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DIVISION SL

**SPECIAL PROVISIONS
ELECTRICAL LIGHTING SYSTEM**

**FOR THE CONSTRUCTION OF:
PERMANENT STREET LIGHTING SYSTEMS**

SL-1 (2545) ELECTRICAL SYSTEM

This work shall be done in accordance with the applicable Minnesota Department of Transportation “Standard Specifications for Construction”, 2005 Edition.

The provisions of Mn/DOT 2471, 2545, and 2565 shall apply in addition to the following: bidders are advised that compliance with the provisions of Mn/DOT 1702, Mn/DOT 2545.2A, and the first paragraph of Mn/DOT 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.

SL-1.1 Scope of Work

The Contractor shall furnish all labor, equipment and materials for the installation and connection of separate underground distribution circuits in conduit to a street lighting system. These materials shall be as shown in the Plan or described within the special provisions and include but shall not be limited to the following items:

Electric Lighting System:

- street lighting poles and luminaires
- rigid steel and non-metallic conduits
- street light foundations (light bases)
- electrical handholes (pull boxes)– Minneapolis Standard
- street lighting pole wire
- in-the-line fuse holders and fuses
- service cabinets pad mounted, and service laterals
- service cabinet foundations
- end caps
- bus shelter feeds and circuitry
- lighting and bus shelter conductors

The electrical contractor is responsible for coordinating electrical service with the Traffic and Parking Services Division (TPS) and Xcel Energy for

all new metered locations. This includes submitting an application that is APPROVED BY THE TPS ELECTRICAL GENERAL FOREMAN (612-673-5759) for each metered electrical service location. The TPS Division will verify meter address, location, and use. No applications will be approved by Xcel Energy without the prior approval by the TPS Electrical General Foreman.

The electrical contractor shall be responsible for paying for all electrical service connections. This work shall be considered incidental to the project with no direct compensation paid therefore.

SL-1.2 General

The distribution circuits of the lighting system shall be of the multiple types consisting of four conductors installed in conduit. Three of the conductors shall constitute two 120-volt circuits and the fourth conductor shall be used as an equipment ground.

Power supply to the lighting system is metered 120/240 volt, single phase, alternating current, and shall be distributed from separate service cabinets regularly spaced throughout the project.

Reference to “the City” or “the City of Minneapolis” in these Special Provisions shall be interpreted to mean “the City of Minneapolis Traffic and Parking Services” or its designated representative.

The Contractor for this Contract shall be responsible for locating all Contractor-installed underground facilities within or outside the project limits until acceptance of the completed project by the City.

The City shall review and approve all work performed by the Contractor prior to the Contractor requesting acceptance by the Engineer.

SL-1.3 Shop Drawings, AS-Built Drawings and Submittals

The Contractor shall submit to the Engineer for approval a complete list of 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 Engineer prior to initiating any work on the Electrical Systems.

The Contractor shall furnish to the Engineer, for preliminary review, four (4) complete sets of shop detail drawings, in accordance with the provisions of Mn/DOT 2471.3B. The shop detail drawings shall be identified by "City of Minneapolis" and the fabricator. Three sets of drawings shall be returned to the Contractor showing any necessary corrections.

The Contractor shall furnish and obtain approval of templates used for setting anchor bolts and verifying concrete workmanship for all light and cabinet bases.

The Contractor shall furnish to the Engineer, for final approval, five (5) complete sets of shop detail drawings. The five sets of drawings shall be distributed, after approval to the following:

- (1) Contractor
- (2) Contractor's Fabricator
- (3) Project Engineer (two sets)
- (4) City of Minneapolis Traffic and Parking Services

Approval of shop drawings and submittals shall neither relieve the Contractor from the responsibility for deviations from the drawings or specifications unless he has, in writing, called the Engineer'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.

Provide certification by a registered engineer in the State of Minnesota that the lighting units have been designed to the loading requirements of the most current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals. Provide manufacturer's warranty information.

