

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: P361309

Luminaire Tested: NVN-SA3B-750-U-T3

Issue Date: 3/3/2020

### Test Information

Test Method: LM-79-2019  
Report Number: P361309  
TEST IS SCALED FROM IESNA LM-79-08 TEST DATA (G2-1903-205-14)  
Test Lab: INNOVATION CENTER  
Issue Date: 3/3/2020  
Manufacturer: COOPER LIGHTING SOLUTIONS  
Product Line: STREETWORKS  
Catalog Number: NVN-SA3B-750-U-T3  
Description: NAVION ROADWAY AND AREA LUMINAIRE  
(3) 70 CRI, 5000K, 800mA LIGHTSQUARES WITH 16 LEDS EACH AND TYPE III OPTICS  
Light Source: -  
Ballast/Driver: ELECTRONIC DRIVER

### Summary

Lumens per Lamp: N/A  
Luminaire Lumens: 17395 lumens  
Efficiency: N/A  
Efficacy: 140.3 lumens/watt  
Luminous Opening: Rectangular (W 0.5' x L: 1.5' x H: 0')  
IES Classification: Type III - Short  
BUG Rating: B3 - U0 - G3

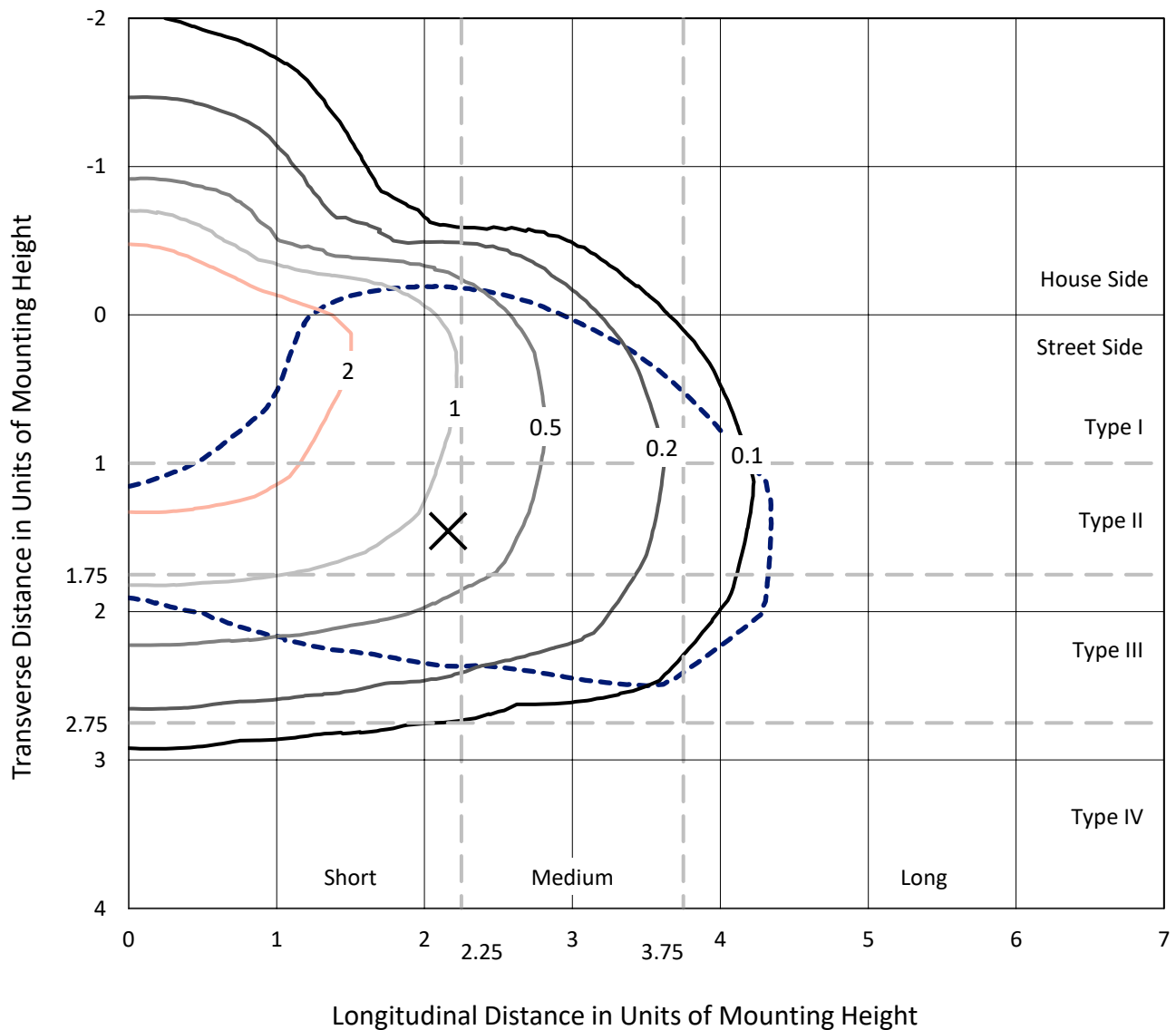
Input Watts (W): 124  
Input Voltage (V): NR  
Input Current (Ain): NR  
Voltage Rise (V): NR  
Power Factor: NR  
Total Harmonic Distortion (THDi): NR  
Frequency (hertz): 60  
Stabilization Time: NR  
Operation Time: NR  
Ambient Temperature (°C): NR  
Test Distance: 28.75 FT



