

GENERAL NOTES:

1. ALL LIGHTING FIXTURES, LAMPS AND RELATED DEVICES FURNISHED UNDER THIS CONTRACT SHALL CARRY THE APPROVAL LABEL OF UL OR ETL FOR THE SPECIFIC APPLICATION IN WHICH THEY ARE USED.
2. THE STATEMENT "FINISH TO BE SELECTED BY DESIGN PROFESSIONAL" SHALL BE INTERPRETED TO MEAN THAT THE FINISH OF THE LUMINAIRE SHALL MATCH THE APPEARANCE OF A PAINT CHIP, COLOR NUMBER, OR METAL SWATCH FURNISHED BY THE DESIGN PROFESSIONAL DURING THE SUBMITTAL REVIEW PROCESS.
3. CONTRACTOR SHALL CONFIRM FIXTURE VOLTAGES, CEILING TRIMS, AND MOUNTING HARDWARE ARE COMPATIBLE WITH THEIR APPLICATION AS DETERMINED BY THE DESIGN PROFESSIONAL PRIOR TO ORDERING FIXTURES.
4. CONTRACTOR SHALL PROVIDE ALL MOUNTING HARDWARE AS REQUIRED FOR FIXTURE INSTALLATION.
5. CONTRACTOR SHALL VERIFY ALL FINAL RUN LENGTHS FOR INTEGRATED MILLWORK LIGHTING EQUIPMENT WITH APPROVED MILLWORK SHOP DRAWINGS.
6. DIMMING RANGES IDENTIFIED IN THE LIGHTING FIXTURES INDICATE THE REQUIRED LOW END DIMMING. ALL LIGHTING EQUIPMENT IDENTIFIED AS DIMMABLE SHALL PROVIDE SMOOTH CONTINUOUS DIMMING FROM 100% POWER OUTPUT TO THE LOW-END PERCENTAGE OF POWER OUTPUT IDENTIFIED IN THE FIXTURE SCHEDULE.
7. ALL DIMMABLE FLUORESCENT AND LED LAMPS SHALL BE BURNED CONTINUOUSLY FOR 100 HOURS AT FULL OUTPUT PRIOR TO FOCUSING OF FIXTURES AND COMMISSIONING OF CONTROL SYSTEMS.
8. **LED CHROMATICITY AND COLOR RENDERING INDEX (CRI)**
WRITE LEDS SHALL MEET, AT A MINIMUM, CHROMATICITY STANDARDS SET BY ANSI/IESNA/ANSI: C78.377.2015.
UNLESS OTHERWISE NOTED, THE COLOR RENDERING INDEX (CRI) FOR LED EQUIPMENT SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS:
 - EXTERIOR LUMINAIRES > 70 CRI
 - INTERIOR LUMINAIRES > 80 CRI
9. **LED LUMEN MAINTENANCE (L70)**
LED LUMEN MAINTENANCE SHALL BE MEASURED IN ACCORDANCE WITH IESNA LM-80 STANDARDS. PHOTOMETRIC TESTING FOR SOLID STATE LUMINAIRES SHALL BE IN ACCORDANCE WITH IESNA LM-79 STANDARDS.
UNLESS OTHERWISE NOTED, THE LUMEN MAINTENANCE (L70) RATED LIFETIME FOR LED EQUIPMENT SHALL MEET THE FOLLOWING MINIMUM REQUIREMENTS:
 - INTEGRATED LED CHIP-BASED LUMINAIRES > 50,000 HOURS
 - LINEAR FLUORESCENT LED TUBES > 30,000 HOURS
 - SCREW-BASE, GU10 BASE & PIN-BASE LED LAMPS > 25,000 HOURS
 - WEDGE-BASE LED LAMPS > 8,000 HOURS
10. **LED WARRANTY:**
UNLESS OTHERWISE INDICATED, ALL LIGHTING EQUIPMENT WITH INTEGRATED LED LIGHT ENGINE (AND ASSOCIATED DRIVERS), ALL SELF-CONTAINED LED LAMPS (SCREW-BASE, PIN-BASE) SHALL PROVIDE A MINIMUM 5-YEAR WARRANTY ON THE LAMP MODULE.
11. CONTRACTOR SHALL SELECT, FURNISH AND INSTALL THE CORRECT SIZE OF SECONDARY WIRING FROM REMOTE TRANSFORMERS AND/OR REMOTE BALLASTS AS REQUIRED TO KEEP VOLTAGE DROP IN THE SECONDARY WIRING BELOW 3% OF RATED VOLTAGE.
12. CONTRACTOR SHALL PROVIDE LABOR AND EQUIPMENT FOR FOCUSING OF ADJUSTABLE FIXTURES AND PRESETTING OF LIGHTING CONTROL SYSTEMS. FOCUSING AND PRESETTING SHALL BE DONE IN THE PRESENCE OF THE DESIGN PROFESSIONAL. CONTRACTOR SHALL FOCUS LIGHTING AFTER DARK IF DIRECTED BY THE OWNER'S REPRESENTATIVE. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL PROVIDE AT LEAST ONE DAY OF A FACTORY-TRAINED AND CERTIFIED TECHNICIAN TO PROVIDE WARRANTY START UP AND PROGRAMMING FOR ALL LIGHTING CONTROL SYSTEMS AND PROGRAMMABLE LIGHTING FIXTURES.

