LIGHT LABORATORY INC.

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

NVLAP

NVLAP LAB CODE 200927-0

Report No:	**L091603909**

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

Model Number: **GCJ2-20H-MV-CW-5-XX-700**

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 GCJ2-20H-MV-CW-5-XX-700 . 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: 9/29/16 - 9/29/16

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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Test Summary	
Manufacturer:	Leotek Electronics USA, LLC
Model Number:	GCJ2-20H-MV-CW-5-XX-700
Driver Model Number:	PHILIPS ADVANCE XI075C105V070CNY2
Total Lumens:	5383.60
Input Voltage (VAC/60Hz):	120.00
Input Current (Amp):	0.38
Input Power (W):	44.85
Input Power Factor:	1.00
Current ATHD @ 120V(%):	8%
Current ATHD @ 277V(%):	9% (0.16A, 44.69W, 0.98PF)
Efficacy:	120
Color Rendering Index (CRI):	73
Correlated Color Temperature (K):	4870
Chromaticity Coordinate x:	0.3496
Chromaticity Coordinate y:	0.3611
Ambient Temperature (°C):	25.0
Stabilization Time (Hours):	0:30
Total Operating Time (Hours):	2:00
Off State Power(W):	0.00
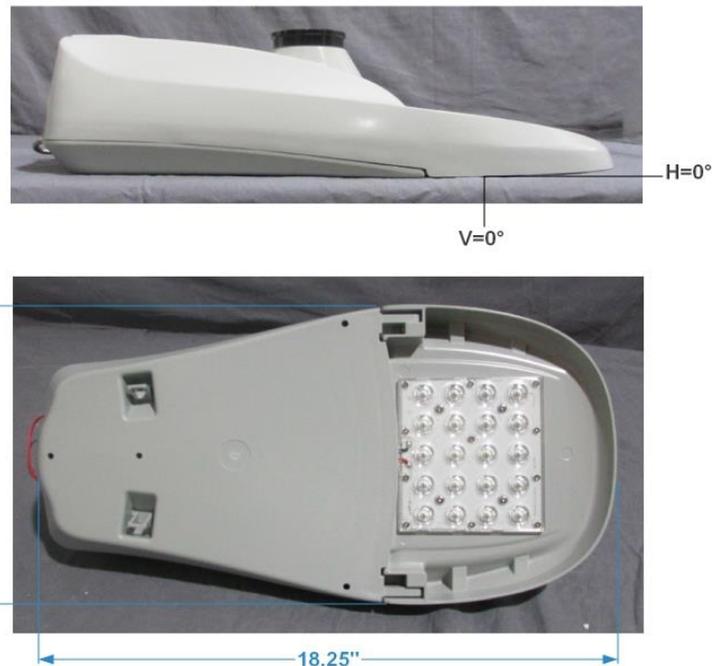
FIG. 1 LUMINAIRE

*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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Report No: L091603909
Date: 9/30/2016

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Spectral Power
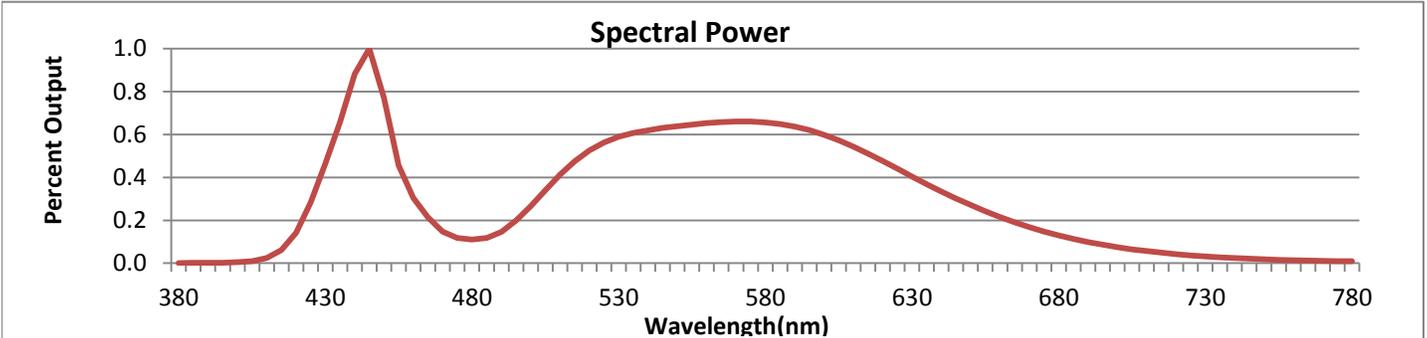
Wavelength	W/m²nm	440	0.8820	510	0.4133	580	0.6560	650	0.2715	720	0.0425
380	0.0011	450	0.7700	520	0.5259	590	0.6371	660	0.2159	730	0.0320
390	0.0018	460	0.3048	530	0.5889	600	0.5992	670	0.1675	740	0.0242
400	0.0048	470	0.1479	540	0.6197	610	0.5433	680	0.1294	750	0.0182
410	0.0244	480	0.1101	550	0.6385	620	0.4761	690	0.0986	760	0.0140
420	0.1421	490	0.1464	560	0.6530	630	0.4048	700	0.0748	770	0.0106
430	0.4653	500	0.2664	570	0.6612	640	0.3348	710	0.0563	780	0.0092

