

## **SECTION 1000**

### **ELECTRICAL**

#### **SECTION 1001 –ROADWAY STREET LIGHT CONSTRUCTION**

##### **1001-1 DESCRIPTION**

This work shall consist of the construction of street lights and related items in accordance with these specifications and standard details at the locations and to the lines and grades shown on the plans or as directed by the ENGINEER.

##### **1001-2 MATERIALS**

**1001-2.1 GENERAL.** Materials to be furnished by the CONTRACTOR shall be all materials required to install roadway street lighting in place as shown on the plans complete and ready for operation.

All materials and equipment furnished shall be new and shall be approved by the Underwriter's Laboratories, Inc. as conforming to its standards in every case where such a standard has been established for the particular item in question.

It is the intent of the Plans and Specifications to comply in every respect to the requirements set forth by the National Electric Code, the North Dakota State Electrical Board, the local utility company, and the ordinances established by the CITY OF MANDAN, and it shall be the responsibility of the CONTRACTOR to ensure that the above requirements are met in every respect.

Should any requirement of the above not be complied with by the Plans or the Specifications either through omission of equipment, material, and method of installation, or by specification of material, equipment, or installation methods, the CONTRACTOR shall immediately notify the ENGINEER.

Where items of equipment and/or materials are specifically identified herein by a manufacturer's name, model, or catalog number, only such specific items may be used in the base bid. If the CONTRACTOR desires to use items of material and equipment other than that named in the base bid, CONTRACTOR or Supplier shall apply in writing to the ENGINEER for approval of substitution at least seven (7) days prior to opening of bid. Request shall be in duplicate. Submittals must indicate the specific item or items to be furnished in lieu of those specified together with complete technical data and comparative data on specified items and proposed items.

All approved substitute items will be clearly identified in an addendum which will be sent to all bidders well in advance of opening of bids. Only those items on the drawings and specifications and those items approved prior to bidding shall be furnished and installed on this project.

Where substitute items are used, the CONTRACTOR shall assume all responsibility for physical dimensions and pay for all changes resulting from substitutions. This responsibility shall also include all extra work necessitated by other trades as a result of the substitutions.

The CONTRACTOR shall submit five (5) copies of descriptive shop drawings or product data covering the following items:

1. Feed point enclosures, relays, switches, panels, and photo cells.
2. Cable.
3. Conduit.
4. Light standard poles, each type.
5. Luminaires, each type.
6. Junction boxes.
7. Splice connectors.

Drawings or product data shall be marked as to item designation and submitted within thirty (30) days after Contract awards. No equipment shall be ordered until drawings and product data have been approved by the ENGINEER.

Submit shop drawings to:

City of Mandan  
Engineering Department  
205 2nd Avenue NW  
Mandan, ND 58554

The CITY OF MANDAN reserves the right to order additional Type "B," "B1," BR concrete standards, additional Type "C," C1 standards, or additional Luminaires along with the CONTRACTOR's shipment for the specific project. Materials are to be billed to the CITY OF MANDAN at the CONTRACTOR's invoice cost plus 15 percent. The CITY OF MANDAN will be responsible for unloading and storing of additional materials ordered by the City. The CONTRACTOR shall contact the City, by letter, prior to placing the CONTRACTOR's order for light standards. The City shall state quantity of additional materials, per item desired, in a letter addressed to the CONTRACTOR.

The CONTRACTOR shall keep one set of plans with him at all times to red line locations of conduits not requested by the CITY OF MANDAN, but installed by the CONTRACTOR for his convenience. In addition, the red lined drawings shall contain relocation of light standards, feed points, and changes in the cable location. This red lined plan set shall be turned over to the CITY OF MANDAN prior to the close of the project.

**1001-2.2 UNDERGROUND CABLE AND CONDUCTORS.** Underground circuit conductors shall be stranded copper, type "RHH/RHW" or "USE," conductors insulated

for direct burial and rated 600 volts. Conductor sheath shall be marked as to voltage, AWG, type (RHH/RHW-USE), and manufacturer.

Underground ground conductor shall be No. 6 stranded bare copper or Type TW insulated copper ground conductor. Service conductors from electric utility service point shall be Type RHW-USE, sized as per utility company requirements and electrical loading.

**1001-2.3 CONDUITS.** Conduits shall be 2-inch steel rigid galvanized conduit when jacked in place with bushings at each end. When pulled into place or direct buried, conduits shall be 2-inch polyvinyl chloride (PVC) schedule 40, U.L. listed for electrical usage and sunlight resistant. Bell type fittings shall be placed at both ends.