REPORT NUMBER: P361309  
 CATALOG NUMBER: NVN-SA3B-750-U-T3

## Iso-Footcandle Lines of Horizontal Illumination

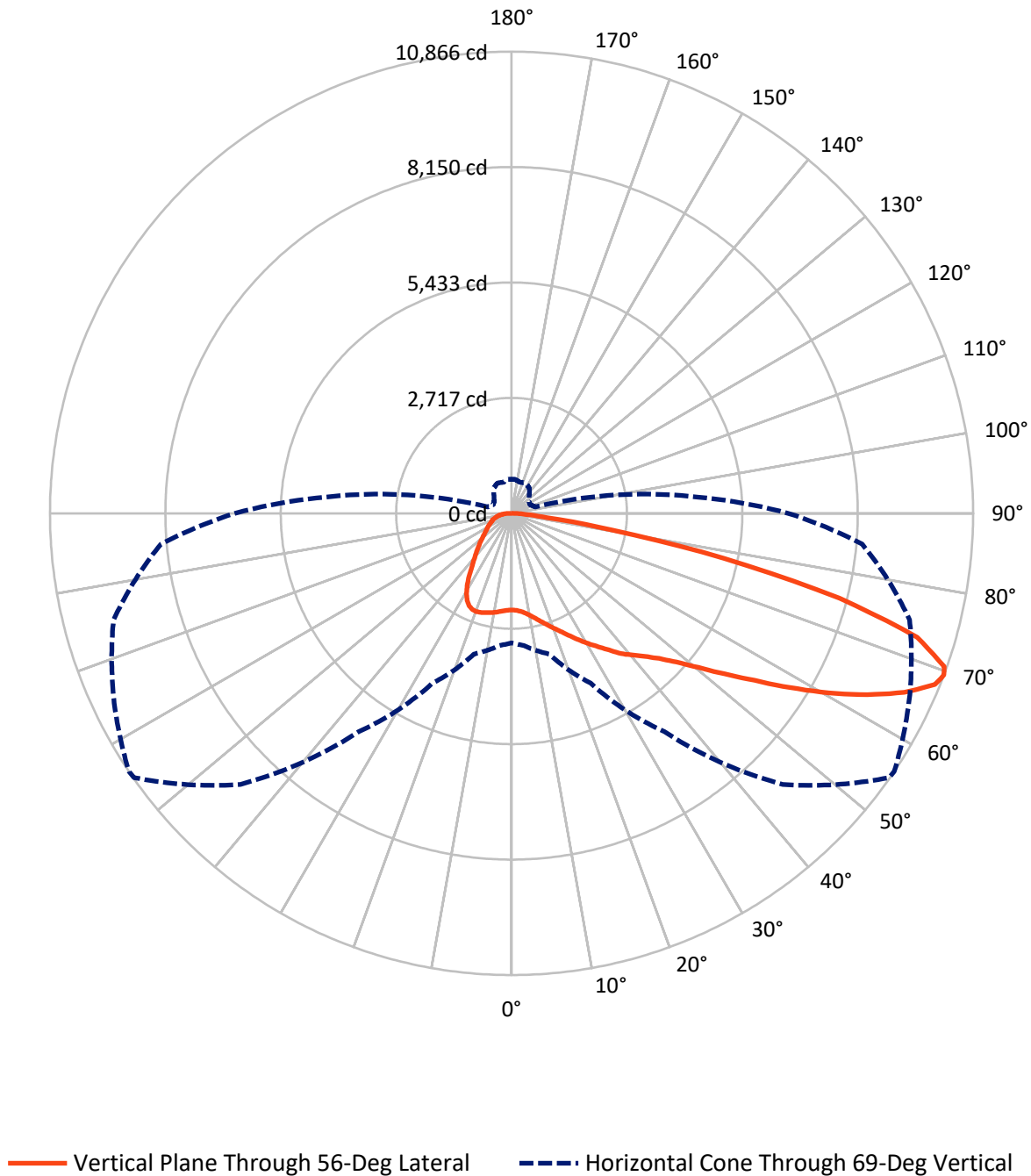
× Max cd  
 - - - 1/2 Max cd



Based on 25 foot mounting height. Maximum calculated value = 4 fc  
 Type III - Short - N/A

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## Luminous Intensity Polar Plot



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CATALOG NUMBER: NVN-SA3B-750-U-T3

**FLUX DISTRIBUTION:**

|                    |           | Downward | Upward | Total   |
|--------------------|-----------|----------|--------|---------|
| <b>House Side</b>  | Lumens    | 3873.8   | 0.0    | 3873.8  |
|                    | % Fixture | 22.3     | 0.0    | 22.3    |
| <b>Street Side</b> | Lumens    | 13521.2  | 0.0    | 13521.2 |
|                    | % Fixture | 77.7     | 0.0    | 77.7    |
| <b>Total</b>       | Lumens    | 17395.0  | 0.0    | 17395.0 |
|                    | % Fixture | 100.0    | 0.0    | 100.0   |

**ZONAL LUMENS:**

| Zone      | Lumens  | % Fixture |
|-----------|---------|-----------|
| 0°-10°    | 223.4   | 1.3       |
| 10°-20°   | 718.2   | 4.1       |
| 20°-30°   | 1253.7  | 7.2       |
| 30°-40°   | 1801.0  | 10.4      |
| 40°-50°   | 2492.4  | 14.3      |
| 50°-60°   | 3651.8  | 21.0      |
| 60°-70°   | 4452.2  | 25.6      |
| 70°-80°   | 2461.5  | 14.2      |
| 80°-90°   | 340.9   | 2.0       |
| 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°    | 17395.0 | 100.0     |
| 0°-180°   | 17395.0 | 100.0     |

