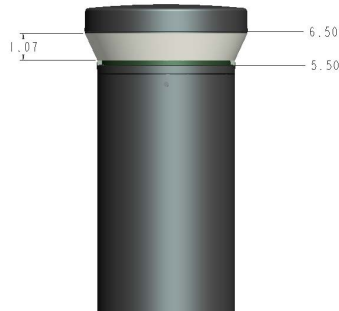


ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 3.5 foot mounting height.



REPORT NUMBER: RAB03739
 ISSUE DATE: 08/30/17 PAGE: 1 OF 9
 DATE SAMPLE TESTED: 08/30/17
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLEDR24N/347,
 BDLEDR24N/347, BLEDR24N/480,
 BDLEDR24N/480 (42" ROUND BOLLARD)
 LUMINAIRE: EXTRUDED BROWN PAINTED
 CYLINDRICAL METAL LOWER HOUSING, CAST
 METAL TOP, CAST FINNED METAL HEAT
 SINK WITH WHITE PAINTED INTERIOR,
 MOLDED SPECULAR FINISHED PLASTIC
 REFLECTOR, 4 WHITE CIRCUIT BOARDS
 EACH WITH 3 LEDS, 4 WHITE CIRCUIT
 BOARDS EACH WITH 2 LEDS, FROSTED
 PLASTIC LENS, CAST BROWN PAINTED
 METAL BOTTOM.

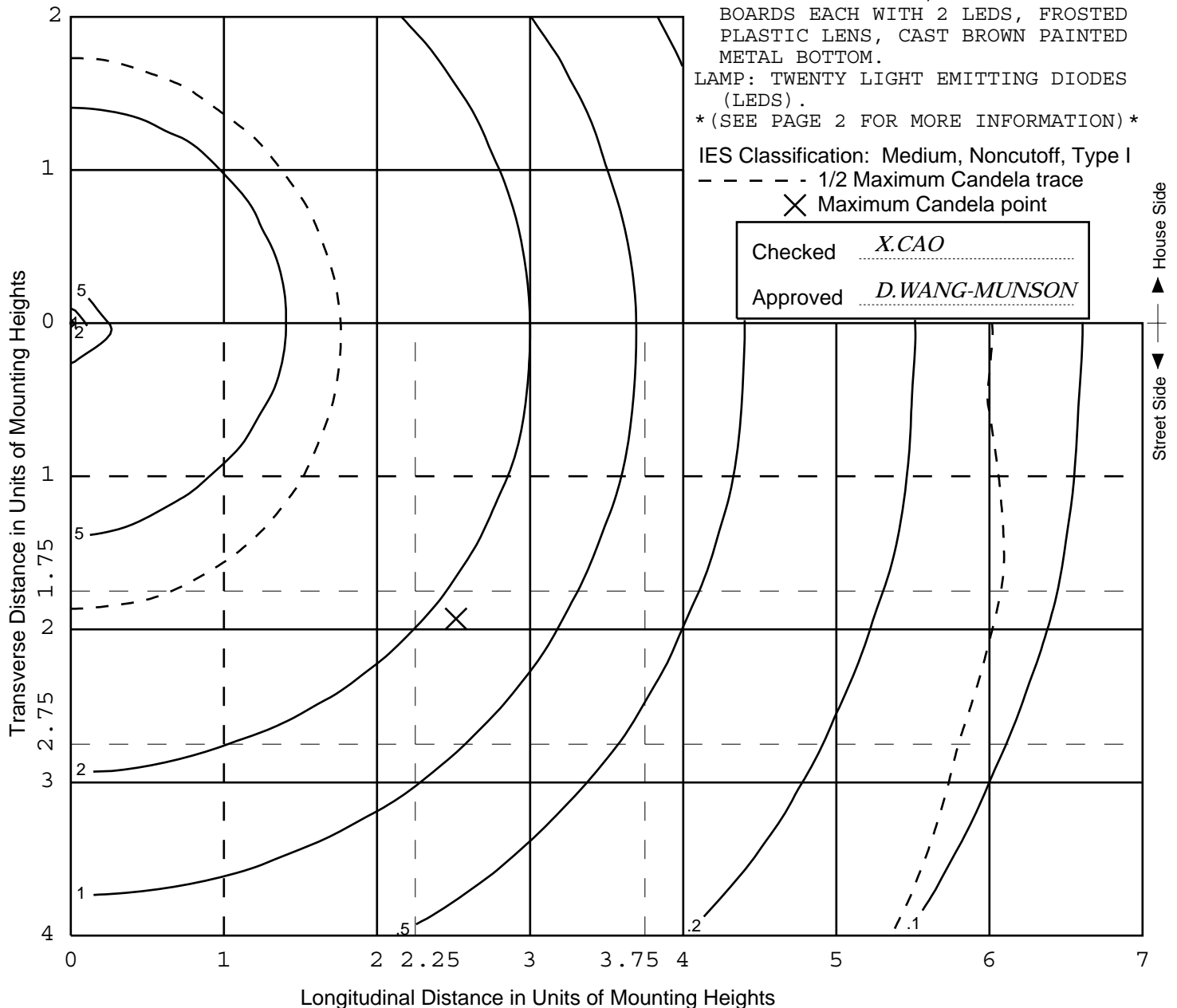
LAMP: TWENTY LIGHT EMITTING DIODES (LEDS).

