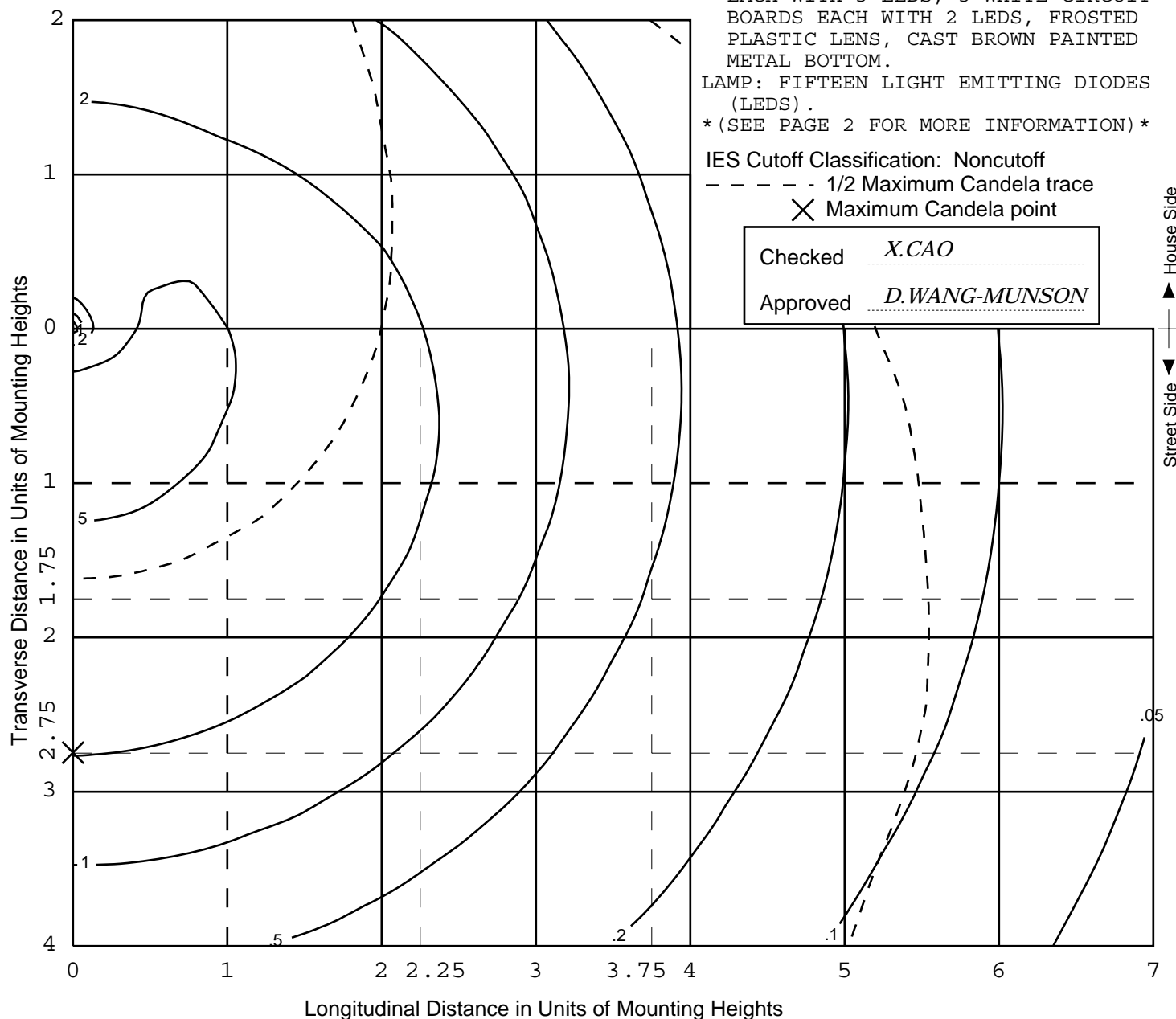


✗ Maximum Candela point

Checked X.CAO  
Approved D.WANG-MUNSON



REPORT NUMBER: RAB03691

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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 = 16.964 W AT 277.0 VAC.

