LIGHT LABORATORY INC.
8165 E Kaiser Blvd. Anaheim, CA 92808
p. 714.282.2270
f. 714.676.5558

Test #: ROADWAY
Date: S01130101

NVLAP LAB CODE 200927-0

Test Report: **S01130101**

Model Number: **LUMINAIRE CATALOG NUMBER**

Report Prepared For: MANUFACTURE NAME
8165 E. KAISER BLVD, ANAHEIM, CA 92808

Test: Electrical and Photometric tests as required by the IESNA test standards.

Standards Used: Appropriate part or all test guidelines were used for test performed:
IESNA LM79: 2008 Approved Methods for Electrical and Photometric Measurements of Solid-State Lighting Products
ANSI NEMA ANSLG C78.377: 2008 Specification of the Chromaticity of Solid State Lighting Products

Description of Sample: Client submitted the sample. Fixture catalog number is LUMINAIRE CATALOG NUMBER. Received in working and undamaged condition. No modifications were necessary.

Sample Arrival Date: 1/1/13

Date of Tests: 1/1/13 - 1/1/13

Seasoning of Sample SSL: No seasoning was performed in accordance with IESNA LM-79.

Equipment List

Equipment Used	Model No	Stock No	Calibration Due Date
Chroma Programmable AC Source	61604	PS-AC02	--
Yokogawa Digital Power Meter	WT210	MT-EL06-S1	01/04/14
Xitron Power Analysis System	2503AH	MT-EL01	01/09/14
Fluke Digital Thermometer	52k/J	MT-TP02-GC	01/04/14
LLI Type C Goniophotometer System	RMG-C-MKII	CD-LL04-GC	--
LLI 2M Sphere	2MR97	CD-SN03-S2	--
LLI Spectroradiometer	SPR-3000	MT-SC01-S2	Before Use

*All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.

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LM-79 Test Summary	
Manufacturer:	MANUFACTURE NAME
Model Number:	LUMINAIRE CATALOG NUMBER
LAMPCAT:	N/A
Driver Model Number:	LED DRIVER CATALOG NUMBER
Total Lumens:	10006.80
Input Voltage (VAC/60Hz):	120.00
Input Current (Amp):	1.10
Input Power (W):	131.54
Input Power Factor:	0.9961
Total Harmonic Distortion @ 120V(%):	2.6%
Total Harmonic Distortion @ 277V(%):	11.2% (0.52A, 130.21W, 0.9039PF)
Efficacy:	76.07
Color Rendering Index (CRI):	72.60
Correlated Color Temperature (K):	5616
Chromaticity Coordinate x:	0.3300
Chromaticity Coordinate y:	0.3300
Ambient Temperature (°F):	77.0
Stabilization Time (Hours):	1:40
Total Operating Time (Hours):	2:35
Off State Power(W):	0.00

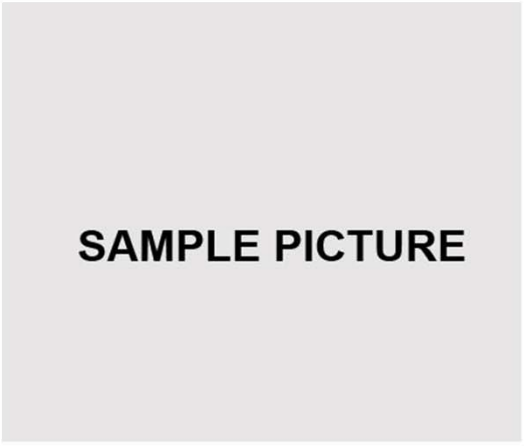

FIG. 1 LUMINAIRE

*All Results in accordance to IESNA LM-79-2008: Approved Method for the Electrical and Photometric Testing of Solid-State Lighting.

