

**SPECIFICATIONS
FOR
ROADWAY LIGHTING
CITY OF MAPLE GROVE, MINNESOTA**

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**SPECIFICATIONS
FOR
ROADWAY LIGHTING
DIVISION RL – ELECTRICAL LIGHTING SYSTEM**

CITY OF MAPLE GROVE, MINNESOTA

1. COMPLIANCE WITH ELECTRICAL CODES AND STANDARDS

Bidders are advised that the National Electrical Code (NEC) and the 2014 edition of MnDOT “Standard Specifications for Construction” shall govern. Compliance with provisions of MnDOT 2545.2A, and the first paragraph of MnDOT 2545.3a will be particularly enforced in conjunction with the construction of any kind or type of electrical system, conduit or conduit system for the conveyance of the electrical conductors, or the required portions thereof, as specified in the Contract. The Minnesota Electrical Act requires that a permit be obtained for the performance of all such work, including the installation of conduits. When required, the City of Maple Grove (Owner) shall obtain the necessary right-of-way permitting required by and through Hennepin County. The Contractor shall obtain all other necessary permits including, but not limited to, an electrical permit. Work shall be inspected and approved by the Owner.

Signal and Lighting Certification will be required for all Contractors, Supervisors or Foreman involved in the field installation of this Project. Signal and Lighting Certification is available through the MnDOT Office of Traffic, Safety, and Technology (OTST). Questions regarding certification or past certification may be directed to the MnDOT Office of Traffic, Safety, and Technology (OTST) at Telephone No. (651) 234-7055.

All material shall meet the requirements of the NEC (NEC), National Electrical Manufacturers Association (NEMA) specifications, and local codes and ordinances, and shall be Underwriter's Laboratories (UL) listed, where UL standards for such products exist.

All work shall be under the direct supervision of a master electrician.

2. (2545) ELECTRICAL SYSTEM

The provisions of MnDOT 2471, 2545, and 2565 shall apply in addition to the following:

3. SCOPE OF WORK

a. DESCRIPTION

The work included in the project shall consist of removal and salvage of existing materials, installation and rewiring of 5 electrical cabinets (furnished by City), furnish and installation of 75 street light poles, and furnish and installation of 79 street light fixtures. The contract includes the furnishing of all required labor and materials for a complete and operable electrical system as indicated on the accompanying Plans and as required by the project manual inclusive of all appurtenances not specifically shown or covered by the specifications but required for complete operation of the electrical system as defined in the documents. The work shall also include the testing, adjustment, start-up and troubleshooting of the electrical equipment and the training of the Owner's operating personnel in its operation and maintenance.

It shall be the responsibility of the Contractor to furnish a complete and fully operating system. The Contractor shall be responsible for all details which may be necessary to properly install, adjust and place in operation the complete installation. The Contractor shall assume full responsibility for additional costs which may result from unauthorized deviations from the contract documents.

Light standards are to be furnished and installed as shown in the Plans and including but not limited to the following items:

- i. furnish and install poles, GFCI's and LED luminaires
- ii. install service cabinet furnished by City on existing foundation

b. VERIFICATION OF DRAWINGS

The locations of equipment shall be verified in the field by the Contractor. In the event it should become necessary to change the location of any work due to interference with other work, consult with the Owner before making any changes. The Contractor shall determine and be responsible for verifying the proper location and character of all anchor bolts, inserts, hangers, sleeves, etc. for the electrical equipment, unless specifically detailed otherwise. Rough-in location confirmation is required to be coordinated with equipment shop drawings prior to installation.

The drawings indicate the extent and general layout of the electrical systems. The drawings are drawn to the scale indicated, but the drawings shall not take precedence over field measurements. Make reasonable modifications to the layout to avoid conflict with other trades.

C. QUALITY

All work shall be installed by skilled mechanics in a neat and workmanlike manner and shall be approved by the Owner before final acceptance.

