

Scaled data based on original data using  
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions  
(formerly Eaton)

Brand: McGRAW-EDISON

Report Number: P322863

Luminaire Tested: **GLEON-SA9D-730-U-T4W-HSS**

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-08  
Report Number: P322863  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-19)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS (FORMERLY EATON)  
Product Line: McGRAW-EDISON  
Catalog Number: GLEON-SA9D-730-U-T4W-HSS  
Description: GALLEON AREA AND ROADWAY LUMINAIRE  
(9) 70 CRI, 3000K, 1200mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE IV WIDE OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 45786 lumens  
Efficiency: N/A  
Efficacy: 79.6 lumens/watt  
Luminous Opening: Rectangular (W 2.5' x L: 1' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B3 - U0 - G5

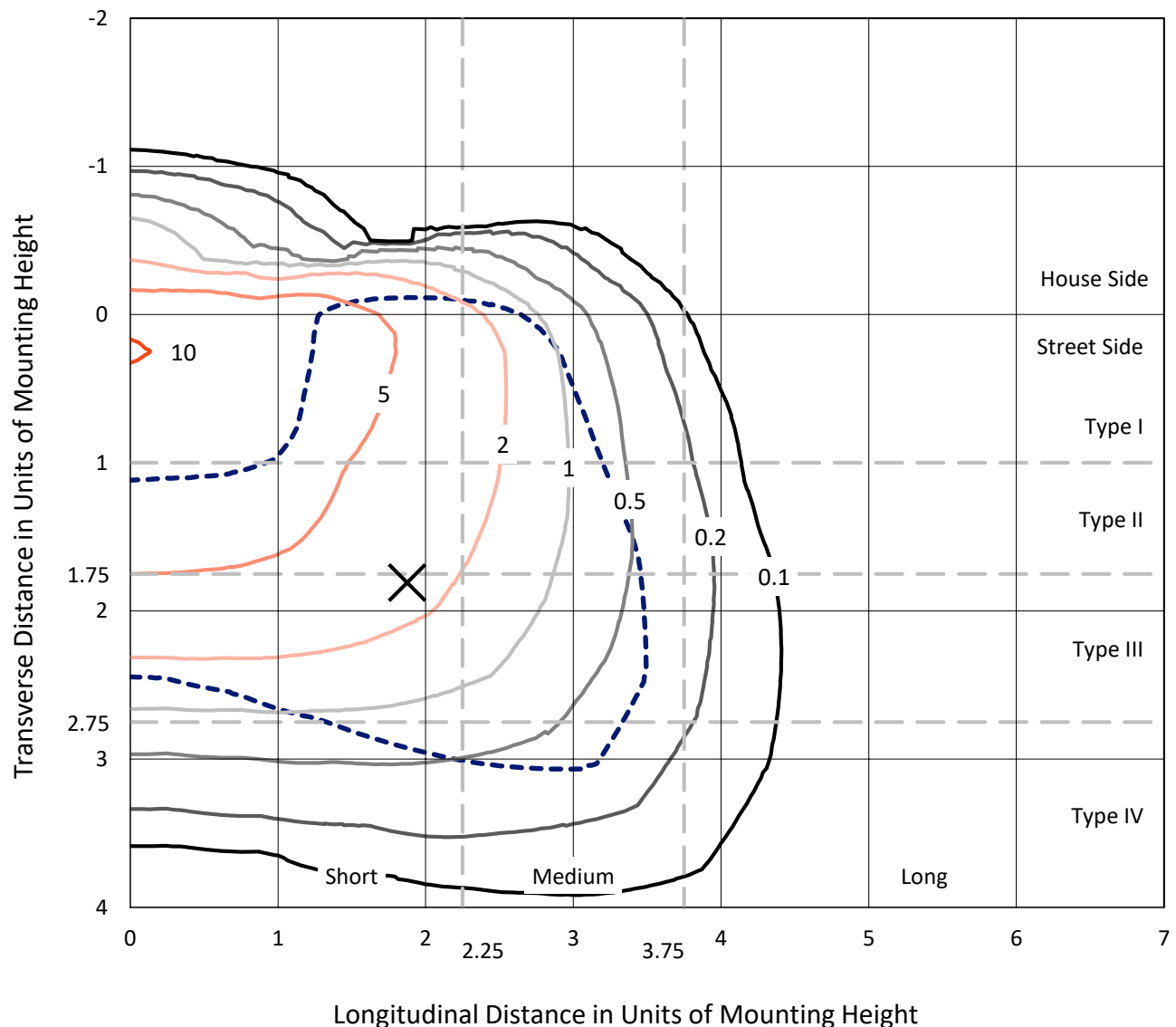
Input Watts (W): 575  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 24 FT