CRI & CCT

x	0.3496
y	0.3611
u'	0.2108
v'	0.4899
CRI	72.70
CCT	4870
Duv	0.00295

R Values

R1	71.11
R2	76.01
R3	80.10
R4	74.52
R5	71.42
R6	67.71
R7	80.39
R8	59.96
R9	-20.00
R10	43.51
R11	73.04
R12	46.39
R13	71.01
R14	88.33
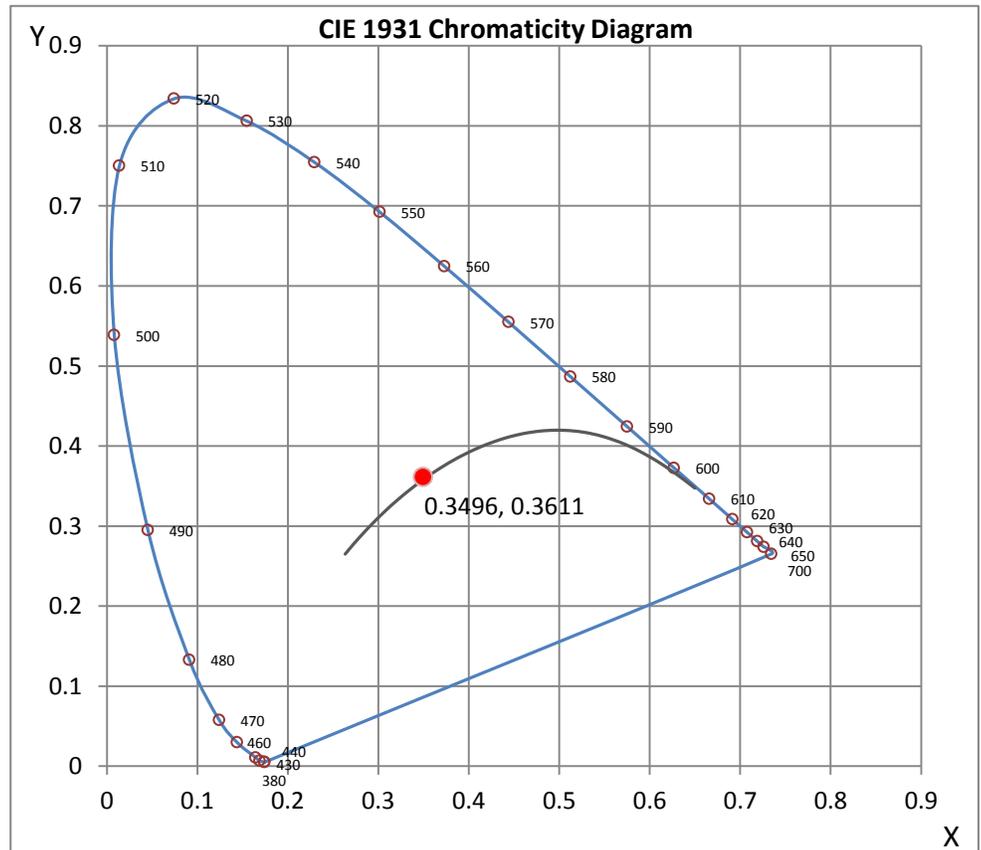
CIE 1931 Chromaticity Diagram