**Coefficient of Utilization**



REPORT NUMBER: P361309

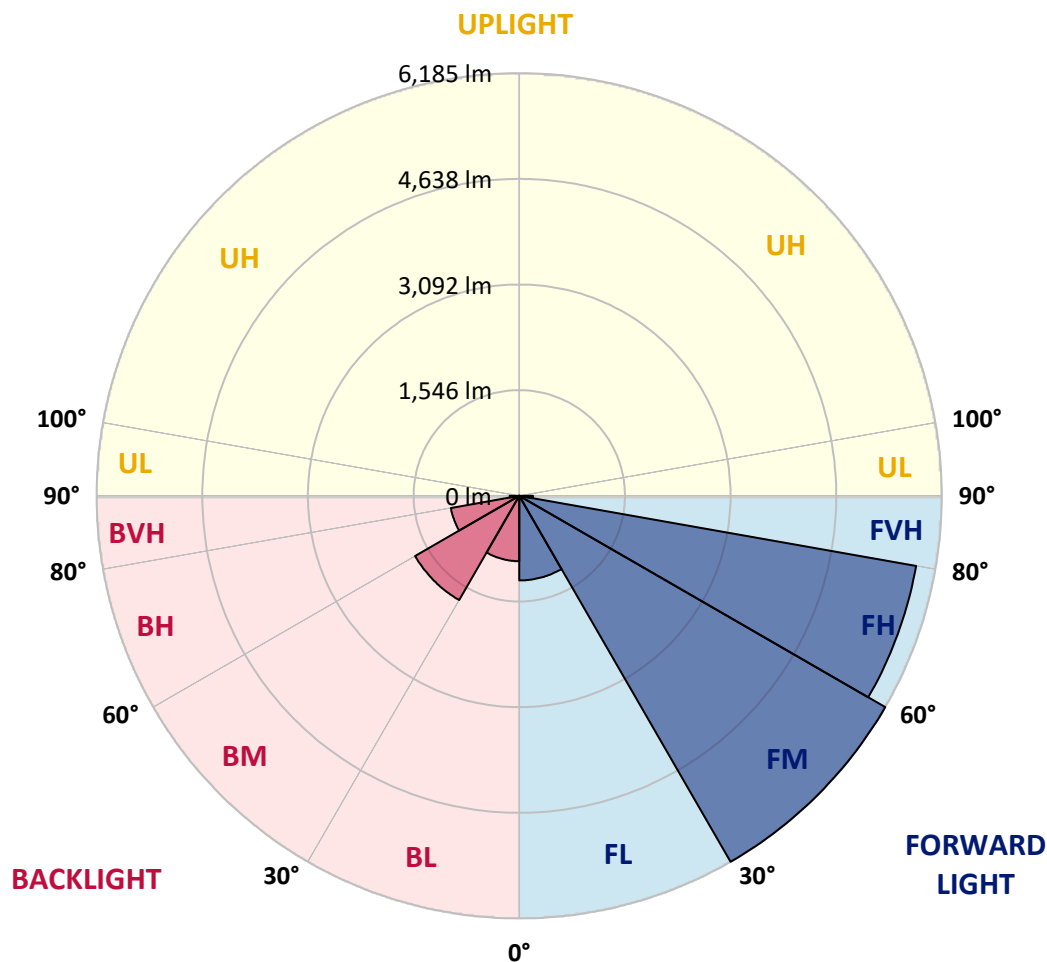
CATALOG NUMBER: NVN-SA3B-750-U-T3

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

| Zone |             | Lumens | % Fixture | Zone Rating/Lumen Limit |      |         |
|------|-------------|--------|-----------|-------------------------|------|---------|
|      |             |        |           | B                       | U    | G       |
| FL   | (0°-30°)    | 1238.0 | 7.1       |                         |      |         |
| FM   | (30°-60°)   | 6184.6 | 35.6      |                         |      |         |
| FH   | (60°-80°)   | 5897.8 | 33.9      |                         |      | G3/7500 |
| FVH  | (80°-90°)   | 200.8  | 1.2       |                         |      | G2/225  |
| BL   | (0°-30°)    | 957.3  | 5.5       | B2/1000                 |      |         |
| BM   | (30°-60°)   | 1760.6 | 10.1      | B2/2500                 |      |         |
| BH   | (60°-80°)   | 1015.8 | 5.8       | B3/2500                 |      | G3/2500 |
| BVH  | (80°-90°)   | 140.1  | 0.8       |                         |      | G2/225  |
| UL   | (90°-100°)  | 0.0    | 0.0       |                         | U0/0 |         |
| UH   | (100°-180°) | 0.0    | 0.0       |                         | U0/0 |         |

