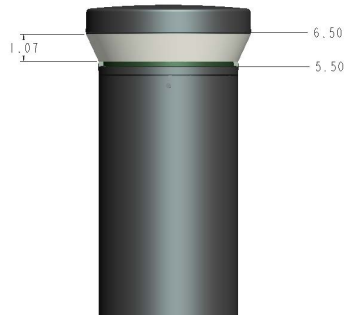


## ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 3.5 foot mounting height.



REPORT NUMBER: RAB03737

ISSUE DATE: 08/29/17

PAGE: 1 OF 9

DATE SAMPLE TESTED: 08/29/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

CATALOG NUMBER: BLEDR24/347,

BDLEDR24/347, BLEDR24/480,

BDLEDR24/480 (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.

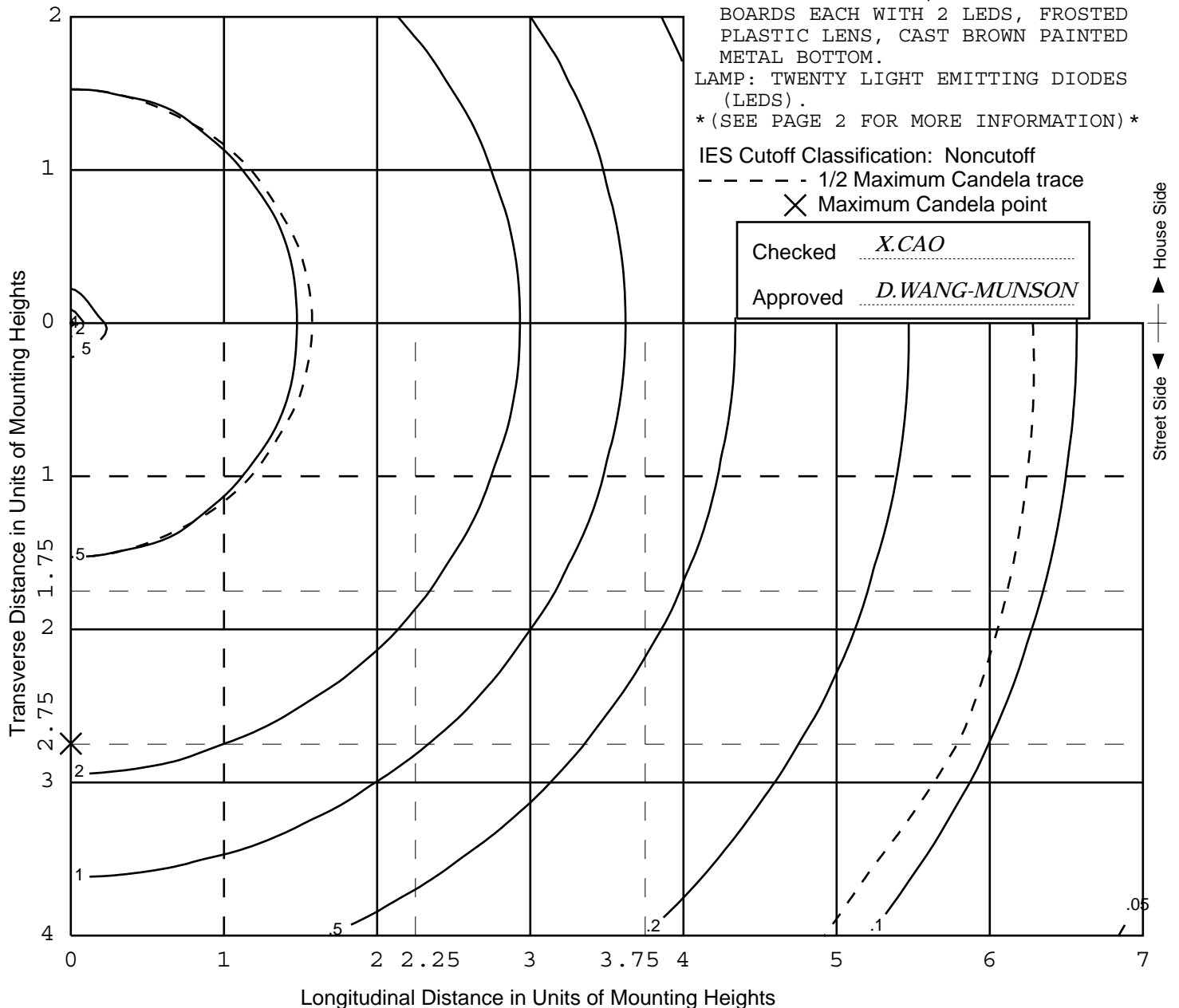
LAMP: TWENTY LIGHT EMITTING DIODES (LEDs).

