



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

Report No: L091604005

Date: 9/23/2016



NVLAP LAB CODE 200927-0

Report No: L091604005

Report Prepared For: Leotek Electronics USA, LLC
 1955 Lundy Ave, San Jose, 95131

Model Number: GCJ0-15H-MV-CW-4-XX-300

Test: Electrical and Photometric tests

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
ANSI C82.77:2002: Harmonic Emission Limits-Related Quality Requirements for Lighting Equipment

Description of Sample: Client submitted the sample. Catalog number is GCJ0-15H-MV-CW-4-XX-300 . Received in working and undamaged condition. No modifications were necessary.

Testing Condition: Fixture is tested with no special conditions.

Sample Arrival Date: 9/12/16

Date of Tests: 9/21/16 - 9/21/16

Seasoning of Sample: 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	11/18/16
Xitron Power Analyzer	2503AH	MT-EL01	11/30/16
ITECH DC Power Supply	IT6122	PSDC-03-S1	11/17/16
Fluke Digital Thermometer	52k/J	MT-TP02-GC	11/24/16
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.

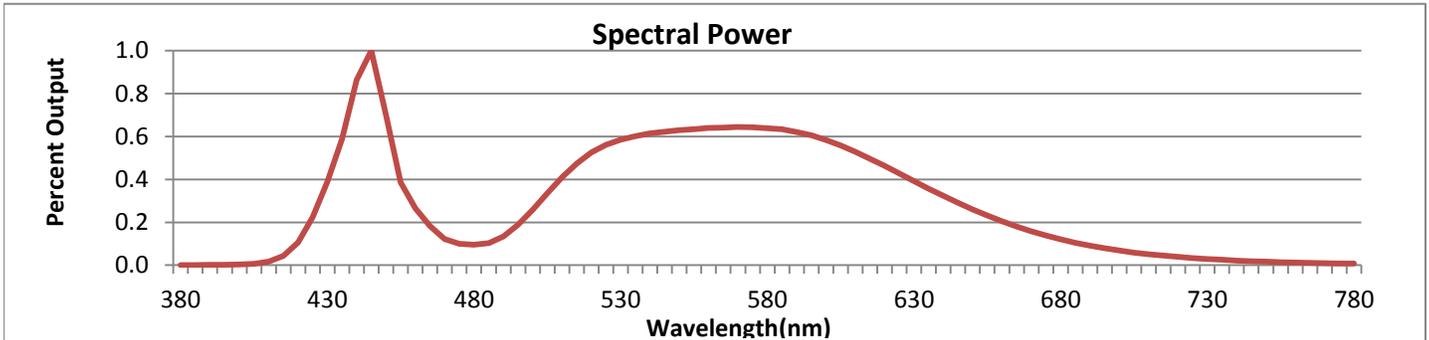
Test Summary

Manufacturer:	Leotek Electronics USA, LLC
Model Number:	GCJ0-15H-MV-CW-4-XX-300
Driver Model Number:	LITEON PA-1600-31SL
Total Lumens:	1986.10
Input Voltage (VAC/60Hz):	120.00
Input Current (Amp):	0.13
Input Power (W):	14.95
Input Power Factor:	0.95
Current ATHD @ 120V(%):	16%
Current ATHD @ 277V(%):	N/A
Efficacy:	133
Color Rendering Index (CRI):	72
Correlated Color Temperature (K):	4787
Chromaticity Coordinate x:	0.3530
Chromaticity Coordinate y:	0.3696
Ambient Temperature (°C):	25.0
Stabilization Time (Hours):	0:35
Total Operating Time (Hours):	1:25
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.



