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SPECIAL PROVISIONS
DIVISION “SL”
SPECIAL REQUIREMENTS

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
- end caps
- lighting conductors

SL-1.2 General

The distribution circuits of the lighting system shall be of the multiple type 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 a relocated service cabinet.

Reference to “the City” or “the City of Minneapolis” in these Special Provisions 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 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 & 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 Lighting 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 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 (2 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.

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. Non-Metallic Conduit (NMC): 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 (Minneapolis Standard Plate Number 3776). 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.

Note that anchor rods for lighting fixtures mounted on bridge parapets need to be 3/4" in diameter rather than 5/8" in diameter as shown in Minneapolis Dept of Public Works Light Base Design standard detail 3053.

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 manufactures 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 existing service cabinet is the City of Minneapolis standard street light or street light and signal service cabinet; it shall be a pad-mounted, weatherproof control cabinet. The cabinet shall be as shown on City of Minneapolis Standard Plate Nos. 3760M.

The service cabinet contains an internal photocell behind a plexiglass covered hole. Contractor to coordinate with Engineer in regards to orientation of the photocell in the existing cabinet and the potential for interference due to on-coming traffic.

See signal plans and special provisions for additional information on the relocated Service Cabinet and a Service Cabinet to be provided for temporary use.

F. Lighting Unit, Type Special 10' Pole

1. The Lighting Unit, Type Special 10' Pole shall be installed on the Lyndale Bridge pilasters.
2. The lighting standard shall consist of a Wadsworth Series Cast Aluminum Pole as available through Holophane, or an approved equal.
 - a. The cast aluminum pole shall be 10' tall, including a transformer base that is 17" tall. The transformer base shall have a 20" diameter on the bottom. The pole shall be tapered from 5.5" above the transformer base to 3.5" below the upper tenon. Both pole and base shall be fluted and covered with a black power coat finish.
 - b. The tenon adds another 3" to the length of the pole, and has an outer diameter of 3".
 - c. Hot dipped galvanized steel anchor rods shall be in accordance to City of Minneapolis Standard Plate No 3053. Anchor rods shall be placed in a 13.5" bolt circle, or as required for make and model of approved pole.
 - d. Transformer base installation and wiring shall be in accordance with City of Minneapolis Standard Plate No 3751; with the exceptions of streetlight wire size per plan and the physical appearance of the transformer base.

- e. The pole shall be furnished with a provision for a 2" x 4" receptacle centered 12" from the top of pole.
 - f. Pole placement shall be as indicated on the plans and as coordinated with the bridge installers. The transformer base handhole shall face, in toward the road, the receptacle shall be installed to face opposite the direction of travel.
3. The lighting fixture shall consist of a Holophane Utility Arlington Series Full Cutoff luminaire, or an approved equal.
- a. The fixture shall be designed and provided with a 100W High Pressure Sodium (HPS) lamp with mogul base.
 - b. The fixture shall be designed to operate with a 120V power input to a multi-tap, high power factor autotransformer type ballast with a protected starter.
 - c. The optical assembly shall provide an asymmetrical full cut off omni-direction distribution. Optics shall be located behind flat glass that is sealed with a gasket
 - d. Fixture shall be the same power coat black as the pole, and shall be furnished with a spike finial.
 - e. Unit shall be provided with stainless steel hex head screws that are to be installed with an anti-seize compound.
4. Two 1/C #12 stranded wires shall be used to connect the luminaire to the pole base wiring.

G. Lighting Unit, Type Special 15' Pole

1. Lighting Unit, Type Special 15' Pole shall be installed on concrete foundations to the south of the Lyndale Bridge.
2. Pole, anchors, and luminaire shall be the same as for Lighting Unit, Type Special 10' Pole except with a longer 15' pole.
3. Transformer base installation and wiring shall be in accordance with City of Minneapolis Standard Plate No 3751B; with the exceptions of streetlight wire size per plan and the physical appearance of the transformer base.
4. Concrete foundation shall be in accordance with City of Minneapolis Standard Plate No 3765C; with the exception that the anchor rod bolt circle shall be as required for selected pole.