**1001-2.4 MARKER TAPE.** Marker tape shall be 6-inch wide red plastic tape marked "Caution - Buried Electric Cable."

**1001-2.5 JUNCTION BOXES.** Junction boxes shall be Quazite or approved manufacturer "PG" style of heavy-weave fiberglass construction capable of withstanding light vehicular traffic. Boxes shall be resistant to sunlight exposure, weathering, chemicals, and unaffected by freeze-thaw cycles to -50°F. No concrete or concrete product boxes shall be considered an as equal alternative. Dimensions shall be 24 inches x 13 inches x 26d inches minimum. Stackable boxes or extensions shall be allowed to achieve required depth. Boxes shall have bolted covers and covers stamped with standard logo "Electric" or "Street Lighting." Boxes shall be provided with knockouts for service entrance.

**1001-2.6 SPLICE CONNECTORS.** Splice connectors at junction boxes for multiple connections shall be Homac, type RAB-X-URD-BUSS submersible insulated subsurface terminal for copper conductor or approved equivalent.

Splice connectors at pole hand hole shall be Penn-Union IPBNA2/0XS or approved equivalent.

**1001-2.7 FEED POINT ENCLOSURE.**

**(a)** Pad mounted feed point enclosure shall be as manufactured by Povolny Specialties of Inver Grove Heights, Minnesota, or equal with two doors. Doors to be complete with locking device capable of utilizing a padlock. Feed point enclosure shall be stainless steel.

**(b)** Pole mounted feed point enclosure shall be Hoffman No. A-42R3612HCR NEMA Type 3R medium enclosure with padlock locking type hinged cover or equal. Feed point enclosure shall be stainless steel.

**1001-2.8 RELAYS, PANELS, SWITCHES, PHOTO CELL.**

**(a)** Relays shall be RCOC type MR-UD No. 6342 with normally open contact.

**(b)** Electric panel shall be a Square "D" QO120M100 load center with a QOC20U1005 door, rated 120/240 volt with 100 amp two pole main breaker, and a 22,000 amp interrupting rating.

**(c)** Switch shall be a single pole with metal box and raised switch cover used for daytime test of lights, marked "Test Switch" with a 3/4-inch x 3-inch nameplate.

**(d)** Photo cell for control of relays shall be Hubbell PBT-1 or equal.

#### **1001-2.9 STREET LIGHT STANDARDS.**

**(a)** Type B, B1 Standards shall be pre-stressed spun concrete of natural polished finish the precast type as manufactured by Ameron MEO-8.5-C6 Brace - No. 112 sky gray natural polished finish or equal to provide a minimum mounting height of 28 feet. Poles shall be complete with hand holes and metal covers secured in place with screws. Concrete light standards shall be equipped with a grounding lead to bond the pole to the grounding system.

**(b)** Type BR standards shall be pre-stressed spun concrete of the precast type. Poles shall be Ameron SEO-4 (direct-embedded octagonal) with a 2 7/8" o.d. cast aluminum top tenon to provide a minimum mounting height of 13 feet. Color shall be No. 112 – sky gray, natural polished finish. Poles shall be complete with hand hole access and covers secured in place with screws. Concrete light standards shall be equipped with a grounding lead to bond the pole to the grounding system.

**(c)** Steel light standards (C, C1) shall be steel, galvanized type, as manufactured by Valmont Industries, Inc. DS90 or equal, of one- or two-piece construction. Galvanizing shall be in accordance with ASTM A123. The shaft shall have only one longitudinal weld and shall have a minimum yield strength of 50,000 psi.

The Davit type mast arm shall be constructed of same material and by same method as the shaft. Mast arm shall have a tenon adaptor for luminaire mounting.

The anchor shall be a one-piece steel casting secured to the lower end of the shaft by two continuous welds. One weld shall be inside the base at the bottom of the shaft and the other shall be on the outside of the shaft at the top of the anchor base. The welded connection shall develop the full strength of the adjacent shaft section. The anchor base shall be complete with bolts, washers, shims, and bolt covers with cap screws for attaching covers to base. Grounding lug to be provided inside of the hand hole.

A hand hole shall be provided in shaft opposite the roadside of pole for all pole types unless otherwise noted in the plans. Hand holes to be a minimum of 4 inches by 6 inches with reinforced frame and removable cover. Cover to be secured in place with screws.