REPORT NUMBER: P322863  
 CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

## Iso-Footcandle Lines of Horizontal Illumination

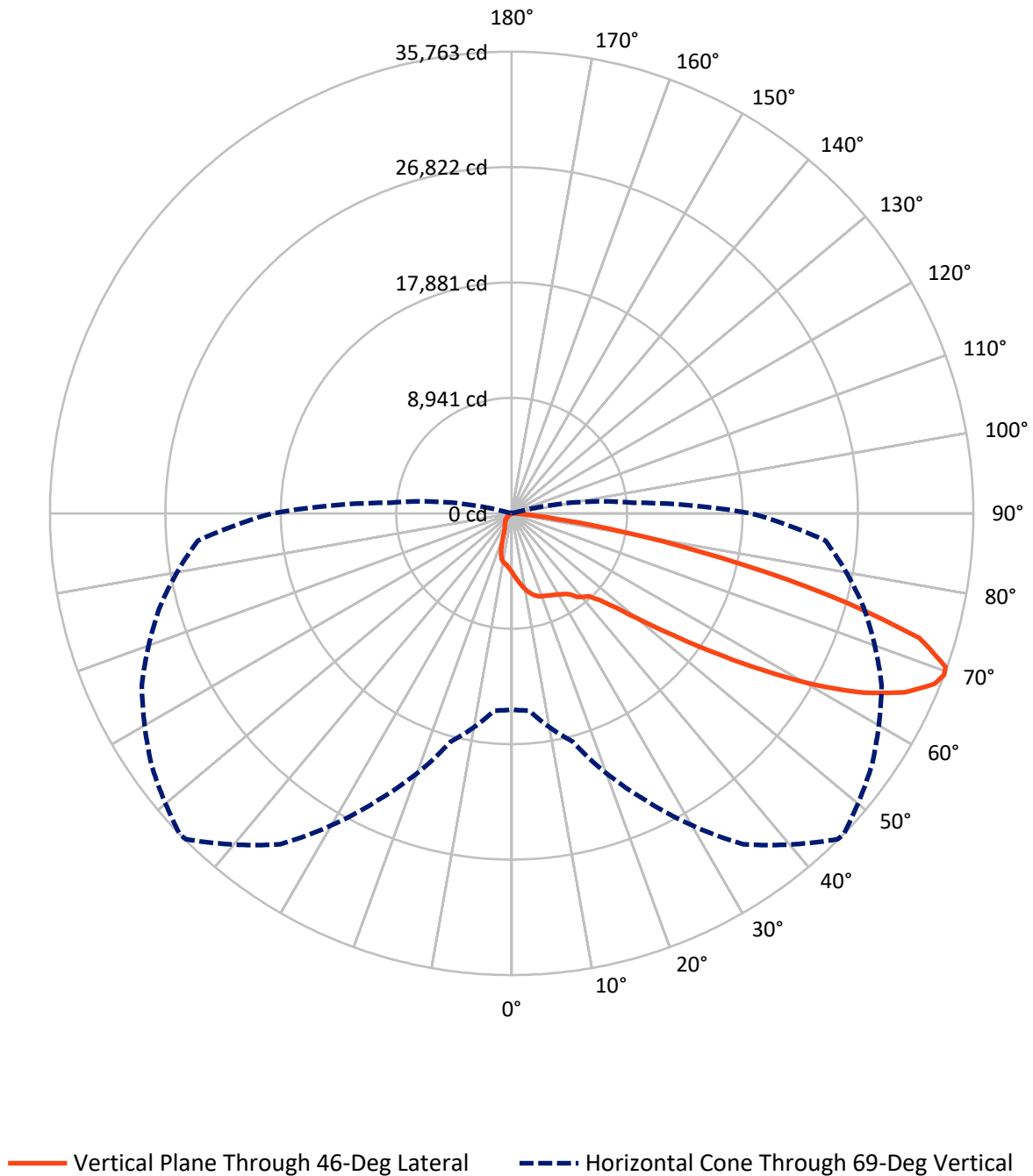
✕ Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 10.7 fc  
 Type IV - Short - N/A

REPORT NUMBER: P322863  
CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P322863  
 CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 4698.9   | 0.0    | 4698.9  |
|                    | % Fixture | 10.3     | 0.0    | 10.3    |
| <b>Street Side</b> | Lumens    | 41087.1  | 0.0    | 41087.1 |
|                    | % Fixture | 89.7     | 0.0    | 89.7    |
| <b>Total</b>       | Lumens    | 45786.0  | 0.0    | 45786.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 456.6   | 1.0       |
| 10°-20°   | 1385.3  | 3.0       |
| 20°-30°   | 2178.6  | 4.8       |
| 30°-40°   | 3124.1  | 6.8       |
| 40°-50°   | 5399.6  | 11.8      |
| 50°-60°   | 10667.5 | 23.3      |
| 60°-70°   | 14908.8 | 32.6      |
| 70°-80°   | 7202.5  | 15.7      |
| 80°-90°   | 462.9   | 1.0       |
| 90°-100°  | 0.0     | 0.0       |
| 100°-110° | 0.0     | 0.0       |
| 110°-120° | 0.0     | 0.0       |
| 120°-130° | 0.0     | 0.0       |
| 130°-140° | 0.0     | 0.0       |
| 140°-150° | 0.0     | 0.0       |
| 150°-160° | 0.0     | 0.0       |
| 160°-170° | 0.0     | 0.0       |
| 170°-180° | 0.0     | 0.0       |
| 0°-90°    | 45786.0 | 100.0     |
| 0°-180°   | 45786.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P322863

