



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

Report No:L091604003

Date: 9/22/2016



NVLAP LAB CODE 200927-0

**Report No:** L091604003

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

**Model Number:** GCJ0-15H-MV-CW-2R-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-2R-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.

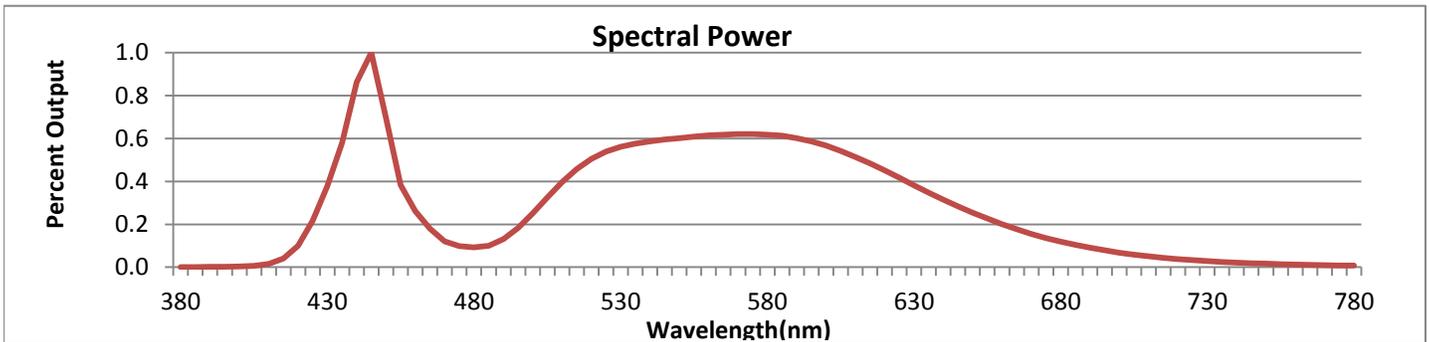
**Test Summary**

<b>Manufacturer:</b>	Leotek Electronics USA, LLC
<b>Model Number:</b>	GCJ0-15H-MV-CW-2R-XX-300
<b>Driver Model Number:</b>	LITEON PA-1600-31SL
<b>Total Lumens:</b>	1941.10
<b>Input Voltage (VAC/60Hz):</b>	120.00
<b>Input Current (Amp):</b>	0.13
<b>Input Power (W):</b>	14.95
<b>Input Power Factor:</b>	0.95
<b>Current ATHD @ 120V(%):</b>	18%
<b>Current ATHD @ 277V(%):</b>	N/A
<b>Efficacy:</b>	130
<b>Color Rendering Index (CRI):</b>	72
<b>Correlated Color Temperature (K):</b>	4802
<b>Chromaticity Coordinate x:</b>	0.3522
<b>Chromaticity Coordinate y:</b>	0.3661
<b>Ambient Temperature (°C):</b>	25.0
<b>Stabilization Time (Hours):</b>	0:30
<b>Total Operating Time (Hours):</b>	1:25
<b>Off State Power(W):</b>	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.



