9177	88.6	B3-U4-G3	8533	82.4	B3-U4-G4

Due to rapid and continuous advances in LED technology, LED luminaire data is subject to change without notice and at the discretion of Hadco.

Lumen output by optic type will vary slightly. See IES files and specification sheets when available. All technical data is subject to change.

Lumen values based on photometric tests performed in compliance with IESNA LM-79.

Note: Some data may be scaled based on tests of similar, but not identical, luminaires.

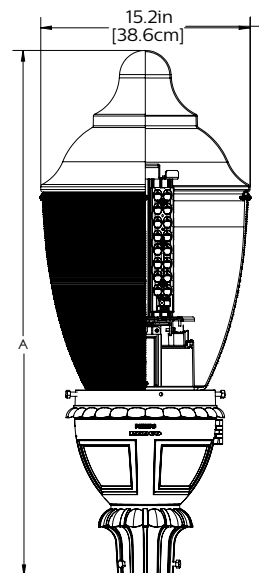
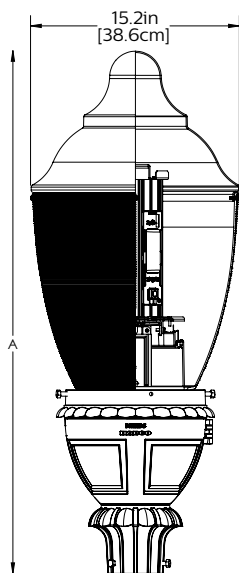
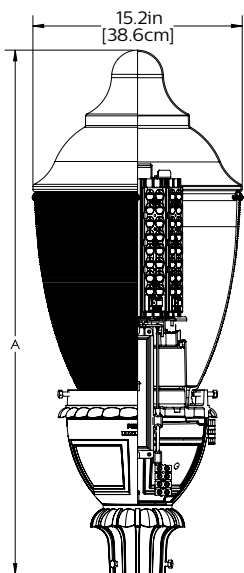
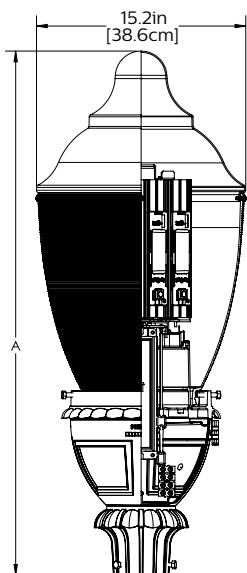
RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post top

Dimensions

RL32 - Type 3

RL52 - Type 5



RL32BCNNxxW configuration shown

RL32BCNNxxS configuration shown

RL52BCNNxxW configuration shown

RL52BCNNxxS configuration shown

Roof	Dimension "A"	
	(in)	(cm)
A Victorian	38.0	96.6
B Acorn	35.4	89.8
C Tall	38.0	96.6
D Short	34.1	86.7

EPA: 2.08 sq. ft. (Varies depending on options selected)
 Weight: 55lbs (maximum)

Dimensions will vary when other pod, cage and brim options are specified.
 See specification text on pages 5 and 6 for option dimensions.

Housing Options

Fitter/Pod Options



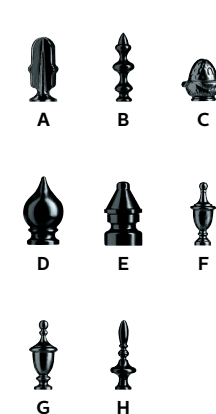
Roof Options



Cage/Band Options



Finial Options



RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post top

Predicted Lumen Depreciation Data

Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output. Calculated per IESNA TM21-11. Published L70 hours limited to 6 times actual LED test hours.

Driver mA	Optic	Ambient Temperature °C	Calculated L70 Hours	L70 per TM-21 (Hours)	Lumen Maintenance % at 60,000 hrs
530	Wide	25	>85,000	>60,000 hours	>88%
530	Short	25	>100,000	>54,000 hours	>98%
450	Wide	25	>100,000	>60,000 hours	>93%
450	Short	25	>100,000	>54,000 hours	>98%
350	Wide	25	>100,000	>60,000 hours	>94%
350	Short	25	>100,000	>54,000 hours	>98%
200	Wide	25	>100,000	>60,000 hours	>94%
200	Short	25	>100,000	>54,000 hours	>98%

Field Adjustable Wattage (FAWS) Multiplier Chart

All 350, 450, and 530 mA Configurations

FAWS Position	Typical Delivered Lumens Multiplier	Typical System wattage and typical current
1	0.30	0.28
2	0.53	0.48
3	0.62	0.56
4	0.73	0.67
5	0.78	0.73
6	0.83	0.78
7	0.87	0.85
8	0.91	0.89
9	0.95	0.93
10	1.00	1.00

All 200mA Configurations

FAWS Position	Typical Delivered Lumens Multiplier	Typical System wattage and typical current
1	0.30	0.35
2	0.50	0.55
3	0.59	0.62
4	0.69	0.72
5	0.77	0.80
6	0.83	0.85
7	0.88	0.90
8	0.93	0.92
9	0.96	0.97
10	1.00	1.00

RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post top

Specifications

Housing

Optional Pods:

A: Octagonal style fitter is constructed of die-cast 360 aluminum alloy with bottom-hinged door providing 135° entry into the fitter assembly for easy access to the electrical components. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal twist-lock photo eye receptacle or optional button eye photocell. Easy access to photo eye through the door on the pod. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 10-3/4" and width is 10-1/4".

B: Round fitter with scalloped petals is constructed of die-cast 360 aluminum alloy with side-hinged door providing 180° entry into the fitter assembly for easy access to the electrical components. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal twist-lock photo eye receptacle or optional button eye photocell. Easy access to photo eye through the door on the pod. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 12-1/4" and width is 11-1/2".

C: Fluted tapered hourglass fitter is constructed of 356 HM High-Strength, Low-Copper cast aluminum. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal button eye photocell. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 8" and width is 8-3/4".

D: Smooth tapered hourglass fitter is constructed of 356 HM High-Strength, Low-Copper cast aluminum. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal

button eye photocell. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 8" and width is 9-1/4".

G: Tall Round fluted fitter is constructed of die-cast 360 aluminum alloy with removable door providing entry into the fitter assembly for easy access to the electrical components. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal button eye photocell. Easy access to photo eye through the door on the pod. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 9" and width is 9".

H: Round contemporary fitter is constructed of 356 HM High-Strength, Low-Copper cast aluminum. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal twist-lock photo eye receptacle or optional internal button eye photocell. Easy access to photocell through tool-less door on pod. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 10" and width is 10".

L: Round fluted long fitter is constructed of 356 HM High-Strength, Low-Copper cast aluminum with a side-hinged door providing entry into the fitter assembly for easy access to the electrical components. Accepts standard Hadco Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal twist-lock photo eye receptacle or button eye photocell. Tool-less access to photo eye through the door on the pod. Heavy cast aluminum post fitter utilizes three 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering the ballast

compartment. Globe is attached using four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). Pod height is 12-1/2" and width is 10-3/4".

T: Decorative Leaf fitter with scalloped petals is constructed of 356 HM High-Strength, Low-Copper cast aluminum with side-hinged door providing 180° entry into the fitter assembly for easy access to the electrical components. Accepts standard HADCO Twistlock ballast assemblies. Wiring block to accept three #8 solid or stranded wires. Optional internal twist-lock photo eye receptacle or optional button eye photocell. Easy access to photo eye through the door on the pod. Heavy cast aluminum post fitter utilizes four 5/16-18 black cadmium stainless steel set screws (Hex head or Allen head as specified) for mounting to 3" O.D. post tenon. Globe holder has an internal water trap to prevent water from entering ballast compartment. Globe is held by utilizing four 5/16-18 black cadmium stainless steel fasteners (Hex head or Allen head as specified). All hardware to be stainless steel and captive. Pod height is 15-1/4" and width is 11-1/2".

Roof

A: Victorian style roof is clear injection molded U.V. stabilized acrylic with 79 horizontal prisms for a soft, even glow. 10-1/4" height and 14-15/16" width. The roof and bottom globe sections are secured in a slip-fit, 1/2" overlap design and use four #10-24 stainless steel pan head screws with four aluminum nutserts providing a mechanical lock and enabling easy future replacement of either the roof or bottom globe section if required.

B: Acorn style roof is clear injection molded U.V. stabilized acrylic with 59 horizontal prisms for a soft, even glow. 7-3/4" height and 15" width. The roof and bottom globe sections are secured in a slip-fit, 1/2" overlap design and use four #10-24 stainless steel pan head screws with four aluminum nutserts providing a mechanical lock and enabling easy future replacement of either the roof or bottom globe section if required.

C: Roof is 0.090" thick spun aluminum. 10" height and 15-3/16" width. The roof and bottom globe sections are secured in a slip-fit, 1/2" overlap design and use four #10-24 stainless steel pan head screws with four aluminum nutserts providing a mechanical lock and enabling easy future replacement of either the roof or bottom globe section if required.

D: Roof is 0.090" thick spun aluminum. 6-1/2" height and 15-3/16" width. The roof and bottom globe sections are secured in a slip-fit, 1/2" overlap design and use four #10-24 stainless steel pan head screws with four aluminum nutserts providing a mechanical lock and enabling easy future replacement of either the roof or bottom globe section if required.

RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post ten

Specification (continued)

Cages and Bands

A: Cage for narrow body globes (15" dia.) is constructed of die-cast 360 aluminum alloy. Cage has 4 legs each with round cast aluminum flower block. Open rectangular band around top of cage. Height of cage is 16" and width of cage is 17-1/2". Finish is polyester thermoset powdercoat.

B: Cage for narrow body globes (15" dia.) is constructed of die-cast 360 aluminum alloy. Cage has 4 legs each with square decorative flower block. Solid rectangular band around top of cage. Height of cage is 17" and width of cage is 17". Finish is polyester thermoset powdercoat.

E: Band for narrow body globes (15" dia.) is architectural slotted aluminum. Supported at 4 points by cast aluminum square flower blocks. Finish is polyester thermoset powdercoat.

F: Band for narrow body globes (15" dia.) is architectural slotted aluminum supported at 4 points by cast aluminum round flower blocks. Finish is polyester thermoset powdercoat.

H: Cage for narrow style globes (15" dia.) is constructed of 356 HM High-Strength, Low-Copper cast aluminum. Cage has 4 curved legs. Solid rectangular band around the top of cage. Height of cage is 15" and width of cage is 16-1/2".

Finials

All finials are cast aluminum mounted with 1/4-20 stainless steel threaded studs. Standard finial finish will match fixture finish as specified. Finish is thermoset powdercoat. (NOTE : C, D, and E finials are not available with "B" Roof.)

Fasteners

Used to secure post fitter to post tenon and globe to globe holder.

- 1: Hex Head Bolts: Black cadmium stainless steel.
- 2: Allen Head Bolts: Black cadmium stainless steel.

Light engine

GX4 is composed of four main components: Heat Sink, LED, Optical System, and Driver. Electrical components are RoHS compliant.

Entire luminaire is rated for operation in ambient temperature of -40°C / -40°F up to +40°C / +104°F. B Voltage configurations rated for operation in ambient temperature of -40°C / -40°F up to +35°C / +95°F.

LED & Optics

Composed of 64 high power LEDs. LED board substrate is MCPCB (Metal Core Printed Circuit Board), designed to minimize thermal resistance from LED junction to heat sinks. Color temperature as per ANSI/NEMA bin Neutral White, 4000 Kelvin nominal (3985K+ / 275K or 3710K to 4260K) or Warm White, 3000 Kelvin

nominal (3045K +/- 175K or 2870K to 3220K), CRI 70 Min. 75 Typical.

(W) Wide and (S) Short Optic choices are available. Both optics are made of optical grade PC and have been optimized to achieve maximum spacing, target lumens, and a superior lighting uniformity.

Wide Optics – Superior performance and light level uniformity for applications where typical pole spacing is approximately six times mounting height of luminaire.

Short Optics – Superior performance and light level uniformity for applications where typical pole spacing is approximately five times mounting height of luminaire. Provides higher illumination levels under pole area, ideal for increased security and applications requiring superior facial recognition.

Type 3 and Type 5 distribution choices are available.

LEDs and optics (S) Short or (W) Wide form an IP66 light engine to ensure complete environmental protection against water and dust ingress and corrosion, critical to long term LED reliability. All wiring is full copper, with 105C rated insulation. LED modules are secured to heatsinks using #8 stainless steel hardware, guaranteeing construction rigidity and vibration resistance.

Heat sinks

LED Engine construction consists of four 6063-T5 aluminum heat sinks, clear anodized to MIL-A-8625 specifications for excellent corrosion resistance and surface finish. Fin spacing has been optimized for maximum convective heat transfer under natural convection conditions, maximizing LED life and efficiency. Heat sinks provide greater than 700 sq. in. of convective surface area total, ensuring proper junction temperature control, lumen maintenance, and system reliability. Extruded heatsinks meet or exceed tolerances as specified by AEC (Aluminum Extruders Council) standards and have been designed to provide superior surface flatness, ensuring excellent contact between heatsinks and LEDs. Product does not use any cooling device with moving parts (passive cooling only).

Heat sinks are secured using galvanized steel brackets and stainless steel hardware to provide additional corrosion resistance.

Globe Assembly

Narrow globe is constructed of clear injection molded U.V. stabilized acrylic. A two-piece (Globe and Roof) slip-fit, 1/2" overlap, design utilizes nutserts and stainless steel fasteners, which eliminates a seam appearance.

The optical section of the globe has a neck opening of 7-3/8" and an outside neck diameter of 8". Globe (less the roof) has a 15-1/2" height

and 15" width at the top with 114 horizontal prisms and 360 highly polished vertical prisms.

Driver

Driver comes standard with 0-10V dimming capability. High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC rated for both application line to line or line to neutral. Class I, THD of 20% max. Driver operating ambient temperature range is -40F (-40C) to +130F (+55C). Certified in compliance to UL1310 cULus requirement (dry and damp location). Assembled on a LumiLock twistlock removable cover with Tyco quick disconnect plug resisting to 221°F (105°C). The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

Driver Options

AST: Pre-set driver for progressive start-up of the LED module(s) to optimize energy management and enhance visual comfort at start-up.

CLO: Pre-set driver to manage the lumen depreciation by adjusting the power given to the LEDs offering the same lighting intensity during the entire lifespan of the LED module.

OTL: Pre-set driver to signal end of life of the LED module(s) for better fixture management.

Dimming Options

- DA:** 4 Hrs 25% Reduction
- DB:** 4 Hrs 50% Reduction
- DC:** 4 Hrs 75% Reduction
- DD:** 6 Hrs 25% Reduction
- DE:** 6 Hrs 50% Reduction
- DF:** 6 Hrs 75% Reduction
- DG:** 8 Hrs 25% Reduction
- DH:** 8 Hrs 50% Reduction
- DJ:** 8 Hrs 75% Reduction
- DALI:** Pre-set driver compatible with DALI logarithmic control system.

FAWS

Field Adjustable Wattage Selector, pre set to the highest position, can be easily switched in the field to the required position. This reduces total luminaire wattage consumption and reduces the light level – see the FAWS multiplier chart for more details.

Note: It is not recommended to use FAWS with other dimming or controls; if you do, set the switch to position 10 (maximum output) to enable the other dimming or controls. Switching FAWS to any position other than 10 will disable the other dimming or controls.

RL32/RL52 Refractive globe with Lumilock LED engine GX4

Post top

Specification (continued)

Scenarios	Pod Photo Control Options	Future Proof Photo Control Options
Scenario 1: Basic Level of Controls only	Choose E, H or R options	Choose None
Scenario 2 - Network Control Solutions are being used immediately on this project	Choose None	Choose R5 or R7 (will ship with a shorting cap for you to remove and replace with your node)
Scenario 3 - You would like the product to be future proof because one day you will use a networked lighting controls system. You also require the use of a basic photo control system now to turn your lights on and off	Choose E, H or R depending on your requirements	Choose R5 or R7 (will ship with a shorting cap for you to remove and replace with your node, then move the shorting cap to the pod receptacle). If you used a button eye, disconnect the button eye.

Future Proof Photo Control Options

R5 - Receptacle with 5 pins enabling dimming. Can be used with a twist lock node or a shorting cap. Will ship with a shorting cap installed for this product. Remove shorting cap when you are ready to install your node.

R7 - Receptacle with 7 pins enabling dimming and additional functionality (to be determined). Can be used with a twist lock node or a shorting cap. Will ship with a shorting cap installed for this product. Remove shorting cap when you are ready to install your node.

Surge Protection

Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA. Option for SP2 20kV/20kA.

Finish

Color in accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils / 24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 2000 hours for salt spray resistant

finish in accordance with testing performed and per ASTM B117 standard.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, using LM-80 data from LED manufacturers and engineering prediction methods, the luminaire useful life is expected to reach 100,000+ hours with >L70 lumen maintenance @ 25°C. 530mA configurations with short optics expected to reach 95,000+ hours with >L70 lumen maintenance @ 25C. 530mA configurations with wide optics expected to reach >75,000 hours with >L70 lumen maintenance @ 25C. Luminaire useful life accounts for LED lumen maintenance and additional factors, including LED life, driver life, PCB substrate, solder joints on/off cycles and burning hours for nominal applications. Lifetime statements do not include the use of controls, including networked controllers.

LED products manufacturing standard

The electronic components sensitive to electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Quality Control

The manufacturer must provide a written confirmation of its ISO 9001 2008 and ISO 14001 2004 International Quality Standards Certification.

Vibration Resistance

Meets the ANSI C136.31 2001, American National Standard for Roadway Luminaire Vibration specifications for Normal Applications.

Service Tag

Each individual luminaire is uniquely identifiable, thanks to the Service tag application. With a simple scan of a QR code, placed inside the luminaire, you gain instant access to the luminaire configuration, making installation and maintenance operations faster and easier, no matter what stage of the luminaire's lifetime. Just download the APP and register your product right away.

For more details visit: philips.com/servicetag

Certifications and Compliance

cETL listed to Canadian safety standards for wet locations. Manufactured to ISO 9001:2008 Standards. UL8750 and UL1598 compliant. ETL listed to U.S. safety standards for wet locations. LM80 & LM79 tested. IP Rating: IP66 sealed light engine. The LED driver is IP66 rated. LED luminaires are Design Lights Consortium qualified.

Warranty

5 year extended warranty.

See philips.com/warranties for details and restrictions.





Project: _____

Location: _____

Cat.No: _____

Type: _____

Lamps: _____ Qty: _____

Notes: _____

The Hadco New London LED post top has an elegance that accentuates the majesty and style of many urban architectural designs. It offers the style of traditional lanterns with today's cutting edge LEDgine technology. The optional cast aluminum spikes provide additional detailing to create the look you need.

Ordering guide

Example: VX8911-48-A-C-2-N-W-A-3-N-N-N-N-SP1-S-N

Series	LED count	Gen	Finish	Panels	Optics	Photo Control	Color Temp	Voltage	Drive Current	Integral Controls ²	Options			Surge Protect	Spikes	House Side Shield
											#1 ²	#2 ²	#3 ²			
VX8911	<input type="text"/>	G2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
VX8911	32 ^{1,3} 32 LEDs 48 48 LEDs 64 64 LEDs	G2 Gen 2	A Black B White G Verde H Bronze J Green	C Clear F Frosted	2 Type 2 3 Type 3 3W Type 3 Wide 4 Type 4 5 Type 5 N None	E 120 VAC button eye H 208/240/277 VAC button eye R 3-Pin Twist Lock Receptacle N None	N Neutral 4000K W Warm 3000K	A 120-277 B ^{2,3} 347-480	3 350mA 5 530mA 7 ¹ 700mA	Dynadimmer DA 4 Hrs, 25% reduction DB 4 Hrs, 50% reduction DC 4 Hrs, 75% reduction DD 6 Hrs, 25% reduction DE 6 Hrs, 50% reduction DF 6 Hrs, 75% reduction DG 8 Hrs, 25% reduction DH 8 Hrs, 50% reduction DJ 8 Hrs, 75% reduction DL DALI N None	AST Adjustable Start Up Time N None	CLO Constant Light Output N None	OTL Over The Life N None	SP1 10kV/10kA Surge Protector SP2 20kV/20kA Surge Protector	S Spikes N None	H House Side Shield N None

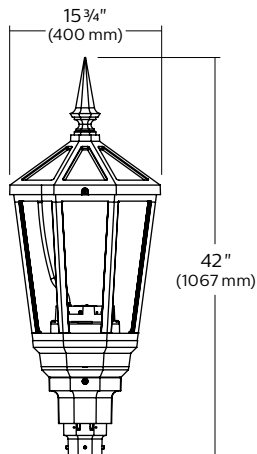
1. The 700mA (7) current is only compatible for 32 LEDs (32) configurations.
 2. Configurations with 347-480VAC (B) voltage are not compatible with optional dimming or optional programming.
 3. Configurations with 32 LEDs (32) at 350mA (3) and 530mA (5) currents are not compatible with 347-480 VAC (B) voltage.



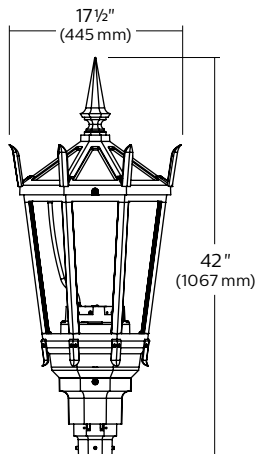
VX8911 New London

Post top

Dimensions



VX8911
 Height: Without Spikes 42" (107cm)
 Width: Without Spikes 15 3/4" (40cm)
 Max. EPA: 2.7 sq. ft.
 Max. Weight 38.5 lbs.



VX8911
 Height: With Spikes 42" (107cm)
 Width: With Spikes 17 1/2" (44.5cm)
 Max. EPA: 2.7 sq. ft.
 Max. Weight 38.5 lbs.

LED Wattage and Lumen Values for 3000K fixtures

Ordering Code: (3000K)	Total LEDs	System current (mA)	Average System Watts ¹ (W)	Type 2			Type 3			Type 3W			Type 4			Type 5		
				Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating
Clear Panel VX8911 3000K																		
32-G2-C-x-W3	32	350	38	2499	65.8	B1-U2-G1	2450	64.5	B1-U2-G1	2583	68.0	B1-U2-G1	2495	65.7	B1-U2-G1	2665	70.1	B2-U2-G1
32-G2-C-x-W5	32	530	53	3585	67.6	B1-U2-G1	3514	66.3	B1-U2-G1	3705	69.9	B1-U2-G1	3579	67.5	B1-U2-G1	3823	72.1	B3-U2-G1
32-G2-C-x-W7	32	700	71	4521	63.7	B1-U2-G1	4432	62.4	B1-U2-G1	4673	65.8	B1-U2-G1	4514	63.6	B1-U2-G1	4821	67.9	B3-U2-G1
48-G2-C-x-W3	48	350	51	3749	73.5	B1-U2-G1	3675	72.1	B1-U2-G1	3875	76.0	B1-U2-G1	3743	73.4	B1-U2-G1	3998	78.4	B3-U2-G1
48-G2-C-x-W5	48	530	79	5377	68.1	B1-U3-G1	5271	66.7	B1-U3-G1	5557	70.3	B1-U2-G2	5368	67.9	B1-U2-G1	5734	72.6	B3-U2-G1
64-G2-C-x-W3	64	350	68	4931	72.5	B1-U3-G1	4942	72.7	B1-U2-G1	5027	73.9	B1-U2-G1	4927	72.5	B1-U2-G1	5137	75.5	B3-U2-G1
64-G2-C-x-W5	64	530	103	7073	68.9	B1-U3-G1	7088	69.1	B1-U3-G2	7210	70.2	B2-U3-G2	7067	68.8	B1-U3-G2	7368	71.8	B3-U3-G2
Frosted Panel VX8911 3000K																		
32-G2-F-x-W3	32	350	38	2191	57.7	B1-U3-G2	2165	57.0	B1-U3-G2	2296	60.4	B1-U3-G2	2216	58.3	B1-U3-G2	2371	62.4	B1-U3-G2
32-G2-F-x-W5	32	530	53	3143	59.3	B1-U3-G2	3105	58.6	B1-U3-G2	3293	62.1	B1-U3-G3	3179	60.0	B1-U3-G3	3401	64.2	B2-U3-G2
32-G2-F-x-W7	32	700	71	3964	55.8	B1-U3-G3	3917	55.2	B1-U3-G3	4154	58.5	B1-U3-G3	4009	56.5	B1-U3-G3	4289	60.4	B2-U3-G3
48-G2-F-x-W3	48	350	51	3287	64.5	B1-U3-G2	3248	63.7	B1-U3-G2	3444	67.5	B1-U3-G3	3324	65.2	B1-U3-G3	3557	69.7	B2-U3-G2
48-G2-F-x-W5	48	530	79	4714	59.7	B1-U3-G3	4658	59.0	B1-U3-G3	4940	62.5	B1-U3-G3	4768	60.4	B1-U3-G3	5101	64.6	B2-U3-G3
64-G2-F-x-W3	64	350	68	4392	64.6	B1-U3-G3	4343	63.9	B1-U3-G3	4501	66.2	B1-U3-G3	4401	64.7	B1-U3-G3	4687	68.9	B2-U3-G3
64-G2-F-x-W5	64	530	103	6300	61.4	B2-U3-G3	6230	60.7	B2-U3-G3	6456	62.9	B2-U3-G3	6312	61.5	B1-U3-G3	6723	65.5	B3-U3-G3

Actual performance may vary due to installation variables including optics, mounting/ceiling height, dirt depreciation, light loss factor, etc.; highly recommended to confirm performance with a layout - contact Applications at outdoorlighting.applications@philips.com.

Note: Some data may be scaled based on tests of similar. But not identical luminaires.

VX8911 New London

Post top

LED Wattage and Lumen Values for 4000K fixtures

Ordering Code: (4000K)	Total LEDs	System current (mA)	Average System Watts ¹ (W)	Type 2			Type 3			Type 3W			Type 4			Type 5		
				Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating	Lumen Output ²	Efficacy (LPW)	BUG Rating
Clear Panel VX8911 4000K																		
32-G2-C-x-N3	32	350	38	2836	74.6	B1-U2-G1	2781	73.2	B1-U2-G1	2932	77.2	B1-U2-G1	2832	74.5	B1-U2-G1	3025	79.6	B2-U2-G1
32-G2-C-x-N5	32	530	53	4068	76.8	B1-U2-G1	3988	75.2	B1-U2-G1	4205	79.3	B1-U2-G1	4062	76.6	B1-U2-G1	4338	81.8	B3-U2-G1
32-G2-C-x-N7	32	700	71	5131	72.3	B1-U3-G1	5030	70.8	B1-U3-G1	5303	74.7	B1-U2-G2	5123	72.2	B1-U2-G1	5472	77.1	B3-U3-G1
48-G2-C-x-N3	48	350	51	4254	83.4	B1-U2-G1	4171	81.8	B1-U2-G1	4397	86.2	B1-U2-G1	4247	83.3	B1-U2-G1	4537	89.0	B3-U2-G1
48-G2-C-x-N5	48	530	79	6102	77.2	B1-U3-G1	5983	75.7	B1-U3-G1	6307	79.8	B1-U2-G2	6092	77.1	B1-U3-G2	6508	82.4	B3-U2-G2
64-G2-C-x-N3	64	350	68	5596	82.3	B1-U3-G1	5608	82.5	B1-U3-G1	5705	83.9	B1-U2-G2	5592	82.2	B1-U3-G1	5830	85.7	B3-U2-G1
64-G2-C-x-N5	64	530	103	8027	78.2	B2-U3-G2	8044	78.4	B2-U3-G2	8183	79.7	B2-U3-G2	8021	78.1	B2-U3-G2	8362	81.5	B3-U3-G2
Frosted Panel VX8911 4000K																		
32-G2-F-x-N3	32	350	38	2487	65.4	B1-U3-G2	2457	64.7	B1-U3-G2	2606	68.6	B1-U3-G2	2515	66.2	B1-U3-G2	2691	70.8	B1-U3-G2
32-G2-F-x-N5	32	530	53	3567	67.3	B1-U3-G2	3524	66.5	B1-U3-G2	3738	70.5	B1-U3-G3	3607	68.1	B1-U3-G3	3860	72.8	B2-U3-G2
32-G2-F-x-N7	32	700	71	4498	63.4	B1-U3-G3	4445	62.6	B1-U3-G3	4714	66.4	B2-U3-G3	4550	64.1	B1-U3-G3	4868	68.6	B2-U3-G3
48-G2-F-x-N3	48	350	51	3730	73.1	B1-U3-G2	3686	72.3	B1-U3-G3	3909	76.6	B1-U3-G3	3772	74.0	B1-U3-G3	4036	79.1	B2-U3-G3
48-G2-F-x-N5	48	530	79	5350	67.7	B1-U3-G3	5287	66.9	B1-U3-G3	5607	71.0	B1-U3-G3	5411	68.5	B1-U3-G3	5790	73.3	B2-U3-G3
64-G2-F-x-N3	64	350	68	4985	73.3	B1-U3-G3	4929	72.5	B1-U3-G3	5108	75.1	B1-U3-G3	4994	73.4	B1-U3-G3	5319	78.2	B2-U3-G3
64-G2-F-x-N5	64	530	103	7150	69.7	B2-U3-G3	7071	68.9	B2-U3-G3	7327	71.4	B2-U3-G4	7164	69.8	B2-U3-G3	7630	74.3	B3-U3-G3

Actual performance may vary due to installation variables including optics, mounting/ceiling height, dirt depreciation, light loss factor, etc.; highly recommended to confirm performance with a layout - contact Applications at outdoorlighting.applications@philips.com.

Note: Some data may be scaled based on tests of similar. But not identical luminaires.

Specifications

Housing

Roof: Hinged roof with stainless steel thumb screw. 356HM low-copper cast.

Panels: Two panel options. Clear panels are made of an U.V Stabilized sheet material. Frosted Panels are U.V. Stabilized sheet material. All panels are attached with a clip and can easily be removed for cleaning.

Fitter: Slip Fitter Dimensions: 3" I.D. x 3" deep. Hinged door to access photocontrol components.

Light Engine

LED engine is composed of five main components: Heat Sink, Lens, LED lamp, Optical System, and Driver. Electrical components are RoHS compliant.

LED Module

Composed of high-performance white LEDs. Color temperature as per ANSI/NEMA bin - Neutral White, 4000 Kelvin nominal (3985K +/- 275K or 3710K to 4260K) or Warm White, 3000 Kelvin nominal (3045K +/- 175K or 2870K to 3220K), CRI 70 Min. 75 Typical.

Heat Sink

Made of cast aluminum optimizing the LEDs efficiency and life. Product does not use any cooling device with moving parts (only passive cooling device).

Optical System

Type 2, 3, 3W, 4 and Type 5 composed of high performance optical grade PMMA acrylic refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Optical system is rated IP66. Performance shall be tested per LM 63, LM 79 and TM 15 (IESNA) certifying its photometric performance. Street side indicated.

Driver

Driver comes standard with 0-10V dimming capability. High power factor of 95%. Electronic driver, operating range 50/60 Hz. Auto adjusting universal voltage input from 120 to 277 VAC rated for both application line to line or line to neutral, Class I, THD of 20% max. Maximum ambient operating temperature from 40°F (4°C) to 130°F (55°C). Certified in compliance to UL1310 cULus requirement (dry and damp location). Assembled on a unitized removable tray with Tyco quick disconnect plug resisting to 221°F (105°C). The current supplying the LEDs will be reduced by the driver if the driver experiences internal overheating as a protection to the LEDs and the electrical components. Output is protected from short circuits, voltage overload and current overload. Automatic recovery after correction. Standard built in driver surge protection of 2.5kV (min).

VX8911 New London

Post top

Specifications (continued)

Driver Options

AST: Pre-set driver for progressive start-up of the LED module(s) to optimize energy management and enhance visual comfort at start-up.

CLO: Pre-set driver to manage the lumen depreciation by adjusting the power given to the LEDs offering the same lighting intensity during the entire lifespan of the LED module.

OTL: Pre-set driver to signal end of life of the LED module(s) for better fixture management.

Dimming Options

DA: 4 Hrs 25% reduction **DF:** 6 Hrs 75% reduction

DB: 4 Hrs 50% reduction **DG:** 8 Hrs 25% reduction

DC: 4 Hrs 75% reduction **DH:** 8 Hrs 50% reduction

DD: 6 Hrs 25% reduction **DJ:** 8 Hrs 75% reduction

DE: 6 Hrs 50% reduction

Surge Protection

Surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/10kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid State Street Lighting Consortium) model specification for LED roadway luminaires electrical immunity requirements for High Test Level 10kV / 10kA. Option for SP2 20kV/20kA.

Luminaire Useful Life

Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, using LM-80 data from LED manufacturers and engineering prediction methods, the luminaire useful life is expected to reach 100,000+ hours with >L70 lumen maintenance @ 25°C (48 LED and 64LED at 530mA is 68,000). Luminaire useful life accounts for LED lumen maintenance and additional factors, including LED life, driver life, PCB substrate, solder joints on/off cycles and burning hours for nominal applications.

Hardware

All non-ferrous fasteners prevent corrosion and ensure longer life.

Wiring

18 AWG wire, 6" (152mm) minimum exceeding from luminaire.

Options



SP2
20kV/20kA integral surge protector (optional)

Finish

Color in accordance with the AAMA 2603 standard. Application of polyester powder coat paint (4 mils/100 microns) with ± 1 mils / 24 microns of tolerance. The Thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. The surface treatment achieves a minimum of 2000 hours for salt spray resistant finish in accordance with testing performed and per ASTM B117 standard.

LED products manufacturing standard

electrostatic discharge (ESD) such as light emitting diodes (LEDs) are assembled in compliance with IEC61340 5 1 and ANSI/ESD S20.20 standards so as to eliminate ESD events that could decrease the useful life of the product.

Quality Control

The manufacturer must provide a written confirmation of its ISO 9001 2008 and ISO 14001 2004 International Quality Standards Certification.

Meets the ANSI C136.31 2010, American national Standard for Roadway Luminaire Vibration specifications for Normal Applications.

Certifications and Compliance

cETL listed to Canadian safety standards for wet locations. Manufactured to ISO 9001:2008 Standards. UL8750 and UL1598 compliant. ETL listed to U.S. safety standards for wet locations. cETL listed to Canadian safety standards for wet locations. LM80 & LM79 tested. Listed on the DesignLights™ Consortium (DLC) Qualified Products List (QPL).

IP Rating

The LED optics chamber is IP66 rated.

Warranty

5 year extended warranty.

LED Performance

Predicted lumen depreciation data ¹				
Ambient Temperature (°C)	Driver mA	Calculated L ₇₀ hours ^{1,2}	L ₇₀ per TM-21 ^{2,3}	Lumen Maintenance % @ 60,000 hours
25°C	up to 700 mA	>100,000	>60,000	90%

1. Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.
 2. L₇₀ is the predicted time when LED performance depreciates to 70% of initial lumen output.
 3. Calculated per IESNA TM21-11. Published L₇₀ hours limited to 6 times actual LED test hours.



LED OUTDOOR LIGHTING CONVERSION PROJECT

LKE, in cooperation with Louisville Metro Government and Lexington-Fayette Urban County Government, conducted an outdoor lighting project to convert HID fixtures to LED. The goal is to understand the true cost of a proactive LED conversion in order to compare against the current maintenance replacement plan, in which existing HID fixtures are replaced only when they fail. A total of 1,347 LED fixtures have replaced existing HID streetlights in LG&E and KU as part of this project.

LG&E enlisted input from Louisville Metro to identify target areas. The project targets areas considered to be hot zones for recurring criminal activity and where the city is pursuing economic investment. Metro believes better lighting will enhance safety in these areas helping bring in new investments. A total of 666 LED fixtures have been installed along roadways at 18th & Broadway, 26th & Broadway, Goss Avenue, Shelby Street, Beechmont, Brownsboro Road, Taylor & Berry, West Market and the Baxter & Bardstown corridors.

KU suggested 6 potential target areas in Fayette County to the LFUCG Public Works department. LFUCG ultimately agreed to allow KU to pursue this conversion project in two of those areas. 681 LEDs have replaced the HID streetlights in the Elm Tree neighborhood and along Man 'O War Boulevard between Versailles Road and Clays Mill Road.

The targeted areas consist of major thoroughfares, urban corridors, and residential neighborhoods. They also include a mix of fixtures types on both wood distribution poles and decorative non-wood poles. This make-up simulated a proactive conversion using a variety of work settings and materials, which allows the companies to better understand the cost of a proactive systematic conversion when deployed system wide.

Today, LKE replaces HID fixtures upon failure with a comparable LED fixture on a one-off basis. In LG&E and Lexington this work is performed by line technician business partners on a per unit basis using a one-man crew with a bucket truck. The proactive conversion project utilizes a two man-crew, one bucket truck and a pickup truck to carry materials and aid in traffic control. For major thoroughfares, an arrow board is required for traffic control, and in some situations a full traffic control unit. In KU, the labor cost per light for a proactive conversion was \$102.20 compared to the average contractor unit cost per light of \$92.10 for a failed fixture replacement (\$10.10 increase per light). In LG&E, the labor cost per light for a proactive conversion was \$112.36 compared to the to the average contractor unit cost per light of \$94.33 for a failed fixture replacement (\$18.03 increase per light).

On average, LG&E's contractor was able to replace one fixture every 40 minutes during the project while KU's contractor was able to replace one fixture every 33 minutes. LKE believes it has secured LED fixtures for the lowest cost possible even considering potential bulk orders to support a system-wide conversion. Therefore, for LKE the primary cost savings opportunity in a proactive conversion is labor costs. Strictly speaking from a labor cost perspective, it appears that the difference between the current maintenance-based conversion and a proactive conversion strategy is negligible.

The below lessons learned, and labor costs snapshot provides an understanding of what improvements need to be made operationally and what costs could be incurred for proactive conversions using actual labor costs per light versus labor unit costs. LKE can use these results to effectively negotiate unit rates for proactive conversion (for example, if a customer request conversion of 5 or more adjacent lights), however, that unit will likely be in line with existing unit rates for LKE's lighting contractors.

LKE is continuing to explore potential efficiencies that can be gained through a proactive conversion of LEDs and is in the beginning stages of planning a second phase of this proactive conversion project for early 2021. LKE will continue to evaluate the benefits of a proactive conversion against the current strategy of a maintenance-based conversion (e.g. less maintenance on LEDs and energy savings).

LABOR COSTS

KU

Area	Fixture Type	# of Fixtures Replaced	Proactive Conversion				Maintenance Conversion Comparison		Labor Variance
			Total Hours	Mins. Per Fixture	Total Labor Cost	Labor Cost Per Light	Unit Rate Per Light	Total Labor Unit Cost	
Elm Tree	Cobra	283	147	31	\$29,130.72	\$102.94	\$116.00	\$32,828.00	
	Contemporary	103	72	42	\$10,602.35	\$102.94	\$75.00	\$7,725.00	
	Open Bottom	1	1	53	\$102.94	\$102.94	\$116.00	\$116.00	
Total		387	220	34	\$39,836.00	\$102.94		\$40,669.00	-\$833.00
Man 'O War	Cobra	294	156	32	\$29,760.00	\$101.22	\$75.00	\$22,050.00	\$7,710.00
KU Totals		681	376	33	\$69,596.00	\$102.20	\$92.10	\$62,719.00	\$6,877.00

LG&E

Area	Fixture Type	# of Fixtures Replaced	Proactive Conversion				Maintenance Conversion Comparison		Labor Variance
			Total Hours	Mins. Per Fixture	Total Labor Cost	Labor Cost Per Light	Unit Rate Per Light	Total Labor Unit Cost	
18th & Broadway	Cobra (OH)	39					\$97.36	\$3,797.04	
	Cobra (UG)	13					\$71.74	\$932.62	
Total		52	36	42	\$5,816.52	\$111.86		\$4,729.66	\$1,086.86
Shelby Street	Cobra (OH)	132	85	39			97.36	\$12,851.52	
	Flood	3	2	39			97.36	\$292.08	
Total		135	86	38	\$14,138.32	\$104.73		\$13,143.60	\$994.72
Goss Avenue	Cobra (OH)	52					97.36	\$5,062.72	
	Cobra (UG)	1					71.74	\$71.74	
Total		53	31	35	\$5,010.65	\$94.54		\$5,134.46	-\$123.81
26th & Broadway	Cobra (OH)	29	18	37	\$3,823.56	\$131.85	97.36	\$2,823.44	\$1,000.12
Beechmont	Cobra (OH)	60	40	40	\$6,867.77	\$114.46	97.36	\$5,841.60	
	Colonial	17	8	28	\$1,943.20	\$114.31	58.73	\$998.41	
	Acorn	14	8	34	\$971.60	\$69.40	58.73	\$822.22	
	Contemporary	18	12	40	\$1,938.84	\$107.71	71.74	\$1,291.32	
Total		109	68	37	\$11,721.41	\$107.54		\$8,953.55	\$2,767.86
Brownsboro Road	Cobra (OH)	43	29	40	\$5,172.33	\$120.29	97.36	\$4,186.48	\$985.85
Taylor & Berry	Cobra (OH)	101	64	38	\$10,110.48	\$100.10	97.36	\$9,833.36	\$277.12
West Market	Cobra (OH)	81	57	42	\$9,039.49	\$111.60	97.36	\$7,886.16	\$1,153.33
Baxter & Bardstown	Cobra (OH)	63	60	57	\$10,000.11	\$158.73	97.36	\$6,133.68	\$3,866.43
LG&E Total		666	449	40	\$74,832.87	\$112.36	\$94.33	\$62,824.39	\$12,008.48

KEY LESSONS LEARNED

OPERATIONS

- Projects should to be broken down into smaller areas to make it easier to manage during construction and on the backend for billing and GIS reconciliation. Exploring making each project 50 or less lights and targeting by street instead of the full target area
- Mapping inaccuracies
 - There is no real way to solve this without doing a full audit beforehand (billing data is accurate, but location is not sufficiently specific to use in place of GIS data)
 - Creating maps for construction months in advance allows for a time lag and lights get changed out on repairs before the actual conversion
 - Ensure delivery of as-built maps from contractor to LKE as work is completed. A GIS technician with CCS/SAP experience participating throughout the duration of the project would help smooth out any issues with timely map creation and billing reconciliation
- LED fixtures should be ordered and stored in smaller amounts to avoid issues with storage and tracking of inventory.
 - Job trailers should be arranged if additional capacity is needed or to help reduce travel times to work locations far from operations centers and storerooms.
- Enhanced communication between contractor and LKE when a project area is completed, and a new area is starting. Recommend a project manager to oversee project if done system wide, communicate schedule and milestone completion with business partners, and be a conduit for information between Asset Info, Billing, Contractors and Customers.

CONTRACTORS:

- Parked cars in city setting created delays on installs
 - Work with city to have cars moved from streets during workdays.
- No issues on main thoroughfares though most work performed when traffic was at a minimum due to COVID-19
 - Arrow board required
 - 9-3pm time constraint in Lexington (explore adjusting timeframe with LFUCG on LED conversion jobs)
- The current setup appears to be as efficient as practical – two-man teams, one bucket truck, one pickup truck carrying materials and arrow board for traffic control.

LED Lighting Replacement Program (Bradley Hayes-Lead)

A. Key Points

- a. Customers are demanding LED lighting and have a mindset that LED's should be less expensive than traditional lighting because of lower energy consumption costs, reduced O&M, and the fact that the cost of the technology continues to decline.
- b. LKE has 271k lights in the field which generate approximately \$51m in revenue per year.
- c. Customers do not want to see the Utility replace traditional lighting with old technology. Customer satisfaction is a factor.
- d. Company has been under-collecting for various street lighting for many years as a result of rate case settlements.
- e. Strategy will target customers currently served by traditional lighting technologies, where rate schedule would not negatively impact customers.

B. Triggers to Timeline

- a. To be included in the 2020 Rate Cases.
- b. Emerging and increased expectations of customers for additional and more efficient lighting offerings.
- c. Obsolescence of traditional lighting technology offerings will necessitate future systematic replacement.
- d. LED lighting rates in proposed 2018 rate cases are generally less expensive than rates for traditional lights.

C. Interdependencies

- a. LKE is proposing to offer 16 new LED offerings in the 2018 Rate Cases, totaling 24 LED offerings
- b. LKE proposes to no longer install new non-LED lights following approval of the 2018 Rate Cases
- c. LKE proposes to replace failed non-LED lighting fixtures with a comparable LED.
- d. LKE proposes to continue to maintain non-LED lighting fixtures by replacing bulbs and photoelectric controls
- e. LKE proposes that proactive conversion to LEDs will be completed in response to customer demand. Customers will pay a monthly fee to convert a working HID light to an LED. The conversion fee is designed to recover the undepreciated net book value of fixtures that are in good working order, but are prematurely removed from service in response to a customer's request for an LED.
 - i. The proposed KU monthly conversion fee is \$6.12 for 5 years
 - ii. The proposed LG&E monthly conversion fee is \$7.49 for 5 years
- f. When the conversion fee is removed from the cost, 76% of LKE's HID fixtures have a comparable LED fixture that is lower in cost.
- g. Under the existing rate structure and due to the ongoing availability of traditional lighting fixtures, LKE anticipates that it cannot require customers to convert to a more expensive LED fixture. Currently, LKE's only ability to address any rate change associated to LED's or traditional lighting offerings is through a rate case.
- h. A future triggering event is the anticipated phasing out of traditional lighting technologies by regulators, manufacturers, and/or market forces - reinforcing this opportunity and recommendation to be proactive in converting existing lights to LED's.

D. Alternatives

- a. Do nothing or partial LED conversion (all Post-Top fixtures, all MV and MH fixtures, etc.).
- b. A website landing page and handout materials to increase customer awareness and education around the Companies' lighting offerings is currently under development.

E. Recommendations

- a. Maintenance based conversion of all 270k lights across the service territory – whenever LG&E or KU touches a fixture that fixture is replaced with a comparable LED - customers will continue to pay the same rate they pay today.
- b. Traditional lighting can be replaced with compatible LED's at the same cost to the customer and any savings to the company will serve to recover undepreciated costs (assets that are removed and replaced).

F. Resources

- a. Street Lighting is a core competency of the Company – a maintenance based conversion of HID lights to LEDs will allow the companies to largely use existing resources and complete a system-wide conversion in 6 to 8 years. Company will utilize both contract and employee workforce to complete this work. Additional contracts may be needed.
- b. Project manager.

G. Financial

- a. Costs are \$125m over six to eight years beginning upon approval of 2020 rate cases.
- b. This initiative is not currently in any BP plans though we are exploring whether there is room in EDO Capital Budgets for 2020 for a conversion pilot opportunity.

Hayes, Bradley

From: Hayes, Bradley
Sent: Tuesday, April 16, 2019 9:07 AM
To: Wolfe, John
Cc: Simon, Denise; Blake, Thomas
Subject: RE: LEDs - additional questions
Attachments: LED DCF Free Cash Flow Analysis - Final.xlsx

Hi John,

Attached is cash flow analysis of two potential LED conversion programs. Tom Blake and I worked together to develop a DCF model using various standard assumptions applicable to LKE (WACC, effective tax rates, tax depreciation schedules, etc.). The prevailing method for performing a DCF analysis is reflected in the Free Cash Flow analysis sheet, showing the present value cash flows prior to any interest or dividends paid to investors for providing the funds to invest in the LED project.

Free Cash Flow	
<u>25 Year Plan</u>	
	NPV (in '000s)
NPV of LED Capital Investment	\$62,374
NPV of Customer Savings	\$59,727
NPV Benefit (Cost)	(\$2,648)
<u>6 Year Plan</u>	
NPV of LED Capital Investment	\$83,932
NPV of Customer Savings	\$82,928
NPV Benefit (Cost)	(\$1,004)

The model is used to evaluate two scenarios: 1) 25 year plan - the plan proposed in the 2018 rate cases (i.e. replacing HID fixtures upon failure with LEDs and full conversion within 25 years). 2) 6 year plan – A 6 year system-wide maintenance based conversion (i.e. replacing HIDs with LEDs when the bulb/PEC fail). Both scenarios look at the cash flow impacts directly tied to the initial LED investment, do not include future expenses for LEDs to replace failed LEDs, and presume a 25 year life of LEDs. Those impacts are fuel savings (base fuel rates per the KPSC tariffs) and capital maintenance savings. There are no significant EDO O&M savings realized from a conversion to LEDs. I believe looking at conversion programs in this manner provides a favorable view of LEDs and that putting this into practice would reveal an even greater NPV cost of an LED conversion. In order to appropriately escalate expenses and savings, 3% annual increase was used for labor and materials and a 2% escalation was used for fuel costs.

I used the 6 year maintenance based conversion plan, rather than a systematic approach because it allows us to complete the conversion with existing resources and relatively known labor costs. Potential reduced labor costs may be realized through a systematic conversion but I have been unable to get comfortable with assumptions to realize those costs and as labor represents roughly 23% of the project cost, potential savings are discounted.

Best Regards,

Bradley Hayes

Group Leader Distribution Analytics and Special Contracts | LG&E and KU
820 West Broadway, Louisville, KY 40202

LKE Combined (\$000s)

Scenario 1 - 2018 Rate Cases Plan - 25 years to complete

Free Cash Flow Needed to Convert to LED	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Investment	\$4,406	\$4,538	\$4,674	\$4,814	\$4,959	\$5,107	\$5,261	\$5,418	\$5,581	\$5,748
Property Taxes	\$68	\$136	\$203	\$269	\$335	\$399	\$463	\$526	\$587	\$648
Income Taxes on Property Taxes	(\$17)	(\$34)	(\$51)	(\$67)	(\$83)	(\$100)	(\$115)	(\$131)	(\$147)	(\$162)
Income Taxes on Tax Depreciation	(\$157)	(\$431)	(\$636)	(\$793)	(\$914)	(\$1,040)	(\$1,169)	(\$1,253)	(\$1,291)	(\$1,330)
Cash Flow Needed to Convert to LED	\$4,300	\$4,209	\$4,190	\$4,224	\$4,295	\$4,367	\$4,439	\$4,559	\$4,731	\$4,905

Free Cash Flow Savings from Converting to LED

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Maintenance Savings (net)	\$0	\$176	\$363	\$560	\$770	\$991	\$1,225	\$1,472	\$1,732	\$2,007
Fuel Savings	\$0	\$136	\$278	\$425	\$578	\$736	\$901	\$1,073	\$1,250	\$1,435
Property Taxes	\$0	\$3	\$8	\$17	\$28	\$42	\$59	\$79	\$103	\$129
Income Taxes on Property Taxes & Fuel Savings	\$0	(\$35)	(\$71)	(\$110)	(\$151)	(\$194)	(\$240)	(\$287)	(\$338)	(\$390)
Income Taxes on Tax Depreciation	\$0	(\$6)	(\$24)	(\$50)	(\$83)	(\$122)	(\$167)	(\$219)	(\$276)	(\$335)
Total Savings from converting to LED	\$0	\$274	\$553	\$842	\$1,141	\$1,453	\$1,778	\$2,117	\$2,472	\$2,845

Summary

NPV of LED Capital Investment	\$62,374
NPV of Customer Savings	\$59,727
NPV Benefit (Cost)	(\$2,648)

Scenario 2 - Bulb Maintenance Based LED Conversion plan - 6 years to complete

Free Cash Flow Needed to Convert to LED	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Investment	\$18,357	\$18,908	\$19,475	\$20,059	\$20,661	\$21,281	\$0	\$0	\$0	\$0
Property Taxes	\$285	\$567	\$846	\$1,122	\$1,394	\$1,663	\$1,588	\$1,512	\$1,437	\$1,362
Income Taxes on Property Taxes	(\$71)	(\$142)	(\$211)	(\$280)	(\$348)	(\$415)	(\$396)	(\$377)	(\$359)	(\$340)
Income Taxes on Tax Depreciation	(\$654)	(\$1,796)	(\$2,651)	(\$3,302)	(\$3,810)	(\$4,333)	(\$4,091)	(\$3,078)	(\$2,214)	(\$1,598)
Cash Flow Needed to Convert to LED	\$17,916	\$17,538	\$17,459	\$17,599	\$17,897	\$18,196	(\$2,899)	(\$1,943)	(\$1,136)	(\$576)

Free Cash Flow Savings from Converting to LED

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Capital Maintenance Savings (net)	\$0	\$734	\$1,511	\$2,335	\$3,206	\$4,128	\$5,102	\$5,255	\$5,413	\$5,575
Fuel Savings	\$0	\$567	\$1,157	\$1,770	\$2,407	\$3,068	\$3,756	\$3,831	\$3,907	\$3,986
Property Taxes	(\$0)	\$11	\$34	\$69	\$116	\$175	\$246	\$317	\$387	\$455
Income Taxes on Property Taxes & Fuel Savings	\$0	(\$144)	(\$297)	(\$459)	(\$629)	(\$809)	(\$998)	(\$1,035)	(\$1,071)	(\$1,108)
Income Taxes on Tax Depreciation	\$0	(\$26)	(\$99)	(\$208)	(\$346)	(\$508)	(\$697)	(\$881)	(\$1,031)	(\$1,150)
Total Savings from converting to LED	\$0	\$1,141	\$2,306	\$3,507	\$4,754	\$6,054	\$7,409	\$7,487	\$7,605	\$7,758

Summary

NPV of LED Capital Investment	\$83,932
NPV of Customer Savings	\$82,928
NPV Benefit (Cost)	(\$1,004)

<u>Year 11</u>	<u>Year 12</u>	<u>Year 13</u>	<u>Year 14</u>	<u>Year 15</u>	<u>Year 16</u>	<u>Year 17</u>	<u>Year 18</u>	<u>Year 19</u>	<u>Year 20</u>	<u>Year 21</u>	<u>Year 22</u>	<u>Year 23</u>	<u>Year 24</u>
\$5,921	\$6,098	\$6,281	\$6,470	\$6,664	\$6,864	\$7,070	\$7,282	\$7,500	\$7,725	\$7,957	\$8,196	\$8,442	\$8,695
\$708	\$767	\$825	\$882	\$938	\$992	\$1,046	\$1,098	\$1,149	\$1,199	\$1,248	\$1,295	\$1,341	\$1,385
(\$177)	(\$191)	(\$206)	(\$220)	(\$234)	(\$248)	(\$261)	(\$274)	(\$287)	(\$299)	(\$311)	(\$323)	(\$335)	(\$346)
(\$1,370)	(\$1,411)	(\$1,453)	(\$1,497)	(\$1,542)	(\$1,588)	(\$1,635)	(\$1,685)	(\$1,735)	(\$1,787)	(\$1,841)	(\$1,896)	(\$1,953)	(\$2,011)
\$5,083	\$5,264	\$5,448	\$5,635	\$5,826	\$6,021	\$6,219	\$6,422	\$6,628	\$6,838	\$7,053	\$7,272	\$7,495	\$7,723

<u>Year 11</u>	<u>Year 12</u>	<u>Year 13</u>	<u>Year 14</u>	<u>Year 15</u>	<u>Year 16</u>	<u>Year 17</u>	<u>Year 18</u>	<u>Year 19</u>	<u>Year 20</u>	<u>Year 21</u>	<u>Year 22</u>	<u>Year 23</u>	<u>Year 24</u>
\$2,297	\$2,603	\$2,924	\$3,263	\$3,620	\$3,994	\$4,389	\$4,803	\$5,238	\$5,695	\$6,174	\$6,677	\$7,205	\$7,759
\$1,626	\$1,825	\$2,030	\$2,243	\$2,464	\$2,693	\$2,930	\$3,175	\$3,430	\$3,692	\$3,965	\$4,246	\$4,537	\$4,838
\$159	\$192	\$228	\$268	\$311	\$358	\$408	\$462	\$519	\$581	\$646	\$715	\$788	\$865
(\$445)	(\$503)	(\$563)	(\$627)	(\$692)	(\$761)	(\$833)	(\$907)	(\$985)	(\$1,066)	(\$1,150)	(\$1,238)	(\$1,329)	(\$1,423)
(\$399)	(\$465)	(\$536)	(\$610)	(\$688)	(\$770)	(\$857)	(\$948)	(\$1,044)	(\$1,144)	(\$1,250)	(\$1,361)	(\$1,478)	(\$1,600)
\$3,238	\$3,650	\$4,083	\$4,538	\$5,014	\$5,514	\$6,037	\$6,585	\$7,158	\$7,757	\$8,384	\$9,040	\$9,724	\$10,439

<u>Year 11</u>	<u>Year 12</u>	<u>Year 13</u>	<u>Year 14</u>	<u>Year 15</u>	<u>Year 16</u>	<u>Year 17</u>	<u>Year 18</u>	<u>Year 19</u>	<u>Year 20</u>	<u>Year 21</u>	<u>Year 22</u>	<u>Year 23</u>	<u>Year 24</u>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$1,286	\$1,211	\$1,136	\$1,061	\$985	\$910	\$835	\$759	\$684	\$609	\$534	\$458	\$383	\$308
(\$321)	(\$302)	(\$283)	(\$265)	(\$246)	(\$227)	(\$208)	(\$189)	(\$171)	(\$152)	(\$133)	(\$114)	(\$96)	(\$77)
(\$1,157)	(\$704)	(\$237)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
(\$192)	\$205	\$616	\$796	\$739	\$683	\$626	\$570	\$513	\$457	\$400	\$344	\$287	\$231

<u>Year 11</u>	<u>Year 12</u>	<u>Year 13</u>	<u>Year 14</u>	<u>Year 15</u>	<u>Year 16</u>	<u>Year 17</u>	<u>Year 18</u>	<u>Year 19</u>	<u>Year 20</u>	<u>Year 21</u>	<u>Year 22</u>	<u>Year 23</u>	<u>Year 24</u>
\$5,743	\$5,915	\$6,092	\$6,275	\$6,463	\$6,657	\$6,857	\$7,063	\$7,275	\$7,493	\$7,718	\$7,949	\$8,188	\$8,433
\$4,065	\$4,147	\$4,230	\$4,314	\$4,400	\$4,488	\$4,578	\$4,670	\$4,763	\$4,858	\$4,956	\$5,055	\$5,156	\$5,259
\$523	\$590	\$656	\$721	\$785	\$848	\$909	\$970	\$1,029	\$1,087	\$1,144	\$1,200	\$1,254	\$1,307
(\$1,145)	(\$1,182)	(\$1,219)	(\$1,256)	(\$1,294)	(\$1,331)	(\$1,369)	(\$1,407)	(\$1,445)	(\$1,483)	(\$1,522)	(\$1,561)	(\$1,599)	(\$1,638)
(\$1,248)	(\$1,332)	(\$1,400)	(\$1,452)	(\$1,495)	(\$1,540)	(\$1,586)	(\$1,634)	(\$1,683)	(\$1,733)	(\$1,785)	(\$1,839)	(\$1,894)	(\$1,951)
\$7,938	\$8,138	\$8,359	\$8,603	\$8,860	\$9,122	\$9,389	\$9,662	\$9,939	\$10,222	\$10,510	\$10,804	\$11,104	\$11,410

<u>Year 25</u>	<u>Year 26</u>	<u>Year 27</u>	<u>Year 28</u>	<u>Year 29</u>	<u>Year 30</u>	<u>Year 31</u>	<u>Year 32</u>	<u>Year 33</u>	<u>Year 34</u>	<u>Year 35</u>	<u>Year 36</u>	<u>Year 37</u>	<u>Year 38</u>
\$8,956	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$1,428	\$1,328	\$1,230	\$1,136	\$1,044	\$955	\$870	\$788	\$709	\$634	\$562	\$494	\$430	\$370
(\$356)	(\$331)	(\$307)	(\$283)	(\$260)	(\$238)	(\$217)	(\$197)	(\$177)	(\$158)	(\$140)	(\$123)	(\$107)	(\$92)
(\$2,072)	(\$1,805)	(\$1,296)	(\$932)	(\$672)	(\$487)	(\$296)	(\$100)	\$0	\$0	\$0	\$0	\$0	\$0
\$7,956	(\$808)	(\$372)	(\$80)	\$111	\$230	\$357	\$492	\$532	\$476	\$422	\$371	\$323	\$278

<u>Year 25</u>	<u>Year 26</u>	<u>Year 27</u>	<u>Year 28</u>	<u>Year 29</u>	<u>Year 30</u>	<u>Year 31</u>	<u>Year 32</u>	<u>Year 33</u>	<u>Year 34</u>	<u>Year 35</u>	<u>Year 36</u>	<u>Year 37</u>	<u>Year 38</u>
\$8,339	\$8,589	\$8,478	\$8,353	\$8,212	\$8,056	\$7,883	\$7,692	\$7,482	\$7,254	\$7,004	\$6,733	\$6,440	\$6,123
\$5,150	\$5,042	\$4,929	\$4,809	\$4,682	\$4,548	\$4,407	\$4,259	\$4,103	\$3,939	\$3,766	\$3,586	\$3,396	\$3,198
\$946	\$1,026	\$1,098	\$1,164	\$1,222	\$1,273	\$1,317	\$1,354	\$1,384	\$1,406	\$1,421	\$1,428	\$1,429	\$1,422
(\$1,521)	(\$1,514)	(\$1,504)	(\$1,490)	(\$1,473)	(\$1,453)	(\$1,428)	(\$1,400)	(\$1,369)	(\$1,333)	(\$1,294)	(\$1,251)	(\$1,204)	(\$1,153)
(\$1,728)	(\$1,850)	(\$1,943)	(\$2,001)	(\$2,034)	(\$2,048)	(\$2,044)	(\$2,022)	(\$1,985)	(\$1,940)	(\$1,890)	(\$1,835)	(\$1,776)	(\$1,711)
\$11,185	\$11,293	\$11,059	\$10,834	\$10,610	\$10,378	\$10,135	\$9,882	\$9,615	\$9,325	\$9,007	\$8,661	\$8,285	\$7,879

<u>Year 25</u>	<u>Year 26</u>	<u>Year 27</u>	<u>Year 28</u>	<u>Year 29</u>	<u>Year 30</u>	<u>Year 31</u>	<u>Year 32</u>	<u>Year 33</u>	<u>Year 34</u>	<u>Year 35</u>	<u>Year 36</u>	<u>Year 37</u>	<u>Year 38</u>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$232	\$163	\$105	\$60	\$27	\$7	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
(\$58)	(\$41)	(\$26)	(\$15)	(\$7)	(\$2)	(\$0)	(\$0)	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$174	\$122	\$79	\$45	\$20	\$5	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

<u>Year 25</u>	<u>Year 26</u>	<u>Year 27</u>	<u>Year 28</u>	<u>Year 29</u>	<u>Year 30</u>	<u>Year 31</u>	<u>Year 32</u>	<u>Year 33</u>	<u>Year 34</u>	<u>Year 35</u>	<u>Year 36</u>	<u>Year 37</u>	<u>Year 38</u>
\$8,686	\$7,456	\$6,144	\$4,746	\$3,259	\$1,678	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$5,364	\$4,560	\$3,721	\$2,846	\$1,935	\$987	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$1,358	\$1,385	\$1,387	\$1,365	\$1,317	\$1,245	\$1,148	\$1,054	\$963	\$876	\$792	\$711	\$635	\$562
(\$1,677)	(\$1,483)	(\$1,274)	(\$1,051)	(\$812)	(\$557)	(\$286)	(\$263)	(\$240)	(\$218)	(\$198)	(\$177)	(\$158)	(\$140)
(\$2,009)	(\$2,017)	(\$1,931)	(\$1,774)	(\$1,559)	(\$1,296)	(\$983)	(\$680)	(\$450)	(\$284)	(\$163)	(\$74)	(\$19)	\$0
\$11,722	\$9,901	\$8,046	\$6,133	\$4,141	\$2,058	(\$121)	\$111	\$272	\$373	\$431	\$460	\$458	\$422

<u>Year 39</u>	<u>Year 40</u>	<u>Year 41</u>	<u>Year 42</u>	<u>Year 43</u>	<u>Year 44</u>	<u>Year 45</u>	<u>Year 46</u>	<u>Year 47</u>	<u>Year 48</u>	<u>Year 49</u>	<u>Year 50</u>	<u>Year 51</u>	<u>Year 52</u>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$314	\$262	\$214	\$171	\$132	\$98	\$69	\$44	\$25	\$11	\$3	(\$0)	\$0	\$0
(\$78)	(\$65)	(\$53)	(\$43)	(\$33)	(\$24)	(\$17)	(\$11)	(\$6)	(\$3)	(\$1)	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$235	\$196	\$161	\$128	\$99	\$73	\$51	\$33	\$19	\$8	\$2	(\$0)	\$0	\$0

<u>Year 39</u>	<u>Year 40</u>	<u>Year 41</u>	<u>Year 42</u>	<u>Year 43</u>	<u>Year 44</u>	<u>Year 45</u>	<u>Year 46</u>	<u>Year 47</u>	<u>Year 48</u>	<u>Year 49</u>	<u>Year 50</u>	<u>Year 51</u>	<u>Year 52</u>
\$5,781	\$5,413	\$5,018	\$4,594	\$4,141	\$3,656	\$3,138	\$2,585	\$1,997	\$1,371	\$706	\$0	\$0	\$0
\$2,990	\$2,772	\$2,545	\$2,307	\$2,059	\$1,800	\$1,530	\$1,249	\$955	\$650	\$331	\$0	\$0	\$0
\$1,408	\$1,387	\$1,358	\$1,323	\$1,281	\$1,231	\$1,175	\$1,112	\$1,042	\$966	\$883	\$794	\$710	\$632
(\$1,097)	(\$1,038)	(\$974)	(\$906)	(\$833)	(\$756)	(\$675)	(\$589)	(\$498)	(\$403)	(\$303)	(\$198)	(\$177)	(\$158)
(\$1,641)	(\$1,565)	(\$1,483)	(\$1,395)	(\$1,300)	(\$1,198)	(\$1,088)	(\$971)	(\$847)	(\$713)	(\$571)	(\$420)	(\$286)	(\$190)
\$7,441	\$6,970	\$6,465	\$5,924	\$5,348	\$4,733	\$4,080	\$3,386	\$2,650	\$1,871	\$1,046	\$176	\$247	\$285

<u>Year 39</u>	<u>Year 40</u>	<u>Year 41</u>	<u>Year 42</u>	<u>Year 43</u>	<u>Year 44</u>	<u>Year 45</u>	<u>Year 46</u>	<u>Year 47</u>	<u>Year 48</u>	<u>Year 49</u>	<u>Year 50</u>	<u>Year 51</u>	<u>Year 52</u>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

<u>Year 39</u>	<u>Year 40</u>	<u>Year 41</u>	<u>Year 42</u>	<u>Year 43</u>	<u>Year 44</u>	<u>Year 45</u>	<u>Year 46</u>	<u>Year 47</u>	<u>Year 48</u>	<u>Year 49</u>	<u>Year 50</u>	<u>Year 51</u>	<u>Year 52</u>
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$493	\$428	\$367	\$310	\$258	\$210	\$167	\$129	\$96	\$68	\$45	\$28	\$0	\$0
(\$123)	(\$107)	(\$92)	(\$77)	(\$64)	(\$53)	(\$42)	(\$32)	(\$24)	(\$17)	(\$11)	(\$7)	\$0	\$0
\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
\$370	\$321	\$275	\$233	\$194	\$158	\$126	\$97	\$72	\$51	\$34	\$21	\$0	\$0



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empowering evening walks
parallel parkers
early risers
commuters
businesses
downtown districts
neighborhoods
our community

Learn more at lge-ku.com/lighting
or call 800-981-0600.



Outdoor LED Lighting Service

empowering more
efficient lighting options



About This Service

KU offers a variety of outdoor LED lighting options for residential, business and industrial customers, as well as local governments within our service territory.

By partnering with KU, we will install and maintain your outdoor lighting for you. Customers who use this service pay a monthly fee, per installed light, that appears on their bill and covers the costs of the lighting installation, maintenance and electricity used.





If your lighting fixture goes out or requires maintenance, simply let us know and we'll respond within two business days at no additional cost to make the necessary repairs.

How It Works

- 1 Review our list of available energy-efficient LED lighting fixtures and poles. Please see the pricing insert for available options and associated costs. A contract may be required for installations.
- 2 Contact KU to schedule an appointment. We will help you make your selection and discuss what's needed for your LED lighting installation. This is a customizable service, so you decide what, where, and how many lighting fixtures you'd like to install.
- 3 Our trained service professionals will then install your new or replace your existing lighting fixtures and poles.

What are the benefits of LED lighting?

Compared to conventional lighting, LEDs offer the following benefits:

-  More energy efficient by using 40-80% less energy
-  Lifespan is 4x longer
-  More environmentally-friendly
-  Improved visibility by offering better field depth and peripheral vision

What is the cost to convert to LEDs?

If you are installing new lighting fixtures or your existing lighting fixture is broken or no longer working, you simply pay a monthly fee that appears on your bill.

If you proactively convert your current, working lighting fixtures to LEDs, there is an additional five-year, monthly conversion fee added to your service fee that appears on your monthly bill. This conversion fee represents the replacement costs of your current, working non-LED lighting fixture.



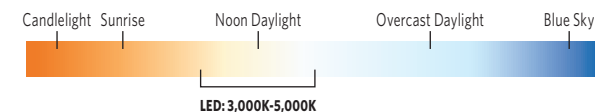
Can I choose to keep my existing non-LED lighting?

In 2019, we transitioned exclusively to LED lighting options through this service and will continue to maintain our existing non-LED lighting for a short time while supplies last. We will only replace your existing lighting fixture with a comparable LED fixture if it fails and cannot be fixed by simply replacing the bulb and photocontrol.

What lighting color options are available in LEDs?

We primarily offer LED lighting fixtures at 3,000 Kelvin, which most closely resembles "daylight at noon" and appears whiter in color compared to conventional lighting. We have several high-powered flood and contemporary lighting fixtures at 4,000 Kelvin, making them a brighter white and ideal for commercial parking lots.


Conventional lighting is considered "omni-directional," which means light emits from all directions, making it less effective at reaching your desired target. LEDs distribute light at sharper, more defined angles to illuminate directly in the intended direction. This helps cut down the loss of lumen, or lighting, making it much more efficient.




Outdoor LED Lighting Service Underground Electric




Below pricing does not reflect the **\$6.03 conversion fee per light** that applies when proactively exchanging existing lighting in working order with LEDs. Additional charges may apply where excess facilities are required.

Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type D	70w	Brushed Aluminum Pole	\$4.00	KC2	\$12.12	PK1	\$16.12
	Type A	100w		\$5.24	396	\$12.12	PK1	\$17.36
	Type B	200w		\$7.30	397	\$12.12	PK1	\$19.42
	Type C*	400w		\$10.54	398	\$12.12	PK1	\$22.66

Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type N	70w	Black Aluminum Pole	\$6.87	KN1	\$11.64	PK2	\$18.51
	Type P	100w		\$8.00	KN2	\$11.64	PK2	\$19.64
	Type R^	200w		\$9.74	KN3	\$11.64	PK2	\$21.38
	Type S^*	400w		\$14.13	KN4	\$11.64	PK2	\$25.77
	Type T^*	1000w		\$21.32	KN5	\$11.64	PK2	\$32.96

^Two contemporary fixtures may be mounted on one pole.

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
	Type U	100w	\$8.17	KF5
	Type V	200w	\$10.00	KF6
	Type W*	400w	\$12.38	KF7
	Type X*	1000w	\$19.09	KF8

Typically installed on existing poles.


Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type H	100w	Decorative Smooth	\$7.41	399	\$8.01	PK3	\$15.42
	Type K	70w or 100w	Decorative Smooth	\$8.83	KA1	\$8.01	PK3	\$16.84
			Historic Fluted	\$8.83	KA1	\$15.02	PK4	\$23.85


*Not available in residential areas unless requested by a government authority.


Outdoor LED Lighting Service Overhead Electric



Below pricing does not reflect the **\$6.03 conversion fee per light** that applies when proactively exchanging existing lighting in working order with LEDs. Additional charges may apply where new wood poles or other excess facilities are required.

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
	Type D	70w	\$8.67	KC1
	Type A	100w	\$9.92	390
	Type B	200w	\$11.98	391
	Type C*	400w	\$15.22	392

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
	Type M	100w	\$8.57	393

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
	Type U	100w	\$11.28	KF1
	Type V	200w	\$13.10	KF2
	Type W*	400w	\$15.49	KF3
	Type X*	1000w	\$22.20	KF4

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or call 502-589-1444 (local) or
800-331-7370 (outside Louisville).



Outdoor LED Lighting Service

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About This Service

LG&E offers a variety of outdoor LED lighting options for residential, business and industrial customers, as well as local governments within our service territory.

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If your lighting fixture goes out or requires maintenance, simply let us know and we'll respond within two business days at no additional cost to make the necessary repairs.

How It Works

- 1 Review our list of available energy-efficient LED lighting fixtures and poles. Please see the pricing insert for available options and associated costs. A contract may be required for installations.
- 2 Contact LG&E to schedule an appointment. We will help you make your selection and discuss what's needed for your LED lighting installation. This is a customizable service, so you decide what, where, and how many lighting fixtures you'd like to install.
- 3 Our trained service professionals will then install your new or replace your existing lighting fixtures and poles.

What are the benefits of LED lighting?

Compared to conventional lighting, LEDs offer the following benefits:

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-  Lifespan is 4x longer
-  More environmentally-friendly
-  Improved visibility by offering better field depth and peripheral vision

What is the cost to convert to LEDs?

