

Signify Classified - Internal  
Cooper Lighting Solutions Photometric Lab  
1121 Highway 74 South  
Peachtree City, GA 30269



Scaled data based on original data using  
LM-79-2019 Approved Method: Electrical and Photometric Measurements of Solid-  
State Lighting Products

Test Report Prepared for  
Cooper Lighting Solutions

Brand: STREETWORKS

Report Number: P363191

Luminaire Tested: NVN-SA1D-750-U-T4FT-HSS

Issue Date: 3/3/2020

**Test Information**

Test Method: LM-79-2019  
Report Number: P363191  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-17)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA1D-750-U-T4FT-HSS  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(1) 70 CRI, 5000K, 1200mA LIGHTSQUARE WITH 16 LEDS AND TYPE IV FORWARD  
THROW OPTICS WITH HOUSE SIDE SHIELD  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

**Summary**

Lumens per Lamp: N/A  
Luminaire Lumens: 5666 lumens  
Efficiency: N/A  
Efficacy: 84.6 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 0.5' x H: 0')  
IES Classification: Type IV - Short  
BUG Rating: B1 - U0 - G2

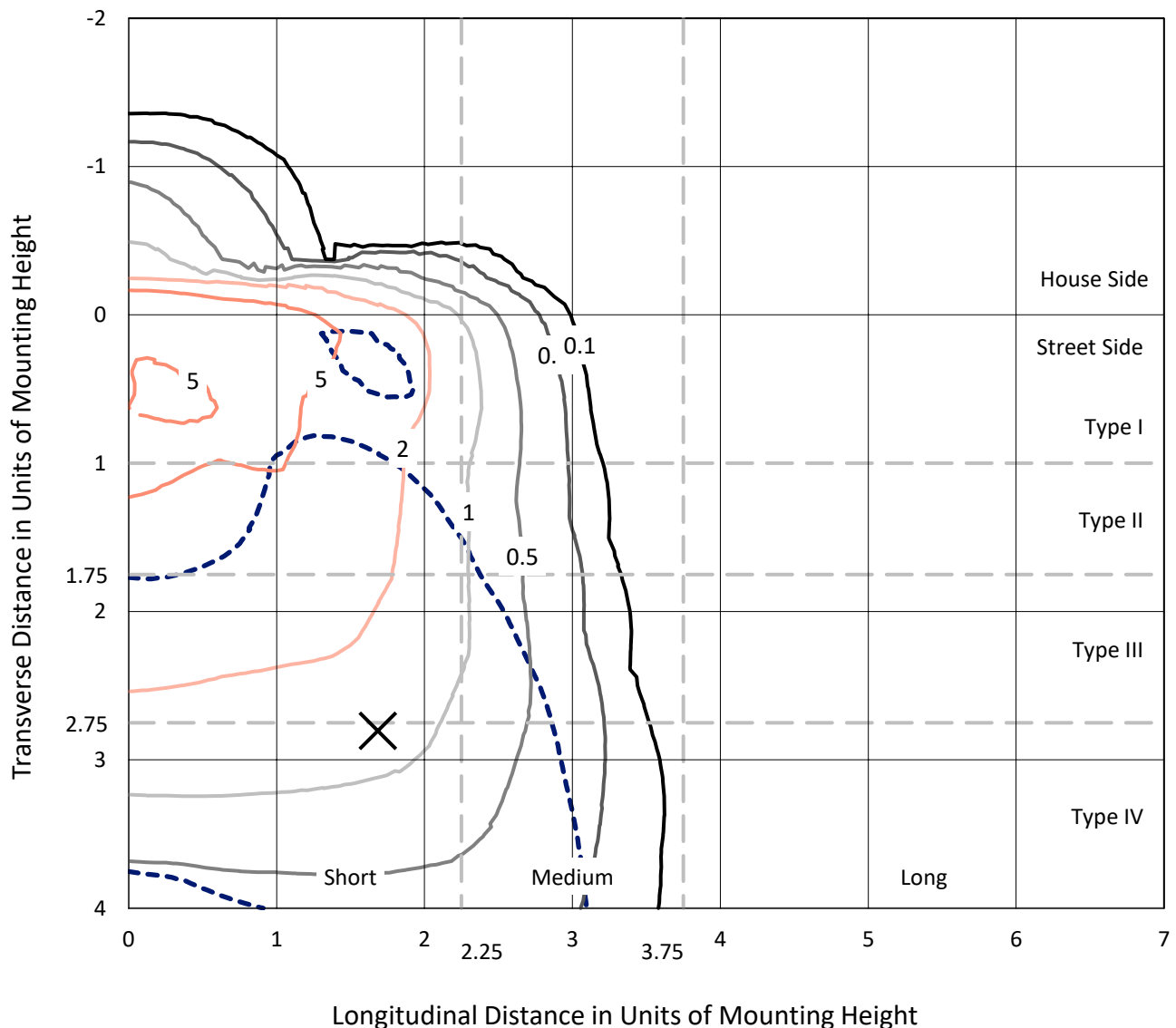
Input Watts (W): 67  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P363191  
 CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