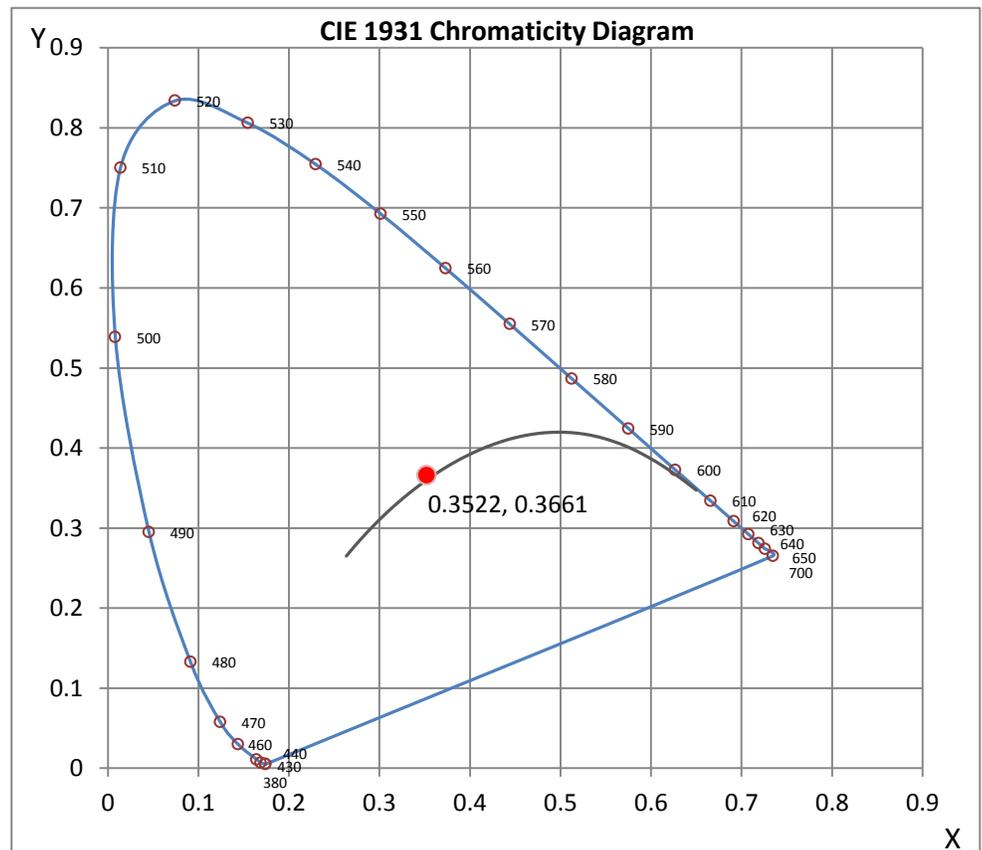
Wavelength	W/m <sup>2</sup> nm	440	0.8621	510	0.3965	580	0.6183	650	0.2544	720	0.0382
380	0.0009	450	0.6960	520	0.5050	590	0.6021	660	0.2012	730	0.0286
390	0.0014	460	0.2623	530	0.5617	600	0.5677	670	0.1555	740	0.0215
400	0.0032	470	0.1203	540	0.5872	610	0.5143	680	0.1196	750	0.0162
410	0.0155	480	0.0930	550	0.6021	620	0.4511	690	0.0904	760	0.0122
420	0.1004	490	0.1308	560	0.6143	630	0.3820	700	0.0679	770	0.0092
430	0.3796	500	0.2509	570	0.6213	640	0.3157	710	0.0507	780	0.0080

**CRI & CCT**

x	0.3522
y	0.3661
u'	0.2106
v'	0.4926
CRI	72.20
CCT	4802
Duv	0.00439

**R Values**

R1	70.50
R2	75.52
R3	80.16
R4	74.20
R5	70.80
R6	67.22
R7	80.22
R8	59.13
R9	-22.54
R10	42.79
R11	72.88
R12	44.87
R13	70.41
R14	88.43



\*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 : L091604003.IES**

## DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002  
 [TEST] L091604003  
 [TESTLAB] LIGHT LABORATORY, INC.  
 [ISSUEDATE] 9/22/2016  
 [MANUFAC] Leotek Electronics USA, LLC  
 [LUMCAT] GCJ0-15H-MV-CW-2R-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 II
Longitudinal Classification	Medium
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1941
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	130
Total Luminaire Watts	14.95
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	1456
Maximum Candela Angle	75H 69V
Maximum Candela (<90 Degrees Vertical)	1456
Maximum Candela Angle (<90 Degrees Vertical)	75H 69V
Maximum Candela At 90 Degrees Vertical	0 (0.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	151 (7.8% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

**IES ROAD REPORT**  
**PHOTOMETRIC FILENAME : L091604003.IES**

**LUMINAIRE CLASSIFICATION SYSTEM (LCS)**

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	192.4	N.A.	9.9
FM - Front-Medium (30-60)	873.6	N.A.	45.0
FH - Front-High (60-80)	481.6	N.A.	24.8
FVH - Front-Very High (80-90)	7.1	N.A.	0.4
BL - Back-Low (0-30)	113.0	N.A.	5.8
BM - Back-Medium (30-60)	191.3	N.A.	9.9
BH - Back-High (60-80)	79.9	N.A.	4.1
BVH - Back-Very High (80-90)	2.3	N.A.	0.1
UL - Uplight-Low (90-100)	0.0	N.A.	0.0
UH - Uplight-High (100-180)	0.0	N.A.	0.0
Total	1941.2	N.A.	100.0
BUG Rating	B1-U0-G0		