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If you proactively convert your current, working lighting fixtures to LEDs, there is an additional five-year, monthly conversion fee added to your service fee that appears on your monthly bill. This conversion fee represents the replacement costs of your current, working non-LED lighting fixtures.



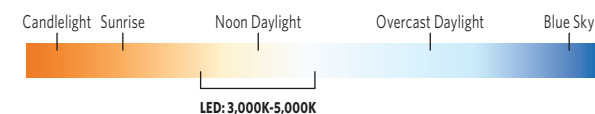
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We primarily offer LED lighting fixtures at 3,000 Kelvin, which most closely resembles "daylight at noon" and appears whiter in color compared to conventional lighting. We have several high-powered flood and contemporary lighting fixtures at 4,000 Kelvin, making them a brighter white and ideal for commercial parking lots.


Conventional lighting is considered "omni-directional," which means light emits from all directions, making it less effective at reaching your desired target. LEDs distribute light at sharper, more defined angles to illuminate directly in the intended direction. This helps cut down the loss of lumen, or lighting, making it much more efficient.




Outdoor LED Lighting Service Underground Electric




Below pricing does not reflect the **\$7.37 conversion fee per light** that applies when proactively exchanging existing lighting in working order with LEDs. Additional charges may apply where excess facilities are required.



Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type D	70w	Black Aluminum Pole or Aluminum Davit Pole (Downtown Metro)	\$3.82	LC2	\$30.04	PL1	\$33.86
	Type A	150w		\$5.05	496	\$30.04	PL1	\$35.09
	Type B	250w		\$7.04	497	\$30.04	PL1	\$37.08
	Type C*	400w		\$10.16	498	\$30.04	PL1	\$40.20

Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type N	85w	16' Bronze Aluminum Pole	\$6.55	LN1	\$14.49	PL2	\$21.04
	Type P	150w		\$7.65	LN2	\$14.49	PL2	\$22.14
	Type R^	225w	30' Bronze Aluminum Pole	\$9.34	LN3	\$21.26	PL3	\$30.60
	Type S^^	400w		\$13.55	LN4	\$21.26	PL3	\$34.81
	Type T^^	1000w		\$20.49	LN5	\$21.26	PL3	\$41.75

^Two contemporary may be mounted on one pole.

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
	Type U	85w	\$7.61	LF5
	Type V	175w	\$9.40	LF6
	Type W*	400w	\$11.73	LF7
	Type X*	1000w	\$18.17	LF8

Typically installed on existing poles.


Fixture	Label	Wattage Equivalence	Pole Type	Fixture Price	Fixture Rate Code	Pole Price	Pole Rate Code	Fixture + Pole Total
	Type H	100w	Smooth Black Aluminum Pole	\$7.04	499	\$14.29	PL4	\$21.33
	Type K	100w	Smooth Black Aluminum Pole	\$6.54	LA1	\$14.29	PL4	\$20.83


*Not available in residential areas unless requested by a government authority.


Outdoor LED Lighting Service Overhead Electric



Below pricing does not reflect the **\$7.37 conversion fee per light** that applies when proactively exchanging existing lighting in working order with LEDs. Additional charges may apply where new wood poles or other excess facilities are required.

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
 Cobra	Type D	70w	\$8.13	LC1
	Type A	150w	\$9.37	490
	Type B	250w	\$11.36	491
	Type C*	400w	\$13.30	492

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
 Open Bottom	Type M	100w	\$8.52	493

Fixture	Label	Wattage Equivalence	Fixture Price	Fixture Rate Code
 Directional Flood	Type U	85w	\$10.86	LF1
	Type V	175w	\$12.65	LF2
	Type W*	400w	\$14.98	LF3
	Type X*	1000w	\$21.42	LF4

*Not available in residential areas unless requested by a government authority.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 6

Responding Witness: John K. Wolfe

Q-6. Identify the useful life for each type of fixture within the proposed Restricted Lighting Service tariff.

A-6. The estimated useful life for each RLS fixture is 25 years.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government**

Dated January 8, 2021

Case No. 2020-00350

Question No. 7

Responding Witness: John K. Wolfe

Q-7. LED fixtures service lives typically range from 50,000 to 100,000, and may extend as high as 250,000 hours or 12.5, 25, or 62 years respectively. As such these extended life spans, should lead to projections of lower annual O&M costs as a component of rate construction. Yet the projected LED LS rates remain at, near, or even higher than the RLS they are replacing.

- a. Is there a projected timeframe or LED saturation level where the Company expects these O&M levels to begin to go down to reflect the reduced O&M costs of LED fixtures?
- b. If the Company does not believe increased deployment of LED fixtures will reduce the O&M costs for leased lighting please elaborate why?
- c. Additionally, public entities have seen a drastic reduction in the cost of outdoor area lighting on the scale of 50% or greater in the past several years, while efficiency continues to increase. Again, the current LED LS rate constructions appear not to reflect this significant downward trend in fixture costs. Please explain the Company's experience in LED fixture costs over the past several years?

A-7. The Company uses an estimated useful life of 100,000 hours or 25 years (based on 4,000 burn hours per year). While some LED fixtures have a calculated or theoretical lumen maintenance (L70) of 250,000 hours, the other components of those fixtures are generally rated for no more than 100,000 hours and no vendor has offered a warranty for more than 10 years.

- a. No. All O&M savings are built into the proposed LS rates and passed through to the customers.
- b. LED fixtures will reduce costs to customers, primarily in the area of energy savings and overall cost of ownership. This can be seen in that 75% of existing RLS fixtures have a comparable LED with a lower monthly rate. The cost built into the Company's proposed LED rates include capital

installation costs, fixed carrying charge (rate of return, straight line depreciation, income taxes, property taxes), annual distribution energy at LE rate, and non-fixture O&M cost of \$5.25-LGE per fixture per year. That non-fixture O&M cost represents the Company's O&M expenses for repair efforts such as cable repairs (not cable replacement), fixing leaning poles, replacing globes/refractors/shields, etc. These O&M expenses are not expected to change as a result of LED deployment. The LED LS rates do not include the capital costs to replace the bulbs and photo controls of RLS fixtures, which represent the majority of lighting repairs and are generally thought to be an area of significant O&M savings for lighting customers and providers. Capital maintenance expenses are not expressly captured in the LS/RLS rate design, those expenses are captured through the carrying cost, specifically the depreciation schedule (which is based on the LED's expected useful life and essentially represents the typical replacement schedule). Furthermore, the Company's RLS rates do not represent the true cost of ownership for those fixtures due to downward pressure on those rates through historical rate case settlements. Additionally, the Company continues to see increases in labor costs for Line Technician resources who perform installation and maintenance of lighting assets, pushing LS LED rates higher.

- c. LG&E and its customers have already realized most of the cost reductions attributable to increased LED fixture efficiency. LED efficiency is subject to the law of diminishing returns. Early on in LED manufacturing, LED efficiency saw massive, dramatic improvements. This meant that LED chips could be made smaller, put out more lumens, and more lumens per watt. This allowed manufacturers to reduce the size of the LED fixtures/housings, saving expenses on metals required for production. As LED technology became more ubiquitous, the LED chips/boards also became cheaper to produce and acquire. This is evidenced by the fixture prices built into proposed rates in the Company's 2016 rate case, compared to those in the 2018 rate cases. The Company, and thus its customers, did realize some savings from reduced fixture prices between the 2016 rate cases and the 2018 rate cases. The gains from more efficient LEDs and smaller fixtures has started to level off over the past 2-3 years and as a direct results LED fixture prices have also leveled off and the Company has started to see typical year-to-year increases seen in other materials and goods. See the table below for a comparison of rates and fixture prices from the 2016, 2018, and 2020 rate cases.

LG&E						
Rate Code	2016		2018		2020	
	Proposed Rate	Fixture Price	Proposed Rate	Fixture Price	Proposed Rate	Fixture Price
493	\$9.65	\$150.25	\$8.74	\$125.40	\$9.46	\$126.07
490	\$14.62	\$228.50	\$9.63	\$148.50	\$10.47	\$167.23
491	\$17.73	\$298.50	\$11.65	\$203.50	\$12.46	\$218.06
492	\$27.18	\$572.50	\$13.65	\$302.50	\$15.77	\$324.39
496	\$53.90	\$228.50	\$36.16	\$148.50	\$32.41	\$167.23
497	\$57.01	\$298.50	\$38.18	\$203.50	\$34.39	\$218.06
498	\$66.46	\$572.50	\$41.35	\$302.50	\$27.71	\$324.37
499	\$46.45	\$662.50	\$21.98	\$330.00	\$23.37	\$330.40

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 8

Responding Witness: John K. Wolfe

- Q-8. What is the percentage of street lights throughout the Company's system that is an LED light?
- A-8. As of November 2020, 4.93% of outdoor lights provided by the Company to customers are LED lights.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 9

Responding Witness: John K. Wolfe

- Q-9. Does the Company have any systematic plans to convert restricted lighting to LED, such as geography or rate code?
- A-9 No. The Company will continue to provide fixtures and poles for non-LED lights as existing fixtures and poles need to be replaced, but will do so only from the Company's existing inventory. When those inventory items are exhausted, a lighting customer whose non-LED fixture or pole needs to be replaced will need to convert to a new LED fixture, pole, or both under Rate LS. The Company has exhausted its inventory of Rate RLS fixtures with the exception of Acorn and Colonial fixtures that are still being use for spot replacements.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 10

Responding Witness: John K. Wolfe

Q-10. In a prior rate case, the Company defined the end of service life for an LED fixture when the fixture fails completely or lumen output is reduced below 70% (L70) of initial output rating.

- a. Does the Company still use the same definition for end of service life for an LED fixture?
- b. What are the Company's plans for service/maintenance for LED lights when they near or reach the end of service?
- c. When sourcing or purchasing LED fixtures, does the Company have a minimum allowable/acceptable L70 rating for fixtures in hours? If so, what is that rating?
- d. Please provide the L70 rating for each LS LED fixture/rate code currently in use.

A-10.

- a. Yes. The Company defines end of service for an LED as when the fixture fails or when the lumens depreciate to 70% of their initial output (L70) and that depreciation becomes noticeable to the human eye.
- b. LED fixtures will be replaced upon failure or when, after customer request or visual inspection, Company personnel determine the LED should be replaced because the lumen output has depreciated beyond a reasonable level.
- c. L70 is not a deciding factor in fixture selection because the Company expects other components of the LED fixture (e.g., transformer/driver or surge protectors) to fail prior to the LEDs reaching L70. Nonetheless, the Company expects all of the LED fixtures to have an L70 of at least 100,000 hours. Due to the integrated design of LED fixtures, failure of these other components requires replacement of the entire LED fixture.
- d. See attached.

L70 or L## Values for LS Rate Codes (LED Fixtures)

LGE Rate Code	KU Rate Code	Fixture Type	L70 rating	L## at 100,000 hours*
490	390	Cobra	100,000+	L84
491	391	Cobra	100,000+	L88
492	392	Cobra	100,000+	L91
493	393	Open Bottom	220,000	
LC1	KC1	Cobra	100,000+	L91
LF1	KF1	Directional (Flood)	100,000+	L89
LF2	KF2	Directional (Flood)	100,000+	L89
LF3	KF3	Directional (Flood)	100,000+	L89
LF4	KF4	Directional (Flood)	100,000+	L86 at 25°C
LC2	KC2	Cobra	100,000+	L91
496	396	Cobra	100,000+	L84
497	397	Cobra	100,000+	L88
498	398	Cobra	100,000+	L91
499	399	Colonial	204,000	
LA1	KA1	Acorn	139,000	
LN1	KN1	Contemporary		L88 at 60,000 hours
LN2	KN2	Contemporary		L88 at 60,000 hours
LN3	KN3	Contemporary		L88 at 60,000 hours
LN4	KN4	Contemporary	100,000+	L81
LN5	KN5	Contemporary	100,000+	L84
LF5	KF5	Directional (Flood)	100,000+	L89
LF6	KF6	Directional (Flood)	100,000+	L89
LF7	KF7	Directional (Flood)	100,000+	L89
LF8	KF8	Directional (Flood)	100,000+	L86 at 25°C
LV1		Victorian	100,000+^	
LL1	KV1	London/Victorian	100,000+^	

*These manufacturers do not provide an L70 value. Alternatively, they provide Lumen Maintenance values (L##) at 100,000 hours (or 60,000 hours). If that L## value is greater than L70 then the L70 value exceeds 100,000 hours

^This manufacturer provides a calculated L70 value that reads ">100,000"

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 11

Responding Witness: John K. Wolfe

Q-11. The Energy Policy Act of 2005 – Section 135 H.R. 6-39 states that “Mercury vapor lamp ballasts . . . shall not be manufactured or imported after January 1, 2008.”

- a. What is the status of the Company’s inventory for mercury vapor replacement?
- b. When is conversion to from mercury vapor to LED anticipated?
- c. Since lamp replacements for these MV fixtures are not consistent with the 2005 Act. Has the Company used a different projection methodology for the replacement of these fixtures? If so, when does the Company anticipate all MV fixtures will be converted?

A-11.

- a. The Company does not maintain an inventory of mercury vapor fixtures.
- b. See the response to Question No. 9.
- c. Lamp replacements for mercury vapor fixtures are consistent with federal law; only the manufacture or importation of mercury vapor lamp ballasts is forbidden. This necessitates replacing mercury vapor lighting over time as ballasts fail and cannot be replaced. The Company continues to purchase and replace mercury vapor lamps, and does not have a different projection methodology for replacement of mercury vapor fixtures.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 12

Responding Witness: John K. Wolfe

- Q-12. Please refer to the RLS Tariff. It states: “In the event restricted fixtures/poles fail and replacements are unavailable, Customer will be given the choice of having Company remove the failed fixture/pole or replacing the failed fixture/pole with other available fixture/pole.” The range of lumen output in the new rates contemplates a photometric study.
- a. How will the Company assist municipalities in evaluating roadway illumination for the new LS rate options?
 - b. Please provide an updated cross-reference table (excel) that associates all existing RLS rate codes with their LS LED equivalent(s). Please ensure the cross reference table includes the RLS and LS cost, and if applicable for LS rates the pole category and charges.
- A-12.
- a. The Company provides a recommended comparable LED fixture to replace each RLS fixture. Upon request, the Company can provide additional details about each LED fixture, including lumen output, light pattern, and IES files
 - b. See attached.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 13

Responding Witness: John K. Wolfe

- Q-13. Please state how many new public street lights were installed by LG&E for each of the past three years, indicating the types of lights installed and the number of these lights which replaced previously existing street lights, for the following: Louisville Metro and LG&E's entire system.
- A-13. KU has a long-standing practice of maintaining a database of all lighting related activities in Lexington-Fayette County. LG&E and KU do not replicate this practice anywhere else in the service territories. LG&E does not have a business need to track information at this level for public street lights. See the attached chart for the net change (includes removals, installs, and upgrades) in Louisville Metro's lights for the past three years.

Case No. 2020-00350
Attachment to Response to METRO-1 Question No. 13
Page 1 of 1
Wolfe

Louisville Metro - Net Change in Billed Lights 2018 to November 2020

Rate Code	Net Change 2018			Net Change 2019		November 2020	Net Change Jan-20 to Nov-20
	January 2018	January 2019	to 2019	January 2020	to 2020		
RLS 453: OH HPS Cobra Head 28500L Fix	8520	8681	161	8750	69	8219	-531
RLS 452: OH HPS Cobra Head 16000L Fix	3704	3852	148	3872	20	3660	-212
RLS 204: OH MV Cobra Head 25000L Fixture	2344	2238	-106	2075	-163	1914	-161
RLS 454: OH HPS Cobra Head 50000L Fix	2055	2018	-37	1932	-86	1835	-97
RLS 203: OH MV Cobra Head 13000L Fixture	1702	1606	-96	1491	-115	1412	-79
RLS 266: UG HPS Cobra/Contemp 28500L	1435	1430	-5	1423	-7	1377	-46
RLS 252: OH MV Cobra/Open Bottom 8000L	1367	1335	-32	1290	-45	1222	-68
RLS 424: UG HPS Cobra Head 28500L Deco	655	681	26	694	13	674	-20
LS 491: OH LED Cobra Head 14166L Fixture	0	7	7	213	206	613	400
LS 490: OH LED Cobra Head 8179L Fixture	0	9	9	112	103	602	490
RLS 274: UG HPS Coach/Acorn 9500L Deco	628	631	3	630	-1	595	-35
RLS 267: UG HPS Cobra/Contemp 50000L	491	488	-3	480	-8	447	-33
RLS 315: UG MV Cobra Head 25000L Deco	415	413	-2	394	-19	386	-8
RLS 314: UG MV Cobra Head 13000L Deco	392	380	-12	369	-11	351	-18
RLS 208: UG MV Coach 8000L Decorative	363	361	-2	355	-6	351	-4
RLS 456: OH HPS Directional 50000L Fix	316	331	15	333	2	327	-6
RLS 277: UG HPS Coach/Acorn 16000L Deco	251	251	0	251	0	251	0
LS LC1: OH LED Cobra Head	0	0	0	0	0	191	191
RLS 457: OH HPS Open Bottom 9500L Fix	121	124	3	129	5	127	-2
RLS 413: UG HPS Colonial 4-Sided 9500L	85	87	2	89	2	90	1
LS 492: OH LED Cobra Head 23214L Fixture	0	4	4	10	6	90	80
RLS 275: UG HPS Cobra/Contemp 16000L	82	82	0	82	0	80	-2
LS 497: UG LED Cobra Head 14166L Dec Smt	0	0	0	19	19	68	49
LS 493: OH LED Open Bottom 5007L Fixture	0	45	45	46	1	47	1
LS 496: UG LED Cobra Head 8179L Dec Smth	0	0	0	2	2	44	42
RLS 276: UG HPS Coach/Acorn 5800L Deco	43	43	0	43	0	43	0
RLS 207: OH MV Directional 25000L Fix	44	44	0	42	-2	40	-2
RLS 348: UG Inc Continental Jr 6000L Dec	39	39	0	39	0	39	0
RLS 318: UG MV Cobra Head 8000L Deco	44	41	-3	40	-1	37	-3
LS 499: UG LED Colonial 4-Sided 5665L De	0	0	0	7	7	32	25
LS LN3: UG LED Contemporary	0	0	0	2	2	32	30
LS LA1: UG LED Acorn	0	0	0	0	0	22	22
RLS 349: UG Inc Continental Jr 1500L Dec	16	16	0	16	0	16	0
RLS 445: UG HPS Acorn 16000L Decorative	15	15	0	15	0	15	0
RLS 423: UG HPS Cobra Head 16000L Deco	14	16	2	17	1	15	-2
RLS 430: UG HPS Victorian 5800L Deco	12	12	0	12	0	12	0
RLS 206: UG MV Coach 4000L Decorative	11	11	0	11	0	11	0
RLS 422: UG HPS Contemporary 50000L Deco	10	10	0	10	0	10	0
RLS 473: OH MH Directional 32000L Fix	2	7	5	9	2	9	0
RLS 425: UG HPS Cobra Head 50000L Deco	7	9	2	8	-1	8	0
RLS 455: OH HPS Directional 16000L Fix	7	8	1	8	0	8	0
RLS 421: UG HPS Contemporary 28500L Deco	7	7	0	7	0	7	0
RLS 420: UG HPS Contemporary 16000L Deco	6	6	0	6	0	6	0
RLS 210: OH MV Directional 60000L Fix	7	7	0	7	0	6	-1
LS LF7: UG LED Directional (Flood)	0	0	0	0	0	5	5
LS LN4: UG LED Contemporary	0	0	0	0	0	5	5
LS LF3: OH LED Directional (Flood)	0	0	0	0	0	4	4
LS LC2: UG LED Cobra Head	0	0	0	0	0	4	4
RLS 416: UG HPS Acorn 9500L Decorative	3	3	0	3	0	3	0
LS 433: UG HPS Victorian 9500L Historic	3	3	0	3	0	3	0
LS 498: UG LED Cobra Head 23214L Dec Smt	0	0	0	1	1	2	1
RLS 201: OH MV Open Bottom 4000L Fixture	2	2	0	2	0	2	0
LS 427: UG HPS London 5800L Historic	2	2	0	2	0	2	0
RLS 209: OH MV Cobra Head 60000L Fixture	1	1	0	1	0	1	0
LS LF2: OH LED Directional (Flood)	0	0	0	0	0	1	1
Total	25221	25356	135	25352	-4	25373	21

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 14

Responding Witness: John K. Wolfe

- Q-14. For each of the past three years, please provide the number of street lights that LG&E had planned on replacing prior to that year, and a summary of the actual number replaced that year for the following: Louisville Metro (extrapolate if needed) and LG&E's entire system.
- A-14. The Company completed a planned, systematic conversion of 666 RLS fixtures paid for by Metro to LS LED fixtures to understand the true cost of a proactive LED conversion, in order to compare against the current cost of replacing those fixtures during routine maintenance upon failure. The Company otherwise had no planned replacements of street lights for each of the past three years. The Company replaces street lights at the request of customers, or when dictated by failure, damage, or unsatisfactory physical condition.

The Company does not track replacements by customers. The Company replaced fixtures in the approximate amounts indicated below.

	2018	2019	2020
LG&E	2438	2119	2317

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government**

Dated January 8, 2021

Case No. 2020-00350

Question No. 15

Responding Witness: John K. Wolfe

- Q-15. Please explain in detail the Company's current policies, procedures, practices, and/or guidelines for maintaining street lights within Louisville Metro and provide copies of the same.
- a. Does the Company regularly inspect individual street lights or the collective street lighting in Louisville Metro?
 - b. Do these inspections take place only upon the receipt by the Company of a complaint regarding a particular street light?
 - c. What is the average response time to replace a non-working street light in Louisville Metro?
 - d. Does this information differ depending upon the type of street light? If so, please provide a detailed explanation.
 - e. Would AMI deployment as proposed in the Company's application provide information to the Company that would improve any of the response times or costs related to lighting?
- A-15. The Company maintains its street lights and other lighting products consistent with the original Company installation standards, the Terms and Conditions of the Lighting Service and Restricted Lighting Service Schedules, and in compliance with 807 KAR 5:041. Electric: Section 2 – General Requirements, Section 3 – Acceptable Standards, and Section 5 – Maintenance or Continuity of Service. See attached for a copy of these installation standards.
- a. The Company conducts proactive lighting patrols as part of its normal operations. These night-time patrols are integrated into the Company's normally scheduled operations for outage response activities. When not responding to outages, the Company's outage technicians, who are on duty 24 hours a day, 7 days a week, undertake lighting patrol and maintenance activities, among other duties that they perform daily.

- b. The Company also issues repair orders in response to light outages reported by Company employees and contractors, customers, Louisville Metro personnel, police, fire departments, and the public. Outages can be reported via:
 - 1. Website: <https://lge-ku.com/outages/report/streetlight>
 - 2. Residential Call Center: 1-800-331-7370
 - 3. Metro311
- c. The Company does not track average response time to replace a non-working light by county. KU has a long-standing practice of tracking lighting repair activity reported by LexCall 311 in Lexington-Fayette County that is not replicated by KU or LG&E anywhere else in the service territories. See the response to Question No. 18 for LG&E-wide data on average response time.
- d. No.
- e. No. Lighting is typically unmetered and therefore is not expected to be impacted by the proposed AMI deployment.

Electric System
 Codes & Standards

MAST ARM INSTALLATION FOR COBRA AND OPEN BOTTOMS 80 06 20
ON WOOD POLES
Rev. C

ASSEMBLY DESCRIPTION
 80 06 20 . XX

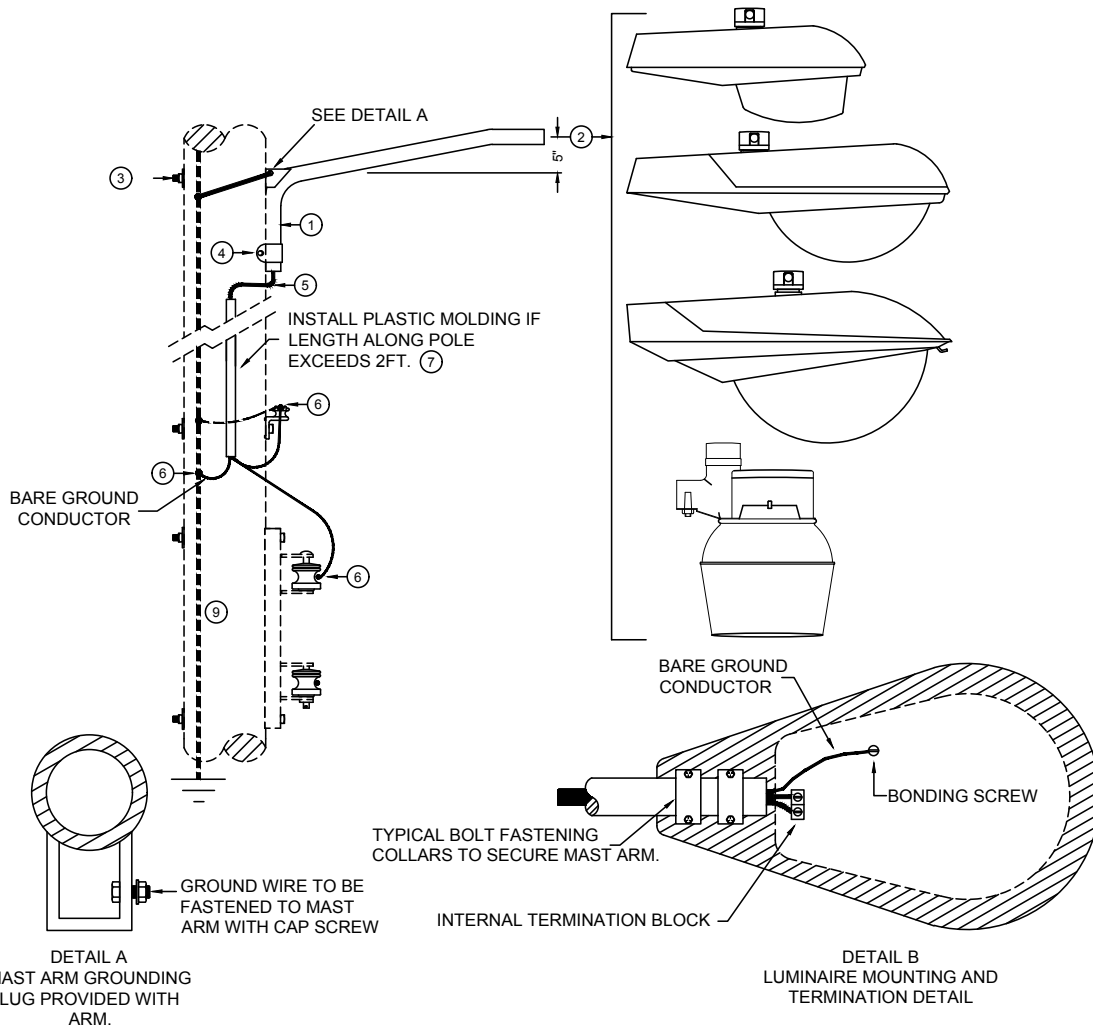
ASSEMBLY DETAILING 2', 6', AND 10'
 MAST ARM INSTALLATION ON WOOD POLES.
 80 06 20. 01 LUMINAIRE ASSEMBLY ON 2' MAST ARM
 80 06 20. 02 LUMINAIRE ASSEMBLY ON 6' MAST ARM
 80 06 20. 03 LUMINAIRE ASSEMBLY ON 10' MAST ARM

NOTE:

1. SECONDARIES SHOWN FOR EXAMPLE PURPOSE ONLY. ACTUAL CONNECTIONS MAY BE 120V OR 240V DEPENDING ON JOB REQUIREMENTS.
2. REFER TO 021012 FOR PROPER SPACING REQUIREMENTS.

MATERIAL LIST

ITEM	UIN	DESCRIPTION	01	02	03
1	VARIABLES	MAST ARM, ALUM - SEE STD 800202	1	1	1
2	VARIABLES	LAMP/LUMINAIRE - SEE STD 800000	1	1	1
3	VARIABLES	5/8" MACHINE BOLT W/NUT	1	1	1
4	1159243	SCREW, LAG, 1/2" X 4", GIMLET POINT, GALV	2	2	4
5	7001357 OR	CABLE, 600V, #12, SOLID, 2/C W/GROUND, TYPE UF-B, OH & UG	*	*	*
	7000414	CABLE, OH, DUPLEX #4 AL W/#4 ACSR NEUTRAL, XLP, TERRIER, 500' COIL	*	*	*
6	VARIABLES	VARIOUS SMALL CONNECTORS	4	4	4
7	7000913	MOULDING, GROUND, 1/2" X 8F, PLASTIC	*	*	*
8	7000337	WASHER, FLAT, SQUARE, 2-1/4" X 2-1/4" X 3/16", FOR 5/8" BOLT, GALV STL	1	1	1
9	7005817	CONDUCTOR, OH WIRE, 4, CU, BARE, SD, SOLID	*	*	*



Electric System
 Codes & Standards

YARD TYPE / PACKAGE LIGHT WOOD POLE INSTALLATION

80 06 22
 Rev. A

Grounding notes:

All existing and new fixtures and mast arms must be grounded unless grounding negatively impacts safety or the reliability of the structure. Grounding of both the fixture and the mast arm can be accomplished by grounding either the fixture, the mast arm or both. In general a visible external ground is preferred.

Internal grounding can be accomplished by attaching a separate ground wire of a 3-wire cable (i.e. 12-2/C w/ground) between the pole ground and ground lug in the fixture.

For external grounding, the pole ground wire is fastened to mast arm with 3/8" x 1-1/4" carriage bolt, nut and lock washer (IIN #3003808) using a minimum of #6 bare SD Cu. Older installations with no grounding provisions can be grounded by drilling the support and using a self tapping screw and washer.

MATERIAL LIST

ITEM	IIN NUMB.	DESCRIPTION	QTY.
1	VARIES	SEE STANDARD 800000 FOR LAMP	1
2	7000258	BOLT, MACHINE, SQ HD, 5/8" X 10", GALV. W/SQ NUT	1
3	7000911	BRACKET, WIRE, 1-INSULATOR, LESS INSULATOR, 4" X 3-1/4"	1
4	7001268	INSULATOR, SECONDARY, SPOOL 3", PORCELAIN OR POLYETHYLENE	1
5	7002215	CLAMP, WEDGE, SERVICE, #2- #6 ACSR, RIGID SS BAIL	*
6	7000339	WASHER, CURVED, SQUARE, 3" X 3" X 1/4", GALV. FOR 5/8" BOLT	1
7	VARIES	VARIOUS SMALL CONNECTOR	*
8	7000913	MOULDING, GROUND, 1/2" X 8F, PLASTIC	*
9	7001357 OR	CABLE, 600V, #12, SOLID, 2/C W/GROUND, TYPE UF-B, OH & UG	*
	7000414	CABLE, OH, DUPLEX, #4 AL W/#4 ACSR NEUTRAL, XLP, TERRIER, 500' COIL	*
10	7005817	CONDUCTOR, OH WIRE, 4, CU BARE, SD, SOLID, 25 LB. SPOOL	*
11	7002252	STAPLE, MOULDING, ROLLED POINT, FOR 1/2" MOULDING, STL	*

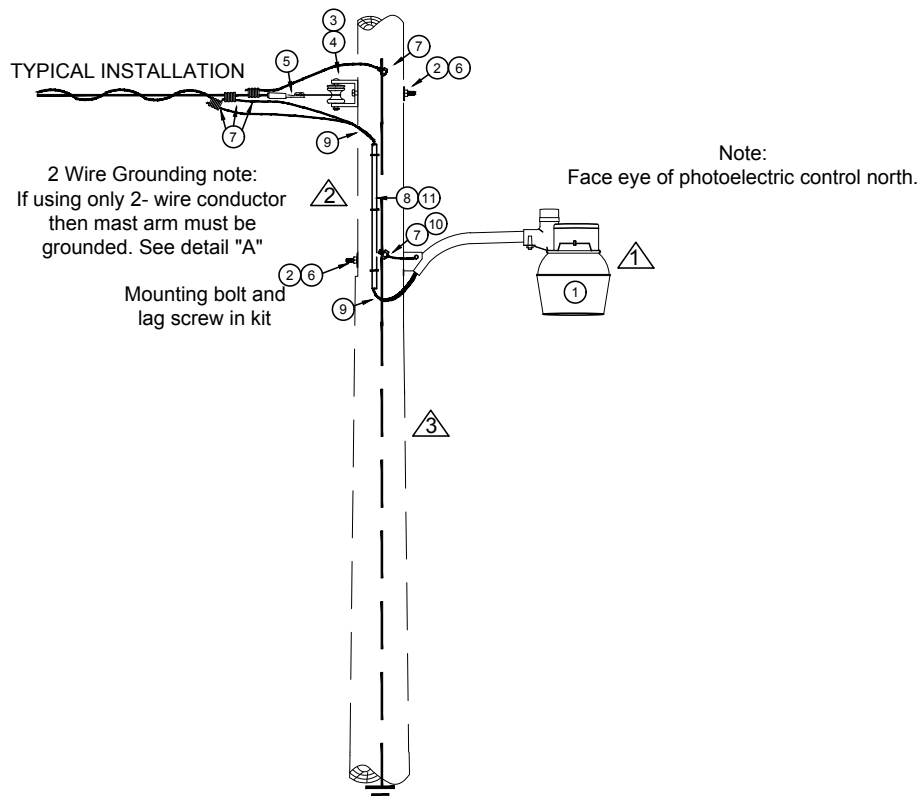
* AS REQUIRED

NOTES:

⚠ Package light kit includes, head, optics, lamp, photo control, 2/wire - pre-wired cable, mast arm, 5/8" mounting bolt & lag screws and grounding bolt. *LED FIXTURES CAN BE USED WITHOUT REFRACTOR.

⚠ Install cable guard 1/2", ground wire moulding (IIN 7000913) if length along pole exceeds 2 ft. Vertical riser must be covered with cable guard even if jacketed conductor cable is used. If 3-#6al. poly is used you may use 1"x 10" cable guard U shaped PVC IIN # 1160501.

⚠ Pole and pole grounding not included in this standard.



Electric System
 Codes & Standards

STREET LIGHT CONSTRUCTION ANCHOR BASE - OVERHEAD COBRA HEAD **80 06 24**
Rev.

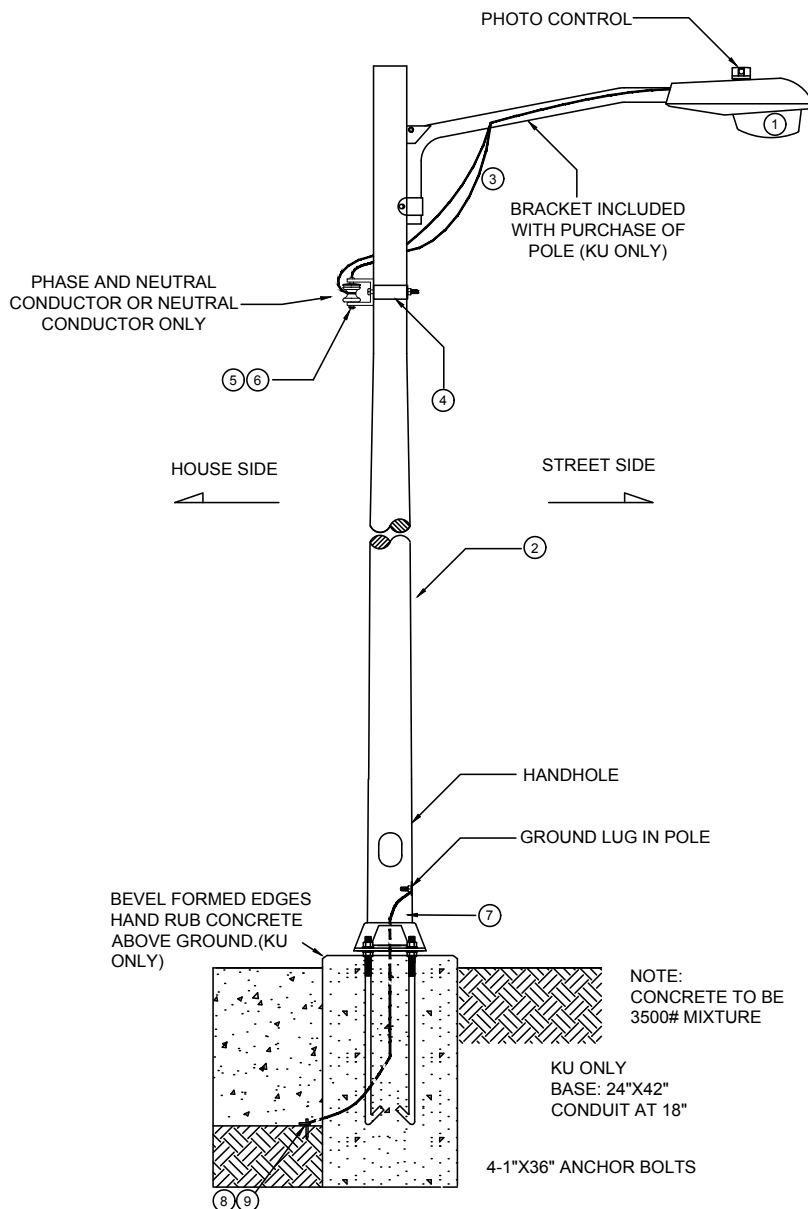
NOTE:
 POLE WITH OH
 SERVICE - NOT
 CONSIDERED
 BREAKAWAY

MATERIAL LIST

ITEM	IIN	DESCRIPTION	QTY
1	VARIABLES	LAMP - SEE STD 800000	1
2	VARIABLES	POLE - SEE STD 800002	1
3	7000414	CABLE, OH, DUPLEX #4 AL W/#4 ACSR NEUTRAL, XLP, TERRIER, 500' COIL	*
4	7000836	BAND, POLE, 4 WAY, SMALL, GALV STL	1
5	7000911	BRACKET WIRE, 1-INSULATOR LESS INSULATOR, 4" X 3-1/4"	1
6	7001268	INSULATOR, SECONDARY, SPOOL 3"	1
7	7005817	CONDUCTOR, OH WIRE, 4, CU, BARE, SD, SOLID, 25 LB. SPOOL	*
8	7000886	ROD, GROUND, 5/8"X8', BONDED COPPER	1
9	7000887	CLAMP, GROUND ROD, 5/8", 8-1/0, HEX CU, HEAVY DUTY	1

* AS REQUIRED

SEE 80 08 04
 FOR KY DOT
 COMPLIANT FOUNDATION



Electric System
 Codes & Standards

POLES USED WITH POST TOP MOUNT LUMINAIRES

80 08 20
 Rev. C

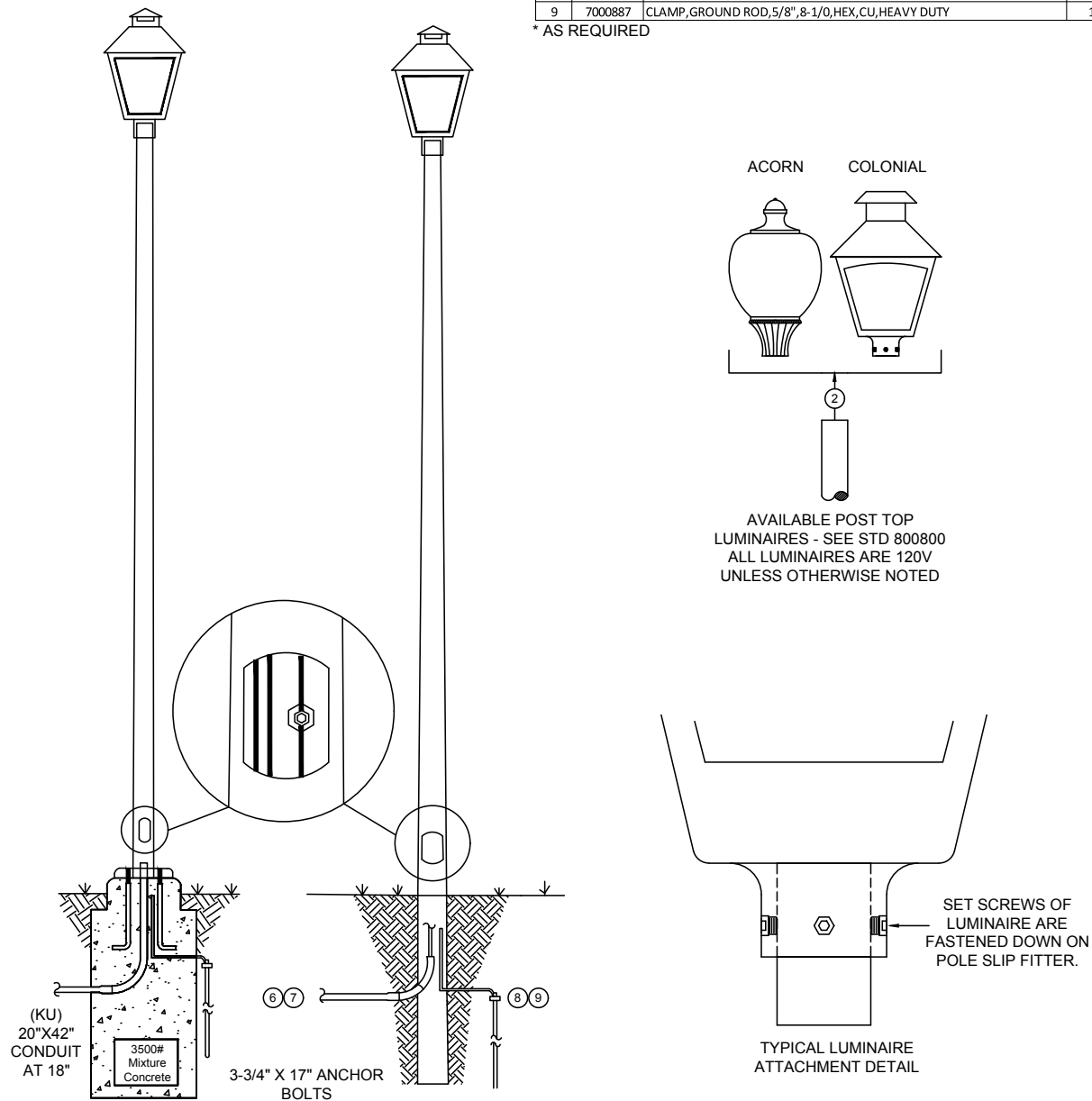
NOTE:

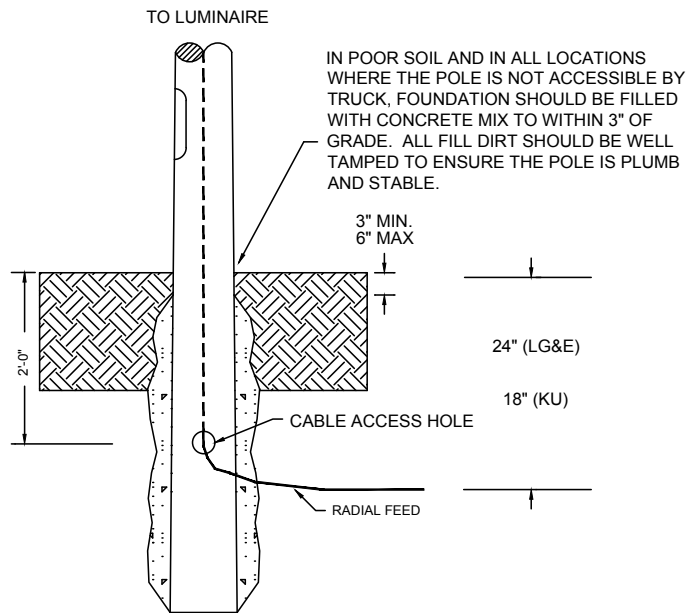
1. PROPER LAMP/LUMINAIRE COMBINATION AND ASSOCIATED EQUIPMENT MUST BE ADDED TO MATERIAL LIST. SEE STANDARD 800000.
2. NEUTRAL CONNECTION IS MADE WITH SPLIT BOLT CONNECTOR ONLY - NO TAPING IS REQUIRED.
3. SEE OPPOSITE PAGE FOR FOUNDATION DETAIL.
4. SPLICING MATERIAL IS INCLUDED IN THIS STANDARD IF NOT NEEDED OMIT FROM MATERIAL LIST.
5. SEE 800002 FOR SETTING OR EMBED DEPTH.

MATERIAL LIST

ITEM	IIN NUMB.	DESCRIPTION	QTY
1	VARIES	POLE - SEE STD. 800002	1
2	7001357 OR 7000414	CABLE,600V,#12,SOLID,2/C W/GROUND,TYPE UF-B,OH & UG CABLE,OH,DUPEX,#4 AL W/#4 ACSR NEUTRAL,XLP,TERRIER	20
3	VARIES	CONNECTOR, SPLIT BOLT	2
4	1164401	TAPE,ELECTRICAL,VINYL,3/4" X 8.5 MIL X 66',BLACK,ALL WEATHER	1
5	1164435	TAPE, NON FUSING RUBBER,3/4" X 30 MIL X 30',EPR	1
6	7000674 OR 7006682	CONDUIT,PVC,1"X10',SCH 40, LONG BELL END CONDUIT,PVC,2"X20',SCH 40, LONG BELL END	*
7	7010086 OR 7001206	ELBOW, CONDUIT, PVC, 1"XSTD(5-3/4"),SCH 40,90 DEG,DEEP SOCKET ELBOW, CONDUIT, PVC, 2"X24",SCH 40,90 DEG, DEEP SOCKET	1
8	7000888	ROD,GROUND,5/8"X8',BONDED COPPER	1
9	7000887	CLAMP,GROUND ROD,5/8",8-1/0,HEX,CU,HEAVY DUTY	1

* AS REQUIRED





FOUNDATION DETAIL FOR POOR SOIL
 OR NON BUCKET TRUCK ACCESSIBLE
 LOCATIONS

Electric System
 Codes & Standards

**INSTALLATION OF DIRECT BURIED ALUMINUM POLES WITH
 MAST ARMS - UNDERGROUND SERVICE**

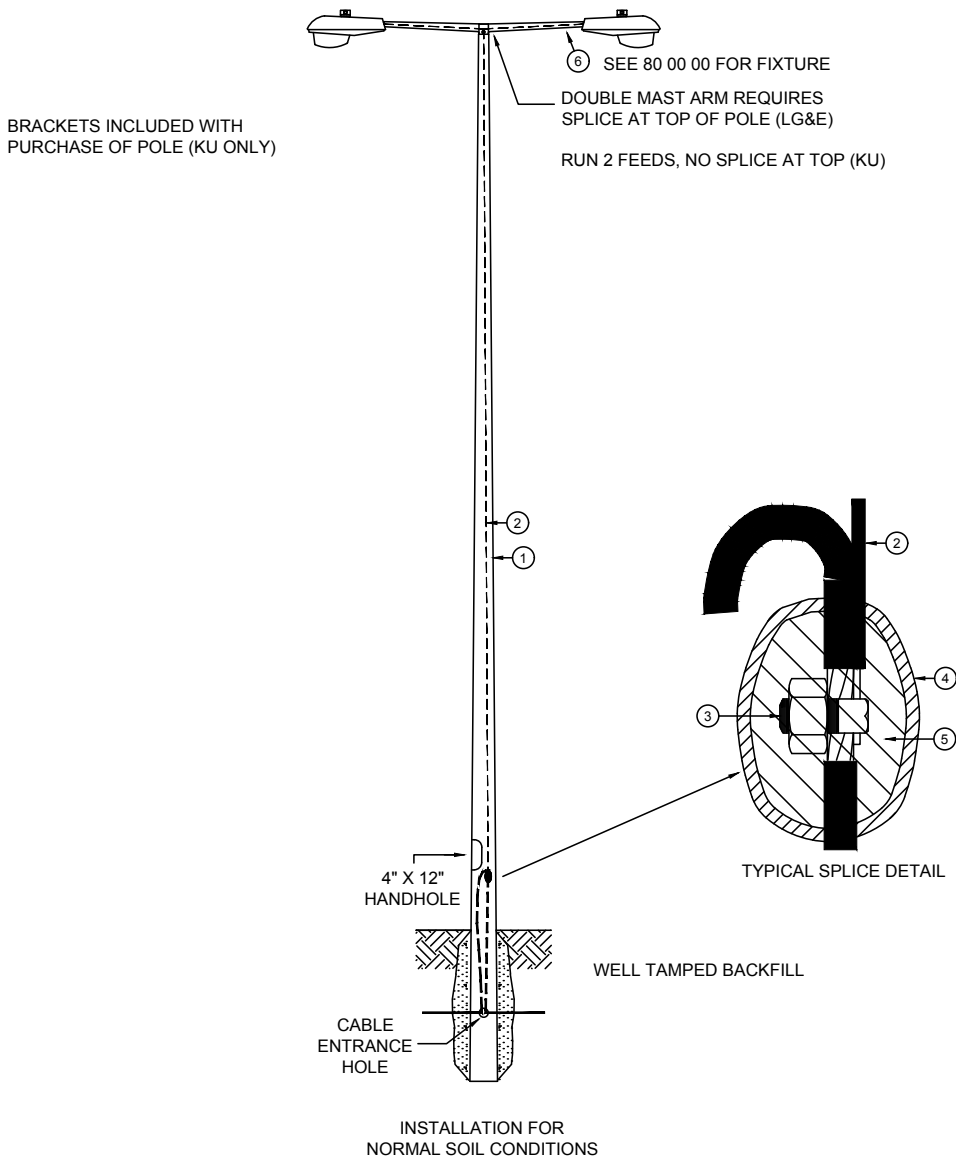
80 08 21
 Rev. E

NOTE:

1. PROPER LAMP/LUMINAIRE COMBINATION AND ASSOCIATED EQUIPMENT MUST BE ADDED TO MATERIAL LIST. SEE STANDARD 80 00 00.
2. SEE OPPOSITE PAGE FOR FOUNDATION AND ARM MOUNTING DETAILS.
3. SPLICING MATERIAL IS INCLUDED IN THIS STANDARD. IF NOT NEED OMIT FROM MATERIAL LIST.
4. MAKE SURE THAT BARE GROUND CONDUCTOR IS BONDED TO THE GROUND STUD OF EACH LUMINAIRE HEAD.

MATERIAL LIST

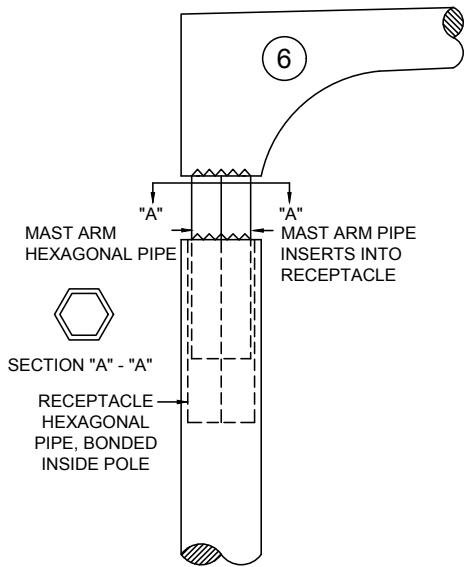
ITEM	QTY	DESCRIPTION	01
1	VARIES	POLE - SEE STD 80 00 02	1
2	7001357	CABLE, 600V, #12, SOLID, 2/C W/GROUND	40
3	VARIES	SPLIT BOLT CONNECTOR	3
4	1164401	TAPE, ELECTRICAL, VINYL, 3/4" X 8.5 MIL X 66', BLACK	1
5	1164435	TAPE, NON FUSING RUBBER, 3/4" X 30 MIL X 30', EPR	1
6	VARIES	ARM/MAST - SEE STD 80 02 02	1
7	7010086 OR	ELBOW, CONDUIT, PVC, 1" X STD (5-3/4")	1
	7001206	ELBOW, CONDUIT, PVC, 2" X 24"	
8	7000674 OR	CONDUIT, PVC, 1" X 10', SCH 40, LONG BELL END	1
	7006682	CONDUIT, PVC, 2" X 20', SCH 40, LONG BELL END	
9	7000888	ROD, GROUND, 5/8" X 8', BONDED COPPER	1
10	7000887	CLAMP, GROUND ROD, 5/8", 8-1/0, HEX, CU, HEAVY DUTY	1



Electric System
 Codes & Standards

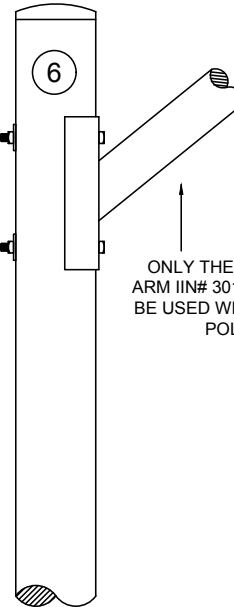
INSTALLATION OF DIRECT BURIED ALUMINUM POLES WITH
 MAST ARMS - UNDERGROUND SERVICE

80 08 21
 Rev. E

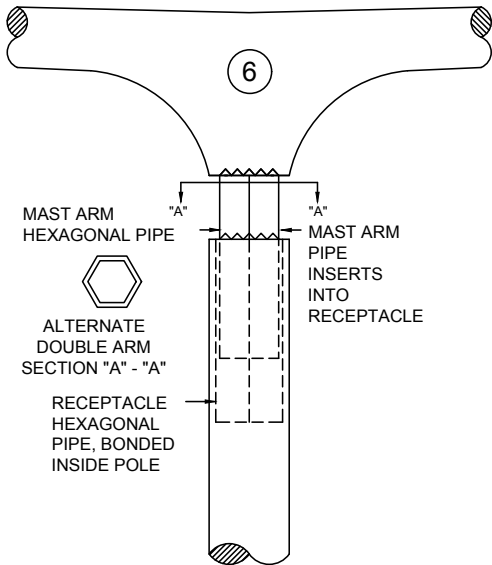


DETAIL "A" SINGLE ARM
 ATTACHMENT 80 08 21 . XX 01

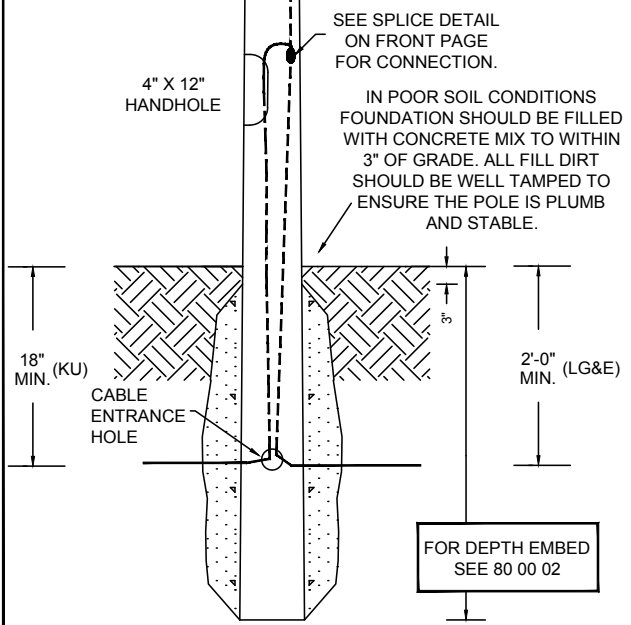
HARDWARE FOR ARM MOUNTING INCLUDED WITH ARM. HOLES FOR BOLTS ARE PREDRILLED IN POLE.



DETAIL "B" ARM
 ATTACHMENT FOR 28' MTH
 BLACK POLE 80 08 21 . 01 01
 ONLY



80 08 21 . XX 02
 DOUBLE ARM ATTACHMENT



FOUNDATION DETAIL FOR
 POOR SOIL CONDITIONS

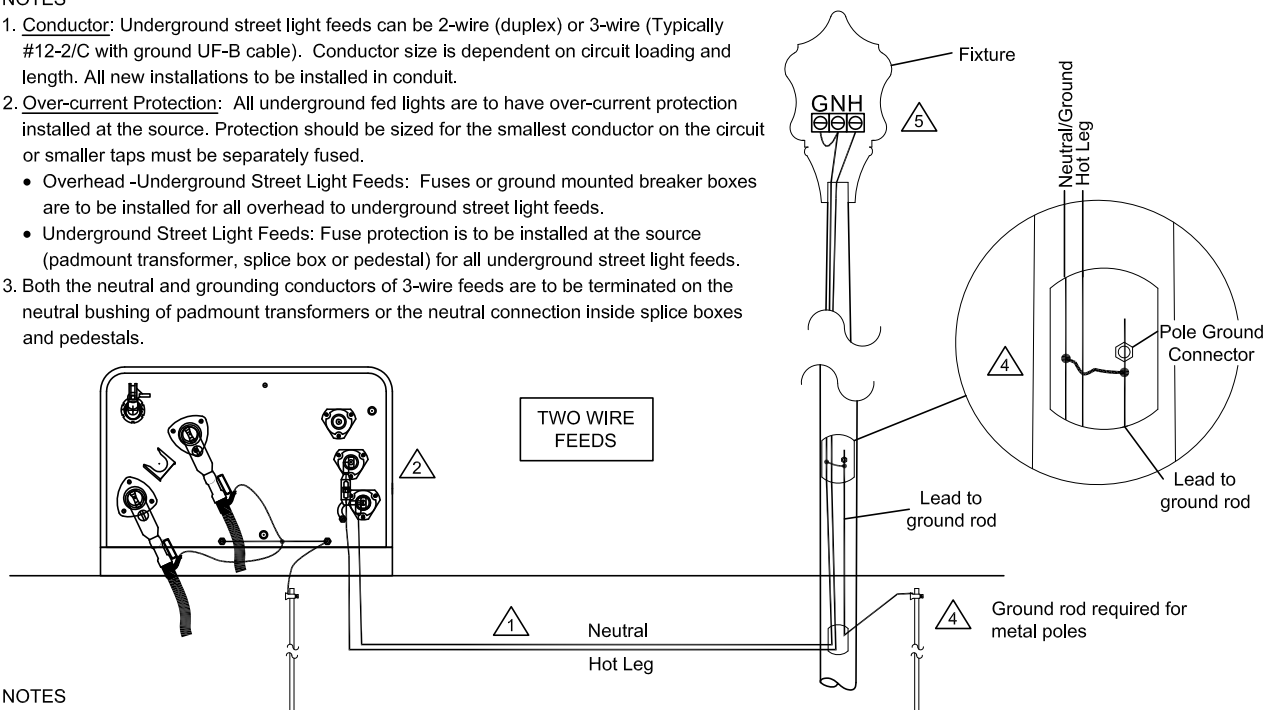
Electric System
 Codes & Standards

GENERAL REQUIREMENTS FOR WIRING AND GROUNDING
 SINGLE PHASE UNDERGROUND FED STREET LIGHT POLES

80 08 25
 Rev. A

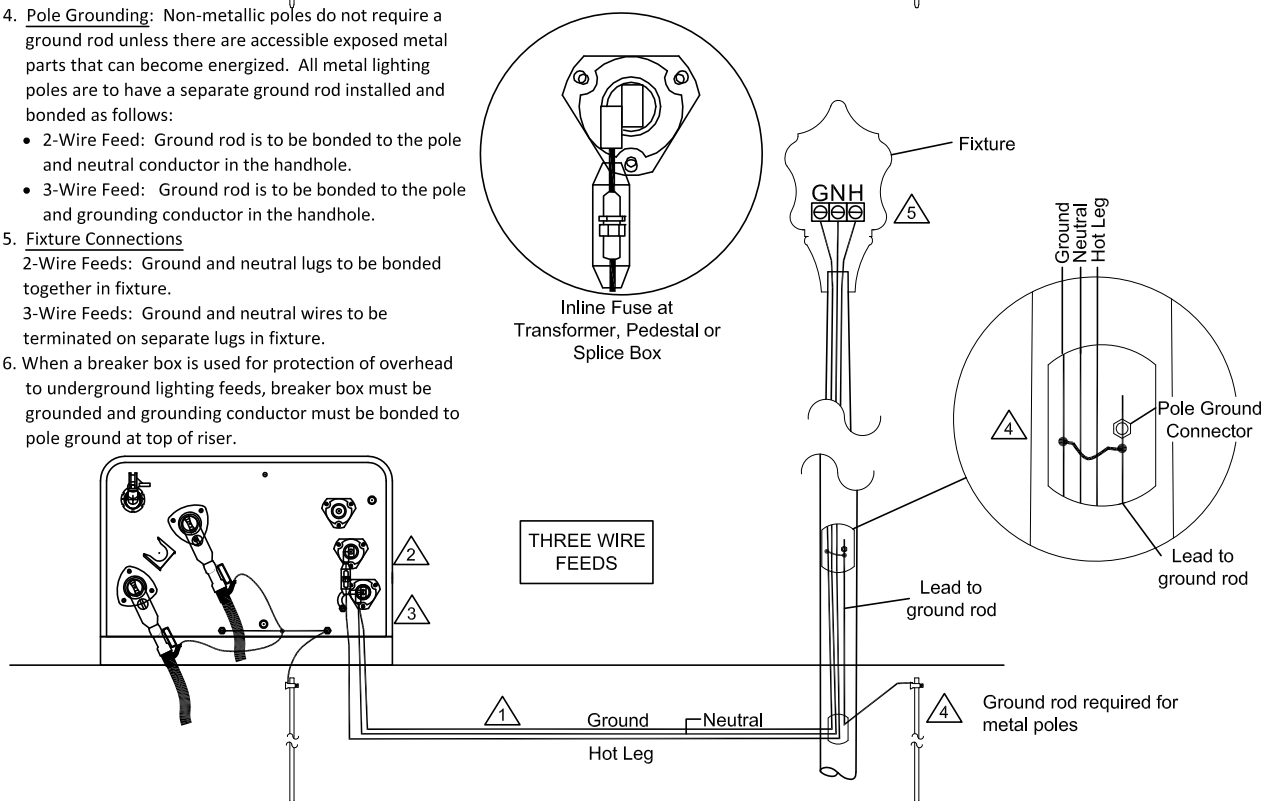
NOTES

- Conductor:** Underground street light feeds can be 2-wire (duplex) or 3-wire (Typically #12-2/C with ground UF-B cable). Conductor size is dependent on circuit loading and length. All new installations to be installed in conduit.
- Over-current Protection:** All underground fed lights are to have over-current protection installed at the source. Protection should be sized for the smallest conductor on the circuit or smaller taps must be separately fused.
 - Overhead -Underground Street Light Feeds: Fuses or ground mounted breaker boxes are to be installed for all overhead to underground street light feeds.
 - Underground Street Light Feeds: Fuse protection is to be installed at the source (padmount transformer, splice box or pedestal) for all underground street light feeds.
- Both the neutral and grounding conductors of 3-wire feeds are to be terminated on the neutral bushing of padmount transformers or the neutral connection inside splice boxes and pedestals.



NOTES

- Pole Grounding:** Non-metallic poles do not require a ground rod unless there are accessible exposed metal parts that can become energized. All metal lighting poles are to have a separate ground rod installed and bonded as follows:
 - 2-Wire Feed: Ground rod is to be bonded to the pole and neutral conductor in the handhole.
 - 3-Wire Feed: Ground rod is to be bonded to the pole and grounding conductor in the handhole.
- Fixture Connections**
 - 2-Wire Feeds: Ground and neutral lugs to be bonded together in fixture.
 - 3-Wire Feeds: Ground and neutral wires to be terminated on separate lugs in fixture.
- When a breaker box is used for protection of overhead to underground lighting feeds, breaker box must be grounded and grounding conductor must be bonded to pole ground at top of riser.



Electric System
 Codes & Standards

**GENERAL REQUIREMENTS FOR WIRING AND GROUNDING
 SINGLE PHASE UNDERGROUND FED STREET LIGHT POLES**

80 08 25
 Rev. A

Fuse Holders

Item	Description	Loadside	Lineside
1177051	FUSEHOLDER, IN LINE, #12 CU TO #3 CU, WATER RESISTANT, 30A, 600V	#12 CU to #3 CU	#12 CU to #3 CU
3012977	FUSEHOLDER, IN LINE, BREAKAWAY, #12 CU TO #8 CU LOAD & #12 AL TO #2 AL- LINE, WATERRESISTANT, 30A, 600V	#12 CU to #8 CU	#12 AL to #2 AL
7010720	FUSEHOLDER, IN LINE, #12 AL TO #2 AL, WATER RESISTANT, 30A, 600V	#12 AL to #2 AL	#12 AL to #2 AL
7003835	FUSEHOLDER, IN LINE, BREAKAWAY, #12 AL TO #2 AL, WATER RESISTANT, 30A, 600V	#12 AL to #2 AL	#12 AL to #2 AL



Fuse Holder Cover

3000397	COVER, SPLICE, SUBMERSIBLE, #14-350, 4-7/16" L	WATER TIGHT	
1177060	BOOT, INSULATING, FOR TRON FUSE HOLDER, TYPE-L	OBSOLETE USE IIN # 3000397	
7010721	BOOT, INSULATING, FOR IN-LINE FUSEHOLDER		



Fuses

7010724	FUSE, CARTRIDGE, 30A, KTK, 13/32" X 1-1/2" 600V, STREETLIGHTS
1160486	FUSE, CARTRIDGE, 20A, KTK, 13/32" X 1-1/2" 600V, STREETLIGHTS
7000708	FUSE, SECONDARY, TUBULAR FLAG, 120/240V, 30A (overhead)
7000709	FUSE, SECONDARY, TUBULAR FLAG, 120/240V, 15A (overhead)
3013202	BLANK FUSE TO BE USE IN BREAKAWAY FUSEHOLDER-NEUTRAL



Breakers

0530719	BREAKER, CIRCUIT, 20 AMP, 1-POLE, SNAP-IN (BREAKER BOX IIN 0530694)
0530735	BREAKER, CIRCUIT, 70 AMP, 1-POLE, SNAP-IN (BREAKER BOX IIN 0530694)



Breaker Boxes

0530701	BOX, BREAKER, KIT, 100A, 120/240V, 2 POSITION WITH/WEATHERPROOF BOX, 2" HUB & 2" PVC WEATHERHEAD AND HARDWARE
0530694	BOX, BREAKER, KIT, 70A, 120/240V, 2 POSITION WITH/WEATHERPROOF BOX, 1" HUB, & 1" PVC WEATHERHEAD AND HARDWARE
0461978	BOX, BREAKER, STEEL, NEMR 3R RATED, 8.88"x 4.88"x18", USE WITH FAL, FHL & FCL CIRCUIT BREAKERS (15A TO 100A), FOR 480V URD APPLICATION WITH NEUTRAL PROVISION



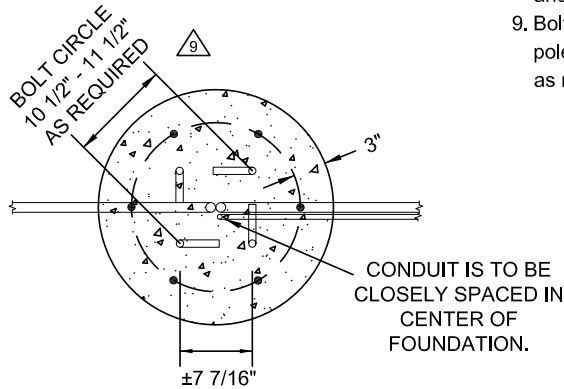
Electric System
 Codes & Standards

SPECIAL KY DOT COMPLIANT FOUNDATION FOR BREAKAWAY POLES UP TO 35' WITH MAXIMUM 15' ARM **80 08 40**
 Rev.

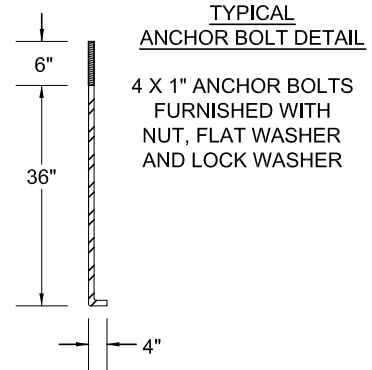
Notes \triangle

1. Precast foundations are not allowed.
2. Ground rod and #4 copper or copper weld ground wire installed by contractor with foundation. A minimum of 24" of ground wire to be exposed above top of conduit.
3. Foundation depth and below ground dimensions are minimums. Where rock is encountered, foundation requires a minimum 2'-0" rock embedment not to exceed an overall depth of 5'-0". Minimum foundation depth with 2'-0" rock embedment is 3'-6" (for anchor bolts).
4. Foundation to extend above ground approximately 1" with

- chamfered edge. Top of foundation to be finished smooth and level with rebar and anchor bolts perpendicular to top of foundation. 3" minimum to be provided between rebar and any edge of foundation
5. Concrete mix to be a minimum 3,500 PSI strength and a 4" to 6" slump and placed in a dry hole.
6. Foundation to be oriented for light positioned between anchor bolts
7. Foundation designed to meet AASHTO 2009 requirements and is acceptable for most soil conditions.
8. Conduit to be Schedule 40 minimum with number, size and orientation to be specified by utility.
9. Bolt pattern shown is for 10 1/2" diameter bolt circle. For poles with larger diameter bolt circles installer may adjust as necessary.

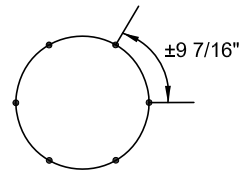
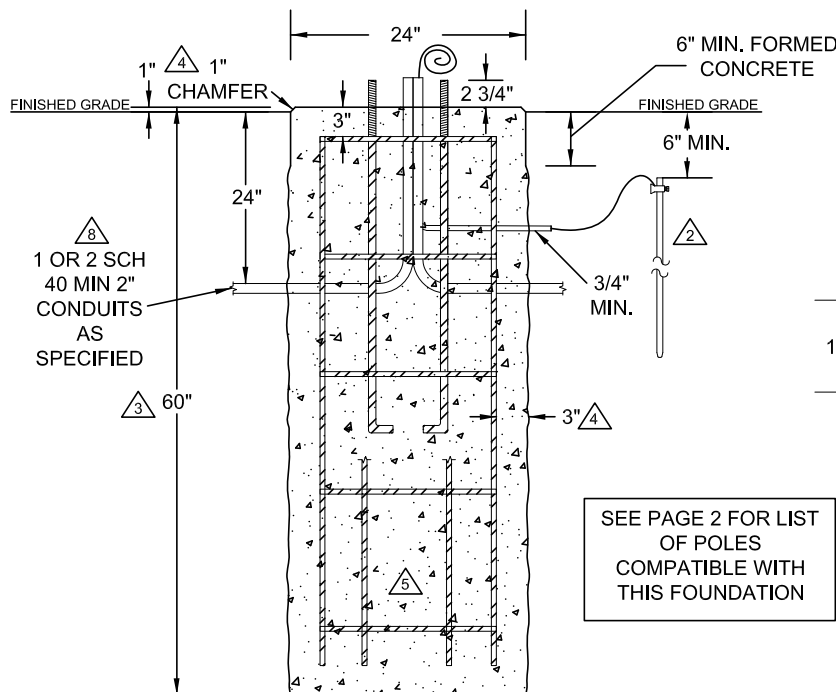


FOUNDATION DETAIL



TYPICAL ANCHOR BOLT DETAIL

4 X 1" ANCHOR BOLTS FURNISHED WITH NUT, FLAT WASHER AND LOCK WASHER



REBAR CAGE DETAIL

6 #5 VERTICAL BARS EQUALLY SPACED
 #3 BAR TIES 12" ON CENTER OR SPACED AT 12" PITCH

Electric System
Codes & Standards

SPECIAL KY DOT COMPLIANT FOUNDATION FOR BREAKAWAY POLES UP TO 35' WITH MAXIMUM 15' ARM

80 08 40
Rev.

Aluminum BREAKAWAY Poles That Fit KYDOT Foundation

Note: Only breakaway poles allowed in KYDOT controlled areas.

IIN	DESCRIPTION	MOUNTING HEIGHT	ARM	BOLT CIRCLE
7010305	POLE,ALUM,30F MH,ORN,4 BOLT,TWIN 6F,W/ANC BOLTS	30'	TWIN 6' ARMS	11"-12"
7010301	POLE,ALUM,30F MH,ORN,4 BOLT,TRUSS 15F,W/ANC BOLTS	30'	15' ARM	10"-11"
7010298	POLE,ALUM,30F MH,ORN,4 BOLT,TRUSS 12F,W/ANC BOLTS	30	12' ARM	10"-11"
7003754	POLE,ALUM,25F MH,ORN,4 BOLT,TWIN 6F,W/ANC BOLTS	25'	TWIN 6' ARMS	10"-11"
7003222	POLE,ALUM,30F MH,ORN,4 BOLT,TWIN 10F,W/ANC BOLTS	25'	TWIN 10' ARMS	11"-12"
7003218	POLE,ALUM,25F MH,ORN,4 BOLT,SINGLE 4F,W/ANC BOLTS	25'	4' ARM	10"-11"
7001420	POLE,ALUM,25F MH,ORN,4 BOLT,SINGLE 6F,W/ANC BOLTS	25'	6' ARM	10"-11"
7001419	POLE,ALUM,25F MH,ORN,4 BOLT,TRUSS 10F,W/ANC BOLTS	25'	10' ARM	10"-11"
7001418	POLE,ALUM,30F MH,ORN,4 BOLT,SINGLE 6F,W/ANC BOLTS	30	6' ARM	10"-11"
7001417	POLE,ALUM,30F MH,ORN,4 BOLT,TRUSS 10F,W/ANC BOLTS	30'	10' ARM	10"-11"
7001416	POLE,ALUM 30F MH,ORN,4 BOLT,SINGLE 8F,W/ANC BOLTS	30'	8' ARM	10"-11"
3008584	POLE,ALUMINUM,30' MH,WITH BREAKAWAY BASE FLANGE,CONTEMPORARY LT, PAINTED STANDARD BLACK POWDER COAT FINISH	30'	N/A	10"-11"
3008583	POLE,ALUMINUM,35' MH,WITH BREAKAWAY BASE FLANGE, 8" x .156",BLACK,CONTEMPORARY (JUST FOR UK)	35'	N/A	11"-12"

Electric System
 Codes & Standards

**STREET LIGHT CONSTRUCTION ANCHOR BASE -
 UNDERGROUND COBRA HEAD**

80 08 44
 Rev.