LED DRIVER: RD-LU018-A035C0SP

TEST PROCEDURE: IESNA LM-79-08

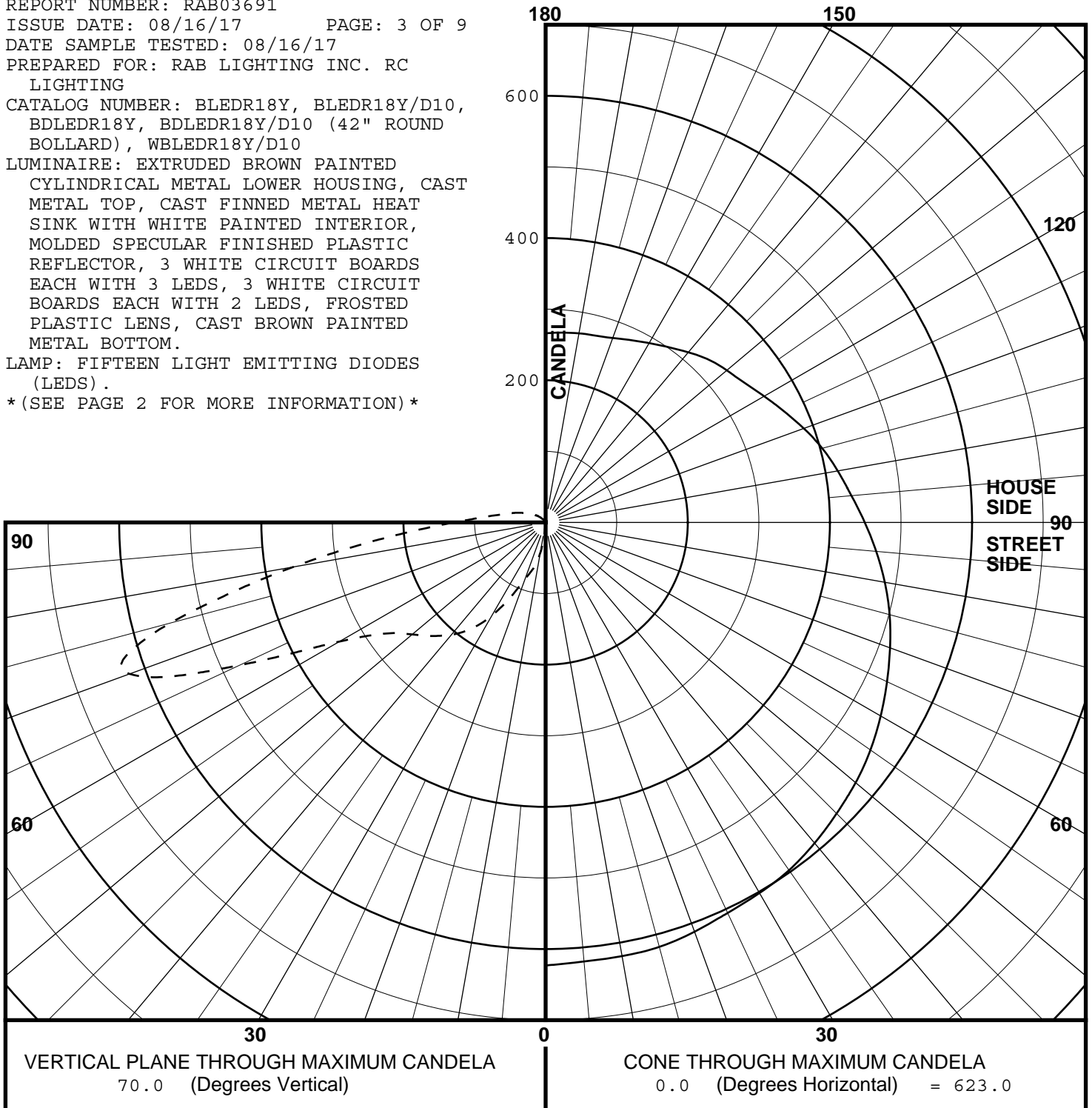
LM-80 DATA AVAILABLE FROM MANUFACTURER FOR SOLID STATE SOURCE

AMBIENT: 24.1

ACCREDITED LABORATORY CODE 201058-0

## MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA

REPORT NUMBER: RAB03691  
 ISSUE DATE: 08/16/17 PAGE: 3 OF 9  
 DATE SAMPLE TESTED: 08/16/17  
 PREPARED FOR: RAB LIGHTING INC. RC  
 LIGHTING  
 CATALOG NUMBER: BLEDR18Y, BLEDR18Y/D10,  
 BDLEDR18Y, BDLEDR18Y/D10 (42" ROUND  
 BOLLARD), WBLEDR18Y/D10  
 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, 3 WHITE CIRCUIT BOARDS  
 EACH WITH 3 LEDS, 3 WHITE CIRCUIT  
 BOARDS EACH WITH 2 LEDS, FROSTED  
 PLASTIC LENS, CAST BROWN PAINTED  
 METAL BOTTOM.  
 LAMP: FIFTEEN LIGHT EMITTING DIODES  
 (LEDS).  
 \*(SEE PAGE 2 FOR MORE INFORMATION)\*



