SP- 230195
(New)

SPECIAL PROVISIONS
FOR
ROADWAY LIGHTING AND ELECTRICAL

Cerro Gordo County
NHSX-065-8(73)--3H-17

Effective Date
July 16, 2024

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230195.01 GENERAL.

A. Section Includes.
- Remove Lighting Equipment
- Salvage Lighting Equipment
- Conductor System
- Conduit System
- Precast Light Bases
- Lighting Units
- Underpass Luminaire
- Service Cabinet
- Equipment Pad
- Handhole

B. References.
- National Electric Code
- State and Local Electrical Code
- National Electrical Contractors Association (NECA) - Standards of Installation
- Underwriters Laboratories, Inc. (UL)
- National Electrical Manufacturers Association (NEMA)

C. Submittals.

1. Shop Drawings.
- **a.** Luminaires
- **b.** Standards (pole and arm)
- **c.** Underpass Luminaire Mounting Bracket
- **d.** Service Cabinets
- **e.** Handholes

f. Junction Box
g. Precast Light Base

2. Product Data.
a. Conductors
b. Conduits & Couplings
c. Fuse Holders
d. Splicing Hardware
e. Adhesive Anchors

D. Regulatory Requirements.

1. Obtain approval of completed system from state or local electrical inspector.

2. Provide all necessary permit and inspection fees.

E. Project Conditions.

1. Painting: Repair any damages to finish of new equipment due to the shipping or installation.

2. Coordinate with the energy supplier for connection to the source. Energy is supplied by Alliant Energy - Contact: Ryan Crooks 641.422.1763

3. Current Characteristics
a. 120/240 Volt, A.C.
b. 1 Phase
c. 60 Hertz
d. 3 Wire

F. Sequencing And Scheduling.

1. All items under this section shall be installed prior to final street, sidewalk, and boulevard grading and/or restoration.

2. Contract unit prices shall reflect all construction costs. Extra construction costs associated with the installation of items under this section after the completion of new street surfaces; curb, boulevard, and sidewalks, shall be considered incidental.

230195.02 MATERIALS.

A. Manufactured Unit.

1. Lighting Units: See the detail and Equipment Schedule on the plans.

2. Underpass Luminaire: See the detail and Equipment Schedule on the plans.

3. Service Cabinet.
a. Manufactured weatherproof, NEMA 3R assembly with dimensions, construction, and components as indicated in the “Service Cabinet” detail in the plans.
b. Completed assembly shall bear ‘UL’ label as “suitable for use as service entrance equipment.”
c. Manufacturer: Povolny Specialties Inc. No substitutions.

4. Arc-Flash Hazard Warning Labels.
Provide 4 inch H by 6 inch W vinyl or polyester labels meeting the following:
a. White Background

b. Orange background behind the WARNING text
c. Black text
d. Self-adhesive
e. Machine printed letters and numbers
f. Water-resistant

5. Handholes.
Designed to carry light vehicular traffic, Tier 8 minimum.
a. Covers.
1) Bolt down type including two stainless steel bolts.
2) Mold the word “ELECTRIC” into cover.
3) Cover shall be capable of carrying light vehicular traffic.
b. Handholes.
1) Quazite, Style PG or equal
2) Sized per code. Minimum box size shall be 13 inches(W) by 24 inches(L) by 18 inches(D).
3) Open bottom
4) Extension shall be used under the handhole, extension shall be Quazite No. PG1324ea08, or approved equal, and shall be 8 inches in height.
c. Materials.
1) Polymer Concrete
2) Conform to ASTM D 635.
3) Self-extinguishing material.
4) Test to 50°F.
5) No change in physical properties due to weather exposure.
6) Color: Gray.
7) Top dimensions shall not exceed bottom dimensions by more than 1 inch.
8) Extensions shall be of same material.

6. Precast Light Base.
a. 20 inch square with 1 inch top chamfer
b. 7 foot depth
c. Four 2 inch PVC conduit entries
d. One 3/4 inch conduit entry for ground wire
e. 5000 psi concrete with air-entrainment
f. See detail in plans.
g. Iowa Base Inc. or equal

B. Components.

1. Conductors.
a. Standard copper with 600 volt insulation.
b. Insulation: Type XHHW-2 for underground installation in conduit, and for aboveground installation within poles and service cabinets.
c. Size and type: As shown on plans.