## **1001-2.10 LUMINAIRES, LAMPS, BALLAST, POST WIRING WITH FUSE.**

**(a)** Luminaires for the types B/B1 or C/C1 shall be totally enclosed with integral high-pressure sodium or metal halide lamps. Luminaires shall consist of head with ballast socket and optical assembly.

Heads to be of aluminum casting non photocell type, ballast door type, designed for internal wiring and shall be furnished with 2-inch slip filter for horizontal mounting. Heads shall be adjustable plus or minus 5 degrees ( $\pm 5^\circ$ ) from horizontal.

Sockets to be adjustable for either IES Type II medium semicutoff or IES Type III medium semicutoff distribution. Photometric data shall be provided.

Ballasts shall be of an integral high power factor, regulated type with multiple voltage taps and suitable for cold weather starting at an ambient temperature of  $-20^\circ\text{F}$ . Data listing starting and normal operating currents shall be provided.

Lamps shall be provided as follows:

- 100 watt – 9,500 Lumens
- 150 watt – 16,000 Lumens
- 250 watt – 30,000 Lumens
- 400 watt – 50,000 Lumens

All Luminaires, by Type specified, shall be by one manufacturer similar and equal.

**(b)** Luminaires for the Type BR lights shall be Holophane RSL350-33-BK series post-top units, non-photocell type with multiple voltage/high power factor ballasts, 150 watt and IES Type III medium, semicutoff distribution glass refractor. Luminaires shall be equipped with integral slipfitter for 3-inch O.D. tenon mount.

**(c)** Post wiring shall be No. 10 AWG stranded copper, Type THWN-600 volt cable of the same type specified for the underground distribution circuits. Post wiring fuses shall be a type FNM 10 ampere fuse with a Buss type HEB in line fuse holder.

**1001-2.11 WOOD POLE.** Wood pole shall be 30 feet Class 3 full length pressure treated (PENTA) pole.

**1001-2.12 UNDERGROUND SPLICES.** Underground splices shall not be permitted unless approved by the CITY OF MANDAN. No more than three underground splices shall be permitted on any continuous run of cable between feed points and poles and junction boxes.

When CITY OF MANDAN Engineer has determined that a splice is acceptable, the CONTRACTOR shall install a Homac, type FSS splice. The splice shall then be wrapped once with 3M tape, type 130C and twice with Scotch tape, type Super 33 Plus..

## **1001-3 CONSTRUCTION REQUIREMENTS**

**1001-3.1 FEEDER AND DISTRIBUTION CIRCUITS.** All feeders and distribution circuits shall be of the multiple type, 120/240 volt, single phase, and shall consist of two or three conductors constituting one or two 120 volt circuits or a single 240 volt circuit. Plans shall indicate where three-wire circuits (2-120) volt and two-wire circuits (1-120 volt or 1-240 volt) are to be installed.

The system shall be laid out on the plans, and distribution circuits shall be routed as shown.

Individual lamp circuits are to be fused in the base of each lighting standard. Tape fuse kits with a 1/2-inch lapped layer for a distance of 1½ inches on each side of joint with conductor. Fuse holders to be complete with proper fuse to protect luminaire ballast. The neutral conductor shall be solidly connected, unfused, throughout system.

Ground conductors shall be provided between all metal poles and associated feed points. Bond to metal pole, to ground rod in pole base, feed point enclosure, feed point panels, relay cabinets, and ground rod.

Conductors shall be continuous from pole base to pole base or from feed point to pole base. Splicing conductors underground will not be allowed without specific approval of ENGINEER.

**1001-3.2 LAYING OF CABLE: IN TRENCH AND/OR CONDUIT.** Distribution circuits consisting of conductor cables, quantity and size as designated on plans and installed direct burial in trench or in conduit, shall be installed to a depth of not less than 24 inches below finished grade. Under streets, drives, and sidewalks, conductor shall be installed not less than 24 inches below underside of concrete, asphalt, or hard surfacing.

Conductor cables shall be packed in sand to provide a cushion and to facilitate drainage in the following manners: Excavate trench to required minimum depth of 27 inches (exception of 48 inches from feed points to transformers, in easements, or as specified).

Trench shall be filled with 3 inches of clean, washed sand bedding, leveled and lightly tamped. Conductor cables, quantity and size designated on plan shall be laid loosely in trench and spaced as per drawing detail. Conductor crossovers shall be avoided.

CONTRACTOR may be required to utilize a paddle template ahead of the 3 inches of sand cover to insure proper spacing. Cover sand shall not be less than 3 inches in depth over conductors. Sand shall again be leveled and lightly tamped the full width of the excavated trench. Trench shall then be backfilled and tamped in regular manner.