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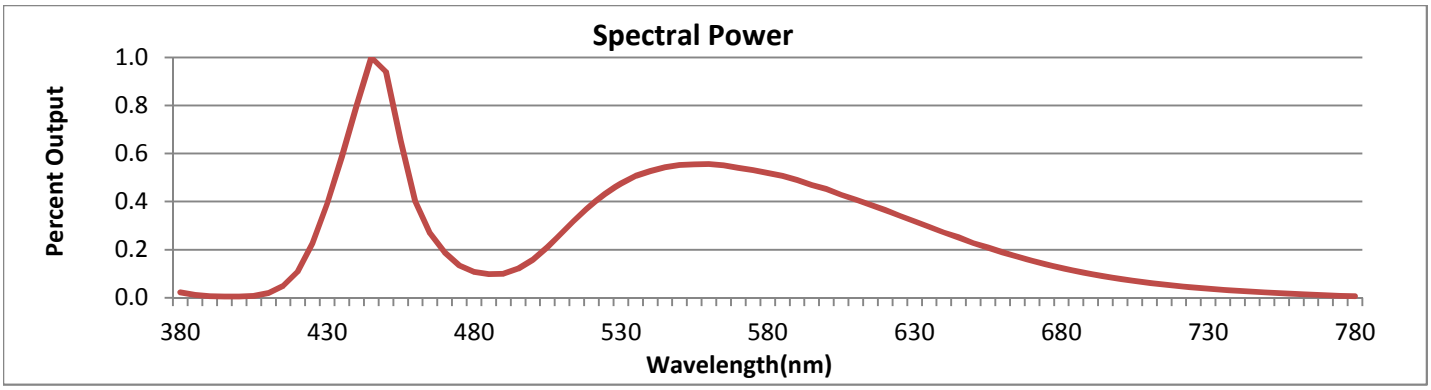


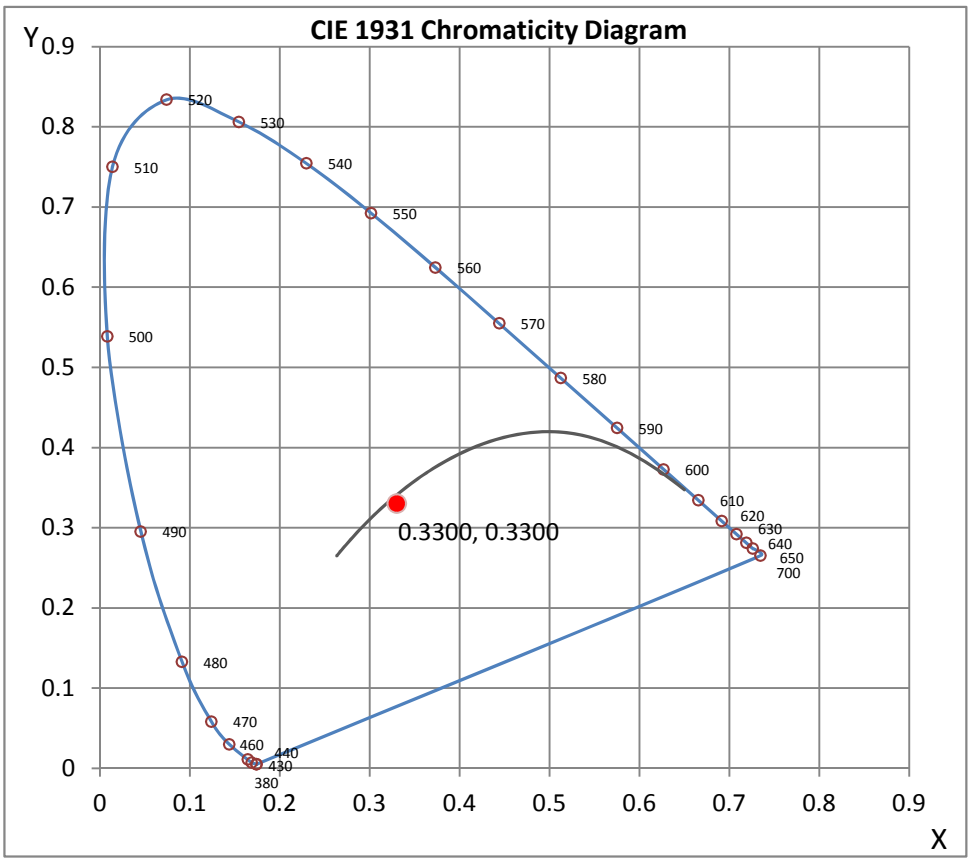
Wavelength	W/m²nm	440	0.7729	510	0.2610	580	0.5023	650	0.2192	720	0.0469
380	0.0219	450	0.9086	520	0.3738	590	0.4740	660	0.1825	730	0.0362
390	0.0058	460	0.3892	530	0.4592	600	0.4376	670	0.1488	740	0.0277
400	0.0041	470	0.1827	540	0.5100	610	0.3940	680	0.1195	750	0.0204
410	0.0185	480	0.1033	550	0.5335	620	0.3530	690	0.0944	760	0.0147
420	0.1058	490	0.0966	560	0.5376	630	0.3073	700	0.0755	770	0.0097
430	0.3782	500	0.1534	570	0.5229	640	0.2625	710	0.0601	780	0.0060