If equipment is furnished having power and control requirements other than as specified, the Contractor shall make all necessary changes and furnish a complete set of drawings for installing the alternate equipment. The installation shall comply with the requirements of the 2014 edition of the NEC, local and state codes and ordinances. Where the contract documents call for workmanship or materials in excess of code requirements, the project manual shall take precedence. Electrical equipment and materials shall be UL listed, where UL standards for such products exist.

All equipment to be installed on the project shall be new and unused.

The Contractor shall keep the premises clean and orderly during installation of this work, remove rubbish periodically and as may be directed by the Engineer. Upon completion of this part of the project, remove all dirt, debris, tools, scaffolding, etc. used or resulting from this work.

All excavation necessary for installation of the electrical lighting system shall be backfilled and compacted at the end of working day or when work has been suspended.

d. COORDINATION

It shall be the sole responsibility of the Contractor to coordinate with other private utilities.

It shall be the sole responsibility of the Contractor to coordinate among suppliers and contractors providing equipment for the project. The coordination shall include, but not be limited to, operators, power requirements, etc.

Cooperate with other trades to avoid interferences in the installation of this work. Install all equipment and systems so as not to delay progress of construction, and correlate with other trades to avoid delay. Should differences of opinion develop; the Owner's decision will be final.

All items shall be installed prior to boulevard grading and/or restoration.

Contract unit prices shall reflect all construction costs.

4. GENERAL

Power supply to the lighting system is 120/240-volt, single phase, alternating current, and controlled as outlined in the Plans.

a. CONSTRUCTION WIRING AND LIGHTING

If required, the Contractor shall make all arrangements with the utility and shall pay the costs of temporary power including costs of installation, maintenance, energy costs, and removal of the system. The Contractor shall not make use of the Owner's service without written permission by the Owner. Wright Hennepin contact: 763-477-3150.

All temporary lighting and power shall use UL approved devices and all systems shall meet safety requirements of the NEC and other applicable ordinances.

5. SHOP DRAWINGS AND SUBMITTALS

The Contractor shall submit to the Owner for approval, a complete list of major electrical system components. This list shall include the names of all suppliers and manufacturers and catalog numbers for the various components. This list must be approved by the Owner prior to the commencement of work on the Lighting System.

The Contractor shall furnish to the Owner five (5) complete sets of shop detail drawings, in accordance with the provisions of MnDOT 2471.3B. The shop detail drawings shall bear the name of the City, the project, and the manufacturer. The five sets of drawings shall be distributed, after approval to the following:

- (1) Contractor
- (2) Contractor's Fabricator
- (3) City (3 sets)

Approval of shop drawings and submittals shall not relieve the Contractor from the responsibility for deviations from the drawings or specifications unless he has, in writing, called the Owner's attention to the deviations at the time of submission, and secured written approval, nor shall it relieve him from the responsibility for errors in shop drawings or submittals.

6. MATERIALS

The Owner reserves the right to sample, test, inspect, and accept or reject any of the materials used for the lighting systems based on its own tests. However, the Owner may at their option, accept materials on the basis of listing by UL.

Fabrication and inspection of structural metals used for the Lighting Systems shall be in accordance with the applicable provisions of MnDOT 2471.

a. LUMINAIRES

Luminaires shall be Arieta LED area luminaire (specification attached) or McGraw Edison LED (specification attached) or approved equal.

Ten year limited warranty is required on all components.

b. POLES

Pole Details:

- i. Material: Aluminum tub 0.156" wall, Alloy 6063-T6
- ii. Length: 35' from the base to the pole cap
- iii. Nominal diameter: 8" nominal diameter at base with a tapered pole
- iv. Factory installed internal damper
- v. Bolt Circle: 12" to 14" diameter bolt circle.
- vi. Finish: anodized bronze finish

c. GENERAL REQUIREMENT:

- i. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall
- ii. Poles: ASTM B 209, 5052-H34 marine sheet alloy with access handhole in pole wall.
 - a. Shape: Round, tapered.
 - b. Mounting Provisions: Butt flange for bolted mountain on foundation or breakaway support.
- iii. Structural Characteristics: Comply with AASHTO LTS-4-M
 - a. Wind load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
 - b. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.2 to obtain the equivalent projected area to be used in pole selection strength analysis.
- iv. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- v. Grounding and Bonding Lugs: Welded 1/2 inch threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- vi. Brackets for Luminaires: Detachable, with pole adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
 - a. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
 - b. Finish: Same as pole.