**ZONAL LUMEN SUMMARY**

Zone	%
0-20	7.2
0-30	15.7
0-40	28.7
0-60	70.6
0-80	99.5
0-90	100
10-90	98.1
20-40	21.6
20-50	40.2
40-70	62.6
60-80	28.9
70-80	8.2
80-90	0.5
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 : L091604003.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	412	412	412	412	412	412	412	412	412	412
2.5	421	426	417	410	413	417	415	412	409	409
5.0	422	420	413	411	413	414	413	413	409	409
7.5	425	421	416	417	415	415	416	414	410	410
10.0	427	426	425	428	424	420	420	419	414	414
12.5	424	426	428	432	430	425	427	426	426	425
15.0	422	425	431	433	435	431	431	434	437	438
17.5	427	427	436	439	443	439	438	441	448	450
20.0	434	434	446	450	454	453	450	454	462	465
22.5	445	447	460	468	469	472	471	472	480	482
25.0	463	467	482	489	491	497	498	497	503	501
27.5	486	489	503	514	519	530	531	528	530	525
30.0	511	511	526	541	555	570	573	570	567	556
32.5	537	539	551	568	592	607	618	620	614	604
35.0	570	576	586	603	630	646	663	675	671	662
37.5	609	617	624	645	672	689	710	727	734	726
40.0	645	656	662	684	710	738	766	776	789	792
42.5	674	684	692	718	744	780	814	829	839	850
45.0	688	699	708	734	772	814	852	882	893	905
47.5	690	700	707	736	784	837	881	924	947	961
50.0	665	678	687	732	788	841	895	946	986	1014
52.5	625	640	668	719	785	843	904	958	1014	1055
55.0	563	589	631	690	761	841	914	959	1012	1062
56.0	538	564	609	670	749	837	932	973	998	1054
57.0	504	530	578	641	734	829	948	990	989	1043
58.0	430	453	502	586	704	819	950	1028	1029	1042
59.0	319	335	386	506	656	800	934	1080	1114	1050
60.0	215	225	273	415	584	753	902	1109	1183	1068
61.0	168	174	209	306	432	603	832	1051	1174	1128
62.0	136	139	158	199	271	435	741	962	1135	1183
63.0	103	104	113	130	169	299	588	838	1061	1170
64.0	67	69	75	99	134	206	383	683	954	1085
65.0	38	39	44	77	111	132	199	521	825	977
66.0	31	32	35	58	87	104	137	357	645	849
67.0	30	32	33	44	67	90	109	206	458	712
68.0	29	31	32	35	53	79	90	115	304	565
69.0	27	29	30	31	44	66	75	86	193	412
70.0	26	27	28	29	36	57	63	73	105	272
71.0	25	26	27	27	33	48	55	60	74	183
72.0	23	25	25	26	31	39	49	51	61	113
73.0	22	25	24	25	29	34	43	45	52	73
74.0	21	24	23	24	27	30	37	39	44	58
75.0	20	24	22	23	25	27	33	35	37	51
76.0	19	22	21	22	23	24	29	31	32	43
77.0	18	21	20	21	22	22	26	28	28	36
78.0	16	19	19	20	20	20	24	25	25	30
79.0	15	17	18	19	19	19	22	23	22	24
80.0	13	16	17	17	17	18	20	20	20	20
82.5	12	17	15	12	12	15	15	13	12	12
85.0	9	19	10	7	7	8	8	7	7	7
87.5	1	1	2	2	2	2	3	3	3	4
90.0	0	0	0	0	0	0	0	0	0	0