0.3496, 0.3611

*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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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 $25^{o}C$ and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at $25^{o}C$ 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 $25^{o}C$ and is measured from the center of the fixture, within 1ft from the outside of the fixture. Temperature is maintained at $25^{o}C$ 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: 12

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 : L091603909.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002
[TEST] L091603909
[TESTLAB] LIGHT LABORATORY, INC.
[ISSUEDATE] 9/30/2016
[MANUFAC] Leotek Electronics USA, LLC
[LUMCAT] GCJ2-20H-MV-CW-5-XX-700
[LUMINAIRE] 18.25"L. X 9.5"W. X 4.5"H. LED STREET LIGHT
[BALLASTCAT] PHILIPS ADVANCE XI075C105V070CNY2
[OTHER] INDICATING THE CANDELA VALUES ARE ABSOLUTE AND
[MORE] SHOULD NOT BE FACTORED FOR DIFFERENT LAMP RATINGS.
[_INPUT] 120VAC, 44.85W
[_TEST PROCEDURE] IESNA:LM-79-08

CHARACTERISTICS

IES Classification	Type VS
Longitudinal Classification	Short
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	5384
Downward Total Efficiency	N.A. (absolute)
Total Luminaire Efficiency	N.A. (absolute)
Luminaire Efficacy Rating (LER)	120
Total Luminaire Watts	44.85
Ballast Factor	1.00
Upward Waste Light Ratio	0.00
Maximum Candela	2129
Maximum Candela Angle	50H 67V
Maximum Candela (<90 Degrees Vertical)	2129
Maximum Candela Angle (<90 Degrees Vertical)	50H 67V
Maximum Candela At 90 Degrees Vertical	0 (0.0% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	92 (1.7% Luminaire Lumens)
Cutoff Classification (deprecated)	N.A. (absolute)

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091603909.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	300.5	N.A.	5.6
FM - Front-Medium (30-60)	1230.6	N.A.	22.9
FH - Front-High (60-80)	1147.6	N.A.	21.3
FVH - Front-Very High (80-90)	13.1	N.A.	0.2
BL - Back-Low (0-30)	300.5	N.A.	5.6
BM - Back-Medium (30-60)	1230.6	N.A.	22.9
BH - Back-High (60-80)	1147.6	N.A.	21.3
BVH - Back-Very High (80-90)	13.1	N.A.	0.2
UL - Uplight-Low (90-100)	0.0	N.A.	0.0
UH - Uplight-High (100-180)	0.0	N.A.	0.0
Total	5383.6	N.A.	100.0