(SEE PAGE 2 FOR MORE INFORMATION)

IES Classification: Medium, Noncutoff, Type I

--- 1/2 Maximum Candela trace

X Maximum Candela point



REPORT NUMBER: RAB03739

PAGE: 2 OF 9

ISSUE DATE: 08/30/17

DATE SAMPLE TESTED: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

ADDITIONAL INFORMATION

NOTE: THIS REPORT WITH THE USE OF THE NVLAP LOGO SHALL NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY NVLAP, NIST, OR ANY AGENCY OF THE FEDERAL GOVERNMENT.

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED.

TOTAL INPUT WATTS = 21.866 W AT 347.0 VAC.

LED DRIVER: RDD-LT40-A0700-60PF

TEST PROCEDURE: IESNA LM-79-08

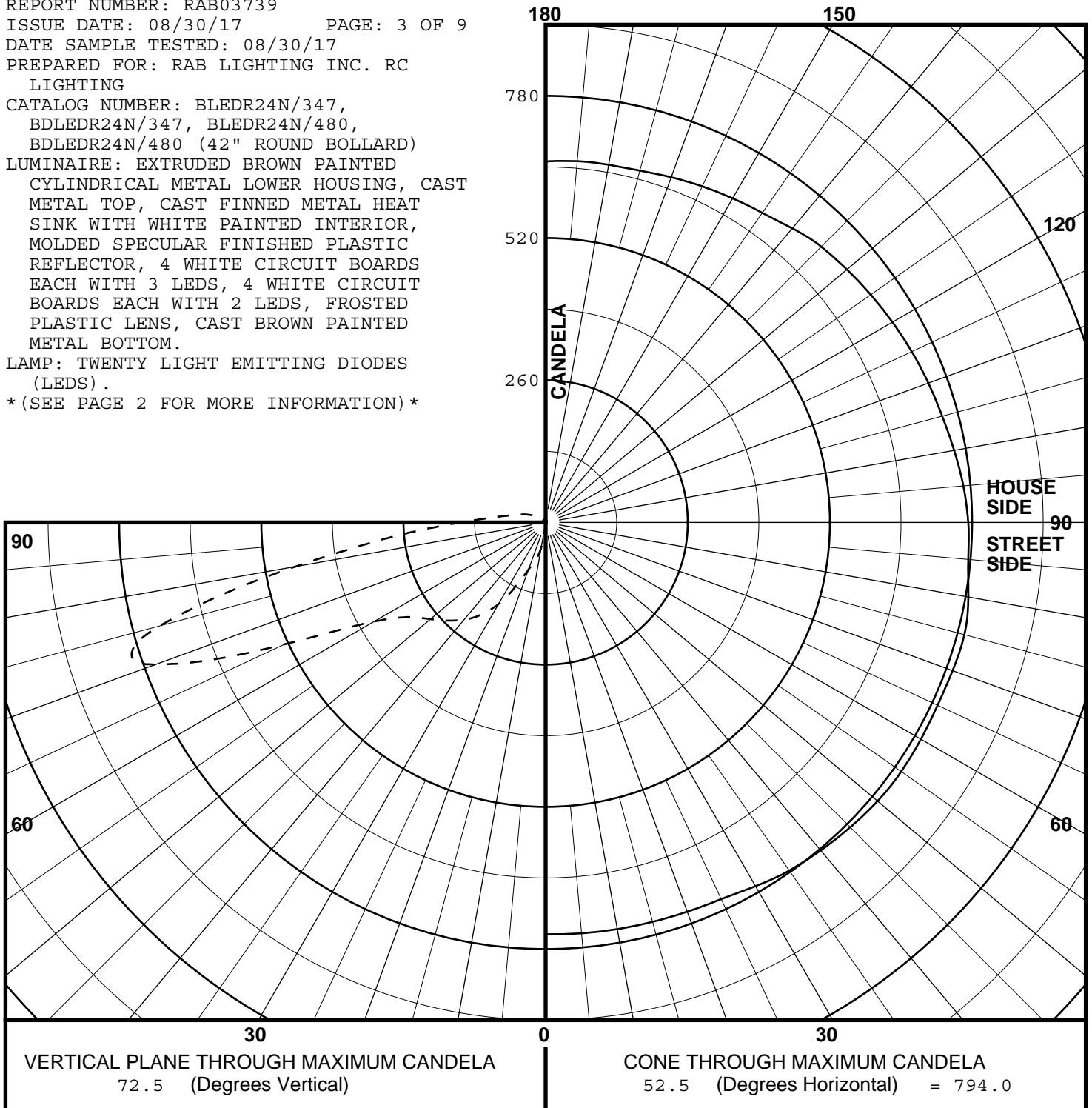
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE

AMBIENT: 24.9

ACCREDITED LABORATORY CODE 201058-0

MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA

REPORT NUMBER: RAB03739
 ISSUE DATE: 08/30/17 PAGE: 3 OF 9
 DATE SAMPLE TESTED: 08/30/17
 PREPARED FOR: RAB LIGHTING INC. RC
 LIGHTING
 CATALOG NUMBER: BLEDR24N/347,
 BDLEDR24N/347, BLEDR24N/480,
 BDLEDR24N/480 (42" ROUND BOLLARD)
 LUMINAIRE: EXTRUDED BROWN PAINTED
 CYLINDRICAL METAL LOWER HOUSING, CAST
 METAL TOP, CAST FINNED METAL HEAT
 SINK WITH WHITE PAINTED INTERIOR,
 MOLDED SPECULAR FINISHED PLASTIC
 REFLECTOR, 4 WHITE CIRCUIT BOARDS
 EACH WITH 3 LEDS, 4 WHITE CIRCUIT
 BOARDS EACH WITH 2 LEDS, FROSTED
 PLASTIC LENS, CAST BROWN PAINTED
 METAL BOTTOM.
 LAMP: TWENTY LIGHT EMITTING DIODES
 (LEDS).
 (SEE PAGE 2 FOR MORE INFORMATION)



REPORT NUMBER: RAB03739

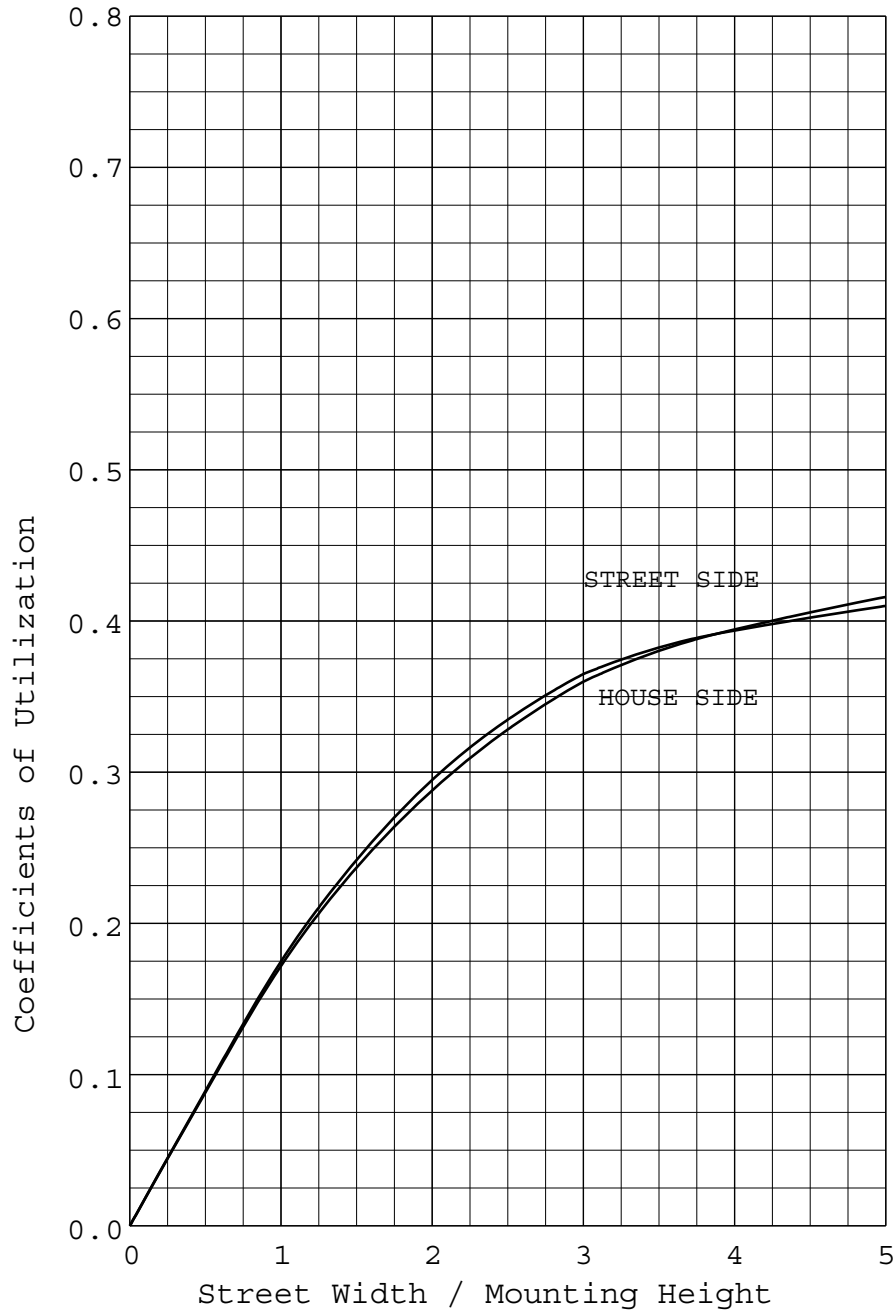
PAGE: 4 OF 9

ISSUE DATE: 08/30/17

DATE SAMPLE TESTED: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	1123.	46.2
DOWNWARD HOUSE SIDE	1083.	44.6
DOWNWARD TOTAL	2206.	90.8
UPWARD STREET SIDE	118.	4.8
UPWARD HOUSE SIDE	106.	4.4
UPWARD TOTAL	223.	9.2
TOTAL FLUX	2430.	100.0
TOTAL INPUT WATTS = 21.9		
EFFICACY = 111.0 Lm/W		

ALL CANDELA AND LUMENS IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY.
THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE
LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