The Contractor shall also complete and submit drawings indicating the final placement of all street lighting facilities ("As-Built Drawings"). Drawings shall indicate all pole, handhole, conduit, and cabinet locations measured from a reliable location. The City will not accept responsibility of installed street lighting facilities until the street lighting as-built drawings are approved by the Traffic and Parking Services Division. The submittal shall include the locations of all final street lighting facilities installed.

SL-1.4

Materials

The Engineer reserves the right to sample, test, inspect, and accept or reject any of the materials used for the Lighting Systems based on Mn/DOT or City of Minneapolis tests. However, the Engineer may, at his option, accept materials on the basis of listing by Underwriters Laboratories, Inc.

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

A. Conduit

1. NMC Conduit: NMC conduit and conduit fittings shall be Type II heavy-wall rigid PVC Schedule 40 plastic conduit and conduit fittings per Mn/DOT 3803. NMC MUST be UL Listed, Labeled, and Marked per the NEC.

2. Metallic Conduit: Metal conduit shall be Rigid Steel Conduit (RSC) and conduit fittings per Mn/DOT 3801. Intermediate Metal Conduit (IMC) and conduit fittings are not permitted. RSC MUST be UL Listed, Labeled, and Marked per the NEC.
- B. Handholes (Pull Boxes)
- New handholes (pull boxes) shall be Minneapolis Electrical Handholes (Pull boxes) with metal frames and covers as shown in the details in the Plans and shall conform to the City of Minneapolis standards. A drain field shall be provided with each hand hole (pull box). Concrete for supporting the metal frames and covers (where required) shall be Mix No. 3A32, no chloride permitted.
- Handhole (pull box) rings and covers shall be constructed from Class 30 Grey Iron, primed with a red oxide primer, and finished with a City-approved green enamel.
- C. Anchor Rods
- Anchor rods, nuts, and washers shall be galvanized in accordance with the provisions of Mn/DOT 3392 and the details shown in the Lighting Plan.
- Threaded portions of all anchor rods above the concrete cabinet foundations and pole foundations (light bases) shall be coated with an approved rust inhibitor before installation of street light poles, or service cabinets.
- D. Electrical Cables and Conductors
- All electrical cables and conductors shall conform to the requirements of Mn/DOT 2545.2D amended as follows.
- The single conductor feeder wires, control wires, and distribution wires shall have Class B stranded annealed uncoated copper conductors and be listed by UL as Type RHW-2/USE-2, 90 degree C, cross linked polyethylene, insulation rated 600 volts in accordance with Article 338 of the National Electrical Code. Cable shall meet requirements of ICEA Publication No. S-66-524, NEMA Pub. No. WC7 for cross linked-polyethylene-insulated wire and cable, and UL standard 854 for service entrance cables. Wire shall bear UL label for Type USE-2, have footage markings every meter, and surface-marking indicating manufacturer's ID, conductor size and metal, voltage rating, UL symbol and type designations. **The insulation on each conductor shall be colored red, black, green or white in accordance with the color-coding shown in the construction plan.**
- Single conductor pole wires connecting the luminaire to the distribution circuits shall be 1/C #12 stranded wire with THHN/THWN rating.

E. Service Cabinet

The service cabinet shall be a combination signal/lighting service cabinet. See signal plans for details.

F. Lighting Units

1. Lighting Unit Type Special 1

Lighting units of the type shall consist of a one piece tapered fluted aluminum pole as shown in Minneapolis Standard Plate No. TRAF-3274, and equipped with a 100-watt octagonal, full-cutoff lantern style luminaire.

The ornamental aluminum pole shall be the Holophane Wadsworth, catalog number:

W15C/19-CA-BK-MOD. Color shall be black.

The octagonal lantern luminaire shall be the Holophane Arlington, catalog number:

ARU-100HP-MA-BK-C3-SPEC. Color shall be black.

Pole and luminaire components shall be interchangeable with those installed along Lyndale Avenue north of Minnehaha Parkway.

All Type 1 poles shall be installed on a Light Base, Design Special 1 as detailed in the Minneapolis Standard Plate No. TRAF-3060 as shown in the plans.