## Iso-Footcandle Lines of Horizontal Illumination

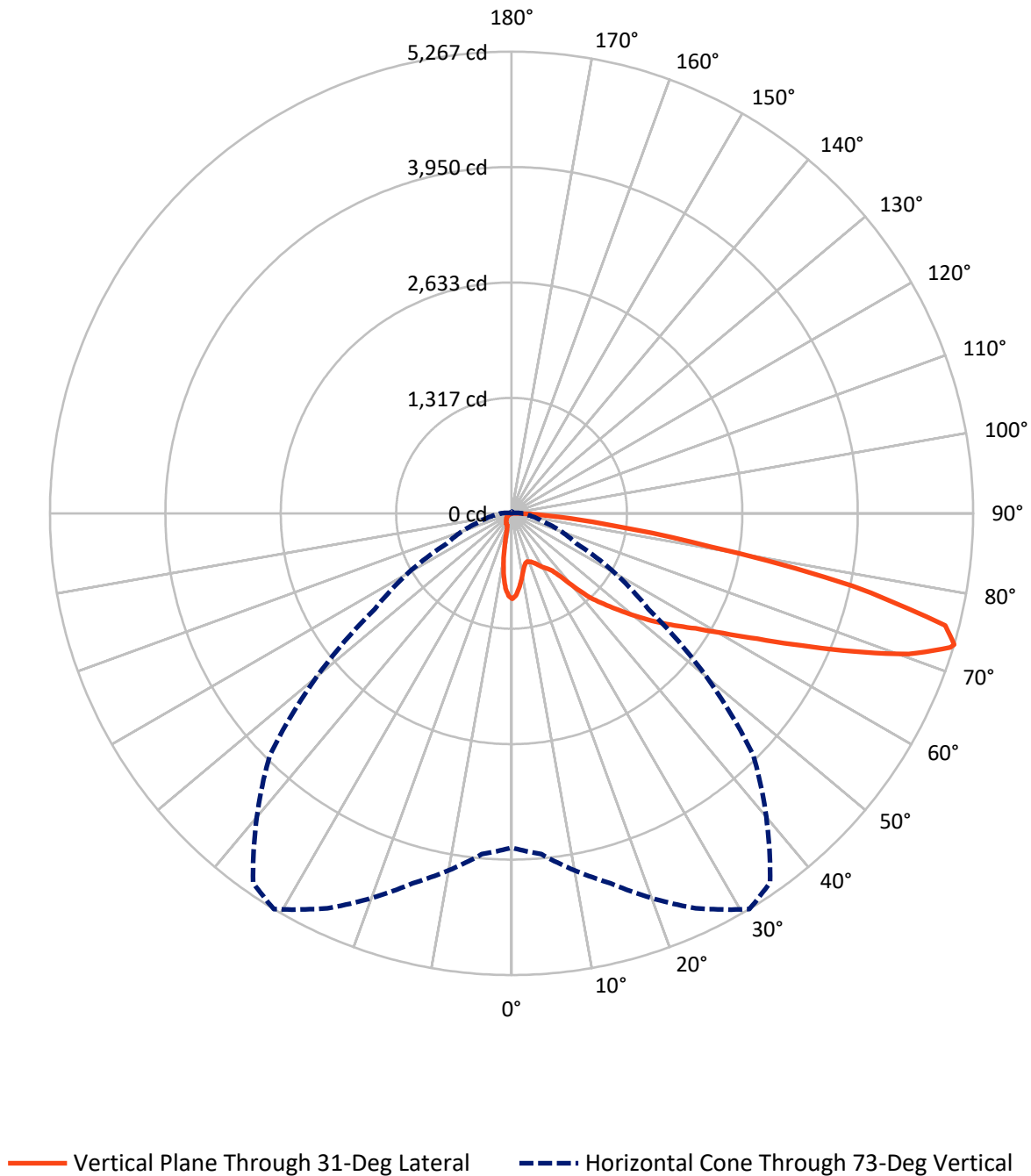
× Max cd  
 - - - 1/2 Max cd



Based on 10 foot mounting height. Maximum calculated value = 9.7 fc  
 Type IV - Short - N/A

REPORT NUMBER: P363191  
CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

## Luminous Intensity Polar Plot



REPORT NUMBER: P363191

CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

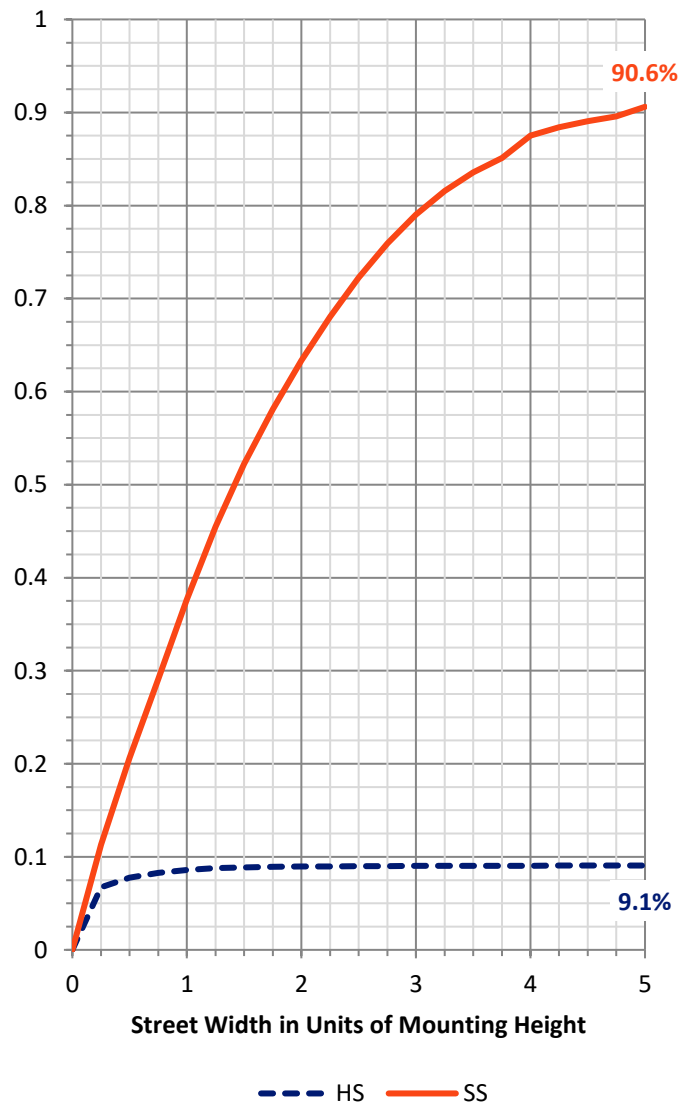
**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total  |
|--------------------|-----------|----------|--------|--------|
| <b>House Side</b>  | Lumens    | 516.5    | 0.0    | 516.5  |
|                    | % Fixture | 9.1      | 0.0    | 9.1    |
| <b>Street Side</b> | Lumens    | 5149.5   | 0.0    | 5149.5 |
|                    | % Fixture | 90.9     | 0.0    | 90.9   |
| <b>Total</b>       | Lumens    | 5666.0   | 0.0    | 5666.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0  |