(NOT APPLICABLE) 13. CONTRACTOR SHALL PROVIDE THE FOLLOWING WITH THEIR BID:
A—THE UNIT PRICE, WITHOUT LAMP, FOR EACH LIGHTING FIXTURE TYPE LISTED WITHIN THE LIGHTING FIXTURE SCHEDULE. THE UNIT PRICE SHALL BE FOR ONE OF THE LISTED MANUFACTURERS FOR THAT PARTICULAR FIXTURE. THE MANUFACTURER SHALL BE IDENTIFIED. SUBSTITUTIONS FOR FIXTURES PROVIDED BY MANUFACTURERS NOT LISTED IN THE SCHEDULE ARE NOT ACCEPTABLE. SEE BELOW FOR REQUIREMENTS ASSOCIATED WITH SUBMITTING LIGHTING FIXTURE SUBSTITUTIONS.
B—THE TOTAL QUANTITY OF EACH FIXTURE TYPE WITH THE EXTENDED GOST FOR THAT QUANTITY.
C—THE UNIT PRICE, TYPE, AND QUANTITY OF LAMPS.

(NOT APPLICABLE) 14. WITHIN 21 DAYS OF CONTRACT AWARD, THE CONTRACTOR SHALL FURNISH SUBMITTALS FOR ALL LIGHTING FIXTURES FOR REVIEW BY THE DESIGN PROFESSIONAL. THE SUBMITTALS SHALL INCLUDE LUMINAIRE CATALOG CUTS, SUBMITTAL SHEETS, OR MANUFACTURER SHOP DRAWINGS INDICATING THE FOLLOWING: NOT USED
A—MANUFACTURER'S NAME AND COMPLETE CATALOG NUMBER
B—FIXTURE TYPE, DIMENSIONS AND FINISHES
C—FIXTURE PHOTOMETRIC TEST DATA FROM AN INDEPENDENT TEST LABORATORY
D—FIXTURE ACCESSORIES, COMPONENTS, AND HARDWARE WITH SPECIFICS
E—LAMP TYPE, QUANTITY, WATTAGE, LUMEN OUTPUT, RATED LIFE, COLOR TEMPERATURE, COLOR RENDERING INDEX AND BEAM SPREAD (AS APPLICABLE)
F—BALLAST TYPE AND FIXTURE VOLTAGE
SUBMITTALS FOR LIGHTING FIXTURES MOUNTED WITHIN ARCHITECTURAL COVES OR GASWORK, VARIABLE LENGTH FIXTURES, AND FOR NON-STANDARD OR CUSTOM FIXTURES, SHALL ALSO INCLUDE SCALED DRAWINGS SHOWING THE LAYOUT AND DIMENSIONS OF ALL FIXTURE COMPONENTS AND ACCESSORIES, THE METHOD OF INSTALLATION, AND A COMPLETE BILL OF MATERIALS.