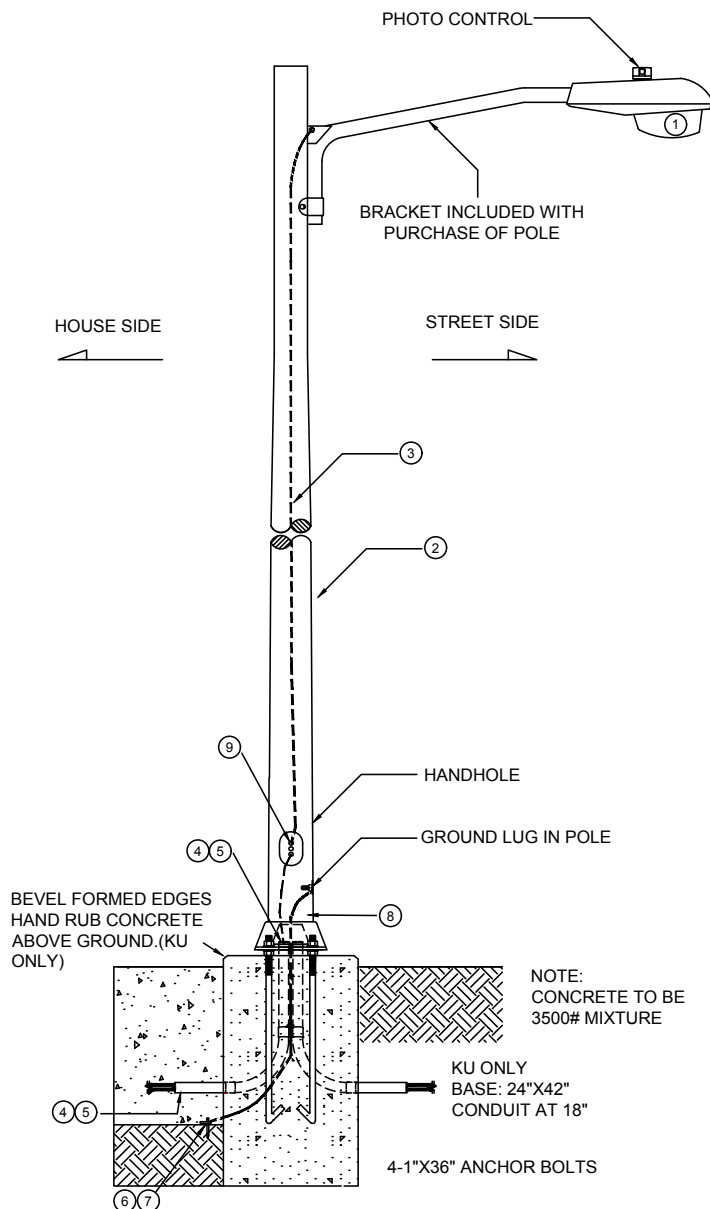
NOTE: FOR BREAKAWAY
 CONSTRUCTION, ANCHOR BASE
 DEPTH MUST BE INCREASED SO
 THAT THE ANCHOR BOLTS DO NOT
 EXCEED 4" ABOVE GRADE.

SEE 80 08 04
 FOR KY DOT
 COMPLIANT FOUNDATION

MATERIAL LIST

ITEM	IIN	DESCRIPTION	QTY
1	VARIABLES	LAMP - SEE STD 800000	1
2	VARIABLES	POLE - SEE STD 800002	1
3	7006487 OR	CABLE, 600V, UG, #6-#6, 2/C AAC DUPLEX, XLP, CLAFILIN	*
3	7001357	CABLE, 600V, #12, SOLID, 2/C W/GROUND, TYPE UF-B, OH & UG	*
4	7000674 OR	CONDUIT, PVC, 1"X10', SCH 40, LONG BELL END, GREY	1
4	7006682	CONDUIT, PVC, 2"X20', SCH 40, LONG BELL END, GREY	1
5	7010086 OR	ELBOW, CONDUIT, PVC, 1"XSTD(5-3/4"), SCH 40, 90 DEG, DEEP SOCKET	1
5	7001206	ELBOW, CONDUIT, PVC, 2"X24", SCH 40, 90 DEG, DEEP SOCKET, GREY	1
6	7000888	ROD, GROUND, 5/8"X8', BONDED COPPER	1
7	7000887	CLAMP, GROUND ROD, 5/8", 8-1/0, HEX, CU, HEAVY DUTY	1
8	7005817	CONDUCTOR, OH WIRE, 4, CU, BARE, SD, SOLID, 25 LB. SPOOL	*
9	7000420	CONNECTOR, COMPRESSION, TAP, AL, 4-2:4-2A, 6-4-1STR	2

* AS REQUIRED



ASSEMBLY DESCRIPTION
 80 08 23

THIS ASSEMBLY INCLUDES:

A BRONZE DECASHIELD III LUMINAIRE 120V, 150W HPS WITH 16' MTH ON A 20' - 4" X 4" DARK BRONZE FIBERGLASS POLE (STRAIGHT SQUARE POLE, DIRECT BURIAL).

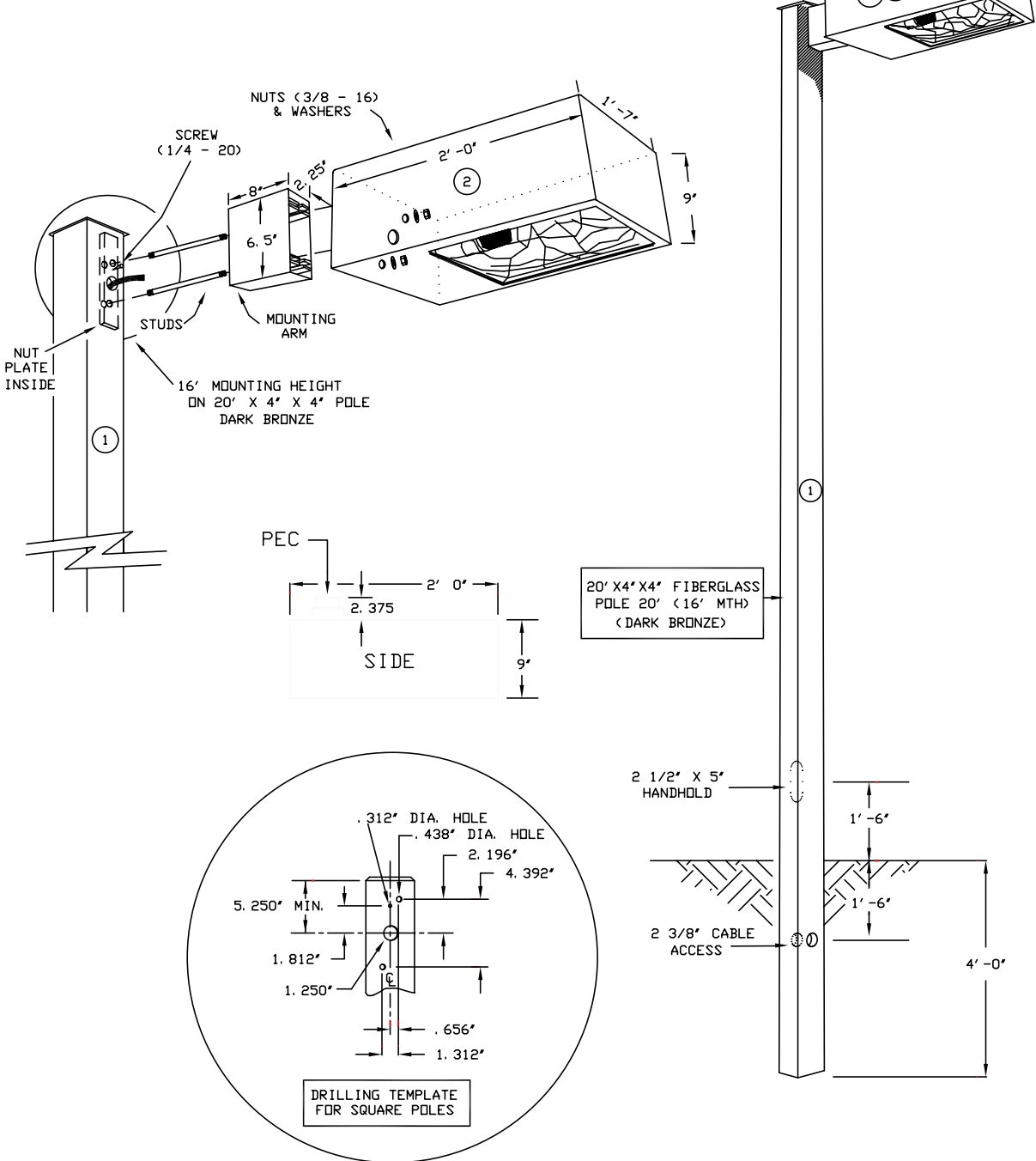
THIS 20' X 4" X 4" FIBERGLASS POLE AND THIS DECASHIELD III LUMINAIRE ARE TO BE USED IN THIS COMBINATION ONLY AND NO OTHER.

FACE EYE OF PHOTOELECTRIC CONTROL NORTH.

MATERIAL LIST

ITEM	IIN NUMB.	DESCRIPTION	QTY
1	0483978	POLE, 20' FIBERGLASS 4" X 4" DARK BRONZE	1
2	0483986	LUMINAIRE, DECASHIELD 111 BRONZE 150W HPS	1
3	1186394	LAMP, 150W HPS	1
4	1185978	PHOTOELECTRIC CONTROL	1
5	1192819	#12-2C CONDUCTOR W/GROUND	22'

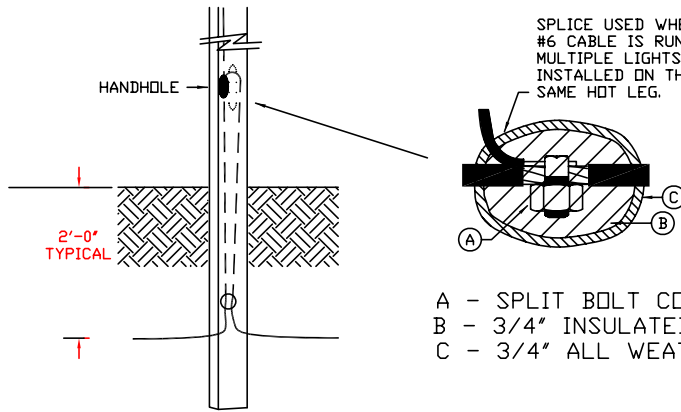
REVISION	-
REPLACES DRAWING	NONE
DATE	06/23/95
DRAWN BY	CLARK/POLLOCK
MANUAL	ESD OVERHEAD & UNDERGROUND LINE DESIGN & CONSTRUCTION
COMPANY	LOUISVILLE GAS & ELECTRIC COMPANY



GENERAL: THIS STANDARD DETAILS THE CONSTRUCTION OF A DECASHIELD III LUMINAIRE 150W HPS ON A 20' X 4" X 4" (16' MTH) DARK BRONZE FIBERGLASS POLE.

DECASHIELD LUMINAIRE 150W HPS / 20' X 4" X 4" BRONZE FIBERGLASS POLE	
SCALE NONE	80 08 23
SHEET 1 OF 2	

SECONDARY SPLICE
 DETAIL (HOT LEGS ONLY)

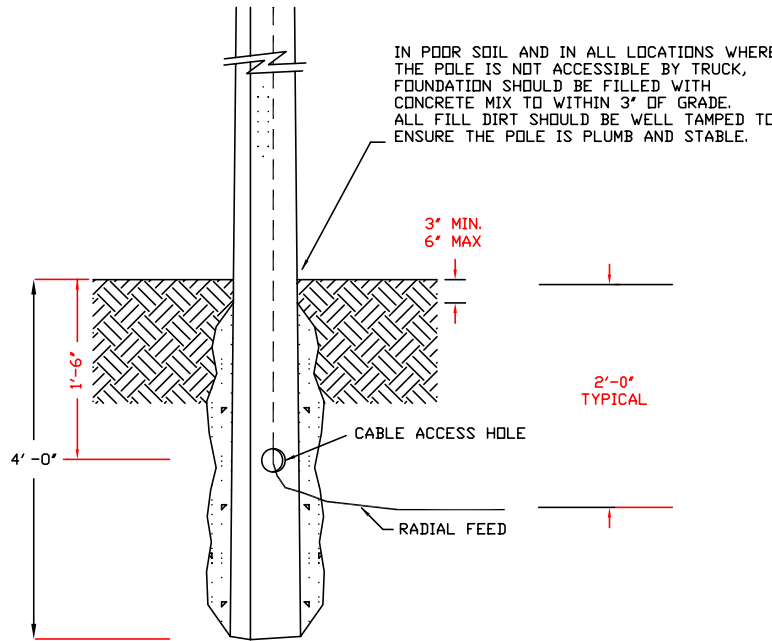


SPLICE USED WHERE
 #6 CABLE IS RUN FOR
 MULTIPLE LIGHTS
 INSTALLED ON THE
 SAME HOT LEG.

- A - SPLIT BOLT CONNECTOR (IIN# VARIES)
- B - 3/4" INSULATED RUBBER TAPE (IIN# 1164435)
- C - 3/4" ALL WEATHER INSULATED TAPE (IIN# 1164401)

MULTIPLE LIGHT FEED
 TO POLES WITH HANDHOLES

TO LUMINAIRE



FOUNDATION DETAIL FOR POOR SOIL
 OR NON BUCKET TRUCK ACCESSIBLE
 LOCATIONS

ICE	
LOUISVILLE GAS & ELECTRIC COMPANY	ET&D OVERHEAD & UNDERGROUND LINE DESIGN & CONSTRUCTION MANUAL
DRAWN BY CLARK/PULLOCK	DATE 6/23/95
REPLACES DRAWING	REVISION
NONE	-

DECASHIELD LUMINAIRE 150W HPS / 20' X 4" X 4" BRONZE FIBERGLASS POLE	
SHEET 2 OF 2	80 08 23
SCALE NONE	

GENERAL: THIS STANDARD DETAILS THE CONSTRUCTION OF A DECASHIELD III LUMINAIRE 150W HPS ON A 20' X 4' X 4' WITH (16' MTH) DARK BRONZE FIBERGLASS POLE.

Electric System
 Codes & Standards

FLOOD LIGHT INSTALLATION

80 04 02
 Rev. C

ASSEMBLY DESCRIPTION
 80 04 02 . XX

- 800402 . 01 SINGLE FLOOD LIGHT MOUNTING
- 800402 . 02 DOUBLE FLOOD LIGHT MOUNTING

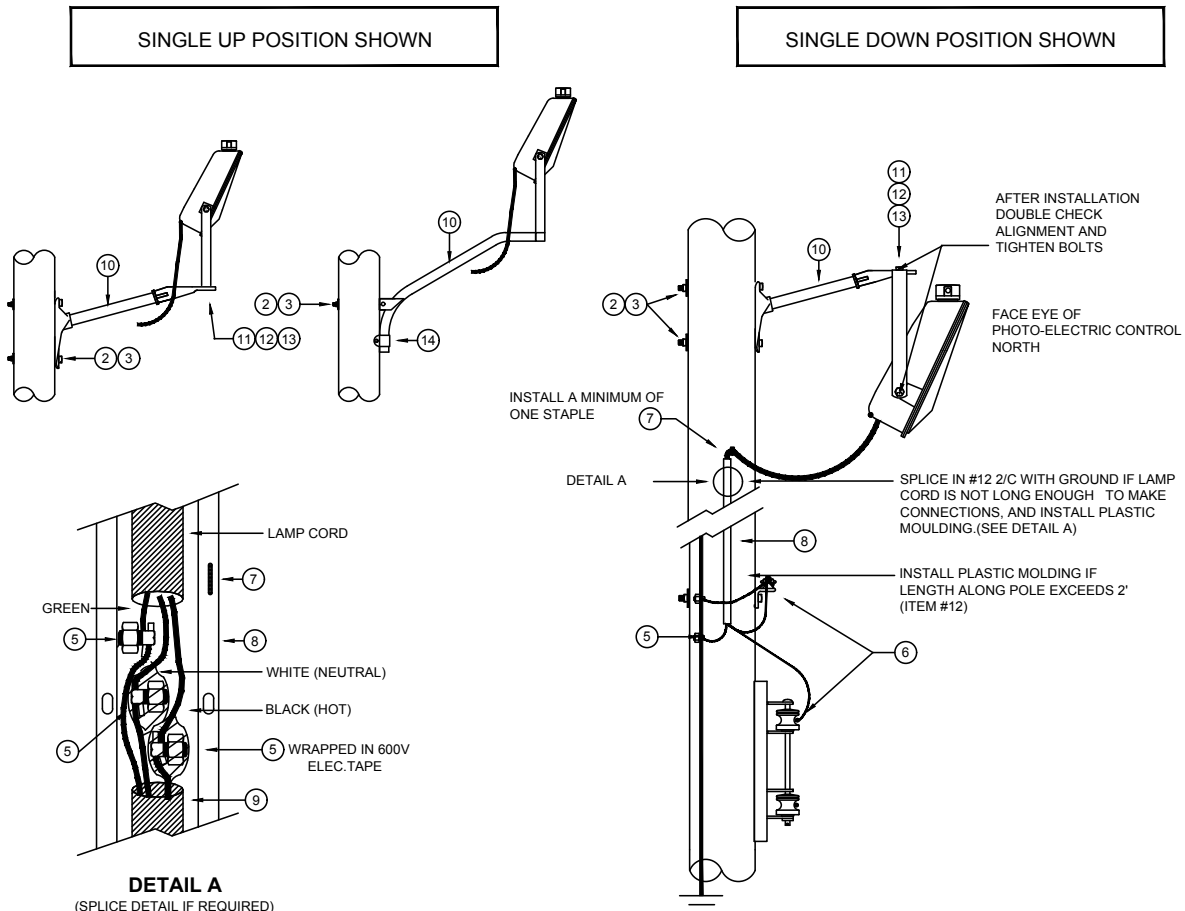
NOTE:

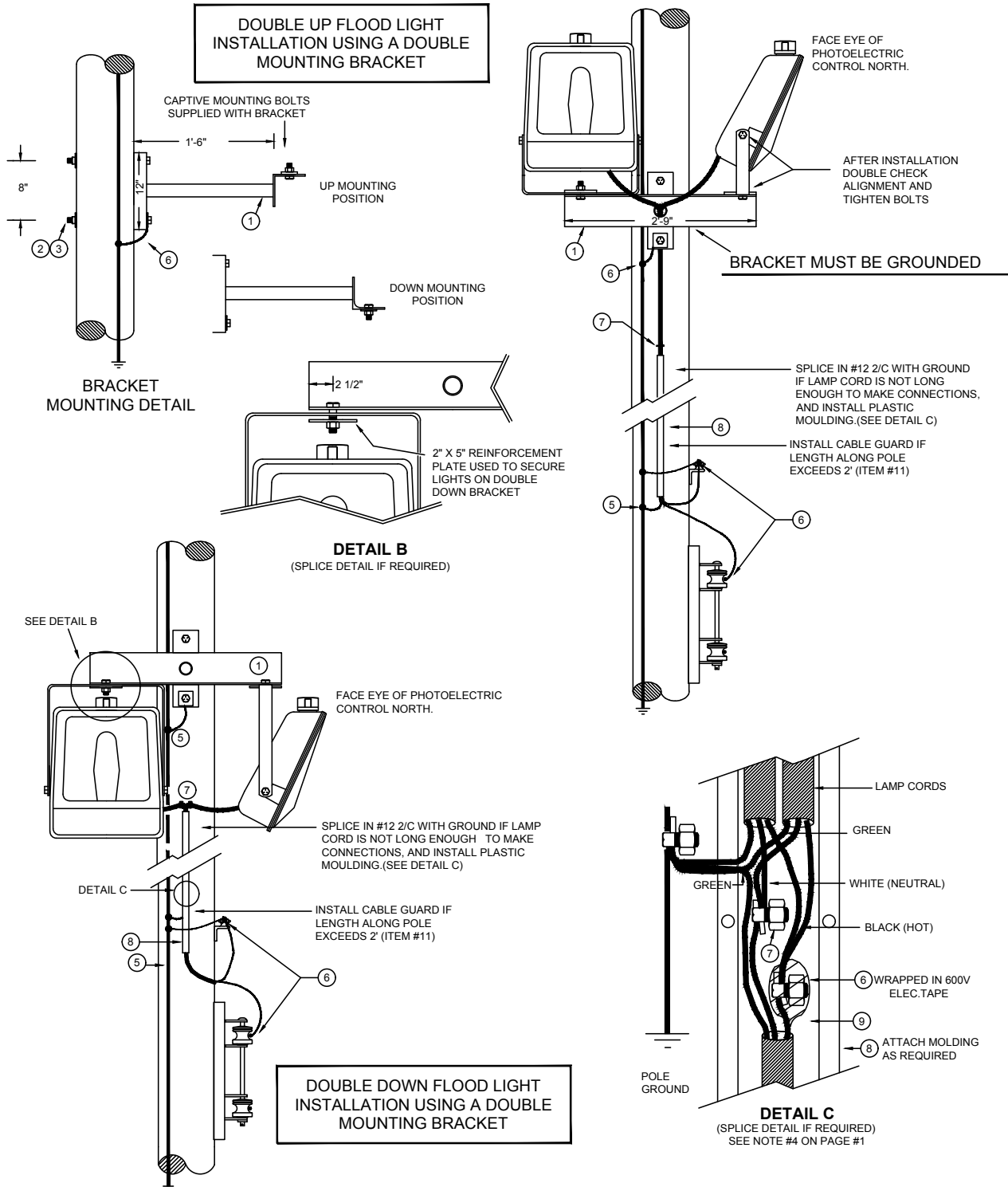
1. ALL COPPER CONNECTIONS ARE TO BE MADE USING SPLIT BOLT CONNECTORS.
2. ALL ALUMINUM TO ALUMINUM OR ALUMINUM TO COPPER CONNECTIONS ARE TO BE MADE USING COMPRESSION CONNECTORS.
3. HOT LEG - SPLIT BOLT CONNECTOR TO BE WRAPPED WITH 600V ELECTRICAL TAPE IN DETAIL A AND C.
4. CONNECT GREEN WIRE OF LAMP CORDS TO POLE GROUND AT END OF CORDS. DO NOT SPLICE TO #12 2/C W/GND IF USED.
5. SEE STANDARD 800000 FOR LIGHT FIXTURES, LAMPS AND PHOTO CELLS.

80 04 02 . XX -- MATERIAL LIST

ITEM	IN	DESCRIPTION	01	02
1	1185901	BRACKET,FLOODLIGHT DOUBLE-UP OR DOUBLE DOWN,AL		
2	VARIES	5/8" MACHINE BOLT W/NUT		
3	7000337	WASHER,FLAT,SQUARE,2-1/4" X 2-1/4" X 3/16", FOR 5/8" BOLT		
4	7005817	CONDUCTOR,OH WIRE,4,CU,BARE,SD,SOLID		
5	1200378	CONNECTOR,SPLIT BOLT,6 SLD,CU		
6	VARIES	VARIOUS SMALL CONNECTORS		
7	7002252	STAPLE, MOULDING,ROLLED POINT,FOR 1/2" MOULDING,STL		
8	7000913	MOULDING,GROUND,1/2"X 8F,PLASTIC		
9	7001357 OR 7006487	CABLE,600V,#12,SOLID,2/C W/GROUND		
10	7001703 OR 7001368	BRACKET,INSULATOR/ARRESTER,18",SINGLE		
11	7010445	BOLT,MACH,SQ HD,3/4" X 2-1/2", GALV,W/SQ NUT		
12	7000349	WASHER,SPLIT LOCK,234 X .188 FOR 3/4" BOLT,GALV STL		
13	7010442	WASHER,FLAT,SQUARE,3" X 3" X 3/16",FOR 3/4" BOLT,GALV STL		
14	7003001	SCREW,LAG,TWIST DRIVE, TEST POINT,1/2"X4-1/2"		

* AS REQUIRED





Electric System
 Codes & Standards

30' ALUMINUM DAVIT STREET LIGHT POLE INSTALLATION

80 08 22
 Rev. C

ASSEMBLY DESCRIPTION
 80 08 22 . XX

- TYPE OF POLE AND BASE
- 80 08 22 . 01 30' ALUMINUM DAVIT WITH A WALL THICKNESS OF .188" AND AN ANCHOR BASE MOUNT
 - 80 08 22 . 02 30' ALUMINUM DAVIT WITH A WALL THICKNESS OF .188" AND A T-BASE MOUNT

80 08 22 . XX -- MATERIAL LIST

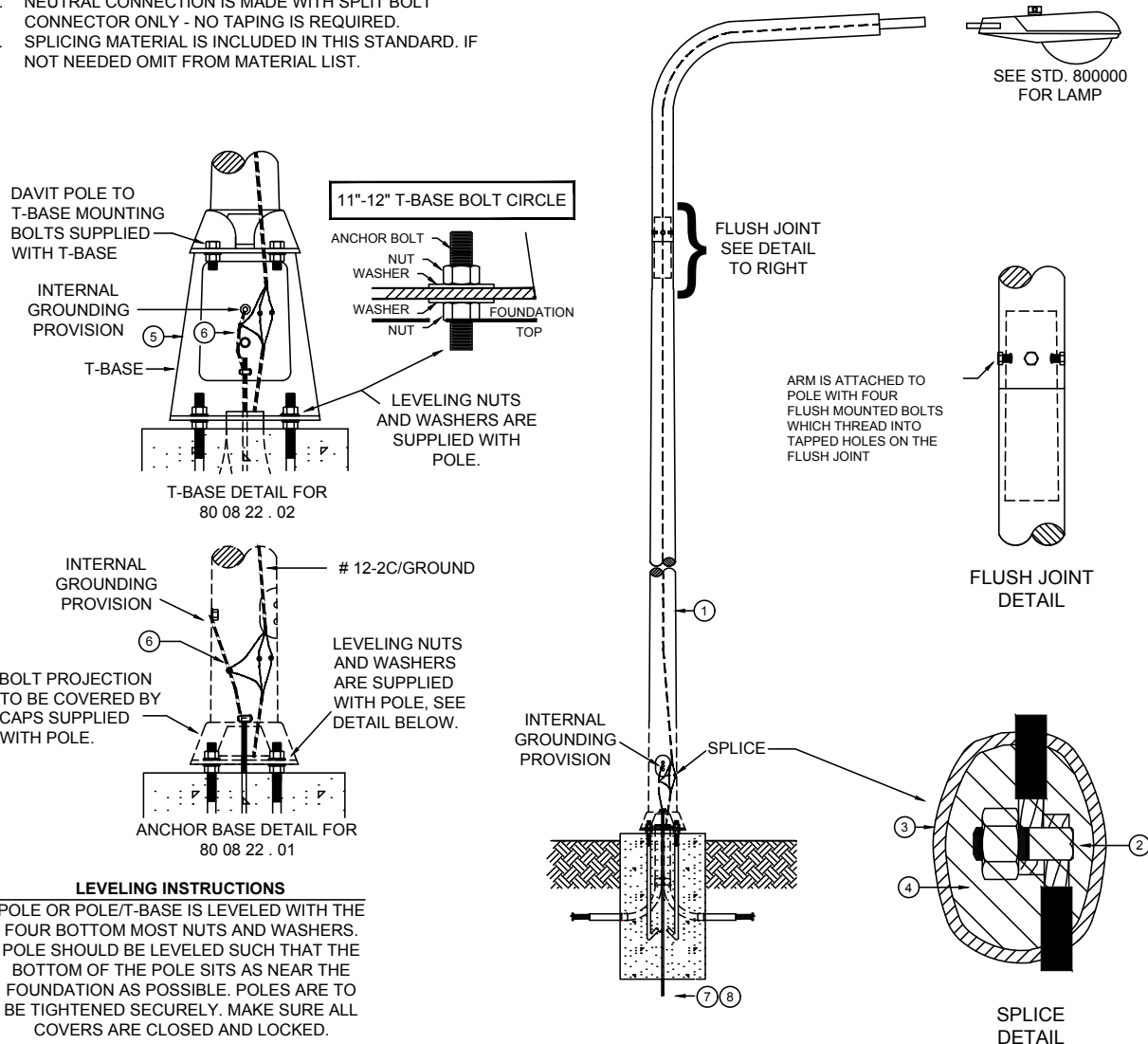
ITEM	IN	DESCRIPTION	01	02
1	1192486	POLE, AL DAVIT, 30'MTH, 6'ARM, 2"SLIP FITTER	1	1
2	1200360	CONNECTOR, SPLIT BOLT, 8 SLD CU	2	2
3	1164401	TAPE, ELECTRICAL, VINYL, 3/4" X 8.5 MIL X 66', BLACK	*	*
4	1164435	TAPE, NON FUSING RUBBER, 3/4" X 30 MIL X 30'	*	*
5	1192527	BASE, TRANSFORMER, AL., FOR 30' ALUM STREET LT. POLES	*	1
6	1199386	WIRE, #2, 7-STR, SOFT DRAWN COPPER XLPE	*	*
7	7000888	ROD, GROUND, 5/8" X 8', BONDED COPPER		
8	7000887	CLAMP, GROUND ROD, 5/8" - 8-1/0, HEX CU, HEAVY DUTY		

* AS REQUIRED

THIS STANDARD DETAILS THE INSTALLATION AND CONNECTION OF A 30' ALUMINUM DAVIT STREET LIGHT POLE. IT INCLUDES POLE, CONNECTING WIRE AND HARDWARE. IT DOES NOT INCLUDE CONCRETE FOUNDATION OR LUMINAIRE.

NOTE:

1. SEE STANDARD 80 08 01 FOR FOUNDATION DETAIL.
2. NEUTRAL CONNECTION IS MADE WITH SPLIT BOLT CONNECTOR ONLY - NO TAPING IS REQUIRED.
3. SPLICING MATERIAL IS INCLUDED IN THIS STANDARD. IF NOT NEEDED OMIT FROM MATERIAL LIST.

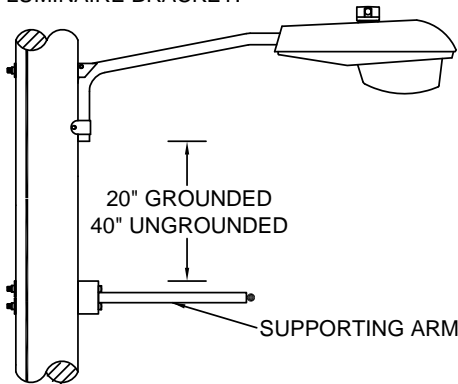


**NESC MINIMUM CLEARANCE REQUIREMENTS FROM
 STREETLIGHTS TO COMMUNICATION FACILITIES**

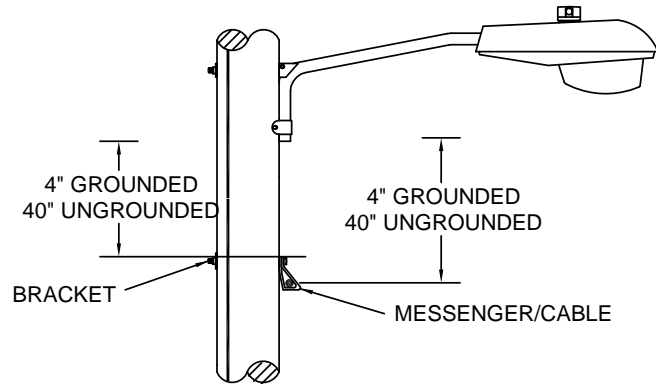
NESC SECTION 238 REQUIREMENTS (NESC 2017)

NOTE:

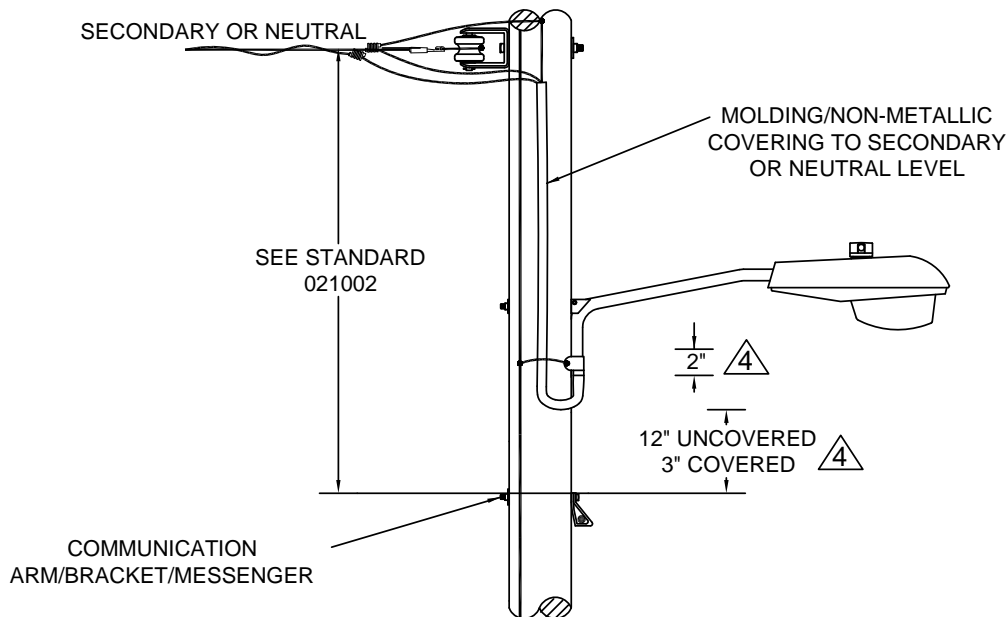
1. ALL NEW STREET LIGHT FIXTURES MUST BE EFFECTIVELY GROUNDED. IF UNABLE TO VERIFY GROUND, EITHER USE UNGROUNDED CLEARANCES OR FIXTURE MUST BE GROUNDED.
2. 40" MIN. CLEARANCE MUST BE MET BETWEEN NEUTRAL AND SECONDARY CABLE HARDWARE AND COMMUNICATIONS EQUIPMENT.
3. THE 12" AND 3" CLEARANCE ONLY APPLIES TO THE DRIP LOOP FEEDING THE LUMINAIRE.
4. THE REDUCED 3" CLEARANCE MAY BE USED IF NON-METALLIC COVERING IS PROVIDED AND EXTENDS 2" INTO LUMINAIRE BRACKET.



**CLEARANCE FROM
 LUMINAIRE BRACKET TO
 TOP OF COMMUNICATION
 SUPPORTING ARM**



**CLEARANCE FROM LUMINAIRE
 BRACKET TO TOP OF COMMUNICATION
 BRACKET OR CABLE/MESSENGER
 MOUNTED TO POLE
 (BOTH REQUIREMENTS APPLY)**



**CLEARANCE FROM DRIP
 LOOP TO TOP OF
 COMMUNICATION
 ARM/BRACKET/MESSENGER**

807 KAR 5:041. Electric.

RELATES TO: KRS Chapter 278

STATUTORY AUTHORITY: KRS 278.280(2)

NECESSITY, FUNCTION, AND CONFORMITY: KRS 278.280(2) provides that the commission shall prescribe rules for the performance of any service or the furnishing of any commodity by the utility. This administrative regulation establishes general rules which apply to electric utilities.

Section 1. Definitions. For purposes of this administrative regulation:

(1) "Applicant" means for purposes of Section 21 of this administrative regulation the developer, builder or other person, partnership, association, corporation or governmental agency applying for the installation of an underground electric supply system.

(2) "Building" means a structure enclosed within exterior walls or fire walls, built, erected and framed of component structural parts and designed for less than five (5) family occupancy.

(3) "Customer" means for purposes of Section 21 of this administrative regulation the developer, builder or other person, partnership, association, corporation or governmental agency applying for installation of an underground electric supply system.

(4) "Customer premises" means the building for which service is intended or in use.

(5) "Distribution system" means electric service facilities consisting of primary and secondary conductors, transformers, and necessary accessories and appurtenances for furnishing electric power at utilization voltage.

(6) "Multiple-occupancy building" means a structure enclosed within exterior walls or fire walls, built, erected and framed of component structural parts and designed to contain five (5) or more individual dwelling units.

(7) "Subdivision" means a tract of land which is divided into ten (10) or more lots for the construction of new residential buildings, or for construction of two (2) or more new multiple occupancy buildings.

Section 2. General Requirements. Every utility shall furnish adequate service and facilities at rates filed with the commission, and in accordance with administrative regulations of the commission and applicable rules of the utility. Energy shall be generated, transmitted, converted and distributed by the utility, and utilized, whether by the utility or the customer, in such manner as to obviate undesirable effects upon the operation of standard services or equipment on the utility, its customers and other utilities.

Section 3. Acceptable Standards. A utility shall construct and maintain its plant and facilities in accordance with good accepted engineering practices. Unless otherwise specified by the commission, the utility shall use applicable provisions in the following publications as standards of accepted good engineering practice for construction and maintenance of plant and facilities, herein incorporated by reference:

(1) National Electrical Safety Code; ANSI C-2. 1990 Edition, available by contacting the IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, New Jersey 08855-1331. This material is also available for inspection and copying, subject to copyright law, at the offices of the Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, Monday through Friday between the hours of 8 a.m. to 4:30 p.m. local time.

(2) National Electrical Code; ANSI-NFPA 70. 1990 Edition, available by contacting the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02169. This material is also available for inspection and copying, subject to copyright law, at the offices of the Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, Monday through Fri-

day between the hours of 8 a.m. to 4:30 p.m. local time.

(3) American National Standard Code for Electricity Metering; ANSI C-12.1. 1982 Edition, available by contacting the Institute of Electrical and Electronics Engineers, Inc., 345 E. 47th Street, New York, New York 10017;

(4) USA Standard Requirements, for Instrument Transformers; ANSI Standard C57.13, 1978 Edition, available by contacting the IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, New Jersey 08855-1331. This material is also available for inspection and copying, subject to copyright law, at the offices of the Public Service Commission, 211 Sower Boulevard, P.O. Box 615, Frankfort, Kentucky 40602, Monday through Friday between the hours of 8 a.m. to 4:30 p.m. local time.

(5) The adoption and applicability of the National Electrical Code as a standard of utility construction is limited to electric utility auxiliary buildings which are not an integral part of a generating plant, substation, or control center. Integral part is defined as essential to the operation or necessary to make complete.

(6) All materials incorporated by reference above are available for public inspection and copying at the Public Service Commission of Kentucky, 211 Sower Boulevard, Frankfort, Kentucky 40601, between the hours of 8 a.m. and 4:30 p.m.

Section 4. Generating Station Meter Records. Every utility shall install such watt-hour meters as necessary to obtain a record of output of its generating station or stations. Every utility purchasing electrical energy shall install such meters as necessary to furnish a proper record of its purchases, unless such instruments are installed by the selling company.

Section 5. Maintenance or Continuity of Service. (1) Each utility shall make all reasonable efforts to prevent interruptions of service, and when such interruptions occur shall endeavor to reestablish service with the shortest possible delay. Whenever service is necessarily interrupted or curtailed for the purpose of working on equipment, it shall be done at a time if practicable, that will cause least inconvenience to customers, and those customers which may be seriously affected shall be notified in advance, except in cases of emergency.

(2) Each utility shall keep a record of: time of starting and shutting down the principal units of its power station equipment and feeders for major divisions; indications of sufficient switchboard instruments to show voltage and quantity of the load; all interruptions to service affecting the entire distribution system of any single community or important division of a community; and date and time of interruption, date and time of restoring service, and when known, cause of each interruption.

(3) When complete distribution systems or portions of communities have service furnished from unattended stations, the utility shall keep these records to the extent practicable. The records of unattended stations shall show interruptions which require attention to restore service, with estimated time of interruption. Breaker or fuse operations affecting service shall also be indicated even though duration of interruption may not be known.

Section 6. Voltage and Frequency. (1) Each utility shall adopt a standard nominal voltage or standard nominal voltages, as required by its distribution system for its entire constant-voltage service, or for each of several districts into which the systems may be divided, which standard voltages shall be stated in every schedule of rates of each utility or in its terms and conditions of service.

(2) Voltage at the customer's service entrance or connection shall be maintained as follows:

(a) For service rendered primarily for lighting purposes, variation in voltage between 5 p.m. and 11 p.m. shall not be more than five (5) percent plus or minus the nominal voltage adopted, and total variation of voltage from minimum to maximum shall not exceed six (6) percent of the nominal voltage.

(b) 1. For service rendered primarily for power purposes, voltage variation shall not at any time exceed ten (10) percent above or ten (10) percent below standard nominal voltage.

2. Where a limited amount of lighting is permitted under these contracts, the entire load shall be considered power as far as voltage variation is concerned.

(c) Where utility distribution facilities supplying customers are reasonably adequate and of sufficient capacity to carry actual loads normally imposed, the utility may require that starting and operating characteristics of equipment on customer premises shall not cause an instantaneous voltage drop of more than four (4) percent of standard voltage nor cause objectionable flicker in other customer's lights.

(d) Equipment supplying constant current circuits shall be adjusted to furnish as nearly as practicable the rated current of the circuit supplied, and in no case shall the current vary more than four (4) percent above or below the circuit rating.

(3) Each utility supplying alternating current shall adopt a standard frequency of sixty (60) hertz which shall be stated in the schedule of rates of each utility.

(4) A frequency meter monitor shall be maintained for each system frequency. Accuracy of the frequency meter shall be checked each day and frequency shall be governed within limits as set forth in this section so that the frequency meters on the system are correct once daily.

(5) The following shall not be considered a violation of this section: Voltage variations in excess of those caused by operation of power apparatus on customer premises which require large starting currents and affect only the user of such apparatus, by action of the elements and infrequent and unavoidable fluctuations of short duration due to system operation.

(6) Greater variation of voltage than specified under this section may be allowed if service is supplied directly from a transmission line, if emergency service, or if in a limited or extended area in which customers are widely scattered or business done does not justify close voltage administrative regulation. In such cases the best voltage administrative regulation shall be provided that is practicable under the circumstances.

Section 7. Voltage Surveys and Records. (1) Every utility shall have two (2) or more portable indicating voltmeters and two (2) or more recording or graphic voltmeters of type and capacity suited to the voltage supplied. Every utility shall make a sufficient number of voltage surveys to indicate the service furnished from each center of distribution. To satisfy the commission of its compliance with voltage requirements, each utility shall keep at least one (1) of these instruments in continuous service at some representative point on its system. All records of the most recent voltage surveys taken within the last three (3) calendar years shall be available for inspection by the utility's customers and commission staff.

(2) Each graphic recording voltmeter shall be checked with a working standard indicating voltmeter when it is placed in operation and when it is removed, or periodically if the instrument is in a permanent location. Notations on each chart shall indicate beginning time and date of registration and when the chart was removed, as well as the point where voltage was taken, and results of the check with indicating voltmeter.

Section 8. Servicing Utilization Control Equipment. (1) Utilities shall service and maintain any equipment they use on customer's premises and shall adjust thermostats, clocks, relays, or time switches, if such devices must be so adjusted to provide service in accordance with their rate provisions.

(2) Time switches used by the utility for controlling equipment such as water heaters and street lights shall be of such quality that the timing mechanism may be adjusted to be accurate within ten (10) minutes per month. Time switches used by the utility for controlling street lighting or display lighting shall be inspected or monitored at least once a month and, if in error, adjusted. Time switch-

es shall also be adjusted upon complaint if found in error or when service interruptions cause them to be in error by one-half (1/2) hour or more.

(3) Time switches and control devices used by the utility for controlling off-peak appliances shall be inspected or monitored periodically and adjusted if in error, and also adjusted upon complaint if found in error or whenever service interruptions result in error of two (2) hours or more or in supplying service to off-peak appliances during peak periods.

Section 9. Measuring Customer Service. (1) All energy sold within the State of Kentucky shall be measured by commercially acceptable measuring devices owned and maintained by the utility, except where it is impracticable to meter loads, such as multiple street lighting, temporary or special installations, in which case consumption may be calculated. The utility shall meter its own electrical energy use except when such service is for emergency or incidental lighting such as outdoor substations, or at remote points on its transmission or distribution lines. All other electrical quantities which the utility's tariff indicates are to be metered shall be metered by commercially acceptable instruments owned and maintained by the utility.

(2) The utility shall regard each point of delivery as an independent customer and meter the power delivered at each point. Combined meter readings shall not be taken at separate points, nor shall energy used by more than one (1) residence or place of business on one (1) meter be measured to obtain a lower rate.

(3) Metering facilities located at any point where energy may flow in either direction and where the quantities measured are used for billing purposes shall consist of meters equipped with ratchets or other devices to prevent reverse registration and be so connected as to separately meter energy flow in each direction.

(4) Whenever possible reactive meters required to meet the conditions of a given rate schedule shall be either all ratcheted or none shall be ratcheted. Reactive metering shall not be employed for determining average power factor for billing purposes where energy may flow in either direction or where a customer may generate an appreciable amount of his own requirements.

(5) Meters which are not direct reading and those operating from instrument transformers shall have the multiplier plainly marked on the dial of the instrument or otherwise suitably marked and all charts taken from recording meters shall be marked with the record date, meter number, customer and chart multiplier.

(6) The register ratio shall be marked on all electro-mechanical meter registers. Meters already in service may be so marked when they are tested.

(7) The watt-hour constant for the meter itself shall be placed on all watt-hour meters. Meters already in service shall be so marked when they come to the meter shop.

Section 10. Service Connections. (1) The utility shall pay all costs of a service drop or an initial connection to its line with the customer's service outlet, except the attachment of the wire support to customer premises. When the customer's outlet is inaccessible to the utility, or the customer desires that the service outlet on any building be at a location other than that closest to the utility's line, cost of such special construction as necessary shall be borne by the customer. The utility shall furnish at its expense an amount of wire, labor and material equivalent to that furnished for a like service connection not requiring such special construction.

(2) Underground service requirements and administrative regulations shall be established by each utility and be on file with the commission.

(3) All equipment and material furnished by the utility at its own expense shall remain the property of the utility and may be removed by it at any reasonable time after discontinuance of service.

Section 11. Distribution Line Extensions. (1) Normal extensions. An extension of 1,000 feet or

less of single phase line shall be made by a utility to its existing distribution line without charge for a prospective customer who shall apply for and contract to use the service for one (1) year or more and provides guarantee for such service. The "service drop" to customer premises from the distribution line at the last pole shall not be included in the foregoing measurements. This distribution line extension shall be limited to service where installed transformer capacity does not exceed 25 KVA. Any utility which extends service to a customer who may require polyphase service or whose installed transformer capacity will exceed 25 KVA may require the customer to pay in advance additional cost of construction which exceeds that for a single phase line where the installed transformer capacity does not exceed 25 KVA.

(2) Other extensions.

(a) When an extension of the utility's line to serve an applicant or group of applicants amounts to more than 1,000 feet per customer, the utility may, if not inconsistent with its filed tariff, require total cost of the excessive footage over 1,000 feet per customer to be deposited with the utility by the applicant or applicants, based on the average estimated cost per foot of the total extension.

(b) Each customer receiving service under such extension will be reimbursed under the following plan: Each year, for a refund period of not less than ten (10) years, the utility shall refund to the customer(s) who paid for the excessive footage the cost of 1,000 feet of extension in place for each additional customer connected during the year whose service line is directly connected to the extension installed and not to extensions or laterals therefrom. Total amount refunded shall not exceed the amount paid the utility. No refund shall be made after the refund period ends.

(c) For additional customers connected to an extension or lateral from the distribution line, the utility shall refund to any customer who paid for excessive footage the cost of 1,000 feet of line less the length of the lateral or extension.

(3) An applicant desiring an extension to a proposed real estate subdivision may be required to pay the entire cost of the extension. Each year, for a period of not less than ten (10) years, the utility shall refund to the applicant who paid for the extension a sum equivalent to the cost of 1,000 feet of the extension installed for each additional customer connected during the year. Total amount refunded shall not exceed the amount paid to the utility. No refund shall be made after the refund period ends.

(4) Nothing contained herein shall be construed as to prohibit the utility from making extensions under different arrangements if such arrangements have been approved by the commission.

(5) Nothing contained herein shall be construed to prohibit a utility from making at its expense greater extensions than herein prescribed, if similar free extensions are made to other customers under similar conditions.

(6) Upon complaint to and investigation by the commission, a utility may be required to construct extensions greater than 1,000 feet upon a finding by the commission that such extension is reasonable.

Section 12. Distribution Line Extensions to Mobile Homes. (1) All extensions of up to 150 feet from the nearest distribution line shall be made without charge.

(2) Extensions greater than 150 feet from the nearest distribution line and up to 300 feet shall be made if the customer pays the utility a "customer advance for construction" of fifty (50) dollars in addition to any other charges required by the utility for all customers. This advance shall be refunded at the end of one (1) year if service to the mobile home continues for that length of time.

(3) For extensions greater than 300 feet and less than 1,000 feet from the nearest distribution line, the utility may charge an advance equal to reasonable costs incurred by it for that portion of service beyond 300 feet plus fifty (50) dollars. Beyond 1,000 feet the extension policies set forth in Section 11 of this administrative regulation shall apply.

(a) This advance shall be refunded to the customer over a four (4) year period in equal amounts

for each year service is continued. The customer advance for construction of fifty (50) dollars shall be added to the first of four (4) refunds.

(b) If service is discontinued for a period of sixty (60) days, or the mobile home is removed and another does not take its place within sixty (60) days, or is not replaced by a permanent structure, the remainder of the advance shall be forfeited.

(c) No refunds shall be made to any customer who did not make the advance originally.

(4) If a utility implements specific requirements pertaining to mobile homes, such requirements shall be subject to approval by the commission and comply with the provisions of this administrative regulation.

Section 13. Testing Equipment and Standards. (1) Each utility shall maintain sufficient laboratories, meter testing shops, standards, instruments and facilities to determine accuracy of all types of meters and measuring devices used by the utility except as provided in 807 KAR 5:006, Section 17.

(2) The following testing equipment shall be available as minimum requirements for each utility or agency making tests or checks for a utility pursuant to 807 KAR 5:006, Section 17(2):

(a) One (1) or more working watt-hour standards and associated devices of capacity and voltage range adequate to test all watt-hour meters used by the utility.

(b) One (1) or more watt-hour standards, which shall be the utility's master watt-hour standards, used for testing the working watt-hour standards of the utility. These standards shall be of an approved type, shall be well compensated for both classes of temperature errors, practically free from errors due to ordinary voltage variations, and free from erratic registration. These master watt-hour standards shall be of capacity and voltage range adequate to test all working watt-hour standards at all loads and voltages at which they are used. These standards shall be kept permanently at one place and not used for routine testing.

(c) Working indicating instruments, such as ammeters, voltmeters and watt-meters, of such various types required to determine the quality of service to customers.

(d) A voltmeter and ammeter, which shall be master indicating instruments, and which shall be used for testing of working indicating and recording instruments. These instruments shall be of an approved type and of accuracy class and range sufficient to determine accuracy of working instruments to within five-tenths (0.5) percent of all ranges and scale deflections at which working instruments are used. They shall be kept permanently at one place and not used for routine testing.

(3) The utility's master watt-hour standards shall not be in error by more than plus or minus three-tenths (0.3) percent at 100 percent power factor, nor more than plus or minus five-tenths (0.5) percent at fifty (50) percent power factor at loads and voltages at which they are used, and shall not be used to check or calibrate working standards unless the master standard has been certified as to accuracy by the commission within the preceding twelve (12) months. Each master watt-hour standard shall have a history card and calibration data available, and when used to calibrate working standards, correction for any error of the master standard shall be applied.

(4) All working watt-hour standards when regularly used shall be compared with a master standard at least once in every four (4) weeks. Working watt-hour standards infrequently used shall be compared with a master standard before they are used.

(5) Working watt-hour standards shall be adjusted, if necessary, so that their accuracy will be within plus or minus three-tenths (0.3) percent at 100 percent power factor and within plus or minus five-tenths (0.5) percent at fifty (50) percent lagging power factor at all voltages and loads at which the standard may be used. A history and calibration record shall be kept for each working watt-hour standard showing all pertinent data and name of person performing tests.

(6) After having adjusted working watt-hour standards to the accuracy specified above, service measuring equipment shall be adjusted to within the accuracies required, assuming working watt-hour standards to be 100 percent accurate.

(7) If calibration charts are attached to working watt-hour standards and the error indicated is applied to all tests run and the accuracy on any range has not varied more than two-tenths (0.2) percent during the past twelve (12) regular test periods, accuracy limits may be extended to plus or minus five-tenths (0.5) percent at 100 percent power factor and plus or minus seven-tenths (0.7) percent at fifty (50) percent lagging power factor at all voltages and loads at which the standard may be used.

(8) The utility's master indicating instruments shall not be in error by more than plus or minus five-tenths (0.5) percent of indication at commonly used scale deflections and shall not be used to check or calibrate working indicating instruments unless the master instrument has been checked and adjusted, if necessary, and certified as to accuracy by the commission within the preceding twenty-four (24) months. A calibration record shall be maintained for each instrument.

(9) All working indicating instruments shall be checked against master indicating instruments at least once in each six (6) months. If the working instrument is found appreciably in error at zero or in error by more than one (1) percent of indication at commonly used scale deflections, it shall be adjusted. A calibration record shall be maintained for each instrument showing all pertinent data and name of person performing tests.

Section 14. Check of Standards by Commission. (1) Each utility, and/or agency making tests or checks for a utility, shall submit to the commission Meter Standards Laboratory, its master watt-hour standard once in each year, and its master indicating voltmeter and ammeter once in each two (2) years.

(2) At the discretion of the commission any or all of these required tests may be made at the utility's or agency's testing facility by means of portable transfer standards. If the standards satisfy the requirements of the commission a Certificate of Accuracy shall be issued by the commission's Division of Engineering.

(3) Each utility which normally checks its own master watt-hour standards and master indicating instruments against primary standards such as precision watt-meters, volt boxes, resistances, standard cells, potentiometers, and timing devices, shall calibrate the master watt-hour standards and indicating instruments before they are submitted to the commission for test, and attach to them a record of such calibration.

Section 15. Testing of Metering Equipment. (1) Testing of any unit of metering equipment shall consist of a comparison of its accuracy with a standard of known accuracy. All metering equipment shall be in good order, and shall be adjusted to as close to zero error as possible.

(2) No meter or measuring device shall be deliberately set in error by any amount. Because of unavoidable irregularities of work done on a commercial scale, some accuracy tolerance shall be allowed. Meters shall be set as near as practicable to 100 percent accuracy but in no case shall the inaccuracy exceed one (1) percent. Further, meters with defective parts shall be repaired regardless of their accuracy.

(3) Metering equipment, including instrument transformers and demand meters, shall be tested for accuracy prior to being placed in service, periodically in accordance with the schedule below, upon complaint, when suspected of being in error, or when removed from service for any cause.

Period Test Schedule	
Self-Contained Meters	
Single phase	8 years
3 wire network	8 years
Polyphase	6 years
Meters used with instrument transformers	

	Single phase	6 years
	Polyphase	4 years
Demand Meters		
	Indicating block-interval and lagged-demand meters	same as associated watt-hour meter
	Graphic and pulse operated recording demand meters	2 years
Instrument Transformers		
	Current: high burden test	same as associated watt-hour meter
	Potential: secondary voltage test	same as associated watt-hour meter
	Var-hour Meters	same as associated watt-hour meter
Direct Current Watt-hour Meters:		
	Up to and including 6 KW	4 years
	Over 6 KW through 100 KW	2 years
	Over 100 KW	1 year

(4) Tests may be made at a meter shop, on the customer's premises, or in a mobile shop.

Section 16. Sample Testing of Single Phase Meters. A utility desiring to adopt a scientific sample meter testing plan for single phase meters shall submit its application to the commission for approval. Upon approval the sample testing plan may be followed in lieu of the periodic test prescribed in Section 15(3) of this administrative regulation. The plan shall include the following:

(1) Meters shall be divided into separate groups to recognize differences in operating characteristics due to changes in design, taking into consideration date of manufacture and serial number.

(2) The sampling procedure shall be based upon accepted statistical principles.

(3) The same sampling procedure shall be applied to each group.

(4) Each utility authorized to test meters by sample meter testing plan shall comply with the following conditions:

(a) The number of meters in addition to the sample shall be taken from those meters in each group longest in service since last test unless a particular meter type is known to be increasing the percentage of meters requiring test for the sample group. In such a case where a particular meter type is increasing the percentage of meters requiring test in any group, these meters may be selected first regardless of test date with any additional tests as required for that group coming from those in that group longest in service since last test. Each year the utility shall use the following table to determine the percentage of the total meters in each group to be tested.

Percentage of Meters Within Limits of 2% Fast or Slow (Indicated by Sample)		Percentage of Meters to be Tested the Next Year
99.0	100.0	2
98.0	98.9	4
97.0	97.9	6
96.0	96.9	8
95.0	95.9	10
93.0	94.9	12
91.0	92.9	14
Less than	91.0	16

(b) Provided, however, that no meter shall remain in service without periodic test for a period longer than twenty-five (25) years.

(5) Whenever a meter is found to be more than two (2) percent fast or slow, refunds or back billing shall be made for the period during which the meter error is known to have existed or if not known for one-half (1/2) the elapsed time since the last test but in no case to exceed three (3) years. This provision shall apply only when sample testing of single phase meters has been approved by the commission and utilized by the utility.

Section 17. Test Procedures and Accuracy Requirements. (1) Meters and associated devices shall be tested at the loads indicated below and adjusted as close as practicable to zero error when found to exceed the tolerance prescribed below.

AC Watt-hour Meters		
% of Test Current	Power Factor	Allowable Tolerance
100	1.0	+ or - 1.0%
10	1.0	+ or - 1.0%
100	0.5	+ or - 1.0%
DC Watt-hour Meters		
% of Test Current		Allowable Tolerance
100	1.0%	
10	1.0%	

(a) Only one (1) test run shall normally be required at each test configuration. However if the test indicates the meter is more than two (2) percent in error fast or slow, additional tests shall be made to verify accuracy prior to refunding or back billing the customer.

(b) When a meter is tested on complaint or request, additional test runs shall be made and care exercised to insure that any trouble with the meter will be detected.

(c) For refund and back billing purposes, accuracy of the meter shall be determined by adding the average registration at light load (ten (10) percent of test current) and the average registration at full load (100 percent of test current) and dividing by two (2).

(2) Demand meters. A demand meter, demand register, or demand attachment used to measure customer's service shall:

- (a) Be in good mechanical and electrical condition.
- (b) Have proper constants, indicating scale, contact device, and resetting device.
- (c) Not register at no load.

(d) Be accurate to the following degrees:

1. Graphic meters which record quantity-time curves and integrated-demand meters shall be accurate to within plus or minus two (2) percent of full scale throughout their working range. Timing elements measuring specific demand intervals shall be accurate to within plus or minus two (2) percent and the timing element which serves to provide a record of the time of day when demand occurs shall be accurate to within plus or minus four (4) minutes in twenty-four (24) hours.

2. Lagged-demand meters shall be accurate to within plus or minus two (2) percent at final indication.

(3) Instrument transformers.

(a) Instrument transformers used in conjunction with metering equipment to measure customer's service shall:

1. Be in proper mechanical condition and have electrical insulation satisfactory for the service on which used.

2. Have characteristics such that the combined inaccuracies of all transformers supplying one (1) or more meters in a given installation shall not exceed the following:

	100% Power Factor		50% Power Factor	
	10% Current	100% Current	10% Current	100% Current
Purchased after Jan. 1, 1942	1%	.75%	3%	2%
Purchased prior to Jan. 1, 1942	2%	1.50%	5%	3%

(b) Meters used in conjunction with instrument transformers shall be adjusted so that overall accuracies will come within the limits specified in this administrative regulation.

(c) Instrument transformers shall be tested with the meter with which they are associated by making an overall test, or may be checked separately. If transformers are tested separately, meters shall also be checked to see that overall accuracy of installation is within the prescribed accuracy requirements.

(d) Results of tests of instrument transformers shall be kept on record and be available for use during the life of the transformer.

(e) Phase shifting transformers shall have secondary voltages under balanced line voltage conditions within one (1) percent plus or minus of the voltage impressed on the primary.

Section 18. Location of Meters. (1) Meters shall be installed in a clean, dry, safe, convenient place as free as possible from vibration. Meters shall be easily accessible for reading, testing, and making necessary adjustments and repairs, and where indoor type meters are necessary they shall not be placed in coal or wood bins or on partitions forming bins, nor on any unstable supports. Unless absolutely unavoidable, meters shall not be installed in attics, sitting rooms, bathrooms, bedrooms, restaurant kitchens, over doors, over windows, or in any location where visits of the meter reader or tester will cause annoyance to the customer or a severe inconvenience to the utility.

(2) Districts subject to flood are excepted from this rule as far as it applies to the location of meters.

(3) Proper provision shall be made by the customer for installation of the utility's meter. Unless the

meter is to be mounted upon a panel or installed within a cabinet, such provision shall consist of a board not less than three-quarters (3/4) of an inch in thickness which shall be mounted not less than five (5) or not more than seven (7) feet from the floor, and in general as near as possible to point of entrance of service. At least six (6) inches clear space shall be available, on all sides of the meter board and not less than thirty (30) inches in front of it. The above provisions as to method of mounting and height from floor do not apply to the installation of weatherproof outdoor meters. Electric meters shall not be installed close to either water or gas meters or anything liable to damage the meter, thereby constituting a hazard to customer's safety and continuous service.

(4) When more than one (1) meter is installed without a meter cabinet in the same building, proper space shall be allotted and provision made by the customer for locating the meters at one (1) place. When a number of meters are placed in the same cabinet or upon the same board, each meter shall be tagged or marked to indicate the circuit metered by it.

Section 19. Overhead and Underground Wire Entrances. (1) The overhead wire entrance shall be located on the exterior of the building nearest the utility's lines at a point not less than twelve (12) nor more than thirty (30) feet above the ground. When proper ground clearance cannot be obtained due to height of building, a proper supporting structure shall be provided by the customer unless arrangements can be made with the utility whereby their overhead service wires can be carried to the building in such a manner that these wires will not constitute an obstruction to free passage of vehicles or fire fighting apparatus.

(2) Approval shall be obtained from the utility as to the proper location for a service entrance.

(3) New service drops, both overhead and underground, shall be installed in accordance with the National Electrical Safety Code.

Section 20. Operation of Illegal Gambling Devices. (1) When an electric utility, subject to the jurisdiction of this commission, is notified in writing by a federal or state law enforcement agency, the Attorney General of Kentucky, a Commonwealth's Attorney or a County Attorney acting in his official capacity, that electric energy furnished by it is being used or will be used for operating an illegal gambling device, it shall discontinue rendering electric service to such customer, after reasonable notice to the customer. No damages, penalty or forfeiture, civil or criminal, shall be found against any electric utility for any act done in compliance with any such notice received from the law enforcement agency or officer. Nothing in this section shall be deemed to prejudice the right of any person affected thereby to secure an appropriate judicial determination that such service should not be discontinued, or should be restored.

(2) As provided by KRS 278.230, any electric utility subject to commission jurisdiction shall furnish to the commission upon request any records or information in the possession of such electric utility that may assist in the enforcement of this rule.

Section 21. Underground Electric Distribution Systems for New Residential Customers. (1) Purpose of rules. To formulate requirements for underground electric distribution systems for all new customers of those systems which will insure safe and adequate service and which will be uniformly applicable within a utility's service area.

(2) Applicability. New residential customers and subdivisions as defined below after the effective date of this rule.

(3) Rights of way and easements.

(a) The utility shall construct, own, operate and maintain distribution lines only along easements, public streets, roads and highways which are by legal right accessible to the utility's equipment and which the utility has legal right to occupy, and on public lands and private property across which rights of way and easements satisfactory to the utility may be obtained without cost or condemnation

by the utility.

(b) Rights of way and easements suitable to the utility for underground distribution facilities shall be furnished by the applicant in reasonable time to meet service requirements. The utility may require that the applicant make the area in which underground distribution facilities are to be located accessible to the company's equipment, remove all obstructions from such area, stake to show property lines and final grade, perform rough grading to reasonable approximation of final grade, and maintain clearing and grading during construction by the utility. The utility may require that suitable land rights be granted to it, obligating the applicant and subsequent property owners to provide continuing access to the utility for operation, maintenance or replacement of its facilities, and to prevent any encroachment in the utility's easement or substantial changes in grade or elevation.

(4) Installation of underground distribution system within new subdivision.

(a) Where appropriate contractual arrangements have been made, the utility shall install within the subdivision an underground electric distribution system of sufficient capacity and suitable materials which, in its judgment, will assure that the property owners will receive safe and adequate electric service for the foreseeable future.

(b) Facilities required to be underground:

1. All single phase conductors installed by the utility shall be underground. Appurtenances such as transformers, pedestal-mounted terminals, switching equipment and meter cabinets may be placed above ground.

2. Three (3) phase primary mains or feeders required within a subdivision to supply local distribution or to serve individual three (3) phase loads may be overhead unless underground is required by governmental authority or chosen by the applicant, in either of which case the differential cost of underground shall be borne by the applicant.

(c) If the applicant has complied with the requirements herein and with the utility's specifications on file with the commission, and has given the utility not less than 120 days written notice prior to anticipated date of completion (i.e., ready for occupancy) of the first building in the subdivision, the utility shall complete installation thirty (30) days prior to estimated completion date. (Subject to weather and ground conditions and availability of materials and barring extraordinary or emergency circumstances beyond reasonable control of the utility.) However, nothing in these administrative regulations shall be interpreted to require the utility to extend service to portions of subdivisions not under active development.

(5) Schedule of charges.

(a) Within sixty (60) days after the effective date of these rules, each utility shall file with the commission a statement setting forth the utility's policy with respect to electric underground extensions. Such policy shall provide for payment by the applicant for the difference between the cost of providing underground facilities and that of providing overhead facilities. The payment made by applicant shall be expressed in terms of an amount per foot of conductor or other appropriate measure.

(b) The utility's policy as filed with the commission shall set forth an "estimated average cost differential," if any, between the average or representative cost of underground distribution systems and of equivalent overhead distribution systems within the utility's service areas. The payment made by applicant as provided for in paragraph (a) of this subsection shall not be more than the estimated average cost differential and shall be nonrefundable.

(c) Detailed supporting data used to determine estimated average cost differential shall be concurrently filed by the utility with the commission and shall be updated annually.

(d) Applicant may be required to deposit the entire estimated cost of the extension. If this is done, the amount deposited in excess of the normal charge for underground extensions, as provided in paragraph (a) of this subsection, shall be refunded to the applicant over a ten (10) year period as provided in Section 11 of this administrative regulation.

(e) Upon agreement by both parties, if the applicant chooses to perform all necessary trenching and backfilling in accordance with utility specifications, the utility shall credit applicant's cost in an amount equal to the utility's cost for trenching and backfilling.

(f) Utility extension from the property or boundary of the subdivision to its existing supply facilities shall normally be made overhead, and any deposit required for that extension is subject to refund under Section 11 of this administrative regulation. Upon request, such extension may be made underground, if the applicant agrees to pay the excess cost for the underground extension, which excess cost shall be nonrefundable.

(g)1. Point of service shall be that point where utility facilities join customer facilities, irrespective of the location of the meter. Such point of service shall normally be either at the property line or at the corner of the building nearest the point at which underground systems enter the property to be served, depending upon whether the utility or the customer owns the underground service lateral.

2. If established utility practice dictates service termination at the customer's property line, the utility shall credit the applicant fifty (50) dollars or the equivalent cost of an overhead service line to the applicant's meter base, whichever is greater.

3. Where established utility practice does not dictate service termination at the customer property line, the utility shall include in its underground plan the furnishing, installation, ownership, and maintenance of the service lateral to the meter base providing the applicant installs in the building adequate electric service entrance capacity to the satisfaction of the utility to assure that the underground service conductors will be adequate to handle present and future load requirements of the building. In this instance the utility will determine the size and type of service lateral conductors and appurtenances to be used in any installation.

4. If, by mutual agreement of the parties, service terminates at some other point on the building or property, the applicant shall pay the full cost of any additional extension required in excess of that provided for in paragraph (g)1, 2 and 3 of this subsection.

(h) When an existing utility-owned supply circuit or service lateral requires replacement or reinforcement due to added loads, etc., the utility at its expense will replace or reinforce it.

(i) Nothing in this administrative regulation shall be construed to prevent any utility from assuming any part of the cost differential of providing underground distribution systems within subdivisions, provided the utility demonstrates to the commission that such practice will not result in increased rates to the general body of rate payers.

(j) The utility shall not be obligated to install any facility within a subdivision until satisfactory arrangements for payment of charges have been completed by the applicant.

(6) Cooperation by applicant. Charges specified in these rules are based on the premise that each applicant will cooperate with the utility in an effort to keep the cost of construction and installation of the underground electric distribution system as low as possible and make satisfactory arrangements for payment of the above charges prior to installation of the facilities.

(7) Construction. All electrical facilities shall be installed and constructed to comply with applicable codes, rules and administrative regulations of the commission.

Section 22. Deviations from Rules. In special cases for good cause shown the commission may permit deviations from these rules. (8 Ky.R. 814; eff. 4-7-1982; 16 Ky.R. 2046; 2430; eff. 6-10-1990; 17 Ky.R. 2507; eff. 4-4-1991; TAm 1-30-2013; Crt eff. 3-27-2019.)

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Dated January 8, 2021**

Case No. 2020-00350

Question No. 16

Responding Witness: John K. Wolfe

- Q-16. Please describe in detail all maintenance that must be performed by the Company on each type of street light to ensure that it operates properly and provide a list of each component of the required maintenance and its monthly cost.
- A-16. Normal maintenance consists of replacing the items listed in the table below as needed. The current unit costs are for materials specific to each installation and do not include associated installation costs (labor, minor materials, equipment, etc.), which are not tracked at this level of detail. Maintenance is required when the Company has identified or received a report that the street light is inoperative. The most common maintenance performed on a street light is the replacement of a burned out bulb and/or replacement of an inoperative photoelectric control. Additional maintenance activities include cable/conductor repair/replacements, pole replacements, and replacing mast arms.

Normal Street Light Maintenance Material

Item #	Unit Description	Unit Cost
7001343	LAMP, HPS,4000L,50W	\$7.58
7001344	LAMP,HPS,5800L,70W	\$6.85
7001345	LAMP, HPS, 100W, 9500L	\$6.85
1186394	LAMP, HPS, 150W, 16000L	\$8.23
1186401	LAMP, HPS, 250W, 100V, 27500L	\$7.34
7001347	LAMP, HPS, 400W, 100V, 50000L	\$8.42
0949519	LAMP, HPS, 1000W	\$34.06
7001348	LAMP, MV, 175W, 8000L, DELUXE WHITE	\$5.51
7001349	LAMP, MV, 250W, 13000L, DELUXE WHITE	\$6.40
7001350	LAMP, MV, 400W, 25000L, DELUXE WHITE	\$7.32
3005449	LAMP, PULSE START MH, 150W, MEDIUM BASE	\$27.77
3005450	LAMP, PULSE START MH, 350W, MOGUL BASE	\$28.69
7005980	LAMP, MH, 1000W, 110000L	\$22.98

7001331	CONTROL,PHOTOELECTRIC,ELECTRONIC,105/130 VOLTS,1000W.,1800VA.,GRAY COVER,CDDMIUM-SULFIDE PHOTOCELL,MINIMUM 160 JOULE MOV ARRESTER,TWIST LOCK BASE,DUSK TO DAWN, USE IN 120V ONLY	\$3.81
7001332	CONTROL,PHOTOELECTRIC,ELECTRONIC,105/285V,1000W,1800VA,BLUE COVER,CADMIUM SULFIDE PHOTOCELL,MINIMUM 160 JOULE MOV ARRESTER,TWISTLOCK BASE,DUSK TO DAWN, USE ON 240V ONLY	\$3.56
0455127	CONTROL,PHOTOELECTRIC,ELECTRONIC,TWIST-LOCK BASE,YELLOW COVER,420/530 VOLTS,1000W,1800VA,CADMIUM-SULFIDE PHOTOCELL,MINIMUM 160 JOULE MOV ARRESTOR,DUSK TO DAWN, USE ONLY ON 480V	\$14.92
7001718	CAP,SHORTING,LOCKING TYPE, TO SHUNT LUMINAIRE CIRCUIT SO THE FEED COULD BE FROM A REMOTE LOCATION	\$4.34
7010269	STARTER,LIGHTING,HPS,50W-400W,PLUG IN TYPE	\$33.15
	LED	
3027572	FIXTURE COLONIAL	\$ 330.40
3024333	FIXTURE OB HEAD	\$ 126.07
3024334	FIXTURE OB KIT	\$ 189.67
3024532	FIXTURE COBRA	\$ 167.23
3024534	FIXTURE COBRA	\$ 218.06
3024533	FIXTURE COBRA	\$ 324.37

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 17

Responding Witness: John K. Wolfe

- Q-17. Please provide both the number and type of public street lights for Louisville Metro accounts for which service or maintenance was performed in each of the last three years and the same information for LG&E entire system. In addition, please provide the basis for generating the above repair or maintenance order (i.e., referral from 311, customer complaint, LG&E) for each of the above.
- A-17. LG&E system-wide repair orders for street and other outdoor lights during the periods in question are in the table below. LG&E does not track repairs by type. LG&E does not track street light repairs by customer.