(Exception: If specific excavation is judged to be free of rocks and debris, CONTRACTOR shall be allowed to utilize backfill without sand cushion upon approval of the ENGINEER.)

Care shall be taken during installation of conductors to not bend or kink cable to a radius of less than six times the cable diameter.

On conductors installed on branch circuit feeders routed underground from pole to pole, all circuits shall be brought up into pole for splicing (especially lights on alternated circuits) unless indicated on plans. No splicing will be allowed of underground cable. Splicing will only be allowed in junction boxes, pole bases, or feed point cabinets.

Conduit shall be provided under hard surfaced driveways, streets, and alleys and when rising up into feed points. Conduit not installed direct burial underground shall be jacked or bored. Rigid steel galvanized conduits shall be installed when jacked or Schedule 80, UL Listed PVC may be utilized when installed with a directional bore or "mole" device. All conduits shall extend 12 inches beyond each roadway, alley, driveway, or concrete surface. Rigid steel conduit ends shall be carefully reamed to provide a smooth surface for conductors. Plastic bushings shall be placed on rigid steel conduit ends and PVC conduit ends shall be terminated with bell type fittings. All cable run through conduit shall be pulled by hand and shall not be strained in any manner. A slack loop shall be provided in conductors prior to entering any conduit. All conduit installed, whether direct buried, bored, or jacked, shall be a minimum of 24 inches below finished grade. Where practical, conduit shall be sloped to provide drainage. Two-inch PVC conduit shall be provided for the risers at the pad mounted feed points and 2-inch rigid steel galvanized at pole mounted feed points.

If an obstruction is encountered when "jacking" or boring conduit under a concrete or asphalt street, driveway, or alley, or for any reason it becomes impractical to install the conduit in this manner, the ENGINEER may grant the CONTRACTOR permission to cut or saw the street, drive, or sidewalk so conduit can be trenched into place. The width of the concrete or asphalt to be removed and the depth of the saw cutting shall be performed as directed by the ENGINEER. No extra payment will be made for cutting the concrete or asphalt. Cost of installing conduit by this method shall be included in the price for 2-inch conduit jacked or pulled in place. Street "cuts" shall not be started until permission is granted by the ENGINEER in writing.

In lieu of trenching to install either conductor or conduit, the CONTRACTOR may utilize directional boring. In this event, alignment and depth shall be maintained according to plan. Any deviation in alignment and/or depth shall be corrected by the CONTRACTOR as directed by the ENGINEER, at no cost to the CITY OF MANDAN. CONTRACTOR shall be paid as if trenched by the appropriate unit bid price for 27-inch or 48-inch trenching plus the unit price bid for sod (conversion from square yards to linear feet shall be: 1 square yard equals 6 linear feet). Any conduit bored solely for the CONTRACTOR's convenience and/or not paid for at the unit price bid for jacked or bored conduit shall be the CONTRACTOR's expense, at the discretion of the ENGINEER.

Where excavations for cables or conduits are made, the backfill shall be compacted in 4-inch lifts or layers. Only suitable material as defined by Section 202-1c shall be used

for backfill of trenches. Backfill with sub-standard material is prohibited even though such materials may have been excavated from the trench.

Excavated trenches shall be compacted by approved methods to 90 percent of maximum dry density at optimum moisture in accordance with ASTM D1557 when under future pavement or concrete areas. Boulevards, grassed areas, and any other disturbed areas shall be compacted to 80 percent of maximum dry density at optimum moisture.

Any tree roots encountered and/or damaged during trenching or boring shall be handled according to Section 201-2.4 "Tree Root Cutting."

Provide marker tape near top of trench (6 inches below final grade) in all trenches; cost to be a part of trenching price.

**1001-3.3 JUNCTION BOX INSTALLATION.** Junction boxes shall be provided at locations shown on plans installed in the boulevard. Top of junction boxes to be same elevation as top of adjacent curb or sidewalk as per standard detail.

Provide slack loop in conductors not being spliced so conductor can be pulled up out of junction box to a minimum of 24 inches above ground.

Provide waterproof connectors for all splicing.

Tape connector kits with half lapped layer of rubber or synthetic rubber tape and one layer of tape for a distance of 1½ inches each side of joint.

**1001-3.4 STREET LIGHT FEED POINTS.** Street light feed points consist of pole mounted, pad mounted, and modifications and additions to existing.