REPORT NUMBER: RAB03691

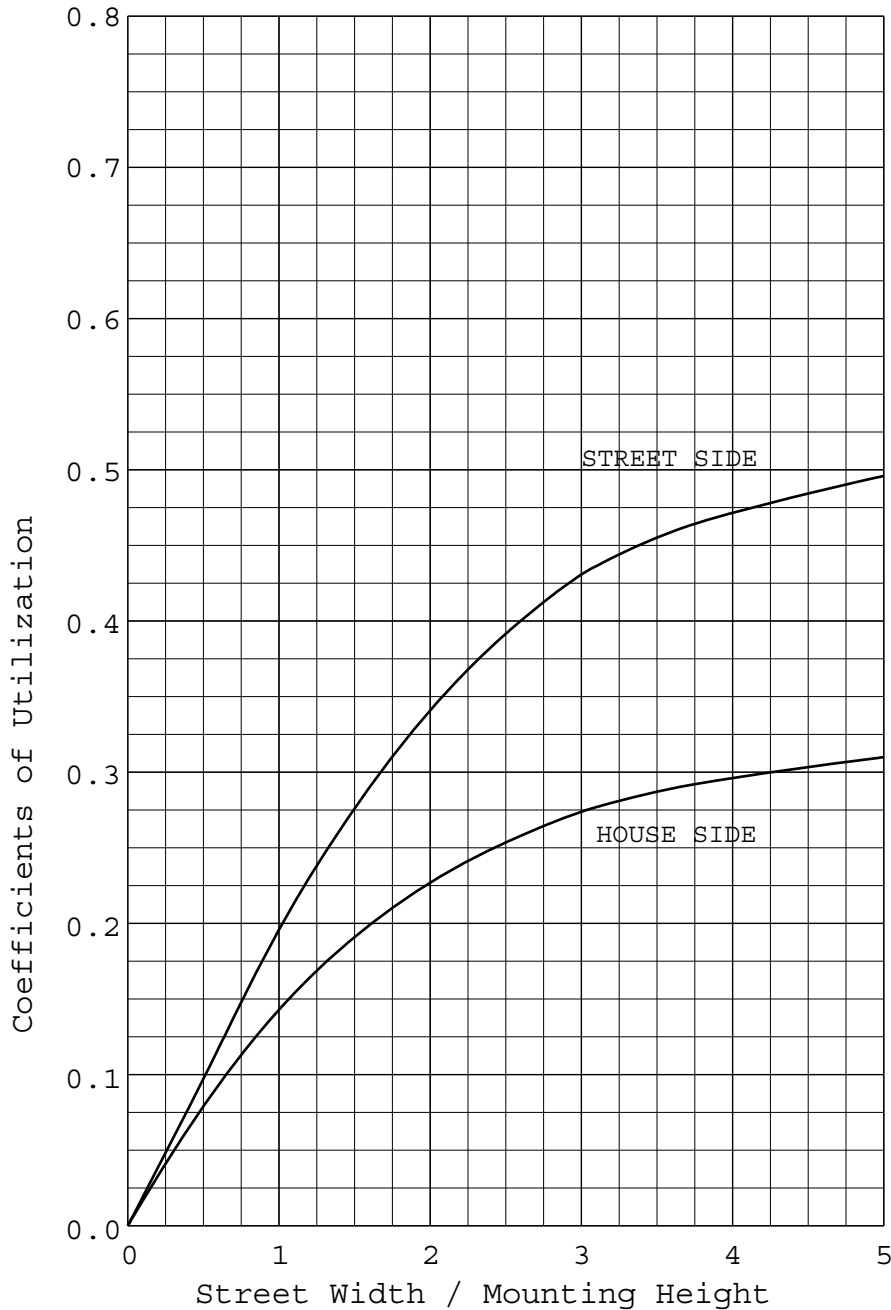
PAGE: 4 OF 9

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PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

## COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	875.	54.9
DOWNWARD HOUSE SIDE	546.	34.3
DOWNWARD TOTAL	1421.	89.2
UPWARD STREET SIDE	101.	6.3
UPWARD HOUSE SIDE	72.	4.5
UPWARD TOTAL	172.	10.8
TOTAL FLUX	1593.	100.0
TOTAL INPUT WATTS = 17.0		
EFFICACY = 93.7 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: RAB03691

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DATE SAMPLE TESTED: 08/16/17

BUG Rating:

Zonal Summary

Lumens

% of Fixture

B1 U3 G2

Zone Ratings

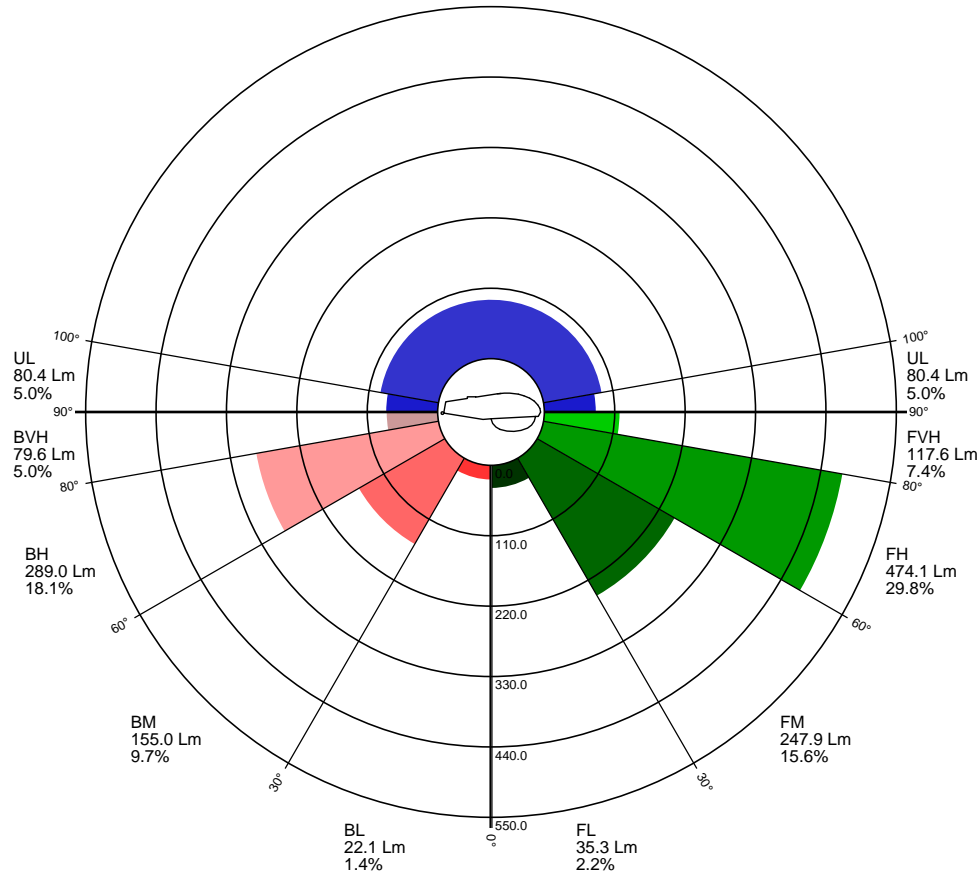
B U G

Forward		875	54.9			
FL	(0° - 30°)	35.3	2.2			
FM	(30° - 60°)	247.9	15.6			
FH	(60° - 80°)	474.1	29.8			G0
FVH	(80° - 90°)	117.6	7.4			G2
Backward		546	34.3			
BL	(0° - 30°)	22.1	1.4	B0		
BM	(30° - 60°)	155.0	9.7	B0		
BH	(60° - 80°)	289.0	18.1	B1		G1
BVH	(80° - 90°)	79.6	5.0			G1
Upward		172	10.8			
UL	(90° - 100°)	80.4	5.0		U3	
UH	(100° - 180°)	92.0	5.8		U3	
Trapped Light		0	0.0			
Total Flux		1593	100.0			

### Zonal Lumen Summary

(Linear scale)

UH  
92.0 Lm  
5.8%



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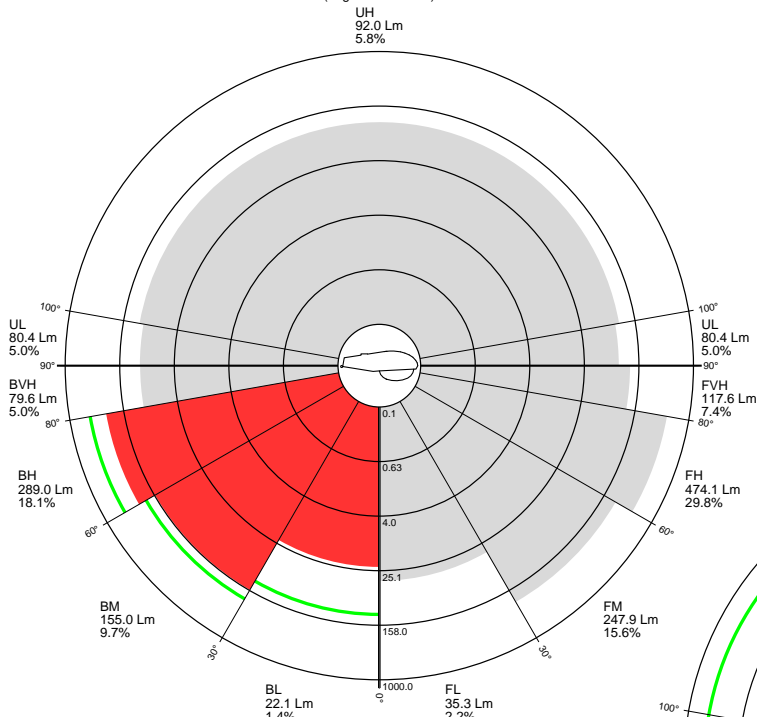
PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/16/17