BUG Rating   B3-U0-G1

ZONAL LUMEN SUMMARY

Zone	%
0-20	4.4
0-30	11.2
0-40	21.5
0-60	56.9
0-80	99.5
0-90	100
10-90	99
20-40	17.1
20-50	31
40-70	65.5
60-80	42.6
70-80	12.5
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 : L091603909.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	0	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**
0.0	532	532	532	532	532	532	532	532	532	532
2.5	535	535	535	535	535	535	535	535	534	533
5.0	546	547	546	546	547	546	547	547	546	546
7.5	563	564	564	564	565	565	565	566	565	565
10.0	585	586	586	586	588	589	590	591	591	590
12.5	608	609	610	611	614	616	618	620	621	620
15.0	631	633	634	636	641	644	648	652	654	654
17.5	659	661	662	665	671	675	681	688	691	692
20.0	689	691	692	696	703	708	716	726	731	732
22.5	722	723	726	730	738	744	753	763	769	772
25.0	750	752	756	763	774	784	795	804	811	814
27.5	776	778	783	792	806	819	835	852	866	872
30.0	798	801	807	818	834	848	867	893	916	927
32.5	815	817	824	837	854	871	891	916	941	953
35.0	826	829	836	850	870	887	908	931	950	959
37.5	838	841	849	862	882	900	921	940	957	966
40.0	855	857	865	878	897	913	932	952	966	974
42.5	879	881	888	900	917	931	948	965	980	987
45.0	916	917	923	933	948	960	972	988	1002	1009
47.5	964	966	971	981	996	1007	1017	1029	1041	1047
50.0	1021	1022	1027	1038	1057	1074	1087	1099	1110	1114
52.5	1086	1088	1094	1111	1134	1159	1181	1202	1219	1225
55.0	1176	1178	1187	1209	1241	1276	1309	1344	1374	1386
56.0	1216	1220	1230	1255	1290	1330	1370	1412	1447	1462
57.0	1252	1256	1271	1301	1341	1387	1434	1483	1524	1541
58.0	1275	1281	1300	1341	1393	1445	1499	1557	1605	1623
59.0	1294	1301	1323	1369	1432	1502	1567	1632	1685	1706
60.0	1302	1309	1336	1386	1459	1545	1631	1705	1766	1789
61.0	1306	1313	1342	1397	1476	1573	1684	1776	1843	1868
62.0	1312	1319	1348	1403	1482	1591	1710	1832	1915	1939
63.0	1327	1334	1360	1408	1483	1595	1724	1874	1977	2005
64.0	1350	1357	1379	1423	1492	1587	1723	1884	2014	2063
65.0	1373	1381	1402	1440	1503	1586	1713	1879	2025	2104
66.0	1366	1376	1398	1438	1501	1587	1704	1863	2014	2116
67.0	1335	1347	1369	1410	1474	1567	1685	1838	1994	2104
68.0	1283	1294	1317	1359	1424	1521	1644	1792	1955	2072
69.0	1212	1223	1243	1281	1344	1448	1578	1730	1891	2007
70.0	1140	1150	1169	1202	1256	1352	1490	1645	1809	1913
71.0	1026	1039	1062	1104	1162	1257	1389	1540	1709	1800
72.0	849	863	896	952	1022	1130	1273	1430	1594	1679
73.0	620	635	674	736	818	947	1099	1299	1479	1536
74.0	446	457	483	528	602	718	876	1089	1283	1342
75.0	274	291	330	370	423	503	639	833	990	1073
76.0	130	142	169	214	264	333	421	556	679	767
77.0	74	77	92	120	145	188	249	338	451	523
78.0	56	57	63	75	88	104	129	176	242	294
79.0	44	45	48	55	61	68	76	92	121	146
80.0	37	38	40	45	48	51	55	63	76	92
82.5	28	28	29	30	31	32	32	34	38	41
85.0	23	23	23	23	22	22	21	21	21	20
87.5	20	20	20	19	18	17	16	15	14	14
90.0	0	0	0	0	0	0	0	0	0	0

CANDELA TABULATION - (Cont.)

Vert. Angles	Horizontal Angles								
	50	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**
0.0	532	532	532	532	532	532	532	532	532
2.5	534	534	533	533	533	533	534	534	534
5.0	546	546	545	545	545	545	545	545	545
7.5	565	564	563	563	562	562	562	562	561
10.0	590	589	587	586	585	584	583	583	582
12.5	620	618	615	613	610	608	606	606	605
15.0	653	650	645	640	636	633	631	630	629
17.5	691	686	677	671	666	662	660	658	657
20.0	731	724	715	708	701	696	692	690	689
22.5	770	762	753	744	736	730	725	722	721
25.0	812	805	795	785	775	765	759	755	753
27.5	867	854	839	822	808	795	787	782	780
30.0	918	896	871	852	836	821	810	804	802
32.5	943	919	894	875	857	840	828	821	819
35.0	952	933	912	892	872	855	842	834	831
37.5	961	944	926	905	886	868	855	847	843
40.0	969	955	939	921	902	884	871	863	860
42.5	983	970	955	939	921	905	892	883	881
45.0	1006	994	979	966	950	934	924	918	915
47.5	1043	1032	1021	1010	996	982	971	965	963
50.0	1110	1100	1088	1074	1057	1041	1028	1021	1018
52.5	1216	1199	1179	1159	1134	1113	1097	1090	1087
55.0	1369	1338	1308	1274	1241	1213	1190	1179	1177
56.0	1442	1406	1368	1328	1289	1258	1232	1219	1216
57.0	1520	1479	1431	1383	1338	1303	1274	1259	1256
58.0	1601	1554	1496	1440	1388	1349	1318	1302	1299
59.0	1684	1629	1562	1496	1441	1396	1362	1344	1341
60.0	1765	1705	1628	1554	1493	1444	1407	1387	1383
61.0	1842	1778	1692	1612	1543	1488	1450	1428	1423
62.0	1913	1844	1750	1666	1587	1529	1489	1465	1460
63.0	1977	1904	1800	1710	1628	1569	1529	1507	1503
64.0	2033	1950	1844	1746	1666	1610	1573	1551	1548
65.0	2076	1984	1880	1779	1697	1640	1600	1576	1572
66.0	2110	2012	1899	1793	1701	1641	1596	1571	1567
67.0	2129	2025	1891	1771	1666	1598	1550	1532	1527
68.0	2099	1997	1845	1708	1594	1521	1476	1471	1465
69.0	2017	1926	1758	1606	1490	1420	1375	1377	1374
70.0	1903	1807	1640	1478	1372	1318	1281	1281	1276
71.0	1769	1625	1505	1362	1263	1200	1146	1137	1134
72.0	1588	1455	1363	1219	1089	995	931	911	910
73.0	1430	1283	1128	998	863	780	728	714	711
74.0	1226	1023	852	771	671	594	541	524	517
75.0	961	773	640	569	486	419	373	344	329
76.0	694	568	437	358	315	253	191	158	146
77.0	472	358	261	204	174	142	102	84	83
78.0	262	201	143	116	104	88	69	62	61
79.0	137	114	92	76	68	61	51	46	46
80.0	91	81	67	58	53	49	40	36	36
82.5	44	40	35	33	31	27	25	23	23
85.0	20	19	19	18	18	17	16	16	16
87.5	14	15	15	15	14	13	13	13	12
90.0	0	0	0	0	0	0	0	0	0