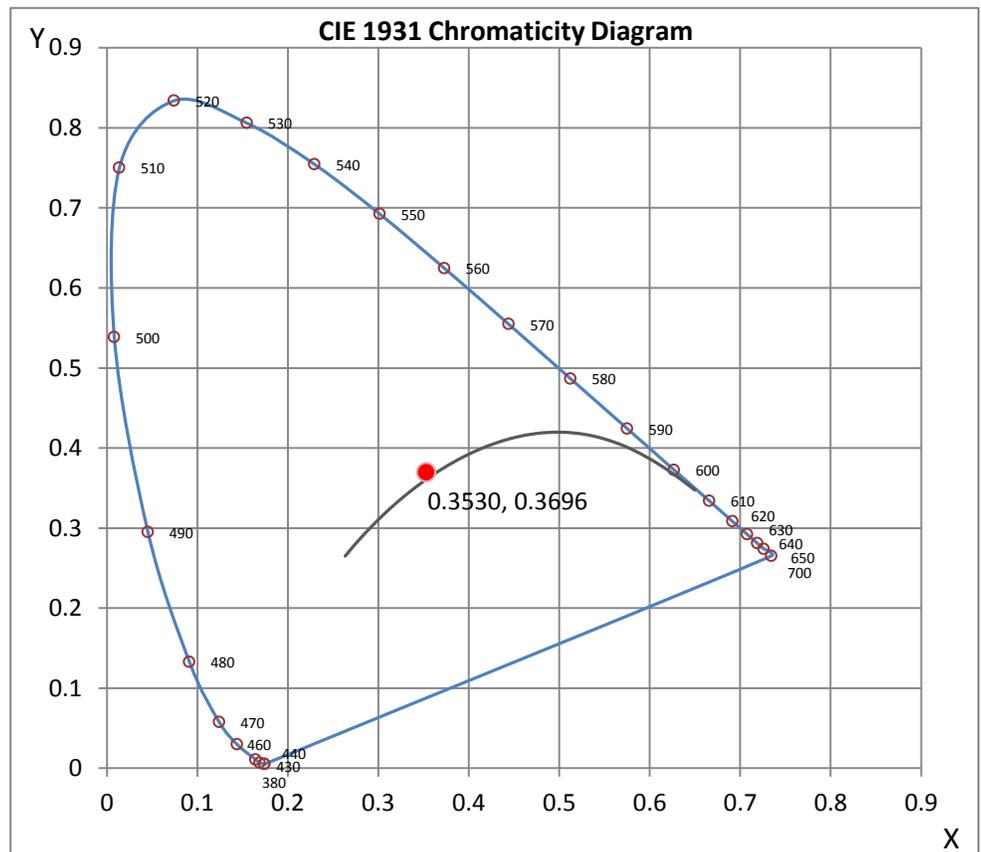
Wavelength	W/m ² nm	440	0.8640	510	0.4104	580	0.6390	650	0.2606	720	0.0385
380	0.0010	450	0.7013	520	0.5251	590	0.6214	660	0.2051	730	0.0290
390	0.0015	460	0.2655	530	0.5858	600	0.5841	670	0.1579	740	0.0219
400	0.0034	470	0.1226	540	0.6144	610	0.5288	680	0.1202	750	0.0166
410	0.0167	480	0.0951	550	0.6295	620	0.4627	690	0.0905	760	0.0127
420	0.1055	490	0.1339	560	0.6399	630	0.3923	700	0.0681	770	0.0097
430	0.3893	500	0.2588	570	0.6439	640	0.3237	710	0.0511	780	0.0085

CRI & CCT

x	0.3530
y	0.3696
u'	0.2098
v'	0.4943
CRI	71.60
CCT	4787
Duv	0.00577

R Values

R1	69.56
R2	74.97
R3	80.15
R4	73.59
R5	69.90
R6	66.56
R7	80.16
R8	58.21
R9	-25.66
R10	41.69
R11	71.99
R12	43.86
R13	69.54
R14	88.44



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

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.

Disclaimers:

This report must not be used by the customer to claim product certification, approval or endorsement by NVLAP, NIST or any agency of Federal Government.

Report Prepared by : JEFF AHN

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: 14*



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Photometric Test Report

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
 [TEST] L091604005
 [TESTLAB] LIGHT LABORATORY, INC.
 [ISSUEDATE] 9/23/2016
 [MANUFAC] Leotek Electronics USA, LLC
 [LUMCAT] GCJ0-15H-MV-CW-4-XX-300
 [LUMINAIRE] 18.25"L. X 9.5"W. X 4.5"H. LED STREET LIGHT
 [BALLASTCAT] LITEON PA-1600-31SL
 [OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
 [MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
 [_INPUT] 120VAC, 14.95W
 [_TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

IES Classification	Type IV
Longitudinal Classification	Medium
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1986
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	133
Total Luminaire Watts	14.95
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	988
Maximum Candela Angle	80H 69V
Maximum Candela (<90 Degrees Vertical)	988
Maximum Candela Angle (<90 Degrees Vertical)	80H 69V
Maximum Candela At 90 Degrees Vertical	0 (0.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	44 (2.2% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

ZONAL LUMEN SUMMARY

	Lumens	% Lamp	% Luminaire	Zone	%
FL - Front-Low (0-30)	193.4	N.A.	9.7		
FM - Front-Medium (30-60)	540.8	N.A.	27.2	0-20	7.8
FH - Front-High (60-80)	509.6	N.A.	25.7	0-30	18.1
FVH - Front-Very High (80-90)	4.0	N.A.	0.2	0-40	32.6
BL - Back-Low (0-30)	165.3	N.A.	8.3	0-60	67.3
BM - Back-Medium (30-60)	436.7	N.A.	22.0	0-80	99.7
BH - Back-High (60-80)	134.6	N.A.	6.8	0-90	100
BVH - Back-Very High (80-90)	1.7	N.A.	0.1	10-90	98.1
UL - Uplight-Low (90-100)	0.0	N.A.	0.0	20-40	24.8
UH - Uplight-High (100-180)	0.0	N.A.	0.0	20-50	41.6
				40-70	56
Total	1986.1	N.A.	100.0	60-80	32.4
				70-80	11.1
BUG Rating	B1-U0-G1			80-90	0.3
				90-110	0
				90-120	0
				90-130	0
				90-150	0
				90-180	0
				110-180	0
				0-180	100

