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ACC: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60

15. Ballasts shall meet the following requirements and shall pass tests in accordance with Test Method Tex-1130-T, Ballasts of Lighting Assemblies.
 - a. Ballast and starter shall be mounted on a removable stainless steel or aluminum tray of adequate thickness as approved by the engineer.
 - b. A wiring diagram for the fixture shall be inside fixture on or near the ballast.
 - c. Ballast shall be copper winding magnetic regulating three isolated coil ballast.
 - d. Ballast shall have a ballast factor between .95 and 1.0.
 - e. When the circuit voltage indicated on the plans is applied, the ballast input wattage during fluctuations of the test voltage of plus 10 percent and minus 10 percent shall not exceed the following:
 - i. 220 Watts for 150 watt nominal lamp rating
 - ii. 440 Watts for 250 watt nominal lamp rating
 - iii. 552 Watts for 400 watt nominal lamp rating
 - f. During fluctuation of the test voltage of plus 10 percent and minus 10 percent, the lamp wattage fluctuation shall not exceed a total of 20 percent and ballast shall maintain lamp wattage within the following limits.
 - i. 110 Watts minimum and 180 Watts maximum for 150 Watt nominal lamp rating
 - ii. 175 Watts minimum and 370 Watts maximum for 250 Watt nominal lamp rating
 - iii. 280 Watts minimum and 475 Watts maximum for 400 Watt nominal lamp rating
 - g. The power factor of any ballast, when tested at the circuit voltage indicated on the plans, shall not be less than 90 percent.
 - h. Ballasts shall be permanently and clearly marked to indicate following:
 - i. Lamp type
 - ii. Catalog number
 - iii. Voltage rating
 - iv. Connection diagram
 - v. Manufacturer
 - vi. UL listing
16. The electronic starting aid shall meet the following requirements and shall pass tests in accordance with Test Method Tex-1140-T, Electronic Starting Aids of High Pressure Sodium Vapor Lighting Assemblies.
 - a. Starting aid shall provide a starting pulse with an amplitude of 2500 volts minimum, 4000 volts maximum.
 - b. The pulse width shall be a minimum of 0.8 microseconds at 2250 volts.
 - c. The pulse shall occur when the open circuit voltage is equal to or greater than 90 percent of peak open circuit voltage.
 - d. Pulse repetition rate shall be a minimum of one per cycle
 - e. Pulse current shall be a minimum of 0.18 amperes.
 - f. The starting aid shall discontinue to pulse when, either,
 - i. the lamp starts, or
 - ii. after a minimum of 3 minutes and a maximum of 10 minutes if the lamp fails to start.
17. Lamps shall meet the following specifications
 - a. Lamps shall be Osram Sylvania Lumalux Plus high pressure sodium (HPS) lamps of the wattages shown on the plans. No alternates will be allowed.
 - b. Lamps shall fully extinguish at end of usable lamp life and remain extinguished without cycling.
 - c. Lamps that burn at reduced output at end of life are not acceptable.
 - d. Lamps shall meet the Federal Toxic Characteristic Leachate Procedure (TCLP).
 - e. 150 watt lamps shall be 55 volt.
 - f. Lamp shall be supplied with the fixture.
18. Photometrics. Fixtures shall meet the following photometric requirements using published photometric data and photometric data obtained by testing sampled fixtures.
 - a. 150 Watt mast arm (underpass) mounted luminaire shall meet IESNA Medium Cutoff requirements. The fixtures shall provide a minimum intensity of 0.20 foot-candle in a rectangular area measuring 110.0 feet by 30.0 feet, when mounted 20.0 feet above the midpoint of either long side of the surface area.
 - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 50:1 within the above mentioned rectangular area.
 - b. The 250-watt mast arm mounted luminaire shall meet IESNA cutoff requirements and, when mounted 40.0 feet above the midpoint of either long side of a rectangular area 190 feet by 45 feet, shall provide a minimum intensity of 0.20 footcandle at any point on the surface of this area. Light intensities measured in footcandles along a line parallel to and 20.0 feet in from the long side of the previously defined rectangular area above which the luminaire is mounted shall decrease at a rate not to exceed 0.50 footcandle in any 5.0 foot interval along the aforementioned line from 10.0 to 90.0 feet on both sides of the luminaire and shall not be less than 0.30 footcandle at any point along such a line.
 - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.
 - c. The 400-watt mast arm mounted luminaire shall meet IESNA cutoff requirements and, when mounted 50.0 feet above the midpoint of either long side of a rectangular area 220.0 feet by 60.0 feet, shall provide a measured minimum intensity of 0.20 footcandle at any point on the surface of this area. Light intensities measured in footcandles along a line parallel to and 30.0 feet in from the long side of the previously defined rectangular area above which the luminaire is mounted shall decrease at a rate not to exceed 0.75 footcandle in any 10.0 foot interval along the aforementioned line from 10.0 to 90.0 feet on both sides of the luminaire and shall not be less than 0.30 footcandle at any point along such a line.
 - i. The maximum to minimum horizontal illuminance uniformity ratio shall not exceed 20:1 within the above mentioned rectangular area.
19. Photometric data shall be consistent from fixture to fixture. Unless otherwise approved by the Engineer, the photometric performance shall match published data (or approved photometric reports submitted during the prequalification process as the typical photometric output in lieu of published data) as follows:
 - a. Point of maximum candela shall be within 5 degrees horizontally and vertically.
 - b. Maximum candela shall be within 20 percent of published maximum candela.
 - c. Fixture efficiency shall be within 10 percent of published efficiency.
20. All luminaires shall be pre-qualified. No alternates will be considered.
 - a. Only materials, with approved product codes or designations, from prequalified producers are accepted on bids. The Construction Division (CST) of the Texas Department of Transportation (TxDOT) maintains the material producers list of approved producer product codes or designations. Use the following website to view this list:
<http://www.dot.state.tx.us/business/materialproducerlist.htm>
 Use of prequalified material does not relieve the contractor of the responsibility to ensure that the material meets specifications. All materials, including those shown on the prequalified material list, may be inspected and tested at any time and may be rejected if not in compliance with the specifications.
 - b. Contractor shall notify the Engineer in writing as to which fixture from the list of approved fixtures will be supplied.

