



LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING
MEMBER
of the
IESNA

905 Harrison Street · Allentown, PA 18103 · 610-770-1044 · Fax 610-770-8912 · www.LuminaireTesting.com

LTL NUMBER: 16731

DATE: 09-28-2009

PREPARED FOR: RENOVA LIGHTING SYSTEMS

CATALOG NUMBER: ECS-LPW4-WN-232-UNV-12L

LUMINAIRE: FORMED WHITE ENAMEL STEEL HOUSING, FORMED WHITE ALUMINUM REFLECTOR, CLEAR PRISMATIC PLASTIC ENCLOSURE WITH LINEAR PRISMATIC SIDES.

LAMP: TWO 32 WATT T8 LINEAR FLUORESCENT LAMPS RATED AT 2850 LUMENS EACH.

LAMP CATALOG NUMBER: PHILIPS F32T8/TL841/ALTO

BALLAST: ONE SYLVANIA "QUICKTRONIC" QHE2X32T8/UNV-ISL-SC

MOUNTING: SURFACE

ELECTRICAL VALUES: 120.0VAC, 0.4008A, 48.05W

Candela Distribution

| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 | Flux |
|-----|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|-------|
| 0 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | |
| 5 | 1551 | 1552 | 1559 | 1554 | 1554 | 1554 | 1559 | 1552 | 1551 | 1552 | 1559 | 1554 | 1554 | 1554 | 1559 | 1552 | 147.7 |
| 15 | 1497 | 1499 | 1508 | 1508 | 1510 | 1508 | 1508 | 1499 | 1497 | 1499 | 1508 | 1508 | 1510 | 1508 | 1508 | 1499 | 424.9 |
| 25 | 1387 | 1391 | 1416 | 1434 | 1441 | 1434 | 1416 | 1391 | 1387 | 1391 | 1416 | 1434 | 1441 | 1434 | 1416 | 1391 | 651.7 |
| 35 | 1219 | 1232 | 1279 | 1308 | 1326 | 1308 | 1279 | 1232 | 1219 | 1232 | 1279 | 1308 | 1326 | 1308 | 1279 | 1232 | 795.8 |
| 45 | 964 | 995 | 1062 | 1117 | 1133 | 1117 | 1062 | 995 | 964 | 995 | 1062 | 1117 | 1133 | 1117 | 1062 | 995 | 809.2 |
| 55 | 539 | 643 | 766 | 804 | 810 | 804 | 766 | 643 | 539 | 643 | 766 | 804 | 810 | 804 | 766 | 643 | 649.8 |
| 65 | 317 | 371 | 483 | 569 | 601 | 569 | 483 | 371 | 317 | 371 | 483 | 569 | 601 | 569 | 483 | 371 | 469.2 |
| 75 | 179 | 215 | 303 | 402 | 433 | 402 | 303 | 215 | 179 | 215 | 303 | 402 | 433 | 402 | 303 | 215 | 325.5 |
| 85 | 51 | 109 | 192 | 275 | 289 | 275 | 192 | 109 | 51 | 109 | 192 | 275 | 289 | 275 | 192 | 109 | 202.8 |
| 90 | 1 | 56 | 141 | 205 | 228 | 205 | 141 | 56 | 1 | 56 | 141 | 205 | 228 | 205 | 141 | 56 | |
| 95 | 1 | 43 | 118 | 174 | 196 | 174 | 118 | 43 | 1 | 43 | 118 | 174 | 196 | 174 | 118 | 43 | 118.5 |
| 105 | 4 | 24 | 72 | 113 | 130 | 113 | 72 | 24 | 4 | 24 | 72 | 113 | 130 | 113 | 72 | 24 | 73.7 |
| 115 | 8 | 9 | 44 | 71 | 82 | 71 | 44 | 9 | 8 | 9 | 44 | 71 | 82 | 71 | 44 | 9 | 42.6 |
| 125 | 8 | 12 | 22 | 44 | 52 | 44 | 22 | 12 | 8 | 12 | 22 | 44 | 52 | 44 | 22 | 12 | 24.4 |
| 135 | 9 | 10 | 18 | 21 | 28 | 21 | 18 | 10 | 9 | 10 | 18 | 21 | 28 | 21 | 18 | 10 | 13.8 |
| 145 | 10 | 11 | 16 | 19 | 21 | 19 | 16 | 11 | 10 | 11 | 16 | 19 | 21 | 19 | 16 | 11 | 9.6 |
| 155 | 10 | 11 | 11 | 13 | 16 | 13 | 11 | 11 | 10 | 11 | 11 | 13 | 16 | 13 | 11 | 11 | 5.7 |
| 165 | 10 | 10 | 12 | 14 | 15 | 14 | 12 | 10 | 10 | 10 | 12 | 14 | 15 | 14 | 12 | 10 | 3.4 |
| 175 | 11 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 1.0 |
| 180 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | |

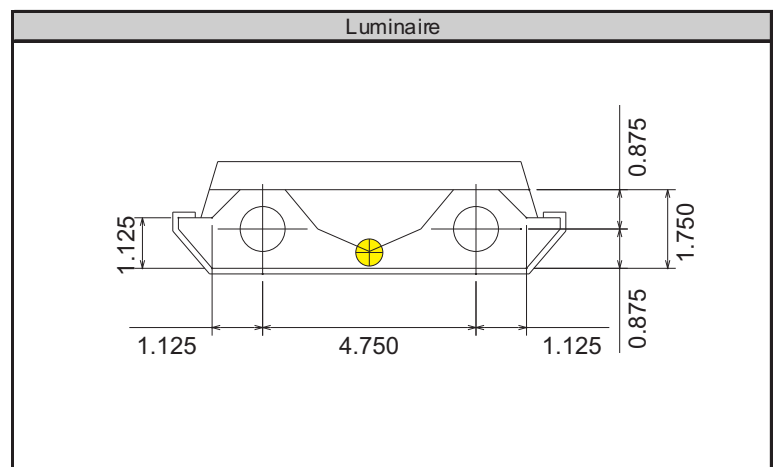
Zonal Lumen Summary

| Zone | Lumens | % of Lamp | % of Luminaire |
|--------|--------|-----------|----------------|
| 0-30 | 1224.4 | 21.5% | 25.7% |
| 0-40 | 2020.2 | 35.4% | 42.4% |
| 0-60 | 3479.1 | 61.0% | 72.9% |
| 0-90 | 4476.6 | 78.5% | 93.9% |
| 90-180 | 292.7 | 5.1% | 6.1% |
| 0-180 | 4769.4 | 83.7% | 100.0% |

Total luminaire efficiency: 83.7%

CIE Type: Direct
Spacing Criterion: 0 deg: 1.25 90 deg: 1.32
180 deg: 1.25 270 deg: 1.32

Total reflectance of paint: 91.2



Approved By: MG

THIS REPORT BASED ON LM-41 AND OTHER PERTINENT IESNA PROCEDURES.



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Candela Tabulation (5 degree Vertical Increments)