2. Lighting Unit Type Special 2

Lighting units of the type shall consist of a tapered aluminum pole as shown in Minneapolis Standard Plate No. TRAF-3290, and equipped with a one-piece cast aluminum base cover, stainless steel transformer base, and the 150-watt HPS Minneapolis Modern Shoebox full-cutoff luminaire.

The aluminum pole and cast aluminum base cover shall be manufactured by Hapco, catalog number:

RTA18D6B4-MOD-BA-A16211 POLE W/1 PIECE BASE. Color shall be black.

The stainless steel transformer base shall be manufactured by Millerbernd, catalog number: 390B99. Color shall be black.

The Modern Shoebox luminaire shall be the Gardco G-18 Gullwing, catalog number:

NSP-G18-1-3XL-150HPS-QUAD-BK-PTF2-LAMP. Color shall be black.

Pole and luminaire components shall be interchangeable with those installed along Marquette Avenue in downtown Minneapolis from 2nd Street South to 12th Street South.

All Type 2 poles shall be installed on a Light Base, Design Special 2 as detailed in Minneapolis Standard Plate No. TRAF-3072 as shown in the plans.

Finishes

The luminaires, poles, arms, fitters, and all other exposed hardware shall be finished with polyester powder paint to insure maximum durability.

All painted metal parts shall go through an alkaline cleaning process, receive microcrystalline phosphate pretreatment, a sealing treatment, then the prepared metal surface shall be thoroughly rinsed with high purity deionized water to remove unwanted chemicals. A controlled drying process shall be completed prior to applying the electrostatic polyester powder paint. Color shall be per architectural specification.

Warranty

All material for lighting units and banner poles shall come with a 5-year manufacturer's warranty. This warranty shall cover defects in material and workmanship for the paint finish, mechanical, optical, and electrical components. The manufacture shall either repair or replace any lighting unit or banner pole components due to these defects.

Interchangeability of Parts

All major assembly items (pole, arm, fitter, luminaire) for lighting units shall be interchangeable with lighting equipment currently approved by the City.

G. Fuses

Street Light Standards in the 120/240-volt system shall be fused in accordance with Plan details. Fuses and fuse holders shall be "UL" listed. Fuse holders shall be Homac in-the-line waterproof Type SLK-6 with a Bussman BAF-10 single element fuse, or approved equal.

H. Light Base Design (Foundations)

Light pole bases and anchor rods shall be in accordance with City of Minneapolis Standard Plates TRAF-3060 and TRAF-3072.

I. Equipment Pad (M)

See Signal plan.

J. Availability of Material

Handhole (pull box) rings and covers, which meet the requirements of these Special Provisions, may be able to be purchased depending upon availability from the Minneapolis Public Works Department, Traffic and Parking Services at the option of the Contractor. Contact Traffic Stores at (612) 673-5750.

SL-1.5 CONSTRUCTION REQUIREMENTS

A. Conduit Placement

Conduit size throughout the lighting project shall be 2-inch NMC unless otherwise noted on the Plans.

Conduits shall be installed underground a maximum of 12 inches from the back of the curb, except through bridges, approach slabs, and under railroad facilities, to a depth of 2 feet, as shown in the Plans or as directed by the Engineer. All conduits installed beneath surfaced streets shall be installed with a minimum cover of 2 feet. Cover material shall not contain rock or other debris that could damage the conduit. The cover material shall be firmly tamped into place in 6-inch lifts to minimize uneven settlement above or below the conduit.

The Contractor shall install red City of Minneapolis Traffic and Parking Services marking tape for marking underground Traffic utilities at a distance of 6 inches above all new conduit placed by the trenching method. Installation of the marking tape by the Contractor will be considered to be incidental work to installing the conduit and no direct payment will be made therefore. The required marking tape shall be purchased from the City of Minneapolis Traffic and Parking Services at 300 Border Avenue North.

1. Extension of Conduits:

The Contractor shall provide a continuous length of conduit of size and type noted on the Plans between the specified terminal points.