	2018	2019	2020
System-wide	12,841	12,679	10,157

LG&E does not track repairs by reporting source. Refer to the detailed response to Question No. 15 for the basis of LG&E's policies and practices regarding repairs and maintenance.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 18

Responding Witness: John K. Wolfe

- Q-18. Provide the average time to repair a malfunctioning street light from the time of discovery, either by public reporting or Company representative, initiation of work order; to the time the light is restored to operation, work order is closed.
- A-18. For LG&E, the average time to respond to a street light outage report in 2020 was 2.03 days. In 2019, the average time to respond to a street light outage report was 1.97 days. Lights were restored to operation during this first run 86% of time in 2019 and 88% of the time in 2020.

For LG&E, the average time to repair (from discovery to the time the light is restored to operation) in 2020 was 2.82 days. In 2019, the average time to repair was 3.30 days.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 19

Responding Witness: John K. Wolfe

- Q-19. Provide a chart of maintenance and repair calls for each street light for Louisville Metro and the total cost for each call, including both materials and labor.
- A-19. LG&E does not track repairs by customer. See attached for a chart of maintenance and repair calls by address for all of Jefferson County, for 2018 through 2020. System-wide, LG&E has approximately 11,892 streetlight work orders per year at an approximate average cost of \$293 per order.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 20

Responding Witness: John K. Wolfe

- Q-20. Provide separately the number of calls from the public regarding street lights paid for by Louisville Metro and the rest of the Company's system.
- A-20. The Company does not track the number of calls from the public regarding street lights paid for by Louisville Metro and the rest of the Company's system.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 21

Responding Witness: John K. Wolfe

Q-21. Provide any internal policies or procedures with regards to street light maintenance, repair and replacement.

A-21. The procedure for street light maintenance, repair, and replacement consists of the following work practices:

- A reported light outage will be investigated within 2 working days by a trouble shooter or service technician.
 - Initial response is comprised of checking the bulb, photocell, voltage, and starter (if applicable).
 - Replacement of any of these failed components will be conducted at that time.
 - If it is identified that none of the above components are responsible for the lighting failure, the work will be transferred to the lighting repair work queue.
- A second-level response to light outages involves further investigation into the cause of the voltage failure.
 - Typical causes include:
 - Defective fixtures
 - Fuses
 - Third party damage (dig-ins)
 - Failed conductors
 - Depending on the type of repair needed, repairs may be made at this time or scheduled for a later date.
- A third-level response will include replacement of a feed to the light or a chain of lights.
 - This replacement would be conducted by means of boring, plowing, or trenching a new feed in conduit.
 - The time frame for this repair will be heavily dependent on weather, customer or city property impacts, and/or soil dynamics

See also the response to Question No. 15.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 22

Responding Witness: John K. Wolfe

- Q-22. Is LG&E able to ascertain, at any given time, the number of street lights paid for by Louisville Metro that are actually in proper working order? If so, please provide a detailed explanation, and further explain:
- a. How many street lights (on average) are actually in proper working order at any given time;
 - b. Whether the Louisville Metro is charged the monthly tariff rate for non-working street lights for the periods of time within which such street lights are non-operational or not working properly;
 - c. The amount of time it takes (on average) to bring such street lights into working order; and
 - d. Whether this information differs among different types of street lights. If so, please provide this information for each type of light.
- A-22. No, LG&E cannot ascertain the number of street lights that are paid for by Louisville Metro that are operable at any given time. However, as described in the response to Question No. 15(a), LG&E proactively identifies street light outages and relies upon customers to report service problems.
- a. All lights, unless reported otherwise, are considered to be in proper working order.
 - b. Louisville Metro pays a monthly tariff rate for all street lights it has requested and that rate schedule provides LG&E two business days to initiate a repair after notification by a customer.
 - c. See the response to Question No. 18.
 - d. See the response to Question No. 15(d).

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 23

Responding Witness: John K. Wolfe

- Q-23. Please state how many existing street lights are scheduled (or anticipated) to be replaced by the Company over the next five years for which Louisville Metro currently and/or in the future will pay a monthly rate. Please provide the quantity of each type of light being removed and the quantity and type of light that will replace it.
- A-23. LG&E has no scheduled replacements of any current Louisville Metro street lighting fixtures. Street lights on the Restricted Lighting Service rate will be replaced at fixture failure with an equivalent LED. LG&E cannot anticipate the rate at which RLS fixtures will fail and subsequently be replaced with an equivalent LED.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 24

Responding Witness: John K. Wolfe

- Q-24. Please estimate based on historical maintenance how many existing street lights are anticipated to be replaced by the Company over the next five years within Louisville Metro. Please provide an anticipated breakdown by rate code based on historical failures and replacements.
- A-24. See the response to Question No. 14 for approximate fixture replacements for 2018, 2019, and 2020. Average annual fixture replacements is 2,291. The Company does not track replacements by rate code or by county. Based on historical maintenance the Company expects to replace approximately 2,291 fixtures with LED fixtures each year over the next 5 years.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 25

Responding Witness: John K. Wolfe

Q-25. In numerous portions of the filing, the Company makes reference to improving communications with the public, including improvements to the web pages and mobile applications. There does not appear to be any indication that the Company will include the ability to use the mobile application to report and “Geo-Tag” inoperable or malfunctioning street lighting.

- a. Does the Company plan to include this capability in any mobile application upgrades, specifically the ability to “Geo-Tag” or more precisely locate the street light?
- b. Currently the Company website has a very limited ability to report street light outages, will this be improved as part of the proposed community engagement improvements?

A-25.

- a. The Company is considering the feasibility of developing this type of feature on the Company’s App or Website, but has no definitive plans for deployment.
- b. The company currently has no plans for improvement to the current “Report a Streetlight Outage” form that can be found here:
<https://lge-ku.com/outages/report/streetlight>

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 26

Responding Witness: William Steven Seelye

Q-26. Please refer to Seelye testimony, page 39, line 6, at which he states, “Accounting for the effect of eliminating the ECR projects and the increases in charges for LED fixtures and poles, an increase of approximately 16.57% was required for each RLS fixture and pole to produce an overall increase for Rate LS and RLS of 11.90%.”

- a. How does a 16.57% increase in RLS fixtures require an increase to the LS lighting tariff?
- b. Why does KU not have the same issue with increased lighting cost?
- c. Can LG&E obtain same benefits or establish same procedures?
- d. How are the pole costs allocated between LS and RLS tariffs??

A-26.

- a. The 16.57% increase for RS fixtures does not relate to or affect Rate LS. Please see Direct Testimony of William Steven Seelye, page 39, lines 6-15.
- b. As to the difference between the overall increase for the class and the increase for individual RS fixtures, KU does have the same issue. The overall increase for LS and RLS is 0.00% whereas the increase for individual RS fixtures is 1.75% on average. Please see Direct Testimony of William Steven Seelye, page 38, lines 13-18.
- c. In developing the rates for RLS and LS, KU and LG&E followed the same procedure. The reason that KU is not proposing an overall increase for RLS and LS is that the KU’s electric cost of service study shows a higher class rate of return than in the LG&E electric cost of service study. For KU, the Rate LS & RLS class rate of return is 12.32%, whereas for LG&E, the Rate LS & RLS class rate of return is 9.74%.

- d. Except for wood poles for new LED lights, the cost of LS and RLS poles are based upon the weighted net book value the poles. The cost of a wood pole for an LED fixture, which is a new offering, is based on the incremental cost of a new pole.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 27

Responding Witness: Daniel K. Arbough

- Q-27. For Public Street & Highway Lighting, LG&E Tab 62 Schedule I-2 shows a 17% increase in revenues from base year to test year. Please elaborate on why the test year increase is considerably higher than the approximately 11% increase in overall lighting rates.
- A-27. The 17% increase from the base year to the test year is driven primarily by a difference in how actual revenues are recorded by revenue class in the first six months of the base year and how they are forecasted by revenue class in the last six months of the base year and twelve months in the test year. There is no impact to rates as a result of this difference in allocation between revenue classes because rates are designed at the tariff level and not the revenue class level.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 28

Responding Witness: Daniel K. Arbough

- Q-28. For Public Street & Highway Lighting, LG&E Tab 62 Schedule I-2, how much of the \$ 2,461,370 base year revenue is associated with Louisville Metro accounts? How many of the 778 customers are Louisville Metro? Why does the number of customers increase to 883 in the test year?
- A-28. Louisville Metro accounts represented 6.6% of the Public Street & Highway Lighting revenue for the first six months of the base period. The last six months of the base period are based on budgeted street light data, which is not split out by customer. As of January 9, 2021, Louisville Metro accounted for 14 of the Public Street and Highway Lighting customers. The increase in the number of customers in the test year is due to a difference in how customer counts are obtained for actual and forecasted periods. Specifically, customer counts are not forecasted for tariffs that do not have a customer charge and forecasted allocations to get revenue from a tariff level to a revenue class level do not always match with how actuals are recorded. There is no impact to rates as a result of these differences.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 29

Responding Witness: John K. Wolfe

- Q-29. The highest, by cost, light in Louisville Metro's portfolio is RC209. The LED equivalent is the RC492. Please confirm this replacement combination and the cost difference that Louisville Metro will incur as these lights are eventually converted. Will Louisville Metro pay more or less as the fixtures are converted? Please express the difference in both dollar value and as a percent.
- A-29. The recommended comparable LED for RC209 is RC492. The proposed rate for RC209 is \$35.65. The proposed rate for RC492 is \$15.77 for a savings to Metro of \$19.88(56%) per RC209 fixture per month once converted to LED. If Metro elects to convert a RC209 fixture in good working order, Metro will save \$12.80 (36%) while paying the proposed conversion fee of \$7.08 per month for 5 years.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 30

Responding Witness: Robert M. Conroy

- Q-30. Will the monthly LED conversion fee for previously converted LEDs change to the new rate of \$7.37 per month or remain at \$7.08 for the remainder of their 60 month term?
- A-30. The question has the current LED conversion fee (\$7.37 per month) and the proposed LED conversion fee (\$7.08) switched. The monthly LED conversion fee for previously converted LEDs will change to the new rate of \$7.08 per month for the remainder of the 60-month term.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 31

Responding Witness: John K. Wolfe

- Q-31. Would the Company recognize cost savings if a customer committed to converting large numbers of traditional street lighting to LED street lighting?
- A-31. No. Any costs savings are embedded in the LS LED rates and passed through to the customer.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 32

Responding Witness: John K. Wolfe

- Q-32. Please provide the number (quantity), rate type, type description, and location (by street address) of each street light located in Jefferson County, Kentucky for which Louisville Metro currently pays rates to the Company.
- A-32. See attached. This data is pulled from the Company's GIS system. Please note that while we strive to maintain accurate GIS data, it should be field verified for accuracy and may not match up precisely with billing data.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 33

Responding Witness: David S. Sinclair

- Q-33. The 2021 Business Plan Electric Load Forecast (Tab 16, Item C, p.5-6) indicates 2021BP consumption of 14,635 GWh for R/C/I customers, decreasing at least - 500 GWh per year through 2025. The downward trend is not reflected in the R/C/I rates used for capital construction in Tab 26. Please explain why the R/C/I values differ between Tab 16 and Tab 26. Which is considered more reliable as a forecast?
- A-33. The 2021 Business Plan Electric Load Forecast (Tab 16, Item C, p.5-6) shows at least a 500 GWh decline plan over plan (2021BP vs. 2020BP) for 2021-2025, not year over year. The chart in Tab 16 is consistent with Tab 26.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 34

Responding Witness: David S. Sinclair

- Q-34. Please quantify the contribution of hydro and solar for the years shown in the 2021 Business Plan Generation & OSS Forecast (Tab 16, Item H, p.10). Does the utility have plans to increase renewable energy production beyond 2025 to help achieve the corporate goal of reducing CO2 emissions by 70%, relative to 2005, by 2040 (Thompson testimony, p.19)? If so, please quantify.
- A-34. The table below shows actual and forecasted hydro and solar generation from the 2021 Business Plan Generation and OSS Forecast.

<i>GWh</i>	Year	Hydro	Solar
Actual	2016	401	12
	2017	341	17
	2018	347	17
	2019	358	17
6 + 6 ¹	2020	384	17
Forecast	2021	390	18
	2022	390	18
	2023	390	18
	2024	390	17
	2025	390	17

As recently approved by the PSC in Case 2020-00016, the Companies plan to purchase approximately 225 GWh per year from a 100 MW solar facility for twenty years starting in 2022, which is not included in the data above. The Companies have also issued a request for proposals for capacity and energy resources, including renewables. The Companies will evaluate these resources based on their ability to provide reliable service to the Companies' customers at the lowest reasonable cost. Any acquisition of additional renewable resources in the Companies' fleet would also serve to reduce CO₂ emissions.

¹ "6+6" indicates that the 2020 total included 6 months of actual data for January through June and 6 months of forecast data for July through December.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 35

Responding Witness: David S. Sinclair

- Q-35. Please Refer to Figure 14 in the PPL Corporate Climate Assessment Report, which is identified in footnote 6 of Thompson's testimony. The Figure shows the curve for the Low load forecast. Please provide the LGE/KU Distributed Solar Penetration curve applicable to the Base load forecast, include the numerical values for the years 2020 through 2030.
- A-35. See attached.

Attachment to Response to METRO-1 Question No. 35

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Sinclair
Solar as a
Percent of
Load

Year	Month	Distributed Solar Generation (MWh)	Distributed Solar Capacity (MW)	Solar Capacity - Less Degredation (MW)	Effective Capacity Factor	Combined Company Load without Solar (MWh)	Combined Company Load with Distributed Solar (MWh)	Sinclair Solar as a Percent of Load
2017	1	228	4.69	4.69	6.5%	3,248,929	3,248,701	0.01%
2017	2	345	4.70	4.70	10.9%	2,788,441	2,788,096	0.01%
2017	3	504	4.72	4.71	14.4%	2,688,657	2,688,152	0.02%
2017	4	553	4.73	4.73	16.2%	2,361,424	2,360,871	0.02%
2017	5	665	4.75	4.74	18.8%	2,666,287	2,665,622	0.02%
2017	6	676	4.76	4.75	19.7%	3,075,965	3,075,289	0.02%
2017	7	675	4.78	4.76	19.0%	3,286,045	3,285,369	0.02%
2017	8	661	4.79	4.78	18.5%	3,363,993	3,363,333	0.02%
2017	9	587	4.80	4.79	17.0%	2,690,540	2,689,953	0.02%
2017	10	501	4.82	4.80	14.0%	2,460,037	2,459,536	0.02%
2017	11	377	4.83	4.81	10.8%	2,636,744	2,636,367	0.01%
2017	12	274	4.85	4.82	7.6%	3,036,033	3,035,758	0.01%
2018	1	279	5.76	5.74	6.5%	3,258,207	3,257,928	0.01%
2018	2	427	5.80	5.77	11.0%	2,789,852	2,789,425	0.02%
2018	3	621	5.83	5.80	14.3%	2,670,904	2,670,283	0.02%
2018	4	683	5.87	5.84	16.2%	2,355,561	2,354,878	0.03%
2018	5	824	5.91	5.87	18.8%	2,680,395	2,679,570	0.03%
2018	6	840	5.94	5.91	19.6%	3,092,532	3,091,691	0.03%
2018	7	843	5.98	5.94	18.9%	3,297,621	3,296,778	0.03%
2018	8	827	6.02	5.98	18.5%	3,358,334	3,357,507	0.02%
2018	9	737	6.05	6.01	16.9%	2,696,655	2,695,918	0.03%
2018	10	631	6.09	6.04	13.9%	2,462,240	2,461,610	0.03%
2018	11	476	6.13	6.08	10.8%	2,621,075	2,620,599	0.02%
2018	12	348	6.16	6.11	7.6%	3,039,704	3,039,356	0.01%
2019	1	428	8.85	8.80	6.5%	3,252,953	3,252,525	0.01%
2019	2	654	8.89	8.83	10.9%	2,785,116	2,784,462	0.02%
2019	3	948	8.93	8.87	14.3%	2,667,337	2,666,388	0.04%
2019	4	1,041	8.96	8.90	16.1%	2,352,609	2,351,568	0.04%
2019	5	1,254	9.00	8.93	18.7%	2,563,540	2,562,286	0.05%
2019	6	1,276	9.04	8.97	19.6%	2,962,006	2,960,731	0.04%
2019	7	1,276	9.08	9.00	18.9%	3,151,107	3,149,830	0.04%
2019	8	1,249	9.11	9.03	18.4%	3,214,212	3,212,963	0.04%
2019	9	1,112	9.15	9.07	16.9%	2,578,141	2,577,029	0.04%
2019	10	949	9.19	9.10	13.9%	2,350,089	2,349,140	0.04%
2019	11	715	9.22	9.13	10.8%	2,502,397	2,501,682	0.03%
2019	12	521	9.26	9.16	7.6%	2,900,236	2,899,715	0.02%
2020	1	578	11.98	11.88	6.5%	3,114,225	3,113,648	0.02%
2020	2	881	12.01	11.91	10.9%	2,648,691	2,571,798	0.03%
2020	3	1,277	12.05	11.94	14.2%	2,547,807	2,546,530	0.05%
2020	4	1,399	12.08	11.96	16.1%	2,249,853	2,248,453	0.06%
2020	5	1,683	12.11	11.99	18.7%	2,564,517	2,562,834	0.07%
2020	6	1,709	12.14	12.02	19.6%	2,962,370	2,960,661	0.06%
2020	7	1,708	12.17	12.04	18.9%	3,150,882	3,149,174	0.05%
2020	8	1,669	12.20	12.07	18.4%	3,213,788	3,212,118	0.05%
2020	9	1,483	12.23	12.09	16.8%	2,577,870	2,576,387	0.06%
2020	10	1,265	12.26	12.12	13.9%	2,350,218	2,348,954	0.05%
2020	11	952	12.29	12.15	10.7%	2,503,089	2,502,138	0.04%
2020	12	692	12.33	12.17	7.5%	2,900,801	2,900,108	0.02%
2021	1	702	14.60	14.44	6.5%	3,104,907	3,104,205	0.02%

Attachment to Response to METRO-1 Question No. 35

Sinclair
Solar as a
Percent of
Load

Year	Month	Distributed Solar Generation (MWh)	Distributed Solar Capacity (MW)	Solar Capacity - Less Degredation (MW)	Effective Capacity Factor	Combined Company Load without Solar (MWh)	Combined Company Load with Distributed Solar (MWh)	Percent of Load
2021	2	1,071	14.63	14.47	10.9%	2,656,238	2,655,167	0.04%
2021	3	1,550	14.67	14.49	14.2%	2,540,258	2,538,708	0.06%
2021	4	1,698	14.70	14.52	16.1%	2,244,012	2,242,314	0.08%
2021	5	2,042	14.73	14.55	18.6%	2,557,509	2,555,467	0.08%
2021	6	2,073	14.76	14.57	19.5%	2,953,331	2,951,258	0.07%
2021	7	2,070	14.79	14.60	18.8%	3,140,555	3,138,486	0.07%
2021	8	2,022	14.82	14.62	18.3%	3,203,178	3,201,156	0.06%
2021	9	1,796	14.85	14.65	16.8%	2,569,897	2,568,101	0.07%
2021	10	1,531	14.88	14.67	13.8%	2,343,483	2,341,952	0.07%
2021	11	1,151	14.91	14.70	10.7%	2,496,109	2,494,958	0.05%
2021	12	837	14.95	14.72	7.5%	2,892,108	2,891,271	0.03%
2022	1	817	17.04	16.81	6.4%	3,104,612	3,103,795	0.03%
2022	2	1,248	17.10	16.87	10.9%	2,655,442	2,654,194	0.05%
2022	3	1,810	17.17	16.92	14.2%	2,539,783	2,537,973	0.07%
2022	4	1,985	17.23	16.97	16.0%	2,243,897	2,241,912	0.09%
2022	5	2,390	17.29	17.03	18.6%	2,557,005	2,554,615	0.09%
2022	6	2,430	17.35	17.08	19.5%	2,952,225	2,949,795	0.08%
2022	7	2,430	17.41	17.14	18.8%	3,138,994	3,136,564	0.08%
2022	8	2,378	17.47	17.19	18.3%	3,201,527	3,199,149	0.07%
2022	9	2,114	17.53	17.24	16.8%	2,568,603	2,566,488	0.08%
2022	10	1,805	17.59	17.30	13.8%	2,342,660	2,340,856	0.08%
2022	11	1,359	17.65	17.35	10.7%	2,495,730	2,494,371	0.05%
2022	12	990	17.72	17.41	7.5%	2,891,442	2,890,452	0.03%
2023	1	1,062	22.17	21.85	6.4%	3,106,839	3,105,777	0.03%
2023	2	1,609	22.23	21.90	10.8%	2,656,827	2,655,218	0.06%
2023	3	2,348	22.29	21.96	14.2%	2,541,526	2,539,178	0.09%
2023	4	2,574	22.35	22.01	16.0%	2,245,651	2,243,077	0.11%
2023	5	3,097	22.41	22.06	18.6%	2,558,824	2,555,728	0.12%
2023	6	3,146	22.47	22.11	19.4%	2,953,772	2,950,626	0.11%
2023	7	3,143	22.54	22.16	18.7%	3,140,361	3,137,218	0.10%
2023	8	3,073	22.60	22.21	18.3%	3,202,824	3,199,751	0.10%
2023	9	2,730	22.66	22.27	16.7%	2,569,650	2,566,920	0.11%
2023	10	2,329	22.72	22.32	13.8%	2,344,035	2,341,707	0.10%
2023	11	1,752	22.78	22.37	10.7%	2,497,599	2,495,846	0.07%
2023	12	1,275	22.84	22.42	7.5%	2,893,688	2,892,413	0.04%
2024	1	1,293	27.03	26.60	6.4%	3,116,236	3,114,943	0.04%
2024	2	1,975	27.13	26.70	10.8%	2,648,211	2,569,940	0.08%
2024	3	2,865	27.24	26.79	14.1%	2,548,802	2,545,937	0.11%
2024	4	3,144	27.34	26.88	16.0%	2,251,960	2,248,816	0.14%
2024	5	3,787	27.45	26.98	18.5%	2,565,718	2,561,931	0.15%
2024	6	3,851	27.55	27.07	19.4%	2,961,536	2,957,684	0.13%
2024	7	3,852	27.66	27.17	18.7%	3,148,534	3,144,682	0.12%
2024	8	3,771	27.77	27.26	18.3%	3,211,051	3,207,280	0.12%
2024	9	3,354	27.87	27.35	16.7%	2,575,966	2,572,612	0.13%
2024	10	2,864	27.98	27.45	13.8%	2,349,883	2,347,020	0.12%
2024	11	2,158	28.08	27.54	10.7%	2,504,556	2,502,398	0.09%
2024	12	1,571	28.19	27.63	7.5%	2,902,321	2,900,749	0.05%
2025	1	1,715	35.86	35.30	6.4%	3,118,982	3,117,266	0.06%
2025	2	2,619	35.97	35.39	10.8%	2,650,213	2,647,594	0.10%

Attachment to Response to METRO-1 Question No. 35

Sinclair
Solar as a
Percent of
Load

Year	Month	Distributed Solar Generation (MWh)	Distributed Solar Capacity (MW)	Solar Capacity - Less Degredation (MW)	Effective Capacity Factor	Combined Company Load without Solar (MWh)	Combined Company Load with Distributed Solar (MWh)	Sinclair Solar as a Percent of Load
2025	3	3,795	36.07	35.48	14.1%	2,551,049	2,547,254	0.15%
2025	4	4,161	36.18	35.57	16.0%	2,254,362	2,250,201	0.18%
2025	5	5,006	36.28	35.66	18.5%	2,568,017	2,563,011	0.20%
2025	6	5,086	36.39	35.75	19.4%	2,963,479	2,958,393	0.17%
2025	7	5,083	36.50	35.84	18.7%	3,149,927	3,144,844	0.16%
2025	8	4,971	36.60	35.93	18.3%	3,212,418	3,207,447	0.15%
2025	9	4,417	36.71	36.02	16.7%	2,577,272	2,572,855	0.17%
2025	10	3,768	36.81	36.11	13.8%	2,351,743	2,347,975	0.16%
2025	11	2,836	36.92	36.20	10.7%	2,507,043	2,504,207	0.11%
2025	12	2,064	37.02	36.29	7.5%	2,905,118	2,903,054	0.07%
2026	1	2,116	44.29	43.55	6.4%	3,116,561	3,114,445	0.07%
2026	2	3,234	44.47	43.71	10.8%	2,663,664	2,660,430	0.12%
2026	3	4,691	44.64	43.86	14.1%	2,549,676	2,544,985	0.18%
2026	4	5,148	44.81	44.01	16.0%	2,253,605	2,248,456	0.23%
2026	5	6,200	44.98	44.17	18.5%	2,566,871	2,560,671	0.24%
2026	6	6,306	45.16	44.32	19.4%	2,960,973	2,954,668	0.21%
2026	7	6,308	45.33	44.48	18.7%	3,146,216	3,139,909	0.20%
2026	8	6,174	45.50	44.63	18.2%	3,208,506	3,202,332	0.19%
2026	9	5,492	45.68	44.79	16.7%	2,574,460	2,568,968	0.21%
2026	10	4,689	45.85	44.94	13.7%	2,350,050	2,345,361	0.20%
2026	11	3,533	46.02	45.10	10.7%	2,505,687	2,502,154	0.14%
2026	12	2,573	46.19	45.25	7.5%	2,902,982	2,900,409	0.09%
2027	1	2,811	58.82	57.85	6.4%	3,120,263	3,117,452	0.09%
2027	2	4,292	58.99	58.00	10.8%	2,666,538	2,662,247	0.16%
2027	3	6,220	59.16	58.15	14.1%	2,552,784	2,546,564	0.24%
2027	4	6,819	59.34	58.30	16.0%	2,256,757	2,249,938	0.30%
2027	5	8,205	59.51	58.45	18.5%	2,570,136	2,561,931	0.32%
2027	6	8,336	59.68	58.60	19.4%	2,963,848	2,955,512	0.28%
2027	7	8,331	59.86	58.75	18.7%	3,148,504	3,140,173	0.27%
2027	8	8,147	60.03	58.89	18.2%	3,210,672	3,202,525	0.25%
2027	9	7,240	60.20	59.04	16.7%	2,576,337	2,569,098	0.28%
2027	10	6,175	60.37	59.19	13.7%	2,352,516	2,346,340	0.26%
2027	11	4,649	60.55	59.34	10.7%	2,508,755	2,504,106	0.19%
2027	12	3,383	60.72	59.49	7.5%	2,906,645	2,903,262	0.12%
2028	1	3,474	72.75	71.49	6.4%	3,130,833	3,127,359	0.11%
2028	2	5,308	73.02	71.73	10.8%	2,658,960	2,563,045	0.21%
2028	3	7,698	73.29	71.98	14.1%	2,561,206	2,553,508	0.30%
2028	4	8,447	73.57	72.22	15.9%	2,264,193	2,255,746	0.37%
2028	5	10,172	73.84	72.46	18.5%	2,578,352	2,568,180	0.40%
2028	6	10,343	74.11	72.70	19.4%	2,972,614	2,962,271	0.35%
2028	7	10,344	74.38	72.94	18.7%	3,157,304	3,146,960	0.33%
2028	8	10,123	74.65	73.18	18.2%	3,219,510	3,209,387	0.32%
2028	9	9,003	74.92	73.42	16.7%	2,583,249	2,574,245	0.35%
2028	10	7,686	75.20	73.67	13.7%	2,359,476	2,351,790	0.33%
2028	11	5,790	75.47	73.91	10.7%	2,517,023	2,511,233	0.23%
2028	12	4,216	75.74	74.15	7.5%	2,916,488	2,912,272	0.14%
2029	1	4,565	95.57	93.95	6.4%	3,129,249	3,124,683	0.15%
2029	2	6,968	95.84	94.18	10.8%	2,673,574	2,666,606	0.26%
2029	3	10,098	96.11	94.41	14.1%	2,560,316	2,550,218	0.40%

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Sinclair
 Solar as a
 Percent of
 Load

Year	Month	Distributed Solar Generation (MWh)	Distributed Solar Capacity (MW)	Solar Capacity - Less Degredation (MW)	Effective Capacity Factor	Combined Company Load without Solar (MWh)	Combined Company Load with Distributed Solar (MWh)	Percent of Load
2029	4	11,070	96.39	94.65	16.0%	2,264,110	2,253,040	0.49%
2029	5	13,319	96.66	94.88	18.5%	2,578,239	2,564,920	0.52%
2029	6	13,531	96.93	95.11	19.4%	2,971,082	2,957,551	0.46%
2029	7	13,521	97.20	95.34	18.7%	3,154,595	3,141,075	0.43%
2029	8	13,220	97.47	95.57	18.2%	3,216,576	3,203,356	0.41%
2029	9	11,748	97.74	95.81	16.7%	2,581,236	2,569,489	0.46%
2029	10	10,020	98.02	96.04	13.7%	2,358,800	2,348,780	0.43%
2029	11	7,542	98.29	96.27	10.7%	2,516,609	2,509,067	0.30%
2029	12	5,487	98.56	96.50	7.5%	2,915,504	2,910,017	0.19%
2030	1	5,611	117.55	115.46	6.4%	3,131,532	3,125,921	0.18%
2030	2	8,569	117.97	115.82	10.8%	2,675,193	2,666,624	0.32%
2030	3	12,426	118.38	116.18	14.1%	2,562,488	2,550,062	0.49%
2030	4	13,632	118.79	116.54	15.9%	2,266,576	2,252,944	0.61%
2030	5	16,411	119.20	116.91	18.5%	2,580,789	2,564,378	0.64%
2030	6	16,683	119.61	117.27	19.4%	2,972,816	2,956,133	0.56%
2030	7	16,682	120.02	117.63	18.7%	3,155,421	3,138,739	0.53%
2030	8	16,322	120.43	117.99	18.2%	3,217,252	3,200,930	0.51%
2030	9	14,513	120.84	118.35	16.7%	2,582,157	2,567,645	0.57%
2030	10	12,386	121.25	118.72	13.7%	2,360,596	2,348,210	0.53%
2030	11	9,329	121.66	119.08	10.6%	2,518,937	2,509,609	0.37%
2030	12	6,792	122.07	119.44	7.5%	2,917,920	2,911,129	0.23%

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 36

Responding Witness: David S. Sinclair

Q-36. Did the utility conduct a literature review of studies seeking to evaluate the impact of distributed generation on peak day loading from jurisdictions having measurable solar market penetration?

A-36. The Companies have not done a formal literature review on this topic. However, the Companies do follow this topic closely. For example, the Companies recently discussed this topic with another utility with a higher penetration of distributed solar, both in terms of number of installations and installed capacity, in their service territory.

Additionally, the Companies seek out studies from other utilities, private consultants, government agencies, and academic institutions on a broad range of topics. The Company reviews literature not only on the impact of distributed generation on peak day loading from jurisdictions having measurable solar market penetration, but also the impact of renewables on many other aspects of utility operations throughout the U.S.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 37

Responding Witness: Robert M. Conroy / Eileen L. Saunders

Q-37. Under how many different types of customer rate codes does Louisville Metro currently make payments to the Company? For each type of class, please provide the following information:

- a. The type of customer rate code;
- b. The number of Louisville Metro accounts in each such rate code;
- c. The total amount paid by the Louisville Metro for each such rate code during the last 12 month period; and
- d. The total net projected impact for each such rate code under the proposed rate increase.

A-37.

- a. See attached.
- b. See attached.
- c. See attached.
- d. The Company has not performed the specific calculation for each of the Louisville Metro accounts. See Schedule M-2.3-E at Tab 66 of the filing requirement for the proposed increase for each rate class.

Louisville Metro

January 2020 through December 2020

Part A			Part B	Part C
Account Class	Rate Code	Rate Description	Count of Contract Accounts*	Total 12 Months Ending December 2020
Commercial	413	RLS 413: UG HPS Colonial 4-Sided 9500L	1 \$	329.30
	452	RLS 452: OH HPS Cobra Head 16000L Fix	1 \$	180.25
	456	RLS 456: OH HPS Directional 50000L Fix	2 \$	2,016.74
	457	RLS 457: OH HPS Open Bottom 9500L Fix	1 \$	160.23
	511	Residential Electric Service	1 \$	888.36
	551	GS Single Phase - Commercial	52 \$	65,492.15
	552	GS Single Phase Space Heating - Comm	1 \$	425.72
	561	PS Secondary - Commercial	1 \$	4,512.66
		PS Secondary PF Adjusted - Commercial	1 \$	48,863.81
	571	Lighting Energy (Metered)	1 \$	267.52
	591	TODS - Commercial	1 \$	281,521.67
	651	GS Three Phase - Commercial	2 \$	6,706.47
	657	GS Three Phase, NMS - Commercial	1 \$	8,658.14
	851	CGS: Firm Commercial Gas Service	12 \$	50,949.03
	LA1	LS LA1: UG LED Acorn	1 \$	281.79
Commercial Total			71 \$	471,254
Public Authorities	201	RLS 201: OH MV Open Bottom 4000L Fixture	1 \$	202.35
	203	RLS 203: OH MV Cobra Head 13000L Fixture	41 \$	223,060.69
	204	RLS 204: OH MV Cobra Head 25000L Fixture	41 \$	381,973.65
	206	RLS 206: UG MV Coach 4000L Decorative	1 \$	1,906.27
	207	RLS 207: OH MV Directional 25000L Fix	15 \$	8,907.26
	208	RLS 208: UG MV Coach 8000L Decorative	13 \$	68,777.02

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Saunders

Louisville Metro

January 2020 through December 2020

Part A			Part B	Part C
Account Class	Rate Code	Rate Description	Count of Contract Accounts*	Total 12 Months Ending December 2020
	209	RLS 209: OH MV Cobra Head 60000L Fixture	1 \$	378.02
	210	RLS 210: OH MV Directional 60000L Fix	3 \$	2,720.15
	252	RLS 252: OH MV Cobra/Open Bottom 8000L	54 \$	170,059.64
	266	RLS 266: UG HPS Cobra/Contemp 28500L	30 \$	539,091.92
	267	RLS 267: UG HPS Cobra/Contemp 50000L	25 \$	201,833.65
	274	RLS 274: UG HPS Coach/Acorn 9500L Deco	30 \$	153,038.08
	275	RLS 275: UG HPS Cobra/Contemp 16000L	13 \$	27,927.69
	276	RLS 276: UG HPS Coach/Acorn 5800L Deco	4 \$	9,025.37
	277	RLS 277: UG HPS Coach/Acorn 16000L Deco	9 \$	78,081.68
	314	RLS 314: UG MV Cobra Head 13000L Deco	20 \$	95,224.42
	315	RLS 315: UG MV Cobra Head 25000L Deco	9 \$	123,131.44
	318	RLS 318: UG MV Cobra Head 8000L Deco	7 \$	9,223.45
	348	RLS 348: UG Inc Continental Jr 6000L Dec	5 \$	6,876.87
	349	RLS 349: UG Inc Continental Jr 1500L Dec	1 \$	1,983.14
	413	RLS 413: UG HPS Colonial 4-Sided 9500L	16 \$	25,632.18
	416	RLS 416: UG HPS Acorn 9500L Decorative	1 \$	941.42
	420	RLS 420: UG HPS Contemporary 16000L Deco	1 \$	2,464.63
	421	RLS 421: UG HPS Contemporary 28500L Deco	5 \$	3,207.51
	422	RLS 422: UG HPS Contemporary 50000L Deco	5 \$	5,129.27
	423	RLS 423: UG HPS Cobra Head 16000L Deco	10 \$	5,837.81
	424	RLS 424: UG HPS Cobra Head 28500L Deco	30 \$	272,384.43
	425	RLS 425: UG HPS Cobra Head 50000L Deco	3 \$	3,763.95

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Attachment to Response to METRO-1 Question No. 37(a-c)

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Saunders

Louisville Metro

January 2020 through December 2020

Part A			Part B	Part C
Account Class	Rate Code	Rate Description	Count of Contract Accounts*	Total 12 Months Ending December 2020
	427	LS 427: UG HPS London 5800L Historic	1 \$	952.16
	430	RLS 430: UG HPS Victorian 5800L Deco	2 \$	5,263.83
	433	LS 433: UG HPS Victorian 9500L Historic	1 \$	1,505.40
	445	RLS 445: UG HPS Acorn 16000L Decorative	1 \$	4,662.95
	451	GS Single Phase, Water Heating - Comm	2 \$	818.97
	452	RLS 452: OH HPS Cobra Head 16000L Fix	57 \$	689,600.78
	453	RLS 453: OH HPS Cobra Head 28500L Fix	67 \$	1,812,754.37
	454	RLS 454: OH HPS Cobra Head 50000L Fix	69 \$	463,330.89
	455	RLS 455: OH HPS Directional 16000L Fix	9 \$	1,571.65
	456	RLS 456: OH HPS Directional 50000L Fix	76 \$	81,821.50
	457	RLS 457: OH HPS Open Bottom 9500L Fix	18 \$	20,341.83
	473	RLS 473: OH MH Directional 32000L Fix	4 \$	2,310.10
	490	LS 490: OH LED Cobra Head 8179L Fixture	30 \$	41,938.19
	491	LS 491: OH LED Cobra Head 14166L Fixture	33 \$	59,046.39
	492	LS 492: OH LED Cobra Head 23214L Fixture	18 \$	7,727.41
	493	LS 493: OH LED Open Bottom 5007L Fixture	5 \$	5,328.39
	496	LS 496: UG LED Cobra Head 8179L Dec Smth	13 \$	8,877.25
	497	LS 497: UG LED Cobra Head 14166L Dec Smt	19 \$	18,116.94
	498	LS 498: UG LED Cobra Head 23214L Dec Smt	2 \$	875.71
	499	LS 499: UG LED Colonial 4-Sided 5665L De	8 \$	4,444.54
	511	Residential Electric Service	433 \$	397,348.95
	551	GS Single Phase - Commercial	478 \$	684,096.77

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Saunders

Louisville Metro

January 2020 through December 2020

Part A		Part B	Part C
Account Class	Rate Code	Rate Description	Count of Contract Accounts* Total 12 Months Ending December 2020
	552	GS Single Phase Space Heating - Comm	1 \$ 6,613.12
	561	PS Secondary - Commercial	40 \$ 2,956,485.69
		PS Secondary PF Adjusted - Commercial	6 \$ 239,042.20
	563	PS Primary - Commercial	3 \$ 671,578.11
		PS Primary PF Adj - Commercial	1 \$ 13,906.01
	567	PS Secondary NMS - Commercial	1 \$ 27,323.53
		PS Secondary NMS PF Adjusted - Comm	1 \$ 96,566.00
	571	Lighting Energy (Metered)	53 \$ 40,591.70
	572	Lighting Energy (Burning Hours)	7 \$ 70,700.13
	573	Traffic Energy (Metered)	521 \$ 104,797.44
	574	Traffic Energy (Flat kWh, Unmetered)	8 \$ 78,084.58
	591	TODS - Commercial	6 \$ 1,440,471.51
	651	GS Three Phase - Commercial	176 \$ 950,577.20
	652	GS Three Phase, Space Heating - Comm	11 \$ 62,964.52
	657	GS Three Phase, NMS - Commercial	1 \$ 3,958.93
	661	PS Secondary PF Adj - Industrial, DSM	1 \$ 26,172.33
	811	Residential Gas Service	245 \$ 123,922.08
	828	Excess Facilities ODL	16 \$ 2,258.97
	851	CGS: Firm Commercial Gas Service	214 \$ 1,625,010.49
	855	IGS: Industrial Gas Service, DSM	1 \$ 16,229.31
	LA1	LS LA1: UG LED Acorn	2 \$ 1,073.67
	LC1	LS LC1: OH LED Cobra Head	17 \$ 8,874.61

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Louisville Metro

January 2020 through December 2020

Part A			Part B	Part C
Account Class	Rate Code	Rate Description	Count of Contract Accounts*	Total 12 Months Ending December 2020
	LC2	LS LC2: UG LED Cobra Head	2 \$	342.54
	LF2	LS LF2: OH LED Directional (Flood)	1 \$	54.78
	LF3	LS LF3: OH LED Directional (Flood)	3 \$	517.98
	LF7	LS LF7: UG LED Directional (Flood)	2 \$	553.72
	LN3	LS LN3: UG LED Contemporary	10 \$	5,057.70
	LN4	LS LN4: UG LED Contemporary	2 \$	1,284.94
	TEC	Traffic Energy - Surveillance Cameras	1 \$	10,918.41
	TES	Traffic Energy - Shot Spotters	1 \$	3,585.46
Public Authorities Total			1,951 \$	15,325,037
Residential	411	Residential Electric, Water Heating	1 \$	24.87
	511	Residential Electric Service	419 \$	442,205.90
	811	Residential Gas Service	310 \$	188,960.86
Residential Total			419 \$	631,192
Grand Total			2,441 \$	16,427,482

*Note that totals do not sum and count unique contract accounts. A contract account include multiple rate codes and change rate code and/or account class over time.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 38

Responding Witness: Robert M. Conroy

- Q-38. For each separate Louisville Metro account please provide a detailed analysis showing the impact of the proposed rate versus the existing rate using the most recent 12 month actual usage and billing data. Please also provide a detailed explanation of the formula that was used to obtain this information. In particular, please show the formula or calculations indicating the total fiscal impact, including the application of the fees and all applicable adjustments (Environmental, DSM, Fuel, etc.).
- A-38. The Company has not performed the specific calculation for each of the Louisville Metro accounts. See Schedule M-2.3-E at Tab 66 of the filing requirements for the proposed increase for each rate class.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 39

Responding Witness: Eileen L. Saunders

- Q-39. Please provide a schedule showing the following information for each current Metro-Louisville account for 2018, for 2019 and the first 10 months of 2020 separately by year and not added together.
- a. Applicable tariff.
 - b. Other tariffs that could be applicable to this account.
 - c. Total sum paid.
- A-39. See attached. The information requested is confidential and proprietary and is being provided under seal pursuant to a petition for confidential protection. Subpart b does not apply, as all customer accounts are currently on their correct rate.

The entire attachment is
Confidential and
provided separately
under seal.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 40

Responding Witness: Christopher M. Garrett

- Q-40. Does the Company have an estimate or general or specific information on how much revenue is derived from Louisville Metro customers? If so, please provide by customer class for each of the last three years as well as a comparison of the percentage of revenue that this constitutes in relation to all revenues.
- A-40. See attached.

Louisville Gas and Electric Company Case No. 2020-00349				
Jefferson County Billed Electric Revenue by Customer Class For the Calendar Years 2018 through 2020				
Line No.	Item (a)	12 Months Ended		
		Three Most Recent Calendar Years		
		2018 (b)	2019 (c)	2020 (d)
1.	Jefferson County Electric Revenue			
2.	Residential Customers	\$ 414,080,973	\$ 412,184,413	\$ 413,521,565
3.	Commercial Customers	361,316,034	364,917,742	349,689,170
4.	Industrial Customers	163,321,338	164,482,163	165,832,839
5.	Public Authorities Customers	83,555,867	86,199,877	80,376,744
6.	Street Lights Customers	2,887,855	2,412,450	1,933,019
7.	Total (L2 through L6)	\$ 1,025,162,067	\$ 1,030,196,645	\$ 1,011,353,337
8.	Total Operating Electric Revenue	\$ 1,167,787,105	\$ 1,178,961,418	\$ 1,139,319,369
9.	Jefferson County Percentage of Electric Revenue	87.79%	87.38%	88.77%

Louisville Gas and Electric Company Case No. 2020-00349				
Jefferson County Billed Gas Revenue by Customer Class For the Calendar Years 2018 through 2020				
Line No.	Item (a)	12 Months Ended		
		Three Most Recent Calendar Years		
		2018 (b)	2019 (c)	2020 (d)
10.	Jefferson County Gas Revenue			
11.	Residential Customers	\$ 186,114,945	\$ 181,249,881	\$ 179,096,261
12.	Commercial Customers	73,619,677	73,155,416	67,383,205
13.	Industrial Customers	6,870,181	6,460,833	6,068,871
14.	Public Authorities Customers	7,986,199	7,555,335	7,000,814
15.	Gas Transport Customers	5,262,729	4,756,804	6,181,037
16.	Interdepartmental Sales	3,504,792	3,812,382	3,012,863
17.	Total (L11 through L16)	\$ 283,358,523	\$ 276,990,651	\$ 268,743,051
18.	Total Operating Gas Revenue	\$ 324,611,484	\$ 330,363,413	\$ 323,889,236
19.	Jefferson County Percentage of Gas Revenue	87.29%	83.84%	82.97%

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 41

Responding Witness: N/A

Q-41. [This item intentionally left blank.]

A-41. N/A

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government**

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Case No. 2020-00350

Question No. 42

Responding Witness: Lonnie E. Bellar

Q-42. Please refer to Bellar testimony, page 55, Line 20, regarding “Status Quo alternative which assumes replacing existing meters as they fail with non-communicating electronic meters.” Describe:

- a. What is failure rate of current meters?
- b. When does the Company believe the current meters in use would be completely replaced by the “non – communicating electronic meters”?
- c. In detail, what type of “non-communicating electronic” meters would be used?
- d. Explain why the Company cannot replace the existing meters, as they fail, with AMI meters?

A-42.

- a. Meter failure rates are a function of age and can be found in Table 2 of the Meter Life Study in Exhibit LEB-3, Appendix C.
- b. The Companies’ electric meters primarily consist of non-communicating electromechanical and non-communicating electronic meters. In the Status Quo, the Companies replace non-communicating electromechanical and non-communicating electronic meters as they fail with non-communicating electronic meters. As stated in the Meter Life Study, the last new electromechanical meters were installed in 2008, and electromechanical meters can last up to 70 years. Therefore, electromechanical meters may not be fully replaced until as late as 2078.
- c. These are traditional solid-state electronic meters that do not have communication modules (e.g., Encoder Receiver Transmitter modules, Power Line Carrier modules, RF mesh modules, or cellular modules).

- d. If granted approval by the Commission, the Companies can replace existing meters as they fail with AMI meters. The Companies evaluated this Replace-As-Meters-Fail alternative in Section 5.2 of Exhibit LEB-3 and found that doing so resulted in a higher cost compared to the proposed AMI project implementation timeline.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 43

Responding Witness: Lonnie E. Bellar

- Q-43. Refer to Exhibit LEB-3. Does the Status Quo scenario include costs already embedded in existing rates? For example, Table 4 identifies costs associated with meter reading and field service, yet these costs are generally associated with customer base charges.
- A-43. Yes. The analysis summarized in Exhibit LEB-3 evaluated all relevant costs for each alternative.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Question No. 44

Responding Witness: John K. Wolfe

- Q-44. Refer to Exhibit LEB-3, Appendix D. With regards to Conservation Voltage Reduction potential, will additional support be available for customers to diagnose issues with the utility? If problems are encountered, will the utility disable “dynamic” CVR to address end-use compatibility problems?
- A-44. AMI meters will be configured to record and provide voltage information to the Companies. This information, in addition to other data collected from devices across the distribution system apart from the proposed AMI project, will provide the Companies with detailed information to assist in diagnosing voltage issues at the Company-customer connection point and across the distribution system.

Customer reliability and electrical service quality is very important to the Company. For certain situations, as problems are encountered or reported, the utility will be able to disable CVR for these select areas until the problems can be resolved.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 45

Responding Witness: John K. Wolfe

- Q-45. Would Conservation Voltage Reduction ever be used to increase voltage within the tolerance band?
- A-45. Conservative Voltage Reduction, by itself, would not be used to increase voltage for customers. The equipment deployed as part of a Volt/Var Optimization program that enables Conservative Voltage Reduction may increase the voltage within the tolerance band depending on the voltage profile of the circuit to keep customers above the minimum limit.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 46

Responding Witness: Kent W. Blake

- Q-46. Please refer to Blake testimony on Page 16, line 19, regarding “The Companies would expect to use the amortization of the regulatory assets and liabilities associated with the AMI project to address this up-front cost and long-term benefit issue such that customers would never see an increase in revenue requirements associated with implementing AMI” and Exhibit KWB-2.
- a. Does page 2 of Exhibit KWB-2 reflect the 15-year allocation of the AMI costs pursuant to the statement beginning on page 16, line 9?
 - b. Would the rate impact of this allocation be zero, or even positive for ratepayers, because of this allocation?
 - c. What, specifically, would the rate impact of this allocation be for Residential, Consumer, industrial, lighting for each year between 2026 and 2046?
 - d. If the answer to c indicates any increase rate in any year for any class, how does that comport with the statement that “customers would never see an increase in revenue requirements”?
 - e. How are customers protected against rate increases if actual costs come in above the expectations shown in Exhibits KWB-1 and KWB-2?
 - f. Is the Company willing to accept in the CPCN case that there will be no rate impact to the AMI proposal?
 - g. If there is no revenue requirement or rate impact to the AMI project, why are the companies seeking a CPCN?
- A-46.
- a. The rows labeled “Regulatory Asset Amortization” and “Regulatory Liability Amortization” on page 2 of Exhibit KWB-2 reflect the concepts from page 16, line 19 assuming the AMI meters are depreciated over a 15-year life.

- b. The impact to the Companies' combined revenue requirement of the AMI project relative to the status quo is shown in the last row of Exhibit KWB-2 (page 2 for a 15-year meter life and page 3 for a 20-year meter life). It does show either zero impact or a positive impact for every year shown.
- c. The Companies have not performed a 20-year cost of service study to assess how the components of the changes to the Companies' combined revenue requirement under AMI would be allocated across customer classes. However, as noted in b above, the combined revenue requirement impact is shown as zero.
- d. N/A
- e. The deployment of AMI is no different than any other capital project. The decision is made with the best available information at the time of the decision. Unforeseen costs or benefits are always possible with any major investment decision. However, the analysis summarized in Exhibit LEB-3 demonstrates that the downside risk associated with the AMI proposal is very low. Furthermore, the Companies are deferring all cost recovery on the project until it is complete and implementation costs are known.

As stated in the Blake testimony at page 3, lines 5-8, the Companies have sought thoughtful ways to "provide for cost recovery of the Companies' proposed AMI investment in a manner which, based on the Companies' current projections, will not result in an increase in our customers' rates currently or when cost recovery of that investment is ultimately sought." Finally, the Commission retains its full ratemaking power under KRS Chapter 278 to approve, deny, or modify the Companies' rates in the future.

- f. See the response to part (e).
- g. The Companies are seeking a CPCN for the proposed AMI project because it is required.

Kentucky statute and regulation require a utility to obtain a CPCN when a proposed construction project is not an "ordinary extension[]" of existing systems in the usual course of business."² The Commission has defined an "ordinary extension" as "facilities that do not result in the wasteful duplication of utility plant, do not compete with the facilities of existing public utilities, and do not involve a sufficient capital outlay to materially affect the existing financial condition of the utility involved or to require an

² KRS 278.020(1). See also 807 KAR 5:001, Section 15(3).

increase in utility rates.”³ Although the proposed AMI project will not result in wasteful duplication of utility plant and will not compete with the facilities of existing public utilities, the proposed AMI project will involve a sufficient capital outlay – approximately \$302.5 million.

Most recently, the Commission issued Orders in the Companies’ 2020 ECR cases that state, “The Commission finds that, until further Order of the Commission, any capital expenditure that exceeds \$100 million will be considered material to [KU’s] [LG&E’s] financial position and will require a CPCN.”⁴ Because the projected cost of AMI implementation is more than three times the threshold amount announced in the Order, the project cost is considered material.

Additionally, the Commission has held that certain projects, such as smart grid deployments,⁵ as a matter of policy generally require a CPCN even if the project cost would not otherwise be considered material.

³ The Application of Northern Kentucky Water District (A) For Authority to Issue Parity Revenue Bonds in the Approximate Amount of \$16,545,000; and (B) A Certificate of Public Convenience and Necessity for the Construction of Water Main Facilities, Case No. 2000-00481, Order at 4 (Ky. PSC Aug. 30, 2001).

⁴ *Electronic Application of Kentucky Utilities Company for Approval of Its 2020 Compliance Plan for Recovery by Environmental Surcharge*, Case No. 2020-00060, Order at 13 (Ky. PSC Sept. 29, 2020); *Electronic Application of Louisville Gas and Electric Company for Approval of an Amended Environmental Compliance Plan and a Revised Environmental Surcharge*, Case No. 2020-00061, Order at 13 (Ky. PSC Sept. 29, 2020).

⁵ *Consideration of the Implementation of Smart Grid and Smart Meter Technologies*, Case No. 2012-00428, Order at 11 (Ky. PSC Apr. 13, 2016).

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 47

Responding Witness: Eileen L. Saunders

- Q-47. Regarding the new AMI Meters proposed in the CPCN.
- a. How long have these meters been in use?
 - b. What other utilities have used them?
 - c. What is the failure rate of the proposed new AMI meters?
 - d. Does the company that provides these meters warrant their operations? For how long?
 - e. What are replacement costs of these new meters?
 - f. What network communications protocols do these proposed new meters use?
- A-47.
- a. At LG&E these meters have been in use for 10 years in the downtown network. Landis + Gyr is a global supplier of these meters. Landis + Gyr introduced the FOCUS AX-SD meter in 2007.
 - b. See attached. The information requested is confidential and proprietary and is being provided under seal pursuant to a petition for confidential protection.
 - c. See the response to Question No. 42(a). As stated in Section 3 of Exhibit LEB-3, AMI meters are assumed to have the same failure rates as non-communicating electronic meters.
 - d. Yes, Landis + Gyr provided a 5-year warranty for the meters.
 - e. See Table 15 in Section 6.1.2 of Exhibit LEB-3.
 - f. The meters use 900 MHz unlicensed spectrum for communications from the meter to a collector. The collector uses fiber or public data network to communicate to Command Center.

The entire attachment is
Confidential and
provided separately
under seal.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 48

Responding Witness: Eileen L. Saunders

- Q-48. Will the proposed AMI meters use capacitor or battery technology as a backup power source to support communication reporting during outages?
- a. What is the anticipated time the backup power source will be able to report?
 - b. What is the anticipated life expectancy of the capacitor or battery?
 - c. Has this proposal included maintenance or replacement costs for this critical piece of the infrastructure?
 - d. What backup power sources will be utilized for the other critical points in the communications network, at the transformers, repeaters, sub-stations, etc?
 - e. Has maintenance and lifecycle replacement costs for the backup power components been included in your proposal, if so please indicate where and how much?
- A-48. The proposed AMI electric meters use a capacitor as a backup power source.
- a. Approximately 1.5 minutes.
 - b. 20 years.
 - c. Yes. When this component fails, the entire meter has to be replaced.
 - d. The collectors in the communications network feature battery backup.
 - e. Yes, the maintenance and lifecycle replacement costs for backup power components are included as part of the ongoing costs related to meters and networks detailed in Sections 6.1 and 6.2 of Exhibit LEB-3. The Companies have not broken out the cost of backup power components from the total ongoing costs for meters and the network.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 49

Responding Witness: Eileen L. Saunders

- Q-49. Accurate meter locations are fundamental to proper billing. Please describe the capabilities of the proposed asset inventory system for AMI with regards to geocoding meter locations against a visible characteristic such as serial number or barcode number.
- A-49. The asset inventory system will track meter locations while the meters are not in service; this includes the meter lifecycle of testing, cleaning, and storing while in inventory. The Companies capture GPS coordinates of their metering locations and store that information, along with characteristics like serial number, in several other systems like the Customer Information System, Geographic Information System, and others.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 50

Responding Witness: John K. Wolfe

- Q-50. Exhibit JKW-2 alludes to potential overlap between information coming from AMI and existing SCADA systems. Does the utility anticipate the retirement of SCADA, or similar, legacy systems as part of AMI? If so, are these beneficial savings part of the analysis in Exhibit LEB-3?
- A-50. No, AMI is not a replacement for SCADA or other distribution systems.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 51

Responding Witness: Eileen L. Saunders

- Q-51. A number of the claimed benefits associated with AMI are improved communications and notifications. Wolfe testimony from EPRI Exhibit JKW-2 says there can be communications issues for customers with multiple accounts. Louisville Metro is a major customer with numerous accounts in the Residential, and General Service rates.
- a. How will you address communications and notification issues for major customers to avoid confusion or to assist in identifying which account has the issue?
 - b. Also, the current MyMeter website utilizes a pull down menu if you have multiple accounts, as Louisville Metro does. What changes or improvements are proposed to assist major clients when accessing the MyMeter interface, i.e. finding one of many accounts in a pulldown?
- A-51.
- a. Communications will be linked to the meter on the account so that issues can be addressed specifically with the service associated with that meter and its account.
 - b. The Company's MyMeter interface now offers functionality that may help (e.g. providing the capability to "nickname" an account to make it easier to find within the pulldown list). Additionally, customers with multiple accounts that would like to view their accounts grouped together can create a "Meter Group" which then allows those customers to see more than one meter's data at a time. The Company welcomes other ideas Louisville Metro may have and an on-going dialog to help them through their Key Account representative.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 52

Responding Witness: Eileen L. Saunders

Q-52. How will information received from AMI meters be received, processed, and then made available via the MyMeter web portal?

- a. Currently this process results in an approximate 24 hour delay. Will the expansion of AMI reduce this average time, or will the increased amount of data being processed increase this time?
- b. Will there be differences noted for different customers, i.e. those in rural areas will take longer, currently opt-in accounts in more urban areas tend to update quicker?

A-52. Raw interval data from AMI meters is securely transferred to MyMeter web portal at least every 4 – 6 hours. Generally, the meter transfers data to a collector either directly or through another meter or router. The data is then transferred to a head-end system called Command Center. The meter data is currently transferred from Command Center to MyMeter. If the proposed AMI deployment is approved, a new step will transfer the validated interval data from the Meter Data Management System (MDMS) to MyMeter on a daily basis.

- a. Currently the data in MyMeter web portal is updated every 4 - 6 hours for customers with mesh meters in the AMS Opt-In Program and every 24 hours for customers with cellular meters. It is expected that this time will not increase if the AMI expansion is approved.
- b. The timeframe stated above is for all customers regardless of location. Communication or network problems can create a longer update period until the issue is resolved but this is the exception and not normal day-to-day experience.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 53

Responding Witness: Eileen L. Saunders

- Q-53. Please refer to Exhibit JKW - 1 at page 35 of 44. Dominion energy utilized advanced analytics from their AMI data to identify individual electrical loads within the individual customer's homes to identify the individual heating system type. Refer to Exhibit ELS-2 KU-LGE Fact sheet sample "MYTH: Advance meters are an invasion of privacy. TRUTH: Advance meters measure how much energy you use, based on time of day, not how you use that energy. Unless you install a home energy management system, advance meters cannot tell whether the energy used is from your oven, air conditioner, or hair dryer." These two exhibits are contradictory, please provide explain the discrepancy.
- a. Schneider Electrical, Sense, and several other manufactures currently have technology (hardware and software) that can and do utilize advanced analytics to identify specific electrical devices based on load characteristics, i.e. water heater, pump, dishwasher, etc. Thus, the technology exists and is currently in widespread commercial use. The Dominion case cited in Exhibit JKW indicates utilities will have the ability to do this level of analytics. Does the Company acknowledge that the AMI system proposed does not have the capability to measure or perform any advanced analytics?
 - b. Will the Company stipulate that should upgrades to the AMI equipment or software make it possible for advanced analytics in the future, the Company is committed to not utilizing this or any other technology to measure anything other than gross or net energy use over time as stated in this filing?
- A-53. AMI meters measure interval energy consumption. When the interval consumption is married with time, then inferences can be made on the source of the consumption. For instance, a large increase in consumption every hour may indicate the energy consumed by an HVAC system above the home's baseline consumption. It is the combination of time with corresponding energy usage fed into an analytical system that is programmed to infer disaggregation of the energy consumption by device. Sometimes the addition of other data such as weather to time and energy consumption allows for better disaggregation. Thus, the two exhibits are not contradictory. The meter by itself does not identify individual

devices in the home. Energy use from the meter feed into an analytics system can infer end-use device consumption.

- a. Confirmed. The AMI system proposed does not have systems or capabilities to perform advanced analytics.
- b. No the Companies will not commit to only measuring energy. The Companies have policies to protect customer's privacy. The Companies previously committed to not sell customer energy usage information. Utilizing advanced analytics to understand how and when customers use the Companies' services is critical to planning for reliable and affordable service. Additionally, customers may want and expect the Companies to provide disaggregated usage so they can make informed decisions on energy efficiency investments they are planning. In addition, advanced analytics can assist in identifying system losses or theft. Consequently, the value of the interval data through advanced analytics is beneficial to both the customer and the Companies.

The Companies will use the data and insights consistent with the privacy policies but will use the value of these analytics in the future to measure things other than gross or net energy over time.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Dated January 8, 2021

Case No. 2020-00350

Question No. 54

Responding Witness: Lonnie E. Bellar

- Q-54. One principle factor the Company is promoting for the implementation of AMI is the ability for customers to utilize the information to perform energy management and cost reductions. What observations have KU or LG&E recorded regarding energy consumption changes in the Opt-in pilot group customers?
- a. Provide all data from the Opt-in pilot group reporting average consumption reductions over time.
 - b. Was this data utilized to project system wide consumption reductions for AMI implementations?
 - c. How will these proposed reductions impact the Company's revenue and generation?
 - d. In Blake's testimony, under other drivers of requested revenue increase; LG&E is requesting an additional \$6,000,000 due to reduction in load and net revenue. It appears based on this precedence that customers may be asked in the future to make up revenue shortfalls that are being shown as a driving factor to benefit the rate payers as a result of customer's energy management activities as a result of AMI implementation? Please explain how this request for additional revenue driven by load reductions, partially due to the widespread adoption of LED lighting, i.e. rate payer energy management activities will not result in future requests for additional revenue?
- A-54. The Companies disagree with the assertion that energy management is a principal factor for AMI implementation, as the project is primarily justified on operational savings. The Companies' observations are a result of Tetra Tech's analysis, summarized in Appendix E of Exhibit LEB-3.
- a. See Exhibit LEB-3, Appendix E.
 - b. Yes. See page A-19 of Appendix A in Exhibit LEB-3.

- c. The proposed reductions will reduce generation and associated fuel expense as evaluated in Exhibit LEB-3. See page A-19 of Appendix A in Exhibit LEB-3. The AMI analysis was focused on these impacts, the Companies have not evaluated the impact on total revenue. Broadly, Company net revenue will also be impacted in any case where consumption is reduced and fixed costs are being recovered in a variable rate, a general concept related to rate design not unique to AMI as noted.
- d. See the response to part c. Additionally, the evaluation in Exhibit LEB-3 shows from a PV perspective revenue requirements overall will be lower should an AMI deployment be undertaken as proposed. Thus, on balance revenue requests from customers (considering all rate mechanisms) will be lower than the Status Quo.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 55

Responding Witness: Eileen L. Saunders

- Q-55. Refer to Blake testimony Page 18, Line 15 regarding “development of a complete RF mesh network across the Companies’ service territories” and Wolfe Testimony, page 28, line 7, regarding “Using the existing, Company-owned, radio frequency mesh network could provide cost savings not possible without that network”
- a. Is the RF network referred to by Mr. Blake, the same one referred to by Mr. Wolfe?
 - i. If not, what “development” is needed to meet the needs of the proposed AMI meters
 - ii. If so, why does a new RF mesh network need to be developed?
 - b. Please describe in detail the network needs to meet the AMI proposal that do not currently exist.

A-55.

- a. Yes.
 - i. N/A
 - ii. The RF mesh network needs to be further developed to communicate with the meters and transfer data/information to and from the meters. The existing RF mesh network, predominately in Jefferson and Fayette Counties, will continue to be utilized in those areas. Operating the metering function to bill customers is the primary purpose of the network. However, the network can be utilized for additional services and information important to Electric Distribution where they do not have communications networks, such as capacitor banks. The RF mesh network can provide communications to those devices that is faster than rolling a truck to the device but is not at the same speed required for a critical infrastructure system such as SCADA.
- b. The Companies do not have a network that spans to every meter served. The networks the Companies operate cover major and critical equipment necessary for the safe and reliable provision of electric and gas service. The RF mesh network will expand to cover every meter and thus provide

information from these meters for analysis and operational purposes, which does not exist today.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 56

Responding Witness: Eileen L. Saunders

Q-56. Please refer to Blake's Testimony at A-15, at which Blake indicates that the proposed use of remote connect/disconnects will be a source of cost savings. It is unlikely that all future connects/disconnects will be done remotely.

- a. What percent of each have you used for cost savings projections? What support do you have for these assumptions?
- b. If these assumptions prove wrong, or there are unforeseen issues that may arise with remote connects/disconnects causing them to be discontinued. Quantify the fiscal impact on future projected savings, if remote connect/disconnect does not meet assumptions.

A-56. The Companies note that the referenced testimony appears to be from Exhibit LEB-3 at A-15.

- a. The Companies estimated cost savings by analyzing Field Services' traditional workload relative to activities that would be impacted by AMI, along with the historical percentage of disconnects/reconnects that have occurred on accounts that would be expected to have the remote capability with AMI. In 2019, over 97% of disconnections/reconnections related to credit involved a meter that would be expected to be capable of remote connection once AMI is installed.

To be conservative, the Companies assumed that some amount of new activities will result from AMI and retained Field Services staff to perform these activities and manage exceptions to remote disconnections/reconnections. The Companies leveraged internal subject matter experts to then review staffing such that the Companies maintain appropriate geographic coverage to respond to customer needs.

- b. It is reasonable to assume that the vast majority of service disconnections/reconnections will be completed remotely, and that retained Field Services staff will be able to manage exceptions to this process. The Companies have not performed any analysis that assumes a higher level of Field Services labor.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 57

Responding Witness: Eileen L. Saunders

- Q-57. Referring to communications with the proposed AMI meters,
- a. Why is communication with the proposed AMI meters using RF and not fiber or other wireless communication options?
 - b. Will the proposed AMI meters be compatible with fiber communications?
 - c. Will the proposed AMI meters be compatible with other wireless communications options?
 - d. Would there need to be any additional costs to use fiber communications?
 - e. Would there need to be any additional costs to use other wireless communications options?
 - f. Does current wireless technology in Louisville Metro meet requirement of full use of the proposed AMI technology?
 - i. If the answer to f is “no”, what level of wireless technology will be needed?
- A-57.
- a. See the response to AG-KIUC 1-200.
 - b. No
 - c. No.
 - d. Yes, fiber does not exist to every meter. The Companies are using fiber to facilitate backhaul from collectors when possible but not every planned collector location has fiber available.
 - e. Yes.

- f. The Companies are not aware of the capabilities of Louisville Metro wireless technology. Should wireless technology refer to publicly available cellular networks, those can be used to support AMI technology but the associated risk of premature obsolescence makes it imprudent for meter level communications at scale. See AG-KIUC 1-200. The Companies plan to use public cellular to aid data backhaul from collectors.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 58

Responding Witness: Eileen L. Saunders

- Q-58. Please Refer to Application Exhibit #4. The Landis and Gyr AMI equipment indicates is it “Zigbee” enabled for home network.
- a. Will the Company allow homeowners the option of connecting to this “Zigbee” connection?
 - b. Will this allow customers to monitor their energy consumption in “Real time” via the “Zigbee” connection?
 - c. Does the Company anticipate charging a fee for customers to utilize the “Zigbee” connection?
 - d. If the Company will not allow customers to utilize this feature contained within the proposed equipment, what is the reason and justification for not permitting customers to monitor via the meter’s local “Zigbee” connection?
- A-58. See the Companies response to AG-KIUC 1-214.
- a. Yes.
 - b. Yes, it could with a “bridge” or other device connected via Zigbee.
 - c. No, not to use the connection.
 - d. Not applicable.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 59

Responding Witness: Kent W. Blake / Eileen L. Saunders

- Q-59. Refer to Thompson testimony page 5, line 18, “The Companies have devoted significant resources to assessing potential cybersecurity vulnerabilities with their operational technology infrastructure and are developing a plan for mitigating those vulnerabilities” and various other statements.
- a. Explain in detail the resources allotted to potential cybersecurity vulnerabilities.
 - b. What is the default behavior of the proposed AMI meters when experiencing a service interruption?
 - c. What is the default behavior of the proposed AMI meters when experiencing a cybersecurity attack?
 - d. Do the proposed AMI meters have a physical, mechanical override function?
 - e. How will company inform specific customers of cybersecurity breaches?
 - f. How will company inform the public of cybersecurity breaches?
 - g. Will the company agree to communicate cybersecurity breaches with Louisville Metro?
- A-59.
- a. The Companies have 24 employees dedicated to cybersecurity. Additionally the Company uses the following organizations and partnerships for threat monitoring and detection: Edison Electric Institute (EEI), including the Cyber Mutual Assistance (CMA) program; Electric Power Research Institute (EPRI); Electricity Information Sharing and Analysis Center (E-ISAC); Cybersecurity Risk Information Sharing Program (CRISP); FBI Infragard Partnership Program; FBI Domestic Security Alliance Council (DSAC); Department of Homeland Security (DHS) – Protective Security Advisors; Fusion Centers in all service areas.

- b. The meter maintains its current status upon a service interruption.
- c. The meter does not have a capability of determining a cybersecurity attack. The meter reports events such as disconnect, reconnection, tilt, reverse flow which can be used to determine tampering. All AMI meters have advanced security communications which means that every meter has its own individual encryption certificate to communicate with the head-end system.
- d. AMI meters have the capability to be closed by an authorized company representative at the meter should the communications fail.
- e. Not all cybersecurity breaches result in customer data being compromised. The specifics of a cybersecurity breach determine how the Companies communicate with customers. In the event the Companies determine customer communications are appropriate they will use standard customer communication options (e.g. postal mail, phone calls, etc.) to ensure customers are informed so they can take appropriate individual actions.
- f. Not all cybersecurity breaches result in customer data being compromised. The specifics of a cybersecurity breach determine how the Companies communicate to the public. In the event the Companies determine customer communications are appropriate they will use standard public communication options.
- g. Communication of a cybersecurity breach to Louisville Metro will be determined based upon the specifics of any breach.

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Case No. 2020-00350

Question No. 60

Responding Witness: Robert M. Conroy

Q-60. The Company has described AMI System as a series of systems integrated to provide many benefits, application exhibit 3. As such, when the project is complete and cost recovery is sought, estimated to be in 5 years,

- a. Will the Company seek cost recovery across all rate payers, as this system benefits the entire distribution system?
- b. Will advanced meters become available for Power Service customers, if so when, if not why?
- c. Currently, The Company's Power Service meters bill in 15 minute intervals, but do not record any data, thus there is no time stamp available when meter/billing issues arise. Are there any plans to address this issue?

A-60.

- a. Cost recovery will follow cost of service principles and will be addressed in the next base rate proceeding. Mr. Bellar states in his direct testimony, page 54 lines 1-3, "Under the ratemaking proposal Mr. Blake presents, there will be no rate impact to customers as a result of these rate cases and customers will ultimately receive the cost savings AMI will provide."
- b. Some Power Service meters will receive advanced meters. Those that are currently processed and billed by the Company's Itron MV-90 system are not in scope for the proposed AMI deployment due to the complexity of billing rate determinants and calculation validations. The advanced meter deployment schedule has meters installed from late 2022 – 2026.
- c. Yes. AMI meters will have 15 minute consumption data available that is date and time stamped.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 61

Responding Witness: Robert M. Conroy / Eileen L. Saunders

- Q-61. Will AMI extend to Time of Day (TOD) Primary and Secondary and Power Service (PS) Primary and Secondary meters/rates?
- a. If PS and TOD meters are not impacted by AMI, will these still be read in person monthly?
 - b. Will all currently required meter inspections and testing that are requested to be waived, modified, or eliminated in this rate case continue or will these be modified even though AMI meters will not be installed on these accounts?
- A-61. Time of Day (TOD) Primary and Secondary meters, and Power Service (PS) Primary and Secondary meters which are currently processed and billed by the Company's Itron MV-90 system are not in scope for the proposed AMI deployment due to complexity of billing rate determinants and calculation validations.
- a. The above-mentioned meters will continue to be read monthly through the Company's existing meter reading process.
 - b. All currently required meter inspections and testing will continue unchanged for the above-mentioned meters.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 62

Responding Witness: Eileen L. Saunders

- Q-62. Collective billing can result in delays up to 59 days from the meter read date to bill issuance, and/or the availability of detailed use and billing data on the customer web portal. Please elaborate on any changes to collective billing that are proposed or may result from AMI implementation.
- a. Would the proposed AMI system decrease the time from meter reading to bill issuance for collective billing customers?
 - b. Would the decrease apply to all rate codes using collective billing? If not, please identify which rate codes would not benefit. Will deployment of the AMI system result in any changes to customers that currently receive utility billing information via "Flat File"? If yes, please explain what changes are anticipated.
- A-62. The proposed AMI implementation is not expected to change collective billing processes in that a collective bill cannot issue until reads from all meters under the collective bill have been received.
- a. The proposed AMI system will enable the Companies to explore ways to bring the meter reading timeframes closer together for meters under a collective bill, thus potentially shortening the time it takes to issue a collective bill.
 - b. Any potential decreased time between meter reading to bill issuance would be the result of meters under the collective bill moving to AMI, as such, the decrease will not apply to all rate codes and would also be impacted by any AMI opt out under the collective bill. Setting opt out aside, collective billing that includes Time of Day (TOD) Primary and Secondary meters, and some Power Service (PS) Primary and Secondary meters which are currently processed and billed by the Company's Itron MV-90 system would not be expected to benefit from decreased time from meter reading to bill issuance. The proposed deployment of the AMI system is not expected to result in any changes to customers that currently receive utility billing information via "Flat File".