**IES ROAD REPORT**  
**PHOTOMETRIC FILENAME : L091604003.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	412	412	412	412	412	412	412	412	412	412
2.5	413	414	413	413	412	413	411	410	408	406
5.0	411	412	410	409	410	408	407	403	400	398
7.5	412	412	409	407	407	405	401	395	392	389
10.0	414	412	408	406	405	402	397	389	386	382
12.5	420	416	411	409	406	403	395	391	384	379
15.0	434	429	421	416	413	408	401	394	386	379
17.5	448	444	439	430	424	415	409	400	391	383
20.0	464	463	461	449	434	424	417	408	399	388
22.5	481	479	480	472	453	436	428	418	407	393
25.0	497	495	494	493	474	453	440	430	417	401
27.5	519	514	513	512	496	472	457	442	428	410
30.0	548	538	532	528	517	494	473	456	438	416
32.5	585	570	559	549	535	509	483	470	450	426
35.0	637	611	593	577	557	532	496	477	461	434
37.5	696	666	637	613	589	557	511	490	468	439
40.0	768	738	699	659	624	586	539	507	482	448
42.5	842	813	765	714	668	625	566	520	492	453
45.0	911	899	850	781	716	661	599	545	508	464
47.5	974	976	929	853	773	709	638	569	524	479
50.0	1027	1039	1004	928	844	767	685	600	546	490
52.5	1071	1082	1064	994	903	822	742	651	581	516
55.0	1093	1099	1092	1040	964	885	811	698	607	527
56.0	1089	1096	1095	1057	988	914	838	720	620	531
57.0	1082	1091	1097	1072	1013	945	865	744	633	537
58.0	1075	1088	1100	1087	1039	977	899	771	648	542
59.0	1073	1087	1105	1102	1069	1013	938	802	663	547
60.0	1076	1089	1115	1123	1104	1055	981	835	678	550
61.0	1108	1105	1142	1166	1160	1114	1033	872	687	550
62.0	1138	1123	1167	1209	1220	1178	1086	907	694	547
63.0	1143	1131	1175	1242	1280	1253	1136	931	691	530
64.0	1119	1128	1164	1263	1338	1336	1181	945	681	501
65.0	1076	1112	1142	1272	1383	1405	1222	958	673	474
66.0	994	1059	1108	1254	1386	1426	1252	988	680	460
67.0	894	988	1062	1223	1375	1431	1278	1023	694	450
68.0	764	883	988	1177	1369	1442	1317	1073	730	461
69.0	610	748	886	1117	1366	1456	1367	1132	784	487
70.0	458	610	777	1043	1347	1454	1394	1173	827	509
71.0	332	492	667	941	1285	1404	1346	1144	829	501
72.0	221	382	555	826	1198	1326	1262	1083	811	481
73.0	145	280	439	688	1053	1170	1105	965	748	434
74.0	104	191	324	532	855	948	884	798	647	361
75.0	74	116	219	384	663	728	665	624	534	282
76.0	55	81	149	275	536	578	512	471	411	201
77.0	43	59	95	183	427	448	378	330	290	125
78.0	33	44	61	119	323	335	266	219	192	71
79.0	26	33	46	82	225	237	175	138	121	42
80.0	22	26	36	56	141	151	100	75	64	22
82.5	13	16	16	21	47	17	13	13	13	12
85.0	7	8	9	9	12	11	10	11	12	11
87.5	4	5	6	6	7	8	8	8	8	7
90.0	0	0	0	0	0	0	0	0	0	0

