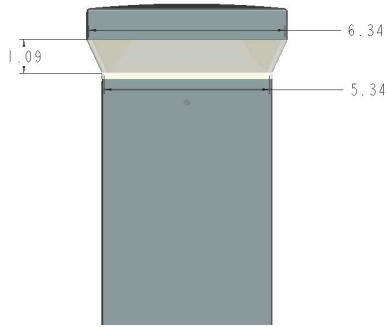


ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 3.5 foot mounting height.



REPORT NUMBER: RAB03693
 ISSUE DATE: 08/16/17 PAGE: 1 OF 9
 DATE SAMPLE TESTED: 08/16/17
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLED24Y/347,
 BLED24Y/480 (42" SQUARE BOLLARD)
 LUMINAIRE: EXTRUDED BROWN PAINTED
 SQUARE METAL LOWER HOUSING, CAST
 METAL TOP, CAST FINNED METAL HEAT
 SINK WITH WHITE PAINTED INTERIOR,
 MOLDED SPECULAR FINISHED PLASTIC
 REFLECTOR WITH WHITE CORNER DIVIDERS
 CREATING 4 OPTICAL COMPARTMENTS, EACH
 OPTICAL COMPARTMENT CONTAINS 1 WHITE
 CIRCUIT BOARD WITH 5 LEDS, FROSTED
 PLASTIC LENS, CAST BROWN PAINTED
 METAL BOTTOM.

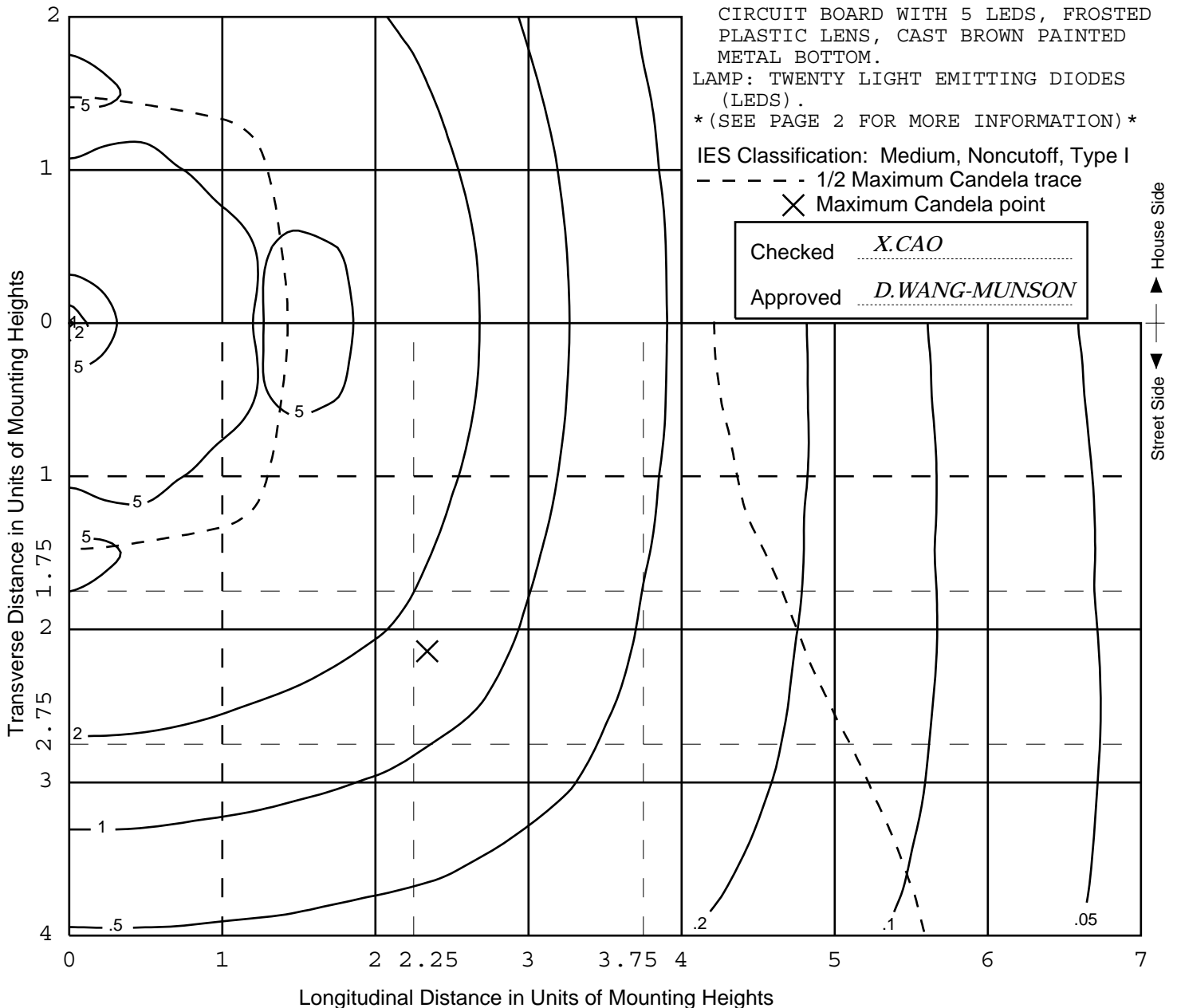
LAMP: TWENTY LIGHT EMITTING DIODES (LEDs).