CRI & CCT

x	0.3300
y	0.3300
u'	0.2095
v'	0.4714
CRI	72.60
CCT	5616
Duv	-0.00467

R Values

R1	73.88
R2	75.59
R3	72.85
R4	74.87
R5	73.27
R6	64.68
R7	79.09
R8	66.81
R9	-2.12
R10	38.43
R11	72.22
R12	43.26
R13	72.61
R14	83.79



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Test Methods

Photometric Measurements - Goniophotometer

A Custom Light Laboratory Type C Rotating Mirror Goniophotometer was used to measure candelas(intensity) at each angle of distribution as defined by IESNA for the appropriate fixture type.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Spectral Measurements - Integrating Sphere

A Sensing Spectroradiometer SPR-3000, in conjunction with Light Laboratory 2 meter integrating sphere was used to measure chromaticity coordinates, correlated color temperature(CCT) and the color rendering index(CRI) for each sample.

Ambient temperature is set to 25°C and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at 25°C throughout the testing process and the sample is stabilized for at least 30mins and longer as necessary for the sample to achieve stabilization.

Electrical measurements are measured using the listed equipment.

Test Report Released by:

Jeff Ahn
Engineering Manager

Test Report Reviewed by:

Steve Kang
Quality Assurance

**Attached are photometric data reports. Total number of pages: 12*

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Photometric Test Report

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] S01130101
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUEDATE] 1/1/2013
[MANUFAC] MANUFACTURE NAME
[LUMCAT] LUMINAIRE CATALOG NUMBER
[LUMINAIRE] LUMINAIRE SIZE & DESCRIPTION
[BALLASTCAT] LED DRIVER CATALOG NUMBER
[BALLAST] ELECTRICAL PROPERTIES OF THE DRIVER
[LAMPPOSITION] 0,0
[OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
[MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
[_INPUT] 120VAC, 131.54W
[_TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

IES Classification	Type III
Longitudinal Classification	Short
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	10007
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	76
Total Luminaire Watts	131.54
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	6586
Maximum Candela Angle	55H 60V
Maximum Candela (<90 Degrees Vertical)	6586
Maximum Candela Angle (<90 Degrees Vertical)	55H 60V
Maximum Candela At 90 Degrees Vertical	0 (0.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	1064 (10.6% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	375.0	N.A.	3.7
FM - Front-Medium (30-60)	4004.5	N.A.	40.0
FH - Front-High (60-80)	3361.1	N.A.	33.6
FVH - Front-Very High (80-90)	120.2	N.A.	1.2
BL - Back-Low (0-30)	247.7	N.A.	2.5
BM - Back-Medium (30-60)	1100.6	N.A.	11.0
BH - Back-High (60-80)	753.9	N.A.	7.5
BVH - Back-Very High (80-90)	50.0	N.A.	0.5
UL - Uplight-Low (90-100)	0.0	N.A.	0.0
UH - Uplight-High (100-180)	0.0	N.A.	0.0
Total	10013.0	N.A.	100.0
BUG Rating	B2-U0-G2		

