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## **SPECIAL PROVISIONS**

### **DIVISION SL**

#### **SPECIAL REQUIREMENTS**

##### **SL-1 (2545) ELECTRICAL LIGHTING POWER AND CCTV SYSTEMS**

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, 2550 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 General**

Reference to "the County" shall be interpreted to mean the Hennepin County or its designated representative. Reference to "the City" or the "City of Minneapolis" shall be interpreted to mean the "City of Minneapolis Transportation 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 County shall review and approve all work performed by the Contractor prior to the Contractor requesting acceptance by the Engineer.

The electrical contractor is responsible for coordinating electrical service with Xcel Energy for all new metered locations. This includes paying for all electrical service connections and power consumption charges during construction and up until the new lighting, festoon, and bus shelter systems are turned over to the City after final inspection. This work shall be considered incidental to the project with no direct compensation paid for.

##### **SL-1.2 Shop 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 review, six (6) complete sets of shop detail drawings, in accordance with the provisions of Mn/DOT 2471.3B. The shop detail drawings shall be identified by "Hennepin County" and the

fabricator. The six sets of drawings shall be distributed, after approval to the following:

- (1) Contractor
- (2) Contractor's Fabricator
- (3) Project Engineer (three sets)
- (4) City of Minneapolis

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.

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

Provide certification by a registered professional engineer in the State of Minnesota that the lighting unit poles types special 1 and 2 have been designed to the loading requirements of the most current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

SL-1.3

As Built Plans and Project Documentation

The Contractor shall furnish "as built Plans" that contain any **changes** in the following:

- Cable locations.
- Conduit locations.
- Light pole locations.
- Equipment locations.
- Feedpoint locations.
- Handhole locations.

Any discrepancy or additions between the final plan and how the lighting, electrical and CCTV systems was actually built **must be indicated** on the "as built plan".

The "as built Plans" shall be clean and legible redlines in a form that is satisfactory to the Engineer.

Provide two complete sets of Operations and Maintenance (O&M) Manuals pertinent to the systems and components furnished for the Project.

The Contractor furnished "as built Plans" and project documentation shall be considered incidental work.

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 County 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. ENT Conduit: ENT conduit and conduit fittings shall be Electrical NonMetalic Tubing per NEC article 362. ENT MUST be Listed, Labeled, and Marked per the NEC.
3. 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

New handholes Type Mpls shall be Minneapolis Electrical Handholes 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. Concrete for supporting the metal frames and covers (where required) shall be Mix No. 3A32, no chloride permitted. Handhole 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.

**New Handholes Type HD shall be the vehicle load rated concrete pre-cast type per MnDOT standard plate 8117. Mn/DOT approved handholes are listed on the Office of Traffic, Safety, and Operations (OTSO) WEB site under the Qualified Products List for Traffic Signals:**

<http://www.dot.state.mn.us/trafficeng/designtools/index.html>

C. Anchor Rods

Anchor rods, nuts, and washers shall be by supplied by the manufacturer of the lighting unit. They 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 from 3/0 to 8 gauge 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 single conductor feeder wires, control wires, and distribution wires from 10 to 14 gauge shall have Class B stranded annealed uncoated copper conductors and be listed by UL as Type XHHW, 90 degree C, cross linked polyethylene insulation rated 600 volts in accordance the National Electrical Code. Wire shall bear UL label for Type XHHW-2, have footage markings every meter, and surface-marking indicating manufacturer's ID, conductor size and metal, voltage rating, UL symbol and type designations.

Single conductor pole wires connecting the luminaire to the distribution circuits shall be 1/C #12 stranded wire with XHHW rating.

**The insulation on each conductor shall be colored in accordance with the color-coding shown in the construction plan.**

E. Service Cabinet, Secondary Type L2 Modified (120/240 VAC)

The Contractor shall furnish and install a Service Cabinet, Secondary Type L2, for supplying power to an electric lighting and power systems, on an equipment pad concrete foundation at the location indicated in the Plans. Mn/DOT approved Service Cabinet's Secondary Type L2 are listed on the Mn/DOT Approved/Qualified Products Lists WEB site for Lighting:

<http://www.dot.state.mn.us/products/index.html>

The service cabinet shall conform to the wiring requirements of Mn/DOT Standard Plate No. 8140B for a Type L2-S-120 lighting service cabinet, to the provision in Mn/DOT 3850, to the details in the Plan, and shall include all internal and external wiring and materials required for a complete cabinet installation.