(SEE PAGE 2 FOR MORE INFORMATION)

IES Classification: Medium, Noncutoff, Type I

--- 1/2 Maximum Candela trace

X Maximum Candela point



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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 = 21.698 W AT 347.0 VAC.

LED DRIVER: RDD-LT40-A0700-60PF

TEST PROCEDURE: IESNA LM-79-08

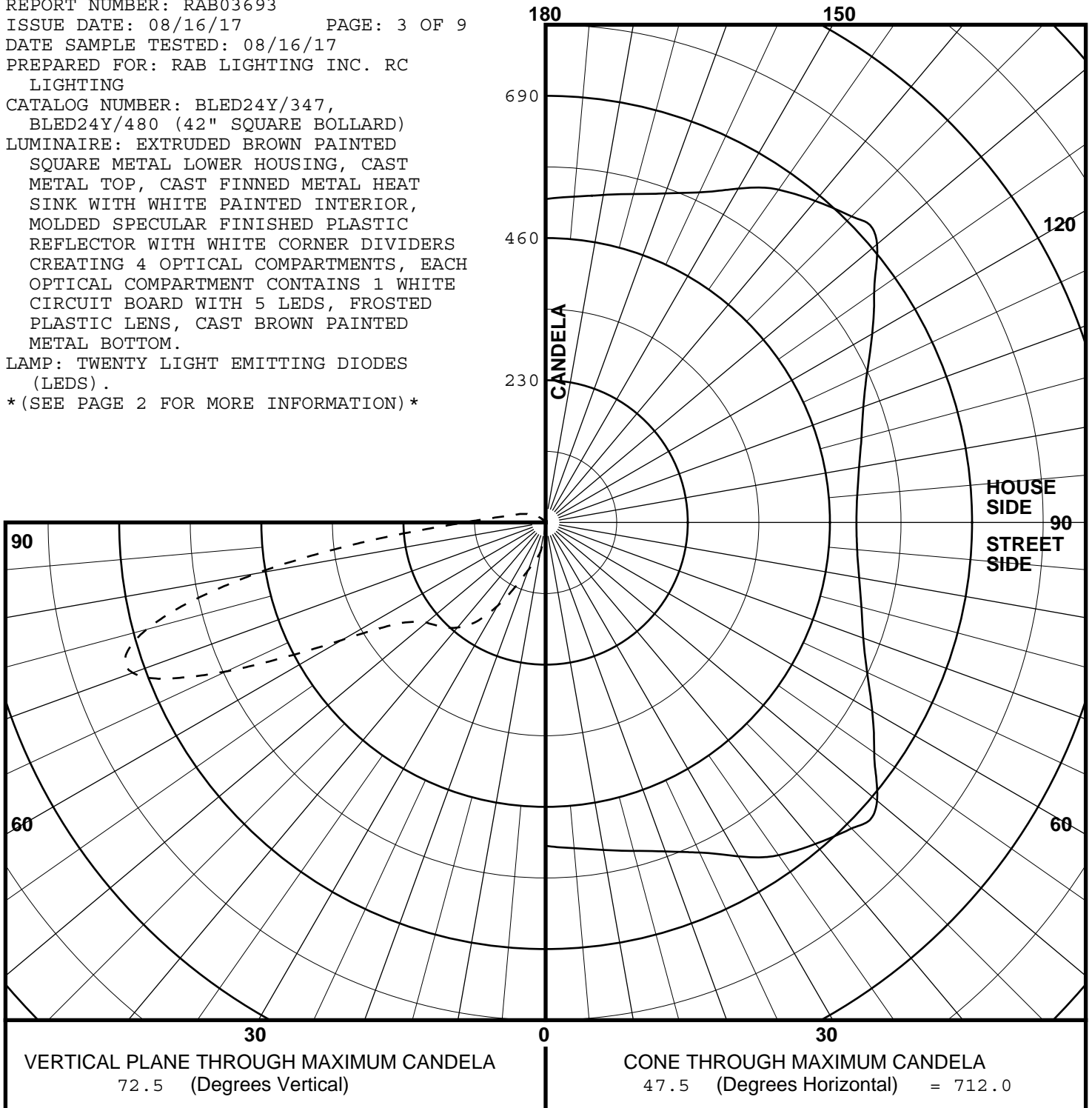
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE

AMBIENT: 25.1

ACCREDITED LABORATORY CODE 201058-0

MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA

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 DATE SAMPLE TESTED: 08/16/17
 PREPARED FOR: RAB LIGHTING INC. RC
 LIGHTING
 CATALOG NUMBER: BLED24Y/347,
 BLED24Y/480 (42" SQUARE BOLLARD)
 LUMINAIRE: EXTRUDED BROWN PAINTED
 SQUARE METAL LOWER HOUSING, CAST
 METAL TOP, CAST FINNED METAL HEAT
 SINK WITH WHITE PAINTED INTERIOR,
 MOLDED SPECULAR FINISHED PLASTIC
 REFLECTOR WITH WHITE CORNER DIVIDERS
 CREATING 4 OPTICAL COMPARTMENTS, EACH
 OPTICAL COMPARTMENT CONTAINS 1 WHITE
 CIRCUIT BOARD WITH 5 LEDS, FROSTED
 PLASTIC LENS, CAST BROWN PAINTED
 METAL BOTTOM.
 LAMP: TWENTY LIGHT EMITTING DIODES
 (LEDS).
 (SEE PAGE 2 FOR MORE INFORMATION)



REPORT NUMBER: RAB03693

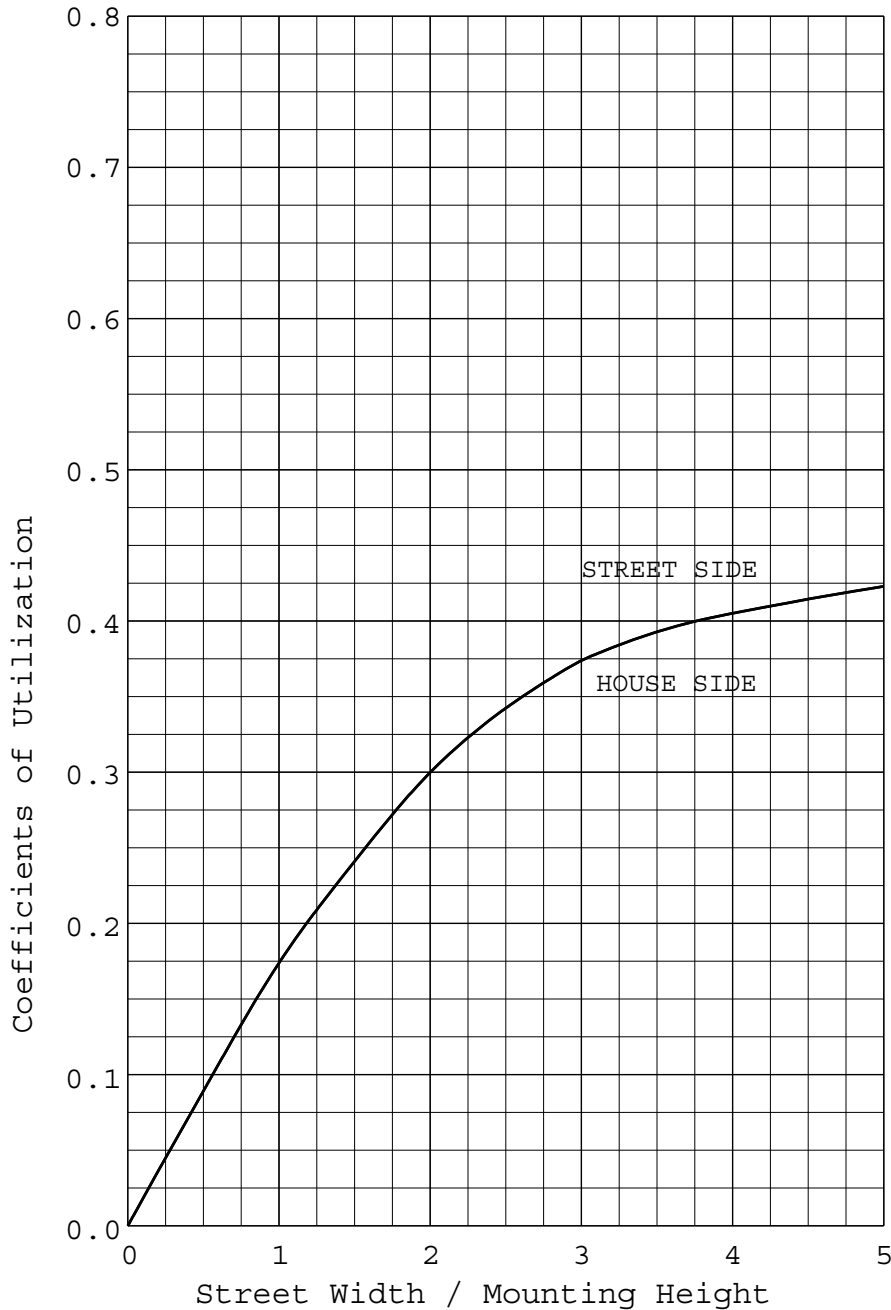
PAGE: 4 OF 9

ISSUE DATE: 08/16/17

DATE SAMPLE TESTED: 08/16/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	976.	45.9
DOWNWARD HOUSE SIDE	976.	45.9
DOWNWARD TOTAL	1951.	91.7
UPWARD STREET SIDE	88.	4.1
UPWARD HOUSE SIDE	88.	4.1
UPWARD TOTAL	177.	8.3
TOTAL FLUX	2128.	100.0
TOTAL INPUT WATTS = 21.7		
EFFICACY = 98.1 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: RAB03693

