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

NVLAP LAB CODE 200927-0

Report No: **L091604009R01**

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

Model Number: **GCJ0-15H-MV-CW-4-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-4-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.

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Report No: L091604009R01
Date: 11/3/2016
NVLAP LAB CODE 200927-0

Test Summary	
Manufacturer:	Leotek Electronics USA, LLC
Model Number:	GCJ0-15H-MV-CW-4-XX-490
Driver Model Number:	LITEON PA-1600-31SL
Total Lumens:	3105.20
Input Voltage (VAC/60Hz):	120.00
Input Current (Amp):	0.21
Input Power (W):	24.22
Input Power Factor:	0.98
Current ATHD @ 120V(%):	13%
Current ATHD @ 240V(%):	17% (0.11A, 23.69W, 0.93PF)
Efficacy:	128
Color Rendering Index (CRI):	72
Correlated Color Temperature (K):	4822
Chromaticity Coordinate x:	0.3516
Chromaticity Coordinate y:	0.3666
Ambient Temperature (°C):	25.0
Stabilization Time (Hours):	0:30
Total Operating Time (Hours):	1:25
Off State Power(W):	0.00

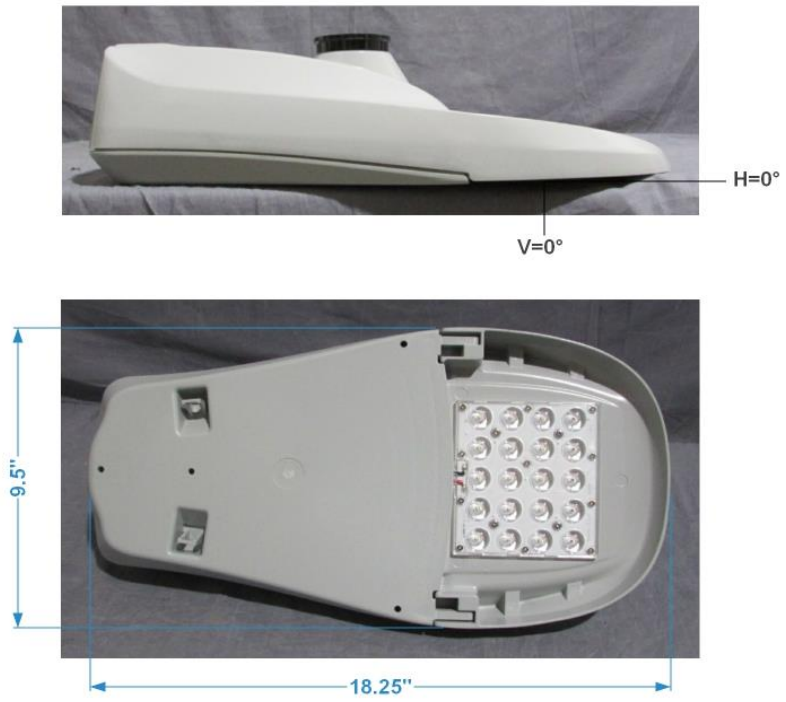

FIG. 1 LUMINAIRE

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

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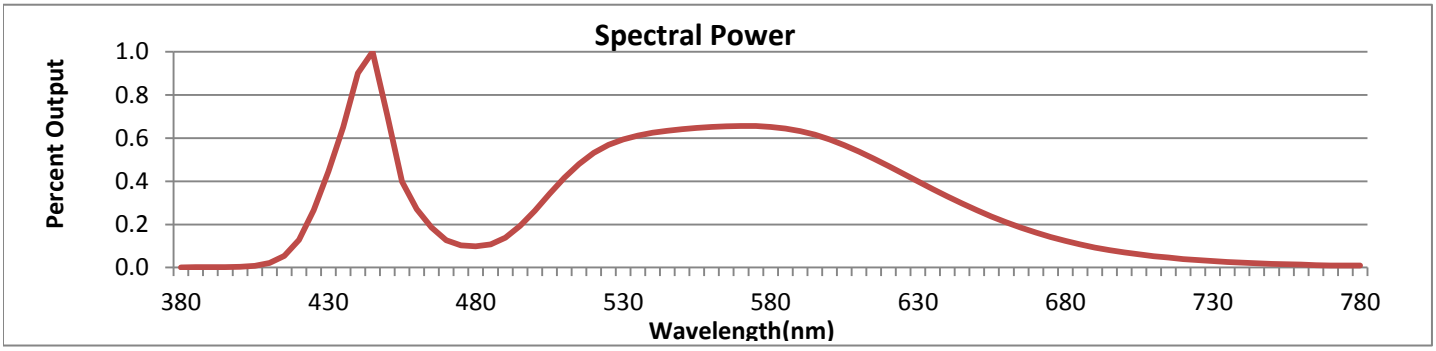
NVLAP LAB CODE 200927-0