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	<u>0</u>	<u>5</u>	<u>10</u>	<u>15</u>	<u>20</u>	<u>25</u>	<u>30</u>	<u>35</u>	<u>40</u>	<u>45</u>
0.0	386	386	386	386	386	386	386	386	386	386
2.5	398	397	395	393	394	394	393	392	392	392
5.0	402	404	401	402	401	404	402	399	401	400
7.5	408	408	409	412	411	413	410	409	411	409
10.0	414	415	418	421	420	424	419	419	420	417
12.5	421	421	427	431	431	433	429	431	430	427
15.0	426	428	435	441	442	445	441	444	441	439
17.5	434	438	445	451	455	453	451	456	454	451
20.0	447	450	457	462	465	464	465	467	465	463
22.5	458	461	467	473	475	478	485	480	478	476
25.0	467	469	475	481	484	493	499	496	494	488
27.5	470	475	481	484	492	503	509	512	509	502
30.0	468	472	478	481	494	513	516	524	521	517
32.5	466	467	471	474	486	507	520	530	532	530
35.0	463	459	463	468	477	497	519	535	543	541
37.5	448	449	450	454	470	490	517	535	546	543
40.0	421	424	427	434	447	472	504	527	538	535
42.5	389	394	399	409	423	454	483	509	530	527
45.0	367	371	377	388	399	426	458	495	520	515
47.5	353	354	358	366	379	401	431	476	506	509
50.0	349	348	348	353	366	386	413	456	492	509
52.5	342	340	339	346	355	375	404	447	489	512
55.0	345	342	341	343	352	373	404	441	483	513
56.0	345	344	346	346	355	372	400	440	482	514
57.0	346	347	349	349	358	375	403	441	486	515
58.0	349	352	353	355	364	379	407	442	484	518
59.0	355	359	360	361	369	384	412	449	494	521
60.0	363	367	368	370	377	392	418	453	497	525
61.0	378	385	384	386	391	403	426	460	504	531
62.0	403	409	407	408	411	420	439	474	517	543
63.0	436	439	436	436	438	446	459	488	528	556
64.0	495	494	484	479	474	478	488	512	548	575
65.0	547	544	536	531	523	520	525	544	578	603
66.0	609	605	594	588	578	573	573	584	610	634
67.0	670	668	657	651	642	633	631	637	657	677
68.0	736	734	726	720	711	705	697	700	717	732
69.0	778	778	779	785	785	781	776	777	788	797
70.0	784	784	791	805	823	838	847	858	871	856
71.0	752	757	769	789	812	837	867	903	905	895
72.0	679	686	707	734	770	800	833	872	862	896
73.0	543	554	600	653	695	725	758	775	776	834
74.0	291	311	389	490	577	627	656	659	668	718
75.0	116	126	187	279	373	463	504	530	542	579
76.0	66	69	87	151	207	266	320	376	399	415
77.0	42	43	50	74	110	139	170	207	234	240
78.0	28	29	33	45	63	74	86	103	112	120
79.0	19	19	22	30	40	46	51	59	60	66
80.0	14	14	14	17	24	29	32	36	36	41
82.5	6	6	6	7	7	8	9	9	9	10
85.0	3	3	3	3	4	4	4	4	4	4
87.5	0	1	1	1	1	2	2	2	3	3
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles									
	<u>50</u>	<u>55</u>	<u>60</u>	<u>65</u>	<u>70</u>	<u>75</u>	<u>80</u>	<u>85</u>	<u>90</u>	<u>95</u>
0.0	386	386	386	386	386	386	386	386	386	386
2.5	392	390	390	390	390	389	387	386	389	389
5.0	398	396	396	396	394	392	391	391	391	392
7.5	405	404	406	403	400	399	397	398	396	398
10.0	414	413	416	412	410	408	406	409	407	405
12.5	425	425	424	422	420	417	416	419	416	414
15.0	438	439	433	430	429	427	428	430	428	425
17.5	450	449	443	441	440	441	439	442	441	436
20.0	460	458	454	452	451	451	454	456	454	449
22.5	469	466	463	463	463	466	474	474	472	467
25.0	482	476	473	472	475	483	491	494	493	487
27.5	495	485	479	481	489	500	514	518	519	510
30.0	507	493	487	489	499	513	529	537	536	533
32.5	521	506	493	496	507	520	542	549	553	551
35.0	532	516	499	498	510	525	548	557	561	562
37.5	534	513	495	495	508	527	551	561	566	570
40.0	524	502	488	490	505	527	549	560	572	575
42.5	516	495	483	486	498	517	539	553	570	576
45.0	506	489	476	474	487	506	524	543	557	568
47.5	502	483	467	463	478	497	518	534	546	559
50.0	502	481	463	457	471	489	514	529	544	551
52.5	504	483	463	458	471	492	513	529	543	549
55.0	507	486	465	461	472	494	516	534	547	550
56.0	507	487	468	463	471	493	520	537	550	552
57.0	509	487	470	464	472	498	524	540	554	556
58.0	512	489	471	464	475	500	527	544	562	562
59.0	514	493	475	467	476	500	532	550	571	573
60.0	520	500	478	471	479	506	535	558	584	587
61.0	528	505	483	474	481	508	540	573	606	610
62.0	537	514	489	478	484	511	549	590	637	645
63.0	553	528	498	483	490	524	574	629	686	694
64.0	573	543	511	493	502	544	608	678	739	732
65.0	596	563	530	512	519	558	644	750	805	749
66.0	630	595	555	523	524	620	768	859	843	721
67.0	672	625	561	526	594	765	890	908	829	686
68.0	718	635	577	620	765	877	946	943	856	651
69.0	757	664	689	785	861	937	988	946	813	577
70.0	809	776	837	861	891	957	962	862	668	433
71.0	894	887	881	875	890	917	856	686	484	266
72.0	934	876	857	831	841	793	640	422	257	125
73.0	856	814	786	756	705	554	356	196	114	69
74.0	747	713	676	606	486	300	147	85	59	43
75.0	588	553	519	378	251	121	70	52	39	30
76.0	395	385	329	189	100	61	47	38	28	20
77.0	234	217	163	89	56	43	34	27	18	15
78.0	120	109	87	52	38	29	23	17	13	12
79.0	68	64	51	40	29	21	16	13	11	11
80.0	44	42	35	28	21	14	11	11	10	10
82.5	11	13	11	10	9	8	8	8	8	7
85.0	5	5	5	6	6	6	7	7	7	6
87.5	4	4	5	5	5	5	5	5	5	4
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