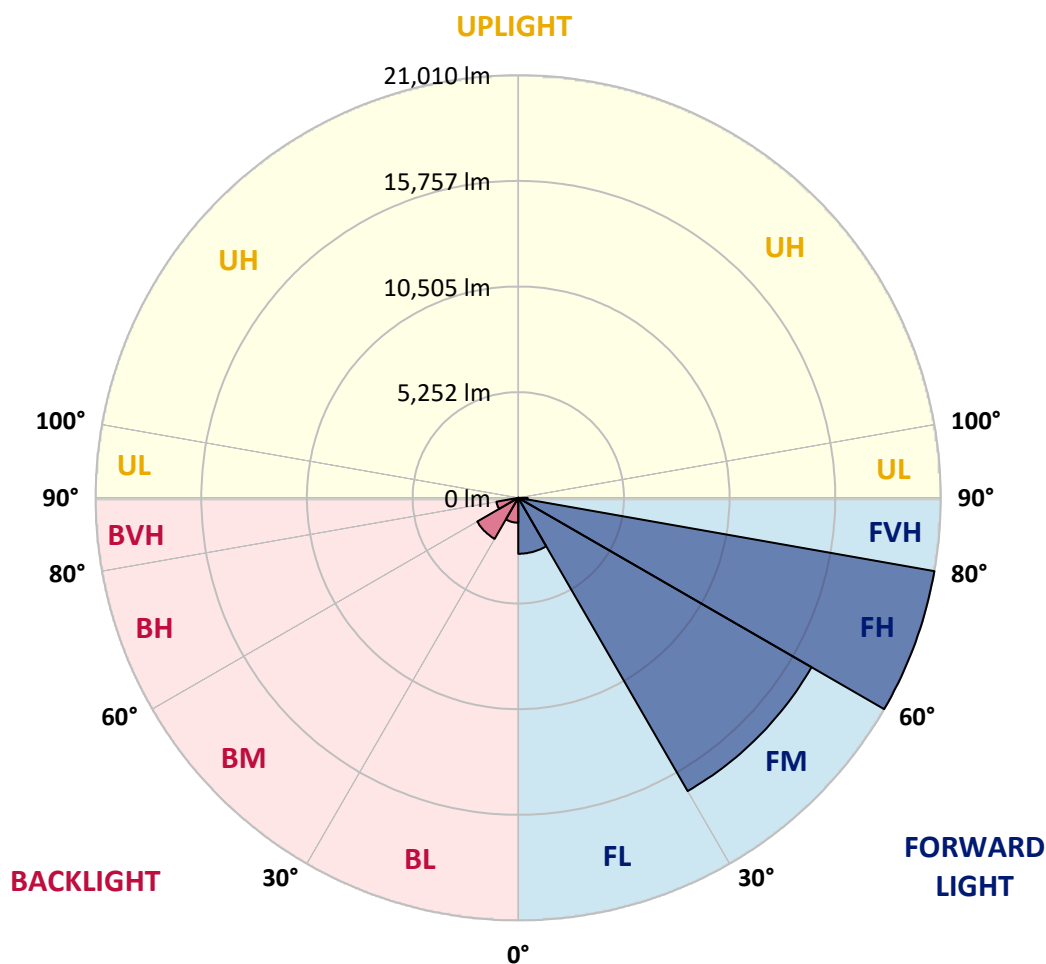
CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

**LUMINAIRE CLASSIFICATION SYSTEM LUMEN TABLE AND BUG RATING:**

| Zone |             | Lumens  | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|---------|-----------|-------------------------|------|---------|
|      |             |         |           | B                       | U    | G       |
| FL   | (0°-30°)    | 2782.0  | 6.1       |                         |      |         |
| FM   | (30°-60°)   | 16836.5 | 36.8      |                         |      |         |
| FH   | (60°-80°)   | 21009.5 | 45.9      |                         |      | G5      |
| FVH  | (80°-90°)   | 459.0   | 1.0       |                         |      | G3/500  |
| BL   | (0°-30°)    | 1238.5  | 2.7       | B3/2500                 |      |         |
| BM   | (30°-60°)   | 2354.7  | 5.1       | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1101.8  | 2.4       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 3.9     | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0     | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0     | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G5**