COEFFICIENTS OF UTILIZATION

Coeff.
Of
Utiliz.

SS
HS

Street Width / Mounting Height
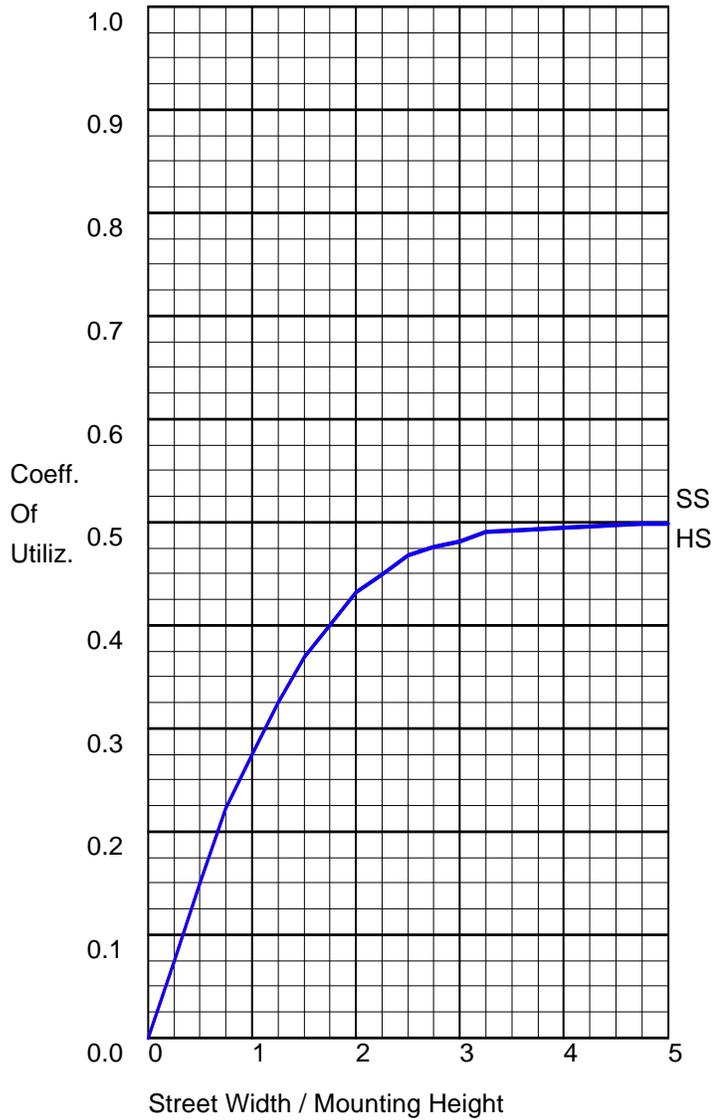
FLUX DISTRIBUTION

|	Lumens	Percent Of Luminaire
Downward Street Side	2691.8	50.0
Downward House Side	2691.8	50.0
Downward Total	5383.6	100.0
Upward Street Side	0.0	0.0
Upward House Side	0.0	0.0
Upward Total	0.0	0.0
Total Flux	5383.6	100.0