CANDELA TABULATION - (Cont.)

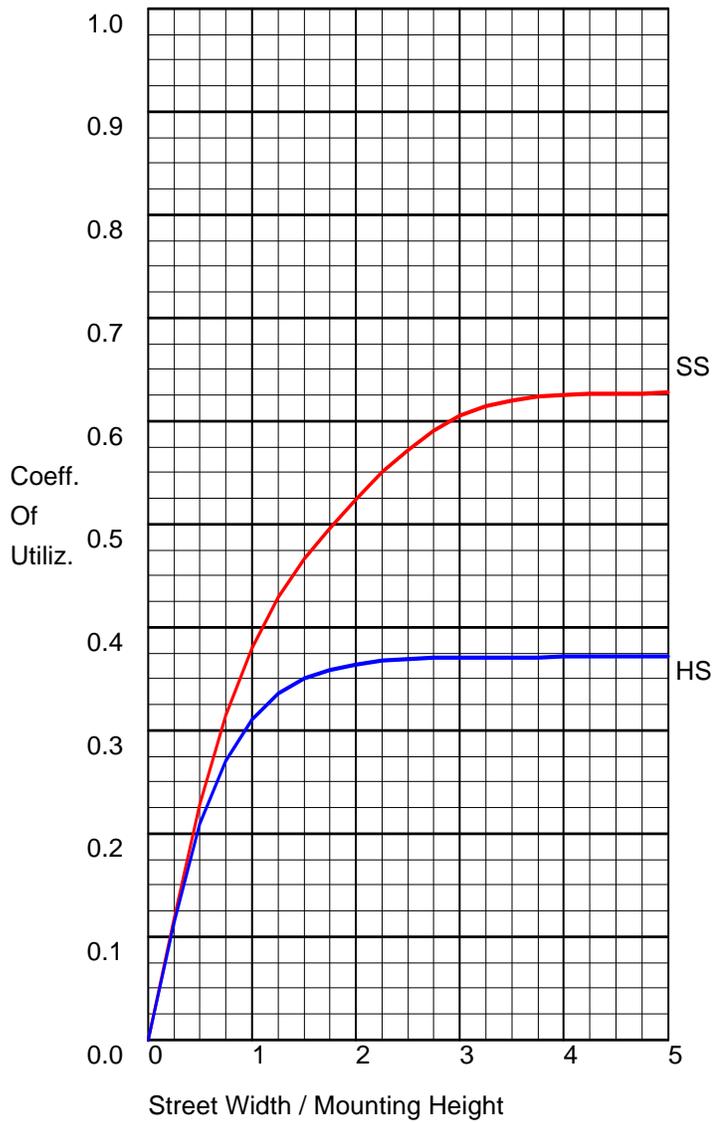
Vert. Angles	Horizontal Angles									
	<u>100</u>	<u>105</u>	<u>110</u>	<u>115</u>	<u>120</u>	<u>125</u>	<u>130</u>	<u>135</u>	<u>140</u>	<u>145</u>
0.0	386	386	386	386	386	386	386	386	386	386
2.5	389	388	388	386	386	384	385	385	385	386
5.0	393	390	391	389	386	384	386	382	383	382
7.5	396	394	393	390	387	386	385	381	381	380
10.0	403	398	396	392	390	388	384	381	380	378
12.5	409	407	399	395	391	389	384	380	378	376
15.0	419	414	404	398	393	388	384	379	376	375
17.5	428	422	412	404	396	390	384	381	375	373
20.0	442	430	420	410	401	394	386	380	374	370
22.5	458	443	431	418	407	396	386	379	371	365
25.0	477	463	447	429	413	397	386	375	367	360
27.5	501	484	462	440	422	401	387	372	363	357
30.0	522	504	482	457	430	404	387	373	363	357
32.5	538	525	500	474	441	410	390	373	362	356
35.0	552	541	517	488	452	417	392	373	361	354
37.5	568	557	535	501	453	415	388	367	355	347
40.0	580	570	549	511	458	415	383	358	345	335
42.5	586	578	558	514	459	408	372	350	336	325
45.0	579	577	558	512	456	398	362	340	328	315
47.5	571	568	545	497	439	387	351	333	318	303
50.0	557	554	535	485	425	368	339	320	303	288
52.5	548	544	519	468	404	354	325	302	282	274
55.0	548	536	504	452	387	339	305	280	263	260
56.0	550	535	503	445	379	329	293	267	255	254
57.0	552	533	496	438	372	324	282	258	248	249
58.0	555	535	494	430	364	314	274	251	243	241
59.0	564	541	495	421	355	300	262	243	236	223
60.0	576	546	490	415	347	294	253	235	222	195
61.0	594	559	491	409	338	284	246	228	199	174
62.0	626	577	495	402	329	269	236	208	174	160
63.0	664	592	490	381	307	256	226	184	160	149
64.0	673	577	452	351	281	235	199	160	145	132
65.0	638	517	403	314	255	214	164	140	124	119
66.0	575	437	333	250	212	177	140	125	113	110
67.0	519	370	261	192	165	134	113	103	100	96
68.0	461	302	208	153	122	98	91	85	84	82
69.0	355	206	139	101	79	64	64	63	63	63
70.0	232	122	80	64	49	41	42	44	44	44
71.0	123	73	54	44	34	29	29	30	31	31
72.0	68	50	40	31	25	22	21	21	22	22
73.0	47	36	29	24	20	17	17	16	17	17
74.0	32	27	23	19	17	15	14	14	13	14
75.0	25	23	20	16	14	13	12	12	12	11
76.0	20	20	17	14	12	12	11	11	10	10
77.0	16	16	14	12	11	10	10	9	8	8
78.0	14	13	11	10	9	9	8	7	7	7
79.0	11	11	9	9	8	7	7	6	6	6
80.0	9	9	8	7	7	6	5	5	5	5
82.5	7	6	6	5	5	4	4	4	3	3
85.0	5	5	4	4	4	3	3	3	2	2
87.5	4	4	4	4	3	3	3	2	2	2
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604005.IES

CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles						
	<u>150</u>	<u>155</u>	<u>160</u>	<u>165</u>	<u>170</u>	<u>175</u>	<u>180</u>
0.0	386	386	386	386	386	386	386
2.5	385	383	383	386	380	375	371
5.0	383	380	381	383	377	371	369
7.5	380	377	378	377	372	367	368
10.0	377	374	375	373	369	366	366
12.5	372	373	374	373	368	365	364
15.0	370	371	372	371	367	364	362
17.5	368	368	368	367	363	362	360
20.0	365	364	362	361	358	356	357
22.5	361	359	354	354	352	350	352
25.0	357	352	350	347	347	348	350
27.5	355	351	349	345	346	350	351
30.0	353	349	347	343	343	346	346
32.5	351	347	344	339	338	340	342
35.0	349	342	336	330	328	331	333
37.5	340	333	325	320	317	318	322
40.0	329	322	311	303	297	297	298
42.5	318	304	292	282	274	272	272
45.0	304	290	277	264	257	253	251
47.5	293	280	269	260	253	248	244
50.0	281	274	267	261	253	247	243
52.5	273	275	275	270	262	253	248
55.0	266	272	272	261	246	230	223
56.0	261	263	257	243	226	211	205
57.0	250	246	235	224	211	198	193
58.0	231	221	216	209	198	185	179
59.0	205	201	200	196	187	178	174
60.0	184	184	184	185	180	172	167
61.0	168	167	173	178	175	167	163
62.0	153	157	168	174	173	167	164
63.0	143	150	158	164	163	157	156
64.0	131	135	143	149	149	146	146
65.0	118	123	129	135	135	133	135
66.0	107	109	114	118	118	116	118
67.0	95	94	97	101	101	102	103
68.0	80	77	79	80	79	80	82
69.0	61	59	59	59	59	58	60
70.0	43	42	42	43	42	42	42
71.0	31	30	30	31	30	29	28
72.0	22	22	21	19	17	14	12
73.0	17	16	14	12	10	8	7
74.0	13	12	10	9	7	6	6
75.0	10	10	9	8	6	5	4
76.0	9	8	7	6	4	4	4
77.0	8	7	6	5	4	3	3
78.0	7	6	5	4	3	3	2
79.0	6	5	4	3	2	2	2
80.0	4	3	3	2	2	2	2
82.5	3	2	2	2	1	1	1
85.0	2	2	2	1	1	1	1
87.5	2	2	2	1	1	1	1
90.0	0	0	0	0	0	0	0