**BUG Rating: B3-U0-G3**

Type III Short





REPORT NUMBER: P361309

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**CANDELA DISTRIBUTION (FULL):**

|       | 0°     | 5°     | 15°    | 25°    | 35°    | 45°    | 55°     | 56°     | 65°     | 75°    | 85°    |
|-------|--------|--------|--------|--------|--------|--------|---------|---------|---------|--------|--------|
| 0°    | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1  | 2274.1  | 2274.1  | 2274.1 | 2274.1 |
| 2.5°  | 2288.5 | 2290.9 | 2289.1 | 2293.9 | 2288.5 | 2292.1 | 2289.1  | 2289.1  | 2287.3  | 2281.9 | 2275.9 |
| 5°    | 2324.5 | 2329.3 | 2326.3 | 2331.1 | 2324.5 | 2325.7 | 2320.3  | 2320.3  | 2314.9  | 2303.5 | 2291.5 |
| 7.5°  | 2380.8 | 2386.2 | 2383.8 | 2388.6 | 2379.6 | 2379.6 | 2372.4  | 2371.8  | 2361.0  | 2342.4 | 2328.7 |
| 10°   | 2447.9 | 2455.1 | 2452.7 | 2459.9 | 2452.7 | 2455.1 | 2447.9  | 2447.9  | 2433.5  | 2407.2 | 2389.8 |
| 12.5° | 2545.6 | 2554.6 | 2548.0 | 2547.4 | 2544.4 | 2549.2 | 2543.2  | 2542.0  | 2528.8  | 2492.9 | 2468.9 |
| 15°   | 2676.2 | 2685.8 | 2672.0 | 2670.8 | 2654.1 | 2652.3 | 2652.3  | 2650.5  | 2642.1  | 2598.9 | 2559.4 |
| 17.5° | 2826.6 | 2829.6 | 2817.6 | 2798.5 | 2776.9 | 2763.1 | 2761.3  | 2766.1  | 2766.1  | 2715.8 | 2652.9 |
| 20°   | 2974.1 | 2979.4 | 2969.9 | 2948.3 | 2920.7 | 2900.3 | 2886.0  | 2895.6  | 2895.0  | 2835.0 | 2745.7 |
| 22.5° | 3134.7 | 3147.2 | 3132.9 | 3105.3 | 3072.9 | 3050.2 | 3025.0  | 3033.4  | 3034.0  | 2960.3 | 2836.8 |
| 25°   | 3342.6 | 3331.2 | 3322.2 | 3283.3 | 3237.1 | 3213.8 | 3190.4  | 3198.8  | 3196.4  | 3095.1 | 2930.9 |
| 27.5° | 3526.6 | 3529.0 | 3517.0 | 3475.6 | 3422.3 | 3370.8 | 3369.6  | 3374.9  | 3366.0  | 3235.3 | 3019.6 |
| 30°   | 3740.5 | 3741.7 | 3724.9 | 3687.8 | 3629.6 | 3563.1 | 3547.5  | 3556.5  | 3537.3  | 3368.4 | 3113.1 |
| 32.5° | 3953.2 | 3959.2 | 3940.6 | 3895.7 | 3849.0 | 3768.1 | 3736.9  | 3742.9  | 3694.9  | 3504.4 | 3209.6 |
| 35°   | 4139.6 | 4148.0 | 4142.0 | 4112.0 | 4061.1 | 3991.6 | 3954.4  | 3950.8  | 3891.5  | 3671.0 | 3337.2 |
| 37.5° | 4329.5 | 4337.3 | 4330.7 | 4305.6 | 4285.2 | 4211.5 | 4191.7  | 4191.7  | 4088.6  | 3841.2 | 3499.6 |
| 40°   | 4524.9 | 4536.9 | 4529.1 | 4494.3 | 4477.0 | 4443.4 | 4396.1  | 4384.7  | 4273.2  | 4045.5 | 3764.5 |