| | 0 | 22.5 | 45 | 67.5 | 90 | 112.5 | 135 | 157.5 | 180 | 202.5 | 225 | 247.5 | 270 | 292.5 | 315 | 337.5 |
|-----|------|------|------|------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|
| 0 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 | 1561 |
| 5 | 1551 | 1552 | 1559 | 1554 | 1554 | 1554 | 1559 | 1552 | 1551 | 1552 | 1559 | 1554 | 1554 | 1554 | 1559 | 1552 |
| 10 | 1532 | 1532 | 1538 | 1534 | 1535 | 1534 | 1538 | 1532 | 1532 | 1532 | 1538 | 1534 | 1535 | 1534 | 1538 | 1532 |
| 15 | 1497 | 1499 | 1508 | 1508 | 1510 | 1508 | 1508 | 1499 | 1497 | 1499 | 1508 | 1508 | 1510 | 1508 | 1508 | 1499 |
| 20 | 1450 | 1452 | 1466 | 1475 | 1482 | 1475 | 1466 | 1452 | 1450 | 1452 | 1466 | 1475 | 1482 | 1475 | 1466 | 1452 |
| 25 | 1387 | 1391 | 1416 | 1434 | 1441 | 1434 | 1416 | 1391 | 1387 | 1391 | 1416 | 1434 | 1441 | 1434 | 1416 | 1391 |
| 30 | 1310 | 1318 | 1356 | 1376 | 1385 | 1376 | 1356 | 1318 | 1310 | 1318 | 1356 | 1376 | 1385 | 1376 | 1356 | 1318 |
| 35 | 1219 | 1232 | 1279 | 1308 | 1326 | 1308 | 1279 | 1232 | 1219 | 1232 | 1279 | 1308 | 1326 | 1308 | 1279 | 1232 |
| 40 | 1109 | 1128 | 1181 | 1232 | 1252 | 1232 | 1181 | 1128 | 1109 | 1128 | 1181 | 1232 | 1252 | 1232 | 1181 | 1128 |
| 45 | 964 | 995 | 1062 | 1117 | 1133 | 1117 | 1062 | 995 | 964 | 995 | 1062 | 1117 | 1133 | 1117 | 1062 | 995 |
| 50 | 755 | 827 | 917 | 964 | 971 | 964 | 917 | 827 | 755 | 827 | 917 | 964 | 971 | 964 | 917 | 827 |
| 55 | 539 | 643 | 766 | 804 | 810 | 804 | 766 | 643 | 539 | 643 | 766 | 804 | 810 | 804 | 766 | 643 |
| 60 | 405 | 488 | 617 | 673 | 693 | 673 | 617 | 488 | 405 | 488 | 617 | 673 | 693 | 673 | 617 | 488 |
| 65 | 317 | 371 | 483 | 569 | 601 | 569 | 483 | 371 | 317 | 371 | 483 | 569 | 601 | 569 | 483 | 371 |
| 70 | 240 | 286 | 377 | 480 | 510 | 480 | 377 | 286 | 240 | 286 | 377 | 480 | 510 | 480 | 377 | 286 |
| 75 | 179 | 215 | 303 | 402 | 433 | 402 | 303 | 215 | 179 | 215 | 303 | 402 | 433 | 402 | 303 | 215 |
| 80 | 115 | 158 | 246 | 336 | 359 | 336 | 246 | 158 | 115 | 158 | 246 | 336 | 359 | 336 | 246 | 158 |
| 85 | 51 | 109 | 192 | 275 | 289 | 275 | 192 | 109 | 51 | 109 | 192 | 275 | 289 | 275 | 192 | 109 |
| 90 | 1 | 56 | 141 | 205 | 228 | 205 | 141 | 56 | 1 | 56 | 141 | 205 | 228 | 205 | 141 | 56 |
| 95 | 1 | 43 | 118 | 174 | 196 | 174 | 118 | 43 | 1 | 43 | 118 | 174 | 196 | 174 | 118 | 43 |
| 100 | 3 | 33 | 94 | 144 | 163 | 144 | 94 | 33 | 3 | 33 | 94 | 144 | 163 | 144 | 94 | 33 |
| 105 | 4 | 24 | 72 | 113 | 130 | 113 | 72 | 24 | 4 | 24 | 72 | 113 | 130 | 113 | 72 | 24 |
| 110 | 6 | 14 | 56 | 89 | 102 | 89 | 56 | 14 | 6 | 14 | 56 | 89 | 102 | 89 | 56 | 14 |
| 115 | 8 | 9 | 44 | 71 | 82 | 71 | 44 | 9 | 8 | 9 | 44 | 71 | 82 | 71 | 44 | 9 |
| 120 | 8 | 11 | 32 | 57 | 65 | 57 | 32 | 11 | 8 | 11 | 32 | 57 | 65 | 57 | 32 | 11 |
| 125 | 8 | 12 | 22 | 44 | 52 | 44 | 22 | 12 | 8 | 12 | 22 | 44 | 52 | 44 | 22 | 12 |
| 130 | 8 | 12 | 17 | 33 | 39 | 33 | 17 | 12 | 8 | 12 | 17 | 33 | 39 | 33 | 17 | 12 |
| 135 | 9 | 10 | 18 | 21 | 28 | 21 | 18 | 10 | 9 | 10 | 18 | 21 | 28 | 21 | 18 | 10 |
| 140 | 10 | 10 | 18 | 21 | 22 | 21 | 18 | 10 | 10 | 10 | 18 | 21 | 22 | 21 | 18 | 10 |
| 145 | 10 | 11 | 16 | 19 | 21 | 19 | 16 | 11 | 10 | 11 | 16 | 19 | 21 | 19 | 16 | 11 |
| 150 | 10 | 11 | 12 | 18 | 18 | 18 | 12 | 11 | 10 | 11 | 12 | 18 | 18 | 18 | 12 | 11 |
| 155 | 10 | 11 | 11 | 13 | 16 | 13 | 11 | 11 | 10 | 11 | 11 | 13 | 16 | 13 | 11 | 11 |
| 160 | 10 | 10 | 13 | 11 | 10 | 11 | 13 | 10 | 10 | 10 | 13 | 11 | 10 | 11 | 13 | 10 |
| 165 | 10 | 10 | 12 | 14 | 15 | 14 | 12 | 10 | 10 | 10 | 12 | 14 | 15 | 14 | 12 | 10 |
| 170 | 11 | 11 | 10 | 11 | 10 | 11 | 10 | 11 | 11 | 11 | 10 | 11 | 10 | 11 | 10 | 11 |
| 175 | 11 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 11 | 11 |
| 180 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |

Zonal Lumen Tabulation (5 degree zones)

| Zone | Lumens | Zone | Lumens | Zone | Lumens | Zone | Lumens |
|-------|--------|-------|--------|---------|--------|---------|--------|
| 0-5 | 37.2 | 45-50 | 394.0 | 90-95 | 65.0 | 135-140 | 6.0 |
| 5-10 | 110.5 | 50-55 | 350.0 | 95-100 | 53.5 | 140-145 | 5.3 |
| 10-15 | 180.3 | 55-60 | 299.7 | 100-105 | 41.9 | 145-150 | 4.4 |
| 15-20 | 244.7 | 60-65 | 254.7 | 105-110 | 31.8 | 150-155 | 3.3 |
| 20-25 | 301.9 | 65-70 | 214.5 | 110-115 | 24.1 | 155-160 | 2.4 |
| 25-30 | 349.7 | 70-75 | 178.7 | 115-120 | 18.5 | 160-165 | 2.1 |
| 30-35 | 386.2 | 75-80 | 146.9 | 120-125 | 14.1 | 165-170 | 1.4 |
| 35-40 | 409.6 | 80-85 | 117.2 | 125-130 | 10.3 | 170-175 | 0.8 |
| 40-45 | 415.2 | 85-90 | 85.7 | 130-135 | 7.8 | 175-180 | 0.3 |



| Coefficients of Utilization - Zonal Cavity Method | | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Effective Floor Cavity Reflectance 20% | | | | | | | | | | | | |
| Ceiling Cavity Reflectance | 90 | | | | 80 | | | | 70 | | | |
| | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 | 70 | 50 | 30 | 10 |
| Room Cavity Ratio (RCR) | | | | | | | | | | | | |
| 0 | 1.014 | 1.014 | 1.014 | 1.014 | 0.984 | 0.984 | 0.984 | 0.984 | 0.955 | 0.955 | 0.955 | 0.955 |
| 1 | 0.921 | 0.874 | 0.832 | 0.794 | 0.892 | 0.849 | 0.811 | 0.776 | 0.863 | 0.825 | 0.79 | 0.759 |
| 2 | 0.839 | 0.761 | 0.697 | 0.644 | 0.811 | 0.74 | 0.681 | 0.632 | 0.784 | 0.72 | 0.666 | 0.62 |
| 3 | 0.767 | 0.669 | 0.594 | 0.535 | 0.74 | 0.651 | 0.582 | 0.527 | 0.714 | 0.633 | 0.57 | 0.519 |
| 4 | 0.703 | 0.592 | 0.513 | 0.453 | 0.678 | 0.577 | 0.504 | 0.447 | 0.655 | 0.563 | 0.494 | 0.441 |
| 5 | 0.647 | 0.529 | 0.449 | 0.39 | 0.624 | 0.516 | 0.441 | 0.386 | 0.603 | 0.504 | 0.434 | 0.381 |
| 6 | 0.597 | 0.476 | 0.397 | 0.341 | 0.576 | 0.465 | 0.391 | 0.337 | 0.557 | 0.455 | 0.385 | 0.334 |
| 7 | 0.553 | 0.432 | 0.354 | 0.301 | 0.535 | 0.422 | 0.349 | 0.298 | 0.517 | 0.413 | 0.344 | 0.295 |
| 8 | 0.515 | 0.393 | 0.319 | 0.268 | 0.498 | 0.385 | 0.314 | 0.266 | 0.482 | 0.377 | 0.31 | 0.263 |
| 9 | 0.48 | 0.361 | 0.289 | 0.241 | 0.465 | 0.353 | 0.285 | 0.239 | 0.45 | 0.346 | 0.281 | 0.237 |
| 10 | 0.45 | 0.332 | 0.263 | 0.218 | 0.436 | 0.326 | 0.26 | 0.216 | 0.422 | 0.32 | 0.257 | 0.215 |