REPORT NUMBER: RAB03739

ISSUE DATE: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

PAGE: 5 OF 9

DATE SAMPLE TESTED: 08/30/17

BUG Rating:

Zonal Summary

Lumens

% of Fixture

B2 U3 G2

Zone Ratings

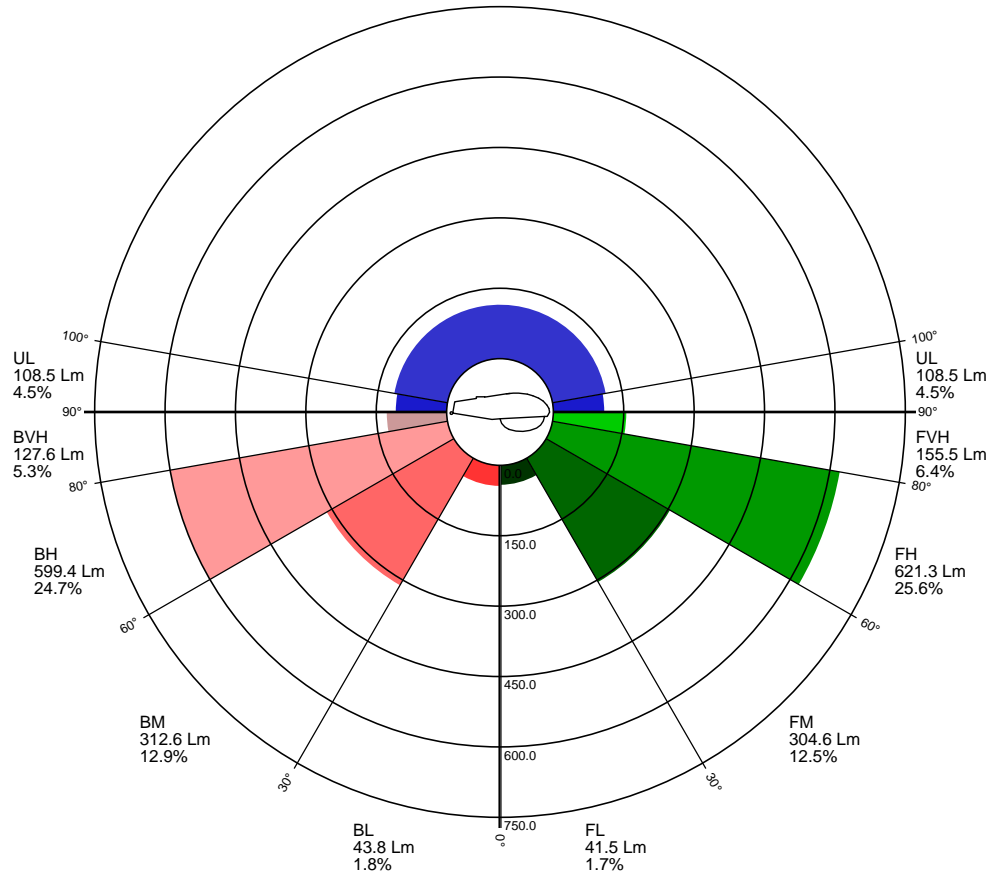
B U G

Forward		1123	46.2			
FL	(0° - 30°)	41.5	1.7			
FM	(30° - 60°)	304.6	12.5			
FH	(60° - 80°)	621.3	25.6			G0
FVH	(80° - 90°)	155.5	6.4			G2
Backward		1083	44.6			
BL	(0° - 30°)	43.8	1.8	B0		
BM	(30° - 60°)	312.6	12.9	B1		
BH	(60° - 80°)	599.4	24.7	B2		G0
BVH	(80° - 90°)	127.6	5.3			G2
Upward		223	9.2			
UL	(90° - 100°)	108.5	4.5		U3	
UH	(100° - 180°)	114.9	4.7		U3	
Trapped Light		0	0.0			
Total Flux		2430	100.0			

Zonal Lumen Summary

(Linear scale)

UH
114.9 Lm
4.7%



REPORT NUMBER: RAB03739

ISSUE DATE: 08/30/17

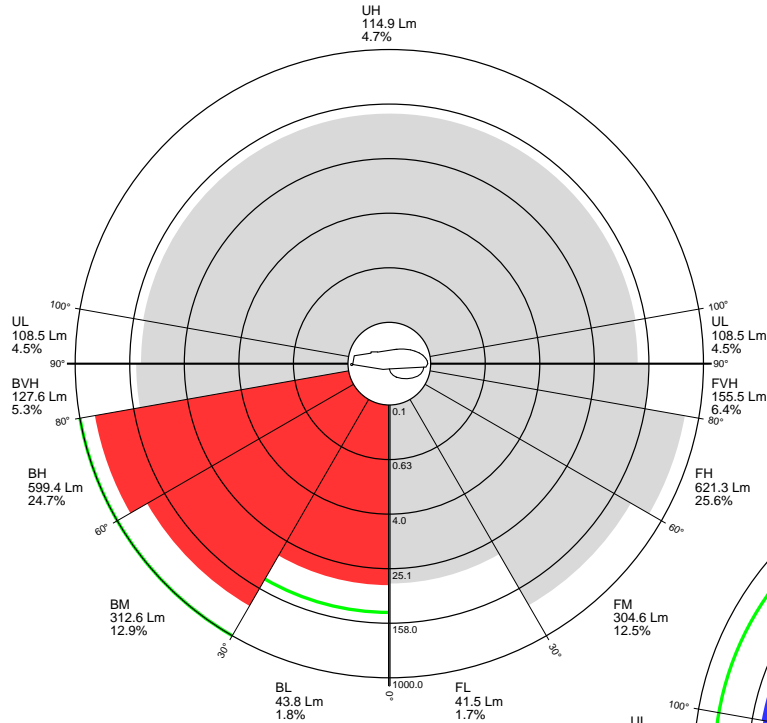
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/30/17