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PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

PAGE: 5 OF 9

DATE SAMPLE TESTED: 08/16/17

BUG Rating:

Zonal Summary

Lumens

% of Fixture

B2 U3 G2

Zone Ratings

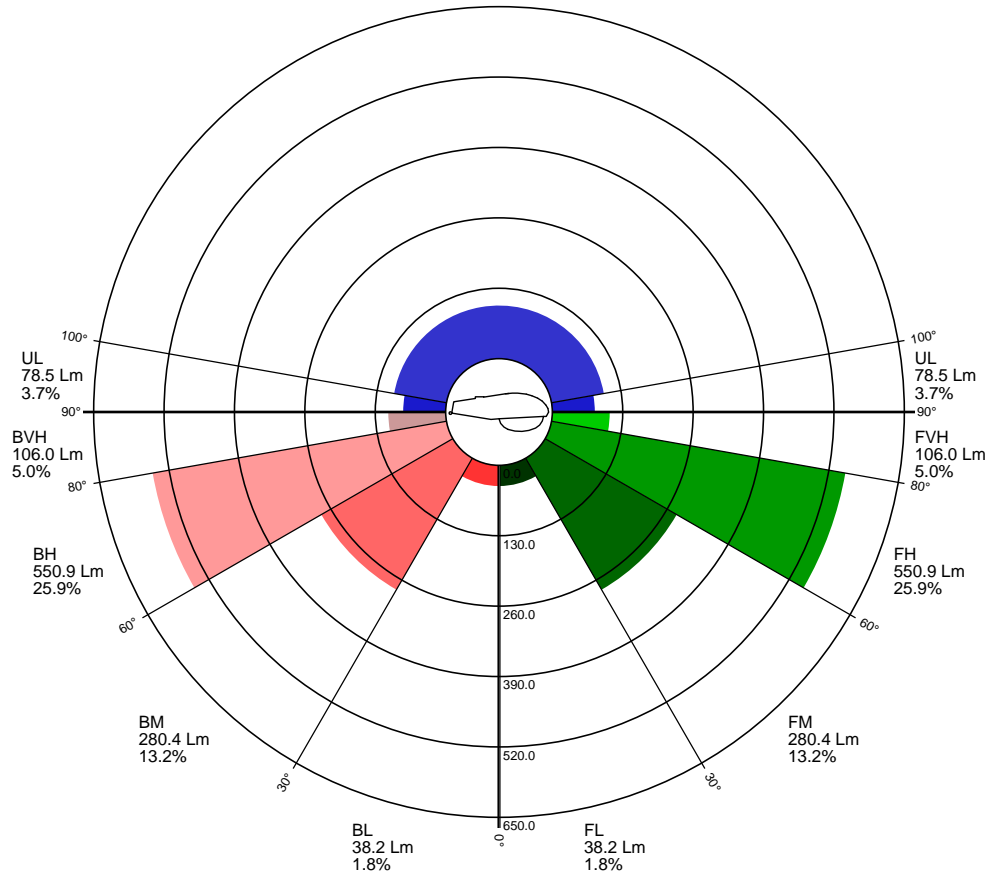
B U G

Forward		976	45.9			
FL	(0° - 30°)	38.2	1.8			
FM	(30° - 60°)	280.4	13.2			
FH	(60° - 80°)	550.9	25.9			G0
FVH	(80° - 90°)	106.0	5.0			G2
Backward		976	45.9			
BL	(0° - 30°)	38.2	1.8	B0		
BM	(30° - 60°)	280.4	13.2	B1		
BH	(60° - 80°)	550.9	25.9	B2		G0
BVH	(80° - 90°)	106.0	5.0			G2
Upward		177	8.3			
UL	(90° - 100°)	78.5	3.7		U3	
UH	(100° - 180°)	98.1	4.6		U3	
Trapped Light		0	0.0			
Total Flux		2128	100.0			

Zonal Lumen Summary

(Linear scale)