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	0	**5**	**15**	**25**	**35**	**45**	**55**	**65**	**75**	**85**
0.0	435	435	435	435	435	435	435	435	435	435
5.0	467	468	467	466	464	463	462	460	458	457
15.0	533	532	535	542	559	581	599	605	589	569
25.0	911	921	976	1032	1071	1115	1171	1192	1156	1064
35.0	1838	1839	1886	1986	2145	2227	2175	2124	2095	1954
45.0	2447	2482	2700	2960	3120	3343	3511	3421	3186	2732
55.0	3569	3565	3661	3999	4735	5605	6253	6315	5677	4538
60.0	3530	3540	3796	4538	5516	6152	6586	6556	5941	4928
62.5	3283	3319	3725	4706	5534	6032	6421	6389	5736	4780
65.0	3001	3025	3592	4581	5231	5616	5996	6011	5289	4432
67.5	2549	2598	3166	4060	4672	4983	5143	5024	4522	3922
70.0	1981	2034	2573	3299	3880	4135	4093	3901	3642	3290
72.5	1517	1562	2005	2522	2969	3107	3136	3029	2774	2508
75.0	1070	1131	1503	1976	2240	2284	2176	2063	1953	1891
77.5	784	819	1103	1456	1668	1586	1523	1469	1407	1394
80.0	514	534	724	976	1064	976	973	939	908	873
82.5	221	232	272	356	350	339	401	439	376	311
85.0	63	66	70	78	74	76	87	93	81	70
87.5	25	25	25	25	25	24	24	25	26	26
90.0	0	0	0	0	0	0	0	0	0	0

Vert. Angles	Horizontal Angles									
	90	**95**	**105**	**115**	**125**	**135**	**145**	**155**	**165**	**175**
0.0	435	435	435	435	435	435	435	435	435	435
5.0	457	455	453	452	451	449	447	447	448	448
15.0	557	547	532	520	512	503	497	492	494	492
25.0	1011	950	833	734	647	595	563	526	476	440
35.0	1830	1703	1429	1186	943	736	584	496	440	397
45.0	2476	2248	1852	1366	919	643	478	396	347	335
55.0	3853	3142	1970	1250	796	501	424	351	308	295
60.0	4346	3689	2203	1117	632	403	322	310	288	269
62.5	4313	3735	2352	1079	535	352	275	266	275	251
65.0	4018	3573	2363	1087	458	312	241	229	240	235
67.5	3598	3232	2166	1043	412	282	215	197	207	213
70.0	3013	2680	1833	946	388	255	194	172	176	188
72.5	2375	2158	1522	842	363	228	176	148	147	158
75.0	1871	1761	1290	716	311	199	162	128	121	133
77.5	1393	1349	1004	542	248	166	133	106	101	112
80.0	894	889	721	394	196	136	103	86	83	84
82.5	296	309	332	197	119	91	72	61	59	55
85.0	67	72	81	56	54	49	44	38	37	35
87.5	27	27	27	26	25	24	22	20	18	17
90.0	0	0	0	0	0	0	0	0	0	0