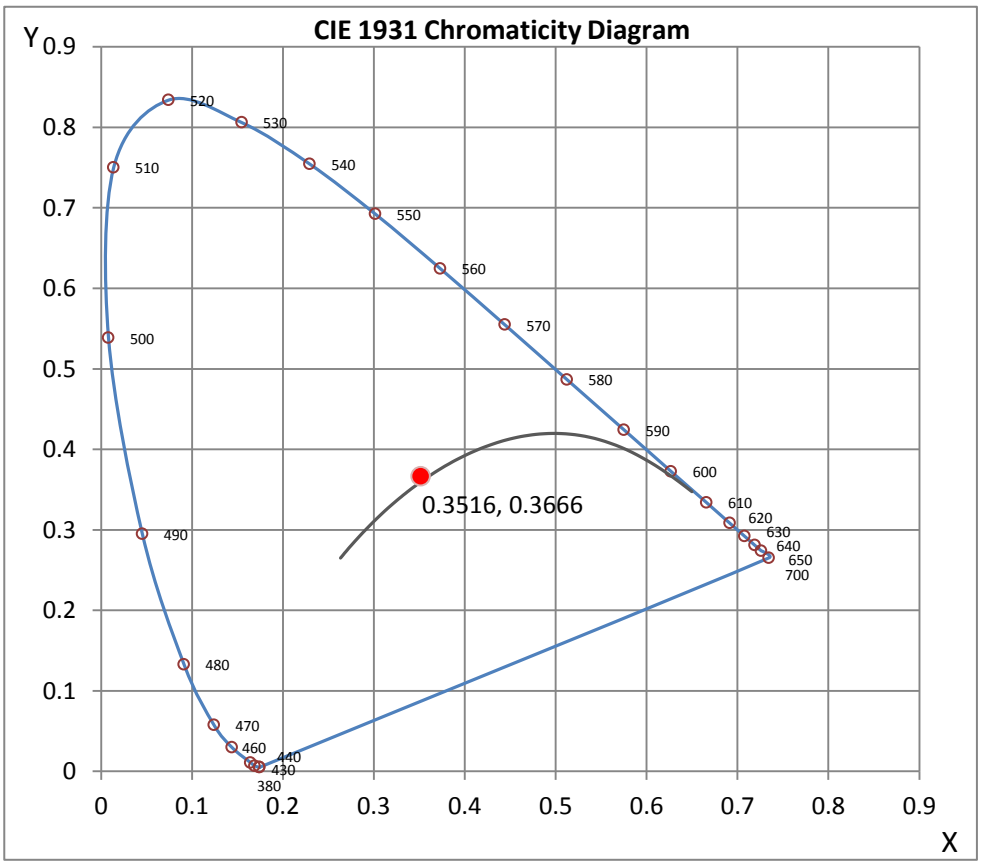
Wavelength	W/m²nm	440	0.9013	510	0.4165	580	0.6515	650	0.2661	720	0.0397
380	0.0011	450	0.7052	520	0.5315	590	0.6331	660	0.2096	730	0.0299
390	0.0017	460	0.2704	530	0.5947	600	0.5948	670	0.1615	740	0.0226
400	0.0041	470	0.1267	540	0.6251	610	0.5378	680	0.1232	750	0.0173
410	0.0207	480	0.0982	550	0.6412	620	0.4709	690	0.0929	760	0.0132
420	0.1289	490	0.1381	560	0.6522	630	0.3993	700	0.0699	770	0.0100
430	0.4464	500	0.2638	570	0.6564	640	0.3296	710	0.0525	780	0.0089

CRI & CCT

x	0.3516
y	0.3666
u'	0.2100
v'	0.4927
CRI	71.70
CCT	4822
Duv	0.00486

R Values

R1	69.81
R2	74.95
R3	79.73
R4	73.63
R5	70.18
R6	66.57
R7	79.83
R8	58.55
R9	-24.61
R10	41.48
R11	72.21
R12	44.70
R13	69.69
R14	88.16



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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:

Jeff Ahn
Engineering Manager

Test Report Reviewed by:

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 : L091604009.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] L091604009
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUEDATE] 9/23/2016
[MANUFAC] Leotek Electronics USA, LLC
[LUMCAT] GCJ0-15H-MV-CW-4-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, 24.22W
[_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	3105
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	128
Total Luminaire Watts	24.22
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	1525
Maximum Candela Angle	80H 69V
Maximum Candela (<90 Degrees Vertical)	1525
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	106 (3.4% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