Type IV Short





REPORT NUMBER: P322863

CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°      | 5°      | 15°     | 25°     | 35°     | 45°     | 46°     | 55°     | 65°     | 75°     | 85°     |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 0°    | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  | 4587.6  |
| 2.5°  | 5096.4  | 5089.9  | 5059.9  | 5047.0  | 4974.0  | 4931.1  | 4913.9  | 4860.2  | 4782.9  | 4705.7  | 4619.8  |
| 5°    | 5676.0  | 5673.8  | 5618.0  | 5564.4  | 5427.0  | 5298.2  | 5274.5  | 5150.0  | 4976.1  | 4813.0  | 4649.8  |
| 7.5°  | 6268.5  | 6240.6  | 6184.8  | 6081.7  | 5882.1  | 5676.0  | 5656.7  | 5480.6  | 5233.8  | 4997.6  | 4763.6  |
| 10°   | 6770.8  | 6753.6  | 6680.7  | 6523.9  | 6290.0  | 6056.0  | 6032.3  | 5815.5  | 5536.4  | 5246.6  | 4948.2  |
| 12.5° | 7161.5  | 7148.6  | 7052.0  | 6856.7  | 6607.7  | 6365.1  | 6332.9  | 6139.7  | 5841.3  | 5517.1  | 5165.1  |
| 15°   | 7399.8  | 7393.4  | 7275.3  | 7067.1  | 6822.3  | 6612.0  | 6584.1  | 6414.5  | 6137.5  | 5798.3  | 5401.2  |
| 17.5° | 7455.6  | 7457.8  | 7335.4  | 7125.0  | 6923.2  | 6773.0  | 6751.5  | 6622.7  | 6390.8  | 6053.8  | 5637.3  |
| 20°   | 7331.1  | 7356.9  | 7247.4  | 7064.9  | 6940.4  | 6861.0  | 6843.8  | 6766.5  | 6571.2  | 6253.5  | 5826.3  |
| 22.5° | 7155.1  | 7168.0  | 7092.8  | 6970.5  | 6918.9  | 6934.0  | 6925.4  | 6882.5  | 6717.2  | 6425.2  | 6013.0  |
| 25°   | 7047.8  | 7047.8  | 7002.7  | 6899.6  | 6934.0  | 7026.3  | 7028.4  | 7019.8  | 6888.9  | 6635.6  | 6240.6  |
| 27.5° | 7043.5  | 7030.6  | 6979.1  | 6901.8  | 6996.2  | 7137.9  | 7146.5  | 7204.5  | 7122.9  | 6891.0  | 6523.9  |
| 30°   | 7215.2  | 7200.2  | 7090.7  | 6989.8  | 7110.0  | 7262.4  | 7283.9  | 7410.6  | 7369.8  | 7168.0  | 6839.5  |
| 32.5° | 7616.6  | 7563.0  | 7320.4  | 7155.1  | 7245.3  | 7427.7  | 7455.6  | 7657.4  | 7721.8  | 7509.3  | 7144.4  |
| 35°   | 8166.2  | 7996.6  | 7646.7  | 7468.5  | 7477.1  | 7668.2  | 7693.9  | 7990.2  | 8181.2  | 7822.7  | 7380.5  |
| 37.5° | 8924.0  | 8840.3  | 8271.4  | 7794.8  | 7833.5  | 8123.3  | 8198.4  | 8520.4  | 8466.7  | 7994.5  | 7648.8  |
| 40°   | 10585.6 | 10454.6 | 9849.2  | 8709.3  | 8174.8  | 8492.5  | 8516.1  | 8687.9  | 8692.2  | 8383.0  | 8207.0  |
| 42.5° | 12848.2 | 12794.6 | 12157.0 | 10368.8 | 8846.7  | 8739.4  | 8782.3  | 9072.1  | 9396.3  | 9203.1  | 9194.5  |