Vert. Angles	Horizontal Angles
	180
0.0	435
5.0	448
15.0	491
25.0	434
35.0	391

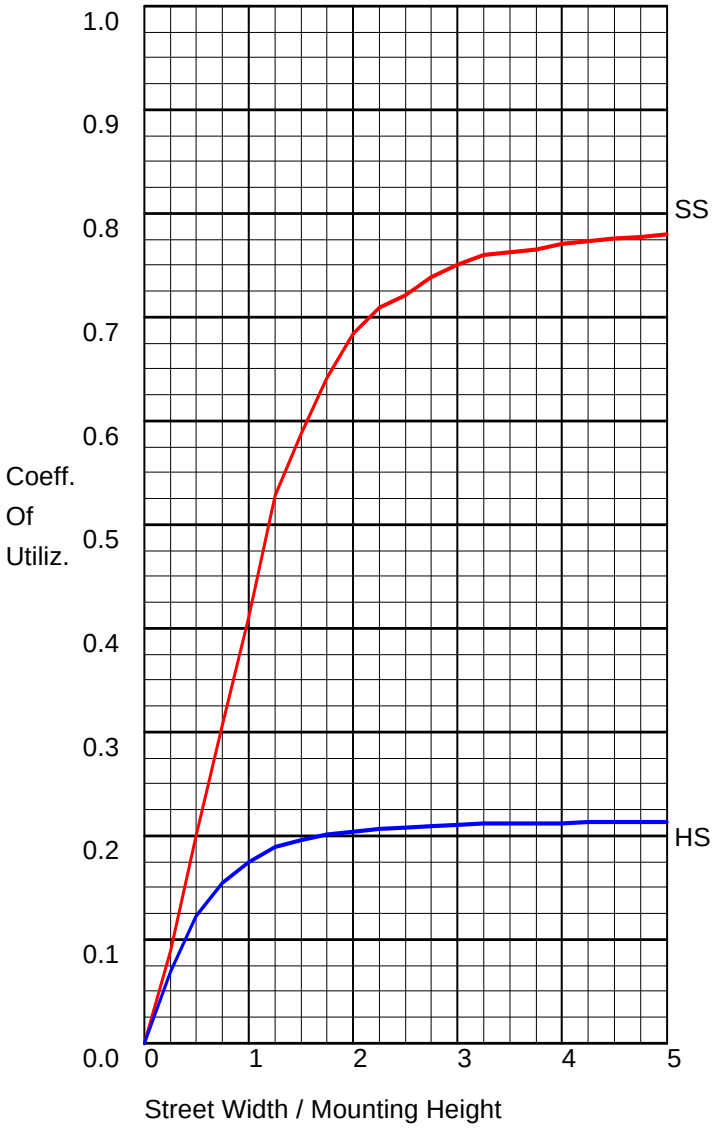
IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

CANDELA TABULATION - (Cont.)

45.0	331
55.0	301
60.0	270
62.5	251
65.0	234
67.5	213
70.0	186
72.5	154
75.0	128
77.5	105
80.0	87
82.5	59
85.0	35
87.5	17
90.0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