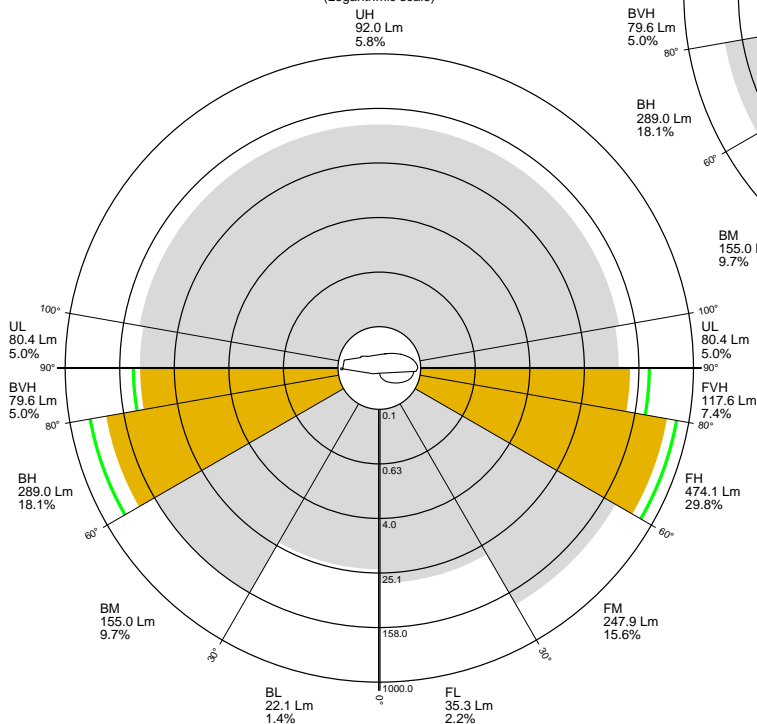
## Backlight Rating Details

(Logarithmic scale)



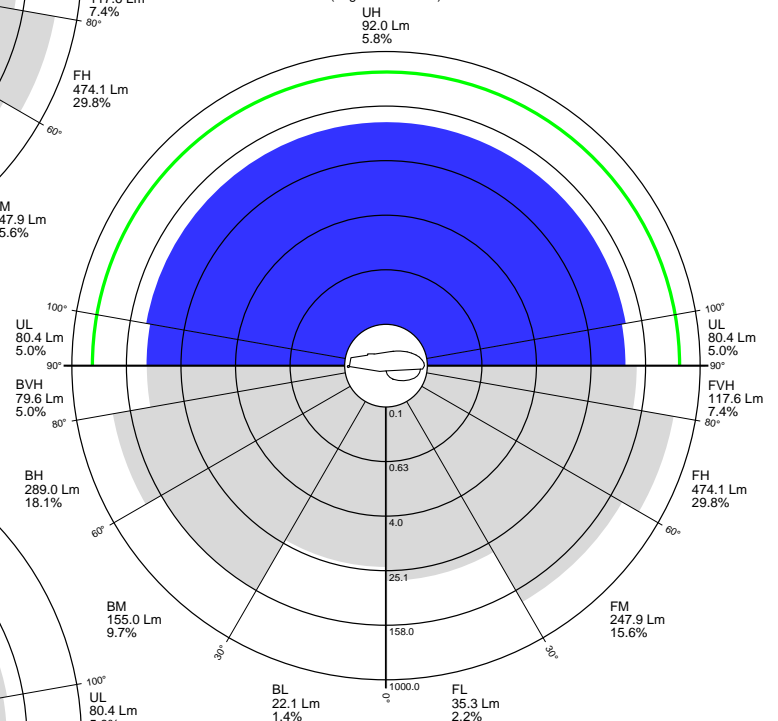
## Glare Rating Details

(Logarithmic scale)



## Uplight Rating Details

(Logarithmic scale)