H. Lighting Unit, Type Special Sconce

1. Lighting Unit, Type Special Sconce shall be installed on the north abutment of the Lyndale Bridge.
2. The luminaire shall be mounted directly to the abutment with a mounting arm provided by the fixture manufacturer. Contractor

shall coordinate the size of the embedded junction box under the mounting arm with abutment installer.

3. The lighting fixture shall consist of a Gardco Gullwing series type GL-18, or an approved equal.
 - a. The fixture shall be designed and provided with a natural light (4000K) LED light source. The LED shall be designed to replicate the light output intensity of a 110W high intensity discharge (HID) bulb.
 - b. The fixture shall be designed to operate with a 120V power input to a universal power source.
 - c. The optical assembly shall provide an IES Type 3 distribution.
 - d. Fixture shall be furnished with a bronze finish on a one-piece die cast aluminum housing.
 - e. Unit shall be provided with mounting arm for direct wall mounting and stainless steel hex head screws that are to be installed with an anti-seize compound.
4. Note –the fixture description is “sconce” because the luminaire is being mounted to a wall rather than a pole; however the selected luminaire is a full size Gardco Gullwing area lighting fixture, it is not the Gardco Gullwing Sconce (which resembles an area lighting fixture cut in half).

I. 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.

J. Light Base Design Special 15’ Pole (Foundations)

See mounting description in the Lighting Unit paragraphs.

K. Equipment Pad (Service Cabinet Foundations)

See traffic signal plans and specifications for installation of a foundation for the relocated Service Cabinet, and for a temporary Service Cabinet.

L. Pull Rope

Pull rope shall be ¼” nylon as manufactured by Pro-Pull by Ideal, Catalog No. 31-841 or equal. Rope specifications shall provide for a minimum of 125# working load and 1,250# break loading.

M. Availability of Material

Handhole (pull box) rings and covers, that meet the requirements of these Special Provisions may be able to be purchased depending upon

availability from the Minneapolis Public Works Department, Transportation and Parking Services at the option of the Contractor. Contact Transportation 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.

A pull rope, approved by the City, shall be installed in each conduit along with each run of lighting cable.

The Contractor shall install red City of Minneapolis Transportation and Parking Services marking tape for marking underground Transportation utilities at a distance of 6 inches above all new conduit placed by the trenching method. Installation of the marking tape and the pull rope 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 Transportation 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 (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 extended from mastarm pole transformer base to handholes (pull boxes). The Contractor shall extend lighting system conduits to handholes (pull boxes) installed under the signal system 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.

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 it's 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.

5. The electrical installer shall coordinate with the bridge installer for locations where conduits embedded in the structure transition to trenched conduits. At all such locations the conduit shall be installed with an expansion/deflection coupling.

6. Conduit stubs shall continue to the south end of the construction limits. Conduits shall be left capped.

B. Handholes (pull boxes)

Frames and covers for new or relocated handholes shall be prepared for grounding prior to installation. Grounding shall be accomplished by exothermically welding a 30 inch long #6 solid copper ground wire to the underside of the handhole ring and a 12 inch long #2 braided ground cable between the underside of the handhole ring and the underside of the handhole cover. Handhole frame shall be connected with a ground clamp to a 1/2 inch by 8 ft ground rod sunk inside of the handhole.

Cast-iron frames and covers shall be constructed as shown in the Plans. Minneapolis style handhole (pull box) 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 (pullbox).

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

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 0.5 inches using stainless steel washers. **The Contractor, at the Contractor's expense, shall recap or replace foundations (light bases) that are incorrectly installed.** The lower nuts on anchor rods shall be inside the transformer base and shall be tightened snug against the bottom of the upper plate of transformer base after leveling.

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. 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 transformer bases unless otherwise

shown. 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 No.'s 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 luminaire shall be alternately connected to the red or the black conductor of the street lighting distribution circuit. No two luminaires shall be wired on the same circuit 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

An equipment grounding conductor shall be installed in all conduits containing power conductors, see plans for size. Inside the transformer base the equipment grounding conductor shall be clamped onto one of the anchor rods. The transformer base shall be bonded to the equipment grounding conductor with a #8 bare copper conductor by means of a split bolt connector. Where identified on plan, connection to a ground rod shall also be made with a #8 bare copper conductor by means of a split bolt connector. Furnishing and installing the ground rod shall be an incidental expense for which no direct compensation will be made.