**(a) Pad Mounted (New).** New pad mounted feed points shall be set on a concrete pad which is set on a 12-inch thickness of a crushed rock subbase. Provide 1-inch chamfer all around and down vertical sides to a minimum of 2 inches below grade.

Concrete pad shall be 52 inches long by 24 inches wide by 12 inches deep (52"L x 24"W x 12"D) and shall be constructed in accordance with Section 500 for Concrete Construction. Provide seven (7) 2-inch PVC stubouts down through concrete base and a minimum of 12 inches beyond edge of base. Point one (1) conduit towards power company transformer and six (6) towards direction of outgoing circuits. Provide two 1-inch conduits for ground rods through the base only. Provide 2-inch minimum R.S. conduit for incoming service conductors towards direction of utility transformer.

Provide unistrut mounting brackets and 3/4-inch plywood panel as shown on detail. Plywood to be painted with two (2) coats of oil base grey prior to equipment installation.

Provide 40 amp one pole breakers for each 120 volt street light circuit and a 15 amp one pole breaker for control circuit, 20 amp one pole breaker for convenience outlet. *Paint handle of 15 amp breaker red.*

Provide one (1) relay for each three (3) wire street light circuit (2-120V).

Install switch to be connected into control circuit to bypass photocell for daytime test of street lights.

Install G.F.I. outlet.

Provide two 5/8-inch x 10-foot copper ground rod in conduit through concrete to below cabinet. Bond all circuits, relay cabinets, electric panel cabinet, enclosure, and neutral.

Photo cell shall be mounted on side of enclosure as shown on detail. Direct photo cell to north.

Provide 120/240 volt single phase service from power company. Pad mount transformer. Service shall be installed in 2-inch, minimum, conduit with three Type RHW-USE conductors. Route conduit entrance through meter, if required; if not, route 2-inch service conduit directly into electric panel. All unfused conductors within the feedpoint enclosure shall be placed in conduit.

Location of pad mounted feed points as shown on plans to be determined by location of power company pad mount transformer and by power company space requirements.

**(b) Pole Mounted (new).** Incoming service to be from top of pole. Provide 1½-inch steel galvanized conduit and three THW conductors and extend up pole as shown. L.B. into back of enclosure.

Provide two 5/8-inch x 10-foot copper ground rod at bottom of pole as shown on detail and ground enclosure and service.

Provide relays, panel, etc., similar to specified units under padmount feet point.

Feed points mounted on poles belonging to others shall conform to all requirements of the pole's owner, such as use of stand off brackets. The CONTRACTOR shall be responsible for coordinating with the pole's owner in conforming to their requirements.

**(c) Pole Mounted: (Existing) Additions and Modifications.** Provide additional relays and feeder conduits as shown or specified. Relays to match existing.

Paint entire exterior portion of each existing feed point associated with this project as follows:

1. Wire brush entire surface and sand with extra fine sandpaper.
2. Wipe down with thinner.

3. Brush on two (2) coats of ZRC zinc dust primer.

**1001-3.5 STREET LIGHT STANDARD, CONCRETE BASE AND BUTT PADS.** A concrete pad of dimensions shown in the standard detail shall be constructed around the base of the butt type concrete standard. A concrete-bearing pad 6 inches thick shall be provided under the bottom of the pole as shown. Provide roofing tar paper around poles between pole and concrete pad. In sidewalks, provide 3/4-inch expansion joint around concrete pad between concrete pad and sidewalk.

All costs of constructing the concrete pads and bases shall be included in the price bid for furnishing and installing street light standards.

The concrete to be used in the construction of the concrete pads and bases shall be 3500 pound concrete with a minimum of six (6) bags of cement per cubic yard of concrete and shall conform in all respects to the CITY OF MANDAN Specifications for Sidewalks, Curbs, and Gutters where it applies.

Concrete base for metal standards shall be installed as per standard detail. Bases to be completed with anchor bolts, rebar, and conduit stub-in and ground rod (½ inch x 10 feet). Anchor bolt spacing to accommodate poles shall be verified in the field prior to construction. Concrete to be a minimum of 3500 psi strength at 28 days.

Concrete street light standards shall be set as shown on the plans with the hand hole facing away from curb and cable entrances parallel to roadway. Poles to be complete with hand holes and cover with screws. Installation to include ground rod (½ inch x 10 feet). Ground all concrete standards. Bond to ground rod.

In each post, one (1) feeder lead (hot wire) and one (1) neutral wire shall be run from the cable in the base to each luminaire.