- vii. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designing finishes.
- viii. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
- ix. Mounting, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
 - a. Materials: Shall not cause galvanic action at contact points
 - b. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot dipped galvanized after fabrication unless otherwise indicated
 - c. Anchor Bolt Template: Plywood or Steel

7. CONSTRUCTION REQUIREMENTS

a. INSTALLATION

The Contractor shall furnish, install, wire and start up equipment as required by the contract documents. The manufacturer's installation recommendations shall be observed, and the completed assembly shall meet applicable code requirements.

b. LUMINAIRE INSTALLATION

- i. Fasten luminaire to indicated structural supports. Galvanized or stainless steel bolts, nuts, washers, and screws shall be used for mounting luminaires or luminaire outlets. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- ii. Lenses, refractors, and glassware shall be clean and free from cracks or chips. All reflectors, shades, LED luminaire bodies, etc. shall be free from dents and scratches, thoroughly cleaned, and properly aligned before installation is accepted by the Owner. All exposed tags and labels other than UL and emergency ballast identifiers shall be removed.
- iii. Adjust luminaires that require field adjustment or aiming.

c. POLE INSTALLATION

- i. Pole erection and mounting shall be done according to pole manufacturers recommendations.

- ii. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole. Poles should be installed plumb and level.
- iii. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nut to torque level recommended by pole manufacturer.
 - a. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 - b. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
 - c. Install base covers unless otherwise indicated.
 - d. Use short piece of 1/2-inch diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- iv. Raise and set poles using web fabric slings (not chain or cable).

d. SERVICE CABINET

The service cabinets shall be provided to the Contractor.

The wiring diagram for the service cabinet is shown in detail in the Plans.

The Contractor shall furnish and install photocontrol cell with contacts rated at 15 amperes.

The photo electric control shall be in accordance with MnDOT 3812 and have a 5 minute time delay capability.

Unless otherwise defined, the main circuit breaker shall be rated at 200-amps and 240 volts with an interrupting rating of not less than 14,000 amps, r.m.s., sym. Circuit breakers shall indicate open, closed, or trip conditions by handle position. Circuit breakers shall be quick-make, quick-break with thermal-magnetic trips having long-time and instantaneous tripping characteristics. Multi-pole breakers shall have one handle with handle tie or internal trip bar with the circuit breaker cases fastened together.

The electric meter enclosure shall be installed in the cabinet as shown on the service cabinet detail drawing. The electric meter

sockets shall be suitable for single phase, 3 wire; 120/240-volt service.

Lightning surge arrestors shall be installed in the cabinets on the supply side of the service equipment.

At the pad mounted control cabinets, Contractor shall establish a 25 ohm ground by the use of copper clad ground rods.

A No. 6 AWG bare copper wire shall be extended from the ground rods and be bonded to the pad-mounted control cabinet. The ground rods shall be cast into the control cabinet foundation and be under the control cabinet frame.

The grounding conductor shall be terminated in and be bonded to the pad mounted control cabinet. The neutral conductor shall be bonded to the grounding conductor in the pad-mounted control cabinet.

From the pad mounted control cabinet, two No. 3/0 AWG (Type USE-2) load conductors and one No. 3/0 AWG (Type USE-2) neutral conductor shall extend underground via a 2-inch rigid non-metallic conduit to the ground-mounted transformer, or to an overhead utility transformer or secondary conductors, via a pole mounted riser and weather-head, as outlined in the plans.

Contractor must install duct seal around all conduit entering service cabinet foundation or service cabinet.