2. Conduit Systems.
a. Nonmetallic Conduit (NMC) and Fittings:
1) Polyvinyl Chloride, Schedule 40, UL Label.
2) Extra heavy wall, rigid.
3) Carlon PVC conduit Plus 40, 90°C or approved equal.
b. High Density Polyethylene (HDPE) and Fittings:
1) Schedule 40, UL Label, Comply with NEMA TC-7.
2) Extruded, nonmetallic, flexible conduit.
3) Carlon HDPE conduit schedule 40 or approved equal.

c. Rigid Metallic Conduit and Fittings: Hot dipped galvanized, UL Label.

3. Splicing Equipment.
- **a.** Insulated splicing blocks.
- **b.** Cold temperature rated to -40°C, 1000V
  - **1)** Burndy Uni-Tap
  - **2)** NSI
  - **3)** ILSCO
  - **4)** Polaris

C. Accessories.

1. Grounding Equipment.
- **a.** Grounding Conductors: Bare copper wire.
- **b.** Ground Rods:
  - **1)** 5/8 inch by 8 foot, copper clad, Copperweld, or equal.
  - **2)** Exothermically welded to ground wire.
  - **3)** Place two ground rods 6 feet apart at metered service location per Utility requirements.

2. Fuses.
- **a.** Fuses: 6 Amp, dual element fuse for luminaires.
- **b.** Fuse Holder:
  - **1)** 2 pole
  - **2)** Ideal, 30-S2222D or approved equal from Bussman.

230195.03 CONSTRUCTION.

A. Examination.

1. Verify rules and procedures of the energy supplier for connection to the existing system.

2. Verify locations for making connections to existing facilities.

3. Verify location of existing underground facilities prior to installation.

B. Protection.
Protect all existing surface and underground facilities that are scheduled to remain in place.

C. Installation.

1. General.
- **a.** Conform to the detail contract documents.
- **b.** Install all equipment based on the locations and dimensions shown in the plans unless utility or other conflicts require a new location for proposed lighting equipment.
- **c.** Distribution:
  - **1)** The lighting distribution circuits shall consist of two ungrounded conductors and one grounding conductor. The two ungrounded conductors shall constitute one 240 volt circuit.
  - **2)** The signal cabinet receptacle circuits shall consist of one ungrounded conductor, one grounded conductor, and one grounding conductor. The one ungrounded conductor and one grounded conductor shall constitute one 120 volt circuit.

2. Trenching and Backfill.
- **a.** Excavate trenches to a uniform depth 2 feet below the finished grade.
- **b.** Maintain uniform alignment based on dimensions shown in the plans.
- **c.** Conduit shall be placed in a direct line between light foundations, as shown in plans.

d. Multiple conduits shall be placed in same trench where possible.
e. Use excavated trench materials for backfill. Salvage and reinstall existing Class V aggregate base. If existing Class V becomes contaminated, Contractor shall replace at his own expense.
f. Remove sod, roots, clod, debris and stones over 1 inch in diameter from the backfill material.
g. Compact backfill material in maximum 12 inch lifts. Finished compacted density for work in street sections shall match that of the density specified for street construction.
h. Dispose of surplus excavated materials on the site as directed by the Engineer.
i. Do not place backfill material on foundations frozen deeper than 3 inches.

3. Precast Light Base.
a. Furnish and install a Precast Light Base in accordance with the details in the plan, at the locations indicated in the plan or as directed by the Engineer. Anchor bolt size and circle shall accommodate pole manufacturer's requirements. Contractor to furnish pole manufacturer supplied hot-dipped galvanized anchor bolts to the precast base manufacturer.
b. Compact backfill material in maximum 12 inch lifts. Finished compacted density for shall match that of the density specified for street construction.
c. Install one ground rod next to each precast light base.

