



8165 E Kaiser Blvd. Anaheim, CA 92808
 p. 714.282.2270
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Report No: L091604007R01

Date: 11/3/2016



NVLAP LAB CODE 200927-0

Report No: L091604007R01

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

Model Number: GCJ0-15H-MV-CW-2R-XX-490

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-490 .
 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-2R-XX-490	
Driver Model Number:	LITEON PA-1600-31SL	
Total Lumens:	3049.40	
Input Voltage (VAC/60Hz):	120.00	
Input Current (Amp):	0.21	
Input Power (W):	24.25	
Input Power Factor:	0.98	
Current ATHD @ 120V(%):	13%	
Current ATHD @ 240V(%):	17% (0.11A, 23.69W, 0.93PF)	
Efficacy:	126	
Color Rendering Index (CRI):	72	
Correlated Color Temperature (K):	4847	
Chromaticity Coordinate x:	0.3505	
Chromaticity Coordinate y:	0.3630	
Ambient Temperature (°C):	25.0	
Stabilization Time (Hours):	0:30	
Total Operating Time (Hours):	1:25	
Off State Power(W):	0.00	

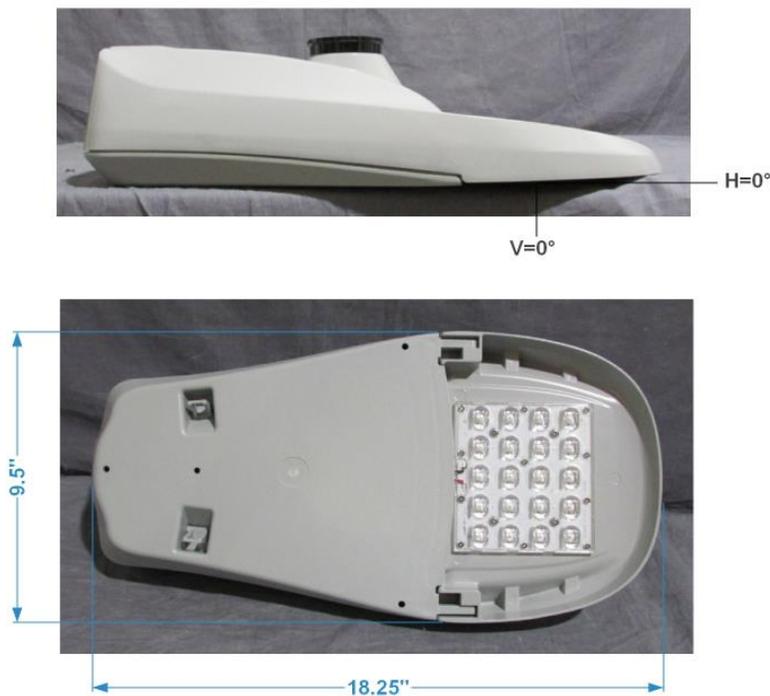
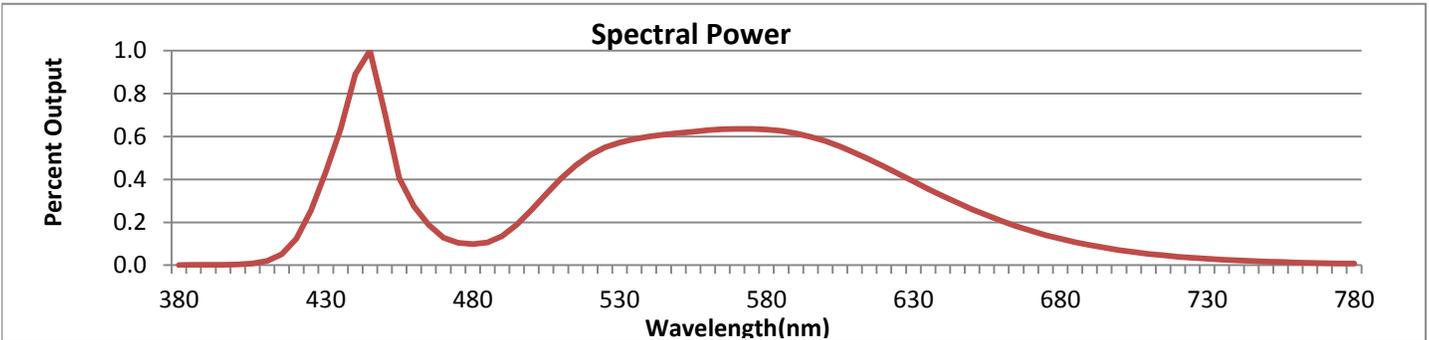