| 42.5° | 4706.5 | 4722.0 | 4753.2 | 4732.8 | 4697.5 | 4702.3 | 4607.0  | 4601.0  | 4519.5  | 4347.5 | 4097.0 |
| 45°   | 4964.1 | 4986.9 | 5039.6 | 5024.1 | 5016.9 | 4990.5 | 4877.3  | 4871.9  | 4840.7  | 4753.8 | 4509.9 |
| 47.5° | 5245.2 | 5276.4 | 5371.6 | 5374.6 | 5451.9 | 5402.2 | 5248.2  | 5229.6  | 5236.8  | 5240.4 | 5013.9 |
| 50°   | 5504.1 | 5538.2 | 5694.6 | 5768.3 | 5950.5 | 5961.3 | 5715.0  | 5698.2  | 5726.4  | 5809.1 | 5601.1 |
| 52.5° | 5710.8 | 5753.9 | 5949.3 | 6177.0 | 6489.2 | 6577.9 | 6289.7  | 6277.1  | 6298.1  | 6440.7 | 6265.1 |
| 55°   | 5862.4 | 5909.2 | 6121.9 | 6536.6 | 7035.1 | 7191.5 | 6951.2  | 6939.3  | 6952.4  | 7134.0 | 6987.2 |
| 57.5° | 5897.8 | 5909.2 | 6217.8 | 6778.7 | 7496.0 | 7871.7 | 7760.8  | 7736.9  | 7672.1  | 7830.3 | 7784.2 |
| 60°   | 5731.8 | 5777.3 | 6138.7 | 6863.8 | 7852.5 | 8542.2 | 8607.0  | 8577.0  | 8395.4  | 8524.9 | 8487.7 |
| 62.5° | 5395.0 | 5476.5 | 5843.2 | 6734.3 | 7992.1 | 9089.9 | 9436.9  | 9401.0  | 9088.1  | 9172.0 | 8993.5 |
| 65°   | 4844.9 | 4879.7 | 5265.0 | 6287.9 | 7814.8 | 9440.5 | 10177.0 | 10159.0 | 9765.3  | 9634.1 | 9086.9 |
| 67.5° | 3860.9 | 3926.3 | 4253.4 | 5354.9 | 7089.1 | 9399.2 | 10749.3 | 10747.5 | 10207.5 | 9805.4 | 8755.6 |
| 69°   | 3050.2 | 3117.9 | 3429.5 | 4411.0 | 6272.9 | 9021.0 | 10845.1 | 10866.1 | 10332.2 | 9701.2 | 8282.2 |
| 70°   | 2431.7 | 2510.2 | 2724.2 | 3715.3 | 5548.4 | 8522.5 | 10765.4 | 10803.2 | 10308.2 | 9529.2 | 7845.3 |
| 72.5° | 1034.9 | 1098.4 | 1250.6 | 1915.2 | 3381.5 | 6364.0 | 9843.2  | 9985.8  | 9752.7  | 8721.4 | 6483.8 |
| 75°   | 451.8  | 471.6  | 540.5  | 780.8  | 1501.1 | 3463.6 | 7711.1  | 7974.8  | 8339.1  | 7371.9 | 4829.9 |
| 77.5° | 330.8  | 339.2  | 376.9  | 458.4  | 673.6  | 1308.2 | 4958.8  | 5112.2  | 6014.0  | 5364.4 | 2962.7 |
| 80°   | 255.9  | 261.9  | 291.2  | 336.8  | 439.8  | 529.1  | 2261.6  | 2393.4  | 3381.5  | 2755.3 | 1233.8 |
| 82.5° | 203.7  | 207.9  | 228.3  | 248.1  | 303.8  | 320.6  | 750.9   | 833.0   | 1248.2  | 761.0  | 326.6  |
| 85°   | 189.4  | 194.2  | 201.3  | 181.0  | 194.8  | 188.2  | 324.8   | 339.8   | 376.9   | 299.0  | 136.6  |
| 87.5° | 85.7   | 101.3  | 199.5  | 140.8  | 103.7  | 82.7   | 133.0   | 139.0   | 156.4   | 157.0  | 60.5   |
| 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: P361309