2. Installation of Conduit into Handholes:

Conduits shall be installed entering handholes through the sidewalls of the handholes, not through the bottom gravel foundation. Conduits shall be installed into handholes by use of a hole saw to cut through the handhole wall. Areas surrounding conduit entrances shall be sealed by filling them with mortar. Conduits installed by the Contractor shall extend a minimum of 2 inches and no more than 3 inches into the handhole.

3. Installation of Conduits Under Driving Surface and Sidewalk:

All conduits that are to be placed under driveways, streets and sidewalk that are not scheduled for removal shall be directional bored, or other method approved by the Engineer that will not damage or disturb the integrity of the driveway, street or sidewalk. All conduits that are to be placed under driveways, alleys, streets, or sidewalk that are scheduled for removal must be placed during the time between the removal of the existing surface and the commencement of pavement operations. The Contractor is responsible for coordination with the paving operation.

4. Extension of Conduit into Traffic Signal Bases:

The signal assemblies with street light fixtures will have conduit stub outs. These stub outs shall be extended by the Contractor to conduit or handholes installed under the lighting construction Plans and specifications. The Contractor shall be responsible for verifying and coordinating the locations of the conduit and handholes with signal construction prior to placing lighting conduits. Lighting and signals are not to share any conduit unless directly stated in the Plan or directed to do so by the Engineer in writing.

5. Connection to Existing Conduits:

The Contractor shall locate the ends of existing conduits as shown in the Plans and extend the conduit to handhole, luminaire pole base, etc. which is to be built by the Contractor. Existing conduits exterior surface shall be cleaned to form a secure connection to the extension.

6. In general, all conduit runs shall be straight and true, and all offsets and bends shall be uniform and symmetrical. **Field bends of conduit may only be performed with an approved heating / bending unit designed for that purpose.** The Contractor shall adjust the elevations of the conduit assembly, for its full length, to approximately the same gradient as the finished roadway, and shall furnish and install, in the trench, such suitable spacers and framing as may be necessary to maintain the correct grade and alignment.

B. Handholes (Pull Boxes)

Cast-iron frames and covers shall be constructed as shown in the Plans. Minneapolis-style handhole frames and covers shall be supported in concrete (Mix No. 3A32) and shall be leveled to the finished surrounding grade. Frames and covers shall be pre-treated such that concrete does not adhere to exposed surfaces. Frames and covers shall be cleaned free of adhering concrete after placement.

Conduits shall be installed by use of a hole saw to cut through the pipe wall. The area surrounding the conduit entrance shall be sealed by filling it with mortar. Conduits shall extend a minimum of 2 inches and not more than 3 inches into the handhole.

C. Foundations (Light Bases)

All street light foundations (light bases) shall be constructed as shown on the Plan details and shall be located in the field by the Engineer. In general, the foundations (light bases) shall be placed with the centerline of the foundation (light base) 24 inches from the backside of the curb at the appropriate elevation relative to the surrounding terrain. Coordinate the setback of foundations with the proposed planting openings in the sidewalk. The Contractor is responsible for obtaining the location of existing utilities and for identifying any possible conflicts. Any such conflicts shall be reported immediately to the Engineer.

Concrete for all foundations (light bases) shall be Mix. No. 3Y43 free of chloride additives, placed and consolidated using vibratory equipment and be finished smooth, flat and level in accordance with the provisions of Mn/DOT 2565.3F. Edges shall not be beveled or chamfered. Concrete shall be allowed to cure for a minimum of seven (7) days before being placed into use unless otherwise permitted by the Engineer.

Concrete base finishing shall be smooth, flat, and level. No more than 0.25 inches of variability compensated by shims will be allowed. Variability in excess of this will require resurfacing or replacement at the direction of the Engineer. Inspections will be performed using a Contractor supplied City approved ½" thick steel template manufactured to match the lights bolt circle and foot print dimensions. The first base shall be inspected in detail, approved and used as the standard for finish and workmanship. All foundations shall be installed utilizing approved templates. All templates required are incidental to the project.