Because several lights will be installed on a bridge structure it will not be possible to install a ground rod in every third light base as noted on City of Minneapolis Standard Plate No.3751/3751B. Where noted, the streetlight equipment ground shall be bonded to a ground rod inside a handhole by an exothermic weld or a listed mechanical clamp.

G. Painting

All painting 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 color for the exterior of the pole, transformer base and luminaire shall be as noted in the Materials section for the lighting units.

A shop coat of primer paint shall be applied to the outside surfaces of each lighting unit pole, and each transformer base.

Handhole rings and covers shall be shop primed with a red oxide primer, and finished with a city approved green enamel.

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 painted except for providing any necessary repairs of damage to paint coats that occur during unloading and erection at the site.

H. Embedded Conduit and Junction Boxes

The conduit and junction boxes embedded in the bridge structure shall be paid for as described in the bridge specification section.

The conduit and junction boxes embedded in the abutment structure shall be paid for as described in the abutment specification section.

Wiring of Service Cabinets

See traffic signal plans and specifications for wiring of the relocated and temporary Service Cabinets.

SL-2 **SCOPE OF WORK, METHOD OF MEASUREMENT AND PAYMENT**

SL-2.1 Purpose

The method of measurement and basis of payment for the various items of work listed in the Contract shall be in accordance with Mn/DOT 2545 except for the following.

Pay Item

Number

Description

2545.511

Lighting Unit Type Special 10' Pole

Lighting Unit Type Special 10' Pole as specified herein at the locations indicated in the Plans will each be measured as an integral unit and will be paid for separately at the Contract price for **EACH**, which price shall be compensation in full for this item.

THIS ITEM INCLUDES THE FOLLOWING:

- (01) Furnishing Pole, Transformer Base, Anchor Rods.
- (02) Furnishing Luminaire and Lamp.
- (03) Assembly and Installation Lighting Unit.
- (04) Furnishing and Installing Fuses and Fuse Holders
- (05) Furnishing and Installing Terminations and Pole Wire
- (06) Testing

2545.511

Lighting Unit Type Special 15' Pole

Lighting Unit Type Special 15' Pole as specified herein at the locations indicated in the Plans will each be measured as an integral unit and will be paid for separately at the Contract price for **EACH**, which price shall be compensation in full for this item.

THIS ITEM INCLUDES THE FOLLOWING:

- (1) Furnishing Pole, Transformer Base, Anchor Rods.
- (2) Furnishing Luminaire and Lamp.

- (3) Assembly and Installation Lighting Unit.
- (4) Furnishing and Installing Fuses and Fuse Holders
- (5) Furnishing and Installing Terminations and Pole Wire
- (6) Testing

2545.511 Lighting Unit Type Special Sconce

Lighting Unit Type Special Sconce as specified herein at the locations indicated in the Plans will each be measured as an integral unit and will be paid for separately at the Contract price for **EACH**, which price shall be compensation in full for this item.

THIS ITEM INCLUDES THE FOLLOWING:

- (1) Furnishing Mounting Arm.
- (2) Furnishing Luminaire, LED Assembly, LED Driver.
- (3) Assembly and Installation Lighting Unit.
- (4) Furnishing and Installing Fuses and Fuse Holders
- (5) Furnishing and Installing Terminations and Wire
- (6) Testing

2545.515 Light Base Design Special 15' Pole

Light Base Design Special 15' Pole as specified herein at the locations indicated in the Plans will each be measured as an integral unit and will be paid for separately at the Contract price for **EACH**, which price shall be compensation in full for this item.

THIS ITEM INCLUDES THE FOLLOWING:

- (1) Excavation, Restoration.
- (2) Concrete, Reinforcing Bars.
- (3) Felt Joints.
- (4) Testing

2565.602 Handhole Design Minneapolis

Handhole Design Minneapolis as specified herein at the locations indicated in the Street Lighting Plans will each be measured as an integral unit and will be paid for separately at the Contract price for **EACH**, which price shall be compensation in full for this item.