The feeder leads to the luminaire shall extend from the cable in the post base through a fuse holder with a fuse. The fuse housing shall be supported by the conductors at the level of the post hand hole. Sufficient excess conductor length shall be provided to permit withdrawal of the fuse holder through the hand hole a minimum of 6 inches outside of the hand hole for purposes of installation and inspection. The neutral wire shall not be fused.

Ground all metal standards. Bond to ground conductor and to ground rod.

Luminaires shall be adjusted to supply light to roadway and boulevards as directed by the ENGINEER.

**1001-3.6 REPAIRS TO SIDEWALKS AND STREETS.** In locations where sidewalks, pavement, driveways, or streets are opened for installation of cable, conduit, or poles, the removed area shall be replaced to the original thickness. The repair shall conform in every way to either Sections 300 and 400 for AC Pavement or Section 500 for Concrete Repair.

In the event of the inability of the CONTRACTOR to either jack or bore conduit or cable under an improved area, the CONTRACTOR shall with the ENGINEER's permission be allowed to open cut the area. The CONTRACTOR shall minimize the area removed as much as possible but must allow enough area to allow for installation of cable or conduit and access for compactive equipment. CONTRACTOR shall make cuts that uniform edges for trenches may be obtained. In concrete, the CONTRACTOR shall utilize existing joints or sawed joints as required.

The backfill under all improved areas shall be Class A and shall be compacted to not less than 90 percent of maximum dry density at optimum moisture in accordance with ASTM D1557.

Where specified on plans, CONTRACTOR shall be paid at the unit price bid for Concrete or AC Pavement unless incidental. In the event of the inability of the CONTRACTOR to jack or bore under an improved area and an open cut is required, the CONTRACTOR shall be paid at unit price bid for installed material only. Repair shall be at CONTRACTOR's expense.

In the event of damage of an improved area due to construction, all repair costs shall be borne solely by the CONTRACTOR.

All AC Pavement patches or repairs shall be seal coated in accordance with Section 400 "Flexible Surface Courses."

**1001-3.7 SODDING.** Sodding installation and care shall conform in every respect with Section 1203 of the CITY OF MANDAN Specifications with the following exception: Existing sod may be cleanly cut, removed, rolled up, kept moist, replaced, and paid per square foot of sodding. CONTRACTOR shall then be responsible for care as per CITY OF MANDAN Specifications. Topsoil to a minimum depth of 4 inches shall be salvaged and replaced or provided and added to the top of the trench incidental to sodding bid item.

**1001-3.8 MAIL BOXES - REMOVE & RESET.** In some areas mail boxes are already in place behind the curb and will require removal and replacement to make way for trenching operations.

CONTRACTOR shall be responsible for:

1. Removal and replacement of mailboxes and shall make every effort to remove and replace in same day. In the event this is not possible, CONTRACTOR shall construct a temporary wood base to hold mail boxes upright.
2. Coordination with Mandan Post Office. The Post Office shall be informed when a mail box is removed and not replaced for more than 24 hours to coordinate mail delivery.

Mail boxes shall be reinstalled with front of box directly above box side (property side) of curb with bottom of box 38 inches above top of curb. Boxes shall be plumb, level, set square with street, and tamped solidly in place.

Mail boxes installed on concrete pads and metal pedestals shall not be removed. A conduit shall be constructed under the base as directed by the ENGINEER.

**1001-3.9 NAMEPLATES.** The CONTRACTOR shall provide nameplates per standard detail for all feed point cabinets. The nameplate shall consist of letters and/or numbers, photo offset printed on a thermosetting laminated plastic consisting of melamine or phenolic core and melamine surface.

The nameplates shall be mounted on the front of the feed point or control cabinet door with a combination of aluminum round head screws and Minnesota Mining and Manufacturing Company adhesive similar to type EC-847.

Name plates to have a black background with white letters and/or numbers unless noted otherwise. One (1) 1½-inch x 6-inch nameplate and one (1) 1½ inch x 3-inch nameplate shall be provided for each new feed point and one (1) ¾-inch x 3-inch nameplate for each test switch. The feed point number and location shall be as designated on plans.

**1001-3.10 REMOVAL OF STREET LIGHT STANDARDS.** The standards shall be removed from the sites shown on the plans, salvaged, transported, and stored (by blocking and supporting at three points) in the City storage yard located at the Mandan Public Works Facility at 411 6th Ave SW. The luminaire receptacle wires shall be disconnected at the fuses and the luminaire shall be removed from the mast arm, salvaged, and delivered to the same location as the poles. Where the plans call for salvaging the conductors in place and resplicing these conductors, the standards shall be removed carefully to prevent damage to the conductors. Splices shall be made by using approved materials. The hole where the standard was removed shall be filled with earth supplied by the CONTRACTOR and tamped to the density of the surrounding soil.