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PAGE: 7 OF 9

ISSUE DATE: 08/16/17

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	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	9.	10.	9.	10.	10.	10.	10.	9.	9.
	125.0	18.	18.	18.	18.	18.	18.	18.	17.	16.
	115.0	31.	31.	31.	31.	30.	30.	30.	29.	27.
	105.0	50.	49.	49.	49.	48.	47.	46.	45.	42.
	95.0	88.	87.	86.	86.	85.	84.	82.	80.	77.
	90.0	129.	131.	128.	130.	127.	126.	122.	119.	115.
	87.5	165.	167.	164.	166.	162.	162.	155.	152.	146.
	85.0	215.	219.	215.	218.	213.	212.	202.	198.	189.
V	82.5	281.	285.	282.	285.	279.	278.	265.	258.	246.
E	80.0	361.	365.	362.	366.	361.	359.	341.	331.	314.
R	77.5	450.	455.	452.	456.	450.	446.	428.	412.	390.
T	75.0	547.	551.	548.	548.	540.	532.	508.	489.	462.
I	72.5	617.	618.	614.	608.	597.	585.	561.	536.	506.
C	70.0<<	623.	620.	618.	606.	597.	579.	558.	530.	501.
A	67.5	565.	559.	561.	546.	540.	522.	503.	476.	453.
L	65.0	475.	468.	471.	458.	456.	438.	426.	402.	382.
	62.5	395.	391.	392.	383.	380.	364.	353.	336.	319.
A	60.0	335.	332.	332.	328.	323.	310.	301.	288.	274.
N	57.5	297.	295.	295.	292.	287.	275.	267.	257.	246.
G	55.0	272.	271.	271.	269.	263.	253.	246.	237.	228.
L	52.5	256.	256.	256.	252.	247.	239.	232.	224.	215.
E	50.0	245.	244.	244.	240.	235.	228.	222.	214.	206.
	47.5	235.	234.	233.	229.	224.	219.	213.	205.	198.
	45.0	226.	226.	223.	219.	215.	210.	205.	197.	190.
	42.5	216.	215.	213.	209.	205.	201.	196.	189.	182.
	40.0	206.	206.	203.	199.	195.	191.	187.	180.	173.
	37.5	195.	195.	192.	189.	184.	181.	177.	171.	164.
	35.0	182.	182.	180.	177.	173.	170.	165.	160.	154.
	30.0	151.	152.	151.	148.	146.	143.	138.	133.	127.
	25.0	115.	115.	115.	114.	112.	110.	106.	102.	97.
	20.0	85.	85.	84.	84.	83.	81.	79.	76.	72.
	15.0	67.	67.	67.	66.	65.	64.	62.	60.	57.
	10.0	44.	45.	44.	44.	44.	43.	42.	41.	40.
	5.0	3.	3.	4.	4.	4.	4.	5.	5.	5.
	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.

||  
PLANE OF MAXIMUM CANDELA

CONE OF MAXIMUM CANDELA

REPORT NUMBER: RAB03691

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	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	175.0	1.	1.	1.	1.	1.	1.	1.	2.	2.	1.	1.
	165.0	1.	1.	1.	1.	1.	1.	1.	2.	2.	2.	1.
	155.0	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
	145.0	4.	3.	3.	3.	3.	3.	3.	2.	2.	2.	2.
	135.0	9.	9.	8.	7.	7.	6.	6.	6.	5.	5.	5.
	125.0	16.	16.	15.	14.	13.	12.	11.	11.	10.	10.	10.
	115.0	27.	26.	25.	23.	22.	21.	19.	18.	18.	17.	18.
	105.0	42.	41.	39.	37.	34.	33.	31.	30.	29.	28.	28.
	95.0	73.	71.	68.	64.	61.	58.	55.	53.	51.	49.	50.
	90.0	108.	106.	100.	95.	90.	86.	81.	78.	74.	72.	72.
	87.5	137.	134.	127.	120.	113.	109.	103.	98.	93.	90.	90.
	85.0	177.	173.	164.	154.	145.	140.	131.	123.	118.	113.	114.
	82.5	228.	222.	210.	197.	186.	179.	167.	157.	149.	143.	144.
	80.0	288.	281.	264.	247.	233.	224.	208.	196.	185.	178.	179.
	77.5	355.	344.	324.	303.	284.	272.	253.	238.	226.	218.	219.
	75.0	419.	404.	377.	351.	329.	311.	292.	274.	263.	256.	256.
	72.5	456.	439.	409.	378.	350.	332.	311.	292.	282.	276.	276.
	70.0<<	449.	432.	403.	370.	342.	324.	301.	283.	272.	268.	266.
	67.5	404.	389.	364.	335.	312.	290.	269.	252.	240.	237.	235.
	65.0	346.	334.	313.	289.	268.	248.	230.	215.	204.	202.	199.
	62.5	292.	283.	265.	245.	228.	211.	196.	184.	176.	174.	172.
	60.0	253.	245.	230.	213.	197.	183.	171.	163.	157.	156.	156.
	57.5	227.	220.	206.	190.	177.	164.	154.	149.	145.	144.	144.
	55.0	210.	203.	190.	175.	162.	152.	142.	138.	136.	135.	135.
	52.5	198.	192.	179.	164.	152.	142.	133.	130.	129.	127.	127.
	50.0	189.	183.	170.	156.	144.	134.	126.	123.	122.	121.	120.
	47.5	181.	175.	163.	149.	137.	127.	120.	116.	115.	114.	114.
	45.0	174.	168.	156.	143.	131.	121.	114.	111.	109.	108.	108.
	42.5	167.	161.	149.	137.	125.	115.	108.	104.	102.	101.	101.
	40.0	160.	154.	142.	130.	119.	109.	102.	98.	95.	94.	94.
	37.5	151.	146.	135.	123.	113.	103.	96.	91.	88.	86.	86.
35.0	142.	137.	126.	116.	106.	97.	89.	84.	81.	78.	78.	
30.0	117.	113.	105.	97.	89.	82.	75.	69.	65.	62.	62.	
25.0	89.	86.	80.	75.	70.	64.	59.	55.	51.	50.	49.	
20.0	67.	65.	61.	57.	54.	50.	47.	44.	42.	41.	41.	
15.0	53.	51.	49.	46.	43.	41.	39.	37.	36.	35.	35.	
10.0	37.	36.	33.	31.	28.	26.	24.	22.	21.	20.	21.	
5.0	6.	6.	6.	5.	5.	4.	4.	3.	3.	3.	2.	
0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	