**IES ROAD REPORT**  
**PHOTOMETRIC FILENAME : L091604003.IES**

**CANDELA TABULATION - (Cont.)**

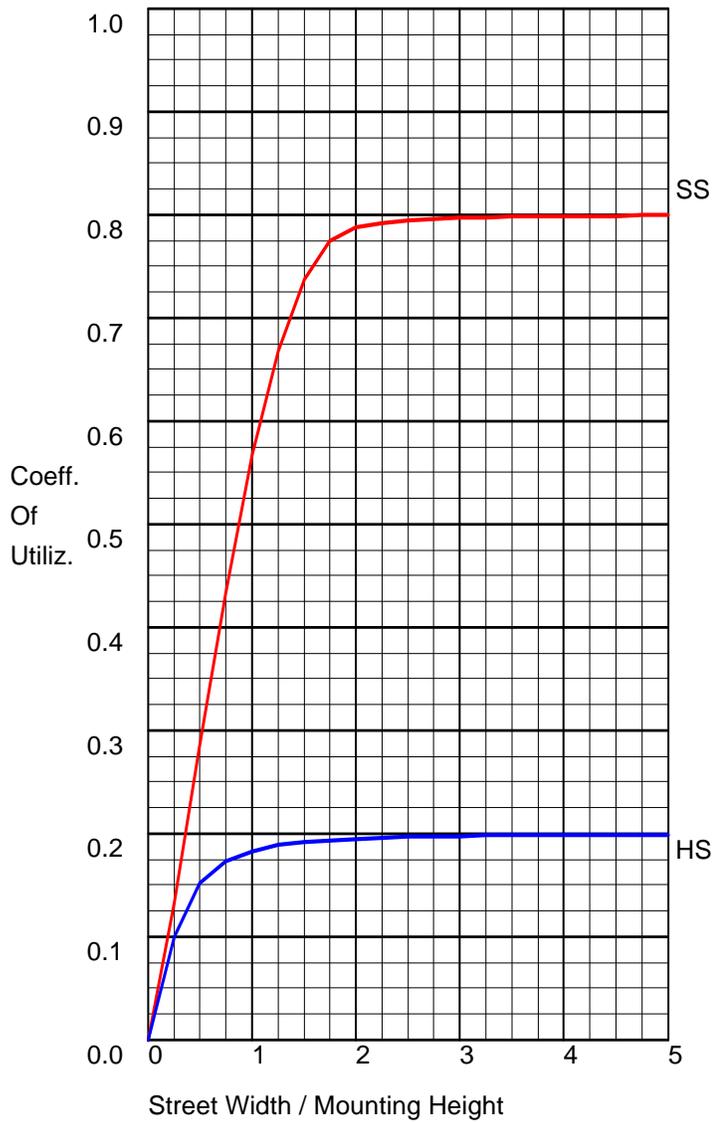
Vert. Angles	Horizontal Angles									
	<u>100</u>	<u>105</u>	<u>110</u>	<u>115</u>	<u>120</u>	<u>125</u>	<u>130</u>	<u>135</u>	<u>140</u>	<u>145</u>
0.0	412	412	412	412	412	412	412	412	412	412
2.5	405	406	407	405	403	405	403	403	401	397
5.0	397	395	397	394	390	389	385	384	380	376
7.5	387	385	383	381	375	368	365	363	356	349
10.0	378	375	371	365	357	347	342	338	330	321
12.5	373	367	361	353	342	328	320	310	301	291
15.0	373	364	355	344	327	310	298	284	273	264
17.5	374	362	351	336	315	296	278	263	248	235
20.0	375	361	345	326	305	284	264	241	223	208
22.5	379	361	342	319	293	270	245	222	202	186
25.0	382	361	337	308	280	254	227	204	182	165
27.5	388	361	333	303	271	240	210	183	162	149
30.0	390	362	329	293	256	222	188	163	148	140
32.5	392	361	325	285	248	208	172	148	139	134
35.0	399	361	321	280	228	185	153	139	133	128
37.5	402	361	317	265	212	163	138	131	126	120
40.0	404	357	307	250	190	145	129	122	117	110
42.5	407	358	303	231	163	128	119	114	107	97
45.0	410	355	289	211	144	117	111	104	94	84
47.5	420	352	273	180	120	105	101	93	81	73
50.0	425	349	254	151	103	93	89	82	73	64
52.5	433	336	225	128	89	83	79	71	62	58
55.0	434	329	208	103	77	72	67	60	56	51
56.0	433	323	196	93	73	67	63	57	53	49
57.0	431	315	183	86	69	64	60	54	49	47
58.0	430	302	167	79	64	60	56	51	47	45
59.0	429	288	152	74	60	57	53	48	45	44
60.0	427	273	137	70	57	54	49	45	44	42
61.0	419	264	128	64	54	51	46	43	42	39
62.0	408	255	119	59	51	48	43	39	39	38
63.0	389	240	110	55	49	45	39	37	37	36
64.0	361	219	98	51	46	42	36	34	34	35
65.0	334	198	87	48	43	38	33	32	32	33
66.0	313	185	80	45	39	35	30	30	30	31
67.0	296	172	75	40	36	32	27	27	27	28
68.0	285	162	69	38	34	30	25	25	25	26
69.0	281	153	63	35	31	27	22	22	22	24
70.0	271	142	58	33	28	24	20	20	20	22
71.0	233	128	53	30	25	22	18	18	18	20
72.0	187	114	48	27	22	20	17	16	16	17
73.0	140	102	45	24	20	18	15	13	13	15
74.0	97	92	44	21	18	16	13	12	12	12
75.0	58	82	42	19	17	15	12	10	10	10
76.0	39	65	33	17	15	13	10	9	9	9
77.0	26	49	24	16	13	12	9	8	8	8
78.0	19	35	18	13	11	10	8	7	7	7
79.0	16	26	16	12	10	9	7	6	6	6
80.0	15	19	13	10	9	8	6	5	5	5
82.5	11	10	9	7	7	6	4	4	3	2
85.0	9	8	7	6	5	4	4	3	2	2
87.5	7	6	6	5	5	4	2	1	1	1
90.0	0	0	0	0	0	0	0	0	0	0