**1001-3.11 RELOCATE STREET LIGHT POLE.** This item shall consist of removing a light standard from its present location and installing at a new location shown on the plans and connecting to the new or existing street light system wiring. The CONTRACTOR shall furnish any materials and equipment required for removing and replacing the street light pole. Installation shall be performed in accordance with these specifications.

**1001-3.12 TESTS.** When the installation is complete and at such time as may be specified by the ENGINEER, the CONTRACTOR shall conduct an operating test for approval. The equipment shall be demonstrated to operate in accordance with the requirement of the Specifications, the Plans, and to the satisfaction of the ENGINEER. The CONTRACTOR shall furnish all instruments and personnel required for all tests. All test results shall be recorded. The CONTRACTOR shall be present during all tests and

inspections unless so informed by the ENGINEER. Nighttime tests and inspections may be held at the option of the ENGINEER.

#### **1001-4 MEASUREMENT AND PAYMENT**

**1001-4.1 TYPE B STREET LIGHT UNITS (150 Watt HPS or Metal Halide).** Type B Street Light units consist of:

1. Designated luminaire with ballast and lamp.
2. Concrete butt type poles with bracket.
3. Wiring and connections to underground circuits.
4. Ground rod with connections.
5. Fuse holder and fuses.
6. Concrete pads.
7. Unit set in place and ready for operation.

Measurement for payment shall be on a per each (EA) unit basis for each complete unit installed and ready for operation.

**1001-4.2 TYPE B1 STREET LIGHT UNITS (250Watt HPS or Metal Halide).** Type B1 Street Light units consist of:

1. Designated luminaire with ballast and lamp.
2. Concrete butt type poles with bracket.
3. Wiring and connections to underground circuits.
4. Ground rod with connections.
5. Fuse holder and fuses.
6. Concrete pads.
7. Unit set in place and ready for operation.

Measurement for payment shall be on a per each (EA) unit basis for each complete unit installed and ready for operation.

**1001-4.3 TYPE C STREET LIGHT UNITS (250Watt HPS or Metal Halide).** Type C Street Light units consist of:

1. Designated luminaire with ballast and lamp.
2. Galvanized steel, bolt down base type pole with bracket.
3. Wiring and connections to underground circuits.
4. Fuse holder and fuses.
5. Reinforced concrete base, anchor bolts, anchor bolt covers, ground rod, and conduit.
6. Unit set in place and ready for operation.

Measurement for payment shall be on a per each (EA) unit basis for each complete unit installed and ready for operation.

**1001-4.4 TYPE C1 STREET LIGHT UNITS (400Watt HPS or Metal Halide).** Type C1 Street Light units consist of:

1. Designated luminaire with ballast and lamp.
2. Galvanized steel bolt over base type pole with bracket.
3. Wiring and connections to underground circuits.
4. Fuse holder and fuses.
5. Reinforced concrete base, anchor bolts, anchor bolt covers, reinforced ground rod, and conduit.
6. Unit set in place and ready for operation.

Measurement for payment shall be on a per each (EA) unit basis for each complete unit installed and ready for operation.

**1001-4.5 TYPE BR STREET LIGHT UNITS (150WATT HPS Or Metal Halide).** Type BR street light units consist of:

1. Designated luminaire with ballast and lamp.
2. Concrete butt type poles with bracket.
3. Wiring and connections to underground circuits.
4. Ground rod with connection.
5. Fuse holder and fuses.
6. Concrete pads.
7. Unit set in place and ready for operation.

Measurement for payment shall be on a per each (EA) unit basis for each complete unit installed and ready for operation.

**1001-4.10 TWO-INCH CONDUIT "JACKED" OR PULLED IN PLACE.**

**(1)** Two-inch conduit jacked in place shall be 2-inch steel rigid galvanized conduit, jacked in place at proper depth sloped for drainage complete with bushings each end and extending 12 inches beyond each side of roadway, drive, or walk or 2-inch PVC (Schedule 40) pulled in place by use of direct bore or drill. PVC shall be sloped similar to 2-inch rigid.

**(2)** Excavations required for "setting up" for pushing or drilling conduit shall be a part of the conduit installation price. This includes breaking out and replacing concrete, asphalt, excavations, filling and tamping, and replacement of grass or sod.