CATALOG NUMBER: NVN-SA3B-750-U-T3

**CANDELA DISTRIBUTION (continued):**

|       | 90°    | 95°    | 105°   | 115°   | 125°   | 135°   | 145°   | 155°   | 165°   | 175°   | 180°   |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0°    | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 | 2274.1 |
| 2.5°  | 2279.5 | 2277.7 | 2280.7 | 2273.5 | 2282.5 | 2281.9 | 2278.9 | 2280.1 | 2286.1 | 2285.5 | 2286.1 |
| 5°    | 2293.3 | 2292.1 | 2295.7 | 2290.3 | 2301.1 | 2304.7 | 2305.3 | 2310.7 | 2317.3 | 2319.1 | 2319.1 |
| 7.5°  | 2328.1 | 2328.1 | 2329.9 | 2322.7 | 2329.9 | 2329.3 | 2326.3 | 2331.7 | 2338.3 | 2338.9 | 2338.3 |
| 10°   | 2388.0 | 2388.6 | 2385.6 | 2367.0 | 2361.0 | 2344.8 | 2329.9 | 2330.5 | 2338.9 | 2345.4 | 2347.2 |
| 12.5° | 2463.5 | 2461.1 | 2447.9 | 2413.8 | 2388.6 | 2355.6 | 2340.1 | 2339.5 | 2347.8 | 2353.2 | 2355.0 |
| 15°   | 2549.8 | 2543.2 | 2509.0 | 2453.3 | 2409.0 | 2376.6 | 2351.4 | 2345.4 | 2340.7 | 2334.7 | 2335.3 |
| 17.5° | 2631.3 | 2616.3 | 2559.4 | 2482.1 | 2435.3 | 2392.2 | 2343.6 | 2304.7 | 2277.7 | 2262.1 | 2257.4 |
| 20°   | 2714.0 | 2684.6 | 2602.5 | 2509.0 | 2449.7 | 2371.2 | 2277.7 | 2198.6 | 2149.5 | 2126.7 | 2122.5 |
| 22.5° | 2789.5 | 2742.1 | 2642.7 | 2537.2 | 2438.3 | 2300.5 | 2153.7 | 2038.6 | 1970.3 | 1939.8 | 1942.2 |
| 25°   | 2863.2 | 2797.3 | 2684.6 | 2557.0 | 2380.8 | 2175.9 | 1981.1 | 1839.7 | 1760.6 | 1726.4 | 1725.2 |
| 27.5° | 2927.9 | 2853.0 | 2730.2 | 2540.8 | 2273.5 | 1998.5 | 1776.8 | 1638.9 | 1573.0 | 1543.7 | 1538.9 |
| 30°   | 3002.2 | 2923.1 | 2790.7 | 2479.1 | 2116.5 | 1793.5 | 1577.2 | 1480.1 | 1433.4 | 1404.0 | 1398.6 |
| 32.5° | 3092.7 | 3018.4 | 2840.4 | 2367.0 | 1915.8 | 1579.6 | 1421.4 | 1353.7 | 1311.1 | 1278.2 | 1272.2 |
| 35°   | 3224.5 | 3144.2 | 2853.0 | 2206.4 | 1695.3 | 1410.6 | 1307.0 | 1237.4 | 1179.9 | 1137.4 | 1133.2 |
| 37.5° | 3389.9 | 3301.8 | 2824.2 | 1998.5 | 1481.3 | 1301.0 | 1211.7 | 1126.0 | 1051.1 | 991.2  | 981.6  |
| 40°   | 3628.4 | 3495.4 | 2744.5 | 1758.8 | 1323.7 | 1216.5 | 1118.8 | 1021.1 | 928.2  | 858.1  | 844.3  |
| 42.5° | 3914.9 | 3722.5 | 2622.3 | 1520.3 | 1208.1 | 1130.8 | 1026.5 | 905.5  | 816.8  | 767.0  | 759.8  |