LOUISVILLE GAS AND ELECTRIC COMPANY

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Question No. 63

Responding Witness: Eileen L. Saunders

- Q-63. Will deployment of the AMI system result in any changes to customers that currently receive utility billing information via “Flat File”? If yes, please explain what changes are anticipated.
- A-63. Yes. Customers will still be able to receive their “Flat File.” However, AMI offers enhanced capabilities and customers may find they no longer have a need for a “Flat File.” For example, customers can download their data from the MyMeter web Portal on demand. Customers can set usage alerts and see the data graphically.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 64

Responding Witness: William Steven Seelye

- Q-64. Regarding Schedule M-1.3, please affirm or clarify whether the lines for “Solar Energy Credit” represent energy exported to the utility grid from privately owned distributed generation systems, and that the total generation received in the base year was 498,348 kWh.
- A-64. No. The 498,348 kWh referred to in the question appears to be for KU and not LG&E. In Schedule M-1.3-E, “Solar Energy Credit” refers to energy credits provided to customers served under LG&E’s Solar Share or Business Share Programs. These credits do not represent energy exported to the utility grid from privately owned distributed generation systems.

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Question No. 65

Responding Witness: Robert M. Conroy

- Q-65. Please refer to Seeley testimony at 43 that refers to the Rider SQF that was implemented to comply with Sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978. What is the capacity limit for qualifying facilities under PURPA?
- A-65. The capacity limit for a qualifying facility under PURPA is 80 MW; however, Rider SQF is limited to 100 kW.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 66

Responding Witness: Robert M. Conroy

- Q-66. Is SQF tariff value equal to the avoided cost to the Companies of providing unneeded energy to the qualifying cogeneration or small power production facilities while these facilities are generating and providing power to the companies' system?
- a. Please provide the calculations the Company used to compute the existing Standard Rate Rider SQF.
 - b. Do Sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978 require that the SQF tariff be equal to avoided cost? Please provide the reason for your answer.

A-66. Yes.

- a. See the response to AG-KIUC 1-172.
- b. The legal authority under for the Companies' Standard Rate Rider SQF is 807 KAR 5:054, which the Commission promulgated in accordance with the Public Utility Regulatory Policies Act of 1978. The Commission's regulation states at Section 7(2) regarding utility purchases from qualifying facilities with design capacity of 100 kilowatts or less, "These rates shall be based on avoided costs after consideration of the factors listed in subsection (5)(a) of this section" The factors to which the quoted regulation refers are:

Availability of capacity or energy from a qualifying facility during the system daily and seasonal peak. The utility should consider for each qualifying facility the ability to dispatch, reliability, terms of contract, duration of obligation, termination requirements, ability to coordinate scheduled outages, usefulness of energy and capacity during system emergencies, individual and aggregate value of energy and capacity, and shorter construction lead times associated with cogeneration and small power production.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 67

Responding Witness: William Steven Seelye

Q-67. Please refer to Seeley testimony at 54. The DG customer load profile shown in Graph 3 would be impacted by the azimuth of the systems and the relative size of each system.

- a. Please provide the capacity and azimuth of the systems used to derive the DG profile.
- b. In the absence of such data, is it reasonable to assume that the systems would favor a due-south azimuth?
- c. Please clarify the Y-axis scaling. Is “Net Metering Load” and average or weighted value whereas “Total Residential Load” is cumulative?

A-67.

- a. The data used to derive Graph 3 was developed from actual hourly metering data for a small sample of distributed generation customers. The Companies do not have the capacity and azimuth of the systems.
- b. The Companies have no knowledge of whether the customer’s solar panels favor a due-south azimuth.
- c. The Y-axis for “Total Residential Load” is the total hourly load for all residential customers. The Y-axis for “Net Metering Load” is sum of all kWh per hour for a group of residential distributed generation customers for which the Companies have recorded 15-minute demand intervals. The purpose of the graphs is to illustrate the difference in load shapes for the residential rate class as a whole compared to a sample of distributed generation customers. (The load data used to develop these load shapes are not based on a statistically valid sample, particularly considering the large variance in the usage patterns for net metering customers.)

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 68

Responding Witness: Robert M. Conroy / William Steven Seelye

- Q-68. The recently amended net metering statute, KRS 278.466, states, in part: “Using the ratemaking process provided by this chapter, each retail electric supplier shall be entitled to implement rates to recover from its eligible customer-generators all costs necessary to serve its eligible customer-generators, including but not limited to fixed and demand-based costs, without regard for the rate structure for customers who are not eligible customer-generators.” Please describe in detail how the tariff rate in NMS-2 recovers these “costs”? Does the rate proposed in NMS-2 collect more than these “costs” from the eligible customer-generator?
- A-68. See the testimony of Mr. Seelye beginning at page 46. The proposed Rider NMS-2 addresses the compensation for energy supplied to the grid; it does not address cost recovery from Rider NMS-2 participants.

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Question No. 69

Responding Witness: Robert M. Conroy

- Q-69. How many total customers of the Company currently take service under NMS?
- A-69. See the response to Sierra Club 1-2(a).

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Question No. 70

Responding Witness: Robert M. Conroy

Q-70. How many customers began taking service under NMS for the first time in each year from 2010 to 2020?

A-70.

Year of Original Installation	LG&E
2010	31
2011	48
2012	20
2013	28
2014	29
2015	47
2016	48
2017	35
2018	71
2019	112
2020	129
	<hr/>
	598

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
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Case No. 2020-00350

Question No. 71

Responding Witness: Christopher M. Garrett

Q-71. Please provide a listing of all revenue LG&E/KU received from PJM and MISO (provided separately) by year for the years 2017-2020 by category including but not limited to transmission, energy sales and capacity sales.

A-71. See attached.

Louisville Gas and Electric Case No. 2020-00350					
MISO and PJM revenues For the Calendar Years 2017 through 2020					
Line No.	Item	Years ended			
		2017	2018	2019	2020
1.	<u>MISO revenues</u>				
2.	Energy	\$ 2,633,635	\$ 4,831,111	\$ 3,039,028	\$ 666,729
3.	Transmission	\$ -	\$ -	\$ -	\$ -
4.	Capacity	\$ -	\$ -	\$ -	\$ -
5.	Total MISO revenues	\$ 2,633,635	\$ 4,831,111	\$ 3,039,028	\$ 666,729
6.	<u>PJM revenues</u>				
7.	Energy	\$ 4,144,776	\$ 18,358,508	\$ 2,261,551	\$ 451,967
8.	Transmission	\$ -	\$ -	\$ -	\$ -
9.	Capacity	\$ -	\$ -	\$ -	\$ -
10.	Total PJM revenues	\$ 4,144,776	\$ 18,358,508	\$ 2,261,551	\$ 451,967

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Question No. 72

Responding Witness: Lonnie E. Bellar

- Q-72. Please explain why and how energy and capacity payments would increase by being a member of PJM/MISO from the status quo.
- A-72. The Companies' RTO membership analyses have shown potential costs and benefits from participating in the RTOs' energy and capacity markets. There are potential net positive trade benefits from participating in the energy markets, which would occur by receiving market energy sales margins that are higher than the market energy purchase costs for retail and wholesale requirements customers. There are potential net positive capacity auction benefits, which would occur if the market value of the Companies' generating capacity that clears the RTO capacity auction is positive when netted against the cost to purchase enough capacity to cover the Companies' capacity need as defined by the RTO. The potential also exists for net costs to be higher than the status quo.

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Case No. 2020-00350

Question No. 73

Responding Witness: Lonnie E. Bellar

- Q-73. Did the 2018 RTO Membership Analysis include both FRR and RPM for PJM? If yes, please provide the results. If not, why not?
- A-73. No, the 2018 RTO Membership Analysis only included RPM for PJM. The Companies focused on RPM to allow for the potential revenues from the capacity market to result in the most cost-effective scenario for their customers. Because FRR is an alternative to RPM for an entity to satisfy its capacity obligations in PJM, it would not have been practical to also include FRR in the analysis.

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Case No. 2020-00350

Question No. 74

Responding Witness: Lonnie E. Bellar

Q-74. Are there quantifiable cybersecurity and reliability benefits that LG&E/KU would receive for belonging to PJM or MISO? If so, please state what they are and if not, please state why not.

A-74. The Companies have not quantified such potential benefits. The potential cybersecurity benefits or costs that might result from the tradeoffs of switching to new software platforms required to participate in the RTOs are unknown. Because the RTOs and the Companies plan reliability using similar targets, the differences in reliability may be minimal. However, ceding control of the Companies' generation and transmission systems to the RTOs from the Companies, their stakeholders, and regulators would put the reliability interests of the Companies' customers into a broader pool of various entities across multiple states and would be costly to reverse. MISO, in particular, is facing projected reserve margin deficiencies and resource inadequacy, as reported by the North American Electric Reliability Corporation ("NERC").⁶ PJM is in a more favorable capacity position, but is planning its next capacity auction for May 2021, which will be its first auction since 2018 as it has struggled to implement market design and rules changes.

⁶ See NERC's "2020 Long-Term Reliability Assessment," December 2020 at https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2020.pdf.

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Question No. 75

Responding Witness: Lonnie E. Bellar

- Q-75. Please provide a current update on the status of SEEM which was described in Mr. Bellar's testimony.
- a. Are there any reliability benefits from being a member of SEEM? If yes, please state why and if not, please state why not.
 - b. Has a financial analysis been provided analyzing the financial advantages and disadvantages of membership? If so, please attach a copy of such study.
- A-75. See the response to PSC 2-33.

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Case No. 2020-00350

Question No. 76

Responding Witness: Lonnie E. Bellar

- Q-76. Is there any cost associated with the SEEM proposal in the current rate case? If yes, identify the amount.
- A-76. See the response to PSC 2-33.

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Question No. 77

Responding Witness: Robert M. Conroy

Q-77. How do the Companies plan to get approval from the PSC for SEEM if they choose to participate?

A-77. See the response to AG-KIUC 1-243.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 78

Responding Witness: Lonnie E. Bellar

Q-78. Are LGE/KU still members of SERTP?

- a. Does SERTP remove the necessity of LGE/KU belonging to an RTO?
- b. Did the RTO analysis filed in the 2018 rate case and updated in March 2020 assume that LGE/KU continues to belong to SERTP?

A-78. Yes

- a. There is no requirement for LGE/KU to be in an RTO; therefore, SERTP does not remove the necessity of LGE/KU belonging to an RTO. LGE/KU belong to SERTP in compliance with FERC Order 1000. Compliance with Order 1000 could be met with membership in another region that is not necessarily an RTO.
- b. Yes

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 79

Responding Witness: William Steven Seelye

- Q-79. Did the cost of service study prepared by William Steven Seelye for this case include any categories of costs used to determine customer charge which were not included in his 2018 cost-of-service study for the Company? If the answer is yes, please list the nature of the costs and the amount.
- A-79. There are not any categories of costs used to determine the customer charge in this case that were not included in the Company's last rate case.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 80

Responding Witness: William Steven Seelye

- Q-80. Were there any changes in the methodology in the 2020 cost of service study from his 2018 cost of service study? If the answer is yes, please describe the changes.
- A-80. There are no changes in the methodologies that were used to prepare the cost of service study in this case and those used in the 2018 Rate Case.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 81

Responding Witness: William Steven Seelye

- Q-81. Why did the customer service charge cost (as reflected in the cost of service study) for gas customers increase from approximately \$0.82 in conjunction with the 2018 rate case to approximately \$0.98 per day in 2020?
- A-81. The increase in the customer costs is due to general increases in rate base, O&M expenses, A&G expenses, taxes, and other costs.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 82

Responding Witness: William Steven Seelye

- Q-82. Are all fixed and demand-based costs necessary to serve residential customers recovered through the Basic Service Charge and the Infrastructure portion of the Energy Charge? If not, where else are they? Why?
- A-82. Yes, all fixed and demand-based costs necessary to serve residential customers are recovered through the Basic Service Charge and the Infrastructure portion of the Energy Charge.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 83

Responding Witness: Lonnie E. Bellar / John K. Wolfe

Q-83. Please provide a copy of every vegetation management plan employed by LGE/KU during the last 20 years for:

- a. distribution lines; and
- b. transmission lines.

A-83.

- a. See attached for the 2007 Distribution Vegetation Management Plan filed with the KPSC.
- b. See attached.



Mr. Jim Welch
Director of Engineering
Kentucky Public Service Commission
211 Sower Boulevard
Frankfort, Kentucky 40602-0615

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December 19, 2007

**RE: An Investigation of the Reliability Measures of Kentucky's
Jurisdictional Electric Distribution Utilities and Certain Reliability
Maintenance Practices- Administrative Case 2006-00494**

Dear Mr. Welch:

Enclosed please find Louisville Gas and Electric Company ("LG&E") and Kentucky Utilities Company's ("KU") Vegetation Management Plan pursuant to the Commission's Order dated October 26, 2007 in the above mentioned matter.

Should you have any questions concerning the enclosed, please do not hesitate to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Rick E. Lovekamp".

Rick E. Lovekamp

**Louisville Gas and Electric Company
and
Kentucky Utilities Company**

Distribution Vegetation Management Plan

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Introduction

The Distribution Vegetation Management Program encompasses right of way maintenance for Louisville Gas and Electric Company and Kentucky Utilities Company (referred to as the “Companies”). The program is centralized and managed by a Forestry Manager and nine company Utility Arborists. All are certified arborists by the International Society of Arboriculture. The Companies employ five professional tree contractor companies (Asplundh, Nelson, Phillips, Townsend and Wright). Utility line clearing is undertaken to maintain safety, reliability of service, and access to the utility’s facilities for maintenance and repair.

Safety

The Companies primary focus and core value is to ensure the health and safety of our employees, business partners, and the public. The policies, procedures, and goals contained in the Companies’ *No Compromise Plan* support our current operating and safety commitments. Contractors shall regard safety as their first priority. Contractors and their employees will recognize and follow all laws, rules and regulations regarding public and worker safety. Any incident must be reported to the appropriate safety consultant immediately. Tree Trimming Contractors are held accountable for safety per OSHA and Company standards. Every new contract employee must complete a safety training program in the first 30 days. Safety performance is also included in the contractor evaluation.

Right of Way Maintenance Strategy

The Companies employ an Integrated Vegetation Management Program (IVM) that is the process of using chemical, manual, or mechanical techniques to control undesirable vegetation and includes natural or directional pruning, environmentally safe herbicides, and tree removals. The program includes flexibility to operate and maintain variable easement widths, differences between rural and urban service areas, applicable codes or ordinances, and the need to maintain some level of flexibility in addressing landowner requests or concerns. Schedules and priorities for tree trimming are based on vegetation growth, cycle-last trim date, reliability data, and visual inspections. Reliability centered maintenance concepts are also employed in establishing tree trimming priorities.

The plan includes the application of a flexible multi-cycle strategy to address growth and tree density which will vary across the service area. The Companies’ plan is to maintain a proactive trim cycle while balancing the reactive needs of worst performing circuits. The Companies’ goal is to maintain an average trim cycle of five years or less.

All tree trimming shall be governed by approved principles of modern arboriculture and shall adhere to International Society of Arboriculture (ISA) standards. Other standards utilized in the program include ANSI A300, NESC, and OSHA 1910.269 as well as compliance with tree ordinances and local codes.

Reliability Criteria and Reports

The reliability criteria used to develop the vegetation management plan are system SAIDI, SAIFI, and CAIDI. System performance targets are established annually. Reports used to develop the plan include the Worst Performing Circuit Report and Circuit SAIDI, SAIFI, and CAIDI Reports.

The Annual Reliability Report will include the Worst Performing Circuits and how well the Companies implemented its vegetation plan as well as changes to the plan in the coming year.

Work Plan

Work plans are prepared annually by circuit based on vegetation growth, cycle-last trim date, reliability data, and visual inspections by arborists who develop work plans to target trees that need to be trimmed or removed as well as the flexibility to prescribe a different trim cycle by circuit that addresses growth and tree density for that circuit. A mid-cycle "touch up" is used as needed based on field inspections for multi-phase lines. The vegetation plan strategy will balance the routine trimming plan to maintain an average trim cycle with the reliability centered maintenance plan to address the worst performing circuits. The top 10 worst performing circuits are identified by each reliability index. These circuits are evaluated to determine root cause of the outages. If the root cause is tree related, the arborist will visually inspect the circuit to determine the appropriate plan of action.

The Work Plan includes the following sections:

Routine Trimming Cycle Plan

The routine trimming cycle plan is a proactive plan to trim circuits based on the date last trimmed.

Mid-Cycle Touch Up Plan

The mid-cycle touch up plan focuses on specific fast growing and hazard trees on multi-phase lines.

Herbicide Treatment Plan

The herbicide plan is a proactive plan to control brush and immature trees.

Worst Performing Circuits Plan

The worst performing circuit plan is a reactive plan that has identified trees as the root cause of poor performance and is recommended by the arborist after inspection to be included in the tree work plan.

Evaluation of Plan Effectiveness

The effectiveness of the plan is evaluated by the cycle, system performance as measured by system SAIDI, SAIFI and CAIDI, and customer feedback as measured by satisfaction surveys. Reports used to monitor the plan effectiveness include the Circuit Reliability Report, System SAIDI, SAIFI, and CAIDI Reports, and Customer Satisfaction Surveys.

Customer Communication

Each customer on the circuit receives a mailing notification letter, one to two weeks prior to beginning the circuit work. The crew “knocks on the door” before the work begins. Customer complaints are investigated. Customer satisfaction is included in the contractor evaluation. Customer education about tree trimming and planting trees is provided in consumer mail inserts, participation in community events, and media announcements.

Contractor Performance Management

The vegetation management strategy includes target pricing and firm bid work. Target pricing promotes efficiency in contractor resource management. The target price strategy deploys prescriptive tree management techniques. All trees and brush are planned, counted, and marked on a circuit map, span by span. Contractor work is prescribed and a target price is established for the work. Every circuit is inspected after the tree work is complete. Approximately 8 to 10 percent of the tree work is bid on a firm basis to validate target pricing and encourage contractor competition.

Contractor’s performance is evaluated based on safety, productivity, quality, and customer satisfaction on a quarterly and annual basis. Contractors are held accountable for safety per OSHA and Company standards.



Transmission

VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

02/01/2011

Revised 02/19/2014

Revised 03/22/2016

Revised 8/8/2018

Submitted by Ted Clawson, Kevin Montgomery

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VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

1. Introduction

These Vegetation Practices, Approved Procedures and Specifications are preferred methods for performing vegetation work on the LGE-KU transmission system.

2. Aerial Spraying

Aerial herbicide treatment of transmission rights-of-way is the preferred method of maintenance. It is a highly technical and specialized technique and shall be performed by properly licensed applicators.

2.1. Liquid

Liquid applications shall be made only between the time of full leaf development and the first of September. Granular applications shall be made only after total leaf drop and prior to any leaf development.

2.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

2.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated. Spraying shall not be done when wind exceeds 5 miles per hour.

2.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

2.5. Brush and Tree Heights

Brush and trees should be a minimum of 5 feet high for best results in order to absorb a lethal quantity of herbicides.

Transmission

2.6. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

2.7. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

2.8. Spray Boom

The spray boom and mounting arrangement shall meet all application requirements and the spray boom, similar to the micro-foil, with 0.060 nozzles, shall maintain proper pressure for spray solution during complete applications.

2.9. Moisture Restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3. High Volume Foliar Application

HVF is best suited in areas of medium to heavy brush and tree density, particularly where aerial applications cannot be performed.

3.1. Application

Liquid application shall be made only between the time of full leaf development and the first of October.

3.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

3.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

Transmission

3.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

3.5. Brush and Tree Heights

Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

3.6. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

3.7. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure the solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

3.8. Low Volume Foliar Application

LVF is best suited in areas where brush and tree density is low, particularly scattered stems along public highways, fence rows, and ditch banks and cleanup of resistant plants on r/w or where aerial application or high volume foliar application cannot be performed.

3.9. Application

Liquid application shall be made only between the time of full leaf development and the first of October.

3.10. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

3.11. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

3.12. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most garden

Transmission

3.13. Brush and Tree Heights

Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

3.14. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

Spray solution shall be applied first at top of foliage working downward, wetting leaves.

Spray nozzle setting shall be varied by operator, from a Flat Fan Tip for brush less than 6 feet tall to an Adjustable Cone Tip adjusted to a straight stream for lacing on brush greater than 6 feet tall, to obtain sufficient wetting of each plant.

Brush and trees shall not be sprayed at a distance greater than 15 feet from the spray nozzle.

3.15. Moisture restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3.16. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure the solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

4. Low Volume Basal Application

LVB is best suited in areas where brush and tree density is low, particularly scattered stems along public highways, fence rows, and ditch banks and cleanup of resistant plants on r/w or where aerial application or high volume and low volume foliar applications cannot be performed.

4.1. Application

Applications may be made in all seasons of the year when authorized and weather permitting, but is best suited for dormant season application. LVB is to be applied using backpack equipment.

Transmission

4.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

4.3. Spray Pattern

Spray nozzle shall be directed at base of plant and moved upward in a slow steady motion.

Spray solution shall be applied evenly to the point of run-off over the lower 18"-24" of stem, root collar and exposed roots.

Nozzle pressure shall be adequate for efficient distribution of solution without waste.

4.4. Brush and Tree Heights

Normally 5'-10' on private rights-of-way and heights up to 15'-20' where authorized.

Normally 4'-6' along public roadsides.

Low growing herbaceous (ground cover) plants shall not be treated.

4.5. Weather Restrictions

Solution shall not be applied when brush or tree stem is wet from dew, fog, rain, or covered with ice or snow. Do not apply LVB when temperature is below freezing.

Solution shall not be applied when wind interferes with proper spray pattern.

5. Cut Stubble Application

A soil active product best suited following mowing of R/W and prior to vigorous re-growth.

5.1. Application

Application shall be only when the temperature is above freezing. However, do not apply when the ground is frozen, or heavily saturated after rainfall.

5.2. Formulation

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

5.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

Transmission

5.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

5.5. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

6. Stump Treatment

To be applied to the cut surface area following hand cutting.

6.1. Application

Application can be made in all seasons of the year, except during sap flow, to deciduous species when weather permits.

6.2. Formulation

Same as basal spraying.

6.3. Timing and Spray Solution

Shall be applied when clearing has occurred along transmission R/W. Water based mix must be applied within one hour following cutting, and oil based mixture should be applied as soon as possible following cutting, but no longer than 4 hours. The cambium layer will be treated completely around the circumference of the stump.

6.4. Spray Equipment

May be applied with backpack sprayer, or even hand type sprayers.

7. Brush and Tree Control Notification and Agreement

Before manual, mechanical, or herbicide brush work is begun, agreed to work shall be clearly communicated by Company representative to Contractor's representative. Nearby property owners may need to be notified of work plan and schedule.

When necessary to do so, a qualified representative of the Contractor shall procure rights for work on private property, Federal, State, and County road rights-of-way. If required in special cases, a Company representative may assist.

Transmission

Contractor crew foreman shall notify and secure agreement from adjacent property owners for scheduled brush and tree work on and along public roads.

During the performance of applying herbicides, special care shall be exercised to assure that no damage will occur to livestock and crops, and insure that no herbicide is misapplied nor left unattended.

8. Mowing, Shredding, and Side Trimming

Mowing and tree shredding is used to clear easements and reclaim the edges of the rights-of-way. Side trimming is used to clear limbs growing toward and over the lines.

8.1 Equipment

Specific equipment to be used on the right-of-way to mow, mulch or side trim the edges shall be determined by the size and type of vegetation and the terrain to be mowed.

8.2 Types of Equipment

- Kershaw, Hydro-Ax, Barko or equivalent with Fecon rotary mower
- 4X4 Heavy Duty Tractor with Bush Hog
- Excavator with Tree Shredder attachment
- Excavator with Fecon Rotary attachment
- Skytrim or Jarraffe type, (75' boom with 24" saw attachment)
- Aerial Saw for side trimming (attached to helicopter)

9. Resistant Species

Due to basic plant characteristics and probability rate of plant food assimilation, certain brush and tree species may not react quickly to foliage treatment. Alternative methods may be recommended by Company.

9.1. Coniferous Species

Where coniferous (retain live needles or leaves year round) plants are a brush or tree control problem, Company shall provide approval of methods for treating these species.

Transmission

9.2. Caution

To obtain maximum effect from herbicides, foliage and basal spray treated brush and trees shall not be cut or otherwise disturbed for a minimum period of one year.

10. Brush and Tree Disposal and Site Clean Up

This section deals with the time consuming and often difficult problem of brush and tree disposal from work performed on public and private property. The average property owner expects a site left in as orderly a condition as when work began. Public agencies will not permit littering of public places.

10.1. Tree Work Clean Up

In the interest of sanitation, safety and orderliness, most local, county, and state governments have regulations against the abandonment or dumping of any foreign materials in public places. Many municipalities provide landfills and regulate their use. Such facilities should be used when conveniently close to tree work operations. Regardless of methods employed to meet local circumstances, Contract supervisors shall not risk any Company or personal liability in brush and tree disposal.

- All severed limbs and branches shall be removed from trimmed trees.
- Tools and ropes shall be removed from trees and ladders placed aside.
- Brush Handling
- Brush and wood should be moved off travel ways and sidewalks as same reaches the ground and in a manner not to unnecessarily inconvenience the traveling public.
- When a tree is completed, brush should be promptly loaded on the truck or fed into a power chipper.

10.2. General

- Wood and brush shall not be stored in public places over night without permission.
- In rural areas, brush and wood may be disposed of in accordance with property owners wishes except same must not be left on road rights-of-way.
- All urban and suburban sites shall be thoroughly cleaned.
- Lawns, parkways, and sidewalks shall be cleaned of leaves, twigs, and litter.
- Care shall be taken not to damage any of the property owner's facilities.
- Where wood and brush is discarded at landfills, all regulations shall be complied with.
- Loaded brush shall not extend beyond truck bed sides and if more than 4' over rear end, same shall carry a red flag.
- Where permissible by rural property owners and public highway regulations, debris from power chippers may be blown on the rights-of-way or into the woods.
- Chips left at the site shall be thinly scattered to leave no objectionable bulk or may be stacked or bagged as agreed to by the property owner.

Transmission

- Brush and tree wood should be disposed of in the most economical manner in accordance with all regulations and laws.
- Avoid unnecessary handling and hauling. Burning of brush and trees is generally not allowed.

10.3. Poisonous Plants

Tree workers should be able to readily identify poisonous plants, such as poison ivy, poison oak, and poison sumac, since contact with this plant can cause skin rash and extreme swelling. Workers should also be able to identify wild cherry and buckeye and take necessary precautions to insure that livestock will not have the opportunity to eat the leaves of these trees following cutting or herbicide treatment.

11. Tools and Equipment

This section deals with Contractor's selection, use and care of tools and equipment for line clearing operations. Suitable Contractor equipment, maintained in good working condition, makes tree work easier for workers and yields best results.

11.1. Clearing, Removal, Trimming, Felling, and Brushing

All tools and equipment shall be kept in first class working condition at all times.

11.2. Tree-man Saddle (if used)

This device with safety straps is designed for tree climber's safety and convenience. It shall be inspected frequently for general condition and wear. Tree-man saddles with safety straps shall not be stored with cutting tools.

11.3. Ladders:

Ladders shall be of sound construction and of non-conducting materials.

A ladder should be used in climbing trees where lower branches cannot be manually reached from the ground.

11.4. Power Saws:

Only chain type power saws of reputable, established brands and suitable capacity should be used. All rules, regulations, ordinances, and laws shall be adhered to for the safety of personnel and handling of fuel and lubricant associated with power saw work.

Transmission

11.5. Climbing line:

Rope is used extensively in tree work for lifting, pulling, and holding loads, also for climbing lines, hand lines, slings, and lashings.

It shall be approved No. 1 quality ½” diameter manila rope or equivalent when new, with whipped ends.

11.6. Care of Small Tools:

- Manual saws shall be kept sharpened and properly set.
- Pole pruners and axes shall be kept sharp and in good working order.
- Pruners, axes, and saws shall be safely laid to one side or stored when not in service.
- Pruning and pull or trim saws shall be carried in protective scabbards.
- Pruner poles should be kept clean to guard against moisture absorption and kept free of all surface splinters. Pruner head blade bolts, and rivets should be kept adjusted and oiled for free, smooth cutting.
- All cutting tools shall be dried and free of rust before storing in a dry place, with guards attached or in racks.
- An axe shall not be used as a sledge and shall be inspected daily for: loose, rough, or cracked handles; dull, nicked or split blade; and loose blade and loose wedge in eye. Faulty axes shall be reconditioned before further use.
- A tool shall not be used beyond its capacity.
- All tools should be accounted for daily.
- Care of Ladders:
 - When stored on a truck, ladders should be securely fastened.
 - Ladders should be removed from base of tree when not in use.
 - Broken or seriously damaged rungs shall be replaced before further use.
 - Side rails shall be kept smooth.
 - A ladder with cracked or splintered side rails shall be promptly discarded.
- Care of Power Saws:
 - Chain Type
 - Keep lubricated and in good cutting condition.
 - Perform touch-up sharpening with suitable file or hone.
 - Keep cutter teeth of equal length.
 - Keep correct tension on chain for safety and best cutting.
 - To avoid costly engine wear, replace dull chains promptly.
 - Avoid rocks, dirt, concrete and other damaging material.

11.7. Motors

- Use fuel only as recommended by manufacturer’s manual.
- Blend oil and gasoline carefully before placing in fuel tank.
- Gasoline and oil shall never be separately placed in fuel tank.
- All parts requiring special lubrication shall be checked regularly.

Transmission

- Clean and replace air filters as instructed by manufacturer's manual.
- Cylinder fins should be cleaned each two weeks or more often if needed.

11.8. General

When not in use, power saws must be laid in a safe place.

When stored on a truck, power saws shall be racked firmly and covered against damage and dust.

11.9. Backpack Sprayers with Hand Pump

This type of sprayer shall be of a safety (Special Fire Proof) approved design and used where herbicides are applied by manual methods.

- Capacity shall not exceed 5 gallons.
- Tank, pump, and hose shall be inspected frequently for leaks.
- Trigger and spray action shall shut off properly.
- Nozzle vent and screen shall be kept clean to insure proper operation.
- Tank should be flushed out daily.
- Sprayers shall not be store without thorough cleaning of nozzle, hose, pump and tank.

11.10. Power Chippers

When brush and tree volume requires three or more hours per day disposal effort or for other sound reasons, a mechanical chipper should be considered as part of tree crew equipment.

- Trailer type chippers are preferred.
- Manufacturer's instructions on diameter size and hardness of wood fed into hopper should be followed.
- Extreme care shall be practiced in keeping stones, metal and other foreign materials out of hopper.
- Major bearings should be greased daily.
- Motor oil and filters should be checked frequently and changed as called for by manufacturer's manual.
- Cutter knives shall be checked frequently for tightness and sharpness. Dull knives shall be changed promptly for safe, efficient work and to avoid excess engine wear.
- Protective goggles or equivalent shall be worn by workers feeding the chipper.
- Hearing protection shall be worn by the clipper operator.
- Wood shall not be fed into machine before motor is thoroughly warm.
- Machine shall be protected with shroud during bad weather and in outdoor storage.

11.11. Transportation

Vehicles of adequate capacity to perform the job assigned shall be provided.



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- Where power chippers are used in urban areas, a 300 cubic feet or larger, dust tight box may be substituted for the conventional truck bed.
- All trucks shall have built-in water proof storage space for tool storage and side racks for ladders and pruner poles.
- Trucks shall be maintained in sound, safe and efficient operating condition.
- All trucks shall have signage indicating it is a contractor for LGE-KU.



VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

02/01/2011
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Revised 03/22/2016

Submitted by Ted Clawson, Kevin Montgomery

Transmission

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VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

1. Introduction

These Vegetation Practices, Approved Procedures and Specifications are preferred methods for performing vegetation work on the LGE-KU transmission system.

2. Aerial Spraying

Aerial herbicide treatment of transmission rights-of-way is the preferred method of maintenance. It is a highly technical and specialized technique and shall be performed by properly licensed applicators.

2.1. Liquid

Liquid applications shall be made only between the time of full leaf development and the first of September. Granular applications shall be made only after total leaf drop and prior to any leaf development.

2.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

2.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated. Spraying shall not be done when wind exceeds 5 miles per hour.

2.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

2.5. Brush and Tree Heights

Brush and trees should be a minimum of 5 feet high for best results in order to absorb a lethal quantity of herbicides.

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2.6. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

2.7. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

2.8. Spray Boom

The spray boom and mounting arrangement shall meet all application requirements and the spray boom, similar to the micro-foil, with 0.060 nozzles, shall maintain proper pressure for spray solution during complete applications.

2.9. Moisture Restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3. High Volume Foliar Application

HVF is best suited in areas of medium to heavy brush and tree density, particularly where aerial applications cannot be performed.

3.1. Application

Liquid application shall be made only between the time of full leaf development and the first of October.

3.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

3.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

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3.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

3.5. Brush and Tree Heights

Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

3.6. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

3.7. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure the solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

3.8. Low Volume Foliar Application

LVF is best suited in areas where brush and tree density is low, particularly scattered stems along public highways, fence rows, and ditch banks and clean up of resistant plants on r/w or where aerial application or high volume foliar application cannot be performed.

3.9. Application

Liquid application shall be made only between the time of full leaf development and the first of October.

3.10. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

3.11. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

3.12. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most garden

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3.13. Brush and Tree Heights

Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

3.14. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

Spray solution shall be applied first at top of foliage working downward, wetting leaves.

Spray nozzle setting shall be varied by operator, from a Flat Fan Tip for brush less than 6 feet tall to an Adjustable Cone Tip adjusted to a straight stream for lacing on brush greater than 6 feet tall, to obtain sufficient wetting of each plant.

Brush and trees shall not be sprayed at a distance greater than 15 feet from the spray nozzle.

3.15. Moisture restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3.16. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure the solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

4. Low Volume Basal Application

LVB is best suited in areas where brush and tree density is low, particularly scattered stems along public highways, fence rows, and ditch banks and clean up of resistant plants on r/w or where aerial application or high volume and low volume foliar applications can not be performed.

4.1. Application

Applications may be made in all seasons of the year when authorized and weather permitting, but is best suited for dormant season application. LVB is to be applied using backpack equipment.

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4.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

4.3. Spray Pattern

Spray nozzle shall be directed at base of plant and moved upward in a slow steady motion.

Spray solution shall be applied evenly to the point of run-off over the lower 18"-24" of stem, root collar and exposed roots.

Nozzle pressure shall be adequate for efficient distribution of solution without waste.

4.4. Brush and Tree Heights

Normally 5'-10' on private rights-of-way and heights up to 15'-20' where authorized.

Normally 4'-6' along public roadsides.

Low growing herbaceous (ground cover) plants shall not be treated.

4.5. Weather Restrictions

Solution shall not be applied when brush or tree stem is wet from dew, fog, rain, or covered with ice or snow. Do not apply LVB when temperature is below freezing.

Solution shall not be applied when wind interferes with proper spray pattern.

5. Cut Stubble Application

A soil active product best suited following mowing of R/W and prior to vigorous re-growth.

5.1. Application

Application shall be only when the temperature is above freezing. However, do not apply when the ground is frozen, or heavily saturated after rainfall.

5.2. Formulation

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

5.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

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5.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

5.5. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

6. Stump Treatment

To be applied to the cut surface area following hand cutting.

6.1. Application

Application can be made in all seasons of the year, except during sap flow, to deciduous species when weather permits.

6.2. Formulation

Same as basal spraying.

6.3. Timing and Spray Solution

Shall be applied when clearing has occurred along transmission R/W. Water based mix must be applied within one hour following cutting, and oil based mixture should be applied as soon as possible following cutting, but no longer than 4 hours. The cambium layer will be treated completely around the circumference of the stump.

6.4. Spray Equipment

May be applied with backpack sprayer, or even hand type sprayers.

7. Brush and Tree Control Notification and Agreement

Before manual, mechanical, or herbicide brush work is begun, agreed to work shall be clearly communicated by Company representative to Contractor's representative. Nearby property owners may need to be notified of work plan and schedule.

When necessary to do so, a qualified representative of the Contractor shall procure rights for work on private property, Federal, State, and County road rights-of-way. If required in special cases, a Company representative may assist.

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Contractor crew foreman shall notify and secure agreement from adjacent property owners for scheduled brush and tree work on and along public roads.

During the performance of applying herbicides, special care shall be exercised to assure that no damage will occur to livestock and crops, and insure that no herbicide is misapplied nor left unattended.

8. Mowing and Shredding

Mowing and tree shredding is used to clear easements and reclaim the edges of the rights-of-way.

8.1 Equipment

Specific equipment to be used on the right-of-way to mow, mulch or side trim the edges shall be determined by the size and type of vegetation and the terrain to be mowed.

8.2 Types of Equipment

- Kershaw or equivalent with Fecon rotary mower
- 4X4 Heavy Duty Tractor with Bush Hog
- Excavator with Tree Shredder attachment
- Excavator with Fecon Rotary attachment
- Skytrim or Jarraffe type, (75' boom with 24" saw attachment)

9. Resistant Species

Due to basic plant characteristics and probability rate of plant food assimilation, certain brush and tree species may not react quickly to foliage treatment. Alternative methods may be recommended by Company.

9.1. Coniferous Species

Where coniferous (retain live needles or leaves year round) plants are a brush or tree control problem, Company shall provide approval of methods for treating these species.

9.2. Caution

To obtain maximum effect from herbicides, foliage and basal spray treated brush and trees shall not be cut or otherwise disturbed for a minimum period of one year.

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10. Brush and Tree Disposal and Site Clean Up

This section deals with the time consuming and often difficult problem of brush and tree disposal from work performed on public and private property. The average property owner expects a site left in as orderly a condition as when work began. Public agencies will not permit littering of public places.

10.1. Tree Work Clean Up

In the interest of sanitation, safety and orderliness, most local, county, and state governments have regulations against the abandonment or dumping of any foreign materials in public places. Many municipalities provide landfills and regulate their use. Such facilities should be used when conveniently close to tree work operations. Regardless of methods employed to meet local circumstances, Contract supervisors shall not risk any Company or personal liability in brush and tree disposal.

- All severed limbs and branches shall be removed from trimmed trees.
- Tools and ropes shall be removed from trees and ladders placed aside.
- Brush Handling
- Brush and wood should be moved off travel ways and sidewalks as same reaches the ground and in a manner not to unnecessarily inconvenience the traveling public.
- When a tree is completed, brush should be promptly loaded on the truck or fed into a power chipper.

10.2. General

- Wood and brush shall not be stored in public places over night without permission.
- In rural areas, brush and wood may be disposed of in accordance with property owners wishes except same must not be left on road rights-of-way.
- All urban and suburban sites shall be thoroughly cleaned.
- Lawns, parkways, and sidewalks shall be cleaned of leaves, twigs, and litter.
- Care shall be taken not to damage any of the property owner's facilities.
- Where wood and brush is discarded at landfills, all regulations shall be complied with.
- Loaded brush shall not extend beyond truck bed sides and if more than 4' over rear end, same shall carry a red flag.
- Where permissible by rural property owners and public highway regulations, debris from power chippers may be blown on the rights-of-way or into the woods.
- Chips left at the site shall be thinly scattered to leave no objectionable bulk or may be stacked or bagged as agreed to by the property owner.
- Brush and tree wood should be disposed of in the most economical manner in accordance with all regulations and laws.
- Avoid unnecessary handling and hauling. Burning of brush and trees is generally not allowed.

Transmission

10.3. Poisonous Plants

Tree workers should be able to readily identify poisonous plants, such as poison ivy, poison oak, and poison sumac, since contact with this plant can cause skin rash and extreme swelling. Workers should also be able to identify wild cherry and buckeye and take necessary precautions to insure that livestock will not have the opportunity to eat the leaves of these trees following cutting or herbicide treatment.

11. Tools and Equipment

This section deals with Contractor's selection, use and care of tools and equipment for line clearing operations. Suitable Contractor equipment, maintained in good working condition, makes tree work easier for workers and yields best results.

11.1. Clearing, Removal, Trimming, Felling, and Brushing

All tools and equipment shall be kept in first class working condition at all times.

11.2. Tree-man Saddle (if used)

This device with safety straps is designed for tree climber's safety and convenience. It shall be inspected frequently for general condition and wear. Tree-man saddles with safety straps shall not be stored with cutting tools.

11.3. Ladders:

Ladders shall be of sound construction and of non-conducting materials.

A ladder should be used in climbing trees where lower branches cannot be manually reached from the ground.

11.4. Power Saws:

Only chain type power saws of reputable, established brands and suitable capacity should be used. All rules, regulations, ordinances, and laws shall be adhered to for the safety of personnel and handling of fuel and lubricant associated with power saw work.

11.5. Climbing line:

Rope is used extensively in tree work for lifting, pulling, and holding loads, also for climbing lines, hand lines, slings, and lashings.

It shall be approved No. 1 quality ½" diameter manila rope or equivalent when new, with whipped ends.

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11.6. Care of Small Tools:

- Manual saws shall be kept sharpened and properly set.
- Pole pruners and axes shall be kept sharp and in good working order.
- Pruners, axes, and saws shall be safely laid to one side or stored when not in service.
- Pruning and pull or trim saws shall be carried in protective scabbards.
- Pruner poles should be kept clean to guard against moisture absorption and kept free of all surface splinters. Pruner head blade bolts, and rivets should be kept adjusted and oiled for free, smooth cutting.
- All cutting tools shall be dried and free of rust before storing in a dry place, with guards attached or in racks.
- An axe shall not be used as a sledge and shall be inspected daily for: loose, rough, or cracked handles; dull, nicked or split blade; and loose blade and loose wedge in eye. Faulty axes shall be reconditioned before further use.
- A tool shall not be used beyond its capacity.
- All tools should be accounted for daily.
- Care of Ladders:
 - When stored on a truck, ladders should be securely fastened.
 - Ladders should be removed from base of tree when not in use.
 - Broken or seriously damaged rungs shall be replaced before further use.
 - Side rails shall be kept smooth.
 - A ladder with cracked or splintered side rails shall be promptly discarded.
- Care of Power Saws:
 - Chain Type
 - Keep lubricated and in good cutting condition.
 - Perform touch-up sharpening with suitable file or hone.
 - Keep cutter teeth of equal length.
 - Keep correct tension on chain for safety and best cutting.
 - To avoid costly engine wear, replace dull chains promptly.
 - Avoid rocks, dirt, concrete and other damaging material.

11.7. Motors

- Use fuel only as recommended by manufacturer's manual.
- Blend oil and gasoline carefully before placing in fuel tank.
- Gasoline and oil shall never be separately placed in fuel tank.
- All parts requiring special lubrication shall be checked regularly.
- Clean and replace air filters as instructed by manufacturer's manual.
- Cylinder fins should be cleaned each two weeks or more often if needed.

11.8. General

When not in use, power saws must be laid in a safe place.

Transmission

When stored on a truck, power saws shall be racked firmly and covered against damage and dust.

11.9. Backpack Sprayers with Hand Pump

This type of sprayer shall be of a safety (Special Fire Proof) approved design and used where herbicides are applied by manual methods.

- Capacity shall not exceed 5 gallons.
- Tank, pump, and hose shall be inspected frequently for leaks.
- Trigger and spray action shall shut off properly.
- Nozzle vent and screen shall be kept clean to insure proper operation.
- Tank should be flushed out daily.
- Sprayers shall not be store without thorough cleaning of nozzle, hose, pump and tank.

11.10. Power Chippers

When brush and tree volume requires three or more hours per day disposal effort or for other sound reasons, a mechanical chipper should be considered as part of tree crew equipment.

- Trailer type chippers are preferred.
- Manufacturer's instructions on diameter size and hardness of wood fed into hopper should be followed.
- Extreme care shall be practiced in keeping stones, metal and other foreign materials out of hopper.
- Major bearings should be greased daily.
- Motor oil and filters should be checked frequently and changed as called for by manufacturer's manual.
- Cutter knives shall be checked frequently for tightness and sharpness. Dull knives shall be changed promptly for safe, efficient work and to avoid excess engine wear.
- Protective goggles or equivalent shall be worn by workers feeding the chipper.
- Hearing protection shall be worn by the clipper operator.
- Wood shall not be fed into machine before motor is thoroughly warm.
- Machine shall be protected with shroud during bad weather and in outdoor storage.

11.11. Transportation

Vehicles of adequate capacity to perform the job assigned shall be provided.

- Where power chippers are used in urban areas, a 300 cubic feet or larger, dust tight box may be substituted for the conventional truck bed.
- All trucks shall have built-in water proof storage space for tool storage and side racks for ladders and pruner poles.
- Trucks shall be maintained in sound, safe and efficient operating condition.
- All trucks shall have a magnetic sign on at least the drivers' door indicating it is a contractor for KU/LG&E.



Transmission

VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

02/01/2011

Submitted by (David Comstock, Ted Clawson, John Philpot)

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VEGETATION PRACTICES, APPROVED PROCEDURES, AND SPECIFICATIONS

1. Introduction

This section should provide information on the report's purpose, scope and format along with a project description. If the introduction is short, include as part of the discussion rather than on a separate page.

2. Aerial Spraying

Aerial herbicide treatment of transmission rights-of-way is the preferred method of maintenance. It is a highly technical and specialized technique and shall be performed by properly licensed applicators.

2.1. Liquid

Liquid applications shall be made only between the time of full leaf development and the first of September. Granular applications shall be made only after total leaf drop and prior to any leaf development.

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Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

2.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated. Spraying shall not be done when wind exceeds 5 miles per hour.

2.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

2.5. Brush and Tree Heights

Brush and trees should be a minimum of 5 feet high for best results in order to absorb a lethal quantity of herbicides.

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2.6. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

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The spray boom and mounting arrangement shall meet all application requirements and the spray boom, similar to the micro-foil, with 0.060 nozzles, shall maintain proper pressure for spray solution during complete applications.

2.9. Moisture Restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3. High Volume Foliar Application

HVF is best suited in areas of medium to heavy brush and tree density, particularly where aerial applications cannot be performed.

3.1. Application

Liquid application shall be made only between the time of full leaf development and the first of October.

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Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

3.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

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3.4. Crops Most Susceptible to Herbicides

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Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

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Liquid application shall be made only between the time of full leaf development and the first of October.

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Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

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Extreme care shall be used to guard against drift of material off the area intended to be treated.

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Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most garden

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3.13. Brush and Tree Heights

Brush and trees should be a maximum of 15 feet high for best results in order to absorb a lethal quantity of herbicides.

3.14. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

Spray solution shall be applied first at top of foliage working downward, wetting leaves.

Spray nozzle setting shall be varied by operator, from a Flat Fan Tip for brush less than 6 feet tall to an Adjustable Cone Tip adjusted to a straight stream for lacing on brush greater than 6 feet tall, to obtain sufficient wetting of each plant.

Brush and trees shall not be sprayed at a distance greater than 15 feet from the spray nozzle.

3.15. Moisture restrictions

Spray solution shall not be applied within 30 minutes after a fog, dew, or rain heavy enough to cause run-off from leaves.

Spraying done 4 hours or less prior to such fog, dew, or rain shall be redone.

3.16. Solution Preparation

The spray solution shall be prepared as specified by the manufacturer's label being sure the solution is thoroughly mixed and agitated, while filling sprayer and being applied. All label directions shall be followed when mixing.

4. Low Volume Basal Application

LVB is best suited in areas where brush and tree density is low, particularly scattered stems along public highways, fence rows, and ditch banks and clean up of resistant plants on r/w or where aerial application or high volume and low volume foliar applications can not be performed.

4.1. Application

Applications may be made in all seasons of the year when authorized and weather permitting, but is best suited for dormant season application. LVB is to be applied using backpack equipment.

Transmission

4.2. Formulations

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

4.3. Spray Pattern

Spray nozzle shall be directed at base of plant and moved upward in a slow steady motion.

Spray solution shall be applied evenly to the point of run-off over the lower 18"-24" of stem, root collar and exposed roots.

Nozzle pressure shall be adequate for efficient distribution of solution without waste.

4.4. Brush and Tree Heights

Normally 5'-10' on private rights-of-way and heights up to 15'-20' where authorized.

Normally 4'-6' along public roadsides.

Low growing herbaceous (ground cover) plants shall not be treated.

4.5. Weather Restrictions

Solution shall not be applied when brush or tree stem is wet from dew, fog, rain, or covered with ice or snow. Do not apply LVB when temperature is below freezing.

Solution shall not be applied when wind interferes with proper spray pattern.

5. Cut Stubble Application

A soil active product best suited following mowing of R/W and prior to vigorous re-growth.

5.1. Application

Application shall be only when the temperature is above freezing. However, do not apply when the ground is frozen, or heavily saturated after rainfall.

5.2. Formulation

Only EPA approved herbicide mixtures approved by TRWC, shall be used in all foliage spraying for plant control. Label directions shall be followed at all times.

5.3. Wind

Extreme care shall be used to guard against drift of material off the area intended to be treated.

Transmission

5.4. Crops Most Susceptible to Herbicides

Tobacco, tomatoes, grapes, beans, peas, clover, oats, soybeans, corn, cotton, buckwheat, flax, sugar beets, annual garden flowers, and most gardens.

5.5. Spray Pattern

The spray solution shall be applied as specified by the manufacturer's label using the spray consistency approved by TRWC.

6. Stump Treatment

To be applied to the cut surface area following hand cutting.

6.1. Application

Application can be made in all seasons of the year, except during sap flow, to deciduous species when weather permits.

6.2. Formulation

Same as basal spraying.

6.3. Timing and Spray Solution

Shall be applied when clearing has occurred along transmission R/W. Water based mix must be applied within one hour following cutting, and oil based mixture should be applied as soon as possible following cutting, but no longer than 4 hours. The cambium layer will be treated completely around the circumference of the stump.

6.4. Spray Equipment

May be applied with backpack sprayer, or even hand type sprayers.

7. Brush and Tree Control Notification and Agreement

Before manual, mechanical, or herbicide brush work is begun, agreed to work shall be clearly communicated by Company representative to Contractor's representative. Nearby property owners may need to be notified of work plan and schedule.

When necessary to do so, a qualified representative of the Contractor shall procure rights for work on private property, Federal, State, and County road rights-of-way. If required in special cases, a Company representative may assist.

Transmission

Contractor crew foreman shall notify and secure agreement from adjacent property owners for scheduled brush and tree work on and along public roads.

During the performance of applying herbicides, special care shall be exercised to assure that no damage will occur to livestock and crops, and insure that no herbicide is misapplied nor left unattended.

8. Resistant Species

Due to basic plant characteristics and probability rate of plant food assimilation, certain brush and tree species may not react quickly to foliage treatment. Alternative methods may be recommended by Company.

8.1. Coniferous Species:

Where coniferous (retain live needles or leaves year round) plants are a brush or tree control problem, Company shall provide approval of methods for treating these species.

8.2. Caution:

To obtain maximum effect from herbicides, foliage and basal spray treated brush and trees shall not be cut or otherwise disturbed for a minimum period of one year.

9. BRUSH AND TREE DISPOSAL AND SITE CLEAN UP

This section deals with the time consuming and often difficult problem of brush and tree disposal from work performed on public and private property. The average property owner expects a site left in as orderly a condition as when work began. Public agencies will not permit littering of public places.

9.1. Tree Work Clean Up

In the interest of sanitation, safety and orderliness, most local, county, and state governments have regulations against the abandonment or dumping of any foreign materials in public places. Many municipalities provide landfills and regulate their use. Such facilities should be used when conveniently close to tree work operations. Regardless of methods employed to meet local circumstances, Contract supervisors shall not risk any Company or personal liability in brush and tree disposal.

- All severed limbs and branches shall be removed from trimmed trees.
- Tools and ropes shall be removed from trees and ladders placed aside.
- Brush Handling

Transmission

- Brush and wood should be moved off travel ways and sidewalks as same reaches the ground and in a manner not to unnecessarily inconvenience the traveling public.
- When a tree is completed, brush should be promptly loaded on the truck or fed into a power chipper.

9.2. General

- Wood and brush shall not be stored in public places over night without permission.
- In rural areas, brush and wood may be disposed of in accordance with property owners wishes except same must not be left on road rights-of-way.
- All urban and suburban sites shall be thoroughly cleaned.
- Lawns, parkways, and sidewalks shall be cleaned of leaves, twigs, and litter.
- Care shall be taken not to damage any of the property owner's facilities.
- Where wood and brush is discarded at landfills, all regulations shall be complied with.
- Loaded brush shall not extend beyond truck bed sides and if more than 4' over rear end, same shall carry a red flag.
- Where permissible by rural property owners and public highway regulations, debris from power chippers may be blown on the rights-of-way or into the woods.
- Chips left at the site shall be thinly scattered to leave no objectionable bulk or may be stacked or bagged as agreed to by the property owner.
- Brush and tree wood should be disposed of in the most economical manner in accordance with all regulations and laws.
- Avoid unnecessary handling and hauling. Burning of brush and trees is generally not allowed.

9.3. Poisonous Plants

Tree workers should be able to readily identify poisonous plants, such as poison ivy, poison oak, and poison sumac, since contact with this plant can cause skin rash and extreme swelling. Workers should also be able to identify wild cherry and buckeye and take necessary precautions to insure that livestock will not have the opportunity to eat the leaves of these trees following cutting or herbicide treatment.

10.EQUIPMENT

This section deals with Contractor's selection, use and care of tools and equipment for line clearing operations. Suitable Contractor equipment, maintained in good working condition, makes tree work easier for workers and yields best results.

10.1. Standard Equipment

10.2. Clearing, Removal, Trimming, Felling, and Brushing

All tools and equipment shall be kept in first class working condition at all times.

Transmission

10.3. Tree-man Saddle (if used)

This device with safety straps is designed for tree climber's safety and convenience. It shall be inspected frequently for general condition and wear. Treeman saddles with safety straps shall not be stored with cutting tools.

10.4. Ladders:

Ladders shall be of sound construction and of non-conducting materials.

A ladder should be used in climbing trees where lower branches cannot be manually reached from the ground.

10.5. Power Saws:

Only chain type power saws of reputable, established brands and suitable capacity should be used. All rules, regulations, ordinances, and laws shall be adhered to for the safety of personnel and handling of fuel and lubricant associated with power saw work.

11. Rope

Rope is used extensively in tree work for lifting, pulling, and holding loads, also for climbing lines, hand lines, slings, and lashings.

11.1. Climbing line:

This line is a rope to secure climbers in trees.

It shall be approved No. 1 quality ½" diameter manila rope or equivalent when new, with whipped ends.

11.2. Care of Small Tools:

- Manual saws shall be kept sharpened and properly set.
- Pole pruners and axes shall be kept sharp and in good working order.
- Pruners, axes, and saws shall be safely laid to one side or stored when not in service.
- Pruning and pull or trim saws shall be carried in protective scabbards.
- Pruner poles should be kept clean to guard against moisture absorption and kept free of all surface splinters. Pruner head blade bolts, and rivets should be kept adjusted and oiled for free, smooth cutting.
- All cutting tools shall be dried and free of rust before storing in a dry place, with guards attached or in racks.
- An axe shall not be used as a sledge and shall be inspected daily for: loose, rough, or cracked handles; dull, nicked or split blade; and loose blade and loose wedge in eye. Faulty axes shall be reconditioned before further use.

Transmission

- A tool shall not be used beyond its capacity.
- All tools should be accounted for daily.
- Care of Ladders:
 - When stored on a truck, ladders should be securely fastened.
 - Ladders should be removed from base of tree when not in use.
 - Broken or seriously damaged rungs shall be replaced before further use.
 - Side rails shall be kept smooth.
 - A ladder with cracked or splintered side rails shall be promptly discarded.
- Care of Power Saws:
 - Chain Type
 - Keep lubricated and in good cutting condition.
 - Perform touch-up sharpening with suitable file or hone.
 - Keep cutter teeth of equal length.
 - Keep correct tension on chain for safety and best cutting.
 - To avoid costly engine wear, replace dull chains promptly.
 - Avoid rocks, dirt, concrete and other damaging material.

11.3. Motors

- Use fuel only as recommended by manufacturer's manual.
- Blend oil and gasoline carefully before placing in fuel tank.
- Gasoline and oil shall never be separately placed in fuel tank.
- All parts requiring special lubrication shall be checked regularly.
- Clean and replace air filters as instructed by manufacturer's manual.
- Cylinder fins should be cleaned each two weeks or more often if needed.

11.4. General

When not in use, power saws must be laid in a safe place.

When stored on a truck, power saws shall be racked firmly and covered against damage and dust.

11.5. Backpack Sprayers with Hand Pump

This type of sprayer shall be of a safety (Special Fire Proof) approved design and used where herbicides are applied by manual methods.

- Capacity shall not exceed 5 gallons.
- Tank, pump, and hose shall be inspected frequently for leaks.
- Trigger and spray action shall shut off properly.
- Nozzle vent and screen shall be kept clean to insure proper operation.
- Tank should be flushed out daily.
- Sprayers shall not be store without thorough cleaning of nozzle, hose, pump and tank.

Transmission

11.6. Power Chippers

When brush and tree volume requires three or more hours per day disposal effort or for other sound reasons, a mechanical chipper should be considered as part of tree crew equipment.

- Trailer type chippers are preferred.
- Manufacturer's instructions on diameter size and hardness of wood fed into hopper should be followed.
- Extreme care shall be practiced in keeping stones, metal and other foreign materials out of hopper.
- Major bearings should be greased daily.
- Motor oil and filters should be checked frequently and changed as called for by manufacturer's manual.
- Cutter knives shall be checked frequently for tightness and sharpness. Dull knives shall be changed promptly for safe, efficient work and to avoid excess engine wear.
- Protective goggles or equivalent shall be worn by workers feeding the chipper.
- Hearing protection shall be worn by the clipper operator.
- Wood shall not be fed into machine before motor is thoroughly warm.
- Machine shall be protected with shroud during bad weather and in outdoor storage.

11.7. Transportation

Vehicles of adequate capacity to perform the job assigned shall be provided.

- Where power chippers are used in urban areas, a 300 cubic feet or larger, dust tight box may be substituted for the conventional truck bed.
- All trucks shall have built-in water proof storage space for tool storage and side racks for ladders and pruner poles.
- Trucks shall be maintained in sound, safe and efficient operating condition.
- All trucks shall have a magnetic sign on at least the drivers' door indicating it is a contractor for KU/LG&E.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 84

Responding Witness: Lonnie E. Bellar

- Q-84. Please refer to the testimony of Lonnie Bellar in response to the question at line 6, page 5.
- a. Please provide a copy of all written instructions, directives, and emails sent to employees and/or contractors related to the current 5-year cycled approach.
 - b. Please provide a copy of the Transmission System Infrastructure Plan (“TSIP”) (2016) currently in effect at this time.
 - c. Prior to 2016, did the Company have a written TSIP that included vegetation management? If so, please provide a copy of same.
 - d. Was the 2016 TSIP the first such written plan?
 - e. Please describe the “just-in-time” plan previously in place for transmission line maintenance.
 - f. How are “hazard trees” defined?
- A-84.
- a. See attached.
 - b. The Transmission System Improvement Plan (2017-2021) (“TSIP”) was filed as Exhibit PWT-2 in Case Nos. 2016-00370 and 2016-00371.⁷ The TSIP is still in effect at this time.
 - c. No.
 - d. Yes

⁷ In the Matter of: Application of Kentucky Utilities Company for an Adjustment of its Electric Rates and for Certificates of Public Convenience and Necessity, Case No. 2016-00370 and In the Matter of: Application of Louisville Gas and Electric Company for an Adjustment of its Electric and Gas Rates and for Certificates of Public Convenience and Necessity, Case No. 2016-00371.

- e. See page 20 of Exhibit PWT-2 as referenced in response b above.
- f. Hazard trees are defined as diseased or dying trees that are at risk for causing a circuit interruption.

Transmission Cycle Based Line Clearing



Adam Smith
Mgr Transmission Line Svcs



PPL companies

Program Overview

- 2014 Program Assessment
- Included in Transmission System Improvement Plan
- Cycle based approach
- Hazard tree program
- ~\$15M annual funding
- ~35 contract crews (100 FTEs)
- First Cycle Timing
— July 2017 – June 2022

Cycle Based Process



1. Reclaim



2. Establish



3. Sustain

Lancaster – Stanford 69kV



1. Reclaim



2. Establish



3. Sustain

“Hot Spot” Photos



Customer Experience

- Property owner concerns
- Community impacts
- Program mitigation

Project Team

- Corporate Communications
- Customer Experience
- Corporate Responsibility
- Distribution Vegetation
- Environmental Affairs
- External Affairs
- Legal
- Rates and Regulatory

Communication Plan

- Dedicated phone and email address
- Customer letter and brochure
- Project webpage
- Elected official outreach
- PSC awareness (customer complaints)
- Community organizations outreach
- Employee outreach
- Customer experience talking points
- Customer service talking points



Cycle-based Transmission Clearance Program Communications Plan Pleasant Grove to Watterson (LG&E)

Summary/Background

As part of ongoing work to strengthen the safety and reliability of the system, Louisville Gas and Electric Company and Kentucky Utilities Company are conducting tree trimming around transmission infrastructure across the utilities' service territories. These efforts will enable the utilities to further enhance service to customers by minimizing the potential for service interruptions and large scale outages. Consistent with regulatory requirements, LG&E and KU routinely work to maintain areas around transmission infrastructure and rights of way to ensure trees cannot get near or fall into high-voltage transmission lines. The utilities' cycle-based approach for these efforts are industry best practices for maintaining transmission infrastructure and is part of the utilities' proactive method for keeping trees in these areas a safe distance from transmission lines. Along with other infrastructure upgrades being conducted by the utility, these efforts are expected to significantly reduce the duration of outages experienced by customers, reduce associated costs and ensure a safe, reliable system well into the future.

The first Louisville project in this program will cover a 16 mile stretch of transmission line running from LG&E's Pleasant Grove substation along Highway 44 in Mt. Washington to the utility's Watterson substation at Hurstbourne Lane and Bardstown Road. Details on this section include the following:

- The Pleasant Grove to Watterson section project of this program involves clearance around 16 miles of 69 and 138 kV transmission line and infrastructure.
- Just over 300 customers, primarily residential and a few businesses, are along this section of transmission line.
- Easement widths along this line are 50 feet (13.5 miles) and 150 feet (2.5 miles)

This work is tentatively scheduled to take place between April and November of 2019.

Objectives

- Communicate effective and timely messages to relevant audiences through each phase of the program to ensure all parties are aware of these project efforts, the benefits of this work and the company's ongoing commitment to safe, reliable service, as well as the environment.
- Maintain a focus on customers to minimize the impact of, and any inconvenience associated with, the work.
- Ensure employees, including those living and working in the project areas, are informed and able to act as company ambassadors or connect with the appropriate person(s) should they receive any questions about the project.



- Reinforce the company's commitment to investing in its infrastructure to ensure safe, reliable service now and into the future which, in turn, helps to keep Kentucky an attractive place to live and work.

Audiences

- Customers along trimming routes – including those customers below
 - Charlie Vettner Park and Golf Course
 - Wethington Nursery
- Adjacent neighborhoods/property owners/tenants living in or around the project area
 - 10 estimated HOA's including:
 - Silver Oaks
 - Mary Dell (Cannot make our name from Google Earth)
 - Billtown farms (4 residents affected)
 - Equinox
 - Cedar Ridge Estates
 - Woods Mt. Washington
 - Woodlake
 - Bethel Branch
- City/state/neighborhood elected officials, community representatives
 - Jeffersontown Mayor Bill Dieruf
 - District 11 Councilman Kevin Kramer
 - District 20 Councilman Stuart Benson
 - District 22 Councilwoman Robin Engel
 - Bullitt County Judge Exec. Jerry Summers
 - Spencer County Judge Exec. John Riley
- Regulatory agencies
- Business partners who will be performing the work
- Tree/vegetation related community organizations that may have interest/concern
- Employees who live or work within the project area
- Local organizations (ex. Trees Louisville, other for each line)
- Media (as necessary)

Key Messages

(Same as overall program talking points)

- As part of ongoing work to strengthen the safety and reliability of the system, Louisville Gas and Electric Company and Kentucky Utilities Company are conducting tree trimming and clearance efforts around transmission infrastructure across the utilities' service territories.
- These efforts will enable the utilities to further enhance service to customers by minimizing the potential for service interruptions and large-scale outages.



- These efforts will also help to further protect the system from the impacts of conditions similar to those seen during historic storms that hit the LG&E and KU service territories in 2018.
- For context, transmission lines are essentially multi-lane energy highways that carry electricity to substations where the voltage is stepped down before being transported through distribution lines, which serve as secondary roads and side streets carrying electricity into neighborhoods and commercial areas.
- When outages occur within a transmission system, they can have widespread, large-scale impacts - like the Northeast Blackout of 2003. The blackout occurred when a tree branch came into contact with a high-voltage electric transmission line. While there were multiple contributing issues, the vegetation issue was the most significant cause. Since that time, there have been reliability standards developed to mitigate the issues. Line clearing of vegetation is a primary focus of those reliability standards.

Minimizing the potential for these types of large-scale outages is one of many reasons keeping transmission systems up to date is so critical. This project will allow KU to further strengthen electric reliability for our customers and the entire region.

- Consistent with regulatory requirements, LG&E and KU routinely work to maintain areas around transmission infrastructure and rights of way to ensure trees cannot get near or fall into high voltage transmission lines.
- The cycle-based approach for these efforts is an industry best practice for maintaining transmission infrastructure and is part of our proactive method for keeping trees in these areas a safe distance from transmission lines.
- The average cycle established for Transmission related tree trimming and clearance work is every 5 years, with the exception of those lines demonstrating the need for more frequent trimming. As part of this approach, some trees will be removed from areas we have not cleared in the recent past.
- Crews will be working in the utility easements to remove or trim trees that have the potential to make contact with the lines.
- Though this work will take place in the utilities' easements, there are some areas where it will be necessary for crews to cross a portion of some yards to access the work area. In some of these locations, we will need to temporarily remove fences and install temporary matting to provide a stable path for construction vehicles and to minimize the potential for rutting.



- An on-site crew member will communicate with property owners whose yards will need to be crossed or whose fences will need to be removed. These crew members will be happy to address any concerns you have and/or make any accommodations before starting the work in your area. Once the work in the area is completed, we will take steps to replace the fences and restore property to its current – or better – condition.
- Along with other infrastructure upgrades being conducted by the utility, these efforts are expected to reduce the frequency and duration of outages experienced by customers, reduce the associated costs and ensure a safe, reliable system far into the future.
- Other enhancements currently underway across LG&E and KU's high-voltage transmission system include replacing aging equipment such as wooden poles, cross arms, insulators, lines and substation controls; and installing smart restoration-detection equipment.
- The safety of the general public, as well as our employees and crews working on our behalf is our top priority.
- Crews working in the project areas will be using heavy equipment, such as backhoes, cranes and specialized tree removal equipment.
- There may be times when equipment will be left in the area overnight and on weekends. We ask that you keep children and pets away from the work area and any equipment that may remain on site during the project.
- In addition, we ask that you be mindful of our crews' presence as you drive through the area over the coming weeks.
- For your awareness and safety, our employees and contractors drive vehicles marked with the LG&E and KU logo.
- Prior to beginning this work, letters communicating details of the project are being sent to property and business owners within the project areas. Details of the work are also being communicated to area representatives.

In addition, certified arborists working on the project are making personal visits to owners of properties along the project route to discuss the work to be done and any concerns or further arrangements necessary in advance of the work.



PPL companies

- While this tree trimming work is a critical part of maintaining the system, LG&E and KU are committed to enhancing the environment and landscape across the communities we serve.
 -
 -
 - More than 40,000 trees have been planted across the LG&E and KU service territories as part of the company's Plant for the Planet Grant program;
 - Since 1981, the company has donated more than 760,000 tree seedlings for planting across the service territories through its annual tree seedling giveaways;
 - And the company has contributed more than \$300,000 to tree planting efforts across the state.

Tactics (Timing TBD):

Internal

- CUSTOMER EXPERIENCE webpage talking points
- TARGETED EMAIL - to be sent to employees who live/work within the identified work area(s)
- BUSINESS SERVICE/CUSTOMER SERVICE talking points
- CE CONTRACTOR MEETING

External

- DEDICATED PHONE AND EMAIL ADDRESS – to be provided to customers to contact project representatives with questions
- BROCHURES (single utility)– containing project details and Q&A of commonly asked questions
- PROJECT WEBPAGE – to be created on company website and provided to customers, business partners and others as a place to stay up-to-date and refer others to information on work
- LETTERS (single utility) - w/brochure and contact info referenced above, to customers who live along the route of the project
- DOOR HANGERS (single utility)– to be considered for leaving in all urban/suburban neighborhoods impacted
- TALKING POINTS - to Media Relations/Customer Service/Customer Experience/Outreach teams



- POWER SOURCE NEWSLETTER – small blurb targeted to customers, providing high level information on tree-trimming/Transmission system improvement work.
- TARGETED CUSTOMER COMMITMENT WORK – (as needed) to address potential inquiries/complaints
- OTHER TACTICS – (as needed/identified)

Project/Project Communications Timing (Tentative)

Week of:

- 3/25 – Update brochure, letter (related web content), other communications
- 4/1 – Finalize communications plan and talking points for outreach
- 4/1– Talking points to Customer Service, Customer Experience, Media Relations
- 4/1 – Send targeted email to employees along first phase route for awareness
- 4/1– Letter(s) to affected property owners and residents along and around project route (brochure attached for those along route, project web page and contact info provided)
- 4/1 – Door Hangers
- 4/8 – Publish Grid article
- TBD – Work begins

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 85

Responding Witness: Lonnie E. Bellar

- Q-85. Please provide a listing by type of trees and number of same removed from transmission lines in Louisville Metro during this five year cycle.
- A-85. Transmission began transitioning to a five-year cycle in 2017. The company did not track the number of trees removed within Louisville Metro for transmission vegetation management for years 2017-2020.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 86

Responding Witness: Lonnie E. Bellar

- Q-86. By the categories of high voltage and low voltage transmission lines, please provide how many trees and corridor miles in Louisville Metro have been cleared and how many remain to be cleared under the current five year plan.
- A-86. The Company does not have the requested information specific to Louisville Metro and has provided it for the entire LG&E system. As of December 31, 2020, 87 corridor miles of cycled clearing was complete and 24 corridor miles remain on LG&E high voltage (345kV-500kV) lines. For lower voltage (69kV-161kV) lines, 298 corridor miles of cycled clearing was complete and 188 corridor miles remain.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 87

Responding Witness: John K. Wolfe

- Q-87. Please refer to the testimony of John K. Wolfe beginning at page 10:
- a. Please describe the “routine clearing program” for scheduled trimming.
 - b. Please provide the number of customer authorizations LGE/KU required for each year for the past 10 years before tree trimming could occur.
 - c. How long has distribution line maintenance been on a 5-year cycle?
 - d. Please provide a link to the ANSI A300 standards for vegetation management.
 - e. Please provide a list of the number of at-risk trees removed from the distribution system in each year since 2010.
 - f. Please provide the following information separately for (a) Transmission lines and (b) distribution lines: which kind of trees are currently allowed to be planted in the easements and right of ways and which trees are not allowed to be planted.
- A-87.
- a. See the response to Question No. 83(a).
 - b. Authorizations are not required for routine trimming maintenance unless trimming more than the previous cycle trim. The Company does not have detailed records where customer authorization was sought or obtained.
 - c. Since 2007.
 - d. See ANSI A300 link, Utility Pruning of Trees.
https://www.tcia.org/TCIA/Build_Your_Business/A300_Standards/Part_1.aspx

- e. The table below is the number of “at-risk” hazard distribution trees that have been removed from the hazard tree program since 2010. Please note that data is not available in 2010.

Year	At-Risk Trees Removed
2010	N/A
2011	2423
2012	2070
2013	2682
2014	4612
2015	3612
2016	3441
2017	2874
2018	1911
2019	2355
2020	1049

- f. (a) See attachment for vegetation allowed in transmission easements located within residential or urban areas.
- (b) Distribution does not dictate between “allowed and not allowed” but provides suggestions as seen in the attachment “Right Tree Right Place”.