UH
98.1 Lm
4.6%



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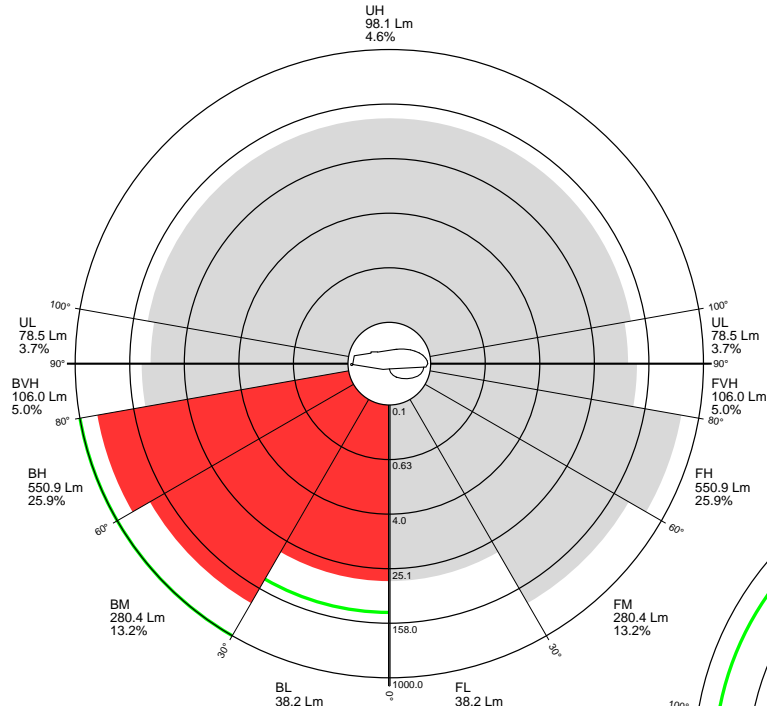
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/16/17

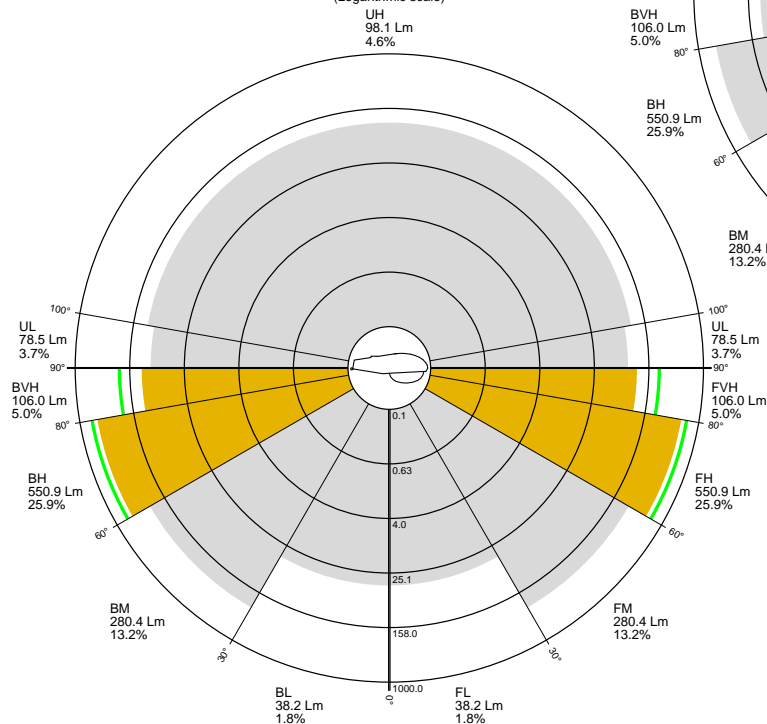
Backlight Rating Details

(Logarithmic scale)



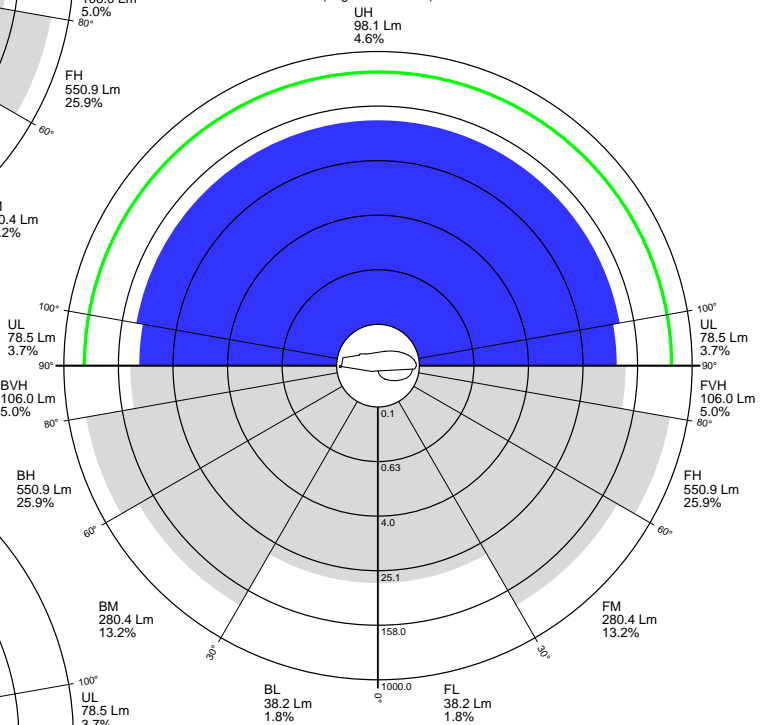
Glare Rating Details

(Logarithmic scale)