(NOT APPLICABLE) 15. LIGHTING FIXTURE SUBSTITUTION REQUESTS MUST BE SENT TO AND RECEIVED BY THE LIGHTING DESIGNER FOR REVIEW 44 DAYS PRIOR TO BID DATE. FAILURE TO SUBMIT WITHIN THIS DEADLINE SHALL CONSTITUTE A GUARANTEE THAT THE SPECIFIED FIXTURES WILL BE SUPPLIED. THE SUBMITTAL SHALL INCLUDE THE FOLLOWING:
A—HARD COPIES OF THE SUBMITTALS REQUIRED ABOVE FOR BOTH THE SPECIFIED FIXTURE AND THE PROPOSED SUBSTITUTE
B—ONE NON-RETURNABLE WORKING SAMPLE OF THE PROPOSED SUBSTITUTE FIXTURE WITH CORRECT PLUG CONNECTION FOR 120-VOLT OPERATION AND SPECIFIED LAMPS
C—CONTRACTOR'S STATEMENT INDICATING THE EFFECT OF THE SUBSTITUTION ON THE CONSTRUCTION SCHEDULE COMPARED TO THE SCHEDULE WITHOUT THE APPROVAL OF THE PROPOSED SUBSTITUTION
D—CONTRACTOR'S CERTIFICATION STATING THAT THE PROPOSED SUBSTITUTION CONFORMS TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS IN EVERY RESPECT AND IS APPROPRIATE FOR THE APPLICATIONS INDICATED IN THE DOCUMENT
E—CONTRACTOR'S CERTIFICATION STATING THAT ANY MODIFICATIONS TO ANY BUILDING SYSTEM OR COMPONENT THAT MAY RESULT FROM THE PROPOSED LIGHTING FIXTURE SUBSTITUTION WILL BE DESIGNED AND CONSTRUCTED AT THE CONTRACTOR'S EXPENSE
F—CONTRACTOR'S WAIVER OF RIGHTS TO ADDITIONAL OWNERSHIP TIME THAT MAY BECOME NECESSARY SHOULD THE PROPOSED SUBSTITUTION FAIL TO PERFORM IN A MANNER THAT MATCHES THE SPECIFIED FIXTURE
G—CONTRACTOR NET UNIT PRICE FOR THE SPECIFIED FIXTURE AND FOR THE PROPOSED SUBSTITUTE FIXTURE
REVIEW ONE ROUND OF VALUE ENGINEERING LIGHTING SUBMITTAL PROPOSED BY THE CONTRACTOR FOR THE BID PACKAGE.

DEFINITIONS:

1. CORRELATED COLOR TEMPERATURE (CCT): THE ABSOLUTE TEMPERATURE, MEASURED IN DEGREES KELVIN, OF A BLACKBODY RADIATOR HAVING CHROMATICITY RESEMBLING THAT OF AN ELECTRIC LIGHT SOURCE. FOR LED SOURCES CCT SHALL NOT DEVIATE FROM THE REFERENCE COLOR TEMPERATURE BY NO MORE THAN THREE MACADAM ELLIPSES, AS DEFINED BY NEMA/ANSI/ANSI/G C78.377.2015.
2. COLOR RENDERING INDEX (CRI): MEASURE OF COLOR SHIFT OBJECTS UNDERGO WHEN ILLUMINATED BY AN ELECTRIC LIGHT SOURCE AS COMPARED WITH THE COLOR OF THE SAME OBJECTS ILLUMINATED BY A REFERENCE SOURCE AT THE SAME COLOR TEMPERATURE. CRI VALUES FOR ELECTRIC LIGHT SOURCES RANGE FROM APPROXIMATELY 20 (LOW PRESSURE SODIUM) TO 99 (HALOGEN). CRI VALUES FOR LED SOURCES SHALL BE MEASURED AFTER 6000 HOURS AND SHALL NOT DEVIATE MORE THAN 3 POINTS FROM THE RATED VALUE.
3. LED LIGHT ENGINE: THE COMBINED LED LIGHT SOURCE AND ITS ASSOCIATED ELECTRONIC DRIVER. THE LED LIGHT ENGINE MAY HAVE AN INTEGRAL DRIVER OR THE DRIVER MAY BE HOUSED IN A SEPARATE ENCLOSURE.
4. LED DRIVER: CONTROL DEVICE THAT MAINTAINS CONSTANT AMOUNT OF CURRENT TO THE LED LIGHT SOURCE. LED DRIVERS GENERALLY OPERATE AT 12VDC OR 24VDC. SOME DRIVERS ARE DESIGNED TO ACCEPT BRANCH CIRCUIT VOLTAGE RANGING FROM 120VAC THROUGH 277VAC OR MAY REQUIRE A SEPARATE TRANSFORMER.
5. TRANSFORMER: ELECTROMAGNETIC OR ELECTRONIC DEVICE THAT STEPS DOWN PRIMARY VOLTAGE TO A LOWER SECONDARY VOLTAGE. GENERALLY SECONDARY VOLTAGE WILL BE 12V OR 24V.
6. DIMMING: THE REDUCTION OF LIGHT INTENSITY OF A LIGHT SOURCE. ALL SOURCES SHALL HAVE A SMOOTH, FICKER-FREE AND CONTINUOUS DIMMING CURVE. LED SOURCES MAY BE DIMMED BY EITHER CONSTANT CURRENT REDUCTION (CCR) OR BY PULSE WIDTH MODULATION (PWM) DIMMING FOR CONSTANT CURRENT DRIVERS.
7. RATED LUMEN MAINTENANCE LIFE: THE ELAPSED OPERATING TIME OVER WHICH AN LED LIGHT SOURCE WILL MAINTAIN THE PERCENTAGE OF ITS INITIAL LUMEN OUTPUT.
L70: TIME, IN HOURS, TO 70% LUMEN MAINTENANCE
L50: TIME, IN HOURS, TO 50% LUMEN MAINTENANCE