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LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	301.7	N.A.	9.7
FM - Front-Medium (30-60)	856.5	N.A.	27.6
FH - Front-High (60-80)	828.8	N.A.	26.7
FVH - Front-Very High (80-90)	9.3	N.A.	0.3
BL - Back-Low (0-30)	256.0	N.A.	8.2
BM - Back-Medium (30-60)	664.6	N.A.	21.4
BH - Back-High (60-80)	185.9	N.A.	6.0
BVH - Back-Very High (80-90)	2.5	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	3105.3	N.A.	100.0
BUG Rating	B1-U0-G1		

ZONAL LUMEN SUMMARY

Zone	%
0-20	7.8
0-30	18
0-40	32.5
0-60	66.9
0-80	99.6
0-90	100
10-90	98.1
20-40	24.7
20-50	41.5
40-70	54.3
60-80	32.7
70-80	12.9
80-90	0.4
90-110	0
90-120	0
90-130	0
90-150	0
90-180	0
110-180	0
0-180	100

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CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**
0.0	603	603	603	603	603	603	603	603	603	603
2.5	616	616	611	611	611	612	613	608	607	611
5.0	631	632	624	620	623	623	622	619	617	620
7.5	650	647	639	634	635	637	634	634	629	631
10.0	670	665	655	649	651	652	650	649	644	644
12.5	687	678	669	664	667	673	669	666	665	662
15.0	700	693	683	680	682	686	690	685	685	683
17.5	711	707	701	698	697	700	709	704	704	706
20.0	717	718	716	718	715	718	726	724	723	722
22.5	723	731	731	737	738	740	744	747	744	736
25.0	730	736	746	756	764	765	761	769	765	751
27.5	731	738	754	768	784	790	785	791	788	770
30.0	730	733	752	769	791	804	808	812	809	794
32.5	724	724	742	759	789	807	822	828	827	817
35.0	715	718	731	751	776	798	826	839	841	836
37.5	703	710	718	737	764	792	829	845	854	851
40.0	673	683	693	717	737	769	813	842	847	840
42.5	635	640	655	678	697	741	788	819	833	826
45.0	595	599	614	638	658	707	750	793	819	811
47.5	563	568	582	603	622	659	711	769	804	799
50.0	542	546	558	575	595	627	677	742	789	797
52.5	526	531	542	558	580	610	662	723	774	794
55.0	512	518	530	543	569	598	644	707	765	795
56.0	516	522	531	542	568	596	645	703	761	795
57.0	520	527	536	544	570	598	644	701	762	798
58.0	526	533	540	547	570	597	645	703	762	798
59.0	534	541	545	552	576	607	650	702	761	799
60.0	546	551	555	561	581	610	655	713	772	805
61.0	560	565	567	573	587	616	664	721	780	814
62.0	584	587	588	592	603	632	673	727	787	825
63.0	618	622	620	622	629	654	696	748	805	843
64.0	660	663	660	661	665	684	723	772	825	865
65.0	728	728	721	718	717	732	759	801	851	897
66.0	812	812	803	794	787	792	813	850	899	936
67.0	895	894	885	877	871	870	881	908	951	988
68.0	989	988	980	970	963	960	964	984	1020	1058
69.0	1084	1085	1079	1073	1068	1063	1064	1081	1111	1144
70.0	1177	1181	1183	1185	1183	1181	1183	1196	1224	1243
71.0	1218	1225	1234	1252	1273	1291	1305	1325	1353	1337
72.0	1209	1217	1227	1254	1287	1327	1368	1416	1426	1414
73.0	1129	1139	1163	1197	1236	1277	1329	1389	1377	1428
74.0	984	1002	1046	1099	1143	1185	1233	1244	1246	1318
75.0	673	707	805	917	995	1044	1083	1058	1075	1133
76.0	308	340	443	592	726	824	868	862	879	925
77.0	131	139	202	316	424	528	596	645	657	667
78.0	82	86	108	161	219	275	327	378	399	387
79.0	54	57	67	92	119	142	164	191	197	193
80.0	37	38	44	59	75	85	93	103	101	106
82.5	16	16	16	19	22	26	29	30	29	29
85.0	7	7	7	8	8	8	9	9	9	9
87.5	4	4	4	5	5	5	5	5	6	6
90.0	0	0	0	0	0	0	0	0	0	0

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IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604009.IES

CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles									
	50	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**
0.0	603	603	603	603	603	603	603	603	603	603
2.5	611	609	606	605	606	604	605	605	605	607
5.0	621	616	612	612	612	611	610	610	609	610
7.5	630	627	625	622	622	620	620	619	619	618
10.0	644	643	642	640	635	633	634	631	630	629
12.5	662	659	659	657	651	650	647	648	646	643
15.0	680	679	677	675	669	665	665	668	665	657
17.5	700	699	696	691	689	686	688	689	687	677
20.0	716	713	710	706	706	709	712	712	707	698
22.5	730	726	723	720	724	733	743	740	733	724
25.0	743	740	736	737	745	760	773	776	770	758
27.5	761	754	749	756	767	789	804	811	813	799
30.0	777	766	763	769	786	813	832	845	846	832
32.5	798	779	774	782	801	830	852	867	869	861
35.0	817	795	785	789	810	840	864	880	884	877
37.5	830	803	784	787	812	840	869	886	893	895
40.0	822	792	774	781	803	838	865	883	898	910
42.5	808	780	764	771	796	827	852	870	892	912
45.0	789	765	752	757	780	804	831	857	882	899
47.5	776	752	741	744	764	790	820	838	862	880
50.0	775	746	731	732	754	784	814	836	854	867
52.5	777	747	727	726	747	783	816	839	854	861
55.0	784	756	733	727	748	785	820	845	862	864
56.0	787	759	734	727	747	785	822	851	868	870
57.0	790	762	737	728	744	783	822	856	872	876
58.0	796	767	740	730	749	789	826	860	879	885
59.0	799	769	742	731	751	792	834	870	892	899
60.0	805	774	747	736	753	794	838	877	910	922
61.0	815	784	753	741	759	802	849	898	941	961
62.0	826	791	760	746	762	806	862	933	993	1015
63.0	841	805	770	755	769	821	887	977	1056	1077
64.0	863	827	787	766	786	845	937	1051	1135	1134
65.0	890	849	805	781	798	875	1017	1189	1244	1152
66.0	928	882	829	802	832	962	1170	1330	1297	1114
67.0	982	925	857	830	925	1148	1345	1397	1278	1044
68.0	1036	960	883	907	1089	1322	1463	1432	1261	969
69.0	1094	997	964	1098	1286	1446	1525	1454	1225	861
70.0	1156	1077	1155	1302	1407	1493	1493	1304	976	581
71.0	1256	1263	1343	1377	1406	1444	1348	1027	662	337
72.0	1401	1386	1385	1347	1351	1294	1034	653	367	174
73.0	1444	1360	1311	1261	1199	978	600	303	162	92
74.0	1335	1238	1170	1091	923	621	279	137	86	61
75.0	1157	1073	997	798	529	264	123	81	62	45
76.0	902	833	721	457	231	114	77	58	41	30
77.0	605	545	390	192	110	75	56	40	26	23
78.0	348	295	206	102	68	52	39	27	20	20
79.0	172	146	112	72	51	38	27	20	18	17
80.0	99	90	70	54	36	25	19	17	16	15
82.5	33	31	25	18	14	13	13	13	12	11
85.0	10	10	10	10	10	10	11	11	10	9
87.5	6	7	7	8	9	9	8	8	7	7
90.0	0	0	0	0	0	0	0	0	0	0

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IES ROAD REPORT
PHOTOMETRIC FILENAME : L091604009.IES

CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles									
	100	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**145**
0.0	603	603	603	603	603	603	603	603	603	603
2.5	607	605	605	600	601	602	601	599	596	599
5.0	611	609	605	601	601	601	598	600	596	595
7.5	615	613	607	603	601	599	598	596	593	591
10.0	624	620	612	608	606	599	596	590	589	587
12.5	637	627	620	613	609	601	595	587	586	584
15.0	649	636	628	621	612	602	595	587	585	583
17.5	664	647	639	626	615	600	593	587	582	579
20.0	682	664	649	634	620	604	595	588	576	569
22.5	706	685	664	644	623	604	595	585	571	560
25.0	739	711	686	657	631	607	592	578	566	553
27.5	776	747	713	678	643	618	592	573	561	555
30.0	811	781	740	701	657	622	592	574	563	559
32.5	843	815	772	728	676	626	596	575	561	554
35.0	869	842	802	752	691	635	597	574	554	543
37.5	892	872	826	765	696	637	590	566	544	529
40.0	913	895	846	776	699	623	577	550	531	513
42.5	919	901	850	777	692	615	565	534	516	496
45.0	907	898	847	770	679	598	550	521	502	478
47.5	889	881	835	762	666	580	535	503	479	456
50.0	870	856	820	730	632	560	516	480	454	433
52.5	860	844	802	704	597	531	484	445	426	416
55.0	858	830	774	676	578	507	449	408	394	395
56.0	859	829	767	665	566	493	433	397	384	385
57.0	864	832	766	660	548	473	415	384	375	364
58.0	870	830	753	640	541	462	404	374	358	325
59.0	883	837	747	630	529	447	393	365	329	288
60.0	907	854	755	629	508	426	376	343	288	260
61.0	940	865	741	607	496	415	365	305	258	237
62.0	983	885	741	592	469	394	338	276	239	220
63.0	1026	877	710	553	432	361	295	239	211	196
64.0	994	819	628	476	387	325	252	210	188	177
65.0	948	744	549	410	328	265	211	183	168	163
66.0	861	633	446	326	260	202	171	155	147	140
67.0	726	512	339	244	192	148	133	125	122	116
68.0	651	407	250	176	122	101	94	90	88	84
69.0	475	235	146	107	79	65	64	62	60	59
70.0	261	134	94	71	55	45	44	43	43	42
71.0	143	88	66	49	38	33	32	31	31	31
72.0	90	63	49	38	31	27	26	24	24	25
73.0	62	47	38	31	26	23	22	21	20	20
74.0	47	39	32	26	23	20	19	18	17	17
75.0	37	33	27	22	20	18	17	16	15	14
76.0	30	27	23	19	18	16	15	14	12	12
77.0	24	22	19	16	15	14	13	12	11	10
78.0	20	18	16	14	13	12	11	10	9	9
79.0	17	15	14	12	11	10	9	8	8	7
80.0	14	13	12	11	10	9	7	7	6	5
82.5	10	9	8	8	7	6	6	5	4	4
85.0	8	7	7	6	6	5	5	4	4	4
87.5	6	6	6	6	5	5	4	4	3	3
90.0	0	0	0	0	0	0	0	0	0	0