FIG. 1 LUMINAIRE

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



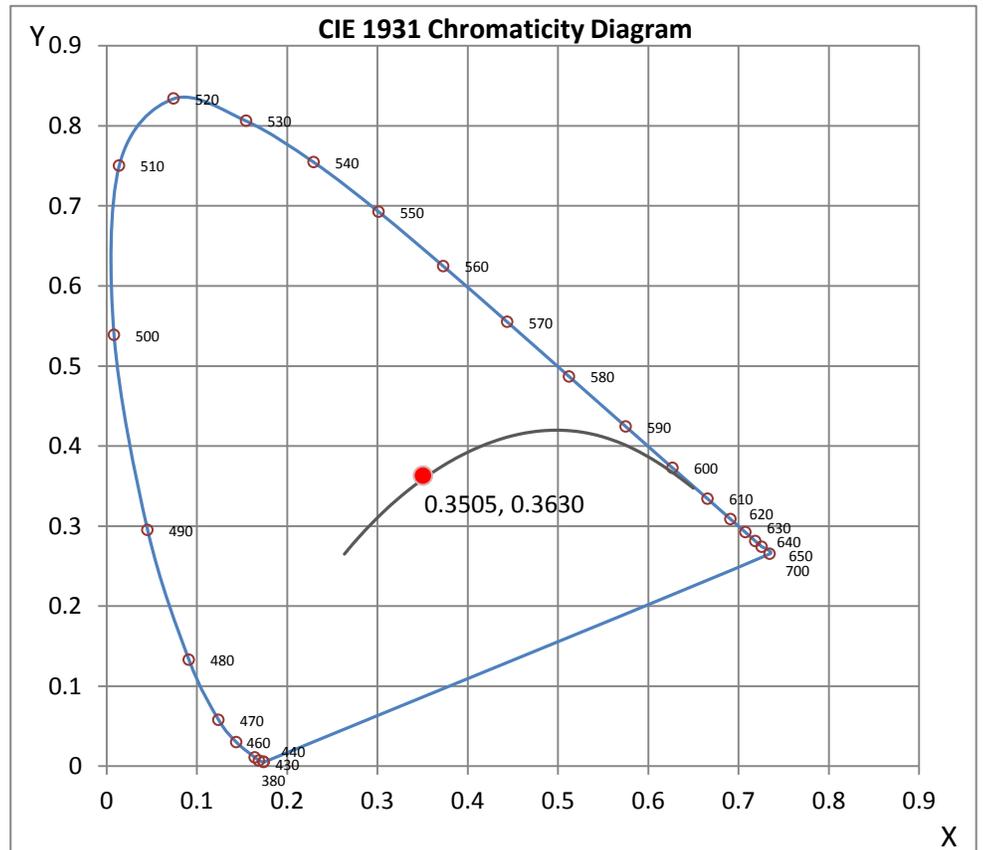
Wavelength	W/m ² nm	440	0.8903	510	0.4035	580	0.6321	650	0.2608	720	0.0397
380	0.0011	450	0.7148	520	0.5135	590	0.6150	660	0.2068	730	0.0300
390	0.0017	460	0.2747	530	0.5724	600	0.5794	670	0.1604	740	0.0225
400	0.0039	470	0.1288	540	0.5999	610	0.5249	680	0.1233	750	0.0171
410	0.0197	480	0.0986	550	0.6162	620	0.4604	690	0.0936	760	0.0128
420	0.1232	490	0.1361	560	0.6292	630	0.3903	700	0.0706	770	0.0098
430	0.4338	500	0.2573	570	0.6362	640	0.3226	710	0.0529	780	0.0084

CRI & CCT

x	0.3505
y	0.3630
u'	0.2107
v'	0.4909
CRI	72.30
CCT	4847
Duv	0.00353

R Values

R1	70.83
R2	75.61
R3	79.85
R4	74.32
R5	71.15
R6	67.33
R7	80.06
R8	59.59
R9	-21.20
R10	42.81
R11	73.11
R12	45.75
R13	70.66
R14	88.22



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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.

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:

Test Report Reviewed by:

Jeff Ahn
 Engineering Manager

Steve Kang
 Quality Assurance

**Attached are photometric data reports. Total number of pages: 14*

*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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Photometric Test Report

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604007.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
 [TEST] L091604007
 [TESTLAB] LIGHT LABORATORY, INC.
 [ISSUEDATE] 9/22/2016
 [MANUFAC] Leotek Electronics USA, LLC
 [LUMCAT] GCJ0-15H-MV-CW-2R-XX-490
 [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, 24.25W
 [_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	3049
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	126
Total Luminaire Watts	24.25
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	2266
Maximum Candela Angle	75H 70V
Maximum Candela (<90 Degrees Vertical)	2266
Maximum Candela Angle (<90 Degrees Vertical)	75H 70V
Maximum Candela At 90 Degrees Vertical	0 (0.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	227 (7.4% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604007.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