**IES ROAD REPORT**  
**PHOTOMETRIC FILENAME : L091604003.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	412	412	412	412	412	412	412
2.5	393	391	393	394	390	385	383
5.0	371	368	368	370	363	357	356
7.5	344	344	339	340	333	327	324
10.0	315	312	307	306	301	294	292
12.5	283	279	273	270	266	261	258
15.0	254	246	241	236	231	226	223
17.5	223	213	207	199	194	190	189
20.0	194	182	173	165	161	159	158
22.5	170	158	151	144	141	140	140
25.0	153	144	138	133	131	129	129
27.5	142	136	130	125	120	118	118
30.0	134	130	124	118	113	110	111
32.5	128	124	117	111	106	102	102
35.0	121	116	109	101	93	89	88
37.5	112	106	95	88	81	77	74
40.0	99	91	83	76	69	64	62
42.5	86	79	71	63	58	54	52
45.0	75	67	60	55	51	48	47
47.5	64	58	53	50	47	44	43
50.0	58	53	49	46	43	39	38
52.5	52	47	44	40	37	34	34
55.0	47	43	39	36	34	32	31
56.0	45	42	38	35	33	31	30
57.0	44	40	37	34	32	30	29
58.0	42	38	35	33	31	30	29
59.0	40	37	34	32	30	29	29
60.0	39	36	33	31	29	29	29
61.0	38	35	32	30	29	29	30
62.0	37	34	31	29	29	30	31
63.0	35	33	31	29	29	30	31
64.0	34	32	30	28	29	29	30
65.0	32	31	29	28	28	28	29
66.0	30	30	28	27	27	27	29
67.0	29	29	27	26	26	27	28
68.0	27	27	25	24	24	25	25
69.0	26	26	24	22	22	21	21
70.0	24	25	23	20	19	18	17
71.0	22	23	22	18	16	16	15
72.0	20	21	21	16	13	13	13
73.0	18	19	19	13	11	11	11
74.0	15	17	16	12	11	10	10
75.0	11	15	13	11	10	9	9
76.0	9	12	11	9	8	8	8
77.0	8	9	9	8	7	7	7
78.0	6	7	7	6	5	5	5
79.0	5	5	6	5	4	4	4
80.0	4	4	4	4	3	3	3
82.5	2	2	1	1	1	1	1
85.0	2	1	1	1	1	0	0
87.5	1	1	1	0	0	0	0
90.0	0	0	0	0	0	0	0