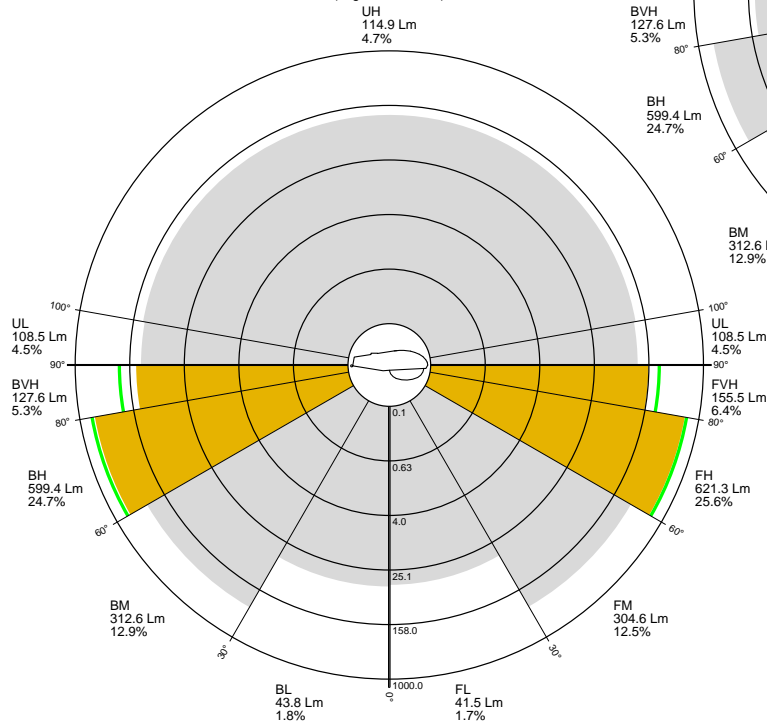
Backlight Rating Details

(Logarithmic scale)



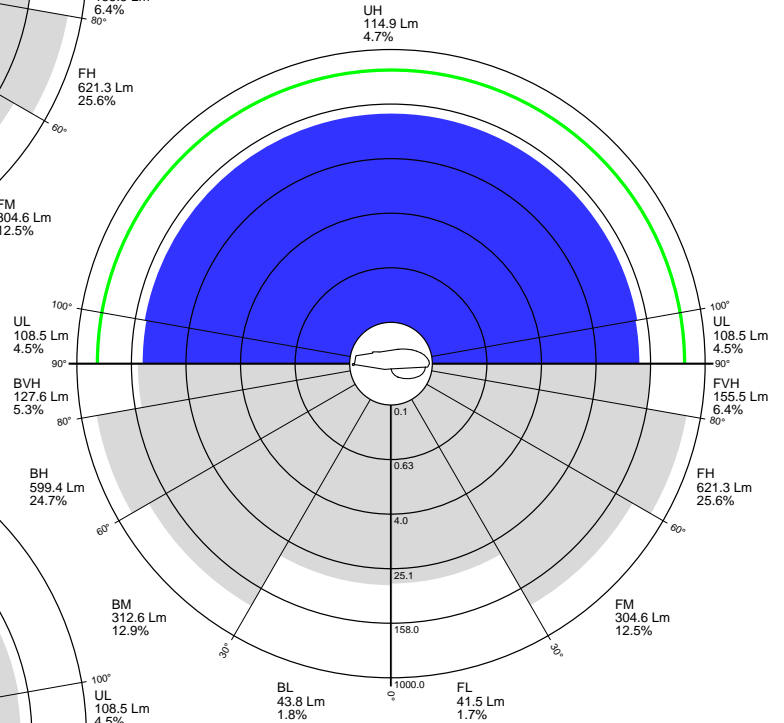
Glare Rating Details

(Logarithmic scale)



Uplight Rating Details

(Logarithmic scale)



REPORT NUMBER: RAB03739

PAGE: 7 OF 9

ISSUE DATE: 08/30/17

DATE SAMPLE TESTED: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CANDELA TABULATION