**ZONAL LUMENS:**

| Zone      | Lumens | % Fixture |
|-----------|--------|-----------|
| 0°-10°    | 80.8   | 1.4       |
| 10°-20°   | 175.5  | 3.1       |
| 20°-30°   | 263.0  | 4.6       |
| 30°-40°   | 418.4  | 7.4       |
| 40°-50°   | 747.1  | 13.2      |
| 50°-60°   | 1159.2 | 20.5      |
| 60°-70°   | 1541.1 | 27.2      |
| 70°-80°   | 1159.2 | 20.5      |
| 80°-90°   | 121.8  | 2.1       |
| 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°    | 5666.0 | 100.0     |
| 0°-180°   | 5666.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P363191

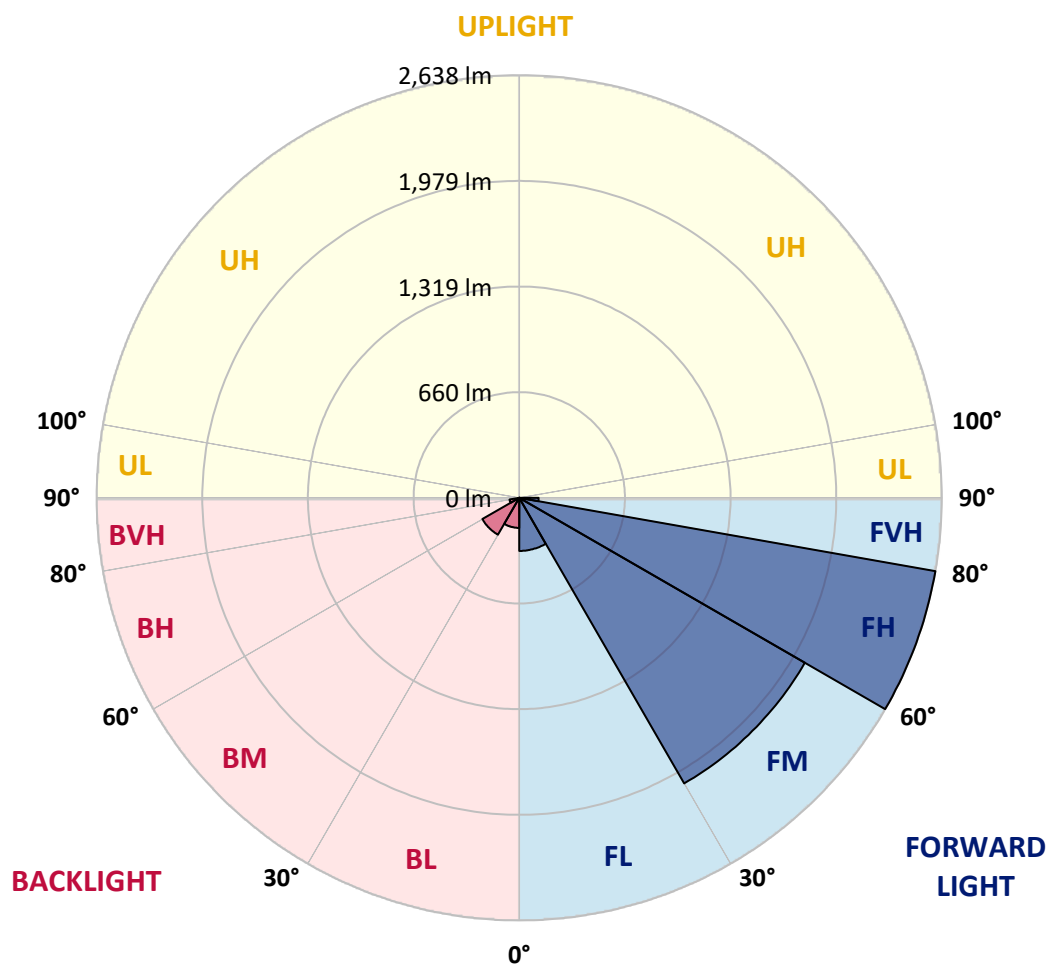
CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 331.5  | 5.9       |                         |      |         |
| FM   | (30°-60°)   | 2058.8 | 36.3      |                         |      |         |
| FH   | (60°-80°)   | 2638.4 | 46.6      |                         |      | G2/5000 |
| FVH  | (80°-90°)   | 120.8  | 2.1       |                         |      | G2/225  |
| BL   | (0°-30°)    | 187.8  | 3.3       | B1/500                  |      |         |
| BM   | (30°-60°)   | 265.8  | 4.7       | B1/1000                 |      |         |
| BH   | (60°-80°)   | 61.8   | 1.1       | B0/110                  |      | G0/110  |
| BVH  | (80°-90°)   | 1.0    | 0.0       |                         |      | G0/10   |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B1-U0-G2**