ZONAL LUMEN SUMMARY

	Lumens	% Lamp	% Luminaire	Zone	%
FL - Front-Low (0-30)	303.9	N.A.	10.0		
FM - Front-Medium (30-60)	1371.4	N.A.	45.0	0-20	7.2
FH - Front-High (60-80)	744.2	N.A.	24.4	0-30	15.9
FVH - Front-Very High (80-90)	10.9	N.A.	0.4	0-40	29
BL - Back-Low (0-30)	181.0	N.A.	5.9	0-60	70.9
BM - Back-Medium (30-60)	304.9	N.A.	10.0	0-80	99.5
BH - Back-High (60-80)	129.4	N.A.	4.2	0-90	100
BVH - Back-Very High (80-90)	3.7	N.A.	0.1	10-90	98.1
UL - Uplight-Low (90-100)	0.0	N.A.	0.0	20-40	21.8
UH - Uplight-High (100-180)	0.0	N.A.	0.0	20-50	40.5
				40-70	62.3
Total	3049.4	N.A.	100.0	60-80	28.6
				70-80	8.2
BUG Rating	B1-U0-G1			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 : L091604007.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	651	651	651	651	651	651	651	651	651	651
2.5	662	671	659	644	651	657	657	648	644	644
5.0	664	667	658	647	652	655	653	646	643	643
7.5	671	671	660	654	656	656	656	650	646	645
10.0	678	678	670	670	667	665	667	664	655	651
12.5	674	676	673	679	674	672	675	677	670	667
15.0	670	676	678	686	683	678	680	684	683	688
17.5	672	680	689	694	698	690	691	695	700	709
20.0	687	691	705	712	718	712	709	716	723	731
22.5	705	709	727	737	744	745	741	747	756	760
25.0	733	738	762	772	782	789	788	788	795	791
27.5	767	774	798	814	828	843	843	838	842	829
30.0	799	810	834	856	880	905	910	904	904	879
32.5	849	852	874	901	934	962	980	982	982	951
35.0	901	906	925	957	992	1021	1046	1067	1070	1047
37.5	958	965	986	1018	1061	1095	1121	1148	1163	1148
40.0	1013	1026	1046	1077	1120	1158	1201	1226	1246	1251
42.5	1057	1068	1090	1129	1176	1234	1285	1312	1326	1337
45.0	1078	1091	1108	1152	1213	1278	1350	1393	1411	1420
47.5	1078	1090	1107	1152	1226	1300	1383	1457	1490	1508
50.0	1041	1050	1074	1141	1233	1318	1398	1483	1548	1591
52.5	961	985	1032	1104	1222	1317	1416	1499	1584	1646
55.0	858	901	969	1068	1187	1291	1430	1498	1578	1657
56.0	813	852	929	1037	1163	1295	1455	1538	1554	1639
57.0	755	789	872	987	1127	1293	1476	1585	1539	1620
58.0	634	662	743	871	1063	1266	1476	1635	1614	1626
59.0	459	479	550	693	967	1206	1447	1677	1769	1657
60.0	296	307	367	514	840	1100	1386	1687	1891	1696
61.0	229	234	278	381	609	838	1239	1589	1846	1771
62.0	187	185	215	266	372	553	1059	1445	1744	1830
63.0	143	139	157	184	227	356	817	1230	1600	1791
64.0	94	93	103	133	184	257	529	954	1418	1648
65.0	55	57	60	95	159	188	276	679	1204	1473
66.0	46	48	50	75	125	153	192	460	908	1264
67.0	45	48	49	61	93	131	155	271	607	1041
68.0	44	47	48	53	73	112	130	159	383	802
69.0	42	44	45	48	61	94	109	122	247	557
70.0	39	43	43	45	54	80	93	105	146	339
71.0	37	40	40	43	49	67	81	88	107	228
72.0	36	39	38	40	47	58	71	76	90	153
73.0	34	38	36	38	44	50	62	67	78	108
74.0	32	37	34	36	40	45	55	60	65	86
75.0	30	36	33	34	37	40	50	54	56	74
76.0	28	33	31	33	35	36	45	48	49	62
77.0	26	30	30	32	33	33	40	43	44	54