	STREET SIDE	LATERAL ANGLE										
		0.0	5.0	15.0	25.0	35.0	45.0	52.5	55.0	65.0	75.0	85.0
	180.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	175.0	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	0.	0.	1.	1.	1.	0.	0.	0.	1.	1.	1.
	145.0	4.	4.	4.	3.	3.	3.	3.	3.	3.	3.	3.
	135.0	10.	10.	10.	10.	10.	10.	10.	10.	9.	9.	9.
	125.0	20.	20.	20.	20.	20.	19.	19.	19.	19.	18.	18.
	115.0	35.	34.	35.	34.	34.	34.	33.	33.	33.	32.	32.
	105.0	56.	56.	56.	56.	55.	55.	54.	54.	53.	53.	52.
	95.0	105.	104.	105.	104.	103.	101.	100.	100.	98.	96.	93.
	90.0	167.	165.	167.	163.	163.	158.	156.	156.	150.	147.	141.
	87.5	221.	219.	221.	214.	214.	207.	204.	204.	196.	193.	187.
	85.0	292.	289.	290.	284.	282.	274.	271.	270.	260.	256.	245.
V	82.5	374.	372.	377.	369.	367.	357.	353.	351.	339.	334.	320.
E	80.0	481.	478.	486.	478.	480.	468.	465.	462.	445.	439.	419.
R	77.5	603.	601.	610.	607.	615.	605.	603.	598.	576.	569.	544.
T	75.0	711.	710.	718.	719.	733.	731.	731.	728.	710.	705.	680.
I	72.5<<	753.	754.	756.	760.	777.	788.	794.	794.	791.	793.	776.
C	70.0	699.	704.	700.	711.	727.	748.	760.	761.	773.	781.	780.
A	67.5	593.	597.	593.	607.	619.	641.	653.	655.	673.	683.	694.
L	65.0	486.	488.	486.	497.	504.	519.	527.	529.	544.	553.	568.
	62.5	407.	408.	405.	413.	413.	422.	426.	427.	438.	443.	457.
A	60.0	358.	359.	355.	359.	357.	360.	362.	364.	371.	373.	383.
N	57.5	328.	328.	324.	325.	322.	324.	325.	326.	332.	333.	339.
G	55.0	305.	305.	303.	302.	298.	300.	302.	303.	307.	308.	311.
L	52.5	293.	294.	291.	287.	283.	285.	287.	288.	293.	295.	296.
E	50.0	282.	282.	278.	274.	270.	273.	275.	276.	281.	285.	285.
	47.5	272.	272.	266.	262.	259.	261.	264.	265.	271.	275.	275.
	45.0	262.	261.	255.	251.	249.	251.	254.	255.	261.	264.	265.
	42.5	250.	250.	244.	241.	239.	241.	243.	244.	250.	253.	254.
	40.0	238.	238.	233.	230.	228.	229.	232.	233.	238.	241.	242.
	37.5	225.	225.	221.	218.	217.	218.	220.	220.	225.	228.	228.
	35.0	208.	210.	207.	205.	204.	204.	206.	206.	210.	212.	212.
	30.0	168.	170.	169.	171.	171.	171.	172.	172.	172.	174.	174.
	25.0	122.	122.	124.	126.	127.	128.	128.	127.	127.	127.	128.
	20.0	88.	88.	88.	90.	91.	92.	92.	92.	91.	92.	92.
	15.0	69.	68.	69.	70.	70.	70.	71.	70.	71.	71.	71.
	10.0	46.	46.	46.	46.	45.	46.	47.	46.	47.	48.	49.
	5.0	3.	4.	4.	5.	4.	6.	7.	6.	10.	10.	11.
	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

||
PLANE OF MAXIMUM CANDELA

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03739

PAGE: 8 OF 9

ISSUE DATE: 08/30/17

DATE SAMPLE TESTED: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CANDELA TABULATION

HOUSE SIDE		LATERAL ANGLE										
		90.0	95.0	105.0	115.0	125.0	135.0	145.0	155.0	165.0	175.0	180.0
V E R T I C A L A N G L E	180.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	175.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	0.	1.	0.	1.	0.	1.	1.	1.	1.	1.	1.
	145.0	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
	135.0	9.	9.	9.	9.	8.	8.	8.	8.	8.	8.	8.
	125.0	18.	18.	18.	17.	17.	17.	17.	17.	17.	17.	17.
	115.0	32.	32.	31.	31.	31.	30.	30.	30.	30.	30.	30.
	105.0	52.	52.	51.	51.	50.	50.	50.	50.	50.	50.	50.
	95.0	93.	92.	91.	90.	90.	90.	89.	89.	88.	89.	88.
	90.0	141.	140.	137.	136.	134.	133.	130.	131.	129.	130.	128.
	87.5	184.	182.	178.	175.	172.	170.	166.	166.	163.	163.	161.
	85.0	245.	241.	236.	230.	225.	223.	215.	215.	210.	210.	207.
	82.5	322.	317.	310.	301.	293.	289.	279.	279.	271.	271.	266.
	80.0	419.	413.	404.	393.	381.	374.	358.	356.	345.	344.	339.
	77.5	543.	537.	523.	510.	494.	484.	463.	456.	443.	441.	435.
	75.0	677.	670.	648.	638.	622.	607.	584.	574.	558.	556.	549.
	72.5<<	773.	767.	751.	739.	726.	713.	691.	678.	666.	663.	660.
	70.0	777.	773.	766.	760.	756.	749.	736.	720.	713.	708.	709.
	67.5	692.	691.	691.	693.	698.	699.	695.	677.	675.	666.	671.
	65.0	568.	570.	575.	582.	589.	593.	596.	579.	579.	568.	576.
	62.5	459.	461.	467.	474.	484.	483.	487.	476.	475.	467.	473.
	60.0	384.	386.	391.	396.	403.	403.	407.	399.	397.	391.	395.
	57.5	339.	340.	342.	345.	348.	350.	353.	348.	346.	342.	344.
	55.0	311.	311.	313.	312.	316.	315.	318.	314.	313.	310.	310.
	52.5	295.	297.	296.	295.	296.	297.	299.	296.	294.	293.	294.
	50.0	284.	285.	282.	279.	280.	283.	283.	280.	281.	280.	280.
	47.5	274.	274.	270.	266.	268.	271.	270.	268.	269.	269.	269.
	45.0	265.	264.	259.	256.	258.	260.	259.	257.	258.	259.	260.
	42.5	253.	252.	248.	245.	247.	248.	249.	246.	247.	249.	250.
	40.0	240.	239.	236.	234.	236.	237.	237.	236.	236.	238.	239.
	37.5	227.	226.	224.	223.	224.	225.	226.	225.	226.	227.	228.
	35.0	212.	211.	211.	210.	211.	212.	213.	213.	213.	214.	214.
30.0	174.	173.	176.	178.	177.	177.	179.	180.	183.	182.	184.	
25.0	129.	129.	131.	133.	134.	134.	134.	135.	136.	136.	136.	
20.0	92.	93.	94.	94.	95.	95.	96.	95.	96.	96.	97.	
15.0	71.	71.	72.	72.	72.	73.	73.	73.	73.	73.	73.	
10.0	49.	49.	50.	50.	51.	52.	52.	53.	54.	53.	54.	
5.0	11.	12.	14.	16.	17.	19.	21.	21.	21.	21.	22.	
0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03739