| 45°   | 15353.5 | 15325.6 | 14649.4 | 12571.3 | 10205.6 | 9548.7  | 9602.4  | 9990.9  | 10611.3 | 10654.3 | 10926.9 |
| 47.5° | 17369.3 | 17356.4 | 16967.8 | 15029.3 | 12285.8 | 10920.5 | 10937.6 | 11349.8 | 12440.4 | 12979.2 | 13415.0 |
| 50°   | 19206.9 | 19269.1 | 18962.2 | 17689.1 | 15119.5 | 13069.4 | 13028.6 | 13303.4 | 15055.1 | 15937.4 | 16478.4 |
| 52.5° | 21761.5 | 21849.5 | 20988.7 | 20170.8 | 18092.7 | 15735.6 | 15703.4 | 15991.1 | 18197.9 | 18859.1 | 18955.7 |
| 55°   | 24017.7 | 23867.5 | 23187.0 | 22950.8 | 21718.6 | 19028.7 | 19020.1 | 19273.4 | 21237.7 | 21518.9 | 21697.1 |
| 57.5° | 25013.8 | 24955.9 | 25284.3 | 25825.3 | 25516.2 | 22920.8 | 22901.4 | 22708.2 | 23957.6 | 23987.7 | 24535.1 |
| 60°   | 25642.8 | 25713.7 | 26720.5 | 28388.5 | 29159.2 | 27109.0 | 26984.5 | 25806.0 | 26555.2 | 26488.6 | 27074.7 |
| 62.5° | 25170.5 | 25310.1 | 27121.9 | 29902.0 | 31885.5 | 30764.9 | 30588.9 | 28644.0 | 28774.9 | 28545.2 | 29090.5 |
| 65°   | 22663.1 | 22880.0 | 25848.9 | 29616.4 | 33238.0 | 33622.3 | 33444.1 | 31149.2 | 30537.4 | 30159.6 | 29856.9 |
| 67.5° | 18401.9 | 18530.7 | 21630.6 | 27132.7 | 32628.3 | 35326.8 | 35290.3 | 33345.3 | 31868.4 | 29886.9 | 27538.4 |
| 69°   | 15207.5 | 15334.2 | 18318.1 | 24517.9 | 31286.6 | 35691.7 | 35762.6 | 34049.5 | 31615.1 | 28229.6 | 24399.9 |
| 70°   | 12880.4 | 13015.7 | 15795.7 | 22276.7 | 29730.2 | 35522.1 | 35648.8 | 33982.9 | 30889.5 | 26310.5 | 21645.6 |
| 72.5° | 6755.8  | 6871.7  | 9724.7  | 15347.1 | 24236.7 | 32617.6 | 33001.9 | 31110.6 | 26183.8 | 19108.1 | 12798.9 |
| 75°   | 2123.1  | 2189.7  | 3797.6  | 8022.4  | 16594.3 | 25361.6 | 25449.6 | 24404.2 | 18592.9 | 10510.4 | 5330.4  |
| 77.5° | 809.3   | 790.0   | 1264.4  | 2956.1  | 8389.5  | 15969.6 | 16508.4 | 15250.4 | 9756.9  | 3716.0  | 1230.1  |
| 80°   | 435.8   | 437.9   | 656.9   | 1223.6  | 3589.4  | 8207.0  | 8662.1  | 7391.2  | 3467.0  | 1159.2  | 283.4   |
| 82.5° | 188.9   | 197.5   | 369.2   | 648.3   | 1648.7  | 3026.9  | 3254.5  | 2709.2  | 1324.5  | 779.3   | 105.2   |
| 85°   | 40.8    | 45.1    | 178.2   | 352.1   | 671.9   | 850.1   | 890.9   | 878.0   | 843.7   | 605.4   | 40.8    |
| 87.5° | 0.0     | 0.0     | 79.4    | 126.7   | 169.6   | 193.2   | 169.6   | 221.1   | 465.8   | 407.9   | 21.5    |
| 90°   | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     | 0.0     |