| Ceiling Cavity Reflectance | 50 | | | | 30 | | | 10 | | | 0 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 70 | 50 | 30 | 10 | 50 | 30 | 10 | 50 | 30 | 10 | 0 |
| Room Cavity Ratio (RCR) | | | | | | | | | | | |
| 0 | 0.901 | 0.901 | 0.901 | 0.901 | 0.852 | 0.852 | 0.852 | 0.807 | 0.807 | 0.807 | 0.785 |
| 1 | 0.81 | 0.779 | 0.751 | 0.725 | 0.738 | 0.715 | 0.694 | 0.7 | 0.681 | 0.664 | 0.643 |
| 2 | 0.734 | 0.681 | 0.637 | 0.598 | 0.646 | 0.609 | 0.577 | 0.614 | 0.584 | 0.557 | 0.536 |
| 3 | 0.668 | 0.601 | 0.547 | 0.503 | 0.571 | 0.526 | 0.488 | 0.543 | 0.505 | 0.473 | 0.452 |
| 4 | 0.612 | 0.535 | 0.476 | 0.43 | 0.51 | 0.459 | 0.418 | 0.486 | 0.443 | 0.407 | 0.388 |
| 5 | 0.563 | 0.48 | 0.419 | 0.372 | 0.458 | 0.405 | 0.364 | 0.438 | 0.392 | 0.355 | 0.336 |
| 6 | 0.521 | 0.434 | 0.373 | 0.327 | 0.415 | 0.361 | 0.32 | 0.398 | 0.35 | 0.313 | 0.295 |
| 7 | 0.485 | 0.395 | 0.334 | 0.289 | 0.379 | 0.324 | 0.284 | 0.363 | 0.315 | 0.278 | 0.261 |
| 8 | 0.452 | 0.362 | 0.302 | 0.259 | 0.347 | 0.293 | 0.254 | 0.334 | 0.286 | 0.249 | 0.233 |
| 9 | 0.424 | 0.333 | 0.274 | 0.233 | 0.32 | 0.267 | 0.229 | 0.308 | 0.26 | 0.225 | 0.21 |
| 10 | 0.398 | 0.308 | 0.251 | 0.211 | 0.297 | 0.245 | 0.208 | 0.286 | 0.239 | 0.205 | 0.19 |

Average Luminance Table (cd/m²)

| | 0 | 45 | 90 |
|----|------|------|------|
| 0 | 6419 | 6419 | 6419 |
| 45 | 5605 | 6022 | 6199 |
| 55 | 3861 | 5160 | 5198 |
| 65 | 3082 | 4165 | 4835 |
| 75 | 2838 | 3779 | 4881 |
| 85 | 2412 | 4604 | 5718 |

THIS TEST WAS CONDUCTED USING RELATIVE PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IESNA PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) ACCORDING TO IESNA PROCEDURES, THE BALLAST(S) AND LAMP(S) ARE PRESUMED TO PRODUCE 100% OF RATED OUTPUT. AN APPROPRIATE BALLAST FACTOR MUST BE APPLIED TO THE LUMEN OUTPUT RATINGS AND LUMINOUS INTENSITY VALUES GIVEN. 3) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25 °C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.