Improperly constructed foundations shall be removed and replaced when directed to do so by the Engineer.

Provide an additional conduit sweep when the base is for the last light on a circuit.

D. Installation of Lighting Units

The Contractor shall mount light standards directly on the foundation (light base). The use of leveling nuts is not permitted. Any light standards that are not plumb shall be corrected up to 0.25 inches using stainless steel washers. **The Contractor, at the Contractor's**

expense, shall recap or replace foundations (light bases) that are incorrectly installed.

Contractor shall apply an approved zinc-based anti-seize compound to all dissimilar-metal mounting hardware prior to assembly of the poles, handhole doors, pole fitters and luminaires.

E. Wiring of Luminaires

The four conductor lighting distribution circuits shall pass through the transformer base of each street light luminaire pole, and traffic signal light pole as shown on Plans. The lighting circuits share a common ground. The conductors shall be fused with the fuses installed in the phase wire to the luminaire-mounted ballast at the base of the light standards as directed by the Plans, specifications herein, and the Engineer. Fuse holders shall be installed in such a manner that the fuse stays with the load side when the holder is separated. Suitable solderless connectors shall be used. All splices must take place in pole bases unless approved by the Engineer. All splices shall be weather tight and use Burndy Multi-Tap BIBS-4-3 or 4-4 connectors as noted in City of Minneapolis Standard Plate Nos. 3751 and 3751B.

Sufficient excess conductor length shall be provided for maintenance purposes. In addition, the Contractor shall form loops in the leads on each side of the fuse holders and so position the fuse holders so that they may be easily removed or inserted through the access hole. The grounding conductor shall not be fused.

The 120 VAC conductor to the luminaires shall be alternately connected to the red or the black conductor of the street lighting distribution circuit. No two loads shall be wired on the same phase consecutively.

The Contractor shall submit a sample of the fuse holder and splice connectors they will be installing BEFORE any installations are made.

F. Grounding

The grounding conductor shall be bonded to the grounding lug and the foundation (light base) ground rod at every street light. A No. 12 AWG bare copper conductor shall be used.

G. Painting

All lighting units shall be factory finished by the manufacturer as described in the lighting unit section.

Painting of all other equipment shall be in accordance with the

provisions of Mn/DOT 2565.3T, except that finish coat paint for all items shall be two coats.

Handhole rings and covers shall be primed with a red oxide primer, and finished with City-approved green enamel (RAL 6005). If field painting is required, it shall be approved in advance and be accepted by approval of the Engineer.

Paint samples must be submitted to the Engineer for approval prior to painting. The Contractor shall furnish all paint required after confirmation of the exact paints and colors.

All lighting units, cabinets, and handholes shall be shop or factory painted as required except for providing any necessary repairs of damage to paint coats that occur during unloading and erection at the site.

H. Wiring of Service Cabinets

Where service equipment is supplied from the Utility Company's overhead circuits, lightning surge arrestors shall be installed in the cabinets on the supply side of the service equipment.

At the pad mounted service cabinets, the 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 service cabinet. The ground rods shall be cast into the service cabinet pad and be inside the service cabinet frame.

When called for in the Plans, two (2) No. 2 AWG lighting conductors and one No. 2 AWG neutral conductor shall be extended underground from the pad mounted service cabinet in 2 inch RSC conduit to the utility company service vault or transformer.

When called for in the Plans, two (2) No. 2 AWG lighting conductors and one No. 2 AWG neutral conductor shall be extended underground, in conduit, from the pad mounted service cabinet to the utility companies pole and up the pole in 2 inch rigid galvanized steel conduit to a weather head located below the utility distribution circuits as directed by the utility and as shown on City of Minneapolis Standard Plate No. 3770C, and in the Plans.

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

Feeder conductors shall be color-coded in the control cabinet and at the weather head or service vault.

The utility will make the final service connections after the

Contractor has filed a Certificate-Affidavit of Inspection, with the utility.