\*(SEE PAGE 2 FOR MORE INFORMATION)\*

IES Cutoff Classification: Noncutoff

--- 1/2 Maximum Candela trace

× Maximum Candela point



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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 = 21.982 W AT 347.0 VAC.

LED DRIVER: RDD-LT40-A0700-60PF

TEST PROCEDURE: IESNA LM-79-08

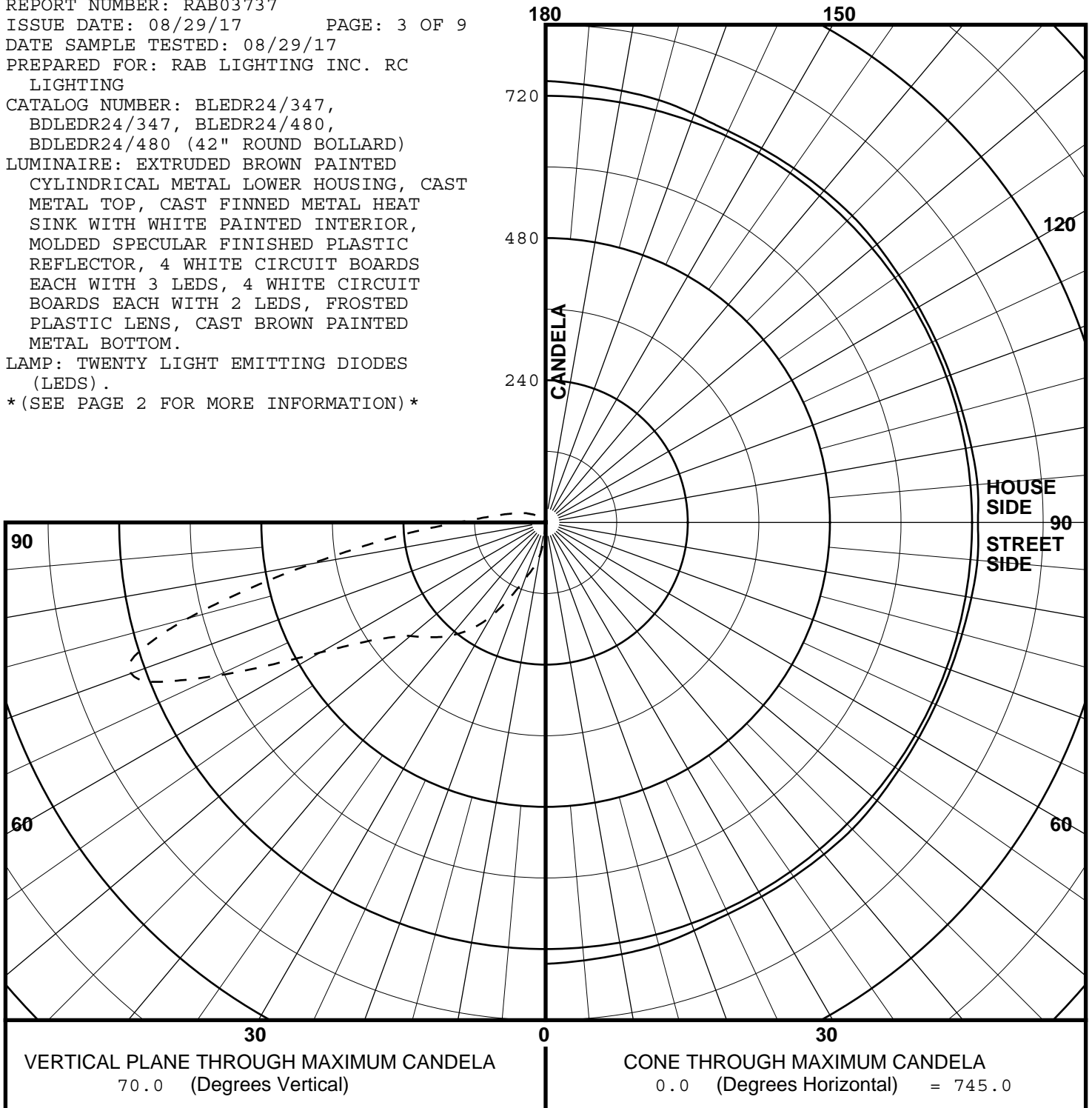
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE

AMBIENT: 24.5

ACCREDITED LABORATORY CODE 201058-0

## MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA

REPORT NUMBER: RAB03737  
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 DATE SAMPLE TESTED: 08/29/17  
 PREPARED FOR: RAB LIGHTING INC. RC  
 LIGHTING  
 CATALOG NUMBER: BLEDR24/347,  
 BDLEDR24/347, BLEDR24/480,  
 BDLEDR24/480 (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: RAB03737