REPORT NUMBER: P322863

CATALOG NUMBER: GLEON-SA9D-730-U-T4W-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°     | 95°     | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|---------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 4587.6  | 4587.6  | 4587.6 | 4587.6 | 4587.6 | 4587.6 | 4587.6 | 4587.6 | 4587.6 | 4587.6 | 4587.6 |
| 2.5°  | 4591.9  | 4553.2  | 4486.7 | 4413.7 | 4362.2 | 4308.5 | 4265.6 | 4246.3 | 4224.8 | 4209.8 | 4229.1 |
| 5°    | 4583.3  | 4508.2  | 4379.4 | 4254.8 | 4164.7 | 4091.7 | 4031.6 | 4008.0 | 3984.4 | 3967.2 | 3965.0 |
| 7.5°  | 4658.4  | 4553.2  | 4355.7 | 4173.3 | 4033.7 | 3935.0 | 3853.4 | 3819.1 | 3791.1 | 3778.3 | 3767.5 |
| 10°   | 4802.3  | 4667.0  | 4403.0 | 4164.7 | 3984.4 | 3816.9 | 3640.9 | 3505.6 | 3417.6 | 3376.8 | 3361.8 |
| 12.5° | 4989.0  | 4819.4  | 4493.1 | 4209.8 | 3947.9 | 3625.8 | 3252.3 | 2930.3 | 2722.1 | 2653.4 | 2612.6 |
| 15°   | 5208.0  | 4997.6  | 4611.2 | 4267.7 | 3814.8 | 3226.6 | 2593.3 | 2172.5 | 1979.3 | 1940.7 | 1897.7 |
| 17.5° | 5418.4  | 5186.5  | 4752.9 | 4278.5 | 3522.8 | 2578.2 | 1899.9 | 1614.3 | 1539.2 | 1565.0 | 1571.4 |
| 20°   | 5603.0  | 5373.3  | 4892.4 | 4184.0 | 2992.6 | 1934.2 | 1470.5 | 1399.7 | 1427.6 | 1477.0 | 1485.5 |
| 22.5° | 5789.8  | 5553.6  | 5021.2 | 3935.0 | 2314.2 | 1468.4 | 1324.5 | 1341.7 | 1369.6 | 1419.0 | 1427.6 |
| 25°   | 6017.3  | 5772.6  | 5141.4 | 3477.7 | 1736.7 | 1249.4 | 1258.0 | 1283.8 | 1311.7 | 1356.7 | 1361.0 |
| 27.5° | 6279.2  | 6049.5  | 5220.9 | 2883.1 | 1288.0 | 1148.5 | 1176.4 | 1215.1 | 1243.0 | 1285.9 | 1294.5 |
| 30°   | 6627.0  | 6414.5  | 5246.6 | 2267.0 | 1079.8 | 1058.3 | 1071.2 | 1118.5 | 1159.2 | 1197.9 | 1204.3 |
| 32.5° | 6953.3  | 6775.1  | 5160.8 | 1711.0 | 1000.4 | 974.6  | 974.6  | 1002.5 | 1049.8 | 1086.3 | 1094.8 |
| 35°   | 7253.8  | 7137.9  | 4886.0 | 1251.6 | 940.3  | 897.3  | 875.9  | 875.9  | 905.9  | 936.0  | 944.6  |
| 37.5° | 7651.0  | 7646.7  | 4441.6 | 998.2  | 882.3  | 832.9  | 787.9  | 753.5  | 742.8  | 749.2  | 753.5  |
| 40°   | 8331.5  | 8337.9  | 3862.0 | 895.2  | 832.9  | 766.4  | 697.7  | 635.4  | 577.5  | 558.2  | 556.0  |
| 42.5° | 9394.1  | 9297.5  | 3254.5 | 845.8  | 790.0  | 697.7  | 594.6  | 510.9  | 420.8  | 392.9  | 390.7  |
| 45°   | 11081.5 | 10508.3 | 2610.4 | 800.7  | 744.9  | 620.4  | 491.6  | 377.8  | 304.8  | 283.4  | 283.4  |
| 47.5° | 13539.5 | 12099.0 | 2022.2 | 751.4  | 684.8  | 532.4  | 371.4  | 272.6  | 223.3  | 212.5  | 214.7  |
| 50°   | 16081.2 | 13657.6 | 1549.9 | 689.1  | 611.8  | 440.1  | 274.8  | 197.5  | 169.6  | 169.6  | 171.7  |
| 52.5° | 18335.3 | 14799.6 | 1208.6 | 622.6  | 521.7  | 345.6  | 208.2  | 154.6  | 141.7  | 139.5  | 141.7  |
| 55°   | 20445.6 | 15536.0 | 925.2  | 545.3  | 414.3  | 257.6  | 158.9  | 126.7  | 118.1  | 113.8  | 111.6  |
| 57.5° | 22480.7 | 15900.9 | 693.4  | 440.1  | 300.5  | 186.8  | 126.7  | 107.3  | 98.8   | 92.3   | 90.2   |
| 60°   | 23835.3 | 15604.7 | 476.6  | 324.2  | 208.2  | 135.2  | 105.2  | 92.3   | 81.6   | 75.1   | 73.0   |
| 62.5° | 24599.5 | 14795.3 | 307.0  | 234.0  | 148.1  | 100.9  | 83.7   | 77.3   | 62.3   | 55.8   | 55.8   |
| 65°   | 24290.4 | 13460.1 | 214.7  | 167.4  | 107.3  | 75.1   | 62.3   | 62.3   | 45.1   | 36.5   | 34.3   |
| 67.5° | 21525.4 | 11371.3 | 163.2  | 124.5  | 77.3   | 55.8   | 47.2   | 53.7   | 27.9   | 17.2   | 17.2   |
| 69°   | 18519.9 | 9424.2  | 139.5  | 103.0  | 64.4   | 45.1   | 40.8   | 49.4   | 19.3   | 12.9   | 10.7   |
| 70°   | 16096.3 | 8129.7  | 126.7  | 90.2   | 53.7   | 38.6   | 36.5   | 47.2   | 19.3   | 10.7   | 8.6    |
| 72.5° | 9630.3  | 4533.9  | 96.6   | 64.4   | 34.3   | 30.1   | 30.1   | 53.7   | 19.3   | 10.7   | 8.6    |
| 75°   | 3892.0  | 1597.2  | 70.8   | 45.1   | 25.8   | 25.8   | 36.5   | 68.7   | 17.2   | 8.6    | 6.4    |
| 77.5° | 882.3   | 349.9   | 40.8   | 27.9   | 17.2   | 25.8   | 42.9   | 53.7   | 10.7   | 4.3    | 0.0    |
| 80°   | 214.7   | 85.9    | 25.8   | 17.2   | 10.7   | 19.3   | 32.2   | 30.1   | 2.1    | 0.0    | 0.0    |
| 82.5° | 70.8    | 30.1    | 10.7   | 8.6    | 2.1    | 6.4    | 15.0   | 8.6    | 0.0    | 0.0    | 0.0    |
| 85°   | 30.1    | 17.2    | 4.3    | 2.1    | 0.0    | 0.0    | 2.1    | 0.0    | 0.0    | 0.0    | 0.0    |
| 87.5° | 19.3    | 6.4     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |
| 90°   | 0.0     | 0.0     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    | 0.0    |

LM-79-2008: Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Report Prepared for

Cooper Lighting Solutions

McGRAW-EDISON

Report Number: SP1-1908-441-2-R4

Test Date: 10/03/2019

Luminaire Tested: SA1C-730-U-5WQ

Data in this report applies to families of products SA1C-730-U-5WQ .