LGE-KU Transmission Approved Tree/Shrub List

*Many Cultivars and Varieties of Most Species Exist – please check tags

Wire Zone – Maximum 10 ft height at maturity

Weeping redbud
Weeping Mulberry
Dogwood 'Pygmaea'
Tree hydrangea
Hibiscus syriacus
Viridis Japanese maple
Dwarf Crape Myrtle
American Snowbell
Redvein Enkianthus
Fernspray Gold Shrub

Most shrubs will not grow above 10 ft. Check tag at retail/nursery to be sure

Border Zone – Maximum 20 ft height at maturity

Native Trees Max. Height 20 feet:

Redbud 'Ace of Hearts', Rising Sun'
Dogwood 'Red Beauty', 'Venus', Hyperion', 'Coud Nine'
Cornelian cherry
Crabapple (most cultivars)
Witch Hazel (all cultivars)
Canadian serviceberry/shadblow 'Glennform', 'Tarzan', Ssprizam'
Blackhaw viburnum (Viburnum prunifolium)
Arrowwood viburnum (Viburnum dentatum)

Non-Native Trees Max. Height 20 feet

Tree hydrangea
Star Magnolia (Magnolia stellata)
Viburnum spp. (Most cultivars)
Japanese snowbell
Weeping cherry (Prunus serrulata. NOT THE HIGAN)

Evergreens Max. Height 20 feet

Evergreen viburnum

Eastern Arborvitae

False Cypress.

Yew/Taxus

Deodar cedar 'Twisted Growth'

(Thuja occidentalis. NOT THE PLICATA)

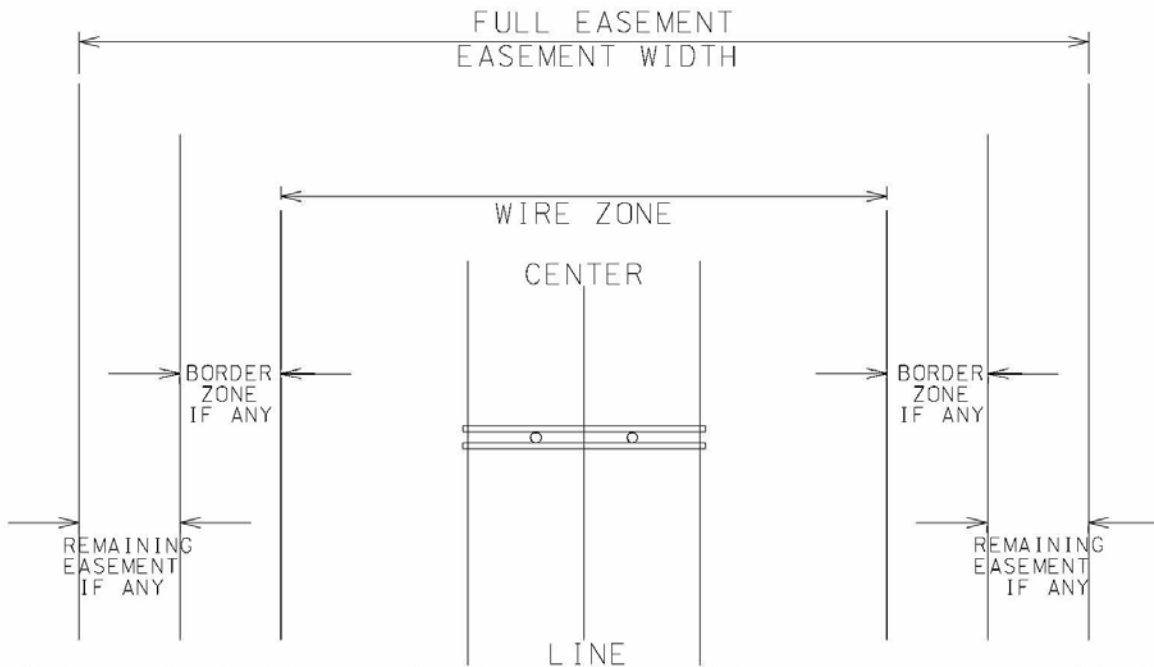
(Chamaecyparis spp. Check the tag!)

This is not necessarily a complete list. Nurseries may have other varieties of specialized species.

Remaining Easement

No current restrictions. Trees subject to trimming when needed or removal if they are dead, diseased or dying or could otherwise make contact with the line when falling.

SKETCH

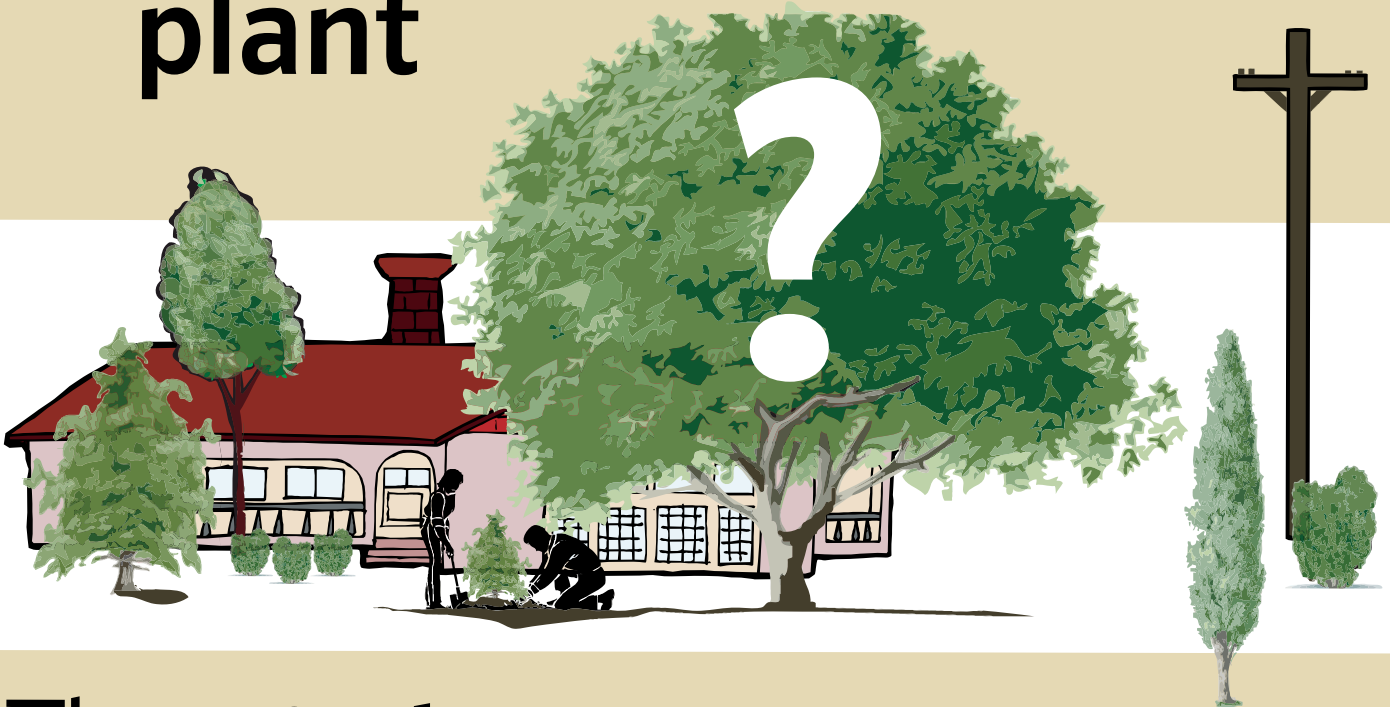


This document applies only to the Transmission Urban Reclamation performed as part of the Transmission System Improvement Plan and is based on current regulations, policies, practices, and current line configuration in effect as of June 2020. Changes to any of these could result in changes to the zones. LGE-KU retains all rights in and to the easement as shown in the recorded document affecting your property.

Rev 1 8-18-2020

Plan

before you
plant



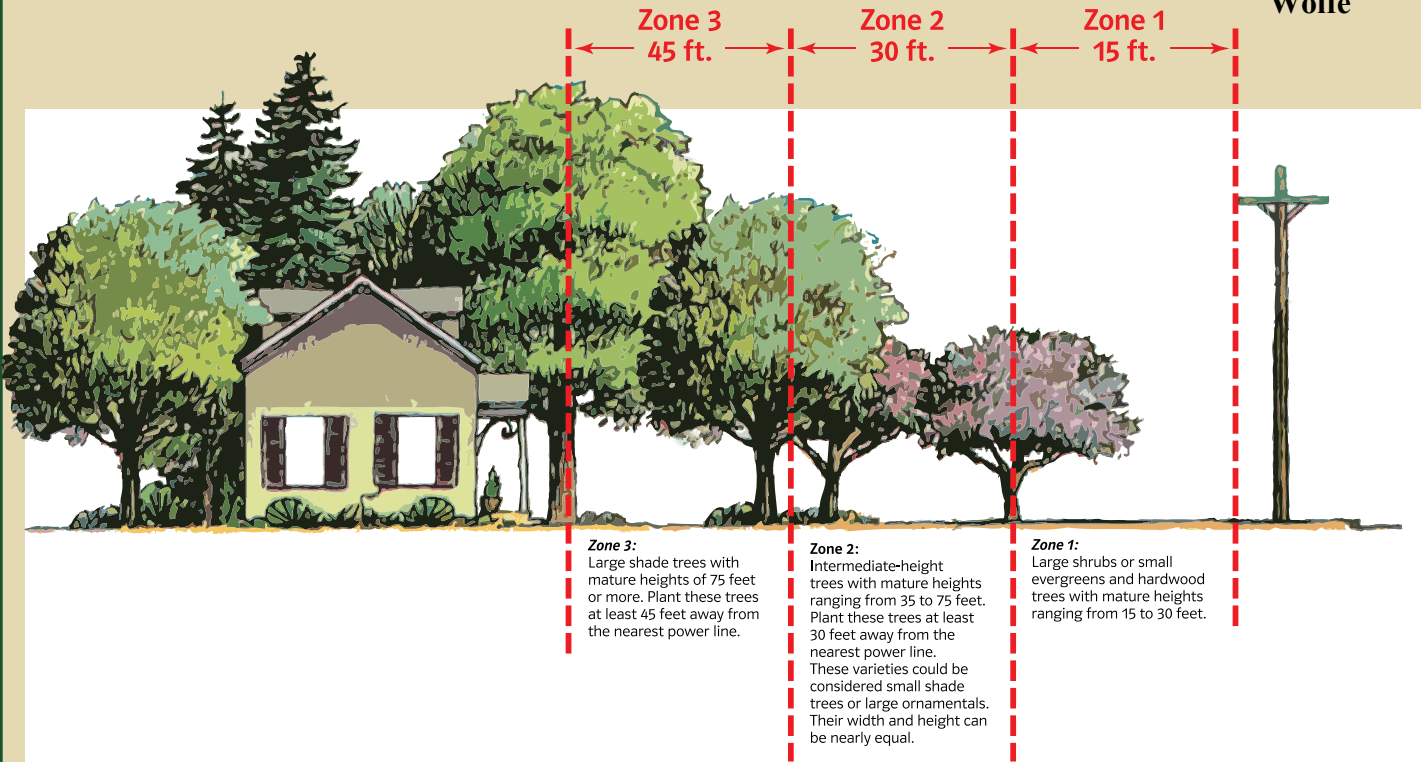
The **right *tree*** —
the **right *place***



PPL companies

Consider the tree being planted...

Wolfe



On these pages, we have compiled a list of tree and shrub varieties and classified them — based on their height at maturity — into three zones. This information will prove valuable in helping you select the right tree for the right space.

These are only suggested varieties. There are many other good varieties available, but two important things to keep in mind when deciding on tree species are knowing the mature height and the mature width of the variety before you plant.

Zone 1: Shrubs						
Species	Drained Soil	Moist Soil	Sun	Shade	Mature Height (ft.)	Value and Remarks
Winterberry	•	•	•		10	Red berries in winter
Viburnum Species	•		•	Semi	25	Fragrant flowers
Winter Honeysuckle	•		•	Semi	10	Good hedge, fragrant flowers
Weigela	•		•		8	Red or pink flowers
Forsythia	•	Semi	•	Semi	10	Yellow blooms
Lilacs	•		•	Semi	10	Fragrant blooms
Mock Orange	•	Semi	•	Semi	8	Choose fragrant varieties
Deutzia	•	Semi	•	Semi	8	Graceful, white pendulous flowers
Flowering Quince	•	Semi	•	Semi	6	Orange, pink or white blooms
Burning Bush	•		•	Semi	6	Red fall color
Hydrangea	•	Semi	•	Semi	8	Many varieties, summer blooms
Taxus Yew	•		•	•	20	Many shapes and forms
Calycanthus	•	Semi	•	Semi	8	Unique, fruity fragrance

Zone 1: Small trees

Species	Drained Soil	Moist Soil	Sun	Shade	Mature Height (ft.)	Value and Remarks
Junipers	•		•		30	Keteleeri, Canaerti, Columnaris
Arborvitae	•	•	•		20	Techny, American, Emerald
Paperbark Maple	•		•		25	Exfoliating bark
Serviceberry	•		•	Semi	30	White flowers; orange-red fall color
Redbud	•	•	•	Semi	35	Purplish flowers in spring
Fringetree	•		•	Semi	30	White blooms in spring
Dogwoods	•		Semi	Semi	40	White or pink blooms
Kousa Dogwoods	•		•	Semi	20	Good resistance
Cornelian cherry dogwood	•		•	Semi	20	Yellow flowers—early spring
Smoke tree	•		•		30	Green- and red-leafed varieties
Winter king hawthorn	•	Semi	•	Semi	35	Red berries in winter
Royal star magnolia	•	Semi	•	Semi	20	White blooms in spring
Sweetbay magnolia	•	Semi	•	Semi	30	Tulip-like blossoms in spring
Ann Magnolia	•	Semi	•	Semi	25	Pinkish-white tulip flowers in spring
Flowering Crabs	•	Semi	•		25	Choose disease-resistant
Japanese tree lilac	•		•		30	White blooms late spring
Red buckeye	•	Semi	•	Semi	25	Red blooms
Akebono flowering cherry	•		•		25	Pinkish-white flowers in spring
Carolina silverbell	•		•	•	25	White bell-like flowers in spring
American hornbeam	•	•	•	•	35	Ky. native; beech-like foliage
Paw paw	•	•	•	•	20	Tropical-like foliage, edible fruit
Witch hazel	•		•	Semi	15	Winter bloomer
Hop-hornbeam	•	Semi	•	Semi	35	Good native ornamental tree
Crepe Myrtle	•		•		15	Train into multi-trunk flowering tree

Zone 2: Medium trees

Species	Drained Soil	Moist Soil	Sun	Shade	Mature Height (ft.)	Value and Remarks
Katsura	•	Semi	•		75	Good yellow fall color
Yellowwood	•		•	Semi	60	Native; white, pea-like blooms
Aristocrat Pear	•	Semi	•		45	Best of the ornamental pears
Sawtooth Oak	•		•		60	Yellow fall color
Honeylocust	•	Semi	•		50	Choose patented varieties
Foster Holly	•		•	Semi	35	Avoid exposure to windy locations
Sourwood	•		•	Semi	75	Beautiful mid-summer bloomer
American Holly	•	Semi	•	Semi	45	Berries range from red to yellow

Zone 3: Large trees

Species	Drained Soil	Moist Soil	Sun	Shade	Mature Height (ft.)	Value and Remarks
Red maple	•	•	•		80	Choose patented varieties
Sugar maple	•		•		100	Yellow-orange fall color
River birch	•	•	•		90	Multi-trunk specimen
Ginkgo	•		•		100	Choose named varieties
Tulip poplar	•	Semi	•		150	Shiny leaves; yellow fall color
Sweetgum	•	•	•		125	Maroon-purple fall color
Blackgum	•	•	•		90	Brilliant red fall color
White oak	•		•		100	Wide-spreading; slow grower
Bald cypress	•	•	•		150	Ferny needle-like foliage
Zelkova	•		•		70	Choose patented varieties
American elm	•		•		100	New disease-resistant varieties
Pin oak	•	•	•		100	Sensitive to high pH
Willow oak	•	•	•		75	Excellent shade tree
Red oak	•		•		100	Rapid grower of the oaks
White Pine	•		•		150	Problems in heavy clay soils
Norway spruce	•		•	Semi	150	Short, dark green needles
Hemlock	•		•	Semi	150	Can withstand shearing



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LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 88

Responding Witness: Lonnie E. Bellar

Q-88. For each year of the current cycle, please provide the number of contractors (individuals) and the number of Company employees engaged in vegetation management in Louisville Metro.

A-88. Transmission began transitioning to a five-year cycle in 2017. From 2017-2020, the company has had one (1) company employee within transmission engaged in vegetation management in Jefferson County. The number of contractors (individuals) performing transmission vegetation management has varied based on the work occurring at any given time. The numbers provided below represent the maximum numbers for each year.

2017 = 23

2018 = 22

2019 = 29

2020 = 37

See table below for the Distribution contractors and employees.

Year	Number of Contractors (Individuals)	Company Employees
2016	108	3
2017	93	3
2018	106	3
2019	117	3
2020	113	3

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 89

Responding Witness: Lonnie E. Bellar

- Q-89. By position and duties, please list all Company positions that supervise contractors in vegetation management.
- A-89. Transmission Right-of-Way coordinators prescribe and monitor work plans along with providing oversight of the vegetation management contractors. Group Leader of Transmission Line Asset Management supervises the Transmission Right-of-Way Coordinators.

Distribution arborists prescribe and monitor work plans along with providing oversight of the vegetation management contractors. Manager of Forestry Services supervises the distribution arborists.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 90

Responding Witness: Lonnie E. Bellar

- Q-90. Please describe the response that the Company has made to each complaint about tree trimming and vegetation management that the Company has received from Louisville Metro customers and how same were resolved.
- A-90. The Company does not have records documenting each complaint related to tree trimming and vegetation management for Transmission and Distribution. The Company makes every effort to follow up on each complaint received. The follow up generally includes a review of the complaint and circumstances, and often includes a site visit with the customer to understand and in many cases resolve their concerns.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government**

Dated January 8, 2021

Case No. 2020-00350

Question No. 91

Responding Witness: Lonnie E. Bellar

Q-91. In the last 20 years has the Company ever recommended that certain type of trees be planted in easements or rights-of-way? If so, please state the date, type of trees and whether any documentation exists.

- a. Please provide the following information separately for (i) transmission lines and (ii) distribution lines: which kind of trees are currently allowed to be planted in the easements and right of ways and which trees are not allowed to be planted.
- b. Is the Company aware of or approve of contractors cutting down trees under either line without regard to whether the trees have been approved?
- c. With respect to type of line (transmission or distribution) what written guidance, laws or regulations require that a particular tree be cleared as opposed to trimming same? Please attach a copy or link to each such written document. Whether such a document exists or not, please detail how the decision is made to clear and not trim and who makes the decision for transmission and distribution lines.

A-91.

- a.
 - i. For transmission, see the response to Question No. 87(f)
 - ii. For distribution see the response to Question No. 87(f)
- b. No.
- c. The Company is not aware of any law or regulations requiring the trees to be cleared and not trimmed. The Company elected to remove the trees located within their existing easement due to their location under the transmission line and their potential impact to the safe and reliable operation of the transmission network.

Distribution does not follow any guidance for “clear vs trim”. Arborists prepare circuits for trim and note any trees that may be good candidates for

removal. During the notification process and prior to work, property owners are asked for permission to authorize the removal.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 92

Responding Witness: John K. Wolfe

Q-92. For the Reliability and Resiliency Plan attached to the testimony of John K. Wolfe, please provide the following information:

- a. How much money is budgeted in this rate case for vegetation management separately for distribution and transmission? Additionally provide the same information for the years 2016-2020.
- b. Please provide a copy of the “integrated management plan” in effect now and for the period covered by the Reliability and Resiliency Plan.

A-92.

- a. The following chart provides the Distribution vegetation management costs budgeted in this rate case (July 01, 2021 – June 30, 2022) and the actual costs for years 2016-2020:

Rate Case Period	Distribution					
	2016	2017	2018	2019	2020	
	8,795,102	8,653,865	7,841,253	8,155,981	7,988,331	8,200,948

The following chart provides the Transmission vegetation management costs budgeted in this rate case and the actual costs for years 2016-2020:

Rate Case Period	Transmission					
	2016	2017	2018	2019	2020	
	6,027,036	1,773,849	2,374,307	3,556,090	5,657,317	5,805,838

- b. See the response to Question No. 83(a).

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 93

Responding Witness: Lonnie E. Bellar

- Q-93. Prior to beginning the implementation of TSIP in 2016, did the Company communicate same to any Louisville Metro official?
- A-93. Yes, the Company presented the TSIP plan in detail as part of its 2016 Rate Case, in which Louisville Metro was an intervener.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 94

Responding Witness: John K. Wolfe

Q-94. Please provide copies of the RCP work plans for the prior 10 years. Which arborists prepared same plans?

A-94. See attached.

Attachment to Response to METRO-1 Question No. 94

Cycle	Co	Op Center	Op Center Tree	Sub Name	Sub No	Circuit No	Volts KV	OH Miles	OH Miles 3PH	Total Customers	2nd Previous Cycle Date	Previous Cycle Date	Compld Trim Date
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1370	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1371	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1372	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1373	13.8KV	2.56	2.56	18	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1374	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1375	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1376	13.8KV	0.12	0.12	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1377	13.8KV	0.93	0.93	3	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1378	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1379	13.8KV	0.00	0.00	0	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1380	13.8KV	3.23	3.23	941	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1440	13.8KV	0.84	0.84	3	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1441	13.8KV	6.00	6.00	49	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1442	13.8KV	3.19	3.18	65	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1443	13.8KV	1.61	1.61	5	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ALGONQUIN	AL	AL1444	13.8KV	3.03	3.03	21	7/1/2011	5/14/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS1416	13.80KV	4.53	4.53	58	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS1417	13.80KV	1.75	1.75	25	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS1418	13.80KV	2.62	2.56	30	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS1419	13.80KV	1.36	1.36	0	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS1420	13.80KV	0.00	0.00	0	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBOTTOM	AS	AS3303	33KV	0.00	0.00	0	7/1/2011	9/5/2015	2/2/2019
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1201	12.47KV	0.06	0.06	0	9/17/2011	11/12/2016	9/19/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1202	12.47KV	12.84	5.25	1559	10/8/2011	11/12/2016	9/19/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1203	12.47KV	12.54	4.42	1187	8/6/2011	11/19/2016	9/26/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1204	12.47KV	13.47	4.02	1193	7/23/2011	11/26/2016	9/19/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1205	7.20KV	16.52	3.74	2183	7/7/2012	11/23/2016	8/29/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1206	7.20KV	14.89	6.87	1055	5/12/2012	10/8/2016	12/19/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1207	7.20KV	7.25	3.00	1570	10/14/2011	11/23/2016	8/29/2020
2019	LGE	LOUOC	LOUOC	ASHBY	AB	AB1208	12.47KV	0.00	0.00	0	10/14/2011	11/23/2016	8/29/2020
2019	LGE	LOUOC	LOUOC	BAPTIST SEMINARY	SS	SS0002	4.16KV	0.00	0.00	0	0.00/0	0.00/0	0.00/0
2019	LGE	LOUOC	LOUOC	BAPTIST SEMINARY	SS	SS0003	4.16KV	0.00	0.00	0	0.00/0	0.00/0	0.00/0
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1217	12.47KV	1.63	1.33	54	11/8/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1218	7.20KV	2.38	2.24	131	11/8/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1219	12.47KV	6.03	4.61	915	11/8/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1220	7.20KV	12.41	3.23	1079	12/6/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1221	12.47KV	3.25	2.00	55	12/6/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1222	12.47KV	1.08	1.08	46	12/6/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1223	12.47KV	6.78	3.63	85	12/6/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BISHOP	BI	BI1224	12.47KV	13.27	6.80	1227	12/6/2008	4/20/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	BRANDENBURG	BB	BB1102	12.47KV	13.77	5.87	766	5/12/2012	8/6/2016	11/28/2020
2019	LGE	LOUOC	LOUOC	BRANDENBURG	BB	BB1103	7.20KV	46.26	15.67	369	3/29/2014	8/6/2016	12/12/2020
2019	LGE	LOUOC	LOUOC	BROOK	BK	BK0001	4.16KV	0.87	0.50	191	6/6/2010	1/7/2016	2/1/2020
2019	LGE	LOUOC	LOUOC	BROOK	BK	BK0002	4.16KV	1.98	1.25	208	6/6/2010	1/7/2016	2/1/2020
2019	LGE	LOUOC	LOUOC	BROOK	BK	BK0003	4.16KV	0.88	0.36	120	6/6/2010	1/7/2016	2/1/2020
2019	LGE	LOUOC	LOUOC	CAMPGROUND	CG	CG1435	13.80KV	0.08	0.08	0	0.00/0	4/25/2013	7/27/2017
2019	LGE	LOUOC	LOUOC	CAMPGROUND	CG	CG1436	13.80KV	0.06	0.06	0	0.00/0	4/25/2013	7/27/2017
2019	LGE	LOUOC	LOUOC	CAMPGROUND	CG	CG1437	13.80KV	0.05	0.05	0	0.00/0	4/25/2013	7/27/2017
2019	LGE	LOUOC	LOUOC	CAMPGROUND	CG	CG1438	13.80KV	0.00	0.00	0	0.00/0	4/25/2013	7/27/2017
2019	LGE	LOUOC	LOUOC	CAMPGROUND	CG	CG1439	13.80KV	0.00	0.00	0	0.00/0	4/25/2013	7/27/2017
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1304	13.8KV	4.10	4.10	21	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1306	13.8KV	3.02	3.02	25	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1340	13.8KV	1.84	1.84	45	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1341	13.8KV	4.97	4.97	935	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1342	13.8KV	3.63	3.56	29	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1343	13.8KV	1.38	1.31	11	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1344	13.8KV	0.00	0.00	0	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1345	13.8KV	0.66	0.66	1456	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1346	13.8KV	4.93	4.93	11	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANAL	CA	CA1435	13.8KV	0.00	0.00	0	4/2/2011	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CANE RUN	CR	CR1420	13.8KV	1.61	1.59	0	6/28/2008	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	CANE RUN	CR	CR1421	13.80KV	2.58	2.58	6	6/28/2008	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	CANE RUN	CR	CR1422	13.8KV	6.43	6.43	14	6/28/2008	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	CANE RUN	CR	CR301	33KV	0.00	0.00	0	6/28/2008	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	CARTER	CT	CT0001	4.16KV	2.32	0.90	411	9/18/2010	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CARTER	CT	CT0002	4.16KV	2.07	0.60	375	9/18/2010	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CARTER	CT	CT0003	4.16KV	0.48	0.47	66	9/18/2010	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CARTER	CT	CT0004	4.16KV	2.33	1.09	427	9/18/2010	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CARTER	CT	CT0005	4.16KV	0.01	0.01	0	9/18/2010	5/7/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	CLARKS LANE	CK	CK0001	4.16KV	0.81	0.24	149	4/6/2013	6/11/2016	9/28/2019
2019	LGE	LOUOC	LOUOC	CLARKS LANE	CK	CK0002	4.16KV	2.98	0.91	451	4/6/2013	6/11/2016	9/28/2019
2019	LGE	LOUOC	LOUOC	CLARKS LANE	CK	CK0003	4.16KV	1.31	0.68	222	4/6/2013	6/11/2016	9/28/2019
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1481	13.8KV	4.96	4.96	178	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1482	13.8KV	1.66	1.66	6	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1483	13.8KV	1.82	1.82	4	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1484	13.8KV	4.10	3.00	11	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1485	13.8KV	3.98	3.98	35	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CLAY	CY	CY1487	13.8KV	1.44	1.44	22	4/23/2011	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	CONESTOGA	CS	CS1260	7.20KV	4.25	2.13	0	0.00/0	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	CONESTOGA	CS	CS1261	12.47KV	4.35	4.27	0	0.00/0	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	CONESTOGA	CS	CS1262	7.20KV	2.36	1.32	0	0.00/0	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	CONESTOGA	CS	CS1263	12.47KV	0.05	0.05	0	0.00/0	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	CROP	CB	CB0001	4.16KV	3.31	1.91	772	5/15/2010	5/7/2016	1/26/2019
2019	LGE	LOUOC	LOUOC	CROP	CB	CB0002	4.16KV	3.53	1.70	700	5/15/2010	5/7/2016	1/26/2019
2019	LGE	LOUOC	LOUOC	CROP	CB	CB0003	4.16KV	2.39	1.24	482	5/15/2010	5/7/2016	1/26/2019
2019	LGE	LOUOC	LOUOC	CROP	CB	CB0004	4.16KV	2.44	1.19	395	5/15/2010	5/7/2016	1/26/2019
2019	LGE	LOUOC	LOUOC	DEL PARK	DE	DE1406	13.8KV	2.20	2.20	1	7/20/2013	8/6/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	DEL PARK	DE	DE1407	13.8KV	1.61	1.60	1	7/20/2013	8/6/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	DEL PARK	DE	DE1408	13.8KV	2.24	2.24	65	7/20/2013	8/6/2016	4/18/2020
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2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1140	12.47KV	4.51	3.64	462	6/14/2008	1/19/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1141	12.47KV	13.21	6.66	786	10/24/2009	12/8/2012	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1142	12.47KV	8.57	4.36	1787	8/9/2008	1/19/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1143	12.47KV	11.11	5.95	1487	8/9/2008	4/27/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1144	12.47KV	1.18	1.18	22	0.00/00	4/27/2013	4/15/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1145	7.20KV	6.62	2.30	1304	7/26/2008	1/19/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1146	12.47KV	0.00	0.00	0	0.00/00	12/29/2012	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1471	13.80KV	0.00	0.00	0	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1472	13.80KV	4.93	4.93	2	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1473	13.80KV	0.00	0.00	0	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1474	13.80KV	0.00	0.00	0	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1475	13.80KV	2.16	2.16	7	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1476	13.80KV	9.00	9.00	77	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1477	13.80KV	5.95	5.91	29	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1478	13.80KV	5.19	5.15	111	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FERN VALLEY	FV	FV1479	13.80KV	0.00	0.00	0	12/20/2008	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	FLOYD	FL	FL1495	13.8KV	3.68	3.68	25	7/30/2011	2/12/2016	12/17/2019
2019	LGE	LOUOC	LOUOC	FLOYD	FL	FL1496	13.8KV	3.20	3.20	53	7/30/2011	2/12/2016	12/17/2019
2019	LGE	LOUOC	LOUOC	FLOYD	FL	FL1497	13.8KV	2.38	2.30	22	7/30/2011	2/12/2016	12/17/2019
2019	LGE	LOUOC	LOUOC	FLOYD	FL	FL1498	13.8KV	1.49	1.49	31	7/30/2011	2/12/2016	12/17/2019
2019	LGE	LOUOC	LOUOC	FLOYD	FL	FL1499	13.8KV	1.19	1.19	9	7/30/2011	2/12/2016	12/17/2019
2019	LGE	LOUOC	LOUOC	FORTY FOURTH	FO	FO0001	4.16KV	1.28	0.55	212	3/5/2011	7/9/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	FORTY FOURTH	FO	FO0002	4.16KV	2.20	0.57	355	3/5/2011	7/9/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	FORTY FOURTH	FO	FO0003	4.16KV	1.44	0.42	245	3/5/2011	7/9/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	GAULBERT	GA	GA0001	4.16KV	4.28	1.54	790	2/5/2011	5/2/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GAULBERT	GA	GA0002	4.16KV	0.11	0.10	26	2/5/2011	5/2/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GAULBERT	GA	GA0003	4.16KV	4.13	1.91	585	2/5/2011	5/2/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GILLIGAN	GI	GI0001	4.16KV	3.90	1.73	708	4/9/2011	6/4/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	GILLIGAN	GI	GI0002	4.16KV	2.45	1.39	174	4/9/2011	6/4/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	GILLIGAN	GI	GI0003	4.16KV	3.27	1.20	479	4/9/2011	6/4/2016	4/18/2020
2019	LGE	LOUOC	LOUOC	GOSS	GO	GO0001	4.16KV	0.34	0.14	40	5/29/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	GOSS	GO	GO0002	4.16KV	3.33	1.08	690	5/29/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	GOSS	GO	GO0003	4.16KV	1.50	0.81	411	5/29/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1330	13.80KV	0.12	0.12	0	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1331	13.80KV	0.07	0.07	0	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1332	13.80KV	0.07	0.07	0	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1333	KV	0.00	0.00	6	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1334	KV	0.00	0.00	6	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADE LANE	GL	GL1335	KV	0.00	0.00	0	0.00/00	1/12/2013	4/1/2017
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1124	12.47KV	0.60	0.30	179	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1462	13.8KV	5.39	5.39	19	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1463	13.8KV	4.41	4.41	25	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1464	13.8KV	3.24	3.24	4	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1465	13.8KV	1.85	1.85	2	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRADY	GR	GR1466	13.8KV	0.97	0.97	6	0.00/00	2/21/2015	1/26/2019
2019	LGE	LOUOC	LOUOC	GRAND	GD	GD0001	4.16KV	2.79	1.41	489	12/11/2010	3/26/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GRAND	GD	GD0002	4.16KV	3.69	1.10	592	12/11/2010	3/26/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GRAND	GD	GD0003	4.16KV	4.15	0.49	164	12/11/2010	3/26/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	GRAND	GD	GD0004	4.16KV	1.25	0.43	229	12/11/2010	3/26/2015	1/9/2019
2019	LGE	LOUOC	LOUOC	HALE	HA	HA0001	4.16KV	3.33	0.75	688	1/8/2011	6/18/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	HALE	HA	HA0002	4.16KV	2.68	1.68	566	1/8/2011	6/18/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	HALE	HA	HA0003	4.16KV	0.00	0.00	0	1/8/2011	6/18/2016	2/9/2019
2019	LGE	LOUOC	LOUOC	HANCOCK	HN	HN1200	12.47KV	6.24	4.18	1212	4/24/2010	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	HANCOCK	HN	HN1201	12.47KV	2.23	2.12	212	4/24/2010	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	HANCOCK	HN	HN1202	12.47KV	0.00	0.00	0	4/24/2010	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	HANCOCK	HN	HN1203	12.47KV	0.00	0.00	0	4/24/2010	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	HANCOCK	HN	HN1204	12.47KV	0.63	0.42	887	4/24/2010	4/25/2015	7/6/2018
2019	LGE	LOUOC	LOUOC	HERMAN	HE	HE0001	4.16KV	3.51	0.87	686	2/5/2011	7/2/2016	3/7/2020
2019	LGE	LOUOC	LOUOC	HERMAN	HE	HE0002	4.16KV	2.87	0.78	563	2/5/2011	7/2/2016	3/7/2020
2019	LGE	LOUOC	LOUOC	HERMAN	HE	HE0003	4.16KV	3.07	1.45	645	2/5/2011	7/2/2016	3/7/2020
2019	LGE	LOUOC	LOUOC	HERMAN	HE	HE0004	4.16KV	1.78	1.12	302	1/5/2008	7/2/2016	3/7/2020
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1290	12.47KV	11.35	4.73	968	8/7/2010	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1291	12.47KV	14.89	4.85	2931	8/7/2010	12/30/2013	7/22/2017
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1292	12.47KV	2.34	2.29	33	5/2/2009	9/4/2013	7/22/2017
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1293	12.47KV	3.44	2.33	231	5/2/2009	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1294	12.47KV	0.00	0.00	3	5/2/2009	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	INTERNATIONAL	IN	IN1295	12.47KV	2.50	2.25	33	5/2/2009	1/5/2014	7/22/2017
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1155	7.20KV	4.82	2.16	1170	1/26/2008	5/12/2012	3/1/2017
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1156	7.20KV	9.31	4.65	1279	2/25/2012	12/16/2016	12/19/2020
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1157	7.20KV	1.75	1.34	292	2/25/2012	12/16/2016	12/19/2020
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1158	12.47KV	17.33	5.87	2403	5/31/2008	6/23/2012	12/16/2016
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1159	7.20KV	12.02	3.10	1456	5/31/2008	6/30/2012	3/18/2017
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1160	12.47KV	5.16	4.85	103	0.00/00	9/5/2015	9/28/2019
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1161	7.20KV	5.43	2.14	734	0.00/00	6/30/2012	3/18/2017
2019	LGE	LOUOC	LOUOC	KENWOOD	KE	KE1162	12.47KV	1.95	1.82	80	2/25/2012	12/16/2016	12/19/2020
2019	LGE	LOUOC	LOUOC	KNOB CREEK	KC	KC3321	3.3KV	9.99	9.99	0	0.00/00	2/14/2015	2/16/2019
2019	LGE	LOUOC	LOUOC	KNOB CREEK	KC	KC3322	3.3KV	0.33	0.33	0	0.00/00	9/6/2014	2/2/2019
2019	LGE	LOUOC	LOUOC	KNOB CREEK	KC	KC3323	3.3KV	4.07	4.07	0	0.00/00	9/6/2014	2/2/2019
2019	LGE	LOUOC	LOUOC	LOCUST	LO	LO1190	7.20KV	17.63	5.35	2216	6/11/2011	1/7/2016	11/9/2019
2019	LGE	LOUOC	LOUOC	LOCUST	LO	LO1191	12.47KV	1.31	1.31	3	12/30/2011	1/7/2016	12/6/2019
2019	LGE	LOUOC	LOUOC	LOCUST	LO	LO1192	12.47KV	9.23	4.07	1276	8/28/2010	1/7/2016	12/6/2019
2019	LGE	LOUOC	LOUOC	LOCUST	LO	LO1193	12.47KV	11.02	5.64	1227	9/18/2010	1/7/2016	12/31/2019
2019	LGE	LOUOC	LOUOC	LOCUST	LO	LO1194	12.47KV	0.00	0.00	0	6/6/2011	1/7/2016	12/6/2019
2019	LGE	LOUOC	LOUOC	LOGAN	LG	LG0001	4.16KV	2.46	1.53	489	3/20/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LOGAN	LG	LG0002	4.16KV	1.75	0.93	359	3/20/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LOGAN	LG	LG0003	4.16KV	1.49	0.64	294	3/20/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LYNN	LN	LN0004	4.16KV	4.93	1.34	710	7/17/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LYNN	LN	LN0005	4.16KV	1.13	0.45	511	7/17/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LYNN	LN	LN0006	4.16KV	2.72	1.89	476	7/17/2010	4/25/2015	7/21/2018
2019	LGE	LOUOC	LOUOC	LYNN	LN	LN0007	4.16KV	2.					

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2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1282	12.47KV	18.98	5.95	2454	4/6/2013	3/18/2017	10/20/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1283	12.47KV	11.35	5.04	1474	3/20/2010	11/21/2015	7/13/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1284	12.47KV	17.48	5.14	1845	1/15/2011	9/5/2015	8/24/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1285	12.47KV	12.16	3.84	1044	4/10/2010	12/31/2013	6/15/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1286	12.47KV	15.39	6.55	2449	1/2/2010	12/31/2013	6/15/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1287	12.47KV	1.05	0.97	65	3/20/2010	11/21/2015	7/13/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1288	12.47KV	26.64	11.35	1501	3/3/2012	10/14/2015	8/3/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1289	12.47KV	7.43	3.86	781	3/3/2012	10/10/2015	7/13/2019
2019	LGE	LOUOC	LOUOC	MUD LANE	ML	ML1290	12.47KV	0.00	0.00	0	3/3/2012	10/10/2015	7/13/2019
2019	LGE	LOUOC	LOUOC	MULDRAUGH	MU	MU1101	12.47KV	18.43	13.02	481	6/13/2009	11/30/2013	1/13/2018
2019	LGE	LOUOC	LOUOC	OKOLONA	OK	OK1271	12.47KV	7.23	3.32	959	1/8/2011	2/20/2016	5/4/2019
2019	LGE	LOUOC	LOUOC	OKOLONA	OK	OK1272	12.47KV	14.83	5.71	1639	5/14/2011	4/2/2016	4/6/2019
2019	LGE	LOUOC	LOUOC	OKOLONA	OK	OK1273	12.47KV	8.42	3.04	776	2/4/2012	2/20/2016	5/4/2019
2019	LGE	LOUOC	LOUOC	OKOLONA	OK	OK1274	12.47KV	11.43	4.26	1361	4/9/2011	2/20/2016	5/4/2019
2019	LGE	LOUOC	LOUOC	OKOLONA	OK	OK1275	12.47KV	8.04	3.81	1115	2/16/2013	4/2/2016	4/6/2019
2019	LGE	LOUOC	LOUOC	ORMSBY	OR	OR0001	4.16KV	2.31	0.94	489	6/24/2010	1/7/2016	2/29/2020
2019	LGE	LOUOC	LOUOC	ORMSBY	OR	OR0002	4.16KV	0.32	0.31	133	6/6/2010	1/7/2016	2/29/2020
2019	LGE	LOUOC	LOUOC	ORMSBY	OR	OR0003	4.16KV	3.17	1.73	586	6/6/2010	1/7/2016	2/29/2020
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1380	13.8KV	2.13	2.13	3	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1381	13.8KV	0.46	0.46	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1382	13.8KV	0.50	0.50	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1383	13.8KV	0.49	0.49	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1384	13.8KV	0.46	0.46	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1385	13.8KV	0.39	0.39	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1386	13.8KV	2.17	2.17	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1387	13.8KV	0.39	0.39	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1388	13.8KV	0.31	0.31	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1389	13.8KV	4.55	4.55	6	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1390	13.8KV	3.74	3.74	42	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1391	13.8KV	0.55	0.55	2	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1392	13.8KV	0.15	0.15	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1393	13.8KV	0.55	0.55	4	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PADDYS RUN	PR	PR1394	13.8KV	0.29	0.29	0	2/11/2011	2/21/2015	1/5/2019
2019	LGE	LOUOC	LOUOC	PIRTLE	PI	PI0001	4.16KV	2.77	2.15	245	5/22/2010	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	PIRTLE	PI	PI0002	4.16KV	4.05	2.26	611	5/22/2010	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	PIRTLE	PI	PI0003	4.16KV	5.25	2.14	699	5/22/2010	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	PLEASURE RIDGE	PL	PL1270	12.47KV	14.11	6.10	235	10/24/2009	5/16/2014	10/12/2018
2019	LGE	LOUOC	LOUOC	PLEASURE RIDGE	PL	PL1271	12.47KV	15.73	5.09	1892	7/11/2009	6/27/2014	8/25/2018
2019	LGE	LOUOC	LOUOC	PLEASURE RIDGE	PL	PL1272	12.47KV	13.43	2.92	1671	8/8/2009	9/13/2014	10/6/2018
2019	LGE	LOUOC	LOUOC	PLEASURE RIDGE	PL	PL1273	12.47KV	2.16	2.05	75	8/8/2009	9/13/2014	10/6/2018
2019	LGE	LOUOC	LOUOC	PLEASURE RIDGE	PL	PL1274	12.47KV	11.41	5.22	1325	7/11/2009	9/13/2014	10/6/2018
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1231	7.20KV	5.15	4.00	114	8/2/2008	10/5/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1232	7.20KV	11.30	6.69	1489	9/13/2008	10/5/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1233	7.20KV	14.24	5.90	2729	8/23/2008	9/28/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1234	7.20KV	13.37	5.05	2291	10/4/2008	6/22/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1235	12.47KV	10.89	5.23	2247	6/14/2008	4/27/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1360	13.80KV	7.06	6.09	48	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1361	13.80KV	1.67	1.67	73	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1362	13.80KV	1.63	1.63	9	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1363	13.80KV	1.18	1.18	7	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1364	13.80KV	2.08	2.06	42	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1366	13.80KV	6.24	6.24	20	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1380	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1381	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1382	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1391	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1392	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1393	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1394	13.80KV	1.43	1.43	2	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1396	13.80KV	0.00	0.00	0	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1397	13.80KV	1.20	1.20	2	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEMINOLE	SM	SM1398	13.80KV	0.00	0.00	13	11/22/2008	9/18/2013	9/16/2017
2019	LGE	LOUOC	LOUOC	SEVENTH	SE	SE0001	4.16KV	1.78	1.16	344	4/13/2013	2/2/2016	12/21/2019
2019	LGE	LOUOC	LOUOC	SEVENTH	SE	SE0002	4.16KV	1.72	1.04	429	4/13/2013	2/2/2016	12/21/2019
2019	LGE	LOUOC	LOUOC	SEVENTH	SE	SE0003	4.16KV	3.86	2.44	474	4/13/2013	2/2/2016	12/21/2019
2019	LGE	LOUOC	LOUOC	SEVENTH	SE	SE0004	4.16KV	1.76	1.01	545	4/13/2013	2/2/2016	12/21/2019
2019	LGE	LOUOC	LOUOC	SHAWNEE	SN	SN0001	4.16KV	3.88	1.72	662	4/6/2011	8/6/2016	3/28/2020
2019	LGE	LOUOC	LOUOC	SHAWNEE	SN	SN0002	4.16KV	2.42	0.52	559	4/6/2011	8/6/2016	3/28/2020
2019	LGE	LOUOC	LOUOC	SHAWNEE	SN	SN0003	4.16KV	1.53	0.57	253	4/16/2011	8/6/2016	3/28/2020
2019	LGE	LOUOC	LOUOC	SHAWNEE	SN	SN0004	4.16KV	2.61	0.71	587	4/16/2011	8/6/2016	3/28/2020
2019	LGE	LOUOC	LOUOC	SHEPHERDSVILLE	SV	SV1121	12.47KV	3.74	2.64	942	4/26/2008	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	SHEPHERDSVILLE	SV	SV1122	7.20KV	14.32	5.60	1065	4/26/2008	5/12/2012	3/4/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1281	12.47KV	9.71	4.94	1616	11/8/2008	9/2/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1282	12.47KV	9.79	3.81	2002	11/8/2008	6/29/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1283	12.47KV	0.75	0.71	8	1/24/2009	11/23/2013	8/12/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1284	12.47KV	4.22	2.85	1283	3/14/2009	11/16/2013	8/12/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1285	12.47KV	7.40	3.48	1088	3/18/2009	12/31/2013	8/12/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1456	13.8KV	3.46	3.46	15	8/28/2010	9/28/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1457	13.8KV	2.16	2.16	42	8/28/2010	9/28/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1458	13.8KV	4.78	4.78	2	8/28/2010	9/28/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SHIVELY	SH	SH1459	13.8KV	4.33	4.33	16	8/28/2010	9/28/2013	8/5/2017
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1249	12.47KV	0.00	0.00	0	1/6/2007	6/27/2014	7/6/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1250	12.47KV	14.54	4.91	1749	7/11/2009	6/27/2014	7/6/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1251	12.47KV	8.99	3.99	1441	1/23/2010	5/23/2014	4/14/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1252	12.47KV	19.58	7.42	2051	3/6/2010	4/1/2014	5/19/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1253	12.47KV	13.32	3.87	1438	9/19/2009	2/1/2011	4/14/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1254	12.47KV	12.11	4.64	1498	8/29/2009	10/26/2010	4/14/2018
2019	LGE	LOUOC	LOUOC	SMYRNA	SY	SY1255	12.47KV	13.00	7.04	2264	9/5/2009	4/26/2014	5/5/2018
201													

2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0432	4.16KV	0.14	0.12	12	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0443	4.16KV	0.01	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0462	4.16KV	0.74	0.70	69	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0464	4.16KV	0.31	0.28	221	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0467	4.16KV	1.30	1.19	187	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0468	4.16KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS0469	4.16KV	0.39	0.39	27	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1305	13.8KV	0.26	0.26	140	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1306	13.8KV	0.00	0.00	3	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1308	13.8KV	0.00	0.00	3	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1310	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1311	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1315	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1319	13.8KV	0.00	0.00	20	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1322	13.8KV	2.31	2.31	2055	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1324	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1330	13.8KV	0.00	0.00	4	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1331	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1332	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1333	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1334	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1335	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1336	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1337	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1425	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1426	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1427	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1428	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1429	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1471	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1472	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1473	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1474	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSIDE	WS	WS1475	13.8KV	0.00	0.00	0	10/28/2006	4/7/2016	1/12/2019
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1151	12.47KV	11.33	6.34	2486	5/23/2009	5/18/2013	6/17/2017
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1152	12.47KV	15.98	8.06	2505	5/23/2009	10/19/2013	6/17/2017
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1153	12.47KV	8.04	4.79	675	1/10/2009	10/12/2013	8/26/2017
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1154	12.47KV	16.34	6.73	1793	5/30/2009	7/26/2014	8/5/2017
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1155	12.47KV	8.11	4.46	1619	4/25/2009	5/11/2013	8/26/2017
2019	LGE	LOUOC	LOUOC	WATERSON	WT	WT1493	13.8KV	0.00	0.00	0	0/00/00	0/00/00	0/00/00
2019	LGE	LOUOC	LOUOC	WEST POINT	WP	WP1104	12.47KV	20.74	10.19	592	3/19/2011	1/16/2015	2/9/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0001	4.16KV	4.78	1.89	939	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0002	4.16KV	2.62	1.33	365	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0003	4.16KV	3.80	2.31	593	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0004	4.16KV	3.29	1.44	555	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0005	4.16KV	0.43	0.41	8	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	WESTERN	WE	WE0006	4.16KV	2.02	1.40	262	10/30/2010	3/26/2016	2/23/2019
2019	LGE	LOUOC	LOUOC	ZORN	ZN	ZN1402	13.8KV	0.00	0.00	0	0/00/00	0/00/00	0/00/00
2019	LGE	LOUOC	LOUOC	ZORN	ZN	ZN1431	13.8KV	0.00	0.00	0	0/00/00	0/00/00	0/00/00

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 95

Responding Witness: Lonnie E. Bellar

Q-95. Which arborists visually inspected the circuits in Louisville Metro in the last 5 years prior to clear cutting trees? Please state the date of the inspection, the arborists performing the inspection, and the circuits examined.

A-95. See attached for transmission inspection records. The Company does not have records of the person performing each inspection.

Distribution does not clear cut except in situations that have been pre-approved by the landowner / city. The following arborists were responsible for inspections in Metro Louisville:

- Robert Arrington-Arborist (retired June 2012). Succeeded by Taylor Clarke-Arborist.
- James Mathews-Arborist (retired Dec 2013). Succeeded by Matthew Wiczorek-Arborist.
- Tamara Eifert-Arborist (retired May 2018). Succeeded by Phillip Robertson-Arborist.

LineCode	LineName	SectionName	PatrolDate
665701A0500	AIKEN - MIDDLETOWN		7/20/2016 9:47
665701A0500	AIKEN - MIDDLETOWN		9/20/2016 21:46
665701A0500	AIKEN - MIDDLETOWN		12/23/2016 10:08
665701A0500	AIKEN - MIDDLETOWN		6/6/2017 20:38
665701A0500	AIKEN - MIDDLETOWN		11/8/2017 14:57
665701A0500	AIKEN - MIDDLETOWN		3/12/2018 10:01
665701A0500	AIKEN - MIDDLETOWN		7/4/2018 11:06
665701A0500	AIKEN - MIDDLETOWN		6/15/2019 9:50
665701A0500	AIKEN - MIDDLETOWN		8/9/2019 9:51
665701A0500	AIKEN - MIDDLETOWN		8/5/2020 12:00
384401A0500	APPLIANCE PARK - MIDDLETOWN		7/20/2016 12:10
384401A0500	APPLIANCE PARK - MIDDLETOWN		9/20/2016 11:47
384401A0500	APPLIANCE PARK - MIDDLETOWN		12/20/2016 13:56
384401A0500	APPLIANCE PARK - MIDDLETOWN		6/6/2017 11:20
384401A0500	APPLIANCE PARK - MIDDLETOWN		11/8/2017 14:58
384401A0500	APPLIANCE PARK - MIDDLETOWN		3/7/2018 9:59
384401A0500	APPLIANCE PARK - MIDDLETOWN		6/28/2018 9:14
384401A0500	APPLIANCE PARK - MIDDLETOWN		6/12/2019 10:08
384401A0500	APPLIANCE PARK - MIDDLETOWN		8/5/2020 12:00
384401A0500	APPLIANCE PARK - MIDDLETOWN		11/12/2020 13:55
383601A0500	ASHBOTTOM - APPLIANCE PARK		7/20/2016 12:10
383601A0500	ASHBOTTOM - APPLIANCE PARK		9/20/2016 21:47
383601A0500	ASHBOTTOM - APPLIANCE PARK		12/20/2016 13:56
383601A0500	ASHBOTTOM - APPLIANCE PARK		6/6/2017 20:40

383601A0500	ASHBOTTOM - APPLIANCE PARK		11/8/2017 14:58
383601A0500	ASHBOTTOM - APPLIANCE PARK		3/7/2018 9:59
383601A0500	ASHBOTTOM - APPLIANCE PARK		6/28/2018 9:14
383601A0500	ASHBOTTOM - APPLIANCE PARK		6/12/2019 10:08
383601A0500	ASHBOTTOM - APPLIANCE PARK		8/5/2020 12:00
387101A0500	BEARGRASS - LYNDON SOUTH		7/21/2016 17:44
387101A0500	BEARGRASS - LYNDON SOUTH		9/20/2016 21:47
387101A0500	BEARGRASS - LYNDON SOUTH		11/23/2016 7:49
387101A0500	BEARGRASS - LYNDON SOUTH		6/6/2017 20:40
387101A0500	BEARGRASS - LYNDON SOUTH		3/12/2018 10:02
387101A0500	BEARGRASS - LYNDON SOUTH		7/4/2018 11:08
387101A0500	BEARGRASS - LYNDON SOUTH		6/15/2019 9:51
387101A0500	BEARGRASS - LYNDON SOUTH		4/21/2020 15:45
387101A0500	BEARGRASS - LYNDON SOUTH		8/5/2020 12:00
387001A0500	BEARGRASS - MIDDLETOWN		7/20/2016 12:10
387001A0500	BEARGRASS - MIDDLETOWN		9/20/2016 11:47
387001A0500	BEARGRASS - MIDDLETOWN		11/9/2016 10:52
387001A0500	BEARGRASS - MIDDLETOWN		6/6/2017 20:40
387001A0500	BEARGRASS - MIDDLETOWN		11/8/2017 14:58
387001A0500	BEARGRASS - MIDDLETOWN		3/7/2018 10:38
387001A0500	BEARGRASS - MIDDLETOWN		7/2/2018 16:59
387001A0500	BEARGRASS - MIDDLETOWN		10/11/2018 10:57
387001A0500	BEARGRASS - MIDDLETOWN		6/12/2019 15:01
387001A0500	BEARGRASS - MIDDLETOWN		6/25/2019 12:52
387001A0500	BEARGRASS - MIDDLETOWN		4/21/2020 15:45

387001A0500	BEARGRASS - MIDDLETOWN		8/5/2020 12:00
387001A0500	BEARGRASS - MIDDLETOWN		11/12/2020 13:55
665101A0500	BEARGRASS - TAYLOR		7/21/2016 17:43
665101A0500	BEARGRASS - TAYLOR		9/20/2016 21:47
665101A0500	BEARGRASS - TAYLOR		11/23/2016 7:49
665101A0500	BEARGRASS - TAYLOR		6/6/2017 20:40
665101A0500	BEARGRASS - TAYLOR		3/12/2018 10:02
665101A0500	BEARGRASS - TAYLOR		7/4/2018 11:07
665101A0500	BEARGRASS - TAYLOR		6/15/2019 9:51
665101A0500	BEARGRASS - TAYLOR		4/21/2020 15:45
665101A0500	BEARGRASS - TAYLOR		8/5/2020 12:00
384601A0500	CENTERFIELD - MIDDLETOWN		5/16/2016 12:10
384601A0500	CENTERFIELD - MIDDLETOWN		7/20/2016 9:47
384601A0500	CENTERFIELD - MIDDLETOWN		9/20/2016 14:43
384601A0500	CENTERFIELD - MIDDLETOWN		10/3/2016 12:11
384601A0500	CENTERFIELD - MIDDLETOWN		11/9/2016 10:32
384601A0500	CENTERFIELD - MIDDLETOWN		6/6/2017 10:43
384601A0500	CENTERFIELD - MIDDLETOWN		3/6/2018 10:25
384601A0500	CENTERFIELD - MIDDLETOWN		3/12/2018 10:01
384601A0500	CENTERFIELD - MIDDLETOWN		6/28/2018 17:38
384601A0500	CENTERFIELD - MIDDLETOWN		6/12/2019 10:08
384601A0500	CENTERFIELD - MIDDLETOWN		8/9/2019 9:51
384601A0500	CENTERFIELD - MIDDLETOWN		8/5/2020 12:00
667601F0500	CONESTOGA TAP		7/21/2016 17:43
667601F0500	CONESTOGA TAP		9/20/2016 21:46

667601F0500	CONESTOGA TAP		12/23/2016 10:08
667601F0500	CONESTOGA TAP		6/6/2017 20:39
667601F0500	CONESTOGA TAP		11/8/2017 14:58
667601F0500	CONESTOGA TAP		3/12/2018 10:01
667601F0500	CONESTOGA TAP		7/4/2018 11:07
667601F0500	CONESTOGA TAP		6/15/2019 9:50
667601F0500	CONESTOGA TAP		8/9/2019 9:52
667601F0500	CONESTOGA TAP		8/5/2020 12:00
667701A0500	FAIRMOUNT - SMYRNA		7/20/2016 12:10
667701A0500	FAIRMOUNT - SMYRNA		9/20/2016 10:22
667701A0500	FAIRMOUNT - SMYRNA		12/20/2016 13:56
667701A0500	FAIRMOUNT - SMYRNA		6/6/2017 20:38
667701A0500	FAIRMOUNT - SMYRNA		11/8/2017 14:57
667701A0500	FAIRMOUNT - SMYRNA		3/7/2018 14:48
667701A0500	FAIRMOUNT - SMYRNA		6/28/2018 17:38
667701A0500	FAIRMOUNT - SMYRNA		10/1/2018 16:54
667701A0500	FAIRMOUNT - SMYRNA		6/12/2019 10:08
667701A0500	FAIRMOUNT - SMYRNA		8/9/2019 9:51
667701A0500	FAIRMOUNT - SMYRNA		8/5/2020 11:32
666201B0500	FAIRMOUNT TAP		7/20/2016 12:10
666201B0500	FAIRMOUNT TAP		9/20/2016 10:22
666201B0500	FAIRMOUNT TAP		12/23/2016 10:08
666201B0500	FAIRMOUNT TAP		6/6/2017 20:38
666201B0500	FAIRMOUNT TAP		11/8/2017 14:57
666201B0500	FAIRMOUNT TAP		3/12/2018 10:01

666201B0500	FAIRMOUNT TAP		6/28/2018 17:38
666201B0500	FAIRMOUNT TAP		6/15/2019 9:50
666201B0500	FAIRMOUNT TAP		8/9/2019 9:51
666201B0500	FAIRMOUNT TAP		8/5/2020 12:00
383701A0500	FERN VALLEY - WATTERSON		7/21/2016 17:43
383701A0500	FERN VALLEY - WATTERSON		9/20/2016 21:47
383701A0500	FERN VALLEY - WATTERSON		12/23/2016 10:09
383701A0500	FERN VALLEY - WATTERSON		6/6/2017 20:40
383701A0500	FERN VALLEY - WATTERSON		11/8/2017 14:58
383701A0500	FERN VALLEY - WATTERSON		3/12/2018 10:02
383701A0500	FERN VALLEY - WATTERSON		7/4/2018 11:07
383701A0500	FERN VALLEY - WATTERSON		6/15/2019 9:50
383701A0500	FERN VALLEY - WATTERSON		8/5/2020 12:00
384201B0500	JEFFERSONTOWN TAP		7/21/2016 17:43
384201B0500	JEFFERSONTOWN TAP		9/20/2016 21:47
384201B0500	JEFFERSONTOWN TAP		12/23/2016 10:09
384201B0500	JEFFERSONTOWN TAP		6/6/2017 20:40
384201B0500	JEFFERSONTOWN TAP		11/8/2017 14:58
384201B0500	JEFFERSONTOWN TAP		3/12/2018 10:02
384201B0500	JEFFERSONTOWN TAP		7/4/2018 11:07
384201B0500	JEFFERSONTOWN TAP		6/15/2019 9:50
384201B0500	JEFFERSONTOWN TAP		8/5/2020 12:00
665401A0500	LYNDON - MIDDLETOWN		7/21/2016 17:44
665401A0500	LYNDON - MIDDLETOWN		9/20/2016 21:47
665401A0500	LYNDON - MIDDLETOWN		11/23/2016 7:49

665401A0500	LYNDON - MIDDLETOWN		6/6/2017 20:40
665401A0500	LYNDON - MIDDLETOWN		3/12/2018 10:02
665401A0500	LYNDON - MIDDLETOWN		7/4/2018 11:08
665401A0500	LYNDON - MIDDLETOWN		6/15/2019 9:51
665401A0500	LYNDON - MIDDLETOWN		4/21/2020 15:45
665401A0500	LYNDON - MIDDLETOWN		8/5/2020 12:00
386801A0500	LYNDON SOUTH - MIDDLETOWN		7/21/2016 17:43
665201A0500	LYNDON SOUTH - MIDDLETOWN		7/21/2016 17:44
386801A0500	LYNDON SOUTH - MIDDLETOWN		9/20/2016 21:47
665201A0500	LYNDON SOUTH - MIDDLETOWN		9/20/2016 21:47
386801A0500	LYNDON SOUTH - MIDDLETOWN		11/9/2016 10:52
665201A0500	LYNDON SOUTH - MIDDLETOWN		11/23/2016 7:49
386801A0500	LYNDON SOUTH - MIDDLETOWN		6/6/2017 14:36
386801A0500	LYNDON SOUTH - MIDDLETOWN		6/6/2017 14:36
665201A0500	LYNDON SOUTH - MIDDLETOWN		6/6/2017 20:40
386801A0500	LYNDON SOUTH - MIDDLETOWN		11/9/2017 10:52
386801A0500	LYNDON SOUTH - MIDDLETOWN		3/7/2018 10:38
665201A0500	LYNDON SOUTH - MIDDLETOWN		3/12/2018 10:02
386801A0500	LYNDON SOUTH - MIDDLETOWN		7/4/2018 11:07
665201A0500	LYNDON SOUTH - MIDDLETOWN		7/4/2018 11:07
386801A0500	LYNDON SOUTH - MIDDLETOWN		6/12/2019 10:08
665201A0500	LYNDON SOUTH - MIDDLETOWN		6/15/2019 9:51
386801A0500	LYNDON SOUTH - MIDDLETOWN		6/25/2019 12:52
386801A0500	LYNDON SOUTH - MIDDLETOWN		4/21/2020 15:45
665201A0500	LYNDON SOUTH - MIDDLETOWN		4/21/2020 15:45

386801A0500	LYNDON SOUTH - MIDDLETOWN		8/5/2020 11:32
665201A0500	LYNDON SOUTH - MIDDLETOWN		8/5/2020 12:00
388301A0500	NORTHSIDE - BEARGRASS		7/20/2016 12:10
388201A0500	NORTHSIDE - BEARGRASS		7/21/2016 17:44
388201A0500	NORTHSIDE - BEARGRASS		9/20/2016 12:13
388301A0500	NORTHSIDE - BEARGRASS		9/20/2016 21:47
388301A0500	NORTHSIDE - BEARGRASS		11/9/2016 10:52
388201A0500	NORTHSIDE - BEARGRASS		11/23/2016 7:49
388201A0500	NORTHSIDE - BEARGRASS		6/6/2017 14:36
388301A0500	NORTHSIDE - BEARGRASS		6/6/2017 20:40
388301A0500	NORTHSIDE - BEARGRASS		11/9/2017 10:52
388201A0500	NORTHSIDE - BEARGRASS		3/12/2018 10:02
388301A0500	NORTHSIDE - BEARGRASS		3/12/2018 10:02
388201A0500	NORTHSIDE - BEARGRASS		7/4/2018 11:08
388301A0500	NORTHSIDE - BEARGRASS		7/4/2018 11:08
388201A0500	NORTHSIDE - BEARGRASS		6/15/2019 9:51
388301A0500	NORTHSIDE - BEARGRASS		6/15/2019 9:51
388301A0500	NORTHSIDE - BEARGRASS		6/25/2019 12:52
388201A0500	NORTHSIDE - BEARGRASS		4/21/2020 15:45
388301A0500	NORTHSIDE - BEARGRASS		4/21/2020 15:45
388201A0500	NORTHSIDE - BEARGRASS		8/5/2020 12:00
388301A0500	NORTHSIDE - BEARGRASS		8/5/2020 12:00
667601A0500	PLEASANTGROVE - SOUTH PARK		7/20/2016 12:10
667601A0500	PLEASANTGROVE - SOUTH PARK		9/20/2016 10:22
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53

667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		12/20/2016 12:53
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 11:20
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 12:24
667601A0500	PLEASANTGROVE - SOUTH PARK		6/6/2017 12:24
667601A0500	PLEASANTGROVE - SOUTH PARK		11/2/2017 13:46
667601A0500	PLEASANTGROVE - SOUTH PARK		3/7/2018 14:48
667601A0500	PLEASANTGROVE - SOUTH PARK		6/28/2018 17:38
667601A0500	PLEASANTGROVE - SOUTH PARK		10/1/2018 15:30
667601A0500	PLEASANTGROVE - SOUTH PARK		6/15/2019 9:49
667601A0500	PLEASANTGROVE - SOUTH PARK		8/9/2019 9:51
667601A0500	PLEASANTGROVE - SOUTH PARK		10/17/2019 11:04
667601A0500	PLEASANTGROVE - SOUTH PARK		8/5/2020 12:00

663901A0500	SOUTH PARK - ASHBOTTOM		7/20/2016 12:10
663901A0500	SOUTH PARK - ASHBOTTOM		9/20/2016 11:32
663901A0500	SOUTH PARK - ASHBOTTOM		12/23/2016 10:09
663901A0500	SOUTH PARK - ASHBOTTOM		6/6/2017 20:39
663901A0500	SOUTH PARK - ASHBOTTOM		11/8/2017 14:58
663901A0500	SOUTH PARK - ASHBOTTOM		3/7/2018 11:10
663901A0500	SOUTH PARK - ASHBOTTOM		6/28/2018 17:38
663901A0500	SOUTH PARK - ASHBOTTOM		6/12/2019 10:08
663901A0500	SOUTH PARK - ASHBOTTOM		8/5/2020 12:00
669201A0500	TAYLOR - LYNDON SOUTH		7/21/2016 17:44
669201A0500	TAYLOR - LYNDON SOUTH		9/20/2016 21:47
669201A0500	TAYLOR - LYNDON SOUTH		11/23/2016 7:49
669201A0500	TAYLOR - LYNDON SOUTH		6/6/2017 20:40
669201A0500	TAYLOR - LYNDON SOUTH		3/12/2018 10:02
669201A0500	TAYLOR - LYNDON SOUTH		7/4/2018 11:08
669201A0500	TAYLOR - LYNDON SOUTH		6/15/2019 9:51
669201A0500	TAYLOR - LYNDON SOUTH		4/21/2020 15:45
669201A0500	TAYLOR - LYNDON SOUTH		8/5/2020 12:00
384701A0500	TRIMBLE COUNTY - CENTERFIELD		5/16/2016 12:10
384701A0500	TRIMBLE COUNTY - CENTERFIELD		7/20/2016 9:47
384701A0500	TRIMBLE COUNTY - CENTERFIELD		9/20/2016 14:43
384701A0500	TRIMBLE COUNTY - CENTERFIELD		11/9/2016 10:19
384701A0500	TRIMBLE COUNTY - CENTERFIELD		6/6/2017 10:43
384701A0500	TRIMBLE COUNTY - CENTERFIELD		3/6/2018 21:24
384701A0500	TRIMBLE COUNTY - CENTERFIELD		3/12/2018 10:01

384701A0500	TRIMBLE COUNTY - CENTERFIELD		6/28/2018 17:38
384701A0500	TRIMBLE COUNTY - CENTERFIELD		6/12/2019 10:08
384701A0500	TRIMBLE COUNTY - CENTERFIELD		8/9/2019 9:51
384701A0500	TRIMBLE COUNTY - CENTERFIELD		8/5/2020 12:00
384201A0500	WATTERSON - MIDDLETOWN		7/20/2016 12:10
384201A0500	WATTERSON - MIDDLETOWN		9/20/2016 11:47
384201A0500	WATTERSON - MIDDLETOWN		11/23/2016 7:49
384201A0500	WATTERSON - MIDDLETOWN		12/23/2016 10:09
384201A0500	WATTERSON - MIDDLETOWN		6/6/2017 20:38
384201A0500	WATTERSON - MIDDLETOWN		11/8/2017 14:58
384201A0500	WATTERSON - MIDDLETOWN		3/7/2018 9:59
384201A0500	WATTERSON - MIDDLETOWN		7/4/2018 11:07
384201A0500	WATTERSON - MIDDLETOWN		6/15/2019 9:50
384201A0500	WATTERSON - MIDDLETOWN		8/5/2020 12:00
384201A0500	WATTERSON - MIDDLETOWN		11/12/2020 13:55
666201A0500	WATTERSON - PLEASANT GROVE		7/20/2016 12:10
666201A0500	WATTERSON - PLEASANT GROVE		9/20/2016 10:22
666201A0500	WATTERSON - PLEASANT GROVE		9/20/2016 10:22
666201A0500	WATTERSON - PLEASANT GROVE		12/20/2016 12:53
666201A0500	WATTERSON - PLEASANT GROVE		6/6/2017 11:20
666201A0500	WATTERSON - PLEASANT GROVE		11/2/2017 14:09
666201A0500	WATTERSON - PLEASANT GROVE		3/7/2018 14:48
666201A0500	WATTERSON - PLEASANT GROVE		6/28/2018 17:38
666201A0500	WATTERSON - PLEASANT GROVE		10/1/2018 15:30
666201A0500	WATTERSON - PLEASANT GROVE		6/12/2019 10:08

666201A0500	WATTERSON - PLEASANT GROVE		8/9/2019 9:51
666201A0500	WATTERSON - PLEASANT GROVE		8/5/2020 12:00
383101A0500	ASHBOTTOM - MANSLICK		4/5/2016 9:21
383101A0500	ASHBOTTOM - MANSLICK		5/3/2016 9:44
383101A0500	ASHBOTTOM - MANSLICK		6/17/2016 9:53
383101A0500	ASHBOTTOM - MANSLICK		9/21/2016 12:14
383101A0500	ASHBOTTOM - MANSLICK		9/21/2016 16:41
383101A0500	ASHBOTTOM - MANSLICK		2/23/2017 9:27
383101A0500	ASHBOTTOM - MANSLICK		6/28/2017 16:39
383101A0500	ASHBOTTOM - MANSLICK		5/11/2018 8:14
383101A0500	ASHBOTTOM - MANSLICK		12/7/2018 23:56
383101A0500	ASHBOTTOM - MANSLICK		10/17/2019 11:01
383101A0500	ASHBOTTOM - MANSLICK		6/16/2020 10:29
383101A0500	ASHBOTTOM - MANSLICK		9/17/2020 16:18
383101A0500	ASHBOTTOM - MANSLICK		11/12/2020 13:55
383901A0500	ASHBY - PLEASURE RIDGE		4/3/2016 10:41
383901A0500	ASHBY - PLEASURE RIDGE		5/3/2016 9:46
383901A0500	ASHBY - PLEASURE RIDGE		6/17/2016 13:59
383901A0500	ASHBY - PLEASURE RIDGE		9/21/2016 14:26
383901A0500	ASHBY - PLEASURE RIDGE		2/23/2017 13:12
383901A0500	ASHBY - PLEASURE RIDGE		6/28/2017 14:25
383901A0500	ASHBY - PLEASURE RIDGE		5/11/2018 8:15
383901A0500	ASHBY - PLEASURE RIDGE		12/7/2018 23:57
383901A0500	ASHBY - PLEASURE RIDGE		10/17/2019 11:02
383901A0500	ASHBY - PLEASURE RIDGE		6/16/2020 10:29

383901A0500	ASHBY - PLEASURE RIDGE		9/17/2020 10:10
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		4/5/2016 9:20
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		5/3/2016 9:43
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		6/18/2016 9:43
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		9/21/2016 12:14
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		2/27/2017 10:30
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		6/28/2017 16:38
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		5/11/2018 8:14
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		12/7/2018 23:56
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		10/17/2019 11:01
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		6/17/2020 11:08
380101A0500	CAMP GROUND - CANE RUN SWIT. STA.		9/17/2020 16:11
660801A0500	CANAL - OHIO FALLS		4/5/2016 9:19
661101A0500	CANAL - OHIO FALLS		4/5/2016 9:19
660801A0500	CANAL - OHIO FALLS		5/3/2016 9:42
661101A0500	CANAL - OHIO FALLS		5/3/2016 9:42
660801A0500	CANAL - OHIO FALLS		6/18/2016 9:42
661101A0500	CANAL - OHIO FALLS		6/18/2016 9:42
660801A0500	CANAL - OHIO FALLS		9/21/2016 12:13
661101A0500	CANAL - OHIO FALLS		9/21/2016 12:13
660801A0500	CANAL - OHIO FALLS		2/27/2017 10:30
661101A0500	CANAL - OHIO FALLS		2/27/2017 10:34
660801A0500	CANAL - OHIO FALLS		6/28/2017 16:38
661101A0500	CANAL - OHIO FALLS		6/28/2017 16:38
660801A0500	CANAL - OHIO FALLS		6/29/2017 17:07