COEFFICIENTS OF UTILIZATION

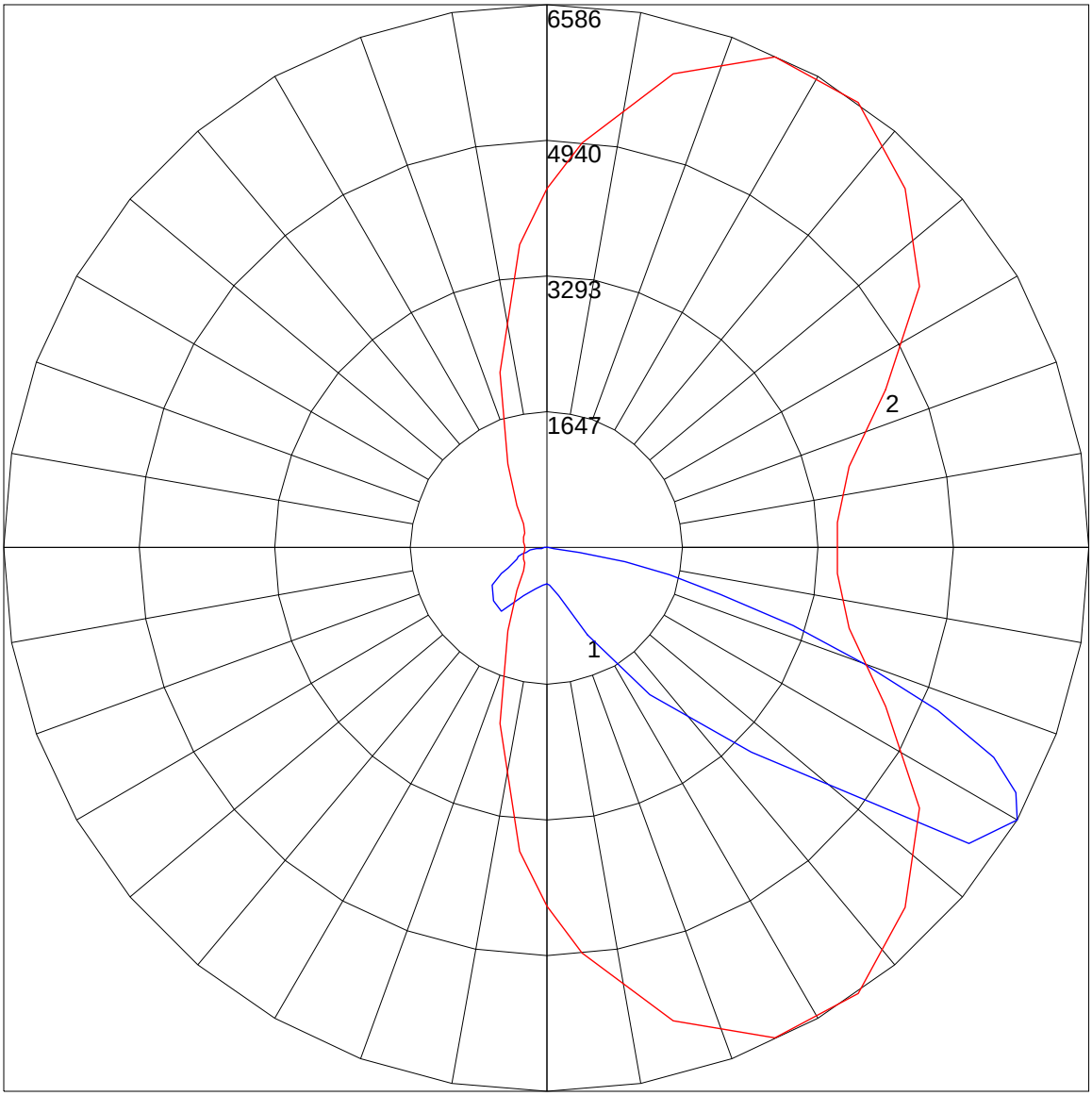


FLUX DISTRIBUTION

	Lumens	Percent Of Luminaire
Downward Street Side	7855.9	78.5
Downward House Side	2150.9	21.5
Downward Total	10006.8	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Flux	10006.8	100.0