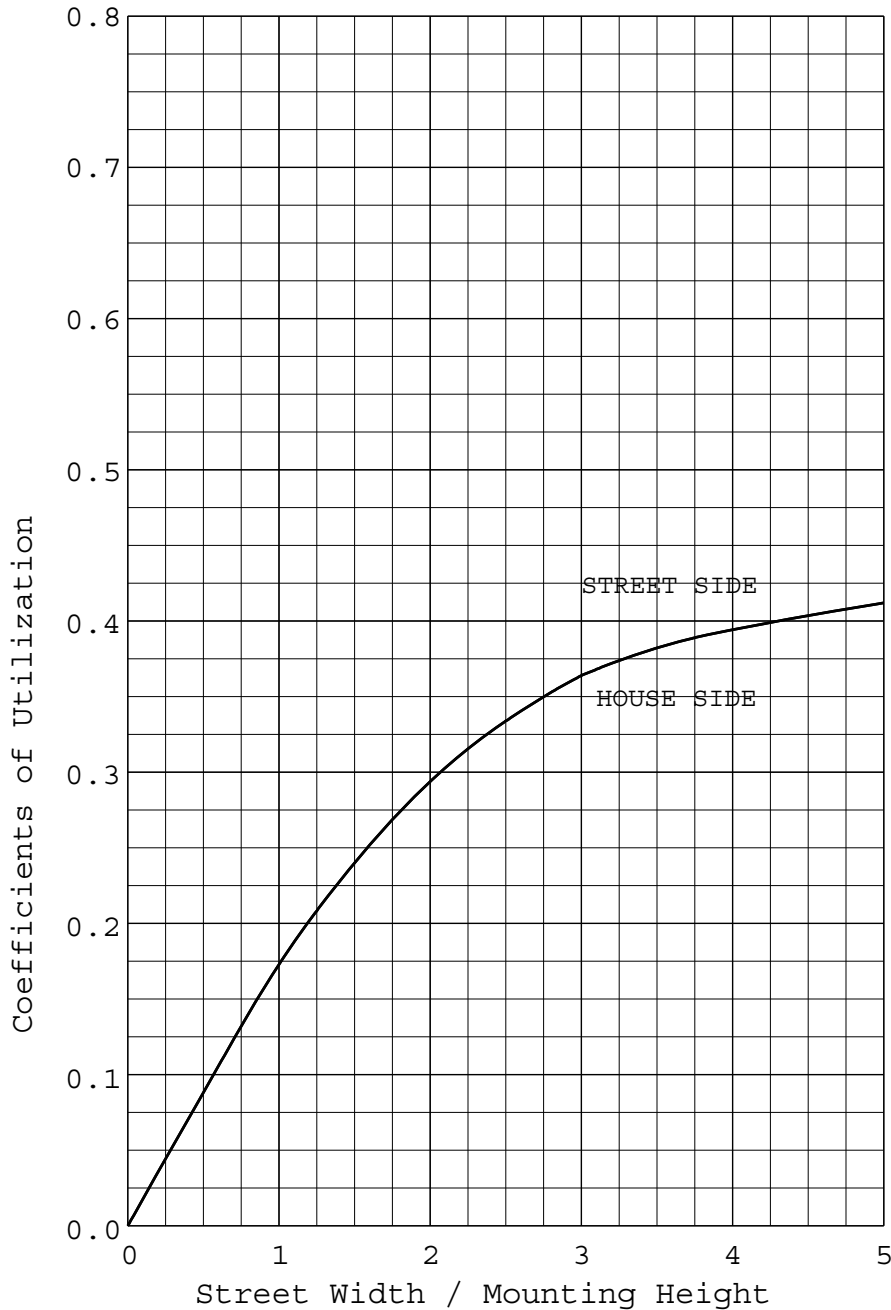
PAGE: 4 OF 9

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PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

## COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	1131.	45.1
DOWNWARD HOUSE SIDE	1131.	45.1
DOWNWARD TOTAL	2263.	90.2
UPWARD STREET SIDE	123.	4.9
UPWARD HOUSE SIDE	123.	4.9
UPWARD TOTAL	245.	9.8
TOTAL FLUX	2508.	100.0
TOTAL INPUT WATTS = 22.0		
EFFICACY = 114.0 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: RAB03737

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PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

PAGE: 5 OF 9

DATE SAMPLE TESTED: 08/29/17

BUG Rating:

Zonal Summary

Lumens

% of Fixture

B2 U3 G2

Zone Ratings

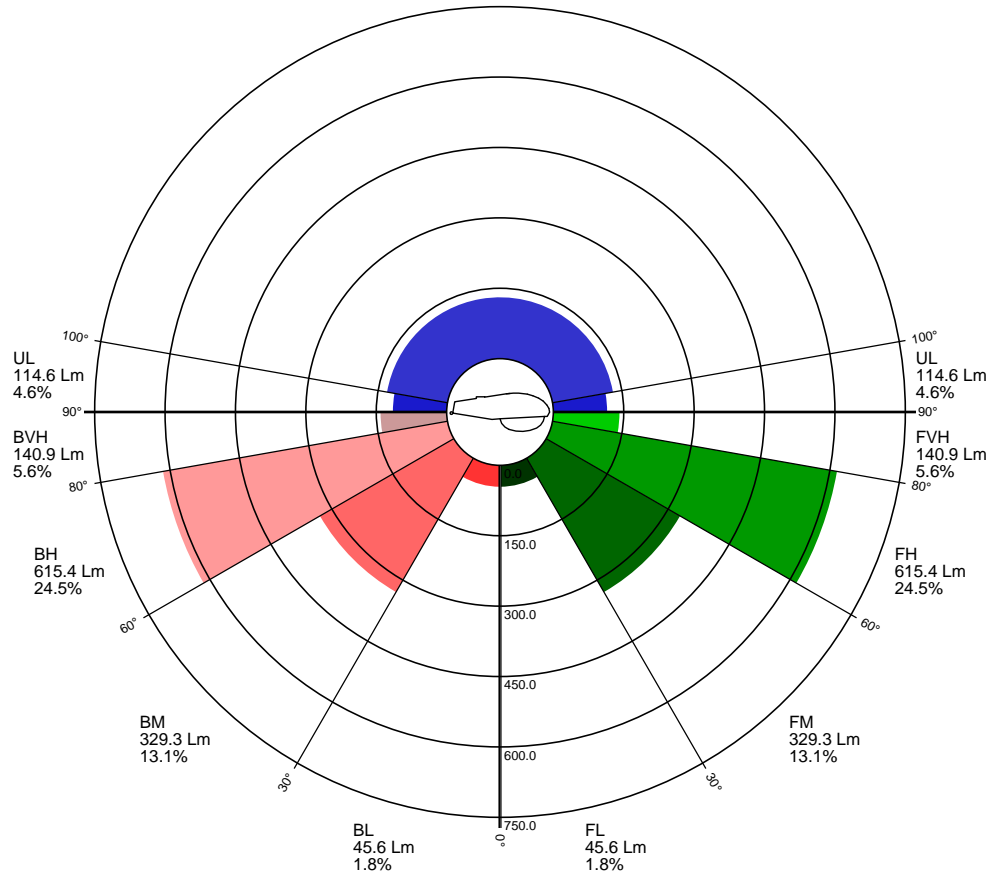
B U G

Forward		1131	45.1			
FL	(0° - 30°)	45.6	1.8			
FM	(30° - 60°)	329.3	13.1			
FH	(60° - 80°)	615.4	24.5			G0
FVH	(80° - 90°)	140.9	5.6			G2
Backward		1131	45.1			
BL	(0° - 30°)	45.6	1.8	B0		
BM	(30° - 60°)	329.3	13.1	B1		
BH	(60° - 80°)	615.4	24.5	B2		G0
BVH	(80° - 90°)	140.9	5.6			G2
Upward		245	9.8			
UL	(90° - 100°)	114.6	4.6		U3	
UH	(100° - 180°)	130.7	5.2		U3	
Trapped Light		0	0.0			
Total Flux		2508	100.0			

### Zonal Lumen Summary

(Linear scale)

UH  
130.7 Lm  
5.2%



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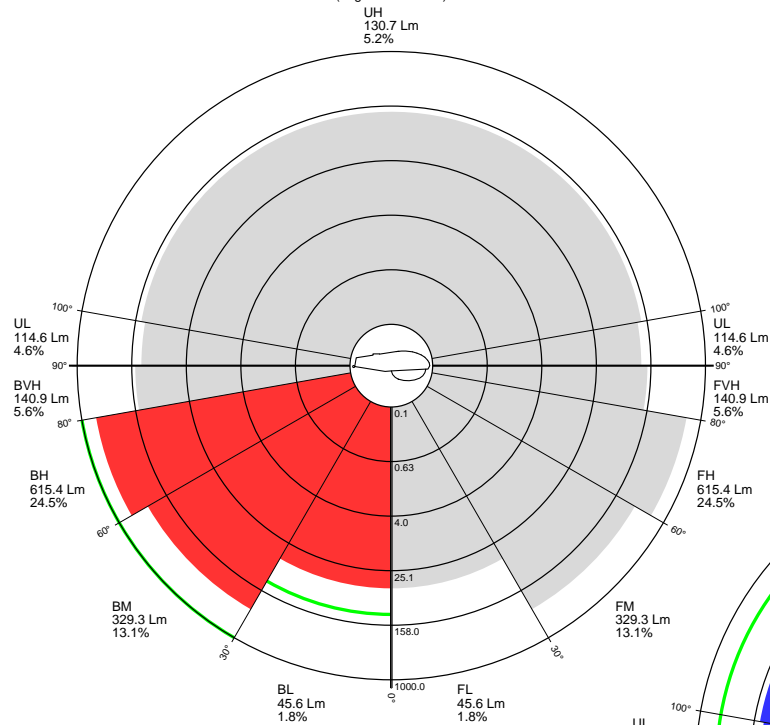
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