660801A0500	CANAL - OHIO FALLS		7/28/2017 8:37
661101A0500	CANAL - OHIO FALLS		7/28/2017 8:37
660801A0500	CANAL - OHIO FALLS		5/11/2018 8:13
661101A0500	CANAL - OHIO FALLS		5/11/2018 8:13
660801A0500	CANAL - OHIO FALLS		12/7/2018 23:56
661101A0500	CANAL - OHIO FALLS		12/7/2018 23:56
660801A0500	CANAL - OHIO FALLS		4/5/2019 16:46
661101A0500	CANAL - OHIO FALLS		4/5/2019 16:46
660801A0500	CANAL - OHIO FALLS		10/17/2019 11:00
661101A0500	CANAL - OHIO FALLS		10/17/2019 11:00
660801A0500	CANAL - OHIO FALLS		6/16/2020 10:29
661101A0500	CANAL - OHIO FALLS		6/17/2020 11:07
660801A0500	CANAL - OHIO FALLS		9/17/2020 16:11
661101A0500	CANAL - OHIO FALLS		9/17/2020 16:11
380201B0500	CANAL TAP		4/5/2016 9:19
380201B0500	CANAL TAP		5/3/2016 9:42
380201B0500	CANAL TAP		6/18/2016 9:42
380201B0500	CANAL TAP		9/21/2016 12:13
380201B0500	CANAL TAP		2/27/2017 10:34
380201B0500	CANAL TAP		6/28/2017 16:38
380201B0500	CANAL TAP		7/28/2017 8:37
380201B0500	CANAL TAP		5/11/2018 8:13
380201B0500	CANAL TAP		12/7/2018 23:56
380201B0500	CANAL TAP		4/5/2019 16:46
380201B0500	CANAL TAP		10/17/2019 11:00

380201B0500	CANAL TAP		6/16/2020 10:29
380201B0500	CANAL TAP		9/17/2020 16:11
382401A0500	CANE RUN - CANE RUN SWIT. STA.		3/9/2016 10:41
382501A0500	CANE RUN - CANE RUN SWIT. STA.		4/1/2016 10:13
382101A0500	CANE RUN - CANE RUN SWIT. STA.		4/5/2016 9:20
382201A0500	CANE RUN - CANE RUN SWIT. STA.		4/5/2016 9:20
382301A0500	CANE RUN - CANE RUN SWIT. STA.		4/5/2016 9:20
382601A0500	CANE RUN - CANE RUN SWIT. STA.		4/5/2016 9:20
382101A0500	CANE RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
382201A0500	CANE RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
382301A0500	CANE RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
382501A0500	CANE RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
382601A0500	CANE RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
382101A0500	CANE RUN - CANE RUN SWIT. STA.		6/17/2016 9:53
382201A0500	CANE RUN - CANE RUN SWIT. STA.		6/18/2016 9:43
382301A0500	CANE RUN - CANE RUN SWIT. STA.		6/18/2016 9:43
382501A0500	CANE RUN - CANE RUN SWIT. STA.		6/18/2016 9:43
382601A0500	CANE RUN - CANE RUN SWIT. STA.		6/18/2016 9:43
382401A0500	CANE RUN - CANE RUN SWIT. STA.		6/30/2016 23:23
382401A0500	CANE RUN - CANE RUN SWIT. STA.		7/27/2016 18:37
382101A0500	CANE RUN - CANE RUN SWIT. STA.		9/21/2016 12:14
382201A0500	CANE RUN - CANE RUN SWIT. STA.		9/21/2016 12:14
382301A0500	CANE RUN - CANE RUN SWIT. STA.		9/21/2016 12:14
382501A0500	CANE RUN - CANE RUN SWIT. STA.		9/21/2016 12:14
382601A0500	CANE RUN - CANE RUN SWIT. STA.		9/21/2016 12:14

382401A0500	CANE RUN - CANE RUN SWIT. STA.		10/3/2016 20:31
382401A0500	CANE RUN - CANE RUN SWIT. STA.		12/2/2016 15:31
382401A0500	CANE RUN - CANE RUN SWIT. STA.		2/13/2017 17:07
382301A0500	CANE RUN - CANE RUN SWIT. STA.		2/27/2017 10:30
382501A0500	CANE RUN - CANE RUN SWIT. STA.		2/27/2017 10:30
382601A0500	CANE RUN - CANE RUN SWIT. STA.		2/27/2017 10:30
382201A0500	CANE RUN - CANE RUN SWIT. STA.		2/27/2017 10:31
382101A0500	CANE RUN - CANE RUN SWIT. STA.		2/27/2017 10:33
382401A0500	CANE RUN - CANE RUN SWIT. STA.		5/25/2017 17:26
382101A0500	CANE RUN - CANE RUN SWIT. STA.		6/28/2017 16:38
382201A0500	CANE RUN - CANE RUN SWIT. STA.		6/28/2017 16:38
382301A0500	CANE RUN - CANE RUN SWIT. STA.		6/28/2017 16:38
382501A0500	CANE RUN - CANE RUN SWIT. STA.		6/28/2017 16:38
382601A0500	CANE RUN - CANE RUN SWIT. STA.		6/28/2017 16:39
382401A0500	CANE RUN - CANE RUN SWIT. STA.		6/29/2017 17:06
382401A0500	CANE RUN - CANE RUN SWIT. STA.		7/28/2017 8:37
382401A0500	CANE RUN - CANE RUN SWIT. STA.		10/4/2017 20:35
382401A0500	CANE RUN - CANE RUN SWIT. STA.		12/11/2017 17:09
382401A0500	CANE RUN - CANE RUN SWIT. STA.		3/6/2018 21:23
382401A0500	CANE RUN - CANE RUN SWIT. STA.		3/12/2018 10:03
382101A0500	CANE RUN - CANE RUN SWIT. STA.		5/11/2018 8:14
382201A0500	CANE RUN - CANE RUN SWIT. STA.		5/11/2018 8:14
382301A0500	CANE RUN - CANE RUN SWIT. STA.		5/11/2018 8:14
382501A0500	CANE RUN - CANE RUN SWIT. STA.		5/11/2018 8:14
382601A0500	CANE RUN - CANE RUN SWIT. STA.		5/11/2018 8:14

382401A0500	CANE RUN - CANE RUN SWIT. STA.		7/26/2018 8:40
382401A0500	CANE RUN - CANE RUN SWIT. STA.		9/5/2018 7:59
382101A0500	CANE RUN - CANE RUN SWIT. STA.		12/7/2018 9:52
382201A0500	CANE RUN - CANE RUN SWIT. STA.		12/7/2018 23:56
382301A0500	CANE RUN - CANE RUN SWIT. STA.		12/7/2018 23:56
382501A0500	CANE RUN - CANE RUN SWIT. STA.		12/7/2018 23:56
382601A0500	CANE RUN - CANE RUN SWIT. STA.		12/7/2018 23:56
382401A0500	CANE RUN - CANE RUN SWIT. STA.		12/14/2018 22:16
382401A0500	CANE RUN - CANE RUN SWIT. STA.		4/4/2019 16:42
382401A0500	CANE RUN - CANE RUN SWIT. STA.		5/31/2019 0:00
382401A0500	CANE RUN - CANE RUN SWIT. STA.		5/31/2019 14:22
382401A0500	CANE RUN - CANE RUN SWIT. STA.		6/25/2019 0:00
382401A0500	CANE RUN - CANE RUN SWIT. STA.		8/9/2019 9:52
382401A0500	CANE RUN - CANE RUN SWIT. STA.		9/19/2019 0:00
382201A0500	CANE RUN - CANE RUN SWIT. STA.		10/16/2019 10:06
382601A0500	CANE RUN - CANE RUN SWIT. STA.		10/16/2019 10:06
382101A0500	CANE RUN - CANE RUN SWIT. STA.		10/17/2019 11:01
382301A0500	CANE RUN - CANE RUN SWIT. STA.		10/17/2019 11:01
382401A0500	CANE RUN - CANE RUN SWIT. STA.		12/27/2019 14:52
382401A0500	CANE RUN - CANE RUN SWIT. STA.		4/21/2020 15:46
382101A0500	CANE RUN - CANE RUN SWIT. STA.		6/16/2020 10:29
382601A0500	CANE RUN - CANE RUN SWIT. STA.		6/16/2020 10:29
382201A0500	CANE RUN - CANE RUN SWIT. STA.		6/17/2020 11:08
382301A0500	CANE RUN - CANE RUN SWIT. STA.		6/17/2020 11:08
382501A0500	CANE RUN - CANE RUN SWIT. STA.		6/17/2020 11:08

382401A0500	CANE RUN - CANE RUN SWIT. STA.		8/5/2020 12:00
382101A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:11
382201A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:18
382301A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:18
382401A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:18
382501A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:18
382601A0500	CANE RUN - CANE RUN SWIT. STA.		9/17/2020 16:18
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		4/1/2016 10:13
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		4/5/2016 9:20
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		5/3/2016 9:44
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		5/3/2016 9:44
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/17/2016 9:53
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/18/2016 9:44
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/21/2016 10:46
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/21/2016 12:14
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/21/2016 16:41
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/21/2016 16:41
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		2/23/2017 9:27
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		2/27/2017 10:31
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/28/2017 11:32
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/28/2017 16:39
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		5/11/2018 8:14
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		5/11/2018 8:14
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		12/7/2018 23:56
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		12/7/2018 23:56

383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		10/17/2019 11:01
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		10/17/2019 11:01
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/16/2020 10:29
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		6/17/2020 11:08
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/17/2020 16:18
383301A0500	CANE RUN SWIT. STA. - ASHBOTTOM		9/17/2020 16:18
383201A0500	CANE RUN SWIT. STA. - ASHBOTTOM		11/12/2020 13:55
668901A0500	HARRODS CREEK - HARMONY LANDING		4/5/2016 9:22
668901A0500	HARRODS CREEK - HARMONY LANDING		4/28/2016 13:34
668901A0500	HARRODS CREEK - HARMONY LANDING		6/18/2016 9:44
668901A0500	HARRODS CREEK - HARMONY LANDING		9/21/2016 15:44
668901A0500	HARRODS CREEK - HARMONY LANDING		2/23/2017 13:12
668901A0500	HARRODS CREEK - HARMONY LANDING		6/28/2017 15:27
668901A0500	HARRODS CREEK - HARMONY LANDING		5/11/2018 8:15
668901A0500	HARRODS CREEK - HARMONY LANDING		12/7/2018 23:57
668901A0500	HARRODS CREEK - HARMONY LANDING		10/16/2019 10:06
668901A0500	HARRODS CREEK - HARMONY LANDING		6/16/2020 10:29
668901A0500	HARRODS CREEK - HARMONY LANDING		9/17/2020 16:19
668001B0500	LOWER MILL CREEK TAP		4/5/2016 9:21
668001B0500	LOWER MILL CREEK TAP		5/3/2016 9:45
668001B0500	LOWER MILL CREEK TAP		6/18/2016 9:44
668001B0500	LOWER MILL CREEK TAP		9/21/2016 16:42
668001B0500	LOWER MILL CREEK TAP		2/27/2017 10:32
668001B0500	LOWER MILL CREEK TAP		6/28/2017 16:39
668001B0500	LOWER MILL CREEK TAP		5/11/2018 8:15

668001B0500	LOWER MILL CREEK TAP		12/7/2018 23:57
668001B0500	LOWER MILL CREEK TAP		10/17/2019 11:01
668001B0500	LOWER MILL CREEK TAP		6/17/2020 11:09
668001B0500	LOWER MILL CREEK TAP		9/17/2020 16:18
383401A0500	MANSLICK - MILL CREEK		4/1/2016 10:13
383401A0500	MANSLICK - MILL CREEK		5/3/2016 9:44
383401A0500	MANSLICK - MILL CREEK		6/17/2016 9:53
383401A0500	MANSLICK - MILL CREEK		9/21/2016 11:16
383401A0500	MANSLICK - MILL CREEK		9/21/2016 16:41
383401A0500	MANSLICK - MILL CREEK		2/23/2017 9:27
383401A0500	MANSLICK - MILL CREEK		6/28/2017 11:32
383401A0500	MANSLICK - MILL CREEK		11/9/2017 12:12
383401A0500	MANSLICK - MILL CREEK		4/30/2018 9:52
383401A0500	MANSLICK - MILL CREEK		12/7/2018 9:52
383401A0500	MANSLICK - MILL CREEK		10/16/2019 10:06
383401A0500	MANSLICK - MILL CREEK		6/16/2020 10:29
383401A0500	MANSLICK - MILL CREEK		9/17/2020 10:10
383401A0500	MANSLICK - MILL CREEK		11/12/2020 13:55
664301A0500	MIDDLETOWN - FORD		4/5/2016 9:22
664301A0500	MIDDLETOWN - FORD		5/3/2016 9:46
664301A0500	MIDDLETOWN - FORD		6/17/2016 15:49
664301A0500	MIDDLETOWN - FORD		9/21/2016 16:23
664301A0500	MIDDLETOWN - FORD		2/27/2017 10:34
664301A0500	MIDDLETOWN - FORD		6/28/2017 15:27
664301A0500	MIDDLETOWN - FORD		11/9/2017 16:29

664301A0500	MIDDLETOWN - FORD		5/11/2018 8:16
664301A0500	MIDDLETOWN - FORD		12/7/2018 23:57
664301A0500	MIDDLETOWN - FORD		10/17/2019 11:02
664301A0500	MIDDLETOWN - FORD		6/17/2020 11:09
664301A0500	MIDDLETOWN - FORD		9/17/2020 16:19
384501A0500	MIDDLETOWN - OLD HENRY		4/5/2016 9:22
384501A0500	MIDDLETOWN - OLD HENRY		5/3/2016 9:46
384501A0500	MIDDLETOWN - OLD HENRY		6/18/2016 9:44
384501A0500	MIDDLETOWN - OLD HENRY		9/21/2016 16:43
384501A0500	MIDDLETOWN - OLD HENRY		2/27/2017 10:34
384501A0500	MIDDLETOWN - OLD HENRY		6/28/2017 16:40
384501A0500	MIDDLETOWN - OLD HENRY		5/11/2018 8:16
384501A0500	MIDDLETOWN - OLD HENRY		12/7/2018 23:57
384501A0500	MIDDLETOWN - OLD HENRY		10/17/2019 11:02
384501A0500	MIDDLETOWN - OLD HENRY		6/17/2020 11:09
384501A0500	MIDDLETOWN - OLD HENRY		9/17/2020 16:19
383801A0500	MILL CREEK - ASHBY		4/5/2016 9:22
383801A0500	MILL CREEK - ASHBY		5/3/2016 9:45
383801A0500	MILL CREEK - ASHBY		6/17/2016 13:59
383801A0500	MILL CREEK - ASHBY		9/21/2016 14:26
383801A0500	MILL CREEK - ASHBY		2/27/2017 10:31
383801A0500	MILL CREEK - ASHBY		6/28/2017 14:25
383801A0500	MILL CREEK - ASHBY		5/11/2018 8:15
383801A0500	MILL CREEK - ASHBY		12/7/2018 23:57
383801A0500	MILL CREEK - ASHBY		10/16/2019 10:06

383801A0500	MILL CREEK - ASHBY		6/16/2020 10:29
383801A0500	MILL CREEK - ASHBY		6/16/2020 10:29
383801A0500	MILL CREEK - ASHBY		9/17/2020 16:19
385701A0500	MILL CREEK - KNOB CREEK		4/1/2016 10:13
385701A0500	MILL CREEK - KNOB CREEK		5/3/2016 9:44
385701A0500	MILL CREEK - KNOB CREEK		6/17/2016 9:53
385701A0500	MILL CREEK - KNOB CREEK		9/21/2016 11:16
385701A0500	MILL CREEK - KNOB CREEK		9/21/2016 16:42
385701A0500	MILL CREEK - KNOB CREEK		2/23/2017 9:27
385701A0500	MILL CREEK - KNOB CREEK		6/28/2017 11:32
385701A0500	MILL CREEK - KNOB CREEK		11/9/2017 12:12
385701A0500	MILL CREEK - KNOB CREEK		4/30/2018 9:52
385701A0500	MILL CREEK - KNOB CREEK		12/7/2018 9:52
385701A0500	MILL CREEK - KNOB CREEK		10/17/2019 11:01
385701A0500	MILL CREEK - KNOB CREEK		6/16/2020 10:29
385701A0500	MILL CREEK - KNOB CREEK		9/17/2020 16:18
385501A0500	MILL CREEK - KOSMOSDALE		4/5/2016 9:21
385501A0500	MILL CREEK - KOSMOSDALE		5/3/2016 9:45
385501A0500	MILL CREEK - KOSMOSDALE		6/17/2016 13:59
385501A0500	MILL CREEK - KOSMOSDALE		9/21/2016 16:42
385501A0500	MILL CREEK - KOSMOSDALE		2/27/2017 10:31
385501A0500	MILL CREEK - KOSMOSDALE		6/28/2017 16:39
385501A0500	MILL CREEK - KOSMOSDALE		5/11/2018 8:15
385501A0500	MILL CREEK - KOSMOSDALE		12/7/2018 23:57
385501A0500	MILL CREEK - KOSMOSDALE		10/17/2019 11:01

385501A0500	MILL CREEK - KOSMOSDALE		6/17/2020 11:09
385501A0500	MILL CREEK - KOSMOSDALE		9/17/2020 16:18
385501B0500	MILL CREEK AUXILLARY TAP		4/5/2016 9:21
385501B0500	MILL CREEK AUXILLARY TAP		5/3/2016 9:45
385501B0500	MILL CREEK AUXILLARY TAP		6/18/2016 9:44
385501B0500	MILL CREEK AUXILLARY TAP		9/21/2016 16:42
385501B0500	MILL CREEK AUXILLARY TAP		2/27/2017 10:32
385501B0500	MILL CREEK AUXILLARY TAP		6/28/2017 16:39
385501B0500	MILL CREEK AUXILLARY TAP		5/11/2018 8:15
385501B0500	MILL CREEK AUXILLARY TAP		12/7/2018 23:57
385501B0500	MILL CREEK AUXILLARY TAP		10/17/2019 11:02
385501B0500	MILL CREEK AUXILLARY TAP		6/17/2020 11:09
385501B0500	MILL CREEK AUXILLARY TAP		9/17/2020 16:19
384901A0500	OLD HENRY - COLLINS		4/5/2016 9:22
384901A0500	OLD HENRY - COLLINS		5/3/2016 9:46
384901A0500	OLD HENRY - COLLINS		6/17/2016 15:49
384901A0500	OLD HENRY - COLLINS		9/21/2016 16:43
384901A0500	OLD HENRY - COLLINS		2/27/2017 10:15
384901A0500	OLD HENRY - COLLINS		6/28/2017 16:40
384901A0500	OLD HENRY - COLLINS		5/11/2018 8:16
384901A0500	OLD HENRY - COLLINS		12/7/2018 23:57
384901A0500	OLD HENRY - COLLINS		10/17/2019 11:02
384901A0500	OLD HENRY - COLLINS		6/17/2020 11:09
384901A0500	OLD HENRY - COLLINS		9/17/2020 16:19
380301A0500	PADDYS RUN - CAMPGROUND		4/5/2016 9:20

380301A0500	PADDYS RUN - CAMPGROUND		5/3/2016 9:43
380301A0500	PADDYS RUN - CAMPGROUND		6/18/2016 9:43
380301A0500	PADDYS RUN - CAMPGROUND		9/21/2016 12:14
380301A0500	PADDYS RUN - CAMPGROUND		2/27/2017 10:32
380301A0500	PADDYS RUN - CAMPGROUND		6/28/2017 16:38
380301A0500	PADDYS RUN - CAMPGROUND		7/28/2017 8:38
380301A0500	PADDYS RUN - CAMPGROUND		5/11/2018 8:14
380301A0500	PADDYS RUN - CAMPGROUND		12/7/2018 23:56
380301A0500	PADDYS RUN - CAMPGROUND		10/17/2019 11:01
380301A0500	PADDYS RUN - CAMPGROUND		6/17/2020 11:08
380301A0500	PADDYS RUN - CAMPGROUND		9/17/2020 16:11
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		4/5/2016 9:20
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		5/3/2016 9:43
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		6/18/2016 9:42
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		9/21/2016 10:46
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		2/27/2017 10:30
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		6/28/2017 16:38
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		7/28/2017 8:38
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		5/11/2018 8:14
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		12/7/2018 23:56
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		10/16/2019 10:06
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		6/17/2020 11:08
380801A0500	PADDYS RUN - CANE RUN SWIT. STA.		9/17/2020 16:11
382701A0500	PADDYS WEST - GALLAGHER PSI		4/5/2016 9:19
382701A0500	PADDYS WEST - GALLAGHER PSI		5/3/2016 9:43

382701A0500	PADDYS WEST - GALLAGHER PSI		6/18/2016 9:43
382701A0500	PADDYS WEST - GALLAGHER PSI		9/21/2016 12:13
382701A0500	PADDYS WEST - GALLAGHER PSI		2/27/2017 10:31
382701A0500	PADDYS WEST - GALLAGHER PSI		6/28/2017 16:38
382701A0500	PADDYS WEST - GALLAGHER PSI		7/28/2017 8:38
382701A0500	PADDYS WEST - GALLAGHER PSI		5/11/2018 8:14
382701A0500	PADDYS WEST - GALLAGHER PSI		12/7/2018 23:56
382701A0500	PADDYS WEST - GALLAGHER PSI		4/5/2019 16:46
382701A0500	PADDYS WEST - GALLAGHER PSI		10/17/2019 11:01
382701A0500	PADDYS WEST - GALLAGHER PSI		6/17/2020 11:08
382701A0500	PADDYS WEST - GALLAGHER PSI		9/17/2020 16:11
382801A0500	PADDYS WEST - PADDYS RUN		4/5/2016 9:19
382801A0500	PADDYS WEST - PADDYS RUN		5/3/2016 9:43
382801A0500	PADDYS WEST - PADDYS RUN		6/17/2016 9:53
382801A0500	PADDYS WEST - PADDYS RUN		9/21/2016 12:13
382801A0500	PADDYS WEST - PADDYS RUN		2/27/2017 10:31
382801A0500	PADDYS WEST - PADDYS RUN		6/28/2017 16:38
382801A0500	PADDYS WEST - PADDYS RUN		7/28/2017 8:38
382801A0500	PADDYS WEST - PADDYS RUN		5/11/2018 8:14
382801A0500	PADDYS WEST - PADDYS RUN		12/7/2018 23:56
382801A0500	PADDYS WEST - PADDYS RUN		4/5/2019 16:46
382801A0500	PADDYS WEST - PADDYS RUN		10/17/2019 11:01
382801A0500	PADDYS WEST - PADDYS RUN		6/17/2020 11:08
382801A0500	PADDYS WEST - PADDYS RUN		9/17/2020 16:11
383201B0500	PLEASURE RIDGE TAP		6/28/2017 16:39

383201B0500	PLEASURE RIDGE TAP		5/11/2018 8:15
383201B0500	PLEASURE RIDGE TAP		12/7/2018 23:57
383201B0500	PLEASURE RIDGE TAP		10/17/2019 11:02
383201B0500	PLEASURE RIDGE TAP		6/17/2020 11:09
383201B0500	PLEASURE RIDGE TAP		9/17/2020 16:19
667901A0500	TERRY - WEST COUNTY		4/5/2016 9:21
667901A0500	TERRY - WEST COUNTY		5/3/2016 9:45
667901A0500	TERRY - WEST COUNTY		6/17/2016 13:59
667901A0500	TERRY - WEST COUNTY		9/21/2016 14:26
667901A0500	TERRY - WEST COUNTY		2/27/2017 10:32
667901A0500	TERRY - WEST COUNTY		6/28/2017 16:39
667901A0500	TERRY - WEST COUNTY		5/11/2018 8:15
667901A0500	TERRY - WEST COUNTY		12/7/2018 23:57
667901A0500	TERRY - WEST COUNTY		10/17/2019 11:01
667901A0500	TERRY - WEST COUNTY		6/16/2020 10:29
667901A0500	TERRY - WEST COUNTY		9/17/2020 16:18
540201A0500	TVA - BLUE LICK		4/5/2016 9:21
540201A0500	TVA - BLUE LICK		5/3/2016 9:45
540201A0500	TVA - BLUE LICK		6/18/2016 9:44
540201A0500	TVA - BLUE LICK		9/21/2016 16:42
540201A0500	TVA - BLUE LICK		2/27/2017 10:31
540201A0500	TVA - BLUE LICK		6/28/2017 16:39
540201A0500	TVA - BLUE LICK		5/11/2018 8:15
540201A0500	TVA - BLUE LICK		12/7/2018 23:57
540201A0500	TVA - BLUE LICK		10/17/2019 11:01

540201A0500	TVA - BLUE LICK		6/17/2020 11:09
540201A0500	TVA - BLUE LICK		9/17/2020 16:18
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	4/3/2016 10:41
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	5/3/2016 9:45
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	6/17/2016 13:59
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	9/21/2016 12:54
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	2/23/2017 11:49
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	6/28/2017 12:46
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	11/9/2017 15:20
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	4/30/2018 9:52
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	12/7/2018 11:12
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	10/16/2019 10:06
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	10/17/2019 11:04
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	6/16/2020 10:29
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	9/17/2020 10:10
540101AA500	TVA - PADDYS RUN	PADDYS RUN - LEBANON JUNC	11/12/2020 13:55
668001A0500	WEST COUNTY - MILL CREEK		4/3/2016 10:41
668001A0500	WEST COUNTY - MILL CREEK		5/3/2016 9:45
668001A0500	WEST COUNTY - MILL CREEK		6/17/2016 13:59
668001A0500	WEST COUNTY - MILL CREEK		9/21/2016 16:42
668001A0500	WEST COUNTY - MILL CREEK		2/27/2017 10:32
668001A0500	WEST COUNTY - MILL CREEK		6/28/2017 16:39
668001A0500	WEST COUNTY - MILL CREEK		5/11/2018 8:15
668001A0500	WEST COUNTY - MILL CREEK		12/7/2018 23:57
668001A0500	WEST COUNTY - MILL CREEK		10/16/2019 10:06

668001A0500	WEST COUNTY - MILL CREEK		6/16/2020 10:29
668001A0500	WEST COUNTY - MILL CREEK		9/17/2020 16:18
453201A0500	BLUE LICK - MILL CREEK		3/9/2016 10:41
453201A0500	BLUE LICK - MILL CREEK		6/30/2016 23:22
453201A0500	BLUE LICK - MILL CREEK		7/27/2016 18:37
453201A0500	BLUE LICK - MILL CREEK		10/3/2016 20:30
453201A0500	BLUE LICK - MILL CREEK		12/2/2016 15:30
453201A0500	BLUE LICK - MILL CREEK		2/13/2017 17:06
453201A0500	BLUE LICK - MILL CREEK		5/25/2017 17:25
453201A0500	BLUE LICK - MILL CREEK		6/29/2017 17:05
453201A0500	BLUE LICK - MILL CREEK		7/28/2017 8:36
453201A0500	BLUE LICK - MILL CREEK		10/4/2017 20:34
453201A0500	BLUE LICK - MILL CREEK		12/11/2017 17:09
453201A0500	BLUE LICK - MILL CREEK		3/6/2018 21:23
453201A0500	BLUE LICK - MILL CREEK		3/12/2018 10:02
453201A0500	BLUE LICK - MILL CREEK		6/5/2018 18:18
453201A0500	BLUE LICK - MILL CREEK		7/26/2018 8:40
453201A0500	BLUE LICK - MILL CREEK		9/5/2018 7:59
453201A0500	BLUE LICK - MILL CREEK		12/14/2018 22:15
453201A0500	BLUE LICK - MILL CREEK		4/4/2019 16:42
453201A0500	BLUE LICK - MILL CREEK		5/31/2019 0:00
453201A0500	BLUE LICK - MILL CREEK		5/31/2019 0:00
453201A0500	BLUE LICK - MILL CREEK		5/31/2019 14:22
453201A0500	BLUE LICK - MILL CREEK		6/25/2019 0:00
453201A0500	BLUE LICK - MILL CREEK		6/25/2019 0:00

453201A0500	BLUE LICK - MILL CREEK		6/25/2019 0:00
453201A0500	BLUE LICK - MILL CREEK		8/9/2019 9:52
453201A0500	BLUE LICK - MILL CREEK		9/19/2019 0:00
453201A0500	BLUE LICK - MILL CREEK		12/27/2019 14:51
453201A0500	BLUE LICK - MILL CREEK		4/21/2020 15:45
453201A0500	BLUE LICK - MILL CREEK		8/5/2020 12:00
453201A0500	BLUE LICK - MILL CREEK		12/22/2020 12:40
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		3/9/2016 10:42
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		6/30/2016 23:24
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		7/27/2016 18:39
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		10/3/2016 20:31
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		11/23/2016 7:51
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		12/2/2016 15:31
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		2/13/2017 17:08
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		5/25/2017 17:27
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		6/29/2017 17:07
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		7/28/2017 8:37
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		10/4/2017 20:36
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		12/11/2017 17:10
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		3/6/2018 21:22
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		3/12/2018 10:04
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		6/5/2018 18:19
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		7/26/2018 8:41
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		9/5/2018 7:59
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		12/14/2018 22:16

454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		4/4/2019 16:42
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		5/31/2019 0:00
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		5/31/2019 0:00
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		5/31/2019 14:23
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		6/25/2019 0:00
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		8/9/2019 9:53
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		9/19/2019 0:00
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		12/27/2019 14:52
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		4/21/2020 15:47
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		8/5/2020 12:00
454301A0500	BUCKNER (Dynergy) - MIDDLETOWN		12/22/2020 12:41
453801A0500	MIDDLETOWN - BLUE LICK		3/9/2016 10:41
453801A0500	MIDDLETOWN - BLUE LICK		6/30/2016 23:21
453801A0500	MIDDLETOWN - BLUE LICK		7/27/2016 18:37
453801A0500	MIDDLETOWN - BLUE LICK		10/3/2016 20:30
453801A0500	MIDDLETOWN - BLUE LICK		12/2/2016 15:30
453801A0500	MIDDLETOWN - BLUE LICK		2/13/2017 17:06
453801A0500	MIDDLETOWN - BLUE LICK		5/25/2017 17:25
453801A0500	MIDDLETOWN - BLUE LICK		6/29/2017 17:05
453801A0500	MIDDLETOWN - BLUE LICK		7/28/2017 8:36
453801A0500	MIDDLETOWN - BLUE LICK		10/4/2017 20:34
453801A0500	MIDDLETOWN - BLUE LICK		12/11/2017 17:08
453801A0500	MIDDLETOWN - BLUE LICK		3/6/2018 21:23
453801A0500	MIDDLETOWN - BLUE LICK		3/12/2018 10:02
453801A0500	MIDDLETOWN - BLUE LICK		6/5/2018 18:18

453101A0500	MIDDLETOWN - MILL CREEK		3/6/2018 10:25
453101A0500	MIDDLETOWN - MILL CREEK		3/6/2018 10:25
453101A0500	MIDDLETOWN - MILL CREEK		3/6/2018 10:25
453101A0500	MIDDLETOWN - MILL CREEK		3/6/2018 10:25
453101A0500	MIDDLETOWN - MILL CREEK		3/12/2018 10:02
453101A0500	MIDDLETOWN - MILL CREEK		6/5/2018 9:37
453101A0500	MIDDLETOWN - MILL CREEK		6/5/2018 9:37
453101A0500	MIDDLETOWN - MILL CREEK		6/5/2018 9:37
453101A0500	MIDDLETOWN - MILL CREEK		7/24/2018 10:15
453101A0500	MIDDLETOWN - MILL CREEK		9/5/2018 7:59
453101A0500	MIDDLETOWN - MILL CREEK		12/13/2018 10:43
453101A0500	MIDDLETOWN - MILL CREEK		12/13/2018 10:43
453101A0500	MIDDLETOWN - MILL CREEK		12/13/2018 10:43
453101A0500	MIDDLETOWN - MILL CREEK		12/13/2018 10:43
453101A0500	MIDDLETOWN - MILL CREEK		12/13/2018 10:43
453101A0500	MIDDLETOWN - MILL CREEK		4/4/2019 16:42
453101A0500	MIDDLETOWN - MILL CREEK		5/31/2019 0:00
453101A0500	MIDDLETOWN - MILL CREEK		5/31/2019 0:00
453101A0500	MIDDLETOWN - MILL CREEK		5/31/2019 14:22
453101A0500	MIDDLETOWN - MILL CREEK		6/25/2019 0:00
453101A0500	MIDDLETOWN - MILL CREEK		6/25/2019 0:00
453101A0500	MIDDLETOWN - MILL CREEK		8/9/2019 9:52
453101A0500	MIDDLETOWN - MILL CREEK		9/19/2019 0:00
453101A0500	MIDDLETOWN - MILL CREEK		12/27/2019 9:23
453101A0500	MIDDLETOWN - MILL CREEK		12/27/2019 9:23

453101A0500	MIDDLETOWN - MILL CREEK		4/21/2020 15:44
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		6/17/2020 11:11
453101A0500	MIDDLETOWN - MILL CREEK		8/5/2020 12:00
453101A0500	MIDDLETOWN - MILL CREEK		12/22/2020 12:40
386601A0500	MILL CREEK - CANE RUN		3/9/2016 10:41
386601A0500	MILL CREEK - CANE RUN		6/30/2016 23:23
386601A0500	MILL CREEK - CANE RUN		7/27/2016 18:37
386601A0500	MILL CREEK - CANE RUN		10/3/2016 20:31
386601A0500	MILL CREEK - CANE RUN		12/2/2016 15:31
386601A0500	MILL CREEK - CANE RUN		2/13/2017 17:07
386601A0500	MILL CREEK - CANE RUN		5/25/2017 17:26
386601A0500	MILL CREEK - CANE RUN		6/29/2017 17:05
386601A0500	MILL CREEK - CANE RUN		7/28/2017 8:37
386601A0500	MILL CREEK - CANE RUN		10/4/2017 20:35
386601A0500	MILL CREEK - CANE RUN		12/11/2017 17:10
386601A0500	MILL CREEK - CANE RUN		3/6/2018 21:23
386601A0500	MILL CREEK - CANE RUN		3/12/2018 10:03
386601A0500	MILL CREEK - CANE RUN		7/26/2018 8:40
386601A0500	MILL CREEK - CANE RUN		9/5/2018 7:59
386601A0500	MILL CREEK - CANE RUN		12/14/2018 22:16
386601A0500	MILL CREEK - CANE RUN		4/4/2019 16:42

017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	5/31/2019 10:56
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	5/31/2019 10:56
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/25/2019 0:00
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/25/2019 12:52
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/8/2019 12:47
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/8/2019 12:47
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/8/2019 12:47
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/8/2019 12:47
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/8/2019 12:47
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	9/19/2019 0:00
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	12/27/2019 0:00
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	12/27/2019 0:00
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	4/21/2020 15:46
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/17/2020 12:22
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/17/2020 12:22
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/17/2020 12:22
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	6/17/2020 12:22
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	8/5/2020 12:00
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	11/12/2020 9:54
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	11/12/2020 9:54
017903A0200	MILL CREEK - HARDIN COUNTY	(KU #30 - Hardin Co. sub)	12/22/2020 8:25
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/8/2016 10:14
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/8/2016 10:14
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/8/2016 10:14
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/8/2016 10:14

456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/8/2016 10:14
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	5/16/2016 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/30/2016 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/30/2016 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/30/2016 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/30/2016 10:39
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/30/2016 10:39
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	7/27/2016 10:21
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	7/27/2016 10:21
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	7/27/2016 10:21
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	10/3/2016 13:16
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	10/3/2016 13:16
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	10/3/2016 13:16
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	12/2/2016 15:31
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	2/13/2017 17:07
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	5/23/2017 11:40
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	5/23/2017 11:40
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/29/2017 17:05
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	7/25/2017 17:46
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	10/4/2017 20:35
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	12/11/2017 17:10
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/6/2018 21:23
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	3/12/2018 10:03
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/5/2018 18:19
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	7/26/2018 8:40

456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	9/5/2018 7:59
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	12/14/2018 22:16
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	4/4/2019 16:42
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	5/31/2019 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	5/31/2019 14:22
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/25/2019 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	6/25/2019 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	8/9/2019 9:52
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	9/19/2019 0:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	12/27/2019 14:51
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	4/21/2020 15:46
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	8/5/2020 12:00
456001A0500	MILL CREEK - HARDIN COUNTY	(LGE #1 at Mill Creek - #29)	12/22/2020 12:40
453301A0500	MILL CREEK - PADDYS WEST		3/8/2016 11:38
453301A0500	MILL CREEK - PADDYS WEST		3/8/2016 11:38
453301A0500	MILL CREEK - PADDYS WEST		5/16/2016 12:10
453301A0500	MILL CREEK - PADDYS WEST		5/16/2016 12:10
453301A0500	MILL CREEK - PADDYS WEST		6/30/2016 17:53
453301A0500	MILL CREEK - PADDYS WEST		6/30/2016 17:53
453301A0500	MILL CREEK - PADDYS WEST		6/30/2016 17:53
453301A0500	MILL CREEK - PADDYS WEST		6/30/2016 17:53
453301A0500	MILL CREEK - PADDYS WEST		7/26/2016 14:12
453301A0500	MILL CREEK - PADDYS WEST		7/26/2016 14:12
453301A0500	MILL CREEK - PADDYS WEST		7/26/2016 14:12
453301A0500	MILL CREEK - PADDYS WEST		7/26/2016 14:12

453301A0500	MILL CREEK - PADDYS WEST		7/26/2016 14:12
453301A0500	MILL CREEK - PADDYS WEST		7/27/2016 18:37
453301A0500	MILL CREEK - PADDYS WEST		10/3/2016 13:16
453301A0500	MILL CREEK - PADDYS WEST		10/3/2016 13:16
453301A0500	MILL CREEK - PADDYS WEST		10/3/2016 13:16
453301A0500	MILL CREEK - PADDYS WEST		12/2/2016 15:30
453301A0500	MILL CREEK - PADDYS WEST		1/16/2017 0:00
453301A0500	MILL CREEK - PADDYS WEST		2/13/2017 17:07
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		5/23/2017 11:40
453301A0500	MILL CREEK - PADDYS WEST		6/29/2017 15:40
453301A0500	MILL CREEK - PADDYS WEST		6/29/2017 15:40
453301A0500	MILL CREEK - PADDYS WEST		6/29/2017 15:40
453301A0500	MILL CREEK - PADDYS WEST		6/29/2017 15:40
453301A0500	MILL CREEK - PADDYS WEST		7/25/2017 17:46
453301A0500	MILL CREEK - PADDYS WEST		7/25/2017 17:46
453301A0500	MILL CREEK - PADDYS WEST		7/25/2017 17:46
453301A0500	MILL CREEK - PADDYS WEST		7/25/2017 17:46
453301A0500	MILL CREEK - PADDYS WEST		7/25/2017 17:46
453301A0500	MILL CREEK - PADDYS WEST		11/2/2017 8:48
453301A0500	MILL CREEK - PADDYS WEST		12/11/2017 16:48
453301A0500	MILL CREEK - PADDYS WEST		3/6/2018 21:23
453301A0500	MILL CREEK - PADDYS WEST		3/7/2018 11:10

453301A0500	MILL CREEK - PADDYS WEST		3/7/2018 11:10
453301A0500	MILL CREEK - PADDYS WEST		3/7/2018 11:10
453301A0500	MILL CREEK - PADDYS WEST		6/5/2018 18:19
453301A0500	MILL CREEK - PADDYS WEST		7/24/2018 10:15
453301A0500	MILL CREEK - PADDYS WEST		8/28/2018 9:26
453301A0500	MILL CREEK - PADDYS WEST		12/13/2018 10:43
453301A0500	MILL CREEK - PADDYS WEST		4/4/2019 16:42
453301A0500	MILL CREEK - PADDYS WEST		5/31/2019 0:00
453301A0500	MILL CREEK - PADDYS WEST		5/31/2019 14:22
453301A0500	MILL CREEK - PADDYS WEST		6/25/2019 0:00
453301A0500	MILL CREEK - PADDYS WEST		8/9/2019 9:52
453301A0500	MILL CREEK - PADDYS WEST		9/19/2019 0:00
453301A0500	MILL CREEK - PADDYS WEST		12/27/2019 14:51
453301A0500	MILL CREEK - PADDYS WEST		4/21/2020 15:46
453301A0500	MILL CREEK - PADDYS WEST		8/5/2020 12:00
453301A0500	MILL CREEK - PADDYS WEST		12/22/2020 12:40
450301A0500	Mill Creek Unit # 3 Tie		3/9/2016 10:41
450301A0500	Mill Creek Unit # 3 Tie		6/30/2016 23:22
450301A0500	Mill Creek Unit # 3 Tie		7/27/2016 18:37
450301A0500	Mill Creek Unit # 3 Tie		10/3/2016 20:30
450301A0500	Mill Creek Unit # 3 Tie		12/2/2016 15:30
450301A0500	Mill Creek Unit # 3 Tie		2/13/2017 17:06
450301A0500	Mill Creek Unit # 3 Tie		5/25/2017 17:25
450301A0500	Mill Creek Unit # 3 Tie		6/29/2017 17:05
450301A0500	Mill Creek Unit # 3 Tie		7/28/2017 8:36

450301A0500	Mill Creek Unit # 3 Tie		10/4/2017 20:34
450301A0500	Mill Creek Unit # 3 Tie		12/11/2017 17:09
450301A0500	Mill Creek Unit # 3 Tie		3/6/2018 21:23
450301A0500	Mill Creek Unit # 3 Tie		3/12/2018 10:03
450301A0500	Mill Creek Unit # 3 Tie		6/5/2018 18:19
450301A0500	Mill Creek Unit # 3 Tie		7/26/2018 8:40
450301A0500	Mill Creek Unit # 3 Tie		9/5/2018 7:59
450301A0500	Mill Creek Unit # 3 Tie		12/14/2018 22:15
450301A0500	Mill Creek Unit # 3 Tie		4/4/2019 16:42
450301A0500	Mill Creek Unit # 3 Tie		5/31/2019 0:00
450301A0500	Mill Creek Unit # 3 Tie		5/31/2019 14:22
450301A0500	Mill Creek Unit # 3 Tie		6/25/2019 0:00
450301A0500	Mill Creek Unit # 3 Tie		8/9/2019 9:52
450301A0500	Mill Creek Unit # 3 Tie		9/19/2019 0:00
450301A0500	Mill Creek Unit # 3 Tie		12/27/2019 14:51
450301A0500	Mill Creek Unit # 3 Tie		4/21/2020 15:46
450301A0500	Mill Creek Unit # 3 Tie		8/5/2020 12:00
450301A0500	Mill Creek Unit # 3 Tie		12/22/2020 12:40
450101A0500	Mill Creek Unit #1 Tie		3/9/2016 10:41
450101A0500	Mill Creek Unit #1 Tie		6/30/2016 23:22
450101A0500	Mill Creek Unit #1 Tie		7/27/2016 18:37
450101A0500	Mill Creek Unit #1 Tie		10/3/2016 20:30
450101A0500	Mill Creek Unit #1 Tie		12/2/2016 15:30
450101A0500	Mill Creek Unit #1 Tie		2/13/2017 17:06
450101A0500	Mill Creek Unit #1 Tie		5/25/2017 17:25

450101A0500	Mill Creek Unit #1 Tie		6/29/2017 17:05
450101A0500	Mill Creek Unit #1 Tie		7/28/2017 8:36
450101A0500	Mill Creek Unit #1 Tie		10/4/2017 20:35
450101A0500	Mill Creek Unit #1 Tie		12/11/2017 17:09
450101A0500	Mill Creek Unit #1 Tie		3/6/2018 21:23
450101A0500	Mill Creek Unit #1 Tie		3/12/2018 10:03
450101A0500	Mill Creek Unit #1 Tie		6/5/2018 18:19
450101A0500	Mill Creek Unit #1 Tie		7/26/2018 8:40
450101A0500	Mill Creek Unit #1 Tie		9/5/2018 7:59
450101A0500	Mill Creek Unit #1 Tie		12/14/2018 22:15
450101A0500	Mill Creek Unit #1 Tie		4/4/2019 16:42
450101A0500	Mill Creek Unit #1 Tie		5/31/2019 0:00
450101A0500	Mill Creek Unit #1 Tie		5/31/2019 14:22
450101A0500	Mill Creek Unit #1 Tie		6/25/2019 0:00
450101A0500	Mill Creek Unit #1 Tie		8/9/2019 9:52
450101A0500	Mill Creek Unit #1 Tie		9/19/2019 0:00
450101A0500	Mill Creek Unit #1 Tie		12/27/2019 14:51
450101A0500	Mill Creek Unit #1 Tie		4/21/2020 15:46
450101A0500	Mill Creek Unit #1 Tie		8/5/2020 12:00
450101A0500	Mill Creek Unit #1 Tie		12/22/2020 12:40
450201A0500	Mill Creek Unit #2 Tie		3/9/2016 10:41
450201A0500	Mill Creek Unit #2 Tie		6/30/2016 23:22
450201A0500	Mill Creek Unit #2 Tie		7/27/2016 18:37
450201A0500	Mill Creek Unit #2 Tie		10/3/2016 20:30
450201A0500	Mill Creek Unit #2 Tie		12/2/2016 15:30

450201A0500	Mill Creek Unit #2 Tie		2/13/2017 17:06
450201A0500	Mill Creek Unit #2 Tie		5/25/2017 17:26
450201A0500	Mill Creek Unit #2 Tie		6/29/2017 17:05
450201A0500	Mill Creek Unit #2 Tie		7/28/2017 8:36
450201A0500	Mill Creek Unit #2 Tie		10/4/2017 20:35
450201A0500	Mill Creek Unit #2 Tie		12/11/2017 17:09
450201A0500	Mill Creek Unit #2 Tie		3/6/2018 21:23
450201A0500	Mill Creek Unit #2 Tie		3/12/2018 10:03
450201A0500	Mill Creek Unit #2 Tie		6/5/2018 18:19
450201A0500	Mill Creek Unit #2 Tie		7/26/2018 8:40
450201A0500	Mill Creek Unit #2 Tie		9/5/2018 7:59
450201A0500	Mill Creek Unit #2 Tie		12/14/2018 22:15
450201A0500	Mill Creek Unit #2 Tie		4/4/2019 16:42
450201A0500	Mill Creek Unit #2 Tie		5/31/2019 0:00
450201A0500	Mill Creek Unit #2 Tie		5/31/2019 14:22
450201A0500	Mill Creek Unit #2 Tie		6/25/2019 0:00
450201A0500	Mill Creek Unit #2 Tie		8/9/2019 9:52
450201A0500	Mill Creek Unit #2 Tie		9/19/2019 0:00
450201A0500	Mill Creek Unit #2 Tie		9/19/2019 0:00
450201A0500	Mill Creek Unit #2 Tie		12/27/2019 14:51
450201A0500	Mill Creek Unit #2 Tie		4/21/2020 15:46
450201A0500	Mill Creek Unit #2 Tie		8/5/2020 12:00
450201A0500	Mill Creek Unit #2 Tie		12/22/2020 12:40
450401A0500	Mill Creek Unit #4 Tie		3/9/2016 10:41
450401A0500	Mill Creek Unit #4 Tie		6/30/2016 23:22

450401A0500	Mill Creek Unit #4 Tie		7/27/2016 18:37
450401A0500	Mill Creek Unit #4 Tie		10/3/2016 20:30
450401A0500	Mill Creek Unit #4 Tie		12/2/2016 15:30
450401A0500	Mill Creek Unit #4 Tie		2/13/2017 17:06
450401A0500	Mill Creek Unit #4 Tie		5/25/2017 17:25
450401A0500	Mill Creek Unit #4 Tie		6/29/2017 17:05
450401A0500	Mill Creek Unit #4 Tie		7/28/2017 8:36
450401A0500	Mill Creek Unit #4 Tie		10/4/2017 20:34
450401A0500	Mill Creek Unit #4 Tie		12/11/2017 17:09
450401A0500	Mill Creek Unit #4 Tie		3/6/2018 21:23
450401A0500	Mill Creek Unit #4 Tie		3/12/2018 10:02
450401A0500	Mill Creek Unit #4 Tie		6/5/2018 18:19
450401A0500	Mill Creek Unit #4 Tie		7/26/2018 8:40
450401A0500	Mill Creek Unit #4 Tie		9/5/2018 7:59
450401A0500	Mill Creek Unit #4 Tie		12/14/2018 22:15
450401A0500	Mill Creek Unit #4 Tie		4/4/2019 16:42
450401A0500	Mill Creek Unit #4 Tie		5/31/2019 0:00
450401A0500	Mill Creek Unit #4 Tie		5/31/2019 14:22
450401A0500	Mill Creek Unit #4 Tie		6/25/2019 0:00
450401A0500	Mill Creek Unit #4 Tie		8/9/2019 9:52
450401A0500	Mill Creek Unit #4 Tie		9/19/2019 0:00
450401A0500	Mill Creek Unit #4 Tie		9/19/2019 0:00
450401A0500	Mill Creek Unit #4 Tie		12/27/2019 14:51
450401A0500	Mill Creek Unit #4 Tie		4/21/2020 15:45
450401A0500	Mill Creek Unit #4 Tie		8/5/2020 12:00

454101A0500	TRIMBLE COUNTY - MIDDLETOWN		6/17/2020 11:11
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		8/5/2020 12:00
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		9/22/2020 9:44
454101A0500	TRIMBLE COUNTY - MIDDLETOWN		12/22/2020 12:41
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	3/7/2016 17:38
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	12/8/2016 0:00
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	6/26/2017 8:07
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	6/28/2017 16:36
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	12/28/2017 15:57
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	6/25/2018 18:13
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	12/9/2018 18:04
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	12/31/2018 12:45
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	6/14/2019 20:00
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	7/9/2019 9:09
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	9/9/2020 11:20
665801A0500	AIKEN - EASTWOOD	AND TIE WITH KU	9/22/2020 12:42
665001A0500	AIKEN - OXMOOR		3/7/2016 17:38

665001A0500	AIKEN - OXMOOR		12/8/2016 0:00
665001A0500	AIKEN - OXMOOR		6/26/2017 8:07
665001A0500	AIKEN - OXMOOR		6/28/2017 16:36
665001A0500	AIKEN - OXMOOR		12/20/2017 0:00
665001A0500	AIKEN - OXMOOR		12/28/2017 15:57
665001A0500	AIKEN - OXMOOR		6/28/2018 11:43
665001A0500	AIKEN - OXMOOR		11/29/2018 10:41
665001A0500	AIKEN - OXMOOR		12/31/2018 12:45
665001A0500	AIKEN - OXMOOR		6/6/2019 10:10
665001A0500	AIKEN - OXMOOR		6/14/2019 19:59
665001A0500	AIKEN - OXMOOR		9/23/2020 8:34
381201A0500	ALGONQUIN - DIXIE		2/17/2016 10:13
381201A0500	ALGONQUIN - DIXIE		12/5/2016 0:00
381201A0500	ALGONQUIN - DIXIE		6/18/2017 16:49
381201A0500	ALGONQUIN - DIXIE		6/22/2017 8:31
381201A0500	ALGONQUIN - DIXIE		6/26/2017 8:03
381201A0500	ALGONQUIN - DIXIE		6/28/2017 16:31
381201A0500	ALGONQUIN - DIXIE		12/14/2017 15:27
381201A0500	ALGONQUIN - DIXIE		12/26/2017 11:29
381201A0500	ALGONQUIN - DIXIE		12/28/2017 15:53
381201A0500	ALGONQUIN - DIXIE		6/25/2018 17:53
381201A0500	ALGONQUIN - DIXIE		10/16/2018 13:28
381201A0500	ALGONQUIN - DIXIE		12/31/2018 12:41
381201A0500	ALGONQUIN - DIXIE		6/19/2019 11:58
381201A0500	ALGONQUIN - DIXIE		12/21/2019 10:46

664401A0500	ALGONQUIN - GRADY		2/24/2016 14:43
664401A0500	ALGONQUIN - GRADY		12/7/2016 0:00
664401A0500	ALGONQUIN - GRADY		6/26/2017 8:08
664401A0500	ALGONQUIN - GRADY		6/28/2017 16:34
664401A0500	ALGONQUIN - GRADY		12/26/2017 0:00
664401A0500	ALGONQUIN - GRADY		12/28/2017 15:56
664401A0500	ALGONQUIN - GRADY		6/26/2018 8:29
664401A0500	ALGONQUIN - GRADY		11/29/2018 10:41
664401A0500	ALGONQUIN - GRADY		12/31/2018 12:44
664401A0500	ALGONQUIN - GRADY		6/19/2019 13:24
664401A0500	ALGONQUIN - GRADY		12/26/2019 15:57
664401A0500	ALGONQUIN - GRADY		8/18/2020 11:20
664401A0500	ALGONQUIN - GRADY		9/18/2020 7:51
664601A0500	ALGONQUIN - MAGAZINE		3/8/2016 17:29
664601A0500	ALGONQUIN - MAGAZINE		12/7/2016 0:00
664601A0500	ALGONQUIN - MAGAZINE		6/26/2017 8:08
664601A0500	ALGONQUIN - MAGAZINE		6/28/2017 16:35
664601A0500	ALGONQUIN - MAGAZINE		12/28/2017 15:56
664601A0500	ALGONQUIN - MAGAZINE		6/21/2018 9:12
664601A0500	ALGONQUIN - MAGAZINE		11/29/2018 10:41
664601A0500	ALGONQUIN - MAGAZINE		12/31/2018 12:44
664601A0500	ALGONQUIN - MAGAZINE		6/19/2019 13:24
664601A0500	ALGONQUIN - MAGAZINE		12/26/2019 15:57
664601A0500	ALGONQUIN - MAGAZINE		8/18/2020 11:20
663201A0500	ALGONQUIN - PADDYS RUN		2/24/2016 14:42

663201A0500	ALGONQUIN - PADDYS RUN		12/7/2016 0:00
663201A0500	ALGONQUIN - PADDYS RUN		6/18/2017 15:05
663201A0500	ALGONQUIN - PADDYS RUN		6/26/2017 8:12
663201A0500	ALGONQUIN - PADDYS RUN		6/28/2017 12:12
663201A0500	ALGONQUIN - PADDYS RUN		12/28/2017 15:55
663201A0500	ALGONQUIN - PADDYS RUN		6/26/2018 8:29
663201A0500	ALGONQUIN - PADDYS RUN		11/15/2018 10:26
663201A0500	ALGONQUIN - PADDYS RUN		12/31/2018 12:43
663201A0500	ALGONQUIN - PADDYS RUN		6/19/2019 12:10
663201A0500	ALGONQUIN - PADDYS RUN		6/27/2019 13:00
663201A0500	ALGONQUIN - PADDYS RUN		12/23/2019 12:19
663201A0500	ALGONQUIN - PADDYS RUN		8/18/2020 11:20
663201A0500	ALGONQUIN - PADDYS RUN		9/18/2020 8:11
664001A0500	ALGONQUIN - SEMINOLE		2/11/2016 17:50
664001A0500	ALGONQUIN - SEMINOLE		12/7/2016 0:00
664001A0500	ALGONQUIN - SEMINOLE		6/26/2017 8:09
664001A0500	ALGONQUIN - SEMINOLE		6/28/2017 16:34
664001A0500	ALGONQUIN - SEMINOLE		12/28/2017 15:56
664001A0500	ALGONQUIN - SEMINOLE		6/14/2018 12:28
664001A0500	ALGONQUIN - SEMINOLE		11/29/2018 10:41
664001A0500	ALGONQUIN - SEMINOLE		12/31/2018 12:44
664001A0500	ALGONQUIN - SEMINOLE		6/19/2019 12:00
387301A0500	APPLIANCE PARK - ETHEL		3/14/2016 11:04
387301A0500	APPLIANCE PARK - ETHEL		12/5/2016 0:00
387301A0500	APPLIANCE PARK - ETHEL		4/15/2017 14:06

387301A0500	APPLIANCE PARK - ETHEL		6/28/2017 12:12
387301A0500	APPLIANCE PARK - ETHEL		6/28/2017 16:32
387301A0500	APPLIANCE PARK - ETHEL		12/14/2017 15:27
387301A0500	APPLIANCE PARK - ETHEL		12/26/2017 11:28
387301A0500	APPLIANCE PARK - ETHEL		12/28/2017 15:54
387301A0500	APPLIANCE PARK - ETHEL		10/16/2018 13:26
387301A0500	APPLIANCE PARK - ETHEL		12/31/2018 12:42
387301A0500	APPLIANCE PARK - ETHEL		6/14/2019 20:05
387301A0500	APPLIANCE PARK - ETHEL		6/19/2019 11:58
387301A0500	APPLIANCE PARK - ETHEL		12/23/2019 12:16
387301A0500	APPLIANCE PARK - ETHEL		8/13/2020 9:06
382901A0500	ASHBOTTOM - GRADE LANE		2/25/2016 7:57
382901A0500	ASHBOTTOM - GRADE LANE		12/27/2016 11:17
382901A0500	ASHBOTTOM - GRADE LANE		6/18/2017 15:05
382901A0500	ASHBOTTOM - GRADE LANE		6/22/2017 8:31
382901A0500	ASHBOTTOM - GRADE LANE		6/26/2017 8:03
382901A0500	ASHBOTTOM - GRADE LANE		6/28/2017 12:12
382901A0500	ASHBOTTOM - GRADE LANE		12/11/2017 0:00
382901A0500	ASHBOTTOM - GRADE LANE		12/14/2017 15:34
382901A0500	ASHBOTTOM - GRADE LANE		12/19/2017 12:03
382901A0500	ASHBOTTOM - GRADE LANE		12/26/2017 11:39
382901A0500	ASHBOTTOM - GRADE LANE		12/28/2017 15:53
382901A0500	ASHBOTTOM - GRADE LANE		6/21/2018 10:42
382901A0500	ASHBOTTOM - GRADE LANE		10/10/2018 19:17
382901A0500	ASHBOTTOM - GRADE LANE		12/31/2018 12:41

382901A0500	ASHBOTTOM - GRADE LANE		6/19/2019 14:24
382901A0500	ASHBOTTOM - GRADE LANE		12/21/2019 10:46
382901A0500	ASHBOTTOM - GRADE LANE		8/10/2020 8:59
664901A0500	ASHBOTTOM - KENWOOD		2/24/2016 17:54
664901A0500	ASHBOTTOM - KENWOOD		12/8/2016 0:00
664901A0500	ASHBOTTOM - KENWOOD		6/26/2017 8:07
664901A0500	ASHBOTTOM - KENWOOD		6/28/2017 16:35
664901A0500	ASHBOTTOM - KENWOOD		12/28/2017 15:57
664901A0500	ASHBOTTOM - KENWOOD		6/14/2018 9:51
664901A0500	ASHBOTTOM - KENWOOD		11/29/2018 10:41
664901A0500	ASHBOTTOM - KENWOOD		12/31/2018 12:45
664901A0500	ASHBOTTOM - KENWOOD		6/14/2019 19:59
664901A0500	ASHBOTTOM - KENWOOD		8/10/2020 8:59
665601A0500	BEARGRASS - BEARGRASS PUMPING		3/8/2016 17:28
665601A0500	BEARGRASS - BEARGRASS PUMPING		12/8/2016 0:00
665601A0500	BEARGRASS - BEARGRASS PUMPING		6/18/2017 16:51
665601A0500	BEARGRASS - BEARGRASS PUMPING		6/26/2017 8:07
665601A0500	BEARGRASS - BEARGRASS PUMPING		6/28/2017 16:36
665601A0500	BEARGRASS - BEARGRASS PUMPING		12/19/2017 13:50
665601A0500	BEARGRASS - BEARGRASS PUMPING		12/28/2017 15:57
665601A0500	BEARGRASS - BEARGRASS PUMPING		12/9/2018 18:01
665601A0500	BEARGRASS - BEARGRASS PUMPING		12/31/2018 12:45
665601A0500	BEARGRASS - BEARGRASS PUMPING		6/27/2019 13:00
662201A0500	BEARGRASS - CLIFTON		3/8/2016 17:27
662201A0500	BEARGRASS - CLIFTON		12/6/2016 0:00

662201A0500	BEARGRASS - CLIFTON		6/18/2017 15:05
662201A0500	BEARGRASS - CLIFTON		6/22/2017 8:32
662201A0500	BEARGRASS - CLIFTON		6/26/2017 8:11
662201A0500	BEARGRASS - CLIFTON		6/28/2017 16:33
662201A0500	BEARGRASS - CLIFTON		12/7/2017 0:00
662201A0500	BEARGRASS - CLIFTON		12/18/2017 0:00
662201A0500	BEARGRASS - CLIFTON		12/28/2017 15:55
662201A0500	BEARGRASS - CLIFTON		6/28/2018 11:43
662201A0500	BEARGRASS - CLIFTON		6/28/2018 15:52
662201A0500	BEARGRASS - CLIFTON		11/15/2018 10:26
662201A0500	BEARGRASS - CLIFTON		12/31/2018 12:43
662201A0500	BEARGRASS - CLIFTON		12/23/2019 16:15
662301A0500	BEARGRASS - MADISON		3/8/2016 17:27
662301A0500	BEARGRASS - MADISON		12/6/2016 0:00
662301A0500	BEARGRASS - MADISON		6/18/2017 15:05
662301A0500	BEARGRASS - MADISON		6/22/2017 8:31
662301A0500	BEARGRASS - MADISON		6/26/2017 8:12
662301A0500	BEARGRASS - MADISON		6/28/2017 12:12
662301A0500	BEARGRASS - MADISON		12/28/2017 15:55
662301A0500	BEARGRASS - MADISON		6/25/2018 17:45
662301A0500	BEARGRASS - MADISON		11/15/2018 10:26
662301A0500	BEARGRASS - MADISON		12/31/2018 12:43
662301A0500	BEARGRASS - MADISON		6/27/2019 12:52
662301A0500	BEARGRASS - MADISON		12/23/2019 16:15
386201A0500	BEARGRASS - WATERSIDE		3/8/2016 17:28

386301A0500	BEARGRASS - WATERSIDE		12/5/2016 0:00
386301A0500	BEARGRASS - WATERSIDE		6/18/2017 16:49
386301A0500	BEARGRASS - WATERSIDE		6/26/2017 8:09
386201A0500	BEARGRASS - WATERSIDE		6/28/2017 16:31
386301A0500	BEARGRASS - WATERSIDE		12/26/2017 11:35
386201A0500	BEARGRASS - WATERSIDE		12/28/2017 15:55
386301A0500	BEARGRASS - WATERSIDE		6/28/2018 15:52
386301A0500	BEARGRASS - WATERSIDE		10/10/2018 19:28
386201A0500	BEARGRASS - WATERSIDE		12/31/2018 12:42
386301A0500	BEARGRASS - WATERSIDE		6/19/2019 14:25
386301A0500	BEARGRASS - WATERSIDE		12/21/2019 10:48
662401A0500	BEARGRASS PUMPING - CLIFTON		12/6/2016 0:00
662401A0500	BEARGRASS PUMPING - CLIFTON		6/18/2017 16:24
662401A0500	BEARGRASS PUMPING - CLIFTON		6/26/2017 8:12
662401A0500	BEARGRASS PUMPING - CLIFTON		6/28/2017 16:33
662401A0500	BEARGRASS PUMPING - CLIFTON		12/28/2017 15:55
662401A0500	BEARGRASS PUMPING - CLIFTON		12/31/2018 12:43
662401A0500	BEARGRASS PUMPING - CLIFTON		6/27/2019 12:52
662401A0500	BEARGRASS PUMPING - CLIFTON		12/23/2019 16:15
662401A0500	BEARGRASS PUMPING - CLIFTON		8/3/2020 13:08
667101A0500	BISHOP - ETHEL		2/25/2016 11:08
667101A0500	BISHOP - ETHEL		12/12/2016 0:00
667101A0500	BISHOP - ETHEL		4/15/2017 14:06
667101A0500	BISHOP - ETHEL		6/18/2017 16:52
667101A0500	BISHOP - ETHEL		6/26/2017 8:06

667101A0500	BISHOP - ETHEL		6/28/2017 12:12
667101A0500	BISHOP - ETHEL		6/28/2017 16:39
667101A0500	BISHOP - ETHEL		12/28/2017 15:59
667101A0500	BISHOP - ETHEL		6/28/2018 11:43
667101A0500	BISHOP - ETHEL		12/9/2018 18:25
667101A0500	BISHOP - ETHEL		12/31/2018 12:46
667101A0500	BISHOP - ETHEL		6/27/2019 13:02
667101A0500	BISHOP - ETHEL		12/30/2019 0:00
667101A0500	BISHOP - ETHEL		10/7/2020 7:17
667201A0500	BISHOP - FERN VALLEY		2/25/2016 10:37
667201A0500	BISHOP - FERN VALLEY		12/12/2016 0:00
667201A0500	BISHOP - FERN VALLEY		4/15/2017 14:06
667201A0500	BISHOP - FERN VALLEY		6/18/2017 16:52
667201A0500	BISHOP - FERN VALLEY		6/26/2017 8:05
667201A0500	BISHOP - FERN VALLEY		6/28/2017 12:12
667201A0500	BISHOP - FERN VALLEY		12/28/2017 15:59
667201A0500	BISHOP - FERN VALLEY		6/21/2018 10:18
667201A0500	BISHOP - FERN VALLEY		12/9/2018 18:25
667201A0500	BISHOP - FERN VALLEY		12/31/2018 12:46
667201A0500	BISHOP - FERN VALLEY		6/27/2019 13:02
667201A0500	BISHOP - FERN VALLEY		12/30/2019 0:00
667201A0500	BISHOP - FERN VALLEY		8/26/2020 12:50
389101A0500	BLUEGRASS - HURSTBOURNE		2/25/2016 13:36
389101A0500	BLUEGRASS - HURSTBOURNE		12/6/2016 0:00
389101A0500	BLUEGRASS - HURSTBOURNE		4/15/2017 14:29

389101A0500	BLUEGRASS - HURSTBOURNE		6/26/2017 8:11
389101A0500	BLUEGRASS - HURSTBOURNE		6/28/2017 12:12
389101A0500	BLUEGRASS - HURSTBOURNE		12/11/2017 0:00
389101A0500	BLUEGRASS - HURSTBOURNE		12/14/2017 15:29
389101A0500	BLUEGRASS - HURSTBOURNE		12/19/2017 12:03
389101A0500	BLUEGRASS - HURSTBOURNE		12/26/2017 11:00
389101A0500	BLUEGRASS - HURSTBOURNE		12/28/2017 15:54
389101A0500	BLUEGRASS - HURSTBOURNE		6/25/2018 18:06
389101A0500	BLUEGRASS - HURSTBOURNE		11/15/2018 10:46
389101A0500	BLUEGRASS - HURSTBOURNE		12/31/2018 12:43
389101A0500	BLUEGRASS - HURSTBOURNE		6/14/2019 20:11
389101A0500	BLUEGRASS - HURSTBOURNE		12/23/2019 12:16
389101A0500	BLUEGRASS - HURSTBOURNE		7/30/2020 12:56
389101A0500	BLUEGRASS - HURSTBOURNE		8/13/2020 9:06
387201A0500	BRECKENRIDGE - ETHEL		2/25/2016 12:31
387201A0500	BRECKENRIDGE - ETHEL		12/5/2016 0:00
387201A0500	BRECKENRIDGE - ETHEL		6/18/2017 16:50
387201A0500	BRECKENRIDGE - ETHEL		6/22/2017 8:31
387201A0500	BRECKENRIDGE - ETHEL		6/26/2017 8:10
387201A0500	BRECKENRIDGE - ETHEL		6/28/2017 16:31
387201A0500	BRECKENRIDGE - ETHEL		12/14/2017 15:33
387201A0500	BRECKENRIDGE - ETHEL		12/26/2017 11:38
387201A0500	BRECKENRIDGE - ETHEL		12/28/2017 15:54
387201A0500	BRECKENRIDGE - ETHEL		6/25/2018 17:49
387201A0500	BRECKENRIDGE - ETHEL		10/16/2018 13:28

387201A0500	BRECKENRIDGE - ETHEL		12/31/2018 12:42
387201A0500	BRECKENRIDGE - ETHEL		6/14/2019 20:13
387201A0500	BRECKENRIDGE - ETHEL		12/21/2019 10:49
387201A0500	BRECKENRIDGE - ETHEL		9/17/2020 9:27
388801A0500	BRECKENRIDGE - HURSTBOURNE		2/25/2016 13:36
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/6/2016 0:00
388801A0500	BRECKENRIDGE - HURSTBOURNE		6/26/2017 8:10
388801A0500	BRECKENRIDGE - HURSTBOURNE		6/28/2017 16:32
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/14/2017 15:29
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/26/2017 11:32
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/28/2017 15:54
388801A0500	BRECKENRIDGE - HURSTBOURNE		6/25/2018 17:49
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/31/2018 12:42
388801A0500	BRECKENRIDGE - HURSTBOURNE		6/6/2019 10:10
388801A0500	BRECKENRIDGE - HURSTBOURNE		6/14/2019 20:04
388801A0500	BRECKENRIDGE - HURSTBOURNE		12/23/2019 14:02
388801A0500	BRECKENRIDGE - HURSTBOURNE		9/23/2020 7:44
665301A0500	BRECKENRIDGE - OXMOOR		3/7/2016 17:38
665301A0500	BRECKENRIDGE - OXMOOR		12/8/2016 0:00
665301A0500	BRECKENRIDGE - OXMOOR		6/26/2017 8:07
665301A0500	BRECKENRIDGE - OXMOOR		6/28/2017 16:36
665301A0500	BRECKENRIDGE - OXMOOR		12/28/2017 15:57
665301A0500	BRECKENRIDGE - OXMOOR		6/29/2018 23:18
665301A0500	BRECKENRIDGE - OXMOOR		12/9/2018 17:56
665301A0500	BRECKENRIDGE - OXMOOR		12/31/2018 12:45

665301A0500	BRECKENRIDGE - OXMOOR		6/14/2019 20:12
665301A0500	BRECKENRIDGE - OXMOOR		10/7/2020 7:16
662901A0500	BRECKINRIDGE - HILLCREST		3/8/2016 17:27
662901A0500	BRECKINRIDGE - HILLCREST		12/7/2016 0:00
662901A0500	BRECKINRIDGE - HILLCREST		4/15/2017 14:29
662901A0500	BRECKINRIDGE - HILLCREST		6/18/2017 16:51
662901A0500	BRECKINRIDGE - HILLCREST		6/26/2017 8:12
662901A0500	BRECKINRIDGE - HILLCREST		6/28/2017 12:12
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662901A0500	BRECKINRIDGE - HILLCREST		6/28/2018 11:43
662901A0500	BRECKINRIDGE - HILLCREST		11/15/2018 10:26
662901A0500	BRECKINRIDGE - HILLCREST		12/31/2018 12:43
662901A0500	BRECKINRIDGE - HILLCREST		6/14/2019 20:04
662901A0500	BRECKINRIDGE - HILLCREST		12/30/2019 12:45
662901A0500	BRECKINRIDGE - HILLCREST		10/7/2020 7:25
661601A0500	CANAL - DEL PARK		3/14/2016 11:04
661601A0500	CANAL - DEL PARK		12/6/2016 0:00
661601A0500	CANAL - DEL PARK		6/18/2017 16:50
661601A0500	CANAL - DEL PARK		6/26/2017 8:11
661601A0500	CANAL - DEL PARK		6/28/2017 16:32
661601A0500	CANAL - DEL PARK		12/26/2017 11:27
661601A0500	CANAL - DEL PARK		12/28/2017 15:54
661601A0500	CANAL - DEL PARK		6/22/2018 11:12
661601A0500	CANAL - DEL PARK		11/15/2018 10:26
661601A0500	CANAL - DEL PARK		12/31/2018 12:43

661601A0500	CANAL - DEL PARK		6/27/2019 12:49
661601A0500	CANAL - DEL PARK		12/23/2019 14:02
661601A0500	CANAL - DEL PARK		8/24/2020 9:56
661701A0500	CANAL - MADISON		3/10/2016 18:30
661701A0500	CANAL - MADISON		12/6/2016 0:00
661701A0500	CANAL - MADISON		6/18/2017 16:50
661701A0500	CANAL - MADISON		6/22/2017 8:32
661701A0500	CANAL - MADISON		6/26/2017 8:11
661701A0500	CANAL - MADISON		6/28/2017 16:32
661701A0500	CANAL - MADISON		12/28/2017 15:54
661701A0500	CANAL - MADISON		6/21/2018 9:12
661701A0500	CANAL - MADISON		11/15/2018 10:26
661701A0500	CANAL - MADISON		12/31/2018 12:43
661701A0500	CANAL - MADISON		6/19/2019 11:58
661701A0500	CANAL - MADISON		12/30/2019 12:44
661201A0500	CANAL - MAGAZINE		12/6/2016 0:00
661201A0500	CANAL - MAGAZINE		6/26/2017 8:04
661201A0500	CANAL - MAGAZINE		6/28/2017 16:40
661201A0500	CANAL - MAGAZINE		12/14/2017 15:30
661201A0500	CANAL - MAGAZINE		12/19/2017 13:50
661201A0500	CANAL - MAGAZINE		12/26/2017 11:34
661201A0500	CANAL - MAGAZINE		12/28/2017 16:02
661201A0500	CANAL - MAGAZINE		6/28/2018 15:52
661201A0500	CANAL - MAGAZINE		10/10/2018 19:23
661201A0500	CANAL - MAGAZINE		12/31/2018 12:49