Type IV Short





REPORT NUMBER: P363191

CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 31°    | 35°    | 45°    | 55°    | 65°    | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  | 974.8  |
| 2.5°  | 923.8  | 927.7  | 931.9  | 932.7  | 939.6  | 939.9  | 949.9  | 957.4  | 964.9  | 972.1  | 974.6  |
| 5°    | 829.0  | 835.4  | 842.9  | 850.4  | 865.1  | 870.9  | 895.3  | 920.2  | 944.1  | 966.8  | 977.9  |
| 7.5°  | 727.8  | 735.0  | 745.6  | 764.1  | 780.5  | 791.9  | 830.4  | 874.8  | 919.1  | 961.0  | 985.1  |
| 10°   | 635.5  | 642.1  | 653.2  | 672.9  | 698.1  | 713.7  | 765.5  | 827.1  | 892.2  | 955.7  | 995.9  |
| 12.5° | 576.7  | 580.3  | 586.4  | 607.5  | 630.2  | 647.7  | 708.7  | 784.9  | 870.0  | 955.4  | 1013.4 |
| 15°   | 565.9  | 567.0  | 562.0  | 571.4  | 589.2  | 606.1  | 667.9  | 750.8  | 853.1  | 959.9  | 1036.1 |
| 17.5° | 583.1  | 582.5  | 565.9  | 564.8  | 578.9  | 592.8  | 648.0  | 727.3  | 841.2  | 970.1  | 1065.5 |
| 20°   | 609.1  | 607.2  | 578.4  | 573.1  | 588.1  | 601.1  | 646.6  | 718.4  | 836.8  | 987.3  | 1101.3 |
| 22.5° | 643.8  | 640.5  | 595.3  | 589.7  | 605.8  | 619.4  | 663.8  | 727.0  | 840.7  | 1010.3 | 1142.9 |
| 25°   | 686.8  | 681.8  | 624.4  | 618.3  | 634.6  | 648.2  | 694.5  | 751.7  | 852.3  | 1038.3 | 1195.5 |
| 27.5° | 735.3  | 728.1  | 671.0  | 655.2  | 673.7  | 687.9  | 735.6  | 789.4  | 870.6  | 1068.0 | 1260.1 |
| 30°   | 781.0  | 771.6  | 720.0  | 694.0  | 716.7  | 732.5  | 779.9  | 834.3  | 900.0  | 1113.8 | 1348.6 |
| 32.5° | 827.1  | 816.5  | 763.9  | 732.8  | 753.3  | 770.5  | 825.7  | 896.1  | 955.2  | 1183.6 | 1466.2 |
| 35°   | 933.0  | 921.9  | 857.3  | 806.0  | 805.7  | 815.4  | 889.7  | 980.7  | 1028.1 | 1280.9 | 1606.4 |
| 37.5° | 1111.3 | 1104.9 | 1043.3 | 946.0  | 919.9  | 909.1  | 977.1  | 1081.6 | 1132.9 | 1414.9 | 1764.8 |
| 40°   | 1306.5 | 1300.9 | 1231.9 | 1143.7 | 1104.1 | 1077.4 | 1102.4 | 1222.2 | 1280.9 | 1578.4 | 1926.4 |
| 42.5° | 1526.9 | 1500.5 | 1377.4 | 1351.1 | 1315.6 | 1295.4 | 1272.9 | 1395.5 | 1462.8 | 1756.4 | 2086.7 |
| 45°   | 1727.1 | 1682.7 | 1523.0 | 1483.1 | 1475.0 | 1480.0 | 1492.5 | 1628.3 | 1667.4 | 1968.0 | 2246.4 |
| 47.5° | 1846.3 | 1811.3 | 1688.8 | 1650.5 | 1648.3 | 1681.3 | 1775.6 | 1891.5 | 1871.2 | 2152.4 | 2386.9 |
| 50°   | 1959.7 | 1928.1 | 1826.3 | 1835.7 | 1846.0 | 1890.9 | 2096.9 | 2162.1 | 2057.3 | 2319.6 | 2515.9 |
| 52.5° | 2051.4 | 2003.2 | 1950.0 | 2002.9 | 2053.4 | 2125.8 | 2428.5 | 2405.0 | 2189.2 | 2452.6 | 2626.2 |
| 55°   | 2104.4 | 2082.5 | 2108.3 | 2161.5 | 2256.3 | 2373.9 | 2741.5 | 2607.1 | 2285.7 | 2574.1 | 2699.7 |
| 57.5° | 2298.5 | 2255.5 | 2306.8 | 2352.8 | 2476.5 | 2640.9 | 3009.7 | 2757.6 | 2355.3 | 2649.2 | 2716.6 |
| 60°   | 2533.3 | 2498.7 | 2528.9 | 2605.4 | 2772.3 | 2965.6 | 3260.3 | 2880.5 | 2391.6 | 2697.5 | 2672.8 |
| 62.5° | 2907.1 | 2861.3 | 2842.5 | 2928.1 | 3149.4 | 3360.4 | 3450.5 | 2965.6 | 2383.6 | 2676.1 | 2522.5 |
| 65°   | 3407.8 | 3360.4 | 3276.1 | 3353.7 | 3635.2 | 3784.0 | 3663.2 | 2983.6 | 2328.2 | 2503.4 | 2142.7 |
| 67.5° | 3920.7 | 3886.4 | 3814.3 | 3945.1 | 4199.1 | 4247.1 | 3888.0 | 2939.8 | 2149.6 | 2029.8 | 1513.8 |
| 70°   | 4259.5 | 4244.9 | 4291.7 | 4581.2 | 4807.7 | 4793.8 | 4094.3 | 2704.4 | 1675.5 | 1248.2 | 748.9  |
| 72.5° | 4015.3 | 4085.7 | 4431.7 | 4956.6 | 5233.3 | 5120.2 | 3988.4 | 2076.7 | 957.7  | 480.2  | 216.5  |
| 73°   | 3812.9 | 3903.0 | 4368.8 | 4970.7 | 5266.8 | 5142.9 | 3899.4 | 1906.2 | 816.3  | 379.0  | 164.1  |
| 75°   | 2652.5 | 2763.2 | 3616.9 | 4629.4 | 5109.9 | 4900.0 | 3250.3 | 1166.7 | 378.2  | 168.0  | 66.3   |
| 77.5° | 1287.9 | 1369.7 | 1991.6 | 3344.9 | 3974.0 | 3828.4 | 2023.4 | 434.7  | 170.8  | 105.1  | 30.5   |
| 80°   | 480.8  | 534.6  | 864.5  | 1702.4 | 2296.5 | 2356.7 | 890.0  | 164.4  | 113.7  | 84.6   | 15.5   |
| 82.5° | 125.9  | 140.3  | 318.8  | 759.1  | 1177.0 | 1231.9 | 280.6  | 82.9   | 83.2   | 69.6   | 9.4    |
| 85°   | 40.2   | 46.0   | 99.5   | 340.8  | 554.5  | 486.9  | 73.2   | 40.2   | 60.4   | 51.8   | 5.3    |
| 87.5° | 5.0    | 6.4    | 31.6   | 80.1   | 122.3  | 67.9   | 11.4   | 11.9   | 25.8   | 28.8   | 3.0    |
| 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: P363191