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

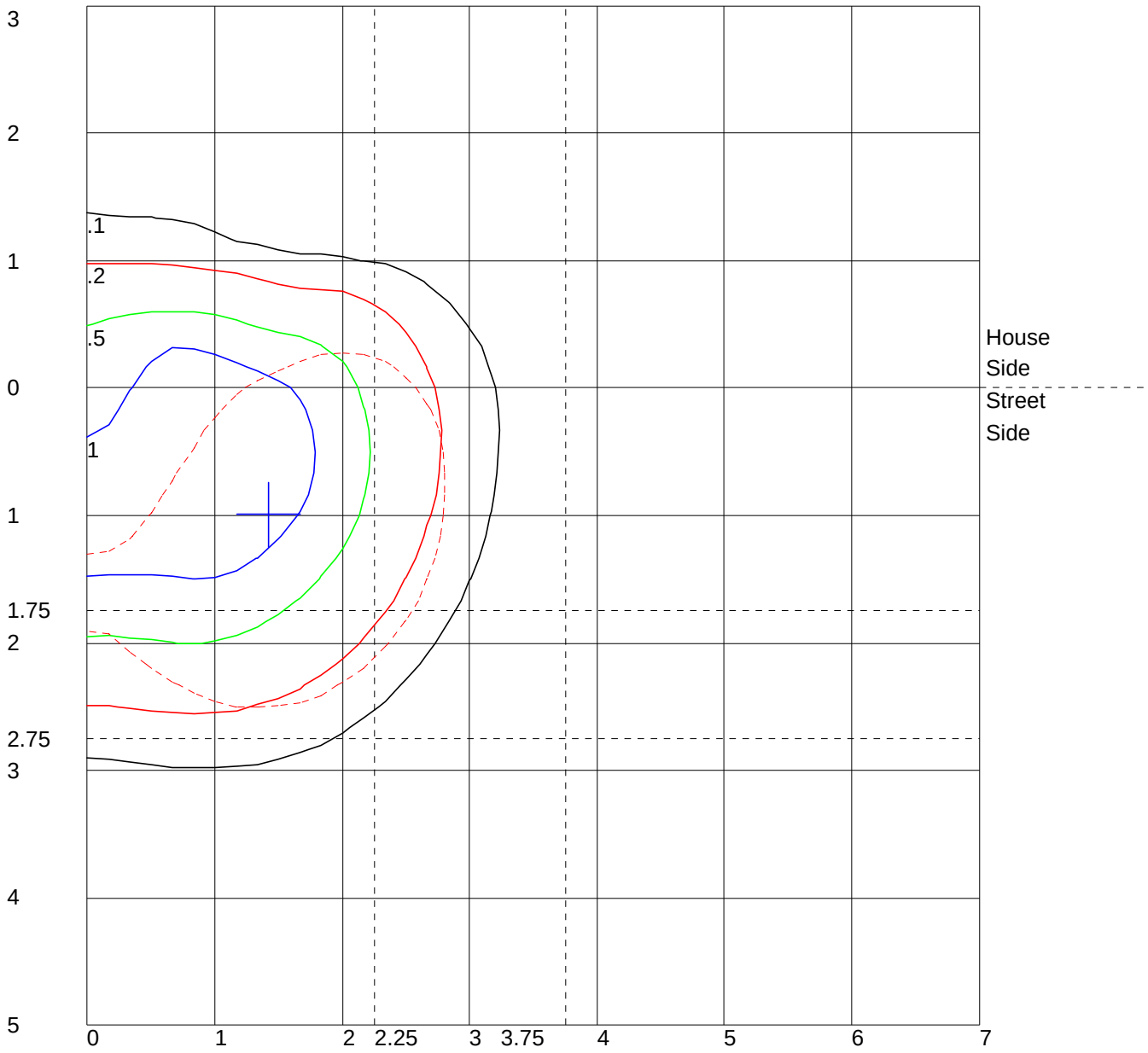
POLAR GRAPH



Maximum Candela = 6586 Located At Horizontal Angle = 55, Vertical Angle = 60
1 - Vertical Plane Through Horizontal Angles (55 - 235) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (60) (Through Max. Cd.)