Uplight Rating Details

(Logarithmic scale)



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DATE SAMPLE TESTED: 08/16/17

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	47.5	55.0	65.0	75.0	85.0
	180.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	175.0	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.	1.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	1.	1.	1.	0.	0.	0.	0.	0.	0.	1.	1.
	145.0	4.	4.	4.	3.	2.	2.	2.	2.	3.	4.	4.
	135.0	10.	10.	10.	9.	8.	8.	8.	8.	9.	10.	10.
	125.0	18.	18.	17.	17.	18.	19.	19.	18.	17.	17.	18.
	115.0	26.	26.	26.	29.	31.	32.	32.	31.	28.	26.	25.
	105.0	34.	34.	38.	44.	47.	48.	49.	47.	43.	37.	34.
	95.0	50.	51.	62.	74.	82.	85.	85.	82.	74.	61.	49.
	90.0	68.	72.	91.	113.	128.	132.	131.	126.	109.	86.	68.
	87.5	86.	92.	115.	144.	169.	176.	176.	170.	141.	108.	86.
	85.0	112.	119.	145.	191.	235.	250.	251.	235.	184.	139.	113.
V	82.5	159.	164.	198.	259.	323.	357.	355.	321.	248.	188.	156.
E	80.0	236.	241.	279.	349.	435.	478.	476.	425.	333.	265.	230.
R	77.5	338.	342.	380.	452.	543.	585.	586.	529.	431.	359.	325.
T	75.0	442.	451.	481.	537.	620.	663.	668.	606.	516.	456.	425.
I	72.5<<	523.	529.	550.	589.	657.	700.	712.	649.	574.	529.	506.
C	70.0	574.	579.	595.	615.	655.	688.	711.	659.	612.	580.	562.
A	67.5	606.	609.	618.	615.	613.	627.	660.	631.	629.	618.	606.
L	65.0	605.	607.	605.	577.	540.	534.	570.	567.	609.	626.	623.
	62.5	566.	565.	554.	515.	456.	435.	468.	482.	550.	590.	600.
A	60.0	495.	493.	479.	437.	380.	356.	380.	398.	468.	517.	535.
N	57.5	409.	407.	394.	362.	321.	303.	319.	329.	381.	426.	444.
G	55.0	325.	325.	319.	301.	280.	275.	283.	283.	310.	336.	349.
L	52.5	259.	259.	261.	260.	257.	257.	264.	258.	263.	268.	272.
E	50.0	215.	217.	225.	235.	244.	246.	252.	243.	235.	227.	223.
	47.5	190.	193.	203.	220.	235.	239.	245.	234.	219.	205.	195.
	45.0	177.	180.	190.	210.	227.	233.	238.	226.	209.	192.	182.
	42.5	169.	172.	182.	201.	219.	226.	231.	219.	201.	183.	174.
	40.0	164.	166.	175.	191.	210.	217.	222.	210.	193.	177.	169.
	37.5	160.	161.	169.	182.	198.	206.	210.	200.	185.	171.	165.
	35.0	155.	156.	163.	172.	185.	192.	196.	187.	176.	166.	161.
	30.0	142.	142.	146.	148.	152.	155.	156.	155.	152.	150.	148.
	25.0	117.	118.	119.	116.	114.	113.	113.	116.	120.	122.	122.
	20.0	87.	87.	88.	86.	83.	82.	82.	83.	86.	88.	89.
	15.0	60.	60.	64.	64.	63.	63.	63.	63.	64.	64.	61.
	10.0	39.	39.	43.	46.	48.	48.	48.	48.	46.	43.	39.
	5.0	21.	21.	18.	15.	14.	14.	12.	14.	14.	16.	20.
	0.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