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CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles						
	150	**155**	**160**	**165**	**170**	**175**	**180**
0.0	603	603	603	603	603	603	603
2.5	594	596	595	595	595	594	596
5.0	591	588	589	587	590	593	595
7.5	590	585	584	582	585	592	594
10.0	588	584	577	580	581	592	596
12.5	585	578	574	575	578	589	593
15.0	580	574	570	569	575	584	591
17.5	574	570	564	562	568	578	584
20.0	563	561	556	551	556	566	571
22.5	553	551	545	542	544	552	554
25.0	547	546	539	537	539	544	543
27.5	548	545	538	538	541	538	535
30.0	549	542	536	530	531	528	522
32.5	544	534	528	518	515	511	509
35.0	532	522	514	501	495	491	490
37.5	515	505	494	481	472	464	461
40.0	496	480	466	454	435	422	416
42.5	477	459	439	425	401	386	380
45.0	457	439	422	410	390	376	368
47.5	440	427	416	406	386	370	363
50.0	427	425	424	418	401	381	372
52.5	420	427	430	421	395	369	359
55.0	399	392	375	352	327	306	295
56.0	374	357	343	328	307	285	272
57.0	339	323	317	305	291	273	261
58.0	304	296	295	288	277	264	253
59.0	273	270	275	274	267	252	247
60.0	250	254	265	269	263	251	249
61.0	232	242	253	258	251	243	244
62.0	215	223	230	236	231	227	228
63.0	193	200	209	215	213	212	212
64.0	176	179	186	191	189	187	188
65.0	156	155	160	163	163	164	166
66.0	135	132	133	136	134	134	137
67.0	109	104	103	103	100	99	99
68.0	80	76	74	74	72	72	72
69.0	56	54	53	54	52	52	51
70.0	41	40	39	36	31	28	26
71.0	31	29	24	22	18	15	13
72.0	23	20	18	16	13	11	10
73.0	18	16	15	13	10	8	8
74.0	15	14	13	11	8	7	7
75.0	13	12	11	8	7	6	5
76.0	12	10	9	7	5	5	4
77.0	10	9	7	5	4	4	4
78.0	8	6	5	4	4	3	3
79.0	6	5	4	4	3	3	3
80.0	5	4	4	3	3	2	2
82.5	4	3	3	2	2	2	2
85.0	3	3	3	2	2	2	2
87.5	3	3	3	2	2	2	2
90.0	0	0	0	0	0	0	0