### Test Information

Test Method: LM-79-2008  
Report Number: SP1-1908-441-2-R4  
Test Lab: COOPER LIGHTING SOLUTIONS  
Photometer: SP1 - 76IN SPHERE  
Measurement Geometry:  $4\pi$   
Issue Date: 10/28/2024  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: MCGRAW-EDISON  
Catalog Number: **SA1C-730-U-5WQ**  
Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-2-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. (1) 70 CRI, 3000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 2993   | CRI (Ra): | 71.8 |      |       |
| CIE u':                   | 0.2508 | R1:       | 67.5 | R9:  | -38.3 |
| CIE v':                   | 0.5215 | R2:       | 82.9 | R10: | 62.5  |
| Duv:                      | 0.0000 | R3:       | 94.7 | R11: | 63.7  |
| CIE x:                    | 0.4374 | R4:       | 67.7 | R12: | 57.8  |
| CIE y:                    | 0.4043 | R5:       | 67.9 | R13: | 70.4  |
| CIE z:                    | 0.1583 | R6:       | 77.6 | R14: | 97.3  |
| Peak Wavelength (nm):     | 593    | R7:       | 76.0 |      |       |
| Dominant Wavelength (nm): | 582    | R8:       | 40.5 |      |       |
| Purity:                   | 53     |           |      |      |       |
| Rf:                       | 75.7   |           |      |      |       |
| Rg:                       | 93.9   |           |      |      |       |



### Test Conditions

Stabilization Time: 53M  
Operation Time: 12H  
Room Temperature (°C) / RH%: 25.0./44%  
Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-2-R4

| Measurement and Test Equipment |                       |                  |                      |
|--------------------------------|-----------------------|------------------|----------------------|
| Instrument                     | Identification Number | Calibration Date | Calibration Due Date |
| Photometer                     | IN0058                | 6/28/2019        | 12/28/2019           |
| Power Meter                    | IN0071                | 12/5/2018        | 12/5/2019            |
| AC Power Source                | IN0063                | 12/5/2018        | 12/5/2019            |
| DC Power Source                | IN0208                | 12/5/2018        | 12/5/2019            |
| Sphere Thermometer             | IN0085                | 12/5/2018        | 12/5/2019            |
| Room Thermometer               | IN0046                | 12/5/2018        | 12/5/2019            |

REPORT NUMBER: SP1-1908-441-2-R4

**CIE 1931 Chromaticity Diagram**



**CIE 1931 Chromaticity Diagram with 2017 ANSI 7-Step and 4-Step Quadrangles**



Point lies inside the ANSI 3000K 4-step quadrangle

REPORT NUMBER: SP1-1908-441-2-R4

**Photopic Flux vs. Wavelength**



#####

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-2-R4

Scotopic Flux vs. Wavelength



Scotopic Lumens: 8494.8

S/P: 1.23

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-2-R4

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 3101.5 M/P: 0.45**

| λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) | λ<br>(nm) | Power<br>(μW/nm) | Lumens<br>(φ/nm) |
|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|-----------|------------------|------------------|
| 360       | 2397             | NR               | 490       | 24908            | NR               | 620       | 118784           | NR               | 750       | 5037             | NR               | 880       | 2677             | NR               |
| 365       | 2084             | NR               | 495       | 30998            | NR               | 625       | 108951           | NR               | 755       | 4413             | NR               | 885       | 2940             | NR               |
| 370       | 2143             | NR               | 500       | 37103            | NR               | 630       | 99573            | NR               | 760       | 4189             | NR               | 890       | 3116             | NR               |
| 375       | 2413             | NR               | 505       | 42987            | NR               | 635       | 90444            | NR               | 765       | 3677             | NR               | 895       | 3345             | NR               |
| 380       | 2172             | NR               | 510       | 48702            | NR               | 640       | 80749            | NR               | 770       | 3366             | NR               | 900       | 2312             | NR               |
| 385       | 1997             | NR               | 515       | 53741            | NR               | 645       | 71664            | NR               | 775       | 3211             | NR               | 905       | 2829             | NR               |
| 390       | 1830             | NR               | 520       | 57283            | NR               | 650       | 63936            | NR               | 780       | 2682             | NR               | 910       | 2783             | NR               |
| 395       | 1861             | NR               | 525       | 61876            | NR               | 655       | 56611            | NR               | 785       | 2804             | NR               | 915       | 2662             | NR               |
| 400       | 1717             | NR               | 530       | 65398            | NR               | 660       | 49763            | NR               | 790       | 2581             | NR               | 920       | 3047             | NR               |
| 405       | 1761             | NR               | 535       | 69597            | NR               | 665       | 42891            | NR               | 795       | 2711             | NR               | 925       | 2256             | NR               |
| 410       | 2680             | NR               | 540       | 74214            | NR               | 670       | 36939            | NR               | 800       | 2609             | NR               | 930       | 2976             | NR               |
| 415       | 4374             | NR               | 545       | 79911            | NR               | 675       | 31946            | NR               | 805       | 2581             | NR               | 935       | 3503             | NR               |
| 420       | 8071             | NR               | 550       | 86153            | NR               | 680       | 27385            | NR               | 810       | 2404             | NR               | 940       | 4226             | NR               |
| 425       | 15169            | NR               | 555       | 93952            | NR               | 685       | 23504            | NR               | 815       | 2556             | NR               | 945       | 2930             | NR               |
| 430       | 26038            | NR               | 560       | 102904           | NR               | 690       | 20210            | NR               | 820       | 2742             | NR               | 950       | 2115             | NR               |
| 435       | 41316            | NR               | 565       | 112009           | NR               | 695       | 17459            | NR               | 825       | 2014             | NR               | 955       | 2634             | NR               |
| 440       | 59674            | NR               | 570       | 121662           | NR               | 700       | 15207            | NR               | 830       | 2488             | NR               | 960       | 4200             | NR               |
| 445       | 72751            | NR               | 575       | 130476           | NR               | 705       | 13322            | NR               | 835       | 2625             | NR               | 965       | 1982             | NR               |
| 450       | 65091            | NR               | 580       | 137926           | NR               | 710       | 11676            | NR               | 840       | 2754             | NR               | 970       | 3613             | NR               |
| 455       | 44894            | NR               | 585       | 143406           | NR               | 715       | 10626            | NR               | 845       | 2708             | NR               | 975       | 4034             | NR               |
| 460       | 32712            | NR               | 590       | 147039           | NR               | 720       | 9416             | NR               | 850       | 2608             | NR               | 980       | 3922             | NR               |
| 465       | 25296            | NR               | 595       | 147365           | NR               | 725       | 8333             | NR               | 855       | 2605             | NR               | 985       | 1909             | NR               |
| 470       | 19318            | NR               | 600       | 145800           | NR               | 730       | 7134             | NR               | 860       | 1765             | NR               | 990       | 3617             | NR               |
| 475       | 17265            | NR               | 605       | 141363           | NR               | 735       | 6437             | NR               | 865       | 2581             | NR               | 995       | 4767             | NR               |
| 480       | 18260            | NR               | 610       | 134199           | NR               | 740       | 5834             | NR               | 870       | 3016             | NR               | 1000      | 2528             | NR               |
| 485       | 20845            | NR               | 615       | 127683           | NR               | 745       | 5500             | NR               | 875       | 3952             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-2-R4