Measurement for payment shall be for each linear foot (LF) of conduit installed and approved by the ENGINEER.

**1001-4.11 2-INCH CONDUIT - PVC LAID IN TRENCH.** Two-inch conduit, PVC laid in trench shall include conduit laid in a trench free of voids and rocks, sloped for drainage and properly backfilled as per specifications. Trenching cost is part of 1001-4.12 - "Trenching 27" Deep."

Measurement for payment shall be for each linear foot (LF) of conduit installed and approved by the ENGINEER.

**1001-4.12 TRENCHING – 27-INCH DEPTH.** Trenching shall include all excavation required for conductor trenches, sand cushion, backfill, tamping, and marker tape.

Measurement for payment shall be for each linear foot (LF) of trench excavated, backfilled, tamped, and with surface restored to original conditions all as accepted and approved by the ENGINEER.

**1001-4.13 TRENCHING – 48-INCH DEPTH.** Trenching shall include all excavation required for conductor trenches, sand cushion, backfill, tamping, and marker tape.

Measurement for payment shall be for each linear foot (LF) of trench excavated, backfilled, tamped, and with surface restored to original conditions all as accepted and approved by the ENGINEER.

**1001-4.20 JUNCTION BOXES.** Junction boxes shall include all splice connectors, excavated, backfilled, tamped, and with surface restored to original conditions.

Measurement for payment will be for each (EA) junction box installed complete and accepted by the ENGINEER.

**1001-4.21 and 1001-4.22 COPPER CIRCUIT CONDUCTORS.** Three (3) No. 4 or two (2) No. 4 stranded copper as the case may be type RHW-USE single conductor - 600 volt direct burial cables laid in common trench and/or conduit shall be measured by the linear foot (LF) of three (3) No. 4 or two (2) No. 4 single conductors furnished and installed in trenches/conduits. Measurement will be from centerline to centerline of pole or feed point. CONTRACTOR shall make allowance for necessary conductors in and out of poles and feed point in unit price.

Payment shall be at unit price bid for each linear foot (LF) of three (3) or two (2) wire conductor installed and accepted by the ENGINEER. Two (2) wire conductor shall be paid for under bid item 1001-4.21, and three (3) wire shall be paid for under 1001-4.22.

**1001-4.23 & 4.24 COPPER CIRCUIT CONDUCTORS.** Two No. 2 or three No. 2 stranded copper, as case may be, Type RHW-USE single conductor – 600 volt direct burial cables laid in common trench and/or conduit shall be measured by the linear foot of two No. 2 or three No. 2 single conductors furnished and installed in trenches/conduits. Measurement will be from centerline to centerline or pole or feed point. CONTRACTOR shall make allowance for necessary conductors in and out of poles and feed point in unit price.

Payment shall be at unit price for each linear foot of 3- or 2-wire conductor installed and accepted by the ENGINEER. Two-wire conductor shall be paid for under Bid Item 1001-4.23 and 3-wire shall be paid for under 1001-4.24.

**1001-4.25 NO. 6 COPPER GROUND - TYPE T OR BARE.** No. 6 copper Type TW or bare shall include all grounding conductor, ground rods, and connections. Ground rods (1/2 inch x 10 feet) to be provided at all junction boxes where No. 6 groundwire is required as part of system.

Measurement for payment shall be based on each linear foot (LF) of No. 6 conductor installed, measured from junction box or pole foundation along centerline of trench or duct.

**1001-4.26 MAIL BOXES - REMOVE & RESET.** Multiple boxes on a single or double support structure shall be measured and paid for per support removed and replaced.

Payment shall be for each (EA) group removed, reset, and approved by the ENGINEER.

**1001-4.27 SODDING.** Sod shall be measured and paid for under Subsection 1203-4.1.

**1001-4.28 STREET LIGHT BASE.** This item consists of constructing concrete bases per those specifications and standard details for street light standards.

Street light bases shall be measured per each (EA) and paid for at the unit price bid for street light bases complete in place and accepted by the ENGINEER.

**1001-4.29 REMOVE STREET LIGHT STANDARDS.** This item shall consist of removal, transport, and storage of street light standards.

Measurement for payment shall be per each (EA) street light standard removed and stored accepted by the ENGINEER.

**1001-4.30 RELOCATE STREET LIGHT POLE.** This item shall consist of removing and relocating and reconnecting conductors not to be abandoned measured per each (EA) pole in place and accepted by the ENGINEER.