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

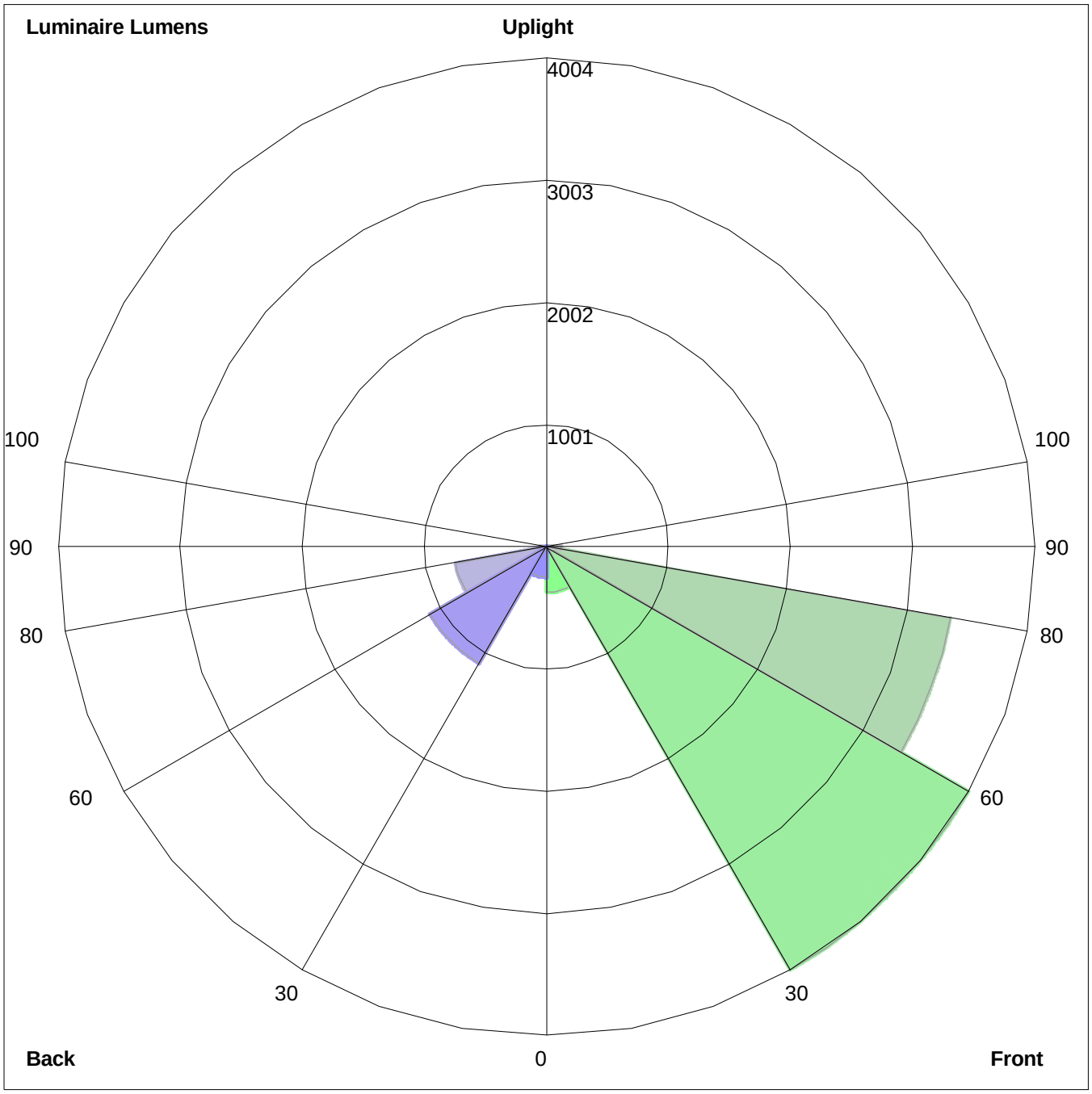
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
Values Based On 25 Foot Mounting Height
1/2 Maximum Candela Trace Shown As Dashed Curve
(+) = Maximum Candela Point

IES ROAD REPORT
PHOTOMETRIC FILENAME : LED-ROADWAY-SAMPLE.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=375.0, Medium=4004.5, High=3361.1, Very High=120.2
Back: Low=247.7, Medium=1100.6, High=753.9, Very High=50.0
Uplight: Low=0.0, High=0.0

BUG Rating : B2-U0-G2