661201A0500	CANAL - MAGAZINE		12/23/2019 12:18
661201A0500	CANAL - MAGAZINE		8/6/2020 11:46
661201A0500	CANAL - MAGAZINE		9/17/2020 7:20
386101A0500	CANAL - WATERSIDE		12/5/2016 0:00
386101A0500	CANAL - WATERSIDE		6/26/2017 8:05
386101A0500	CANAL - WATERSIDE		6/28/2017 16:42
386101A0500	CANAL - WATERSIDE		12/14/2017 15:28
386101A0500	CANAL - WATERSIDE		12/26/2017 11:30
386101A0500	CANAL - WATERSIDE		12/28/2017 16:00
386101A0500	CANAL - WATERSIDE		12/31/2018 12:47
386101A0500	CANAL - WATERSIDE		6/19/2019 14:25
386101A0500	CANAL - WATERSIDE		12/21/2019 10:49
666501A0500	CANE RUN SWIT. STA - FARNSLEY		2/17/2016 17:29
666501A0500	CANE RUN SWIT. STA - FARNSLEY		12/8/2016 0:00
666501A0500	CANE RUN SWIT. STA - FARNSLEY		6/26/2017 8:06
666501A0500	CANE RUN SWIT. STA - FARNSLEY		6/28/2017 16:37
666501A0500	CANE RUN SWIT. STA - FARNSLEY		12/28/2017 15:58
666501A0500	CANE RUN SWIT. STA - FARNSLEY		12/9/2018 18:20
666501A0500	CANE RUN SWIT. STA - FARNSLEY		12/31/2018 12:46
666501A0500	CANE RUN SWIT. STA - FARNSLEY		6/27/2019 13:00
666501A0500	CANE RUN SWIT. STA - FARNSLEY		9/9/2020 11:20
666501A0500	CANE RUN SWIT. STA - FARNSLEY		9/16/2020 13:04
667801A0500	CANE RUN SWIT. STA - TERRY		2/24/2016 10:26
667801A0500	CANE RUN SWIT. STA - TERRY		12/12/2016 0:00
667801A0500	CANE RUN SWIT. STA - TERRY		6/26/2017 8:05

667801A0500	CANE RUN SWIT. STA - TERRY		6/28/2017 16:40
667801A0500	CANE RUN SWIT. STA - TERRY		12/28/2017 15:59
667801A0500	CANE RUN SWIT. STA - TERRY		12/9/2018 18:32
667801A0500	CANE RUN SWIT. STA - TERRY		12/31/2018 12:46
667801A0500	CANE RUN SWIT. STA - TERRY		6/27/2019 13:05
667801A0500	CANE RUN SWIT. STA - TERRY		8/5/2020 12:21
667801A0500	CANE RUN SWIT. STA - TERRY		8/6/2020 11:46
667801A0500	CANE RUN SWIT. STA - TERRY		8/18/2020 11:20
667801A0500	CANE RUN SWIT. STA - TERRY		9/21/2020 11:57
663501A0500	CANE RUN SWIT. STA. - STEWART		2/24/2016 10:32
663501A0500	CANE RUN SWIT. STA. - STEWART		12/7/2016 0:00
663501A0500	CANE RUN SWIT. STA. - STEWART		6/26/2017 8:13
663501A0500	CANE RUN SWIT. STA. - STEWART		6/28/2017 16:34
663501A0500	CANE RUN SWIT. STA. - STEWART		12/28/2017 15:55
663501A0500	CANE RUN SWIT. STA. - STEWART		6/25/2018 18:14
663501A0500	CANE RUN SWIT. STA. - STEWART		6/26/2018 8:29
663501A0500	CANE RUN SWIT. STA. - STEWART		11/15/2018 10:26
663501A0500	CANE RUN SWIT. STA. - STEWART		12/31/2018 12:44
663501A0500	CANE RUN SWIT. STA. - STEWART		6/19/2019 12:10
663501A0500	CANE RUN SWIT. STA. - STEWART		12/30/2019 12:43
663501A0500	CANE RUN SWIT. STA. - STEWART		8/5/2020 12:21
663501A0500	CANE RUN SWIT. STA. - STEWART		8/18/2020 11:20
662601A0500	CANE RUN SWS. TO SHIVELY		2/11/2016 17:51
662601A0500	CANE RUN SWS. TO SHIVELY		12/6/2016 0:00
662601A0500	CANE RUN SWS. TO SHIVELY		6/18/2017 16:49

662601A0500	CANE RUN SWS. TO SHIVELY		6/22/2017 8:31
662601A0500	CANE RUN SWS. TO SHIVELY		6/26/2017 8:03
662601A0500	CANE RUN SWS. TO SHIVELY		6/28/2017 16:30
662601A0500	CANE RUN SWS. TO SHIVELY		12/28/2017 15:53
662601A0500	CANE RUN SWS. TO SHIVELY		6/25/2018 17:52
662601A0500	CANE RUN SWS. TO SHIVELY		11/15/2018 10:50
662601A0500	CANE RUN SWS. TO SHIVELY		12/31/2018 12:41
662601A0500	CANE RUN SWS. TO SHIVELY		6/27/2019 12:59
662601A0500	CANE RUN SWS. TO SHIVELY		12/23/2019 16:20
664501A0500	CLAY - FLOYD		3/8/2016 17:29
664501A0500	CLAY - FLOYD		12/7/2016 0:00
664501A0500	CLAY - FLOYD		6/22/2017 8:32
664501A0500	CLAY - FLOYD		6/26/2017 8:08
664501A0500	CLAY - FLOYD		6/28/2017 16:35
664501A0500	CLAY - FLOYD		12/28/2017 15:56
664501A0500	CLAY - FLOYD		6/14/2018 12:28
664501A0500	CLAY - FLOYD		11/29/2018 10:41
664501A0500	CLAY - FLOYD		12/31/2018 12:44
664501A0500	CLAY - FLOYD		6/19/2019 11:44
664501A0500	CLAY - FLOYD		12/26/2019 15:57
664501A0500	CLAY - FLOYD		8/10/2020 8:59
666301A0500	CLAY - HIGHLAND		3/8/2016 17:29
666301A0500	CLAY - HIGHLAND		12/8/2016 0:00
666301A0500	CLAY - HIGHLAND		6/26/2017 8:06
666301A0500	CLAY - HIGHLAND		6/28/2017 16:37

666301A0500	CLAY - HIGHLAND		12/28/2017 15:58
666301A0500	CLAY - HIGHLAND		6/21/2018 9:12
666301A0500	CLAY - HIGHLAND		12/9/2018 18:15
666301A0500	CLAY - HIGHLAND		12/31/2018 12:46
666301A0500	CLAY - HIGHLAND		6/27/2019 12:52
666301A0500	CLAY - HIGHLAND		12/30/2019 0:00
662701A0500	CLAY - MADISON		3/8/2016 17:28
662701A0500	CLAY - MADISON		12/6/2016 0:00
662701A0500	CLAY - MADISON		6/26/2017 8:12
662701A0500	CLAY - MADISON		6/28/2017 16:33
662701A0500	CLAY - MADISON		12/28/2017 15:55
662701A0500	CLAY - MADISON		6/28/2018 15:52
662701A0500	CLAY - MADISON		11/15/2018 10:50
662701A0500	CLAY - MADISON		12/31/2018 12:43
662701A0500	CLAY - MADISON		6/19/2019 14:26
662701A0500	CLAY - MADISON		12/23/2019 12:19
662801A0500	CLIFTON - HILLCREST		3/8/2016 9:17
662801A0500	CLIFTON - HILLCREST		12/7/2016 0:00
662801A0500	CLIFTON - HILLCREST		6/18/2017 15:05
662801A0500	CLIFTON - HILLCREST		6/26/2017 8:12
662801A0500	CLIFTON - HILLCREST		6/28/2017 16:33
662801A0500	CLIFTON - HILLCREST		12/12/2017 0:00
662801A0500	CLIFTON - HILLCREST		12/18/2017 0:00
662801A0500	CLIFTON - HILLCREST		12/28/2017 15:11
662801A0500	CLIFTON - HILLCREST		6/28/2018 11:43

662801A0500	CLIFTON - HILLCREST		11/15/2018 10:26
662801A0500	CLIFTON - HILLCREST		12/31/2018 12:43
662801A0500	CLIFTON - HILLCREST		6/14/2019 20:04
662801A0500	CLIFTON - HILLCREST		12/23/2019 16:15
662801A0500	CLIFTON - HILLCREST		8/3/2020 13:08
668401A0500	COLLINS - CRESTWOOD		3/7/2016 17:40
668401A0500	COLLINS - CRESTWOOD		12/13/2016 0:00
668401A0500	COLLINS - CRESTWOOD		6/26/2017 8:05
668401A0500	COLLINS - CRESTWOOD		6/28/2017 16:40
668401A0500	COLLINS - CRESTWOOD		12/28/2017 15:59
668401A0500	COLLINS - CRESTWOOD		6/25/2018 17:53
668401A0500	COLLINS - CRESTWOOD		12/9/2018 18:36
668401A0500	COLLINS - CRESTWOOD		12/31/2018 12:47
668401A0500	COLLINS - CRESTWOOD		6/14/2019 20:00
668401A0500	COLLINS - CRESTWOOD		7/27/2020 14:55
668501A0500	COLLINS - FORD		3/7/2016 17:40
668501A0500	COLLINS - FORD		12/13/2016 0:00
668501A0500	COLLINS - FORD		6/26/2017 8:05
668501A0500	COLLINS - FORD		6/28/2017 16:40
668501A0500	COLLINS - FORD		12/28/2017 16:00
668501A0500	COLLINS - FORD		6/25/2018 17:53
668501A0500	COLLINS - FORD		12/9/2018 18:37
668501A0500	COLLINS - FORD		12/31/2018 12:47
668501A0500	COLLINS - FORD		6/14/2019 20:03
331601D0500	COMMISARY TAP		12/27/2016 12:26

331601D0500	COMMISARY TAP		6/18/2017 16:25
331601D0500	COMMISARY TAP		6/18/2017 16:53
331601D0500	COMMISARY TAP		6/26/2017 8:04
331601D0500	COMMISARY TAP		6/28/2017 16:40
331601D0500	COMMISARY TAP		12/28/2017 16:02
331601D0500	COMMISARY TAP		6/21/2018 9:54
331601D0500	COMMISARY TAP		6/25/2018 17:51
331601D0500	COMMISARY TAP		12/9/2018 17:56
331601D0500	COMMISARY TAP		12/31/2018 12:49
666901A0500	DAHLIA - ETHEL		2/25/2016 12:32
666901A0500	DAHLIA - ETHEL		12/8/2016 0:00
666901A0500	DAHLIA - ETHEL		6/18/2017 16:52
666901A0500	DAHLIA - ETHEL		6/26/2017 8:06
666901A0500	DAHLIA - ETHEL		6/28/2017 16:39
666901A0500	DAHLIA - ETHEL		12/28/2017 15:59
666901A0500	DAHLIA - ETHEL		6/29/2018 23:20
666901A0500	DAHLIA - ETHEL		12/9/2018 18:24
666901A0500	DAHLIA - ETHEL		12/31/2018 12:46
666901A0500	DAHLIA - ETHEL		6/27/2019 13:05
666901A0500	DAHLIA - ETHEL		12/21/2019 0:00
666901A0500	DAHLIA - ETHEL		8/13/2020 9:06
666001A0500	DAHLIA - HIGHLAND		3/8/2016 17:30
666001A0500	DAHLIA - HIGHLAND		12/8/2016 0:00
666001A0500	DAHLIA - HIGHLAND		6/26/2017 8:07
666001A0500	DAHLIA - HIGHLAND		6/28/2017 16:36

666001A0500	DAHLIA - HIGHLAND		12/28/2017 15:57
666001A0500	DAHLIA - HIGHLAND		6/29/2018 23:19
666001A0500	DAHLIA - HIGHLAND		12/9/2018 18:10
666001A0500	DAHLIA - HIGHLAND		12/31/2018 12:45
666001A0500	DAHLIA - HIGHLAND		6/14/2019 20:15
666001A0500	DAHLIA - HIGHLAND		12/21/2019 0:00
666001A0500	DAHLIA - HIGHLAND		7/27/2020 14:55
661801A0500	DEL PARK - GRADY		3/14/2016 11:05
661801A0500	DEL PARK - GRADY		12/6/2016 0:00
661801A0500	DEL PARK - GRADY		6/22/2017 8:31
661801A0500	DEL PARK - GRADY		6/26/2017 8:11
661801A0500	DEL PARK - GRADY		6/28/2017 16:33
661801A0500	DEL PARK - GRADY		12/28/2017 15:54
661801A0500	DEL PARK - GRADY		6/22/2018 11:12
661801A0500	DEL PARK - GRADY		11/15/2018 10:26
661801A0500	DEL PARK - GRADY		12/31/2018 12:43
661801A0500	DEL PARK - GRADY		6/27/2019 12:52
661801A0500	DEL PARK - GRADY		12/23/2019 14:02
661801A0500	DEL PARK - GRADY		8/24/2020 9:56
381101A0500	DIXIE - PADDYS RUN		2/16/2016 18:33
381101A0500	DIXIE - PADDYS RUN		12/5/2016 0:00
381101A0500	DIXIE - PADDYS RUN		6/22/2017 8:31
381101A0500	DIXIE - PADDYS RUN		6/26/2017 8:03
381101A0500	DIXIE - PADDYS RUN		6/28/2017 16:30
381101A0500	DIXIE - PADDYS RUN		7/7/2017 0:00

381101A0500	DIXIE - PADDYS RUN		12/1/2017 0:00
381101A0500	DIXIE - PADDYS RUN		12/12/2017 0:00
381101A0500	DIXIE - PADDYS RUN		12/14/2017 15:33
381101A0500	DIXIE - PADDYS RUN		12/26/2017 11:36
381101A0500	DIXIE - PADDYS RUN		12/28/2017 15:53
381101A0500	DIXIE - PADDYS RUN		1/1/2018 0:00
381101A0500	DIXIE - PADDYS RUN		6/26/2018 8:29
381101A0500	DIXIE - PADDYS RUN		6/28/2018 15:52
381101A0500	DIXIE - PADDYS RUN		10/2/2018 11:53
381101A0500	DIXIE - PADDYS RUN		12/31/2018 12:41
381101A0500	DIXIE - PADDYS RUN		6/27/2019 12:41
381101A0500	DIXIE - PADDYS RUN		12/21/2019 10:40
381101A0500	DIXIE - PADDYS RUN		8/10/2020 8:59
667001A0500	ETHEL - NACHAND		3/10/2016 18:31
667001A0500	ETHEL - NACHAND		12/12/2016 0:00
667001A0500	ETHEL - NACHAND		4/15/2017 14:29
667001A0500	ETHEL - NACHAND		6/26/2017 8:06
667001A0500	ETHEL - NACHAND		6/28/2017 12:12
667001A0500	ETHEL - NACHAND		6/28/2017 16:39
667001A0500	ETHEL - NACHAND		12/28/2017 15:59
667001A0500	ETHEL - NACHAND		6/7/2018 13:22
667001A0500	ETHEL - NACHAND		12/31/2018 12:46
667001A0500	ETHEL - NACHAND		6/14/2019 20:06
667001A0500	ETHEL - NACHAND		7/30/2020 12:56
663601A0500	FARNSLEY - PADDYS RUN		2/17/2016 10:53

663601A0500	FARNSLEY - PADDYS RUN		12/7/2016 0:00
663601A0500	FARNSLEY - PADDYS RUN		6/18/2017 16:51
663601A0500	FARNSLEY - PADDYS RUN		6/26/2017 8:13
663601A0500	FARNSLEY - PADDYS RUN		6/28/2017 16:34
663601A0500	FARNSLEY - PADDYS RUN		12/28/2017 15:56
663601A0500	FARNSLEY - PADDYS RUN		6/26/2018 8:29
663601A0500	FARNSLEY - PADDYS RUN		11/15/2018 10:26
663601A0500	FARNSLEY - PADDYS RUN		12/31/2018 12:44
663601A0500	FARNSLEY - PADDYS RUN		12/30/2019 12:46
663601A0500	FARNSLEY - PADDYS RUN		9/1/2020 10:03
663701A0500	FARNSLEY - SHIVELY		2/10/2016 19:27
663701A0500	FARNSLEY - SHIVELY		12/7/2016 0:00
663701A0500	FARNSLEY - SHIVELY		6/26/2017 8:09
663701A0500	FARNSLEY - SHIVELY		6/28/2017 16:34
663701A0500	FARNSLEY - SHIVELY		12/28/2017 15:56
663701A0500	FARNSLEY - SHIVELY		6/25/2018 17:50
663701A0500	FARNSLEY - SHIVELY		11/15/2018 10:51
663701A0500	FARNSLEY - SHIVELY		12/31/2018 12:44
663701A0500	FARNSLEY - SHIVELY		6/27/2019 13:00
663701A0500	FARNSLEY - SHIVELY		12/23/2019 12:20
663701A0500	FARNSLEY - SHIVELY		8/6/2020 11:46
383501A0500	FERN VALLEY - GRADE LANE		2/25/2016 9:05
383501A0500	FERN VALLEY - GRADE LANE		12/5/2016 0:00
383501A0500	FERN VALLEY - GRADE LANE		4/15/2017 14:29
383501A0500	FERN VALLEY - GRADE LANE		6/18/2017 16:50

383501A0500	FERN VALLEY - GRADE LANE		6/26/2017 8:04
383501A0500	FERN VALLEY - GRADE LANE		6/28/2017 12:12
383501A0500	FERN VALLEY - GRADE LANE		6/28/2017 16:31
383501A0500	FERN VALLEY - GRADE LANE		12/14/2017 15:33
383501A0500	FERN VALLEY - GRADE LANE		12/26/2017 11:38
383501A0500	FERN VALLEY - GRADE LANE		12/28/2017 15:53
383501A0500	FERN VALLEY - GRADE LANE		6/28/2018 15:52
383501A0500	FERN VALLEY - GRADE LANE		10/10/2018 19:19
383501A0500	FERN VALLEY - GRADE LANE		10/10/2018 19:20
383501A0500	FERN VALLEY - GRADE LANE		12/31/2018 12:41
383501A0500	FERN VALLEY - GRADE LANE		6/27/2019 12:46
383501A0500	FERN VALLEY - GRADE LANE		12/21/2019 10:40
387601A0500	FERN VALLEY - OKOLONA		2/25/2016 9:34
387601A0500	FERN VALLEY - OKOLONA		12/5/2016 0:00
387601A0500	FERN VALLEY - OKOLONA		6/26/2017 8:10
387601A0500	FERN VALLEY - OKOLONA		6/28/2017 16:32
387601A0500	FERN VALLEY - OKOLONA		12/28/2017 15:54
387601A0500	FERN VALLEY - OKOLONA		6/6/2018 15:02
387601A0500	FERN VALLEY - OKOLONA		6/6/2018 15:02
387601A0500	FERN VALLEY - OKOLONA		12/31/2018 12:42
387601A0500	FERN VALLEY - OKOLONA		6/19/2019 14:26
387601A0500	FERN VALLEY - OKOLONA		12/23/2019 12:16
387601A0500	FERN VALLEY - OKOLONA		10/7/2020 7:28
664701A0500	FLOYD - SEMINOLE		2/3/2016 16:51
664701A0500	FLOYD - SEMINOLE		12/7/2016 0:00

664701A0500	FLOYD - SEMINOLE		6/22/2017 8:32
664701A0500	FLOYD - SEMINOLE		6/26/2017 8:08
664701A0500	FLOYD - SEMINOLE		6/28/2017 16:35
664701A0500	FLOYD - SEMINOLE		12/28/2017 15:56
664701A0500	FLOYD - SEMINOLE		6/21/2018 9:53
664701A0500	FLOYD - SEMINOLE		11/29/2018 10:53
664701A0500	FLOYD - SEMINOLE		12/31/2018 12:44
664701A0500	FLOYD - SEMINOLE		6/14/2019 20:08
664701A0500	FLOYD - SEMINOLE		6/19/2019 12:00
664701A0500	FLOYD - SEMINOLE		12/26/2019 16:06
664701A0500	FLOYD - SEMINOLE		10/7/2020 7:17
665901A0500	FREY'S HILL - FORD		3/7/2016 17:39
665901A0500	FREY'S HILL - FORD		12/8/2016 0:00
665901A0500	FREY'S HILL - FORD		6/18/2017 16:51
665901A0500	FREY'S HILL - FORD		6/26/2017 8:07
665901A0500	FREY'S HILL - FORD		6/28/2017 16:36
665901A0500	FREY'S HILL - FORD		12/28/2017 15:57
665901A0500	FREY'S HILL - FORD		12/9/2018 18:06
665901A0500	FREY'S HILL - FORD		12/31/2018 12:45
665901A0500	FREY'S HILL - FORD		6/6/2019 10:10
665901A0500	FREY'S HILL - FORD		6/14/2019 20:00
665901A0500	FREY'S HILL - FORD		12/30/2019 0:00
665901A0500	FREY'S HILL - FORD		9/17/2020 14:06
665901A0500	FREY'S HILL - FORD		10/7/2020 7:19
669101A0500	FREYS HILL - LYNDON		3/7/2016 17:39

669101A0500	FREYS HILL - LYNDON		12/13/2016 0:00
669101A0500	FREYS HILL - LYNDON		6/26/2017 8:05
669101A0500	FREYS HILL - LYNDON		6/28/2017 16:42
669101A0500	FREYS HILL - LYNDON		12/28/2017 16:00
669101A0500	FREYS HILL - LYNDON		6/25/2018 17:54
669101A0500	FREYS HILL - LYNDON		12/9/2018 18:38
669101A0500	FREYS HILL - LYNDON		12/31/2018 12:47
669101A0500	FREYS HILL - LYNDON		6/14/2019 20:12
669101A0500	FREYS HILL - LYNDON		8/18/2020 11:20
669101A0500	FREYS HILL - LYNDON		9/17/2020 14:18
669101A0500	FREYS HILL - LYNDON		9/18/2020 7:34
663301A0500	GRADY - PADDYS RUN		2/24/2016 14:42
663301A0500	GRADY - PADDYS RUN		12/7/2016 0:00
663301A0500	GRADY - PADDYS RUN		6/18/2017 16:51
663301A0500	GRADY - PADDYS RUN		6/22/2017 8:32
663301A0500	GRADY - PADDYS RUN		6/26/2017 8:12
663301A0500	GRADY - PADDYS RUN		6/28/2017 16:34
663301A0500	GRADY - PADDYS RUN		12/28/2017 15:55
663301A0500	GRADY - PADDYS RUN		6/26/2018 8:29
663301A0500	GRADY - PADDYS RUN		11/15/2018 10:26
663301A0500	GRADY - PADDYS RUN		12/31/2018 12:44
663301A0500	GRADY - PADDYS RUN		6/27/2019 13:00
663301A0500	GRADY - PADDYS RUN		12/23/2019 16:20
385901A0500	HANCOCK - MAGAZINE		3/8/2016 17:29
385901A0500	HANCOCK - MAGAZINE		12/5/2016 0:00

385901A0500	HANCOCK - MAGAZINE		6/26/2017 8:09
385901A0500	HANCOCK - MAGAZINE		6/28/2017 16:31
385901A0500	HANCOCK - MAGAZINE		12/28/2017 15:53
385901A0500	HANCOCK - MAGAZINE		6/21/2018 9:12
385901A0500	HANCOCK - MAGAZINE		10/10/2018 19:20
385901A0500	HANCOCK - MAGAZINE		12/31/2018 12:41
385901A0500	HANCOCK - MAGAZINE		6/19/2019 14:24
385901A0500	HANCOCK - MAGAZINE		12/21/2019 10:46
385901A0500	HANCOCK - MAGAZINE		8/18/2020 11:20
385901A0500	HANCOCK - MAGAZINE		9/16/2020 12:25
388701A0500	HURSTBOURNE - PLAINVIEW		2/25/2016 15:36
388701A0500	HURSTBOURNE - PLAINVIEW		12/6/2016 0:00
388701A0500	HURSTBOURNE - PLAINVIEW		6/22/2017 8:31
388701A0500	HURSTBOURNE - PLAINVIEW		6/26/2017 8:10
388701A0500	HURSTBOURNE - PLAINVIEW		6/28/2017 16:32
388701A0500	HURSTBOURNE - PLAINVIEW		12/14/2017 15:33
388701A0500	HURSTBOURNE - PLAINVIEW		12/26/2017 11:37
388701A0500	HURSTBOURNE - PLAINVIEW		12/28/2017 15:54
388701A0500	HURSTBOURNE - PLAINVIEW		6/25/2018 17:49
388701A0500	HURSTBOURNE - PLAINVIEW		12/31/2018 12:42
388701A0500	HURSTBOURNE - PLAINVIEW		6/14/2019 20:15
388701A0500	HURSTBOURNE - PLAINVIEW		6/19/2019 14:26
388701A0500	HURSTBOURNE - PLAINVIEW		12/23/2019 12:16
388701A0500	HURSTBOURNE - PLAINVIEW		8/12/2020 8:14
663801A0500	KENWOOD - SEMINOLE		2/15/2016 18:04

663801A0500	KENWOOD - SEMINOLE		12/7/2016 0:00
663801A0500	KENWOOD - SEMINOLE		6/18/2017 15:05
663801A0500	KENWOOD - SEMINOLE		6/26/2017 8:09
663801A0500	KENWOOD - SEMINOLE		6/28/2017 16:34
663801A0500	KENWOOD - SEMINOLE		12/28/2017 15:56
663801A0500	KENWOOD - SEMINOLE		6/14/2018 9:51
663801A0500	KENWOOD - SEMINOLE		11/29/2018 10:41
663801A0500	KENWOOD - SEMINOLE		12/31/2018 12:44
663801A0500	KENWOOD - SEMINOLE		6/14/2019 20:09
663801A0500	KENWOOD - SEMINOLE		12/26/2019 15:57
663801A0500	KENWOOD - SEMINOLE		8/10/2020 8:59
663801A0500	KENWOOD - SEMINOLE		9/22/2020 9:57
664701B0500	LOCUST TAP		2/3/2016 16:51
664701B0500	LOCUST TAP		12/8/2016 0:00
664701B0500	LOCUST TAP		6/26/2017 8:08
664701B0500	LOCUST TAP		6/28/2017 16:35
664701B0500	LOCUST TAP		12/28/2017 15:56
664701B0500	LOCUST TAP		6/21/2018 9:12
664701B0500	LOCUST TAP		11/29/2018 10:41
664701B0500	LOCUST TAP		12/31/2018 12:45
664701B0500	LOCUST TAP		6/14/2019 20:08
664701B0500	LOCUST TAP		12/26/2019 15:57
664701B0500	LOCUST TAP		9/1/2020 10:03
669301A0500	LYNDON - OXMOOR		3/7/2016 17:39
669301A0500	LYNDON - OXMOOR		12/13/2016 0:00

669301A0500	LYNDON - OXMOOR		6/26/2017 8:05
669301A0500	LYNDON - OXMOOR		6/28/2017 16:42
669301A0500	LYNDON - OXMOOR		12/28/2017 16:00
669301A0500	LYNDON - OXMOOR		6/29/2018 23:19
669301A0500	LYNDON - OXMOOR		12/9/2018 18:39
669301A0500	LYNDON - OXMOOR		12/31/2018 12:47
669301A0500	LYNDON - OXMOOR		6/14/2019 19:59
669301A0500	LYNDON - OXMOOR		8/24/2020 13:18
669301A0500	LYNDON - OXMOOR		8/31/2020 9:30
380901A0500	MAGAZINE - WATERSIDE		3/10/2016 18:23
380901A0500	MAGAZINE - WATERSIDE		12/5/2016 0:00
380901A0500	MAGAZINE - WATERSIDE		6/18/2017 16:49
380901A0500	MAGAZINE - WATERSIDE		6/22/2017 8:31
380901A0500	MAGAZINE - WATERSIDE		6/26/2017 8:03
380901A0500	MAGAZINE - WATERSIDE		6/28/2017 16:30
380901A0500	MAGAZINE - WATERSIDE		12/26/2017 11:26
380901A0500	MAGAZINE - WATERSIDE		12/28/2017 15:53
380901A0500	MAGAZINE - WATERSIDE		6/28/2018 15:52
380901A0500	MAGAZINE - WATERSIDE		10/2/2018 11:55
380901A0500	MAGAZINE - WATERSIDE		12/31/2018 12:41
380901A0500	MAGAZINE - WATERSIDE		6/19/2019 14:24
380901A0500	MAGAZINE - WATERSIDE		12/21/2019 10:45
387701A0500	MUD LANE - OKOLONA		2/25/2016 9:34
387701A0500	MUD LANE - OKOLONA		12/6/2016 0:00
387701A0500	MUD LANE - OKOLONA		6/26/2017 8:10

387701A0500	MUD LANE - OKOLONA		6/28/2017 16:32
387701A0500	MUD LANE - OKOLONA		12/14/2017 15:29
387701A0500	MUD LANE - OKOLONA		12/26/2017 11:31
387701A0500	MUD LANE - OKOLONA		12/28/2017 15:54
387701A0500	MUD LANE - OKOLONA		6/6/2018 15:00
387701A0500	MUD LANE - OKOLONA		6/21/2018 10:48
387701A0500	MUD LANE - OKOLONA		12/31/2018 12:42
387701A0500	MUD LANE - OKOLONA		6/27/2019 12:46
387701A0500	MUD LANE - OKOLONA		12/23/2019 12:14
387701A0500	MUD LANE - OKOLONA		8/26/2020 12:50
666701A0500	NACHAND - WATTERSON		3/10/2016 18:31
666701A0500	NACHAND - WATTERSON		12/8/2016 0:00
666701A0500	NACHAND - WATTERSON		4/15/2017 14:29
666701A0500	NACHAND - WATTERSON		6/18/2017 15:05
666701A0500	NACHAND - WATTERSON		6/26/2017 8:06
666701A0500	NACHAND - WATTERSON		6/28/2017 12:12
666701A0500	NACHAND - WATTERSON		6/28/2017 16:39
666701A0500	NACHAND - WATTERSON		12/28/2017 15:58
666701A0500	NACHAND - WATTERSON		12/9/2018 18:21
666701A0500	NACHAND - WATTERSON		12/31/2018 12:46
666701A0500	NACHAND - WATTERSON		6/14/2019 20:06
666701A0500	NACHAND - WATTERSON		9/9/2020 11:20
666701A0500	NACHAND - WATTERSON		9/14/2020 13:10
387001B0500	PLAINVIEW TAP		2/25/2016 15:36
387001B0500	PLAINVIEW TAP		3/7/2016 17:41

387001B0500	PLAINVIEW TAP		12/5/2016 0:00
387001B0500	PLAINVIEW TAP		6/22/2017 8:31
387001B0500	PLAINVIEW TAP		6/26/2017 8:09
387001B0500	PLAINVIEW TAP		6/28/2017 16:31
387001B0500	PLAINVIEW TAP		12/26/2017 11:40
387001B0500	PLAINVIEW TAP		12/28/2017 15:54
387001B0500	PLAINVIEW TAP		6/21/2018 9:53
387001B0500	PLAINVIEW TAP		10/16/2018 13:28
387001B0500	PLAINVIEW TAP		12/31/2018 12:42
387001B0500	PLAINVIEW TAP		6/19/2019 14:26
387001B0500	PLAINVIEW TAP		12/30/2019 12:44
387001B0500	PLAINVIEW TAP		12/30/2019 12:44
387001B0500	PLAINVIEW TAP		9/21/2020 13:30
667801C0500	RIVERPORT TAP		2/24/2016 10:26
667801C0500	RIVERPORT TAP		12/13/2016 0:00
667801C0500	RIVERPORT TAP		6/26/2017 8:05
667801C0500	RIVERPORT TAP		6/28/2017 16:40
667801C0500	RIVERPORT TAP		12/28/2017 15:59
667801C0500	RIVERPORT TAP		12/9/2018 18:34
667801C0500	RIVERPORT TAP		12/31/2018 12:47
667801C0500	RIVERPORT TAP		6/27/2019 13:05
667801C0500	RIVERPORT TAP		10/8/2020 8:04
664801A0500	SEMINOLE - SHIVELY		12/8/2016 0:00
664801A0500	SEMINOLE - SHIVELY		6/26/2017 8:08
664801A0500	SEMINOLE - SHIVELY		6/28/2017 16:35

664801A0500	SEMINOLE - SHIVELY		12/28/2017 15:56
664801A0500	SEMINOLE - SHIVELY		6/14/2018 12:28
664801A0500	SEMINOLE - SHIVELY		11/29/2018 10:41
664801A0500	SEMINOLE - SHIVELY		12/31/2018 12:45
664801A0500	SEMINOLE - SHIVELY		6/14/2019 20:08
664801A0500	SEMINOLE - SHIVELY		8/12/2020 8:14
663001A0300	STEWART - ALGONQUIN		2/24/2016 11:10
663001A0300	STEWART - ALGONQUIN		12/7/2016 0:00
663001A0300	STEWART - ALGONQUIN		6/22/2017 8:31
663001A0300	STEWART - ALGONQUIN		6/26/2017 8:03
663001A0300	STEWART - ALGONQUIN		6/28/2017 16:33
663001A0300	STEWART - ALGONQUIN		12/28/2017 15:53
663001A0300	STEWART - ALGONQUIN		6/25/2018 17:52
663001A0300	STEWART - ALGONQUIN		11/15/2018 10:50
663001A0300	STEWART - ALGONQUIN		12/31/2018 12:41
663001A0300	STEWART - ALGONQUIN		6/19/2019 14:27
663001A0300	STEWART - ALGONQUIN		12/30/2019 12:46
663001A0300	STEWART - ALGONQUIN		8/3/2020 13:08
668801A0500	TAYLOR - HARRODS CREEK		3/7/2016 14:31
668801A0500	TAYLOR - HARRODS CREEK		12/13/2016 0:00
668801A0500	TAYLOR - HARRODS CREEK		6/26/2017 8:05
668801A0500	TAYLOR - HARRODS CREEK		6/28/2017 16:40
668801A0500	TAYLOR - HARRODS CREEK		12/28/2017 16:00
668801A0500	TAYLOR - HARRODS CREEK		6/29/2018 23:20
668801A0500	TAYLOR - HARRODS CREEK		12/9/2018 18:37

668801A0500	TAYLOR - HARRODS CREEK		12/31/2018 12:47
668801A0500	TAYLOR - HARRODS CREEK		6/19/2019 11:56
668801A0500	TAYLOR - HARRODS CREEK		10/7/2020 7:25
667801B0500	UPPER MILL CREEK TAP		2/24/2016 10:26
667801B0500	UPPER MILL CREEK TAP		12/12/2016 0:00
667801B0500	UPPER MILL CREEK TAP		6/26/2017 8:05
667801B0500	UPPER MILL CREEK TAP		6/28/2017 16:40
667801B0500	UPPER MILL CREEK TAP		12/28/2017 15:59
667801B0500	UPPER MILL CREEK TAP		6/25/2018 17:54
667801B0500	UPPER MILL CREEK TAP		12/9/2018 18:39
667801B0500	UPPER MILL CREEK TAP		12/31/2018 12:46
667801B0500	UPPER MILL CREEK TAP		6/27/2019 13:05
666101A0500	WORTHINGTON - HARRODS CREEK		3/7/2016 17:40
666101A0500	WORTHINGTON - HARRODS CREEK		12/8/2016 0:00
666101A0500	WORTHINGTON - HARRODS CREEK		6/18/2017 15:05
666101A0500	WORTHINGTON - HARRODS CREEK		6/26/2017 8:06
666101A0500	WORTHINGTON - HARRODS CREEK		6/28/2017 12:12
666101A0500	WORTHINGTON - HARRODS CREEK		6/28/2017 16:37
666101A0500	WORTHINGTON - HARRODS CREEK		12/28/2017 15:58
666101A0500	WORTHINGTON - HARRODS CREEK		6/28/2018 15:51
666101A0500	WORTHINGTON - HARRODS CREEK		12/9/2018 18:15
666101A0500	WORTHINGTON - HARRODS CREEK		12/31/2018 12:46
666101A0500	WORTHINGTON - HARRODS CREEK		6/19/2019 13:24
666101A0500	WORTHINGTON - HARRODS CREEK		12/30/2019 0:00
666101A0500	WORTHINGTON - HARRODS CREEK		9/1/2020 10:03

666101A0500	WORTHINGTON - HARRODS CREEK		9/1/2020 10:03
665901B0500	WORTHINGTON TAP		3/7/2016 17:40
665901B0500	WORTHINGTON TAP		12/8/2016 0:00
665901B0500	WORTHINGTON TAP		6/26/2017 8:06
665901B0500	WORTHINGTON TAP		6/28/2017 16:36
665901B0500	WORTHINGTON TAP		12/28/2017 15:58
665901B0500	WORTHINGTON TAP		12/9/2018 18:07
665901B0500	WORTHINGTON TAP		12/31/2018 12:45
665901B0500	WORTHINGTON TAP		6/27/2019 13:00
665901B0500	WORTHINGTON TAP		10/7/2020 7:20

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 96

Responding Witness: Lonnie E. Bellar

Q-96. For each arborist employed by the Company in the last 10 years, please state the name of the arborist and the direct supervisor of the arborist and additionally whether the arborist was (a) an ISA Certified Arborist or (b) an ISA Certified Arborist Utility Specialist.

A-96. Transmission employed the following arborist:

Michael Daukas (retired in 2015) -- Transmission Right-of-Way Coordinator-ISA ISA Certified Arborist and an ISA Certified Arborist Utility Specialist. His direct supervisor was the Group Leader of Construction, who was neither (a) nor (b).

The company currently uses contract arborists to support transmission vegetation management. Company employees provide oversight of the contract arborists.

Distribution employed the following arborists:

- Robert Arrington-ISA Certified Arborist (retired June 2012). Succeeded by Taylor Clarke- ISA Certified Arborist.
- James Mathews- ISA Certified Arborist (retired Dec 2013). Succeeded by Matthew Wiczorek- ISA Certified Arborist
- Tamara Eifert- ISA Certified Arborist (retired May 2018). Succeeded by Phillip Robertson- ISA and Utility Certified Arborist.
- Manager William Wheeler ISA and Utility Certified Arborist (retired August 2013). Succeeded by Terry Wright ISA Certified Arborist.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 97

Responding Witness: N/A

Q-97. [This item intentionally left blank.]

A-97. N/A

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 98

Responding Witness: N/A

Q-98. [This item intentionally left blank.]

A-98. N/A

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 99

Responding Witness: Lonnie E. Bellar

- Q-99. Please refer to the Commission's final Order in Case No. 2018-00295 dated April 30, 2019 at page 11.
- a. Has the Company previously sought recovery of any of the projects removed from the stipulations? If so, please state in what form the Company sought recovery, how much recovery was sought and when the recovery was sought.
 - b. Is the Company seeking recovery of any other projects removed during the previous rate case in this proceeding? If so, for what projects are recovery sought and how much is sought
- A-99. The only projects referenced on page 11 of the Commission's April 30, 2019 Order at page 11 are uniform diameter transmission pipeline projects. LG&E interprets this data request to ask whether LG&E has sought recovery of the cost of the uniform diameter transmission line projects referenced in Section 2.2.B of the Stipulation and Recommendation submitted to and approved by the Commission in its April 30, 2019 Order in Case No. 2018-00295. This is the only project that was removed from the LG&E's gas revenue requirement pursuant to the Stipulation and Recommendation. The parties to the Stipulation and Recommendation agreed, "to not oppose the particular forum through which LG&E seeks recovery of these costs in the future."⁸
- a. LG&E sought recovery of the uniform diameter transmission pipeline projects in its gas line tracker in Case No. 2019-00301. The Commission denied the request, finding that the projects "[did] not address any immediate safety or reliability concerns."⁹
 - b. LG&E is seeking recovery of the uniform diameter transmission pipeline projects in this case.¹⁰

⁸ Case No. 2018-00295, Stipulation and Recommendation at 11.

⁹ *Electronic Application of Louisville Gas and Electric Company for an Amended Gas Line Tracker*, Case No. 2019-00301, Order at 8 (Ky. PSC Mar. 26, 2020).

¹⁰ See the Bellar Testimony at 52.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 100

Responding Witness: Robert M. Conroy

Q-100. Following the elimination of certain Gas Line Tracker projects described in William Steven Seelye’s testimony at page 83, please state what projects remain and the amount of recovery remaining.

A-100. Ongoing capital and O&M expense related to GLT projects for gas service riser replacement, leak mitigation related to service line replacements and customer service line ownership will remain in the GLT mechanism upon approval of new rates in this proceeding. While this work is expected to continue past LG&E’s business plan period, the table below shows the expected amounts for both O&M and capital over the next five years.

O&M	2021	2022	2023	2024	2025	Total
CSO Meter Conditions	\$ 375,123	\$ 388,136	\$ 398,212	\$ 406,136	\$ 414,146	\$ 1,981,753
GAS CUSTOMER SERVICE UNLOC	\$ 310,000	\$ 310,000	\$ 310,000	\$ 310,000	\$ 310,000	\$ 1,550,000
REPAIR LEAKS - 004190	\$ 288,855	\$ 297,858	\$ 304,954	\$ 310,868	\$ 317,872	\$ 1,520,407
Total	\$ 973,978	\$ 995,994	\$ 1,013,165	\$ 1,027,003	\$ 1,042,019	\$ 5,052,160
Capital	2021	2022	2023	2024	2025	Total
INST CUST SRV - MAGNOLIA	\$ 25,143	\$ 25,143	\$ 25,143	\$ 25,143	\$ 25,143	\$ 125,716
NB CUST SRV LINE & GAS RISER	\$ 4,842,999	\$ 4,843,405	\$ 4,843,037	\$ 4,842,655	\$ 4,842,899	\$ 24,214,995
NB INST CUST SERV LINE & RSR	\$ 23,769	\$ 23,769	\$ 23,769	\$ 23,769	\$ 23,769	\$ 118,843
REP CO GAS SERV 419	\$ 3,135,169	\$ 3,135,033	\$ 3,135,096	\$ 3,134,810	\$ 3,134,891	\$ 15,675,000
REPL EXIST CS & RISER-4485	\$ 98,912	\$ 98,912	\$ 98,912	\$ 98,912	\$ 98,912	\$ 494,559
REPL EXIST CS WITH RISER-MUL	\$ 40,286	\$ 41,289	\$ 42,289	\$ 43,289	\$ 44,289	\$ 211,444
REPL EXIST CUST SRV W RISER	\$ 2,636,365	\$ 2,636,158	\$ 2,635,948	\$ 2,635,845	\$ 2,635,082	\$ 13,179,399
Serv Line Repl-Muldraugh	\$ 290,295	\$ 290,345	\$ 229,658	\$ 229,086	\$ 231,675	\$ 1,271,060
Total	\$ 11,092,938	\$ 11,094,054	\$ 11,033,852	\$ 11,033,510	\$ 11,036,660	\$ 55,291,014

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 101

Responding Witness: Robert M. Conroy

- Q-101. Other than the removal of certain projects from the GLT in this proceeding, have there been any other changes made to the GLT since the entry of the final order in 2018-00295? If so, please state the nature of the modifications.
- A-101. No changes have been made to the operation of the GLT mechanism since the entry of the final order in Case No. 2018-00295. The Company has completed two standard annual filings to update the GLT rates (Case Nos. 2019-00043 and 2020-00032). The Company requested and was subsequently denied GLT recovery of additional projects in Case No. 2019-00301.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 102

Responding Witness: Robert M. Conroy

Q-102. Other than the removal of the projects proposed in this case, are any other modifications proposed to the GLT? If so, please state the nature of the modifications.

A-102. No.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 103

Responding Witness: Robert M. Conroy

- Q-103. Is LG&E seeking to recover in this case any additional gas line costs with base rates or by inclusion in the GLT? If so, please state the amount of the costs and the nature of the expenditures that led to the costs.
- a. For the costs specified, please identify LG&E's requested method of recovery (i.e., base rates, GLT, or other). If other, please specify.
- A-103. LG&E is not seeking to recover any additional gas line costs through the GLT mechanism in this proceeding. All costs related to gas lines that LG&E seeks to recover in its application will be reflected in base rates. A summary of non-mechanism capital expenditures and operations and maintenance expense for gas line projects is included in the testimony of Lonnie Bellar, at pp.41-52. See also the response to PSC 2-17(e).

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 104

Responding Witness: Lonnie E. Bellar

Q-104. Please refer to the answers to the question beginning on line 10, page 42 of the testimony of Lonnie Bellar.

- a. Please detail all of the gas safety measures that LG&E measures.
- b. For each such safety measure, please describe the measure, the purpose of it and how each such measure is computed.
- c. For each such measure, please state LG&E's score for each month from January 1, 2018 – October 2020.

A-104.

- a. In the section of testimony referenced, "measures" refers to the many activities LG&E is performing to address the safety of its system for the communities it serves. Those measures described do not have specific metrics with a monthly score. However, LG&E does track the following safety related metrics:
 - Controllable Motor Vehicle Incident Rate
 - Days Away Restricted Transferred Case Rate (DART)
 - Employee Recordable Injury Incident Rate (RIIR)
 - Contractor Recordable Injury Incident Rate (RIIR)
 - Employee Lost Work Day Case Rate
 - Gas Damage Rate
 - Emergency Response Time
 - Number of Class 1 and Class 2 leaks repaired on PHMSA jurisdictional facilities
- b. and c. See the responses for b. and c. below.

Metric: Controllable Motor Vehicle Incident Rate

Definition: A Reportable motor vehicle Incident in which the driver failed to do everything that reasonably could have been done to avoid the incident. In-depth information on determining incident preventability is available from: National Safety Council [2004]. A guide to determine motor vehicle accident preventability (revised edition). Publication No. 22972-0000. Itasca, IL: National Safety Council.

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	4.23
	February	2.67
	March	4.37
	April	4.15
	May	4.51
	June	3.69
	July	4.11
	August	4.56
	September	4.54
	October	4.2
	November	4.14
	December	3.99
2019	January	4.05
	February	2.81
	March	2.62
	April	2.54
	May	2.63
	June	2.12
	July	1.23
	August	1.59
	September	2.33
	October	2.09
	November	1.9
	December	1.74
2020	January	0.00
	February	1.88
	March	1.28
	April	1.96
	May	1.59
	June	3.28
	July	2.8
	August	3.42

	September	3.48
	October	3.14

Metric: Days Away Restricted Transferred Case Rate (DART)

Definition: Recordable cases involving Days Away from work, days of Restricted work activity or job transfer.

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	5.61
	February	2.51
	March	1.36
	April	1.06
	May	0.87
	June	0.73
	July	1.28
	August	1.04
	September	0.93
	October	0.83
	November	0.75
	December	0.70
2019	January	10.51
	February	4.58
	March	2.51
	April	2.92
	May	3.16
	June	2.69
	July	2.35
	August	1.93
	September	1.74
	October	1.57
	November	1.44
	December	1.33
2020	January	0
	February	1.75
	March	1.22
	April	0.94
	May	0.77
	June	0.65
	July	0.53
	August	0.47
	September	0.43
	October	0.39

Metric: Employee Recordable Injury Incident Rate (RIIR)

Definition: The number of on-the-job occupational injuries and illnesses and lost workday cases (OSHA recordable cases) related to a common exposure base of 100 full-time workers (200,000 hours worked).

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	5.61
	February	2.51
	March	1.36
	April	5.32
	May	2.60
	June	2.94
	July	3.21
	August	2.61
	September	2.32
	October	2.50
	November	2.26
	December	2.09
2019	January	10.51
	February	4.58
	March	2.51
	April	2.92
	May	3.16
	June	2.69
	July	2.93
	August	3.38
	September	3.48
	October	3.54
	November	3.24
	December	3.00
2020	January	0.00
	February	1.75
	March	1.22
	April	0.94
	May	0.77
	June	0.65
	July	1.07
	August	0.95
	September	0.86
	October	0.78

Metric: Contractor Recordable Injury Incident Rate (RIIR)

Definition: The number of on-the-job occupational injuries and illnesses and lost workday cases (OSHA recordable cases) related to a common exposure base of 100 full-time workers (200,000 hour worked).

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	0.00
	February	0.00
	March	0.00
	April	0.00
	May	0.00
	June	0.63
	July	0.55
	August	0.44
	September	0.41
	October	0.36
	November	0.62
	December	0.88
2019	January	0.00
	February	2.45
	March	1.31
	April	0.92
	May	0.67
	June	0.55
	July	0.86
	August	1.29
	September	1.75
	October	1.02
	November	1.16
	December	1.26
2020	January	3.09
	February	2.74
	March	1.85
	April	1.11
	May	0.87
	June	1.39
	July	1.99
	August	2.01
	September	2.03
	October	1.72

Metric: Employee Lost Work Day Case Rate

Definition: Number of Cases involving days away from work related to a common exposure base of 100 full-time workers (200,000 hours worked).

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	0.00
	February	0.00
	March	0.00
	April	0.00
	May	0.00
	June	0.00
	July	0.00
	August	0.00
	September	0.00
	October	0.42
	November	0.38
	December	0.35
2019	January	10.51
	February	4.58
	March	2.51
	April	1.94
	May	2.37
	June	2.02
	July	1.76
	August	1.45
	September	1.3
	October	1.18
	November	1.08
	December	1.00
2020	January	0.00
	February	0.00
	March	0.00
	April	0.00
	May	0.00
	June	0.00
	July	0.00
	August	0.00
	September	0.00
	October	0.00

Metric: Gas Damage Rate

Definition: Industry calculation to normalize the gas damage rate so it can be compared to other utilities. Reported as damages per 1,000 locates.

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	2.76
	February	2.35
	March	2.30
	April	2.29
	May	2.65
	June	2.58
	July	2.67
	August	2.76
	September	2.78
	October	2.79
	November	2.69
	December	2.63
2019	January	1.58
	February	2.04
	March	1.98
	April	2.19
	May	2.14
	June	2.06
	July	2.13
	August	2.22
	September	2.21
	October	2.23
	November	2.16
	December	2.14
2020	January	1.69
	February	1.26
	March	1.15
	April	1.27
	May	1.46
	June	1.60
	July	1.66
	August	1.62
	September	1.68
	October	1.66

Metric: Emergency Response Time

Definition: Average time from the time an emergency order is created until the technician arrives to the job. Emergency orders consist of odor investigations, damage response, carbon monoxide investigations, and fire investigations.

Values: Reported values are year to date (YTD) for each calendar year.

Year	Month	Value
2018	January	31.2
	February	31.6
	March	31.3
	April	31.6
	May	31.4
	June	31.2
	July	31.1
	August	31.1
	September	31.1
	October	31.6
	November	32.2
	December	32.9
2019	January	35.9
	February	34.5
	March	33.5
	April	33.8
	May	33.3
	June	32.9
	July	32.5
	August	32.7
	September	32.6
	October	33.4
	November	33.8
	December	34.1
2020	January	35.5
	February	35.3
	March	34.1
	April	32.9
	May	32.4
	June	32
	July	31.6
	August	31.4
	September	31.2
	October	31.4

Metric: Number of Class 1 and Class 2 leaks repaired on PHMSA jurisdictional facilities.

Definition: A Class 1 leak is a leak that represents an existing or probable hazard to persons and property and requires immediate repair or continuous action until conditions are no longer hazardous. A Class 2 leak is a leak that is recognized as being non-hazardous at the time of detection but justifies scheduled repair based on probable future hazard.

Values: Reported values are monthly for each calendar year.

Year	Month	Class 1	Class 2
2018	January	110	74
	February	86	72
	March	85	81
	April	116	123
	May	109	143
	June	119	77
	July	122	98
	August	144	105
	September	101	118
	October	135	119
	November	118	115
	December	113	115
2019	January	86	120
	February	91	116
	March	101	117
	April	148	158
	May	137	147
	June	136	119
	July	153	128
	August	137	137
	September	99	150
	October	135	142
	November	74	82
	December	93	95
2020	January	81	93
	February	50	77
	March	57	78
	April	57	100
	May	91	51
	June	93	63
	July	97	33

	August	99	56
	September	126	55
	October	108	58

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government
Dated January 8, 2021**

Case No. 2020-00350

Question No. 105

Responding Witness: Lonnie E. Bellar

Q-105. Please refer to the answers to the question beginning on line 8, page 42 of the testimony of Lonnie Bellar.

- a. Is the PHMSA Mega Rule Part I fully in effect at the current time? If so, when did it become effective?
- b. Please provide with specificity each requirement of Mega Rule Part I, when it became effective, the specific measures LG&E has taken and will take in the future and the costs for which LG&E seeks recovery in this case.
- c. Please detail with specificity the expended set of in-line inspections referred to by Mr. Bellar beginning on line 5, page 43; provide the date of implementation of said tool and the increased costs LG&E seeks to recover in this case. Also please state any additional tools which LG&E expects to implement in the next five (5) years and costs thereto.
- d. Please refer to line 12, page 43 of Mr. Bellar's testimony concerning the final rule for safety of underground storage facilities. Please list each such facility that LG&E owns, manages or controls that is affected by the rule. For each such facility, please state the location, the changes to LG&E operations which the rule necessitates and the cost for which recovery is sought in this case for each such compliance measure.

A-105.

- a. No. The Mega Rule Part 1 is not fully in effect at the current time
 - b. On July 1, 2020, requirements took effect in the following sections of 49 CFR 191 and 192: §§ 191.23, 191.25, 192.3, 192.5, 192.7, 192.9, 192.18, 192.67, 192.127, 192.150, 192.205, 192.493, 192.506, 192.517, 192.607, 192.619, 192.632, 192.710, 192.712, 192.805, 192.909, 192.917, 192.921, 192.933, 192.935, 192.937, 192.939, and

Appendix F to Part 192. As part of this, operators must begin to identify, schedule, and perform assessments required by §192.710.

On July 1, 2021, the following requirements take effect.

- Operators must begin retaining records for each individual welder qualification at the time of construction for a minimum of 5 years following construction, per § 192.227.
- For transmission pipe installed after July 1, 2021, operators must begin retaining records for each person's plastic pipe joining qualifications at the time of construction for a minimum of 5 years following construction, per §192.285.
- If subject to §192.624, operators must develop and document procedures for completing all actions required by this section. These procedures must include:
 - A process for reconfirming MAOP for any pipelines that meet a condition of §192.624(a).
 - A process for performing material verification per §192.607.
 - A process for performing an engineering critical assessment (ECA) for MAOP reconfirmation per §192.632.
- Operators must modify their launchers and receivers that will be used after this date to meet the conditions of §192.750.

LG&E has prepared and implemented procedures. It has begun to identify, schedule and perform assessments. LG&E has begun to perform material verifications and document external load design considerations. During inline inspections, it has used technologies which can be leveraged for MAOP reconfirmations. LG&E will continue to follow the new procedures, perform assessments, perform material verifications, document external load design considerations and reconfirm MAOPs. LG&E does not track or budget costs by specific regulation and not all costs associated with the additional regulations are identifiable or known yet. Additional responsibilities will be related to analyzing, complying, and monitoring compliance with the Mega rules adding to the responsibilities of personnel. A significant item related to Mega Rule Part 1 is the inline inspection of covered pipelines. LG&E seeks to recover \$12.4 million in O&M expense in this rate case for inline inspections and in ditch testing on the gas transmission system to meet PHMSA regulations including the Mega Rule Part 1. Additionally, LG&E seeks to recover \$2.8 million in capital costs from 2018 through 2020 and \$1.6 million in future capital costs through the end of the test year related to work driven by these inspections.

- c. The expanded set of in-line inspection tools that are now commonly being used by LG&E include circumferential magnetic flux leakage, electromagnetic acoustic transducer, and pipe grade sensors. This change was implemented in 2018. LG&E seeks to recover an incremental \$2.0 million of O&M expense for inline inspection and in ditch testing of the gas transmission pipelines compared to the prior rate case. LG&E does not currently expect to implement any additional new tools within the next five years.
- d. See attached for a list of the (392) gas storage wells that LG&E owns, manages or controls that is affected by the PHMSA underground natural gas storage fields rule. The main impacts of the Interim Final Rule and Final Rule are as follows:
- Required Storage Operators to incorporate the mandatory statements of the RPs into their written operations, maintenance, and emergency response program manuals. This required LG&E to develop a written storage integrity management plan and develop a risk model to prioritize the baseline inspection schedule and develop operations and maintenance procedures for storage well work.
 - Operators are required to perform a base-line inspection of all wells in order to verify the well's integrity and complete 40% of these inspections within four years of the Final Rule effective date. Operators must complete 100% of these inspections within seven years of the Final Rule effective date. PHMSA requires operators to perform periodic reassessments on a risk-based schedule. The reassessments interval must be performed within seven years of the previous inspection.
 - One of the main components of baseline inspections involves running casing integrity logs in the wells to evaluate the condition of the wells' casing. These logs use similar technology to the in-line inspection tools used to evaluate pipelines.
 - Other impacts of the Final Rule include routine well inspections, data collection, record keeping, notifications, and overall management of the SIMP plan and procedures.

LG&E does not track or budget costs by specific regulation and not all costs associated with the additional regulations are identifiable or known yet. Additional responsibilities will be related to analyzing, complying, and monitoring compliance with the storage integrity rules adding to the responsibilities of personnel. Well logging and inspections is a significant task related to meeting PHMSA requirements for storage fields. The cost for well logging and inspection activities requested for recovery in this case is \$700k.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

**Response to First Request for Information of the
Louisville/Jefferson County Metro Government**

Dated January 8, 2021

Case No. 2020-00350

Question No. 106

Responding Witness: Lonnie E. Bellar

Q-106. Please refer to the answer by Lonnie Bellar to the question beginning on line 18, page 43 of his testimony.

- a. Are there any costs for which LG&E seeks recovery for compliance with part 2 or part 3 of the Mega Rule? If so, please state the new requirement, the compliance measure, the anticipated costs and whether the costs are sought to be recovered in this case.
- b. Please state whether there are any other new PHMSA safety provisions and any new non-PHMSA safety provisions required to be implemented, for which the costs of compliance measures are sought in this case.

A-106.

- a. Among the notable provisions of Part 2 of the Mega rule are the proposed amendments governing corrosion control.

Specifically;

- Post construction electrical surveys for pipeline coating damage.
- Surveys of newly backfilled transmission pipelines.
- Requirements for detailed pipeline coating specifications.
- Requirements for shorter length surveys and interference surveys to detect the presence and level of any electrical stray current.
- More explicit requirements for internal corrosion control. Specifically related to monitoring and mitigation programs.

LG&E does not track or budget costs by specific regulation and not all costs associated with the additional regulations are identifiable or known yet. Additional responsibilities will be related to analyzing, complying, and monitoring compliance with the Mega rules adding to the responsibilities of personnel. The cost for additional corrosion control work related to Mega Rule Part 2 LG&E seeks to recover in this case is \$400k. Part 3 of the Mega Rule focuses on new requirements for gas gathering pipelines. It is not expected to affect LG&E and no costs for Part 3 are sought to be recovered in this case.

- b. Yes, there are other new PHMSA safety provisions required to be implemented, for which the costs of compliance measures are sought in this case. The Pipeline and Hazardous Materials Safety Administration (PHMSA) issued an interim final rule establishing minimum safety standards for underground natural gas storage fields (UNGSTFs) on December 19, 2016. PHMSA issued the Final Rule (effective March 13, 2020) in order to amend the minimum standards. The Final Rule maintained the incorporation by reference of American Petroleum Institute (API) Recommended Practices (RPs) 1170 and 1171 (the RPs) as the basis of the minimum safety standards in 49 CFR part 192. RPs 1170 and 1171 outline safety standards for several types of underground facilities and provide a minimum federal standard for inspection, enforcement, and training. See response to Question No. 105 part d above related to costs.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 107

Responding Witness: Lonnie E. Bellar

Q-107. Please refer to the answer to the question beginning at line 15, page 45 of Mr. Bellar's testimony.

- a. Please attach a copy of the Transmission Modernization Program.
- b. Is this the same program that formerly was called Transmission Pipeline Program? If so, why was the name changed? What projects are included in this program that are not pipeline?
- c. Please list each project in the program with specificity as to the nature of the project; if a pipeline, its length; the estimated cost and whether it is within the GLT or base rates; and the incremental cost sought in this rate case.
- d. Is the 15.5 mile pipeline described beginning on Line 18, page 45 of Mr. Bellar's testimony the same as that described beginning on line 3 on page 46 of Mr. Bellar's testimony?

A-107.

- a. The Transmission Modernization Program (TMP) refers to the projects in Mr. Bellar's testimony beginning at line 15, page 45 to replace the approximately 15.5 miles of natural gas transmission pipeline and were described in Case No. 2016-00371. These projects were referred to as the initial phase when it was approved in Case No. 2016-00371 and future projects considered to be a continuation of the TMP would be brought to the PSC for approval. The Company has not requested approval for additional projects under the TMP title to the Commission. There is not a separate document for the program.
- b. LG&E is not aware of a program called the Transmission Pipeline Program. The projects in part a. of this question have always been referred to as the TMP and are all pipeline projects.
- c. Penile to Blanton – Replace approximately 4.3 miles of pipeline and associated facility work. LG&E does not calculate revenue requirement by

project. Capital costs for this project from inception through June 2021, are expected to be \$29.5 million. Capital costs of \$13.9 million are expected to be spent during the test year. This project is expected to go in-service October 31, 2021. Recovery of costs will be in the GLT through June 30, 2021. Starting July 1, 2021, all costs will be rolled into base rates and only recovered through base rates, pending approval in this proceeding. See also the response to PSC 2-17(e).

Penile to Preston - Replace approximately 5.8 miles of pipeline and associated facility work. LG&E does not calculate revenue requirement by project. Capital costs for this project from inception through June 30, 2021, are expected to be \$41.3 million. Capital costs of \$0.7 million are expected to be spent during the test year. This project went in-service October 31, 2020. Recovery of costs will be in the GLT through June 30, 2021. Starting July 1, 2021, all costs will be rolled into base rates and only recovered through base rates, pending approval in this proceeding. See also the response to PSC 2-17(e).

Preston to Piccadilly - Replace approximately 5.4 miles of pipeline and associated facility work. LG&E does not calculate revenue requirement by project. Capital costs for this project from inception through June 30, 2021, are expected to be \$52.1 million. Capital costs of \$15.8 million are expected to be spent during the test year. This project went in-service October 31, 2020. Recovery of costs will be in the GLT through June 30, 2021. Starting July 1, 2021, all costs will be rolled into base rates and only recovered through base rates, pending approval in this proceeding. See also the response to PSC 2-17(e).

d. Yes.

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Question No. 108

Responding Witness: Lonnie E. Bellar

- Q-108. Please refer to Mr. Bellar's testimony beginning on line 15, page 46.
- a. What is the length of pipelines with more than one diameter; with two diameters; and with more than two diameters?
 - b. Is the installation described by Mr. Bellar the first pipeline with dual diameter in-line inspection? If not, how many miles of pipeline use dual diameter inspection tools? What is the incremental cost of making pipelines dual diameter capable during a pipeline replacement project?
 - c. What is a "data issue" described in line 2, page 47 of Mr. Bellar's testimony? Does LG&E keep records of all "data issues?" If not, why not? How many data issues occurred for each of the years 2015-2020?
- A-108.
- a. The testimony referred to discusses the Western Kentucky A pipeline that is 22.3 miles long and the Western Kentucky B pipeline which is also 22.3 miles long. Both pipelines have more than two diameters.
 - b. No. LG&E expects to use dual-diameter inline inspection tools to gather data on two different diameters within a single pipeline in 56 miles of its system. The costs to modify a pipeline so dual-diameter tools could be used for inspection will vary depending on the pipeline due to factors such as amount of pipe to replace, diameter, location, and construction methods required.
 - c. When inline inspection tools have speed excursions, the data collected by them can be impacted. In some cases, the impact is to the extent that the data cannot be used. LG&E retains inline inspection reports but does not track "data issues" since it has not been necessary to do so prior to the more comprehensive data requirements of the Mega Rule.

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Case No. 2020-00350

Question No. 109

Responding Witness: Lonnie E. Bellar

- Q-109. Please refer to the answer by Mr. Bellar to the question on line 12, page 47.
- a. Why do the expenses described in the text for the elevated pressure system (\$7.9 million) and steel customer service replacement (\$5.2 million) appear in the chart on page 52, but the city gate expenditures (\$19.4 million) and SCADA update (\$1.0 million) do not?
 - b. For each category with a separate cost listed in the page 52 chart, and not previously described in Mr. Bellar's testimony, please describe the project and whether a CPCN was requested and if not, why not, and whether any of the costs are to be recovered in the GLT.
- A-109.
- a. The City Gate and Regulator projects are primarily comprised of the St. Helens Regulator Station, Preston City Gate, and Cannon's Lane Regulator Stations projects that are listed in the chart on page 52. In addition to these three projects, there are other smaller projects included in the Other category under Enhance the Network and Maintain the Network. The SCADA project is included in Other within Maintain the Network. The chart was intended to identify the larger project spending amounts based on prior test year mid-point to current test year mid-point period of November 1, 2019 to December 31, 2021.
 - b. See the response to PSC 2-36. Of the projects listed on page 52 chart in Mr. Bellar's testimony, LG&E received a CPCN for the Transmission Modernization Program, Gas Service Line Replacement, and Bullitt County pipeline in Case No. 2016-00371. LG&E has not sought Commission approval for any of the other gas capital investments, as the projects are ordinary extensions in the usual course of business. See the response to PSC 2-32(a) for an explanation of the Companies' consideration of the necessity of a CPCN. The gas capital investment projects are not duplicative, do not compete with the facilities of other utilities, and do not materially affect LG&E's financial condition. See below for a description of each category of

the table not described in the testimony. These costs are not recovered in the GLT:

Category	Description
Connect New Customer	This category is comprised of multiple projects to extend gas mains and install company services (from main to property line).
Magnolia Crossings	This project replaced 9 oversized road crossings on the Magnolia 16-inch and 20-inch transmission pipelines to facilitate inline inspection.
Enhance the network - Other	Work in this category is for infrastructure related projects for gas facilities for public safety enhancements, reliability, and public work requests.
Maintain the network – Other	Work in this category is primarily for the replacement of aging infrastructure related to maintenance and inspection or to facilitate maintenance and inspection activity.
Repair the network	Work in this category is primarily for pipeline replacements required to eliminate leaks.
Miscellaneous	This category is primarily for equipment including backhoes, work trucks, and other tools.

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Question No. 110

Responding Witness: Lonnie E. Bellar

Q-110. Please refer to Mr. Bellar's testimony in response to the questions on line 4 and 14 on page 50.

- a. For each of the 11 new positions, please state the position, the duties, salary and total expenses to LG&E for the position.
- b. If the total expenses do not equal \$2.1 million, please state why.
- c. Please state with specificity the costs that comprise the \$4.2 million and \$3.9 million in expenses.

A-110.

- a. See Attached. Certain information requested is confidential and proprietary and is being provided under seal pursuant to a petition for confidential protection.

Business Data Analyst (2 positions)

This position functions at the entry level and is expected to continually increase knowledge of the line of business while meeting the organizations data analysis needs. The Business Data Analyst will be responsible for analyzing and maintaining Gas Operations (GO) data in support of operational and statistical reporting, compiling benchmarking data and driving improvement initiatives. This position is responsible for assisting the Group Leader, Operation Managers and GO Directors with identifying data trends, performing statistical analysis, recommending and developing new metrics and continuous improvement of data quality.

Lead Engineer-Codes and Standards

This position provides technical oversight and leadership to other gas department engineers as they design, specify, evaluate, purchase, build, and maintain major natural gas distribution, transmission and storage projects. This oversight places emphasis on all applicable local, state and federal rules and regulations while ensuring adherence to company practices and

performance standards. This position also provides support in ensuring newly developed operational policies and procedures are compliant with applicable regulations.

Senior Gas Storage Specialist

This position provides technical support for development, operation, and maintenance of underground natural gas storage reservoirs. Job responsibilities include monitoring operating performance, maintaining records, project management, developing procedures, business planning, performing studies, and regulatory compliance.

Compliance Field Coordinator

This position ensures quality and compliance with federal and state regulations within Gas Construction. Oversee contract resources performing quality and compliance audits on Gas Construction Projects. Summarize and communicate findings of these audits to Gas Construction Manager. Interface with regulatory agencies and other company departments as required. Meet with business partners and other departments to communicate findings and make recommendations for improvement in processes or quality of construction.

SR&O Technician (3 positions)

This position performs a variety of skilled and technical duties requiring an advanced degree of knowledge and skill related to the construction, installation, inspection, operation and maintenance of Company gas measurement and regulation facilities and associated equipment, and large commercial and industrial metering and regulating facilities.

Gas Controller (2 positions)

This position is responsible for controlling the flow rates of natural gas into the transmission and high-pressure gas distribution systems in order to ensure that adequate customer supplies are maintained. This position utilizes the Gas Control Supervisory Control and Data Acquisition (SCADA) system and manual input to ensure that the system's gas demand requirements are balanced with adequate supplies from available resources and that the gas system can be operated safely. This position is responsible for ensuring that proper system pressures are always consistently maintained and optimized to meet operational requirements throughout the gas system.

Director Integrity Management & Compliance

This position is responsible for strategic direction and oversight of gas regulatory compliance and developing and implementing plans to effectively manage the integrity of natural gas transmission, distribution and underground storage assets in the interest of public safety and reliability and

in compliance with state and federal regulations. This position also provides oversight and leadership for the various gas regulatory compliance programs including operator qualification verification and ensures that proper records are maintained for the associated activities.

- b. The total salary and total expenses do not equal the \$2.1 million. The \$2.1 million reflects the change in wage for all Gas Operations employees from the prior test year, changes in mix of charges between OPEX and capital, as well as the OPEX portion of these incremental positions, and changes in overtime between the prior test year and the current test year.
- c. The \$4.2 million cost increase is for the costs of additional inline inspections, validation digs, and corrosion control work for the transmission and distribution system. The \$3.9 million increase in expenses is primarily for higher contract labor line locating costs for staffing optimization to achieve favorable on time performance and damage reductions. The required incremental funding is needed for LG&E's line locating contract approach to maintain compliance with the Kentucky damage prevention law by providing for flexibility, access to more resources, and a reduction of damage risks.

The entire attachment is
Confidential and
provided separately
under seal.

LOUISVILLE GAS AND ELECTRIC COMPANY

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Case No. 2020-00350

Question No. 111

Responding Witness: Lonnie E. Bellar

- Q-111. Are there any incremental costs in this rate case for the amine replacement program and the new GIS program described on page 51 of Mr. Bellar's testimony?
- A-111. There are no incremental O&M expenses for the amine replacement program. There is \$1.9 million in incremental O&M expense in this case attributable to the enterprise GIS system which supports multiple business areas. The company does not calculate revenue requirement for individual projects.

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Case No. 2020-00350

Question No. 112

Responding Witness: Lonnie E. Bellar

- Q-112. Please see Mr. Bellar's testimony on advanced metering beginning on page 53.
- a. Can connect and disconnect for gas service be done remotely? Can it be done safely?
 - b. Is the reduction in costs for meter reading in AMR-GO the same as if AMI was deployed for gas?
 - c. Because under the proposal meter reading costs will be eliminated, can it ever be cost effective to later to deploy AMI for gas? Is the reason not to propose AMI for GO customers merely a cost difference, or is there a safety/technology issue?
 - d. Please state the names of EPRI members that serve both gas and electric customers that have employed AMI for both gas and electric.
- A-112.
- a. The Companies are aware of AMI offerings that support remote disconnection of gas service but the Companies' proposed deployment does not include that capability. Remote disconnection of gas service can be done safely but requires additional power to the gas meter to operate the service switch and is a much more invasive gas meter upgrade than utilizing an AMI module for meter reads. Further, it is the Companies' stance that remote connection of gas service cannot be done safely as Company personnel should be onsite to ensure there are no gas leaks present.
 - b. No. If AMI modules were deployed in the gas-only territory in lieu of redeploying ERTs, the Companies would reduce meter-reading staff by an additional full-time equivalent, resulting in a slightly greater reduction in meter reading costs.
 - c. See the response to part b, the Company's proposal does retain a meter-reading employee to read the AMR meters in the gas-only territory. While

AMR is the least-cost option at this time, the Company will continue to monitor and evaluate options for serving customers in the future. Deploying AMI to gas only (GO) customers is solely a cost issue at this point.

- d. The Companies do not have this information.

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Question No. 113

Responding Witness: William Steven Seelye

- Q-113. Were there any changes in the methodology in the 2020 gas cost of service study?
If the answer is yes, please describe the differences.
- A-113. No, there were not any changes in the methodology in the 2020 gas cost of service study.

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Case No. 2020-00350

Question No. 114

Responding Witness: William Steven Seelye

Q-114. Why did the customer charge for gas customers increase from approximately \$.82 per day in conjunction with the 2018 rate case to \$.98 per day in 2020?

A-114. See the response to Question No. 81.