CATALOG NUMBER: NVN-SA1D-750-U-T4FT-HSS

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°  | 115°  | 125°  | 135°  | 145°  | 155°  | 165°  | 175°  | 180°  |
|-------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0°    | 974.8  | 974.8  | 974.8 | 974.8 | 974.8 | 974.8 | 974.8 | 974.8 | 974.8 | 974.8 | 974.8 |
| 2.5°  | 977.1  | 975.7  | 976.0 | 968.7 | 964.0 | 954.6 | 944.9 | 940.5 | 935.8 | 933.8 | 935.8 |
| 5°    | 982.1  | 979.6  | 972.4 | 950.2 | 926.6 | 896.1 | 867.5 | 845.9 | 818.7 | 811.3 | 819.0 |
| 7.5°  | 989.8  | 984.8  | 963.8 | 918.6 | 866.2 | 807.9 | 742.5 | 694.8 | 655.7 | 630.5 | 639.6 |
| 10°   | 1001.2 | 991.8  | 949.3 | 872.5 | 778.8 | 675.7 | 582.8 | 510.4 | 459.1 | 438.1 | 437.2 |
| 12.5° | 1020.3 | 1002.6 | 931.6 | 812.6 | 672.1 | 534.6 | 412.8 | 334.4 | 292.8 | 265.9 | 265.3 |
| 15°   | 1041.4 | 1015.3 | 909.1 | 740.8 | 547.9 | 382.9 | 265.9 | 206.3 | 179.4 | 170.8 | 169.7 |
| 17.5° | 1067.2 | 1030.0 | 880.0 | 652.4 | 417.8 | 253.7 | 173.6 | 156.4 | 155.3 | 154.4 | 154.4 |
| 20°   | 1099.6 | 1047.5 | 842.6 | 551.2 | 296.4 | 169.4 | 147.5 | 148.6 | 149.2 | 148.1 | 148.3 |
| 22.5° | 1137.3 | 1065.2 | 798.0 | 442.5 | 200.5 | 141.7 | 141.1 | 142.5 | 143.1 | 142.5 | 142.8 |
| 25°   | 1181.1 | 1085.8 | 743.6 | 328.6 | 144.7 | 134.5 | 135.9 | 137.8 | 139.2 | 139.2 | 139.2 |
| 27.5° | 1235.5 | 1110.7 | 678.2 | 229.3 | 125.0 | 127.0 | 130.9 | 134.5 | 136.4 | 137.0 | 137.0 |
| 30°   | 1306.2 | 1141.8 | 599.7 | 157.2 | 113.7 | 117.0 | 124.2 | 131.1 | 134.7 | 135.3 | 135.6 |
| 32.5° | 1395.5 | 1176.7 | 508.8 | 116.2 | 104.0 | 106.5 | 114.2 | 125.9 | 132.8 | 133.9 | 133.9 |
| 35°   | 1497.8 | 1217.2 | 410.9 | 101.2 | 97.0  | 97.9  | 104.0 | 117.3 | 129.5 | 132.5 | 132.8 |
| 37.5° | 1609.8 | 1257.1 | 312.5 | 94.5  | 91.2  | 91.2  | 95.7  | 107.0 | 121.4 | 130.9 | 132.0 |
| 40°   | 1714.3 | 1281.2 | 219.0 | 89.3  | 86.0  | 86.0  | 89.8  | 98.2  | 111.7 | 125.9 | 128.9 |
| 42.5° | 1810.8 | 1289.5 | 152.5 | 84.3  | 81.0  | 81.8  | 85.1  | 91.8  | 102.0 | 116.2 | 118.9 |
| 45°   | 1910.0 | 1288.2 | 111.2 | 78.5  | 76.0  | 78.5  | 81.0  | 86.0  | 93.4  | 101.5 | 102.0 |
| 47.5° | 1984.9 | 1276.5 | 88.2  | 72.9  | 71.3  | 74.6  | 76.8  | 80.1  | 84.3  | 83.7  | 83.7  |
| 50°   | 2055.1 | 1248.2 | 71.0  | 65.4  | 66.5  | 70.4  | 71.5  | 72.6  | 72.9  | 67.7  | 67.1  |
| 52.5° | 2108.3 | 1204.1 | 56.8  | 57.4  | 61.8  | 65.7  | 64.6  | 62.9  | 60.2  | 53.8  | 52.7  |
| 55°   | 2126.0 | 1119.3 | 44.6  | 47.4  | 54.9  | 59.9  | 55.7  | 52.1  | 46.9  | 41.6  | 40.5  |
| 57.5° | 2093.9 | 1009.8 | 36.3  | 36.9  | 46.3  | 50.5  | 45.7  | 41.6  | 35.8  | 31.3  | 30.5  |
| 60°   | 2025.7 | 888.1  | 29.9  | 27.7  | 35.8  | 39.4  | 36.3  | 32.2  | 26.9  | 23.6  | 23.3  |
| 62.5° | 1890.4 | 758.3  | 24.7  | 21.6  | 27.2  | 30.2  | 28.3  | 25.2  | 20.8  | 18.6  | 18.3  |
| 65°   | 1605.9 | 606.6  | 20.0  | 17.5  | 21.1  | 23.6  | 21.9  | 19.7  | 16.4  | 14.7  | 14.4  |
| 67.5° | 1121.0 | 410.1  | 16.4  | 14.4  | 16.6  | 18.6  | 17.2  | 16.1  | 13.0  | 12.8  | 13.0  |
| 70°   | 540.7  | 197.7  | 13.6  | 11.6  | 13.0  | 14.4  | 13.9  | 13.0  | 12.5  | 14.4  | 16.6  |
| 72.5° | 155.0  | 66.3   | 10.8  | 9.7   | 10.5  | 11.4  | 11.9  | 11.6  | 13.6  | 17.5  | 20.2  |
| 73°   | 119.2  | 53.5   | 10.3  | 9.1   | 10.0  | 11.1  | 11.6  | 11.4  | 13.9  | 17.7  | 20.2  |
| 75°   | 51.0   | 25.8   | 7.8   | 7.5   | 8.3   | 9.7   | 10.3  | 10.3  | 13.9  | 18.0  | 19.4  |
| 77.5° | 23.0   | 13.9   | 5.0   | 5.8   | 7.2   | 7.8   | 8.6   | 8.6   | 11.1  | 13.9  | 13.9  |
| 80°   | 13.0   | 7.5    | 3.9   | 4.4   | 5.3   | 5.3   | 5.3   | 4.7   | 5.0   | 5.5   | 6.1   |
| 82.5° | 8.3    | 5.0    | 3.0   | 3.6   | 3.3   | 2.8   | 2.2   | 2.2   | 1.9   | 2.2   | 2.8   |
| 85°   | 4.7    | 2.8    | 2.8   | 2.2   | 1.4   | 1.1   | 1.4   | 1.1   | 0.3   | 0.0   | 0.3   |
| 87.5° | 2.8    | 1.7    | 0.8   | 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: SP1-1908-441-4-R4