I. Cabinet Pads

Concrete pad finishing shall be smooth, flat, and level. No more than 0.125 inches of variability compensated by shims will be allowed. Variability in excess of this will require resurfacing or replacement at the direction of the Engineer. Inspections will be performed using a Contractor supplied City approved ½” thick steel template manufactured to match cabinet dimensions. The first pad shall be inspected in detail, approved and used as the standard for finish and workmanship. All templates required are incidental to the project.

J. Removing and Salvaging Existing Systems

The Contractor shall remove or salvage all items associated with the existing street lighting systems including lighting units, underground cable, conduit, service equipment, service cabinets, cabinet and street light foundations (light bases), and handholes (pull boxes) in accordance with the applicable provisions of Mn/DOT 2104; with the applicable provisions of Mn/DOT 2565.3U, and the following:

1. Existing lighting units shall be salvaged unless otherwise directed by the Engineer. Luminaires shall be removed from the luminaire mast arms before being delivered to the City of Minneapolis. The salvage of existing lighting units shall be measured on a per each basis.
2. Existing concrete lighting and cabinet foundations (light bases) shall be removed unless otherwise directed by the Engineer. The removal of existing foundations shall be measured on a per each basis.
3. The existing underground conduit systems and lighting service equipment shall be removed unless otherwise directed by the Engineer. The removal of existing conduit system shall be measured on a lump sum basis.
4. Existing handholes (pull boxes) shall be salvaged unless otherwise directed by the Engineer.
5. Existing cable shall be removed unless otherwise directed by the Engineer.
6. All existing underground street light facilities will be removed under the site work activities. The Contractor shall perform removal of existing conduit, handholes, (pull boxes), cabinet foundations and pole foundations (light bases) during pavement

and sidewalk removal. Removal of existing cable between lighting units shown on the Plans shall be performed by the Contractor prior to pavement and sidewalk removal. The removal and/or salvage of cable, handholes (pull boxes), and service equipment shall be considered incidental to the lighting unit and conduit removal activity and no direct compensation shall be paid for this work.

7. The salvaged lighting units and handhole rings and covers shall be delivered to the City of Minneapolis Traffic and Parking Services at 300 Border Avenue North in Minneapolis. The salvaged material shall be deposited where and as directed by the Engineer.

The Contractor shall notify Mr. Larry Mountjoy at 612-673-5514 at least three working days in advance of hauling any material to storage.

Any damage to the salvaged materials resulting from the salvage operation shall be repaired and replaced at the Contractor's expense.

8. Items associated with the existing street lighting system deemed unsalvageable by the Engineer, shall be removed and disposed of outside the right of way in any manner that the Contractor may elect subject to the provisions of Mn/DOT 2104.3C3 and as noted elsewhere in these Special Provisions.
9. The concrete pole foundations (signal and light bases) and the underground signal and lighting conduits may include asbestos containing electrical conduits (Transite). The 3' x 18" vertical pipe in handholes may also contain asbestos (Transite). Underground signal and lighting conduits that contains asbestos will have been encased in concrete at the time of installation. Hennepin County has developed a procedure for handling and disposal of these asbestos-containing materials that shall be followed by the Contractor. For procedure, see the Appendix for the "Technical Specifications for the Excavation of Asbestos Containing Electrical Conduit".
10. The provisions on Mn/DOT 1903 are modified such that no price adjustment will be made in the event of increased or decreased quantities for removing and salvaging existing systems.

K. Temporary Lighting System

The general roadway construction will be phased to enable vehicle traffic to move along a minimum of one-half (one side) of the full

length of Lyndale Avenue for the duration of the project. The contractor shall provide a temporary lighting system along the half of Lyndale Avenue that is open to traffic, and pedestrian levels of lighting along the sidewalk area opposite of the open roadway, for the duration of the project. The temporary lighting system shall consist of the installation of temporary wood pole lighting, or maintaining existing light poles and services where appropriate, and/or the energizing of new lighting systems if available. All temporary items furnished by the Contractor shall become the property of the Contractor.