PAGE: 6 OF 9

DATE SAMPLE TESTED: 08/29/17

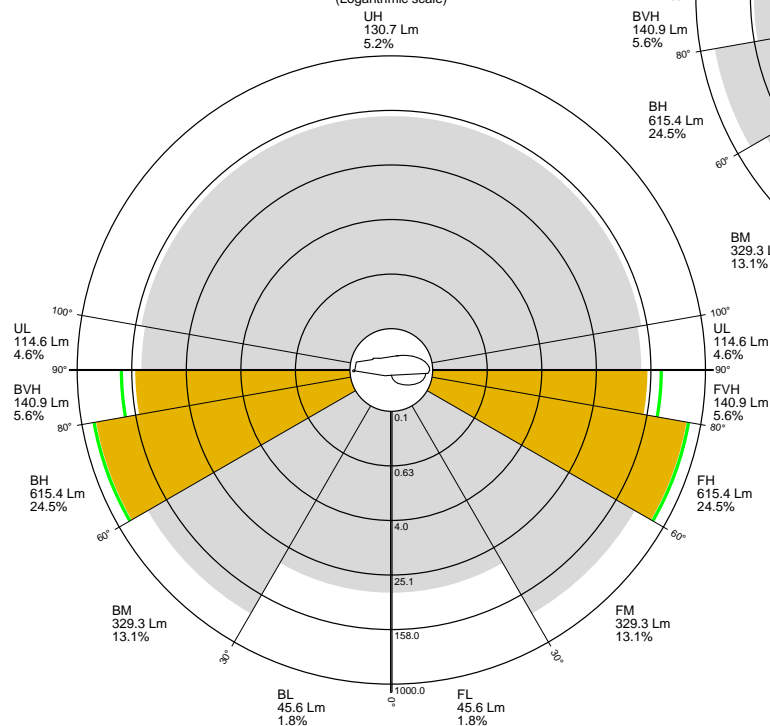
## Backlight Rating Details

(Logarithmic scale)



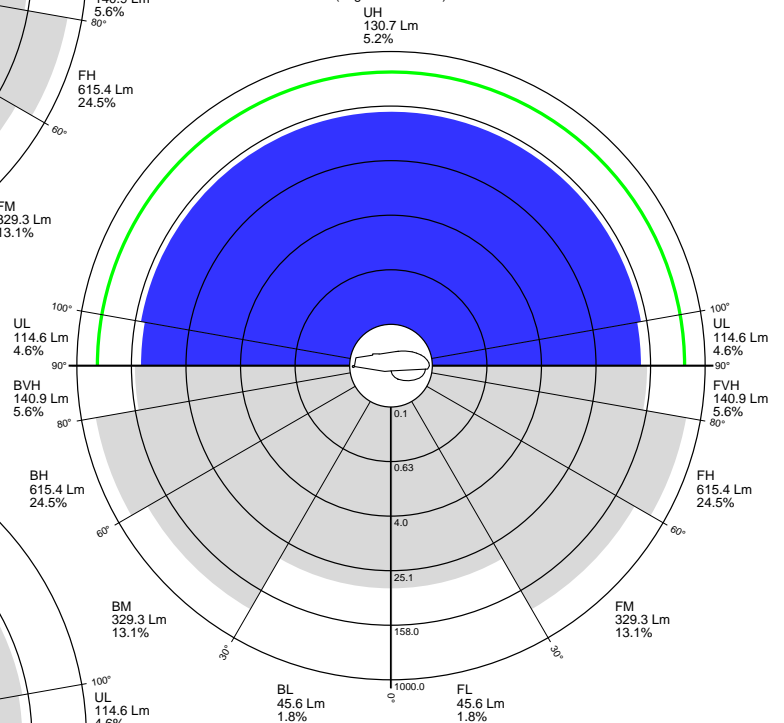
## Glare Rating Details

(Logarithmic scale)