Test Date: 10/02/2019

Luminaire Tested: SA1C-750-U-5WQ

Data in this report applies to families of products SA1C-760-U-5WQ .

### Test Information

Test Method: LM-79-2008  
 Report Number: SP1-1908-441-4-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-750-U-5WQ**  
 Description: MCGRAW EDISON ROADWAY AND AREA LUMINAIRE

\*\*\*THIS IS A REVISION OF SP1-1908-441-4-R3. TO UPDATE THE CATALOG INFORMATION.\*\*\*TESTED IN SITU. ROADWAY AND AREA LUMINAIRE. (1) 70 CRI, 5000K, 1050MA LIGHTSQUARE WITH 16 LEDS AND TYPE V WIDE OPTICS.

### Spectral Parameters

|                           |        |           |      |      |       |
|---------------------------|--------|-----------|------|------|-------|
| CCT (K):                  | 4884   | CRI (Ra): | 73.5 |      |       |
| CIE u':                   | 0.2101 | R1:       | 70.5 | R9:  | -28.4 |
| CIE v':                   | 0.4904 | R2:       | 77.7 | R10: | 48.6  |
| Duv:                      | 0.0037 | R3:       | 84.6 | R11: | 73.2  |
| CIE x:                    | 0.3493 | R4:       | 74.7 | R12: | 50.7  |
| CIE y:                    | 0.3624 | R5:       | 71.9 | R13: | 71.2  |
| CIE z:                    | 0.2884 | R6:       | 70.7 | R14: | 91.4  |
| Peak Wavelength (nm):     | 444    | R7:       | 81.2 |      |       |
| Dominant Wavelength (nm): | 571    | R8:       | 56.9 |      |       |
| Purity:                   | 13.7   |           |      |      |       |
| Rf:                       | 74.9   |           |      |      |       |
| Rg:                       | 96.3   |           |      |      |       |



### Test Conditions

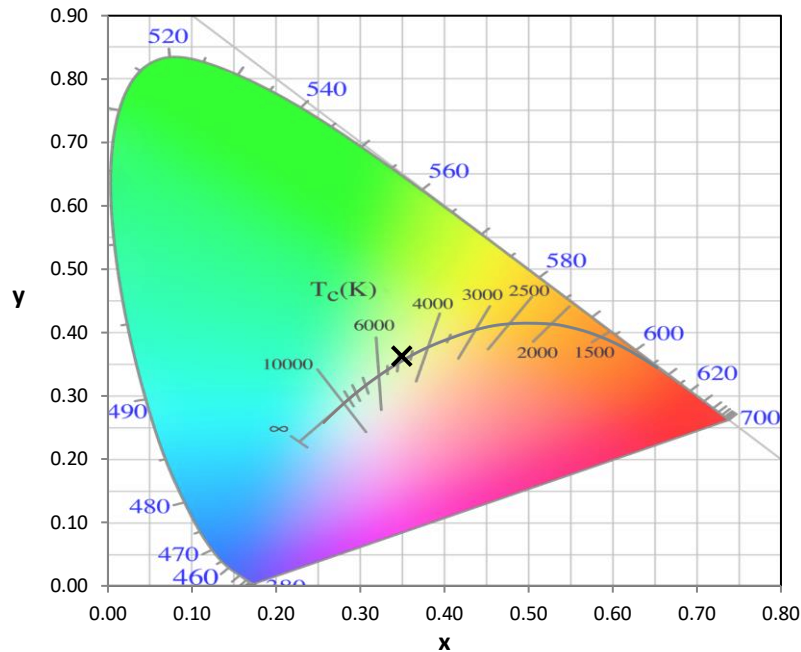
Stabilization Time: 240M  
 Operation Time: 12H  
 Room Temperature (°C) / RH%: 25.0./44%  
 Sphere Temperature (°C): 25.7

REPORT NUMBER: SP1-1908-441-4-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: SP1-1908-441-4-R4

CIE 1931 Chromaticity Diagram



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



Point lies inside the ANSI 5000K 4-step quadrangle

REPORT NUMBER: SP1-1908-441-4-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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-4-R4