78.0	24	28	28	30	30	31	36	38	38	45
79.0	22	26	27	27	28	28	33	34	33	36
80.0	21	25	25	25	25	26	29	30	28	29
82.5	20	26	22	18	19	22	21	20	18	19
85.0	15	28	15	9	10	11	10	10	9	10
87.5	2	2	2	2	3	3	4	5	5	6
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604007.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	651	651	651	651	651	651	651	651	651	651
2.5	652	653	650	650	650	651	649	646	644	641
5.0	648	649	646	645	647	643	641	636	632	629
7.5	647	647	641	641	641	637	631	624	621	617
10.0	652	649	643	638	637	633	625	616	610	605
12.5	665	657	649	641	638	634	625	618	608	600
15.0	686	678	665	656	650	643	631	623	611	601
17.5	707	704	694	680	667	654	644	631	619	607
20.0	730	730	728	713	687	666	657	645	630	617
22.5	756	755	758	747	716	688	673	660	644	623
25.0	785	780	783	780	757	717	694	679	660	635
27.5	819	811	807	807	786	746	719	698	676	650
30.0	863	849	839	835	816	781	745	718	693	660
32.5	928	901	879	868	848	809	761	741	713	676
35.0	1015	973	935	911	882	841	782	752	728	684
37.5	1110	1058	1010	968	930	885	810	774	741	695
40.0	1220	1166	1101	1043	984	929	852	796	761	711
42.5	1337	1288	1210	1130	1059	989	898	819	775	718
45.0	1442	1416	1338	1237	1143	1056	954	858	801	735
47.5	1534	1538	1477	1353	1226	1122	1008	897	828	756
50.0	1614	1635	1585	1469	1334	1211	1091	944	859	773
52.5	1676	1696	1669	1558	1427	1298	1175	1026	916	814
55.0	1703	1715	1714	1637	1521	1398	1267	1100	957	831
56.0	1693	1709	1717	1659	1560	1446	1322	1136	977	839
57.0	1678	1699	1717	1677	1600	1496	1382	1173	998	847
58.0	1671	1695	1721	1700	1641	1547	1438	1219	1021	856
59.0	1673	1696	1729	1728	1685	1599	1490	1274	1049	868
60.0	1684	1700	1744	1764	1737	1660	1547	1329	1074	876
61.0	1730	1723	1784	1830	1823	1752	1628	1374	1090	874
62.0	1775	1746	1824	1901	1917	1854	1714	1420	1100	867
63.0	1780	1760	1839	1959	2019	1969	1809	1472	1105	852
64.0	1741	1763	1828	2001	2121	2092	1907	1528	1107	829
65.0	1668	1741	1801	2025	2202	2193	1989	1579	1104	802
66.0	1520	1659	1749	2009	2211	2218	2015	1606	1097	763
67.0	1344	1546	1676	1968	2195	2222	2027	1632	1096	727
68.0	1142	1375	1553	1889	2169	2238	2076	1697	1143	727
69.0	922	1152	1383	1772	2136	2264	2156	1797	1233	763
70.0	701	926	1199	1631	2081	2266	2205	1872	1315	800
71.0	495	730	1016	1448	1982	2198	2145	1848	1346	823
72.0	309	548	832	1249	1849	2083	2024	1772	1343	825
73.0	192	391	646	1032	1627	1842	1769	1579	1250	755
74.0	142	264	461	802	1326	1488	1393	1280	1070	611
75.0	112	160	296	583	1030	1139	1026	975	870	461
76.0	85	114	203	413	823	907	799	739	670	342
77.0	64	87	136	268	645	710	612	528	475	235
78.0	50	67	91	172	484	531	442	357	317	149
79.0	39	50	67	125	339	370	289	227	198	87
80.0	32	37	51	90	217	227	158	122	103	40
82.5	21	23	24	28	76	31	21	21	21	19
85.0	11	12	13	15	19	18	17	18	19	17
87.5	6	7	9	10	11	12	12	13	13	12
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604007.IES