ISSUE DATE: 08/30/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/30/17

5-DEGREE ZONAL LUMEN SUMMARY

0- 5	0
5- 10	2
10- 15	7
15- 20	13
20- 25	23
25- 30	39
30- 35	57
35- 40	75
40- 45	91
45- 50	109
50- 55	128
55- 60	158
60- 65	223
65- 70	332
70- 75	378
75- 80	288
80- 85	178
85- 90	105
90- 95	65
95-100	44
100-105	32
105-110	24
110-115	19
115-120	14
120-125	10
125-130	7
130-135	4
135-140	3
140-145	1
145-150	1
150-155	0
155-160	0
160-165	0
165-170	0
170-175	0
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	3
0- 20	23
0- 30	85
0- 40	217
0- 50	417
0- 60	702
0- 70	1257
0- 80	1923
0- 90	2206
0-100	2315
0-110	2371
0-120	2403
0-130	2420
0-140	2427
0-150	2429
0-160	2430
0-170	2430
0-180	2430

REPORT NUMBER: RAB03740
 DATE: 8/30/2017
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLEDR24N/347, BDLEDR24N/347, BLEDR24N/480, BDLEDR24N/480 (42" ROUND BOLLARD)

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: EXTRUDED BROWN PAINTED CYLINDRICAL METAL LOWER HOUSING, CAST METAL TOP, CAST FINNED METAL HEAT SINK WITH WHITE PAINTED INTERIOR, MOLDED SPECULAR FINISHED PLASTIC REFLECTOR, 4 WHITE CIRCUIT BOARDS EACH WITH 3 LEDS, 4 WHITE CIRCUIT BOARDS EACH WITH 2 LEDS, FROSTED PLASTIC LENS, CAST BROWN PAINTED METAL BOTTOM.

LAMP: TWENTY LIGHT EMITTING DIODES (LEDS).

DRIVER: RDD-LT40-A0700-60PF

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT VOLTAGES (347.0 AND 480.0 VAC, 60Hz) TO THE TEST SAMPLE.

INSTRUMENTS:	GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100	Calibration Due: N/A
	CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	3/01/18
	OCEAN OPTICS QE65PRO Spectroradiometer	08/22/18
	RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	08/22/18

OBJECT OF TEST: Measure the Absolute Flux in lumens*, Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRIa,1-14), Chromaticity Coordinates (x,y; u'v'), ANSI C78.377 Duv, and electrical data including ANSI C82.77-2002 Power Factor (PF), and Total Harmonic Distortion (THD) to the test sample. Measure electrical data including Total Harmonic Distortion (THD) at maximum nominal rated input voltage. Report Off-State Power.

PROCEDURE: The test sample was mounted inside the integrating sphere, energized, and allowed to stabilize. After stabilization occurred, measurements were taken. In order to measure mean performance, multiple data sets were recorded and averaged. Readings were taken with the test sample operating at 60 HZ input in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. Electrical data was also recorded at maximum nominal rated input voltage (480.0 VAC). All data are traceable to the National Institute of Standards and Technology. Off-State Power was reported with no voltage applied to the sample.