## Uplight Rating Details

(Logarithmic scale)



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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	55.0	65.0	75.0 85.0
	180.0	1.	1.	1.	1.	1.	1.	1.	1.	1.
	175.0	1.	1.	1.	1.	1.	1.	1.	1.	1.
	165.0	1.	1.	1.	1.	1.	1.	1.	1.	1.
	155.0	1.	1.	1.	1.	1.	1.	1.	1.	1.
	145.0	4.	4.	4.	4.	4.	4.	4.	4.	4.
	135.0	11.	11.	11.	11.	11.	11.	11.	11.	11.
	125.0	21.	22.	22.	22.	21.	22.	21.	22.	21.
	115.0	37.	37.	36.	36.	36.	36.	36.	36.	36.
	105.0	58.	58.	58.	58.	58.	58.	57.	58.	57.
	95.0	101.	101.	101.	102.	101.	102.	101.	101.	100.
	90.0	148.	149.	150.	150.	150.	150.	149.	150.	148.
	87.5	189.	190.	191.	192.	191.	192.	190.	192.	187.
	85.0	245.	246.	246.	247.	247.	249.	247.	249.	248.
V	82.5	313.	315.	316.	317.	317.	321.	319.	323.	320.
E	80.0	401.	405.	405.	406.	406.	411.	409.	414.	411.
R	77.5	509.	512.	513.	514.	513.	517.	516.	521.	519.
T	75.0	625.	626.	626.	624.	620.	627.	625.	630.	631.
I	72.5	717.	715.	713.	706.	705.	710.	708.	710.	713.
C	70.0<<	745.	742.	738.	729.	730.	732.	728.	727.	728.
A	67.5	703.	700.	697.	691.	691.	689.	683.	679.	676.
L	65.0	612.	611.	611.	608.	607.	602.	597.	590.	585.
	62.5	518.	519.	518.	517.	513.	510.	505.	499.	493.
A	60.0	439.	441.	440.	441.	438.	433.	431.	426.	420.
N	57.5	382.	384.	383.	385.	382.	377.	377.	375.	370.
G	55.0	343.	343.	343.	344.	341.	338.	339.	338.	336.
L	52.5	317.	318.	319.	317.	314.	313.	314.	313.	314.
E	50.0	298.	299.	301.	298.	297.	296.	296.	298.	298.
	47.5	286.	286.	286.	284.	281.	281.	281.	281.	283.
	45.0	274.	274.	272.	270.	268.	268.	268.	268.	269.
	42.5	262.	262.	259.	256.	254.	254.	254.	254.	256.
	40.0	249.	249.	246.	243.	241.	240.	240.	241.	243.
	37.5	235.	235.	233.	230.	228.	227.	227.	227.	229.
	35.0	219.	219.	218.	215.	213.	212.	212.	212.	214.
	30.0	181.	181.	182.	180.	179.	178.	178.	178.	177.
	25.0	137.	137.	138.	139.	138.	138.	137.	136.	136.
	20.0	101.	101.	102.	103.	103.	103.	103.	102.	102.
	15.0	79.	79.	80.	80.	81.	81.	81.	80.	80.
	10.0	57.	56.	56.	55.	55.	55.	55.	55.	56.
	5.0	13.	13.	13.	14.	14.	14.	14.	14.	14.
	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.