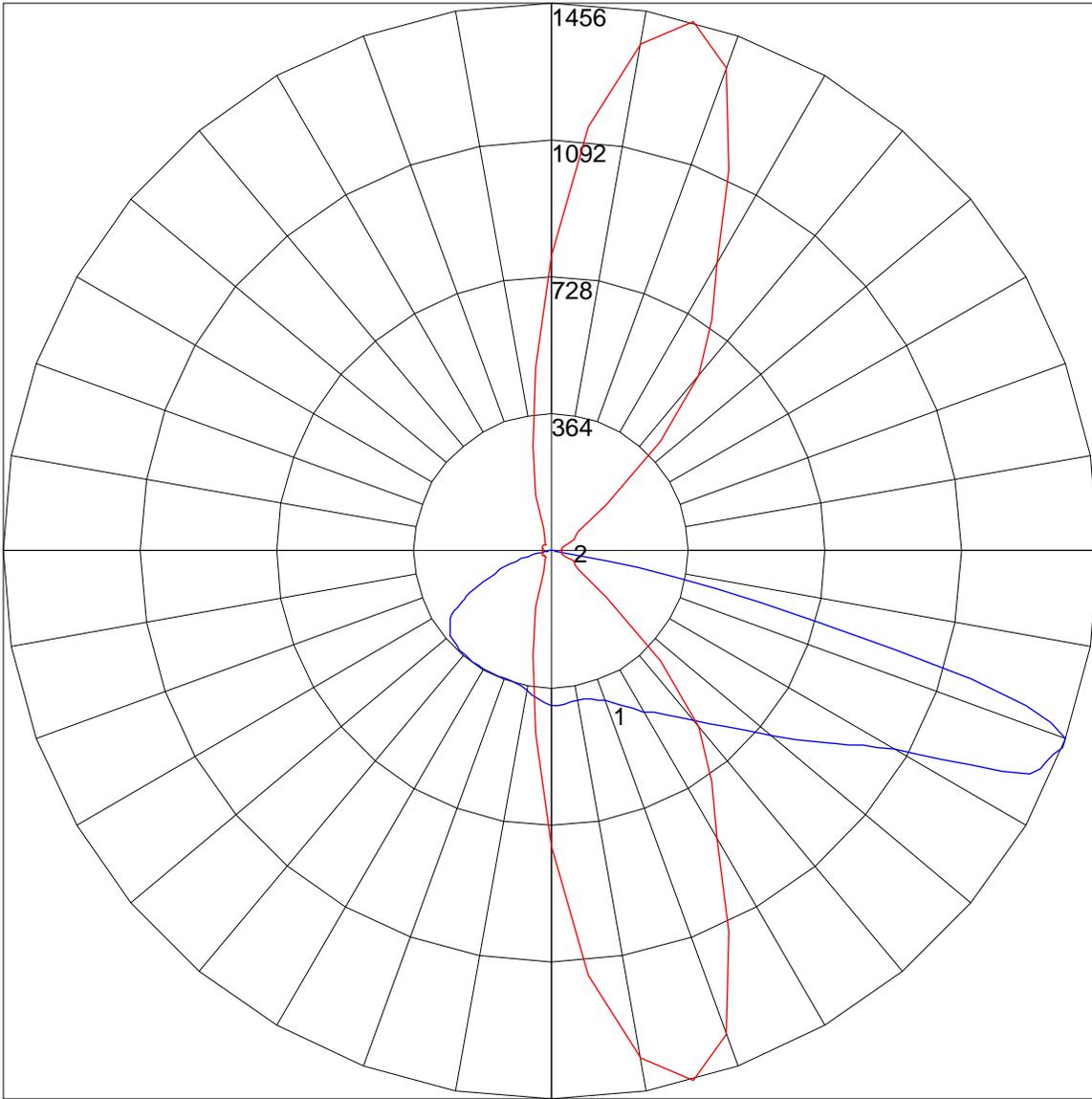
**COEFFICIENTS OF UTILIZATION**



**FLUX DISTRIBUTION**

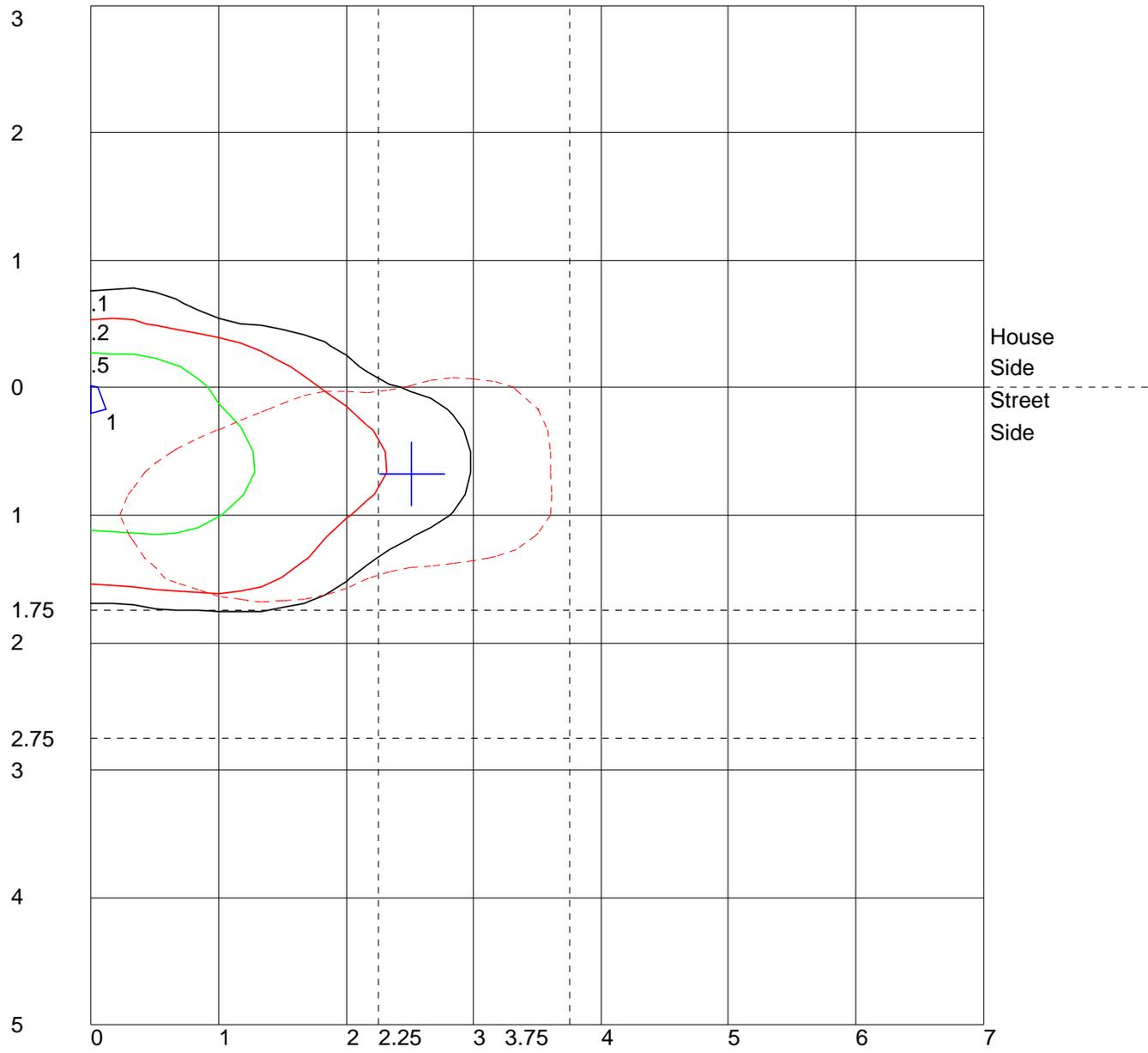
	Lumens	Percent Of Luminaire
Downward Street Side	1554.7	80.1
Downward House Side	386.4	19.9
Downward Total	1941.1	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
<b>Total Flux</b>	<b>1941.1</b>	<b>100.0</b>