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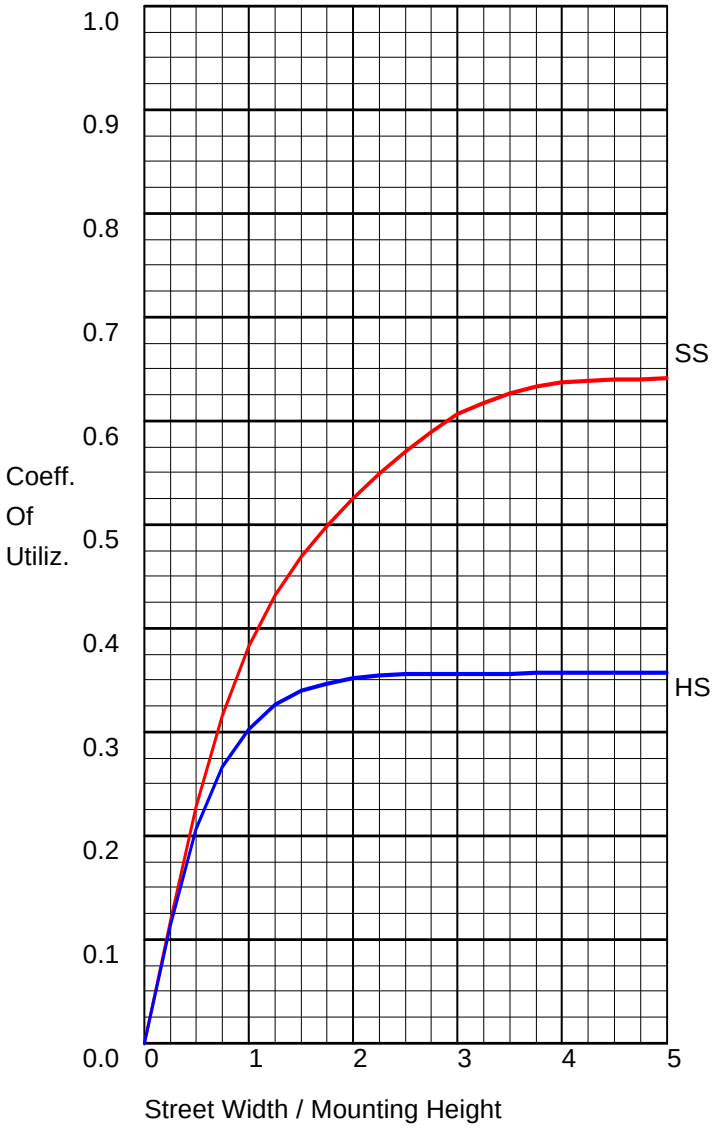
COEFFICIENTS OF UTILIZATION



FLUX DISTRIBUTION

	Lumens	Percent Of Luminaire
Downward Street Side	1996.3	64.3
Downward House Side	1108.9	35.7
Downward Total	3105.2	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Flux	3105.2	100.0

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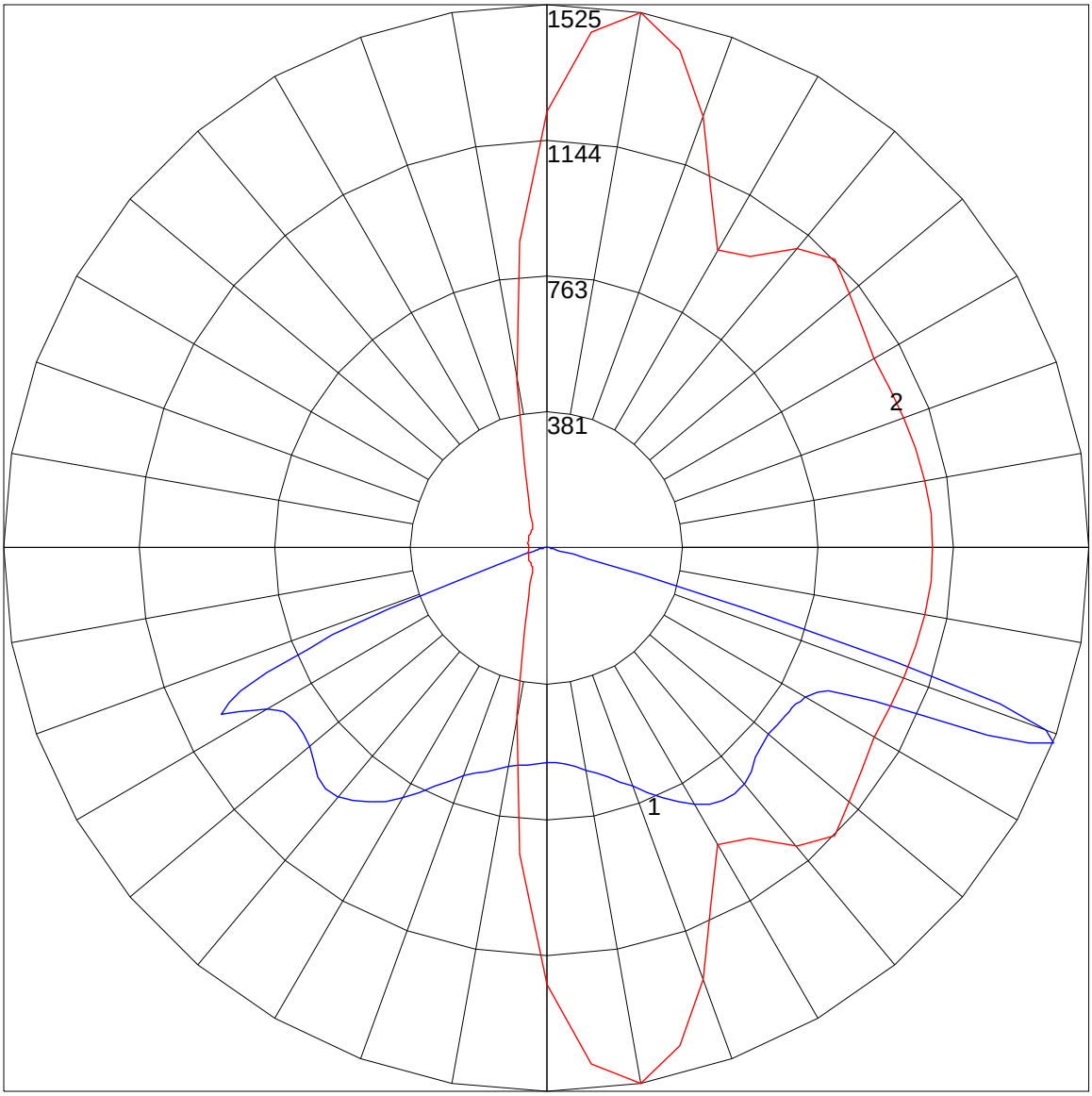
POLAR GRAPH