POLAR GRAPH
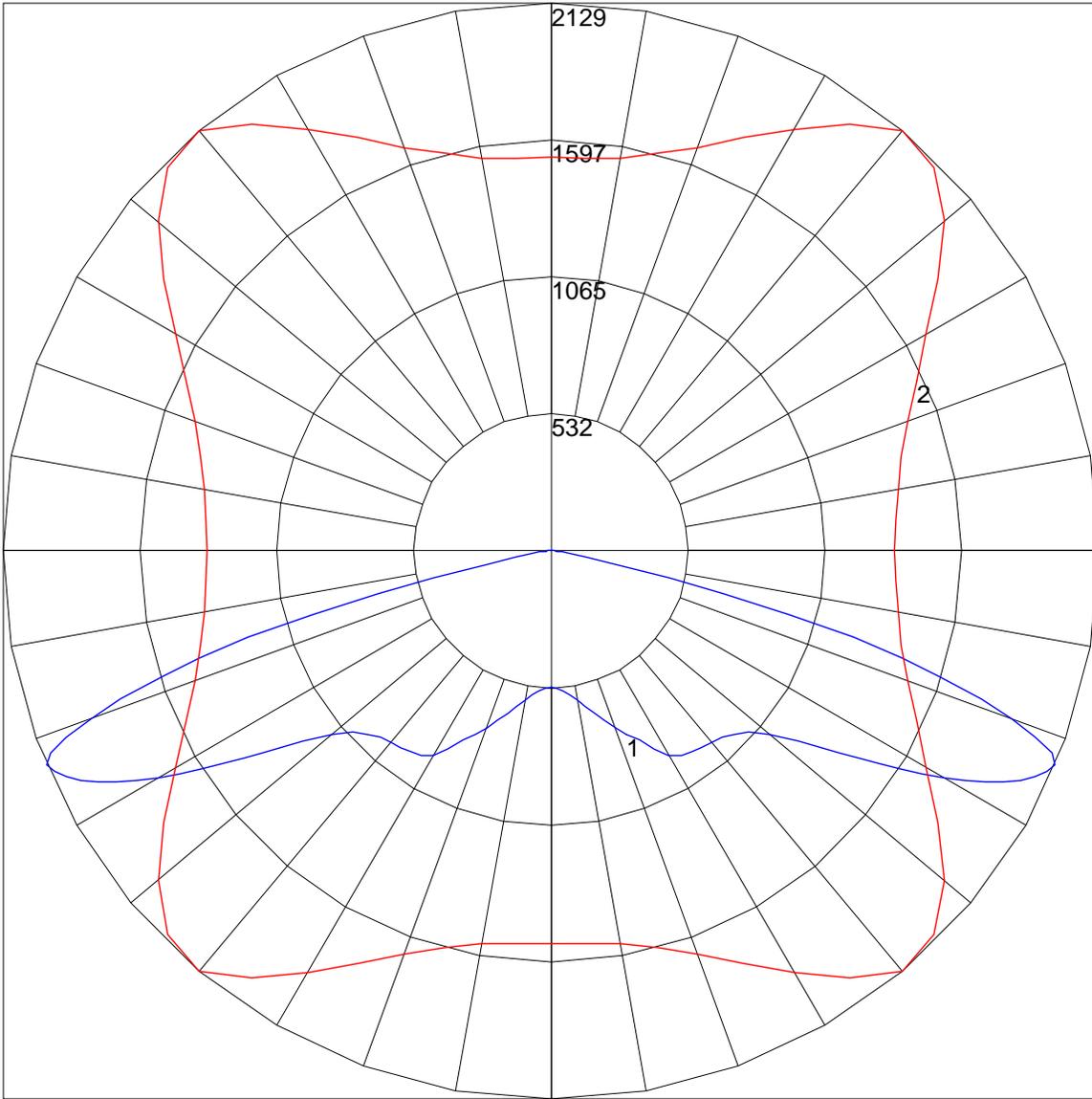
Maximum Candela = 2129   Located At Horizontal Angle = 50, Vertical Angle = 67
1 - Vertical Plane Through Horizontal Angles (50 - 230) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (67) (Through Max. Cd.)

ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE
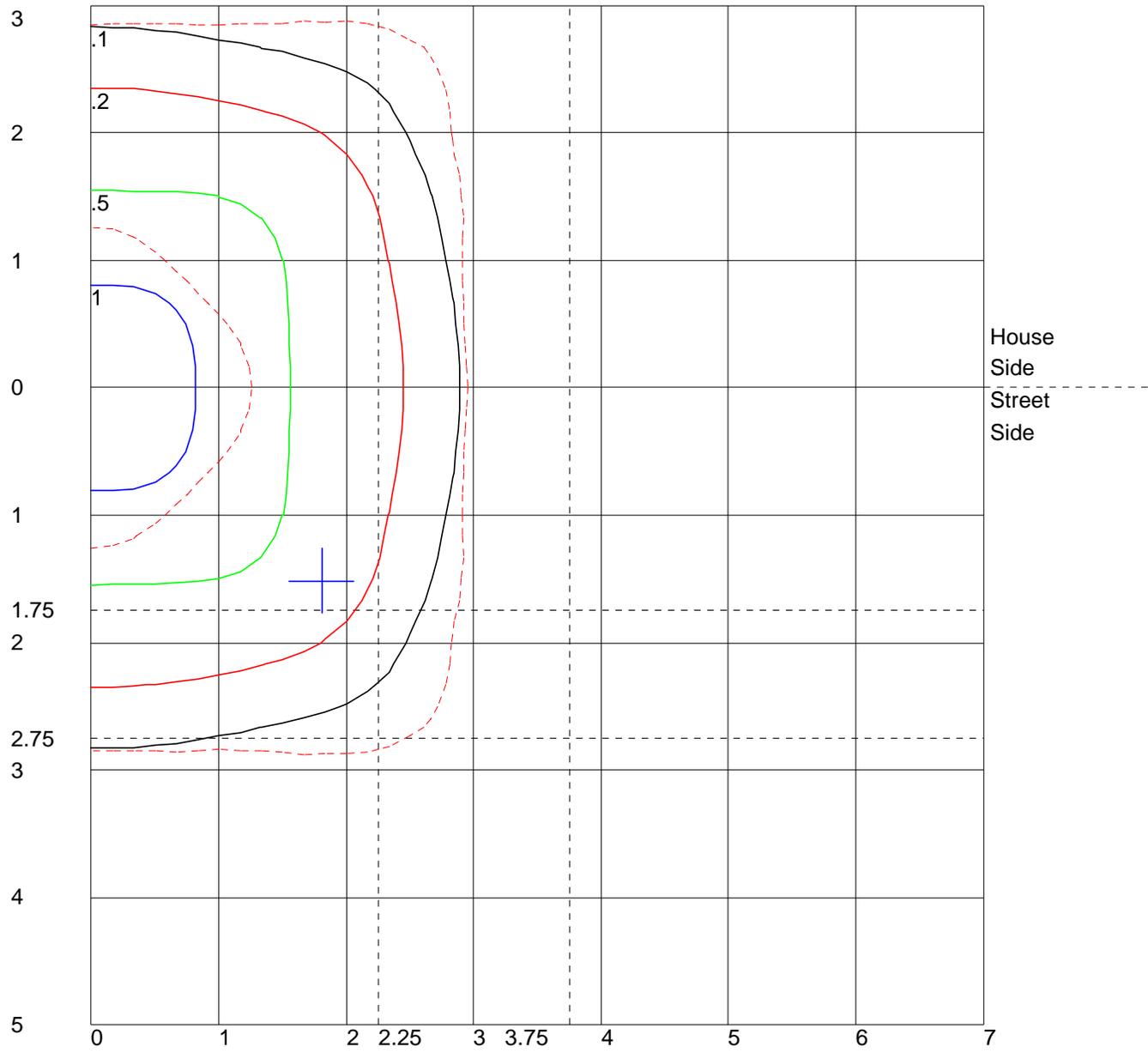
Distance In Units Of Mounting Height