- c. A manufacturer desiring to have a fixture listed as a pre-qualified fixture shall:
 - i. Submit a sample of each type of luminaire and all pertinent data, including published photometric data and recently tested photometric data (IES format, both "averaged" and both sides of "un-averaged" data) to:

TxDOT- TRF
118 East Riverside Dr.
Austin, TX 78704
 - ii. Manufacturer must demonstrate a commitment to quality
 - iii. Manufacturer shall prepare and submit a QA/QC program documentation with the following minimum requirements.
 1. Written statement of the companies QA/QC policy
 2. QA/QC person is employed that has special QA/QC training and has QA/QC as their primary job responsibility
 3. A written procedure specifically for handling orders for fixtures built to TxDOT specifications.
 4. A written procedure for keeping track of fixtures built, certified, and tested for TxDOT orders.
 5. A check list of features for TxDOT fixtures with QA/QC person signature.
 - d. Prequalification samples, if approved, will not be returned to the manufacturer but will be retained by TxDOT for comparison testing. Once a fixture has been approved, no changes shall be made in any material or manufacturing methods without prior approval of the Department. Unapproved changes will result in rejection of fixtures.
 - e. In addition, luminaires will be tested for compliance with this specification. Luminaires that inconsistently pass testing or that are inconsistent with published photometric information will be removed from the pre-qualified list at the discretion of the engineer.
21. Sampling. Sample in accordance with Text Method Tex-1110-T, Sampling Lighting Assemblies.
22. Warranty. Any fixture failing within five years of installation will be replaced by the manufacturer with a fixture that passes all testing, delivered to the project location.
23. Testing. The manufacturer shall conduct electrical testing required in paragraphs 15 and 16, and all photometric testing shall be at the manufacturer's expense and at the following rates.
 - a. From each lot or manufacturing run, the manufacturer shall select one completed fixture of each 25, with a minimum of two and a maximum of 5, to be photometrically tested at an independent test lab approved by TxDOT.
 - i. Testing shall provide IES photometric report in two formats:
 1. Standard averaged format for asymmetric fixtures
 2. Un-averaged format showing both sides, un-averaged data may be supplied in two files or as otherwise approved by the Engineer.
 - ii. Test data shall be supplied directly to TRF-TE electronically for evaluation prior to shipping fixtures to the project.
 - iii. Test reports shall include:
 1. TxDOT's Control-Section-Job number, maintenance contract number, or purchase order number that the fixtures are assigned to,
 2. a unique fixture test number per fixture,
 3. date of manufacture, and
 4. quantities supplied and lot number per fixture type.
 - iv. Unique lab report number shall be written on the top of the fixture housing with permanent marker. Test lab shall keep results for 5 years and shall make all documentation available to TxDOT.
 - v. Manufacturer shall keep records of manufacturing lots, test reports, lot quantities, and other pertinent details. Such records shall be submitted to the Department upon request.
 - vi. Manufacturer shall make available to TxDOT inspectors upon request, all manufacturing facilities involved in the production of fixtures intended to be used on TxDOT projects, inventories of fixtures produced to TxDOT specifications, and records of fixture testing and tracking.
 - b. Departmental Test Reporting. Departmental test reports will be issued as follows:
 - i. For projects requiring 1-15 fixtures of a particular wattage, TRF will authorize a passing test report when the following steps have been completed.
 1. a review of the submittal letter from the contractor to the Engineer identifying the fixture to be supplied,
 2. a review of test reports supplied by the manufacturer shows that the fixtures meet the photometric requirements of this specification, and
 3. a review of the history of testing from that manufacturer shows consistent passing of the electrical, photometric, and fixture construction quality requirements.
 - ii. For projects with 16 or more fixtures of a particular wattage, TRF will authorize a passing test report when the following steps have been completed.
 1. a review of the submittal letter from the contractor to the Engineer identifying the fixture to be supplied,
 2. a review of test reports supplied by the manufacturer shows that the fixtures meet the photometric requirements of this specification, and
 3. a review of the history of testing from that manufacturer shows consistent passing of the photometric and fixture construction quality requirements.
 4. Fixtures are shipped to the project and two fixtures are sampled and tested by the Engineer in accordance with Texas Test Method Tex 1110-T.
 5. A review of the photometric test reports from the Departments lab show compliance with this specification and comparison to photometric reports supplied by the manufacturer are within the tolerances allowed by this specification.

1/04 Revision

Modify fixture specifications

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|-------------------------------------|----------------|---|---------------------|------------------------------------|----------|
| STANDARD PLANS | | Texas Department of Transportation | | <i>Traffic Operations Division</i> | |
| ROADWAY ILLUMINATION DETAILS | | | | | |
| RID(3)-04 | | | | | |
| © TxDOT January 1992 | | DR - KB | CR - KB | DR - FON | CR - CAL |
| REVISIONS | STATE DISTRICT | FEDERAL RECTOR | FEDERAL AID PROJECT | SHEET | |
| 5-93 | | | | 147 | |
| 10-93 | DA | 6 | CM 97(8) | | |
| 10-98 | | | | | |
| 1-04 | COUNTY | CONTROL | SECTION | JOB | REMARK |
| | DALLAS | 0918 | 45 | 344 | MS |