Maximum Candela = 1525 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.)

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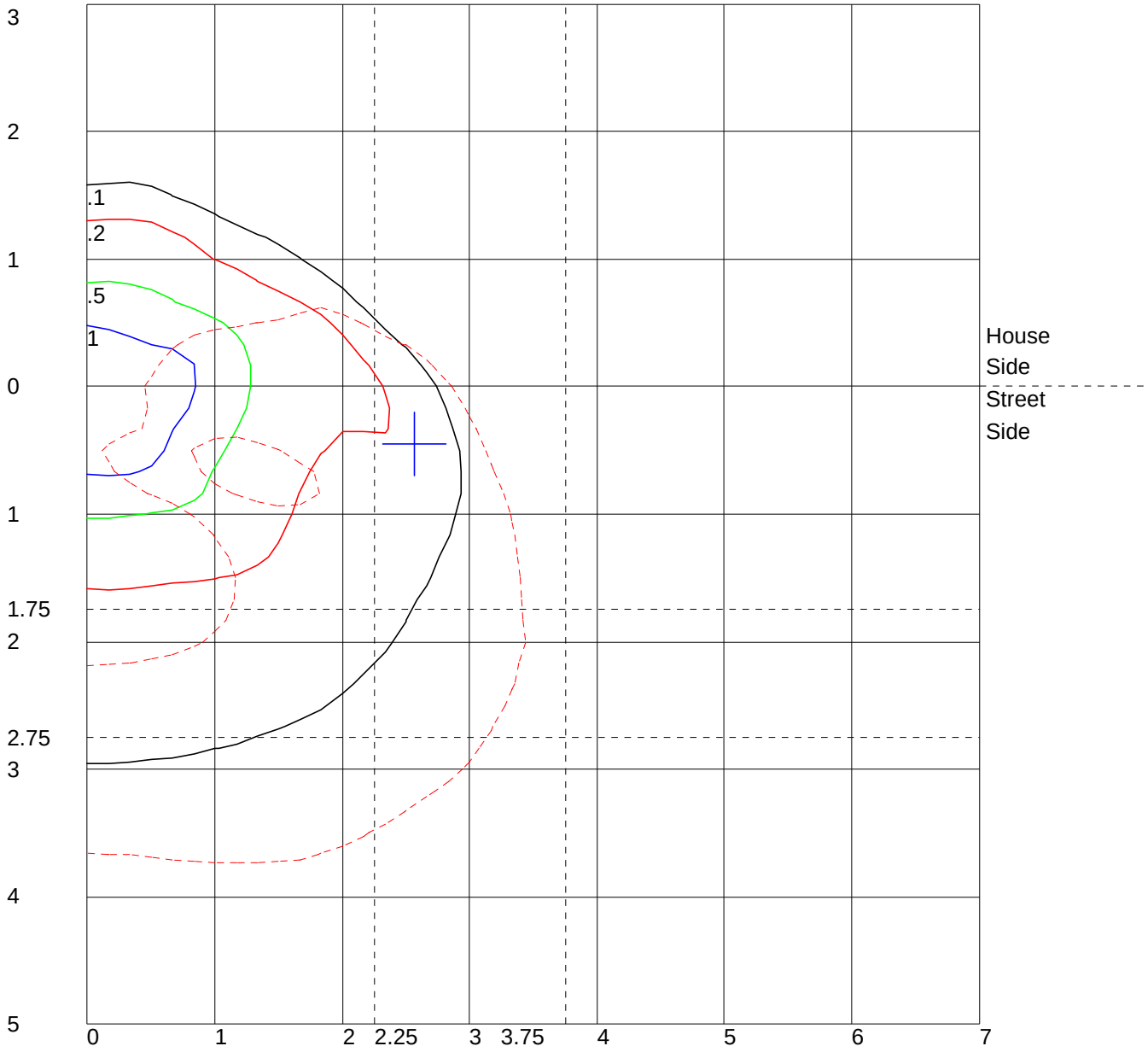
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