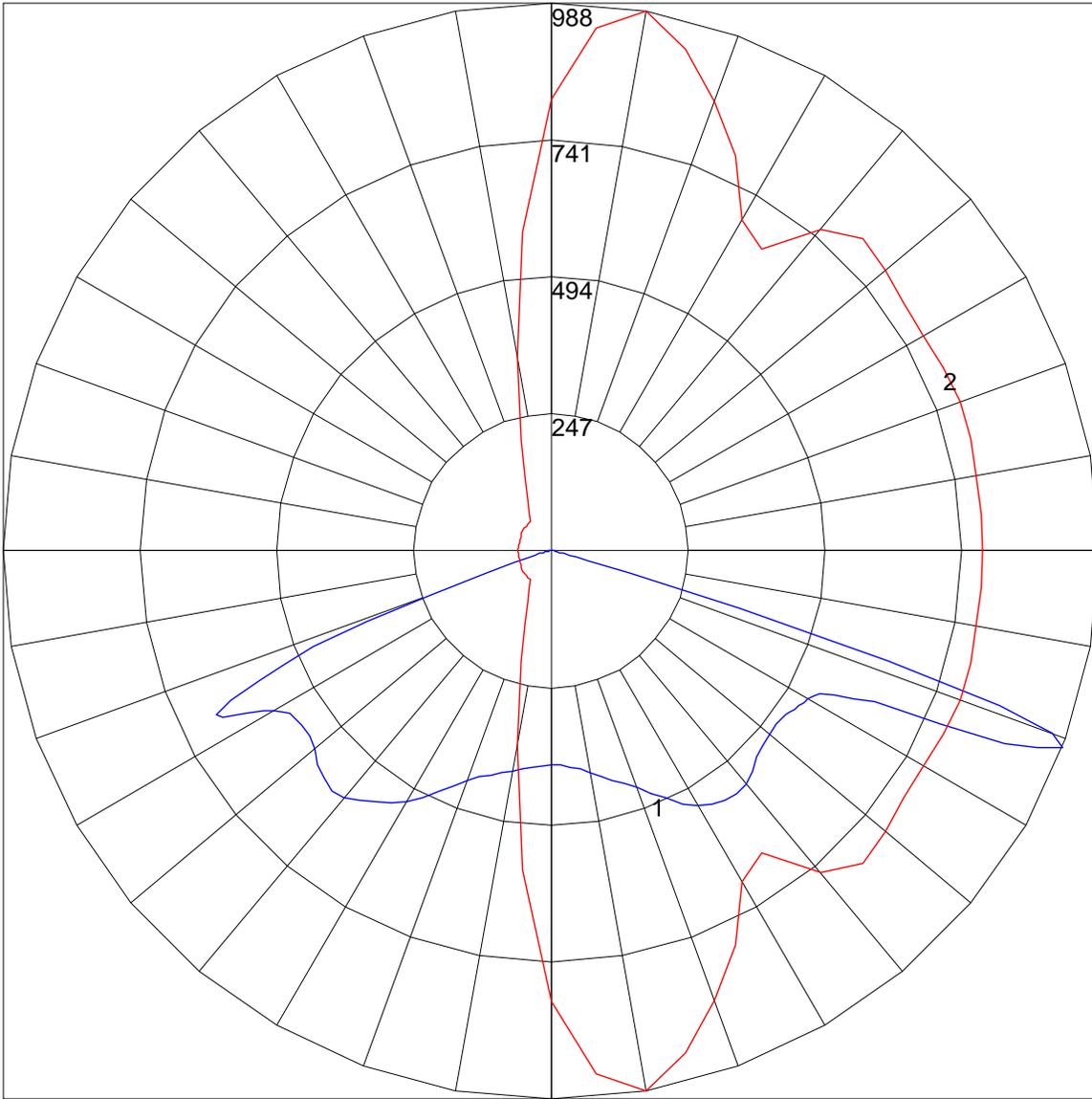
COEFFICIENTS OF UTILIZATION



FLUX DISTRIBUTION

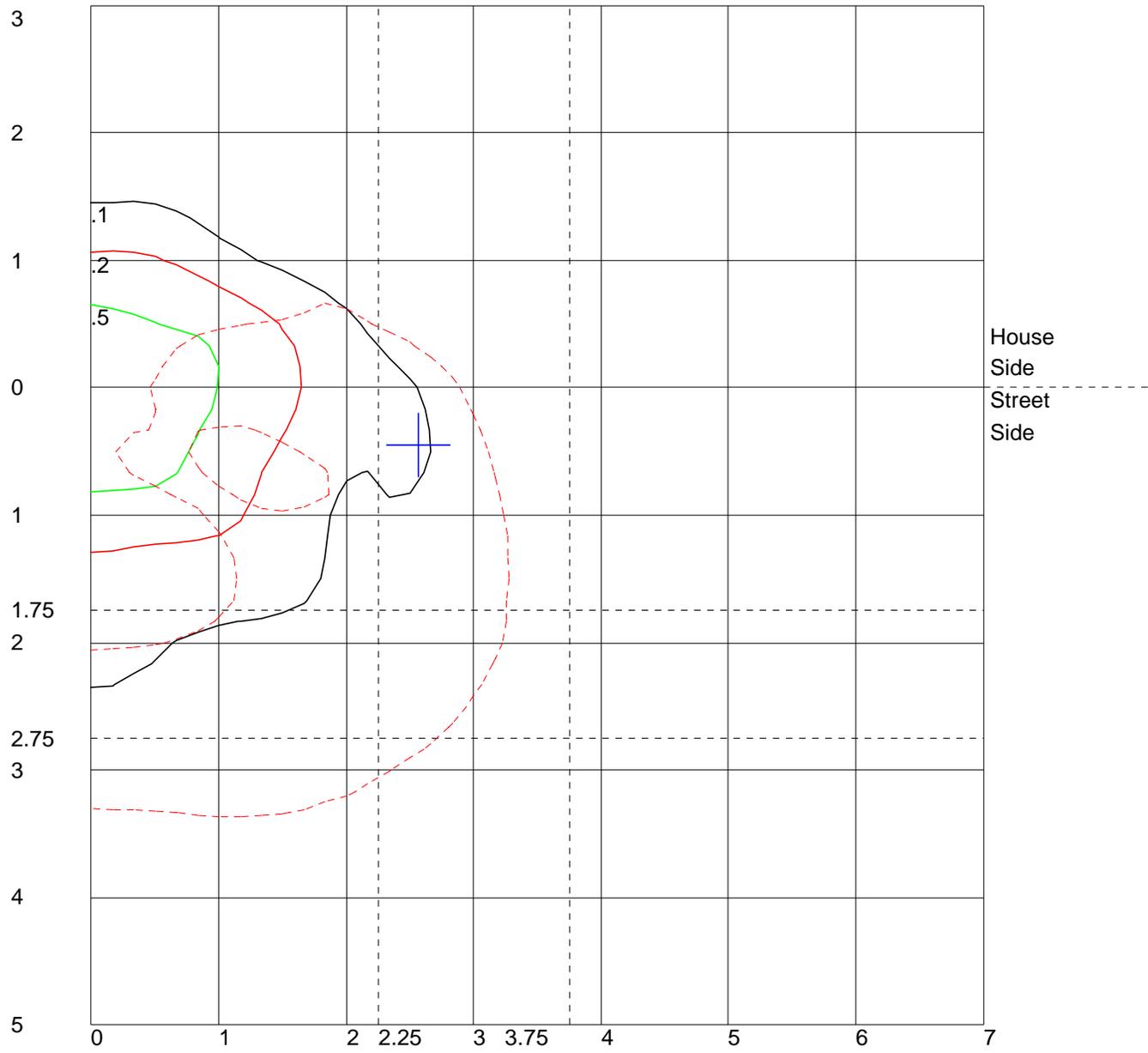
	Lumens	Percent Of Luminaire
Downward Street Side	1247.8	62.8
Downward House Side	738.3	37.2
Downward Total	1986.1	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Flux	1986.1	100.0