*NOTE: Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

RESULTS: (continued subsequent pages)

Checked	<u>X.CAO</u>
Approved	<u>D.WANG-MUNSON</u> Lighting Engineer

REPORT NUMBER: RAB03740
 DATE: 8/30/2017
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLEDR24N/347, BDLEDR24N/347, BLEDR24N/480, BDLEDR24N/480 (42" ROUND BOLLARD)

Page 2 of 4

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	2430 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3784
Chromaticity Ordinate y	0.3743
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2247
Chromaticity Ordinate v'	0.5002
Correlated Color Temp CCT (K)	4038
ANSI C78.377-2008 Duv	-0.001
Total Radiant Flux (milliWatts)	7065 *
ELECTRICAL	
Input Voltage (Volts AC)	347.0
Input Current (Amps AC)	0.064
Input Power (Watts)	21.9
Input Power Factor (%)	97.9
Input Current THD (%)	8.3
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	
	111.0
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	480.0
Input Current (Amps AC)	0.055
Input Power (Watts)	22.2
Input Power Factor (%)	83.6
Input Current THD (%)	9.3
Input Voltage THD (%)	0.2
Off-State Power (Watts)	
	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	72
R1 Light greyish red	70
R2 Dark greyish yellow	79
R3 Strong yellowish green	85
R4 Moderate yellowish green	71
R5 Light bluish green	69
R6 Light blue	70
R7 Light violet	81
R8 Light reddish purple	54
R9 Strong red	-26
R10 Strong yellow	49
R11 Strong green	65
R12 Strong blue	40
R13 Light yellowish pink (skin)	71
R14 Moderate olive green (leaf)	91

*NOTE:

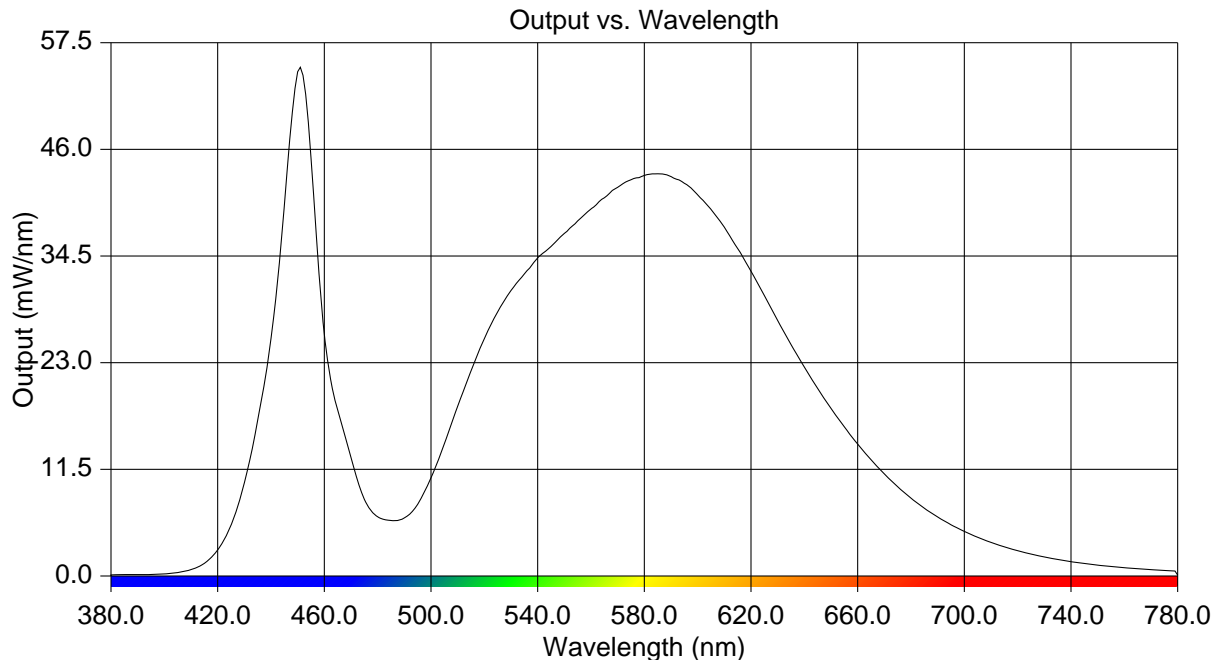
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

REPORT NUMBER: RAB03740
 DATE: 8/30/2017
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLEDR24N/347, BDLEDR24N/347, BLEDR24N/480, BDLEDR24N/480 (42" ROUND BOLLARD)

Page 3 of 4

RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.115	515	22.137	650	18.053
385	0.137	520	25.551	655	16.083
390	0.137	525	28.513	660	14.227
395	0.168	530	30.780	665	12.531
400	0.234	535	32.564	670	11.014
405	0.363	540	34.316	675	9.614
410	0.673	545	35.524	680	8.382
415	1.359	550	36.905	685	7.297
420	2.797	555	38.281	690	6.356
425	5.489	560	39.591	695	5.522
430	10.004	565	40.775	700	4.797
435	16.807	570	41.904	705	4.159
440	25.596	575	42.719	710	3.616
445	39.981	580	43.185	715	3.133
450	54.367	585	43.350	720	2.728
455	45.086	590	43.057	725	2.368
460	26.100	595	42.340	730	2.056
465	17.910	600	41.062	735	1.785
470	12.774	605	39.515	740	1.542
475	8.268	610	37.609	745	1.339
480	6.381	615	35.304	750	1.175
485	5.989	620	32.853	755	1.022
490	6.263	625	30.290	760	0.892
495	7.724	630	27.529	765	0.777
500	10.606	635	24.956	770	0.679
505	14.269	640	22.496	775	0.598
510	18.311	645	20.232	780	0.091



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CIE Chromaticity Diagram