||  
PLANE OF MAXIMUM CANDELA

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03737

PAGE: 8 OF 9

ISSUE DATE: 08/29/17

DATE SAMPLE TESTED: 08/29/17

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
	180.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	175.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	165.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	155.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	145.0	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
	135.0	11.	11.	11.	11.	11.	11.	11.	11.	11.	11.
	125.0	21.	21.	22.	22.	21.	22.	21.	22.	22.	21.
	115.0	36.	36.	36.	36.	36.	36.	36.	36.	36.	37.
	105.0	57.	58.	57.	58.	57.	58.	58.	58.	58.	58.
	95.0	99.	100.	100.	101.	101.	102.	101.	102.	101.	101.
	90.0	147.	147.	148.	150.	149.	150.	150.	150.	150.	149.
	87.5	187.	187.	190.	192.	190.	192.	191.	192.	191.	190.
	85.0	244.	245.	248.	249.	247.	249.	247.	247.	246.	246.
V	82.5	317.	317.	320.	323.	319.	321.	317.	317.	316.	315.
E	80.0	407.	409.	411.	414.	409.	411.	406.	406.	405.	405.
R	77.5	515.	517.	519.	521.	516.	517.	513.	514.	513.	512.
T	75.0	629.	630.	631.	630.	625.	627.	620.	624.	626.	626.
I	72.5	715.	716.	713.	710.	708.	710.	705.	706.	713.	715.
C	70.0<<	730.	732.	728.	727.	728.	732.	730.	729.	738.	742.
A	67.5	675.	676.	676.	679.	683.	689.	691.	691.	697.	700.
L	65.0	580.	581.	585.	590.	597.	602.	607.	608.	611.	611.
	62.5	487.	488.	493.	499.	505.	510.	513.	517.	518.	519.
A	60.0	415.	416.	420.	426.	431.	433.	438.	441.	440.	441.
N	57.5	367.	367.	370.	375.	377.	377.	382.	385.	383.	384.
G	55.0	333.	333.	336.	338.	339.	338.	341.	344.	343.	343.
L	52.5	312.	312.	314.	313.	314.	313.	314.	317.	319.	318.
E	50.0	297.	297.	298.	298.	296.	296.	297.	298.	301.	299.
	47.5	283.	283.	283.	281.	281.	281.	281.	284.	286.	286.
	45.0	271.	270.	269.	268.	268.	268.	268.	270.	272.	274.
	42.5	258.	257.	256.	254.	254.	254.	254.	256.	259.	262.
	40.0	245.	244.	243.	241.	240.	240.	241.	243.	246.	249.
	37.5	231.	230.	229.	227.	227.	227.	228.	230.	233.	235.
	35.0	215.	214.	214.	212.	212.	212.	213.	215.	218.	219.
	30.0	178.	177.	177.	178.	178.	178.	179.	180.	182.	181.
	25.0	136.	135.	136.	136.	137.	138.	138.	139.	138.	137.
	20.0	102.	101.	102.	102.	103.	103.	103.	103.	102.	101.
	15.0	80.	80.	80.	80.	81.	81.	81.	80.	80.	79.
	10.0	57.	56.	56.	55.	55.	55.	55.	55.	56.	56.
	5.0	13.	12.	14.	14.	14.	14.	14.	14.	13.	13.
	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

CONE OF MAXIMUM CANDELA



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ISSUE DATE: 08/29/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/29/17

### 5-DEGREE ZONAL LUMEN SUMMARY

0- 5	0
5- 10	3
10- 15	8
15- 20	15
20- 25	25
25- 30	40
30- 35	58
35- 40	77
40- 45	95
45- 50	115
50- 55	138
55- 60	177
60- 65	249
65- 70	343
70- 75	363
75- 80	276
80- 85	175
85- 90	106
90- 95	67
95-100	47
100-105	35
105-110	27
110-115	21
115-120	16
120-125	12
125-130	8
130-135	5
135-140	3
140-145	2
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	26
0- 30	91
0- 40	226
0- 50	436
0- 60	750
0- 70	1341
0- 80	1981
0- 90	2263
0-100	2377
0-110	2439
0-120	2476
0-130	2495
0-140	2504
0-150	2507
0-160	2507
0-170	2508
0-180	2508

REPORT NUMBER: RAB03738  
DATE: 8/28/2017  
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
CATALOG NUMBER: BLEDR24/347, BDLEDR24/347, BLEDR24/480, BDLEDR24/480 (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 (CRI<sub>a</sub>,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: RAB03738  
 DATE: 8/28/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR24/347, BDLEDR24/347, BLEDR24/480, BDLEDR24/480 (42" ROUND BOLLARD)

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### RESULTS:

<b>PHOTOMETRIC</b>	
Total Integrated Flux (lumens)	2508 *
<b>SPECTRORADIOMETRIC</b>	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3370
Chromaticity Ordinate y	0.3456
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2082
Chromaticity Ordinate v'	0.4805
Correlated Color Temp CCT (K)	5308
ANSI C78.377-2008 Duv	0.000
Total Radiant Flux (milliWatts)	7622 *
<b>ELECTRICAL</b>	
Input Voltage (Volts AC)	347.0
Input Current (Amps AC)	0.065
Input Power (Watts)	22.0
Input Power Factor (%)	97.4
Input Current THD (%)	8.5
Input Voltage THD (%)	0.2
<b>EFFICACY (Lumens/Watt)</b>	
	114.0
<b>ELECTRICAL AT MAX NONIMAL INPUT</b>	
Input Voltage (Volts AC)	480.0
Input Current (Amps AC)	0.057
Input Power (Watts)	22.4
Input Power Factor (%)	82.4
Input Current THD (%)	10.3
Input Voltage THD (%)	0.2
<b>Off-State Power (Watts)</b>	
	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	75
R1 Light greyish red	73
R2 Dark greyish yellow	80
R3 Strong yellowish green	83
R4 Moderate yellowish green	75
R5 Light bluish green	73
R6 Light blue	71
R7 Light violet	83
R8 Light reddish purple	60
R9 Strong red	-19
R10 Strong yellow	50
R11 Strong green	71
R12 Strong blue	44
R13 Light yellowish pink (skin)	74
R14 Moderate olive green (leaf)	90