POLAR GRAPH



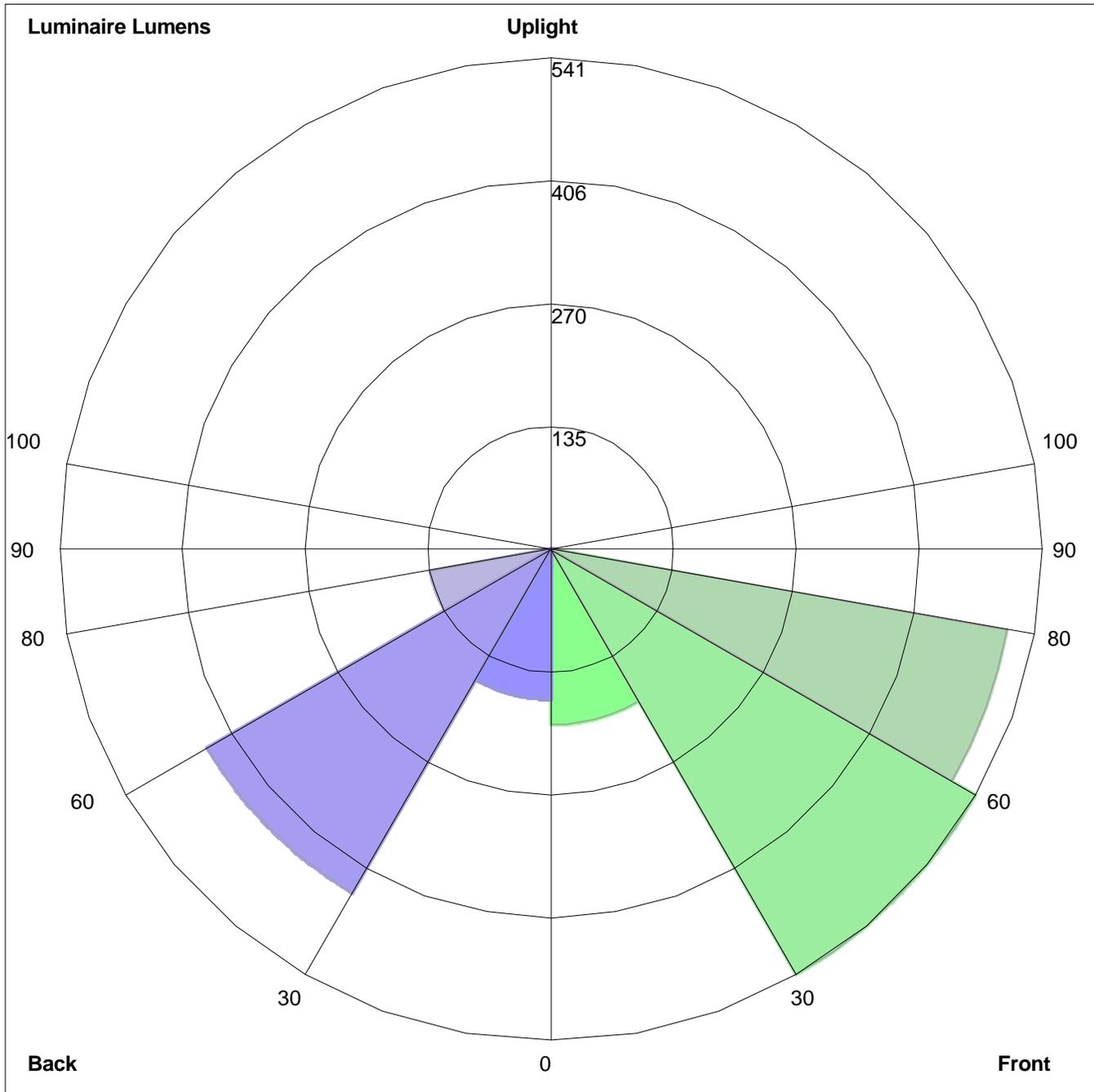
Maximum Candela = 988 Located At Horizontal Angle = 80, Vertical Angle = 69
1 - Vertical Plane Through Horizontal Angles (80 - 260) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (69) (Through Max. Cd.)

ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
 Values Based On 20 Foot Mounting Height
 1/2 Maximum Candela Trace Shown As Dashed Curve
 (+) = Maximum Candela Point

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=193.4, Medium=540.8, High=509.6, Very High=4.0
Back: Low=165.3, Medium=436.7, High=134.6, Very High=1.7
Uplight: Low=0.0, High=0.0

BUG Rating : B1-U0-G1