Scotopic Flux vs. Wavelength



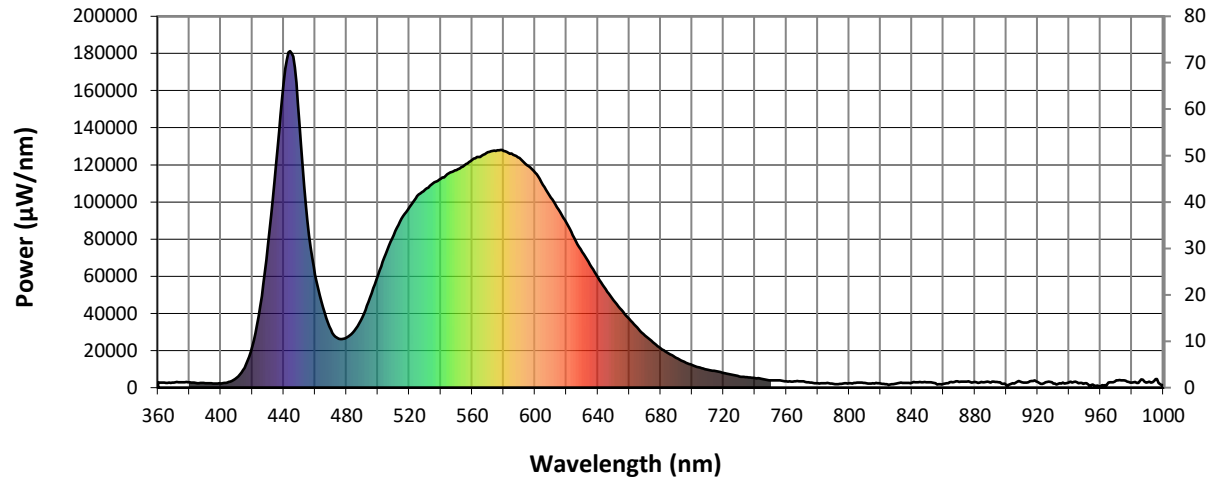
Scotopic Lumens: 13493.5

S/P: 1.77

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-4-R4

**Melanopic Flux vs. Wavelength**



**Melanopic Lumens: 5378.9**

**M/P: 0.71**

| 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       | 2945             | NR               | 490       | 37941            | NR               | 620       | 88803            | NR               | 750       | 3908             | NR               | 880       | 2997             | NR               |
| 365       | 2596             | NR               | 495       | 48525            | NR               | 625       | 80578            | NR               | 755       | 3988             | NR               | 885       | 2927             | NR               |
| 370       | 2732             | NR               | 500       | 60609            | NR               | 630       | 73127            | NR               | 760       | 3335             | NR               | 890       | 2649             | NR               |
| 375       | 2894             | NR               | 505       | 72036            | NR               | 635       | 66244            | NR               | 765       | 3438             | NR               | 895       | 2828             | NR               |
| 380       | 2822             | NR               | 510       | 82168            | NR               | 640       | 59440            | NR               | 770       | 3427             | NR               | 900       | 1407             | NR               |
| 385       | 2394             | NR               | 515       | 90898            | NR               | 645       | 52864            | NR               | 775       | 2759             | NR               | 905       | 2224             | NR               |
| 390       | 2370             | NR               | 520       | 97142            | NR               | 650       | 47085            | NR               | 780       | 2340             | NR               | 910       | 2905             | NR               |
| 395       | 2267             | NR               | 525       | 103255           | NR               | 655       | 41789            | NR               | 785       | 2412             | NR               | 915       | 3350             | NR               |
| 400       | 2262             | NR               | 530       | 106697           | NR               | 660       | 37064            | NR               | 790       | 1999             | NR               | 920       | 3114             | NR               |
| 405       | 3000             | NR               | 535       | 110081           | NR               | 665       | 32299            | NR               | 795       | 2054             | NR               | 925       | 2834             | NR               |
| 410       | 5324             | NR               | 540       | 112494           | NR               | 670       | 28142            | NR               | 800       | 2331             | NR               | 930       | 2271             | NR               |
| 415       | 10725            | NR               | 545       | 115513           | NR               | 675       | 24505            | NR               | 805       | 2648             | NR               | 935       | 2228             | NR               |
| 420       | 22128            | NR               | 550       | 117203           | NR               | 680       | 21162            | NR               | 810       | 2485             | NR               | 940       | 2833             | NR               |
| 425       | 44095            | NR               | 555       | 119753           | NR               | 685       | 18400            | NR               | 815       | 2409             | NR               | 945       | 2941             | NR               |
| 430       | 77002            | NR               | 560       | 122602           | NR               | 690       | 16065            | NR               | 820       | 2221             | NR               | 950       | 2323             | NR               |
| 435       | 119881           | NR               | 565       | 124314           | NR               | 695       | 13860            | NR               | 825       | 1562             | NR               | 955       | 1667             | NR               |
| 440       | 164454           | NR               | 570       | 126775           | NR               | 700       | 12177            | NR               | 830       | 2249             | NR               | 960       | 749              | NR               |
| 445       | 179997           | NR               | 575       | 127511           | NR               | 705       | 10757            | NR               | 835       | 2573             | NR               | 965       | 2669             | NR               |
| 450       | 142822           | NR               | 580       | 127577           | NR               | 710       | 9601             | NR               | 840       | 2764             | NR               | 970       | 3968             | NR               |
| 455       | 90008            | NR               | 585       | 126153           | NR               | 715       | 8944             | NR               | 845       | 3109             | NR               | 975       | 3886             | NR               |
| 460       | 60557            | NR               | 590       | 123678           | NR               | 720       | 7947             | NR               | 850       | 2963             | NR               | 980       | 2788             | NR               |
| 465       | 43305            | NR               | 595       | 119774           | NR               | 725       | 7062             | NR               | 855       | 2336             | NR               | 985       | 3496             | NR               |
| 470       | 31089            | NR               | 600       | 115733           | NR               | 730       | 6004             | NR               | 860       | 2118             | NR               | 990       | 2913             | NR               |
| 475       | 26278            | NR               | 605       | 109231           | NR               | 735       | 5594             | NR               | 865       | 3144             | NR               | 995       | 4659             | NR               |
| 480       | 27060            | NR               | 610       | 102408           | NR               | 740       | 5165             | NR               | 870       | 3069             | NR               | 1000      | 1308             | NR               |
| 485       | 30698            | NR               | 615       | 96015            | NR               | 745       | 4687             | NR               | 875       | 3311             | NR               |           |                  |                  |