| 45°   | 4279.2 | 3958.6 | 2452.7 | 1311.7 | 1094.2 | 1045.1 | 927.0  | 815.6  | 760.4  | 723.9  | 717.9  |
| 47.5° | 4695.1 | 4223.5 | 2274.7 | 1142.2 | 997.7  | 964.8  | 847.3  | 775.4  | 731.7  | 702.9  | 697.5  |
| 50°   | 5206.2 | 4522.5 | 2086.0 | 1003.1 | 900.7  | 868.3  | 809.6  | 753.3  | 718.5  | 696.3  | 690.9  |
| 52.5° | 5782.7 | 4859.9 | 1949.9 | 893.5  | 820.4  | 797.0  | 789.8  | 741.3  | 713.1  | 696.3  | 690.9  |
| 55°   | 6403.5 | 5203.2 | 1803.1 | 801.2  | 750.9  | 757.4  | 776.6  | 742.5  | 723.3  | 702.9  | 695.1  |
| 57.5° | 7024.9 | 5558.0 | 1639.5 | 723.3  | 695.7  | 728.1  | 767.6  | 744.9  | 728.7  | 708.9  | 701.7  |
| 60°   | 7516.3 | 5782.7 | 1386.1 | 658.0  | 652.0  | 695.7  | 746.1  | 726.9  | 705.9  | 706.5  | 705.3  |
| 62.5° | 7745.8 | 5770.7 | 1106.2 | 599.8  | 608.2  | 652.0  | 711.3  | 698.7  | 681.3  | 704.7  | 706.5  |
| 65°   | 7617.0 | 5483.1 | 861.1  | 547.1  | 561.5  | 606.4  | 675.3  | 684.9  | 690.9  | 735.9  | 741.9  |
| 67.5° | 7076.5 | 4923.4 | 667.0  | 501.0  | 518.9  | 575.3  | 678.9  | 746.1  | 753.9  | 801.2  | 800.6  |
| 69°   | 6517.4 | 4398.5 | 579.5  | 477.0  | 498.0  | 583.1  | 725.7  | 785.0  | 755.6  | 806.0  | 798.8  |
| 70°   | 6048.8 | 3983.2 | 532.7  | 460.8  | 488.4  | 596.8  | 756.8  | 784.4  | 746.7  | 789.8  | 777.8  |
| 72.5° | 4658.5 | 2865.6 | 451.8  | 430.9  | 456.0  | 571.1  | 765.8  | 767.0  | 725.7  | 734.1  | 713.7  |
| 75°   | 3195.2 | 1810.9 | 394.3  | 390.1  | 406.9  | 514.8  | 737.1  | 732.9  | 671.2  | 659.2  | 642.4  |
| 77.5° | 1761.8 | 919.8  | 335.0  | 351.2  | 362.5  | 456.0  | 670.0  | 664.0  | 613.0  | 587.9  | 581.9  |
| 80°   | 679.5  | 402.7  | 282.8  | 312.2  | 319.4  | 394.9  | 587.3  | 581.9  | 539.3  | 507.0  | 498.0  |
| 82.5° | 256.5  | 210.9  | 233.7  | 270.3  | 267.9  | 326.0  | 497.4  | 494.4  | 453.0  | 405.7  | 391.3  |
| 85°   | 118.7  | 126.4  | 185.2  | 222.9  | 205.5  | 241.5  | 397.9  | 403.3  | 353.0  | 296.6  | 296.6  |
| 87.5° | 50.3   | 70.7   | 131.2  | 168.4  | 138.4  | 163.0  | 291.8  | 278.6  | 255.9  | 177.4  | 166.6  |
| 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   |           |      |      |       |



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)