All of these conductors shall be of the same type as specified for the underground conductors of the distribution circuits, and shall be color-coded in the control cabinet and at the utility transformer. Wright Hennepin will make the final connections to their transformers or secondary overhead conductors.

e. CORROSION PREVENTION

- i. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- ii. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap

- conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.
- iii. A thorough application of an approved rust inhibitor shall be used to grease the threads above the foundation both before and after erecting and plumbing of the light standard, and to grease the threads of the screws used to secure the access covers to the standard.
 - iv. All stainless steel threaded hardware utilized with steel, aluminum, and other dissimilar metal components of standards and luminaires shall be coated with zinc-based anti-seize compound prior to assembly by the Contractor.
 - v. Contractor shall touch-up all lighting equipment damaged during transportation and installation with a color-matched finish.

f. WIRING OF LUMINARIES AND RECEPTACLES

All conductors of the lighting and receptacle distribution circuits shall pass through the base of each light standard. The conductors shall be fused as previously noted. All splices must take place in the base of the light standard. All splices shall be weather tight and use Burndy Uni-Tap BIBS 4-3 or 4-4 connectors.

The conductors to the luminaires and receptacles shall be stranded, No. 12 AWG Type XHHW-2 and be connected to the load and ground conductors of their respective distribution circuit.

Splices shall be made only in the service panel and light standard bases. Splices in light bases and service cabinets shall only be made using Burndy Uni-tap splicing hardware. No more than one wire per screw will be allowed.

g. RESTORATION

If sections of sidewalk have been removed by the Contractor, they shall be replaced in full panel increments. Where sections of sidewalk intersections are removed, the Contractor shall remove and replace entire sidewalk intersection to a point where it connects to the curb radius.

Any damages by the Contractor as a result of construction activities shall be restored to acceptable condition per the City of Maple Grove Specifications at no additional cost. This includes but is not

limited to restoration of sod, settling/heaving/cracking of pavement due to construction activities and any other damage associated with the installation of the electrical lighting system.

Where sidewalks, pavement, or streets are opened the opening shall be restored to the original thickness using a material type equal to that removed.

All necessary restoration due to construction activities shall be completed with 7 day of the completion of said activity.

8. SYSTEM TESTING

A factory-trained technician shall be present when the system is put into service and shall certify to the Engineer/Owner that all equipment has been installed correctly and is operating properly.

Technician shall make all modifications necessary to obtain proper operation of the system.

Verify that all wiring connections are complete and correct.

After installation and before termination, all wiring and cabling shall be checked and tested to ensure there are no grounds, opens, or shorts on any conductors or shields.

Test for and eliminate ground loops that may result from use of different power sources for various components.

All functions and features to be tested as a complete system and corrections made at no cost to the Owner.

Test relays and switches after installation to confirm proper operation and confirm correct loads are recorded on directory card in each panel.

All devices shall be calibrated to obtain the specified function and to reach the specified footcandle level.

Contractor shall notify the Owner's Representative when testing is complete and the system is functioning as required per specifications. The contractor shall then coordinate with the Owner's Representative a time for the Owner's Review phase.

Once the lighting control system revisions have been completed, Contractor shall test the system as described above. After the testing, Contractor shall notify the Owner's Representative when testing is complete and the system is functioning as required per specifications. The contractor shall then coordinate with the Owner's Representative a time for Engineer to walk through the system and develop a punch list.

Upon completion of the punch list and verification that all punch items have been resolved by the contractor the Owner's

Representative will notify that the testing phase of the project has been completed and that the contractor is ready to start the record drawings phase of the project.

9. WARRANTY

The contractor shall guarantee the operation of the installation and that the materials and workmanship of the equipment be free from defects in accordance with the contract specifications, providing the equipment has been operated and maintained in accordance with the manufacturer's recommendations. If a dispute exists regarding whether the equipment has been maintained according to the manufacturer's recommendations, the Engineers decision will be final. The guarantee shall include all parts and labor necessary to return the system to normal operations. The guarantee on all equipment shall start after formal acceptance of equipment as defined by the General Conditions and after successful completion of start-up procedures.

a. SPECIAL WARRANTY

Manufacturer to provide a limited life-time warranty and agree to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

b. LUMINAIRES

Ten year limited warranty is required on all components.