REPORT NUMBER: SP1-1908-441-4-R4

**TM-30-18**

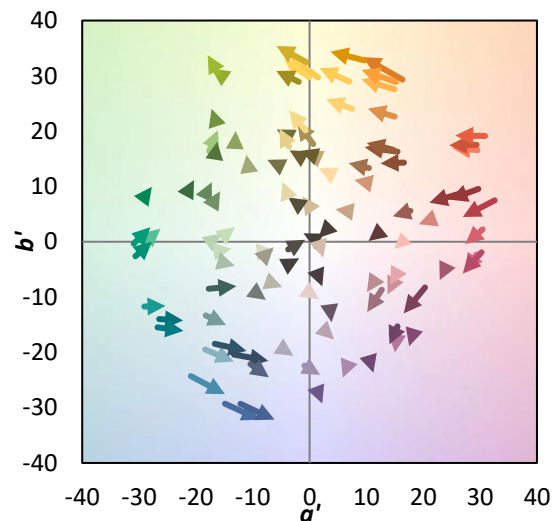
**Summary**

$R_f = 74.9$   
 $R_g = 96.3$   
 CIE  $R_a = 73.5$   
 $R_g = -28.4$

**Spectral Power Distribution Comparison**



**Color Vector Graphics**



REPORT NUMBER: SP1-1908-441-4-R4

**TM-30-18**

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

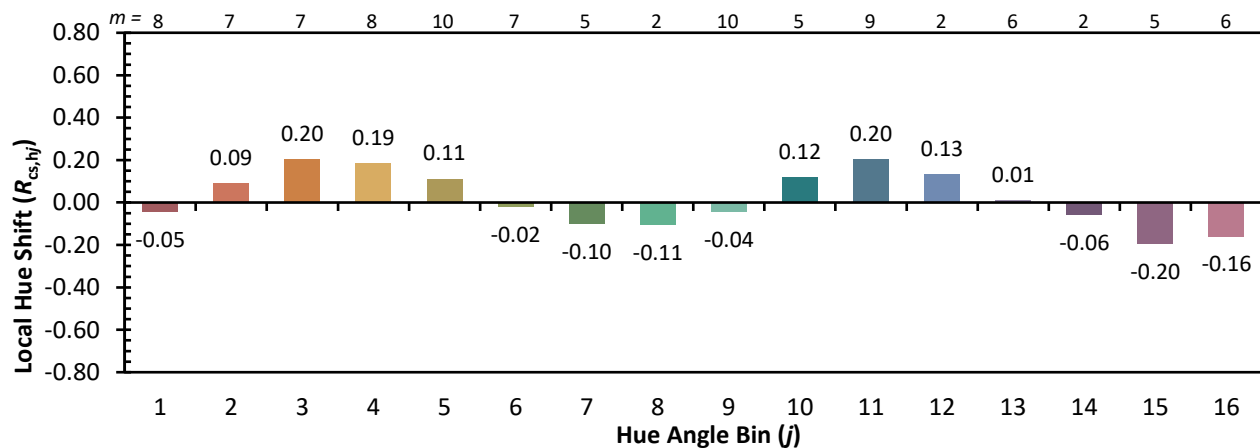
|            |            |            |            |
|------------|------------|------------|------------|
| CES01 = 85 | CES26 = 61 | CES51 = 90 | CES76 = 52 |
| CES02 = 60 | CES27 = 84 | CES52 = 91 | CES77 = 71 |
| CES03 = 30 | CES28 = 81 | CES53 = 79 | CES78 = 54 |
| CES04 = 69 | CES29 = 58 | CES54 = 83 | CES79 = 80 |
| CES05 = 46 | CES30 = 67 | CES55 = 83 | CES80 = 77 |
| CES06 = 50 | CES31 = 63 | CES56 = 73 | CES81 = 77 |
| CES07 = 39 | CES32 = 59 | CES57 = 72 | CES82 = 90 |
| CES08 = 38 | CES33 = 69 | CES58 = 73 | CES83 = 86 |
| CES09 = 29 | CES34 = 69 | CES59 = 88 | CES84 = 88 |
| CES10 = 73 | CES35 = 83 | CES60 = 93 | CES85 = 84 |
| CES11 = 56 | CES36 = 95 | CES61 = 88 | CES86 = 75 |
| CES12 = 61 | CES37 = 78 | CES62 = 85 | CES87 = 78 |
| CES13 = 41 | CES38 = 76 | CES63 = 77 | CES88 = 79 |
| CES14 = 74 | CES39 = 93 | CES64 = 74 | CES89 = 75 |
| CES15 = 70 | CES40 = 86 | CES65 = 67 | CES90 = 77 |
| CES16 = 46 | CES41 = 87 | CES66 = 69 | CES91 = 89 |
| CES17 = 49 | CES42 = 78 | CES67 = 67 | CES92 = 66 |
| CES18 = 55 | CES43 = 75 | CES68 = 73 | CES93 = 80 |
| CES19 = 71 | CES44 = 99 | CES69 = 81 | CES94 = 57 |
| CES20 = 64 | CES45 = 83 | CES70 = 63 | CES95 = 71 |
| CES21 = 85 | CES46 = 81 | CES71 = 60 | CES96 = 78 |
| CES22 = 77 | CES47 = 80 | CES72 = 86 | CES97 = 85 |
| CES23 = 91 | CES48 = 72 | CES73 = 53 | CES98 = 75 |
| CES24 = 90 | CES49 = 81 | CES74 = 96 | CES99 = 62 |
| CES25 = 71 | CES50 = 89 | CES75 = 58 |            |



REPORT NUMBER: SP1-1908-441-4-R4

**TM-30-18**

Color Rendition by Hue-Angle Bin



REPORT NUMBER: SP1-1908-441-4-R4

**TM-30-18**

**Measure Comparisons**



(END OF REPORT)