F. Equipment Pad B

The Contractor shall furnish and install a complete concrete pad in accordance with Mn/DOT Standard Plate No. 8106B, at the locations indicated in the Plan. The equipment pad shall be constructed in accordance with Mn/DOT 2545.3F except the concrete shall be Mix No. 3A32.

The equipment pad mentioned will be used for mounting of a lighting service cabinet. The reinforcement bars for use in the foundation shall conform to the requirements of Mn/DOT 3301.

G. Lighting Unit Type Special 1 (Canted 25' Poles)

Lighting units of this type shall consist of a one piece stainless steel pole, fitter and luminaire. The pole shall provide an approximate 25'-0" mounting height.

All poles of this type are to be installed directly on the bridge structure as shown plan detail sheets. Leveling nuts are not permitted. Any light standards that are not level shall be corrected at the Contractor's expense.

The luminaires for this lighting unit shall consist of 104 watt LED luminaire. Luminaire shall meet the following criteria:

- 1) Type 3 distribution
- 2) Provide 5600 initial lumens at 4300K
- 3) Accept multi-volt power (120v-277v) fed at 240V.
- 4) Provide LED data that complies with the testing requirements as established by the DOE/CALiPER program. This includes photometric and electrical testing as prescribed by the IESNA LM79 and LM80. The testing to be done by an independent and unbiased testing lab and designated as "pre-qualified" on the CALiPER web site.
- 5) Match the style and form factor shown on the drawings
- 6) Minimum starting/operating temperature of -40° C
- 7) Maximum starting/operating temperature of 50° C
- 8) CRI 75
- 9) Listed for Wet Location, IP66 rated
- 10) Housing die-cast aluminum powder-coated finish
- 11) 5 yr warranty on LED's and driver and 10 yr warranty on the fixture and finish.
- 12) LED life >150,000 hours @ 25 degrees C at 350mA drive current.
- 13) Fixtures must be RoHS(Restriction on Hazardous Material)

compliant with no mercury and no lead

- 14) Fixtures are capable of being switched or dimmed to lower levels
- 15) Fixtures must be compatible with a variety of lighting control systems, have instant on – off and dimming capability with color stability, and no negative impact on life from frequent starts.
- 16) The fixture shall be full cutoff.

Two 1/C #12 stranded wires shall be used to connect the luminaire to the pole base wiring.

H. Lighting Unit Type Special 3 (15' 150W Lantern Style Light)

Lighting units of this type shall consist of a one piece tapered fluted aluminum base and shaft with a tenon slip fitter 3 inches O.D. and projecting 3 inches. The pole shall provide an approximate 15'-0" mounting height and provision for future installation of one duplex outlet at 14'-0". **The pole shall accommodate a 13.5-inch diameter bolt circle using 5/8 inch anchor bolts as shown in the plans (NO EXCEPTIONS).**

Ornamental pole shall be City of Minneapolis approved and be:

Pedestrian Light Pole shall be:

Holophane Wadsworth Style Pole  
Ornamental Pole Catalogue No. W15C/19-CA/Black  
or  
City approved equal

Color shall be black per architectural specification and as approved by the Architect.

All poles of this type are to be installed directly on bases described by Minneapolis standard plate 3765 as shown in the Lighting Plan detail sheets and accounted for in the tabulations as light base Design Special 3. Leveling nuts are not permitted. Any light standards that are not level shall be corrected at the Contractor's expense.

The luminaires for this lighting unit shall consist of 120-volt CWA regulated ballast, 150-watt high-pressure sodium lantern-type luminaire with a Type 3 light distribution pattern. Lamps for the luminaires shall be 150-watt high-pressure sodium manufactured by General Electric, Sylvania, Norelco, or approved equal.

Pedestrian Luminaire shall be City of Minneapolis approved and be:

Holophane Utility Lantern ARU 150 HP12BA3  
or  
City approved equal



I. Lighting Unit Type Special 5 (30' 250W Shoebox Style Light)

Lighting Units of this type shall consist of a tapered stainless steel pole with a 30 foot mounting height, a 3' davit type mast arm, and a fabricated stainless steel transformer base.

The pole and transformer base shall be constructed so as to conform to the design shown in the lighting plan detail sheets as City of Minneapolis Standard Plate No. 3786S, and Detail Drawing B3721.