||
PLANE OF MAXIMUM CANDELA

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03693

PAGE: 8 OF 9

ISSUE DATE: 08/16/17

DATE SAMPLE TESTED: 08/16/17

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	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	1.	1.	1.	0.	0.	0.	0.	0.	1.	1.	1.
	145.0	4.	4.	4.	3.	2.	2.	2.	3.	4.	4.	4.
	135.0	10.	10.	10.	9.	8.	8.	8.	9.	10.	10.	10.
	125.0	18.	18.	17.	17.	18.	19.	18.	17.	17.	18.	18.
	115.0	25.	25.	26.	28.	31.	32.	31.	29.	26.	26.	26.
	105.0	33.	34.	37.	43.	47.	48.	47.	44.	38.	34.	34.
	95.0	49.	49.	61.	74.	82.	85.	82.	74.	62.	51.	50.
	90.0	65.	68.	86.	109.	126.	132.	128.	113.	91.	72.	68.
	87.5	81.	86.	108.	141.	170.	176.	169.	144.	115.	92.	86.
	85.0	106.	113.	139.	184.	235.	250.	235.	191.	145.	119.	112.
	82.5	148.	156.	188.	248.	321.	357.	323.	259.	198.	164.	159.
	80.0	221.	230.	265.	333.	425.	478.	435.	349.	279.	241.	236.
	77.5	321.	325.	359.	431.	529.	585.	543.	452.	380.	342.	338.
	75.0	423.	425.	456.	516.	606.	663.	620.	537.	481.	451.	442.
	72.5<<	503.	506.	529.	574.	649.	700.	657.	589.	550.	529.	523.
	70.0	559.	562.	580.	612.	659.	688.	655.	615.	595.	579.	574.
	67.5	603.	606.	618.	629.	631.	627.	613.	615.	618.	609.	606.
	65.0	621.	623.	626.	609.	567.	534.	540.	577.	605.	607.	605.
	62.5	600.	600.	590.	550.	482.	435.	456.	515.	554.	565.	566.
	60.0	536.	535.	517.	468.	398.	356.	380.	437.	479.	493.	495.
	57.5	447.	444.	426.	381.	329.	303.	321.	362.	394.	407.	409.
	55.0	350.	349.	336.	310.	283.	275.	280.	301.	319.	325.	325.
	52.5	272.	272.	268.	263.	258.	257.	257.	260.	261.	259.	259.
	50.0	222.	223.	227.	235.	243.	246.	244.	235.	225.	217.	215.
	47.5	194.	195.	205.	219.	234.	239.	235.	220.	203.	193.	190.
	45.0	180.	182.	192.	209.	226.	233.	227.	210.	190.	180.	177.
	42.5	172.	174.	183.	201.	219.	226.	219.	201.	182.	172.	169.
	40.0	167.	169.	177.	193.	210.	217.	210.	191.	175.	166.	164.
	37.5	163.	165.	171.	185.	200.	206.	198.	182.	169.	161.	160.
35.0	159.	161.	166.	176.	187.	192.	185.	172.	163.	156.	155.	
30.0	147.	148.	150.	152.	155.	155.	152.	148.	146.	142.	142.	
25.0	122.	122.	122.	120.	116.	113.	114.	116.	119.	118.	117.	
20.0	88.	89.	88.	86.	83.	82.	83.	86.	88.	87.	87.	
15.0	60.	61.	64.	64.	63.	63.	63.	64.	64.	60.	60.	
10.0	38.	39.	43.	46.	48.	48.	48.	46.	43.	39.	39.	
5.0	19.	20.	16.	14.	14.	14.	14.	15.	18.	21.	21.	
0.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03693

ISSUE DATE: 08/16/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

PAGE: 9 OF 9

DATE SAMPLE TESTED: 08/16/17

5-DEGREE ZONAL LUMEN SUMMARY

0- 5	0
5- 10	2
10- 15	6
15- 20	12
20- 25	21
25- 30	34
30- 35	48
35- 40	61
40- 45	73
45- 50	88
50- 55	116
55- 60	175
60- 65	255
65- 70	310
70- 75	304
75- 80	233
80- 85	137
85- 90	75
90- 95	46
95-100	32
100-105	25
105-110	20
110-115	16
115-120	12
120-125	9
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	2
0- 20	21
0- 30	76
0- 40	185
0- 50	346
0- 60	637
0- 70	1202
0- 80	1739
0- 90	1951
0-100	2029
0-110	2074
0-120	2102
0-130	2118
0-140	2125
0-150	2127
0-160	2127
0-170	2127
0-180	2128

REPORT NUMBER: RAB03694
DATE: 8/08/2017
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
CATALOG NUMBER: BLED24Y/347, BLED24Y/480 (42" SQUARE BOLLARD)

Page 1 of 4

ADDRESS: 170 LUDLOW AVE, NORTHVALE, NJ 07647

LUMINAIRE: EXTRUDED BROWN PAINTED SQUARE METAL LOWER HOUSING, CAST METAL TOP, CAST FINNED METAL HEAT SINK WITH WHITE PAINTED INTERIOR, MOLDED SPECULAR FINISHED PLASTIC REFLECTOR WITH WHITE CORNER DIVIDERS CREATING 4 OPTICAL COMPARTMENTS, EACH OPTICAL COMPARTMENT CONTAINS 1 WHITE CIRCUIT BOARD WITH 5 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	06/22/18
	RAB 2.0 meter Diameter Integrating Sphere, 4PI Geometry	06/22/18

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: RAB03694
 DATE: 8/08/2017
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLED24Y/347, BLED24Y/480 (42" SQUARE BOLLARD)

Page 2 of 4

RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	2128 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.4393
Chromaticity Ordinate y	0.4078
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2505
Chromaticity Ordinate v'	0.5232
Correlated Color Temp CCT (K)	2990
ANSI C78.377-2008 Duv	0.001
Total Radiant Flux (milliWatts)	6499 *
ELECTRICAL	
Input Voltage (Volts AC)	347.0
Input Current (Amps AC)	0.064
Input Power (Watts)	21.7
Input Power Factor (%)	97.9
Input Current THD (%)	8.3
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	
	98.1
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	480.0
Input Current (Amps AC)	0.055
Input Power (Watts)	22.0
Input Power Factor (%)	83.5
Input Current THD (%)	9.9
Input Voltage THD (%)	0.2
Off-State Power (Watts)	
	0.0