### \*NOTE:

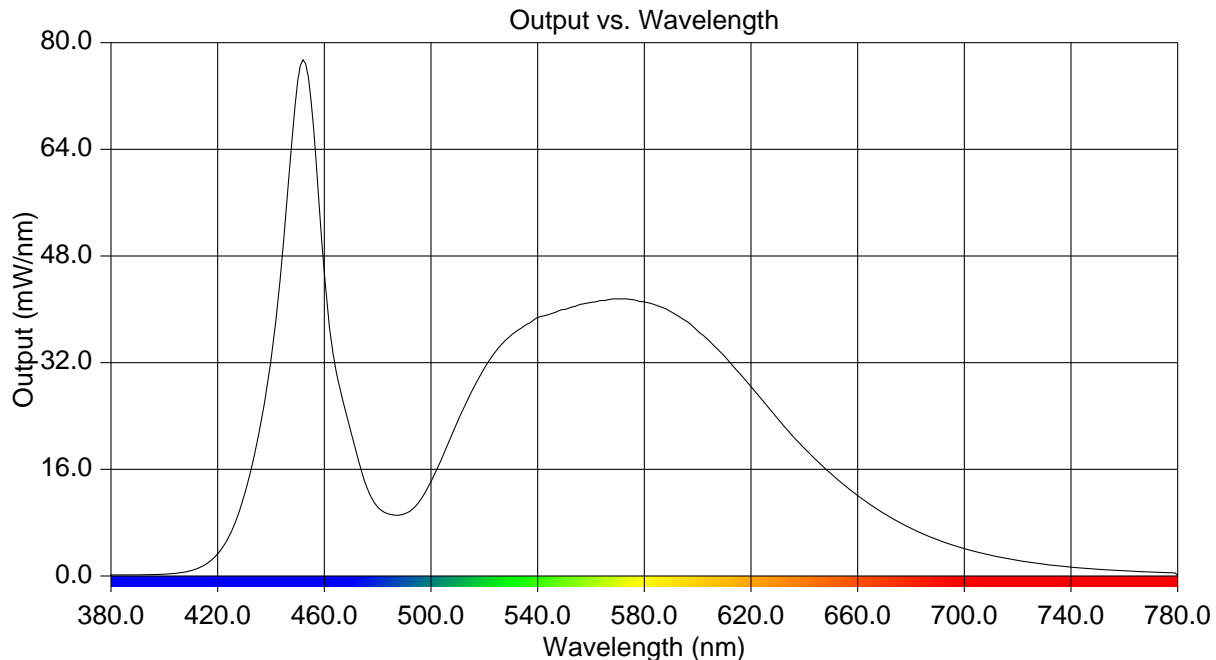
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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: RAB03738  
 DATE: 8/28/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR24/347, BDLEDR24/347, BLEDR24/480, BDLEDR24/480 (42" ROUND BOLLARD)

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### RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.156	515	27.487	650	15.331
385	0.172	520	31.121	655	13.632
390	0.172	525	34.079	660	12.063
395	0.207	530	36.100	665	10.628
400	0.281	535	37.518	670	9.357
405	0.436	540	38.782	675	8.189
410	0.798	545	39.339	680	7.144
415	1.617	550	39.980	685	6.221
420	3.304	555	40.603	690	5.416
425	6.546	560	41.057	695	4.717
430	12.113	565	41.311	700	4.096
435	20.651	570	41.558	705	3.555
440	32.383	575	41.473	710	3.091
445	51.586	580	41.107	715	2.698
450	74.216	585	40.530	720	2.344
455	71.396	590	39.644	725	2.028
460	45.408	595	38.399	730	1.761
465	29.587	600	36.753	735	1.536
470	21.609	605	34.987	740	1.330
475	14.336	610	33.011	745	1.159
480	10.339	615	30.706	750	1.019
485	9.229	620	28.408	755	0.885
490	9.319	625	26.064	760	0.771
495	10.836	630	23.570	765	0.673
500	14.207	635	21.276	770	0.588
505	18.528	640	19.154	775	0.514
510	23.249	645	17.178	780	0.079



REPORT NUMBER: RAB03738  
 DATE: 8/28/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR24/347, BDLEDR24/347, BLEDR24/480, BDLEDR24/480 (42" ROUND BOLLARD)

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## CIE Chromaticity Diagram