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

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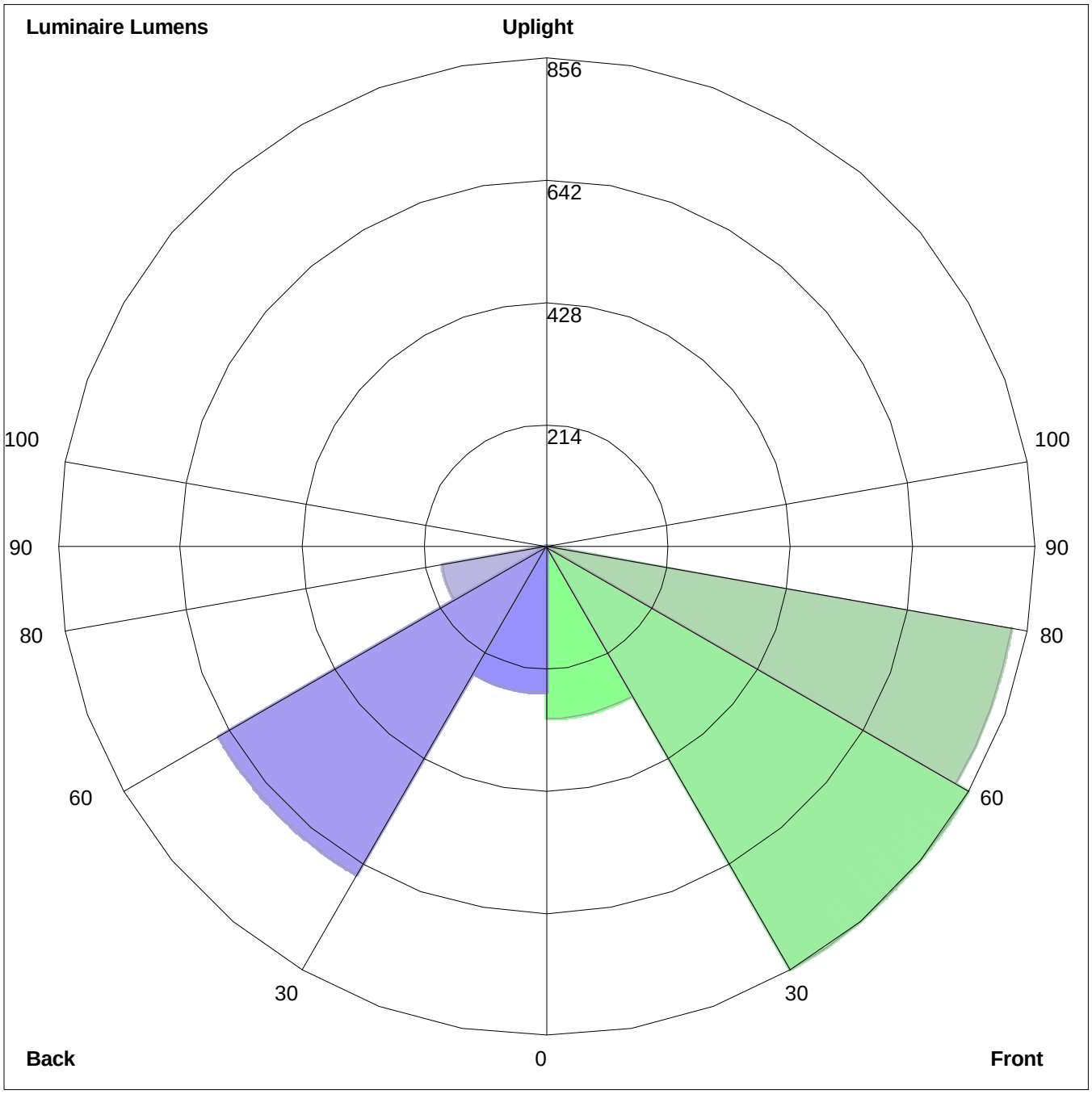
LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=301.7, Medium=856.5, High=828.8, Very High=9.3
Back: Low=256.0, Medium=664.6, High=185.9, Very High=2.5
Uplight: Low=0.0, High=0.0

BUG Rating : B1-U0-G1

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