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	84
R1 Light greyish red	82
R2 Dark greyish yellow	93
R3 Strong yellowish green	95
R4 Moderate yellowish green	81
R5 Light bluish green	83
R6 Light blue	92
R7 Light violet	82
R8 Light reddish purple	60
R9 Strong red	12
R10 Strong yellow	84
R11 Strong green	81
R12 Strong blue	74
R13 Light yellowish pink (skin)	85
R14 Moderate olive green (leaf)	98

*NOTE:

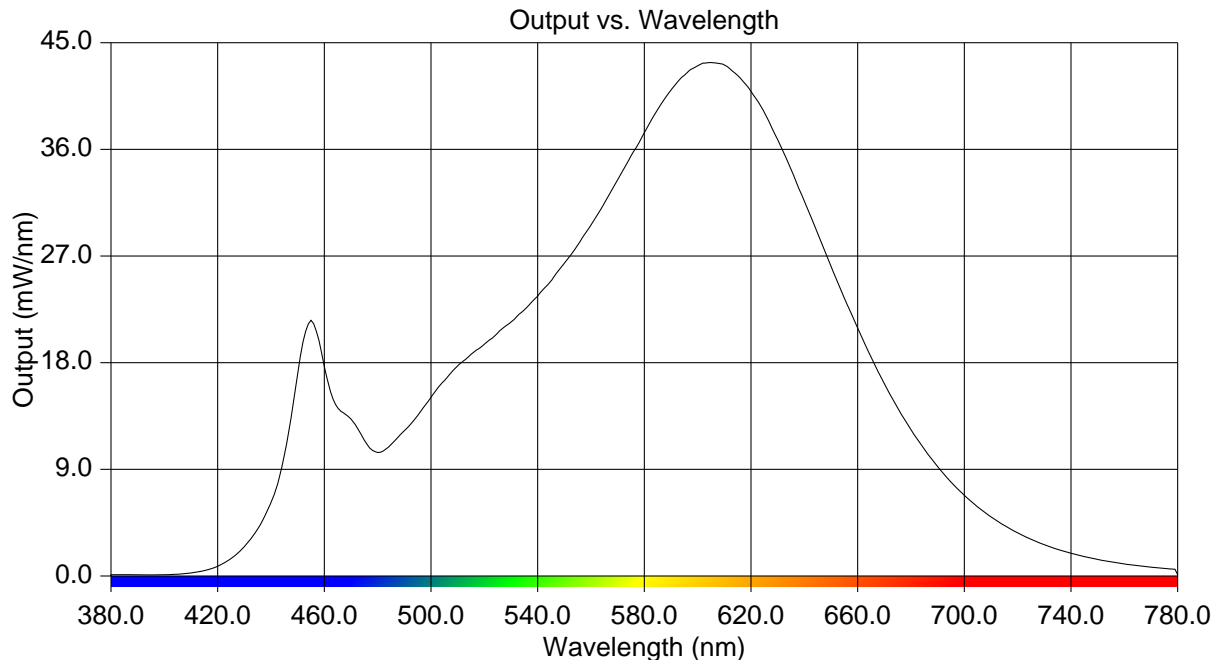
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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: RAB03694
 DATE: 8/08/2017
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING
 CATALOG NUMBER: BLED24Y/347, BLED24Y/480 (42" SQUARE BOLLARD)

Page 3 of 4

RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.099	515	18.701	650	26.152
385	0.095	520	19.563	655	23.449
390	0.096	525	20.500	660	20.923
395	0.099	530	21.416	665	18.446
400	0.114	535	22.455	670	16.244
405	0.149	540	23.608	675	14.181
410	0.243	545	24.897	680	12.326
415	0.452	550	26.372	685	10.700
420	0.819	555	27.911	690	9.226
425	1.465	560	29.614	695	7.924
430	2.482	565	31.463	700	6.812
435	3.961	570	33.423	705	5.829
440	6.192	575	35.452	710	4.981
445	10.194	580	37.445	715	4.276
450	17.079	585	39.346	720	3.626
455	21.574	590	41.014	725	3.100
460	17.663	595	42.246	730	2.638
465	14.183	600	43.052	735	2.248
470	13.236	605	43.324	740	1.917
475	11.461	610	43.127	745	1.636
480	10.420	615	42.236	750	1.403
485	11.090	620	40.881	755	1.189
490	12.258	625	39.140	760	1.015
495	13.534	630	36.822	765	0.872
500	15.088	635	34.342	770	0.739
505	16.478	640	31.625	775	0.641
510	17.734	645	28.925	780	0.096



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CIE Chromaticity Diagram