All poles of this type are to be installed on bases constructed in accordance with City of Minneapolis Standard Plate No. 3726 as shown in the lighting plan detail sheets.

Luminaires for this lighting unit shall be "UL" listed, shall be of a rectilinear style with an aluminum housing with a 2 3/8" O.D. pipe type slip fitter attachment connector. Units shall have an integral CWA regulator high power factor ballast, mogul type socket, medium cutoff IES Type III light distribution pattern, factory applied finish, a polycarbonate refractor, drop lens styling, and be equipped with a snow guard. Lamps shall be 250 Watt HPS and be General Electric, Sylvania, Norelco, or an approved equal.

The exterior of the pole, transformer base and luminaire shall be painted UPS Brown thermo-set acrylic exterior.

Luminaires shall be City of Minneapolis approved and be:

American Electric  
Series 154  
Catalog No. S-530387,  
or  
City approved equal

Two 1/C #12 stranded wires shall be used to connect the luminaire to the pole base wiring.

J. 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 Bussman in-the-line waterproof Type HEB with a Bussman BAF-10 single element fuse, or approved equal.

SL-1.5 Electric Lighting System A (Pier 1 Power and Lighting)

Electric Lighting System A shall consist of providing interior lighting, and receptacles for the enclosed area between pier 1A and 1B.

A. Basis of payment

Electric Lighting System A shall consist of furnishing and installing a complete and operational electrical system providing interior lighting,

receptacles, and power. This shall include luminaires, receptacles, electrical panels, disconnects, switches, conduit, wire, cable, mounting hardware, installation, testing, and all miscellaneous components necessary to provide a complete and operational system as described herein and on the Electric Lighting System A plan sheets.

SL-1.6 Electric Power System (Box Girder Ventilation Power and Lighting)

Electric Power System shall consist of providing box girder interior lighting, receptacles, and ventilation power and control.

A. Basis of payment

Electric Power System shall consist of furnishing and installing a complete and operational electrical system providing box girder interior lighting, receptacles, and ventilation power and control. This shall include luminaires, receptacles, electrical panels, disconnects, switches, conduit, wire, cable, mounting hardware, installation, testing, and all miscellaneous components necessary to provide a complete and operational system as described herein and on the Electric Power System plan sheets.

SL-1.7 Construction Requirements

A. Conduit

Open ends of all installed conduit shall be immediately capped until cables are installed.

Standard bell ends shall be installed on all conduit ends to prevent damage to the installed cable.

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 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.

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 (pull boxes):

Conduits shall be installed entering handholes (pull boxes) through the sidewalls of the handholes (pull boxes), not through the bottom gravel foundation. Conduits shall be installed into handholes (pull boxes) by use of a hole saw to cut through the handhole (pull box) 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 any 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 Handholes (pull boxes) at Traffic Signal Locations:

The signal assemblies with street light fixtures will have conduit stub outs. These stub outs shall be extended by the Contractor into handholes (pull boxes) installed under the lighting construction Plans and specifications. The Contractor shall be responsible for verifying and coordinating the locations of these handholes (pull boxes) 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 (pull box), 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 shall not be permitted unless 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. Conduits shall extend a minimum of 2 inches and not more than 3 inches into the handhole (pullbox).

C. Foundations (Light Bases)

All street light foundations shall be constructed as shown on the Plan details and shall be located in the field by the Engineer. The foundations shall be at the appropriate elevation relative to the surrounding terrain. 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 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 bases 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.**

E. Grounding

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

F. Painting

All lighting units shall be factory painted 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 2565.3, except that finish coat paint for all items shall be two coats.

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.

G. Wiring of Service Cabinets

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

A No. 2 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.

Were multiple service cabinets are located on the same pad or on separate but adjacent pads their ground rods shall be connected with a #2 wire to form a ground grid.

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.

H. Cabinet Pads

Concrete pad finishing shall be smooth, level, and flat. 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.

I. Removing and Salvaging Existing Systems

When directed by the Engineer, the Contractor shall remove and salvage all items of the existing street lighting systems, underground cable, conduit, service equipment, 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 2565.3T, and the following:

1. Underground conduit shall be removed unless otherwise directed by the Engineer.

2. The salvaged lighting units shall delivered to the appropriate agency.

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

3. Concrete pole foundations (light bases), conduit, and other items, deemed non salvageable by the Engineer, of the existing street lighting systems 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.