POLAR GRAPH



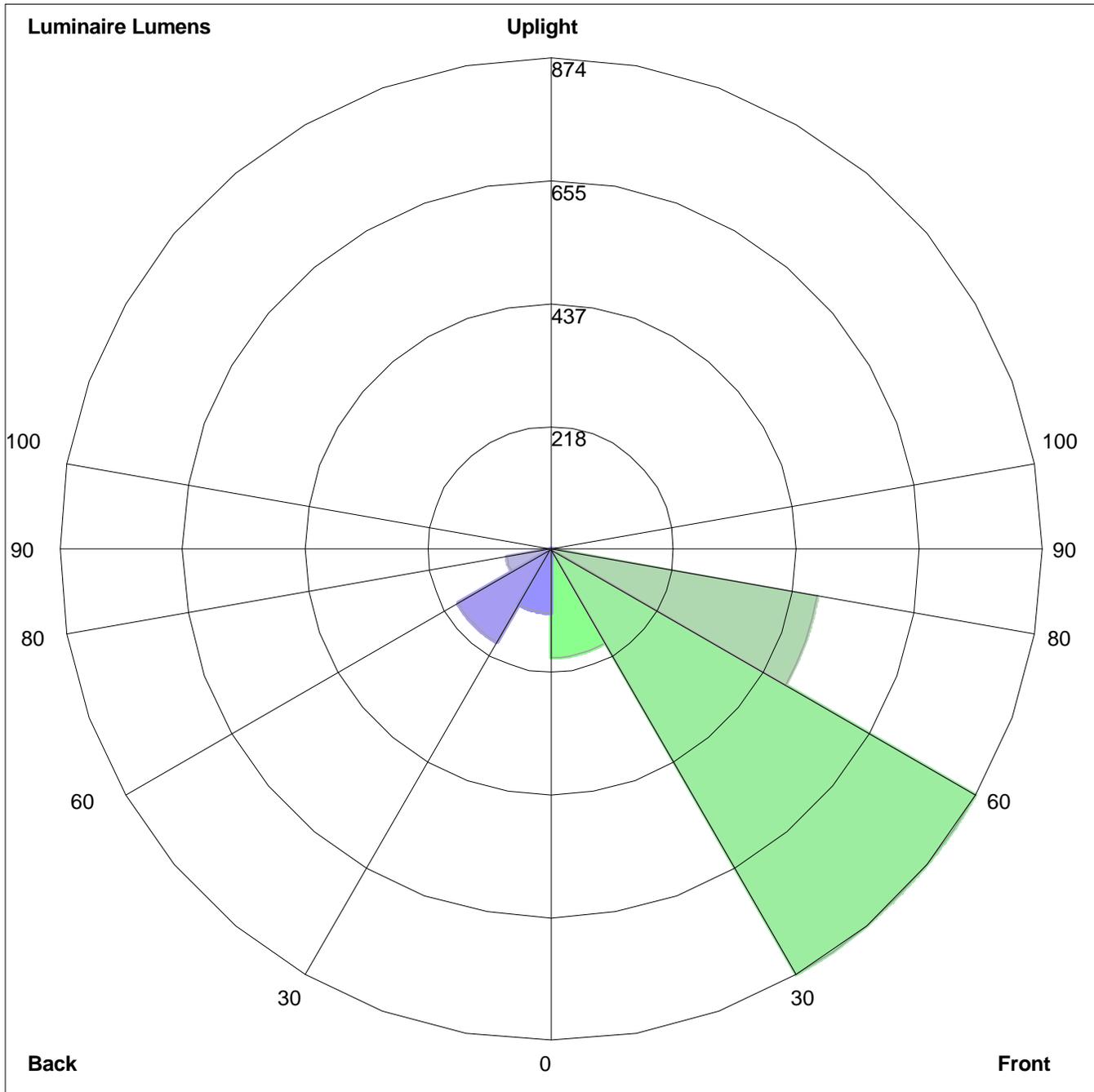
Maximum Candela = 1456 Located At Horizontal Angle = 75, Vertical Angle = 69  
# 1 - Vertical Plane Through Horizontal Angles (75 - 255) (Through Max. Cd.)  
# 2 - Horizontal Cone Through Vertical Angle (69) (Through Max. Cd.)

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=192.4, Medium=873.6, High=481.6, Very High=7.1  
 Back: Low=113.0, Medium=191.3, High=79.9, Very High=2.3  
 Uplight: Low=0.0, High=0.0

BUG Rating : B1-U0-G0