CONE OF MAXIMUM CANDELA



REPORT NUMBER: RAB03691

ISSUE DATE: 08/16/17

PREPARED FOR: RAB LIGHTING INC. RC LIGHTING

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DATE SAMPLE TESTED: 08/16/17

### 5-DEGREE ZONAL LUMEN SUMMARY

0- 5	0
5- 10	2
10- 15	5
15- 20	10
20- 25	16
25- 30	25
30- 35	36
35- 40	48
40- 45	59
45- 50	71
50- 55	84
55- 60	104
60- 65	142
65- 70	202
70- 75	231
75- 80	187
80- 85	123
85- 90	75
90- 95	47
95-100	33
100-105	25
105-110	19
110-115	14
115-120	11
120-125	8
125-130	6
130-135	4
135-140	2
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	17
0- 30	57
0- 40	142
0- 50	272
0- 60	460
0- 70	805
0- 80	1223
0- 90	1421
0-100	1501
0-110	1544
0-120	1570
0-130	1584
0-140	1590
0-150	1592
0-160	1593
0-170	1593
0-180	1593

REPORT NUMBER: RAB03664  
 DATE: 7/27/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR18Y, BLEDR18Y/D10, BDLEDR18Y, BDLEDR18Y/D10 (42" ROUND BOLLARD), WBLEDR18Y/D10  
 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, 3 WHITE CIRCUIT BOARDS EACH WITH 3 LEDS, 3 WHITE CIRCUIT BOARDS EACH WITH 2 LEDS, FROSTED PLASTIC LENS, CAST BROWN PAINTED METAL BOTTOM.

LAMP: FIFTEEN LIGHT EMITTING DIODES (LEDS).

DRIVER: RD-LU018-A035C0SP

OBJECT OF TEST: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT THE RATED INPUT VOLTAGES (277.0 AND 120.0 VAC, 60Hz) TO THE TEST SAMPLE.

INSTRUMENTS:	GWINSTEK PROGRAMMABLE AC POWER SOURCE APS-7100	Calibration Due:
	CHROMA PROGRAMMABLE DIGITAL POWER METER MODEL 66202	N/A
	OCEAN OPTICS QE65PRO Spectroradiometer	3/01/18
	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 (120.0 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: RAB03664  
 DATE: 7/27/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR18Y, BLEDR18Y/D10, BDLEDR18Y, BDLEDR18Y/D10 (42" ROUND BOLLARD), WBLEDR18Y/D10

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### RESULTS:

PHOTOMETRIC	
Total Integrated Flux (lumens)	1593 *
SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.4391
Chromaticity Ordinate y	0.4088
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2499
Chromaticity Ordinate v'	0.5236
Correlated Color Temp CCT (K)	3001
ANSI C78.377-2008 Duv	0.002
Total Radiant Flux (milliWatts)	4851 *
ELECTRICAL	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.068
Input Power (Watts)	17.0
Input Power Factor (%)	89.7
Input Current THD (%)	10.4
Input Voltage THD (%)	0.2
EFFICACY (Lumens/Watt)	
	93.7
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.137
Input Power (Watts)	16.3
Input Power Factor (%)	99.5
Input Current THD (%)	6.5
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	96
R4 Moderate yellowish green	81
R5 Light bluish green	83
R6 Light blue	92
R7 Light violet	83
R8 Light reddish purple	60
R9 Strong red	11
R10 Strong yellow	83
R11 Strong green	81
R12 Strong blue	74
R13 Light yellowish pink (skin)	85
R14 Moderate olive green (leaf)	98