CANDELA TABULATION - (Cont.)

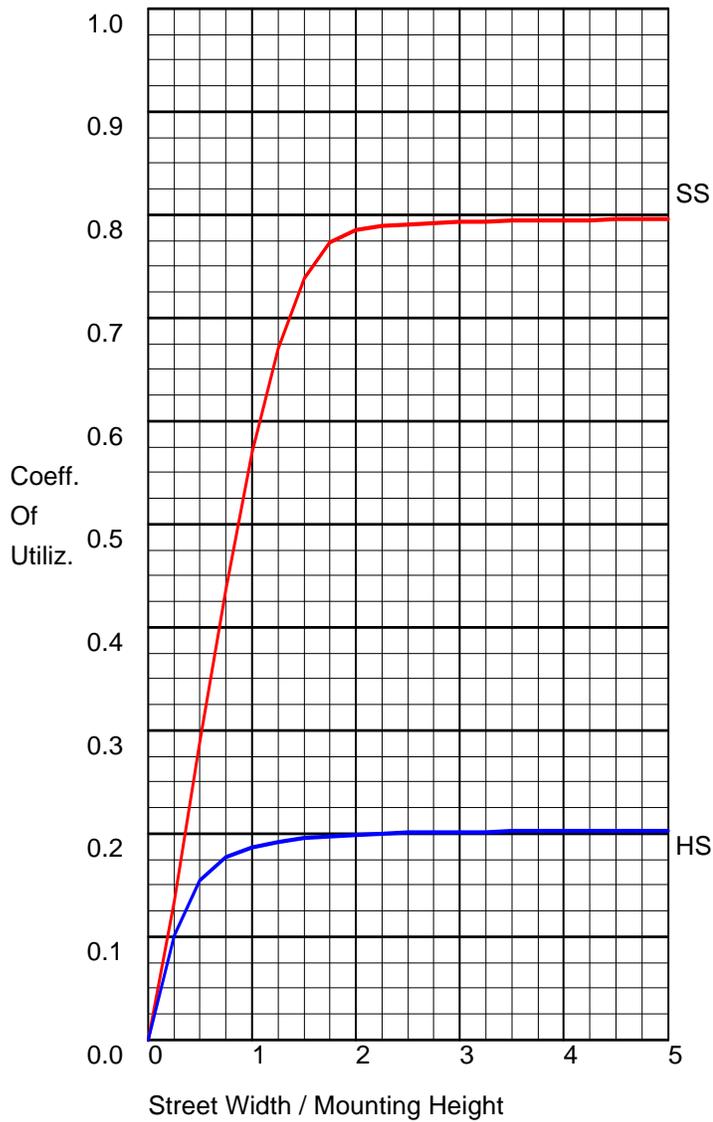
Vert. Angles	Horizontal Angles									
	<u>100</u>	<u>105</u>	<u>110</u>	<u>115</u>	<u>120</u>	<u>125</u>	<u>130</u>	<u>135</u>	<u>140</u>	<u>145</u>
0.0	651	651	651	651	651	651	651	651	651	651
2.5	640	643	646	643	639	640	640	640	636	631
5.0	628	628	629	629	623	618	614	613	608	599
7.5	613	612	609	607	599	588	583	581	572	558
10.0	600	596	591	583	572	554	546	542	531	516
12.5	591	584	576	564	547	525	511	496	483	470
15.0	591	578	565	548	524	498	475	458	439	425
17.5	594	578	559	535	506	474	446	421	401	381
20.0	597	575	550	521	489	457	425	390	362	338
22.5	600	575	543	508	472	437	399	361	331	302
25.0	607	576	539	494	455	410	368	329	295	267
27.5	613	573	527	483	435	388	342	296	261	239
30.0	621	577	525	470	416	363	309	265	238	224
32.5	624	574	520	462	403	335	278	239	221	212
35.0	630	570	509	445	376	304	248	222	210	201
37.5	638	575	507	427	345	266	221	207	199	191
40.0	641	569	493	405	310	235	204	194	186	175
42.5	641	566	481	376	273	207	189	182	171	157
45.0	650	566	466	345	230	186	176	165	152	134
47.5	659	554	432	295	193	166	160	149	129	116
50.0	672	558	413	258	162	148	141	131	115	103
52.5	688	539	368	208	141	131	125	112	100	91
55.0	679	516	323	176	121	113	108	97	89	81
56.0	681	511	309	161	114	107	102	91	84	78
57.0	683	503	296	146	107	101	94	86	79	74
58.0	683	490	275	132	102	95	89	81	75	71
59.0	679	467	249	120	95	90	84	76	72	69
60.0	672	445	224	109	90	86	79	71	69	65
61.0	662	430	209	102	85	81	74	66	65	63
62.0	650	415	194	95	81	77	69	63	62	60
63.0	632	393	179	89	76	72	63	59	58	58
64.0	607	365	161	82	72	67	58	55	54	55
65.0	575	332	143	76	67	62	54	51	51	52
66.0	526	292	129	71	62	57	49	47	47	49
67.0	475	251	116	65	58	53	45	44	44	46
68.0	448	227	107	61	54	48	39	39	39	43
69.0	444	220	99	57	49	43	35	35	36	39
70.0	433	214	91	53	45	38	31	31	33	35
71.0	380	196	82	49	39	34	28	27	29	32
72.0	316	177	74	44	35	31	26	25	25	28
73.0	242	162	70	38	31	29	24	22	22	24
74.0	164	151	67	33	28	26	22	20	19	21
75.0	93	137	64	29	26	24	20	17	17	17
76.0	60	110	53	26	23	21	17	15	15	15
77.0	38	82	39	24	21	19	15	12	12	12
78.0	26	58	30	22	19	17	12	11	10	10
79.0	23	42	25	19	17	15	11	9	9	9
80.0	23	28	21	17	15	12	10	8	8	7
82.5	18	16	13	11	10	9	7	6	5	4
85.0	15	12	11	9	8	7	6	4	4	3
87.5	10	10	9	8	7	6	4	3	2	1
90.0	0	0	0	0	0	0	0	0	0	0