Values Based On 20 Foot Mounting Height

1/2 Maximum Candela Trace Shown As Dashed Curve

(+) = Maximum Candela Point

IES ROAD REPORT
PHOTOMETRIC FILENAME : L091603909.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH
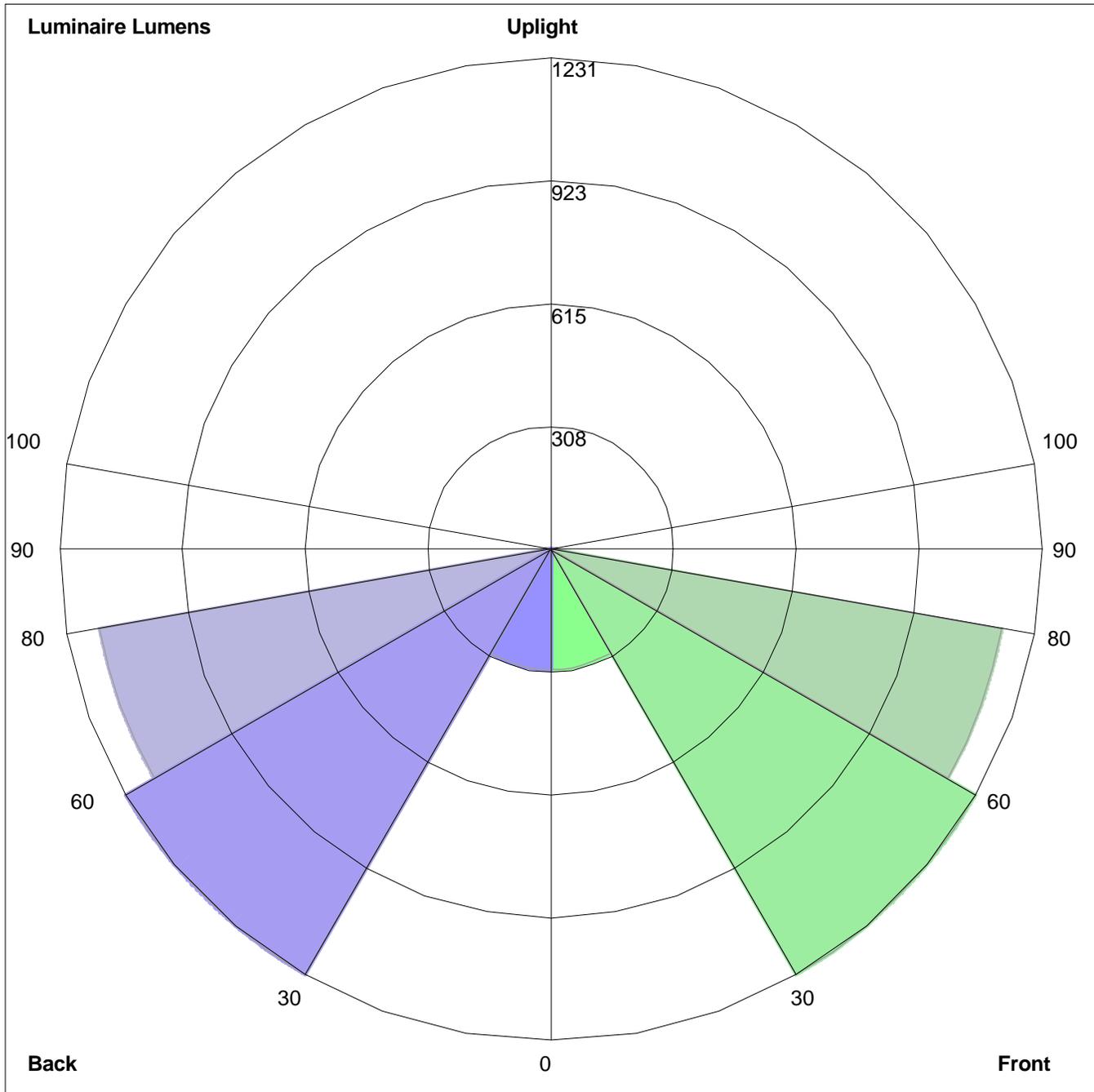
Luminaire Lumens:
Front: Low=300.5, Medium=1230.6, High=1147.6, Very High=13.1
Back: Low=300.5, Medium=1230.6, High=1147.6, Very High=13.1
Uplight: Low=0.0, High=0.0

BUG Rating : B3-U0-G1