### \*NOTE:

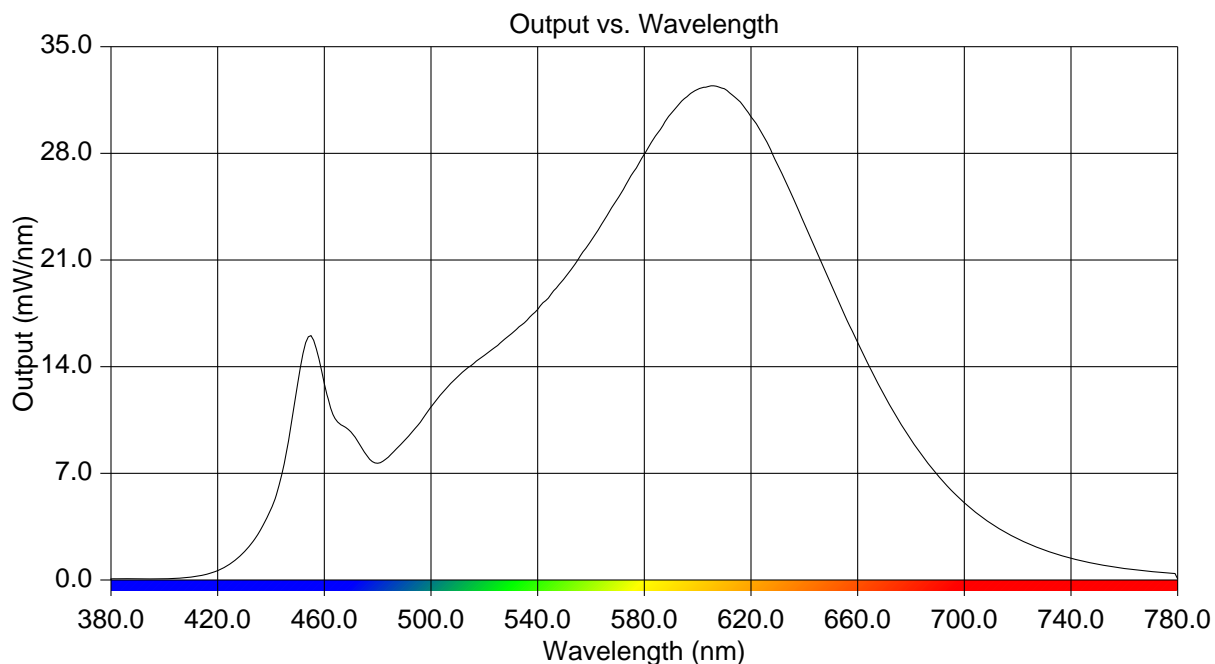
Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even 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: RAB03664  
 DATE: 7/27/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR18Y, BLEDR18Y/D10, BDLEDR18Y, BDLEDR18Y/D10 (42" ROUND BOLLARD), WBLEDR18Y/D10

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### RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	0.073	515	14.065	650	19.388
385	0.076	520	14.737	655	17.432
390	0.072	525	15.391	660	15.580
395	0.076	530	16.141	665	13.775
400	0.085	535	16.875	670	12.135
405	0.109	540	17.753	675	10.584
410	0.184	545	18.747	680	9.214
415	0.337	550	19.783	685	7.961
420	0.616	555	20.985	690	6.882
425	1.098	560	22.259	695	5.905
430	1.853	565	23.630	700	5.075
435	2.972	570	25.013	705	4.331
440	4.650	575	26.534	710	3.703
445	7.670	580	27.947	715	3.170
450	12.883	585	29.330	720	2.709
455	16.038	590	30.622	725	2.304
460	12.882	595	31.588	730	1.964
465	10.369	600	32.192	735	1.670
470	9.707	605	32.430	740	1.422
475	8.396	610	32.241	745	1.217
480	7.661	615	31.527	750	1.042
485	8.245	620	30.399	755	0.882
490	9.137	625	29.035	760	0.759
495	10.137	630	27.242	765	0.653
500	11.344	635	25.383	770	0.556
505	12.434	640	23.383	775	0.481
510	13.352	645	21.431	780	0.072



REPORT NUMBER: RAB03664  
 DATE: 7/27/2017  
 PREPARED FOR: RAB LIGHTING INC. RC LIGHTING  
 CATALOG NUMBER: BLEDR18Y, BLEDR18Y/D10, BDLEDR18Y, BDLEDR18Y/D10 (42" ROUND BOLLARD), WBLEDR18Y/D10

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## CIE Chromaticity Diagram