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604007.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	651	651	651	651	651	651	651
2.5	625	624	626	629	622	611	608
5.0	592	592	589	593	582	573	568
7.5	552	551	544	545	537	527	521
10.0	507	502	493	493	486	476	472
12.5	458	450	444	437	431	424	418
15.0	409	400	392	385	377	372	367
17.5	361	346	338	326	319	313	311
20.0	317	298	283	270	262	258	257
22.5	276	255	242	231	227	226	226
25.0	244	229	219	212	208	206	206
27.5	226	217	207	198	192	189	189
30.0	213	204	195	187	180	175	176
32.5	202	196	187	177	168	163	163
35.0	193	185	174	164	153	144	141
37.5	180	170	153	142	132	125	120
40.0	160	149	135	122	111	104	101
42.5	140	128	114	103	93	87	84
45.0	119	107	95	88	81	76	74
47.5	104	93	85	79	74	70	67
50.0	92	83	78	73	67	62	60
52.5	82	74	70	64	60	55	53
55.0	74	67	61	58	54	50	49
56.0	71	65	59	56	52	49	48
57.0	69	62	57	54	50	47	47
58.0	66	60	56	52	49	46	46
59.0	64	59	54	50	47	46	46
60.0	62	58	53	49	46	45	46
61.0	60	57	51	47	46	46	47
62.0	58	55	50	46	46	47	48
63.0	56	54	48	45	45	47	48
64.0	54	52	47	45	45	46	47
65.0	52	50	46	44	44	45	45
66.0	49	48	45	42	43	44	44
67.0	46	46	43	40	40	42	43
68.0	44	44	40	38	38	39	39
69.0	40	42	38	35	34	35	34
70.0	38	39	36	32	31	31	29
71.0	35	37	34	29	27	27	25
72.0	31	34	33	26	23	23	22
73.0	28	31	30	23	20	20	20
74.0	24	27	27	22	18	18	18
75.0	20	24	23	20	17	17	16
76.0	17	20	20	17	15	15	15
77.0	13	16	17	15	12	12	12
78.0	11	12	13	11	10	10	10
79.0	9	9	10	9	8	8	8
80.0	7	7	7	7	6	6	6
82.5	3	3	3	2	2	2	2
85.0	3	2	2	1	1	1	1
87.5	1	1	1	1	0	0	0
90.0	0	0	0	0	0	0	0