**TM-30-18**

**Summary**

$R_f = 75.7$   
 $R_g = 93.9$   
 CIE  $R_a = 71.8$   
 $R_g = -38.3$



**Color Vector Graphics**



REPORT NUMBER: SP1-1908-441-2-R4

**TM-30-18**

**Individual Sample Fidelity Index ( $R_{f,i}$ )**

|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 86 | CES26 = 67 | CES51 = 87 | CES76 = 63 |
| CES02 = 63 | CES27 = 88 | CES52 = 86 | CES77 = 80 |
| CES03 = 31 | CES28 = 87 | CES53 = 78 | CES78 = 67 |
| CES04 = 71 | CES29 = 66 | CES54 = 84 | CES79 = 87 |
| CES05 = 49 | CES30 = 73 | CES55 = 84 | CES80 = 86 |
| CES06 = 51 | CES31 = 70 | CES56 = 75 | CES81 = 71 |
| CES07 = 41 | CES32 = 65 | CES57 = 74 | CES82 = 94 |
| CES08 = 40 | CES33 = 73 | CES58 = 76 | CES83 = 90 |
| CES09 = 29 | CES34 = 79 | CES59 = 85 | CES84 = 89 |
| CES10 = 76 | CES35 = 89 | CES60 = 93 | CES85 = 77 |
| CES11 = 59 | CES36 = 97 | CES61 = 84 | CES86 = 61 |
| CES12 = 65 | CES37 = 87 | CES62 = 91 | CES87 = 78 |
| CES13 = 43 | CES38 = 81 | CES63 = 77 | CES88 = 77 |
| CES14 = 74 | CES39 = 95 | CES64 = 72 | CES89 = 67 |
| CES15 = 71 | CES40 = 92 | CES65 = 68 | CES90 = 76 |
| CES16 = 47 | CES41 = 88 | CES66 = 69 | CES91 = 89 |
| CES17 = 50 | CES42 = 89 | CES67 = 67 | CES92 = 58 |
| CES18 = 56 | CES43 = 79 | CES68 = 72 | CES93 = 74 |
| CES19 = 73 | CES44 = 99 | CES69 = 81 | CES94 = 49 |
| CES20 = 66 | CES45 = 85 | CES70 = 66 | CES95 = 68 |
| CES21 = 87 | CES46 = 80 | CES71 = 67 | CES96 = 76 |
| CES22 = 79 | CES47 = 82 | CES72 = 88 | CES97 = 82 |
| CES23 = 92 | CES48 = 69 | CES73 = 59 | CES98 = 75 |
| CES24 = 91 | CES49 = 80 | CES74 = 95 | CES99 = 62 |
| CES25 = 73 | CES50 = 87 | CES75 = 69 |            |



REPORT NUMBER: SP1-1908-441-2-R4

**TM-30-18**

**Color Rendition by Hue-Angle Bin**



REPORT NUMBER: SP1-1908-441-2-R4

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)