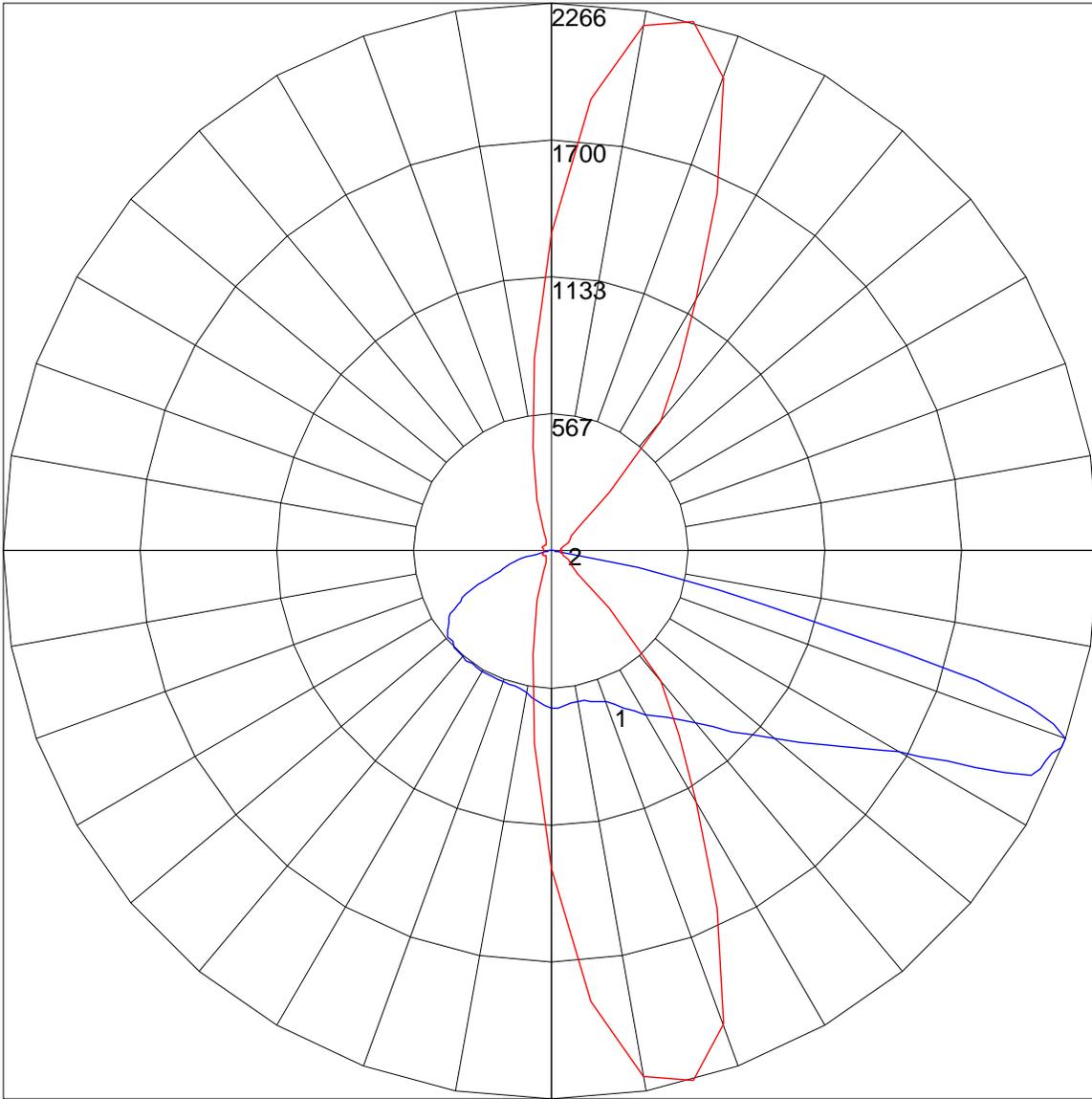
COEFFICIENTS OF UTILIZATION



FLUX DISTRIBUTION

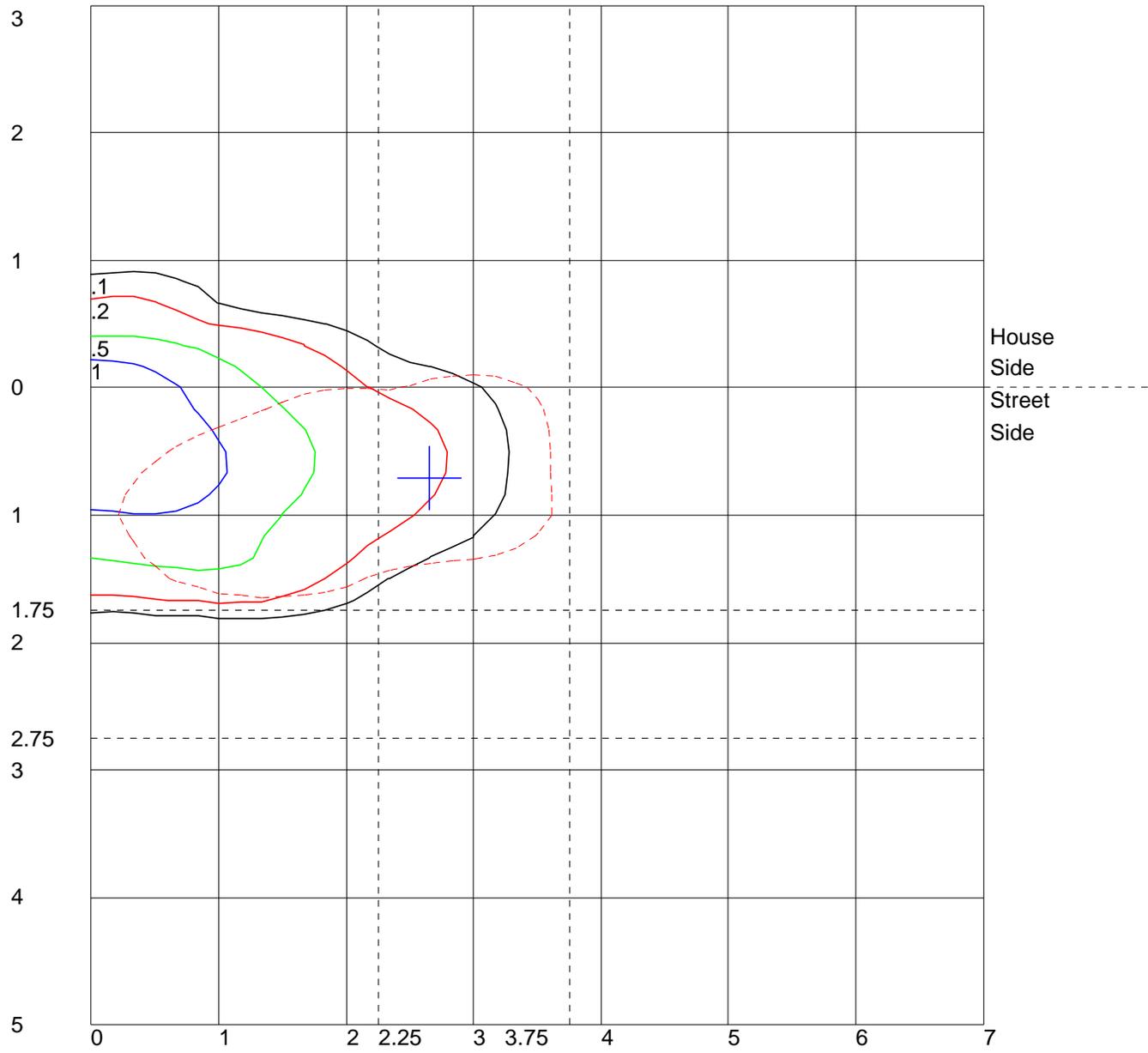
	Lumens	Percent Of Luminaire
Downward Street Side	2430.5	79.7
Downward House Side	618.9	20.3
Downward Total	3049.4	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Flux	3049.4	100.0

POLAR GRAPH



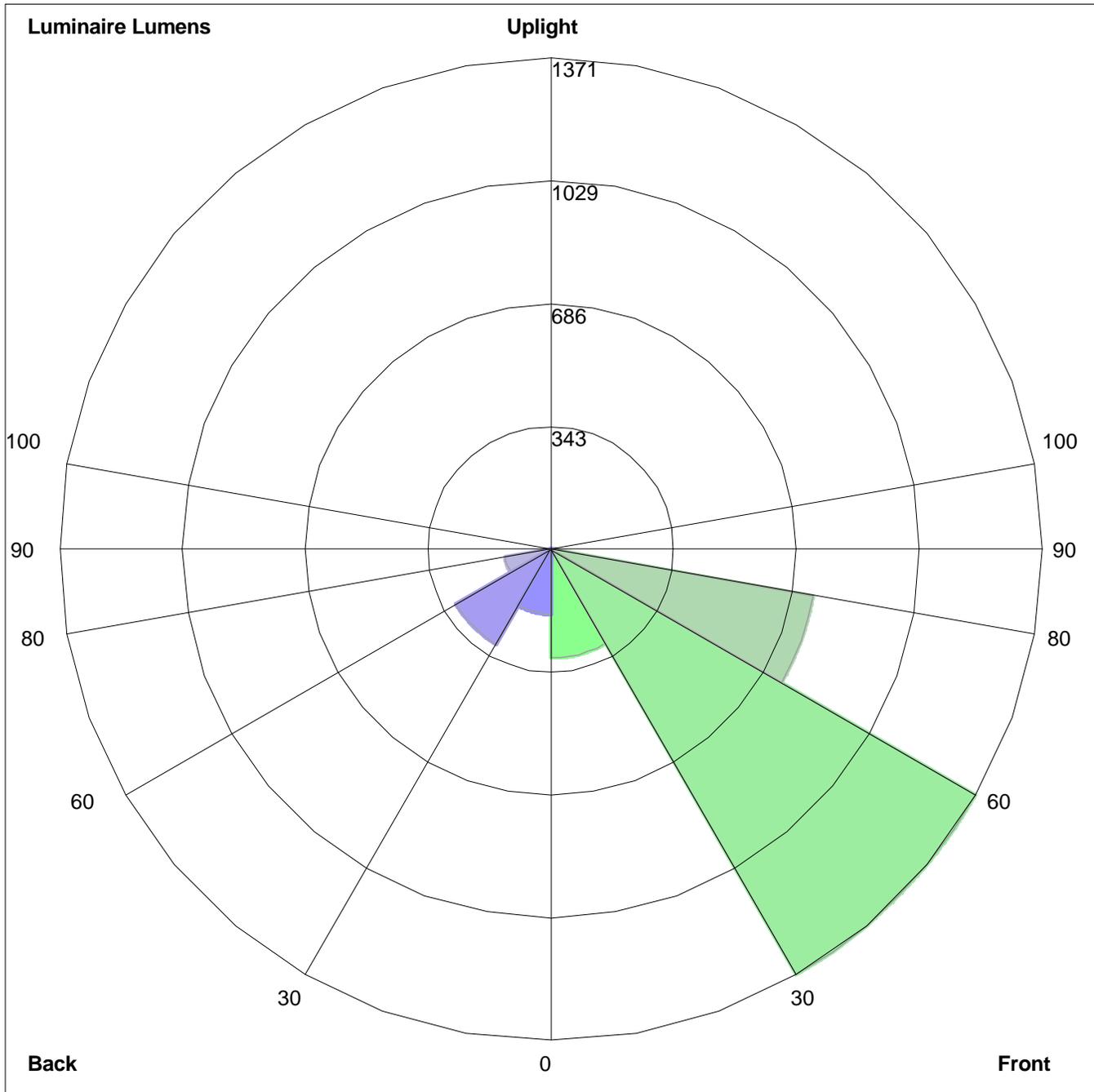
Maximum Candela = 2266 Located At Horizontal Angle = 75, Vertical Angle = 70
1 - Vertical Plane Through Horizontal Angles (75 - 255) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (70) (Through Max. Cd.)

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=303.9, Medium=1371.4, High=744.2, Very High=10.9
Back: Low=181.0, Medium=304.9, High=129.4, Very High=3.7
Uplight: Low=0.0, High=0.0

BUG Rating : B1-U0-G1