4. Lighting Units.
a. Luminaires.
1) Stainless steel mounting hardware shall be used to mount luminaires, and arms to poles.
2) The Contractor shall apply an approved zinc-based anti-seize compound to all mounting hardware prior to assembly.
b. Poles.
1) Poles shall be installed plumb and level.
2) Stainless steel mounting hardware shall be used to secure access door and to mount luminaires to horizontal pole tenons.
3) Handhole doors shall be oriented opposite of luminaire arm.
4) The Contractor shall apply an approved zinc-based anti-seize compound to all mounting hardware prior to assembly.

5. Underpass Luminaire.
a. Stainless steel mounting hardware shall be used to mount luminaires and mounting brackets.
b. The Contractor shall apply an approved zinc-based anti-seize compound to all mounting hardware prior to assembly.

6. Service Cabinet.
a. Install new lighting service cabinet at location indicated on plans. Coordinate location with proposed signal cabinet where applicable.
b. The cabinet type shall be as detailed in the contract documents. Cabinet shall be equipped with components as indicated. All materials including, photocell, conduit, fittings, clamps and hardware, and all labor, tools, equipment, incidentals, and coordination necessary to complete the contract work shall be incidental to the cabinet and installed as per details in the plans.
c. Service Cabinet shall include all items incidental to a complete meter socket and service installation.
d. Install on concrete foundation as per detail and location indicated in plan.
e. Provide grounding per Utility requirements.
f. Install conduit stub to a point outside of the service cabinet base to enable the Alliant Energy service connection. Coordinate with energy provider for connection.
g. Alliant Energy to provide service conduit and conductors and make final connection.

7. **Equipment Pad.**
   - **a.** Furnish and install a equipment pad in accordance with the details in the Plan, at the location indicated in the Plan or as directed by the Engineer. The anchor bolt size and pattern shall accommodate the cabinet manufacturer's requirements.
   - **b.** Provide a rigid template of the cabinet base including anchor bolt holes and a slot to hold in proper position and height the anchor bolts, ground rod and conduits during the concrete pouring. The template shall not be removed until the concrete has cured.
   - **c.** Anchor rods shall be hot dipped galvanized full length and shall be four in quantity for each cabinet. Each anchor rod shall be threaded a minimum of 4 inches and be provided with two hex-head galvanized nuts and one galvanized washer.
   - **d.** Maintain 4 inches of clearance from finished boulevard or sidewalk grade to top of foundation. The Contractor shall coordinate foundation installation with the Engineer to ensure proper foundation elevation is maintained.

8. **Wiring and Grounding.**
   - **a.** Type XHHW-2 conductors shall be used for all underground conduit runs. Leave sufficient lengths of branch conductors to allow conductor splices to be extracted from pole base for maintenance.
   - **b.** Extend three No. 12 AWG Type XHHW-2 feeder leads to the luminaires from the cables in the pole base. Install two/pole fuse holders on feeder leads. Leave 18 inches minimum lengths of feeder conductors to allow fuse holders and conductors to be extracted from pole base for maintenance.
   - **c.** Provide a No. 6 AWG bare copper wire connection to ground rods with ample length to allow connection to light standard grounding lug and system ground conductor.
   - **d.** Attach grounding conductor to the energy suppliers neutral at the service point.
   - **e.** Terminate grounding conductor with a 25 ohm ground at the service points and at the end of each distribution run.
   - **f.** Establish 25 ohm ground with driven ground rods.
   - **g.** Provide minimum 2 feet of cover over all wiring.
   - **h.** Provide two ground rods at the metered service per Utility requirements.

9. **Splicing.**
   - **a.** Splicing shall be performed only within the pole bases and service cabinets. If identified on the plans, splicing may be performed within handholes and must use submersible splicing hardware installed per manufacturer's recommendations.
   - **b.** Wire-nuts are not an acceptable method of splicing within pole base.

10. **Conductors.**
    - **a.** Install complete cable in conduit to each lighting unit as specified on the Plan.
    - **b.** Do not splice cable between connection points.
    - **c.** All conductors shall be color-coded. If multiple lighting circuits are to be installed within the same conduit, unique color codes or tracer colors shall be applied to conductor groups to identify respective circuits. The conductors shall be grouped and clearly labeled in the lighting service cabinet and each pole.
    - **d.** Use insulation of greater rating at the connection of two unlike types.

11. **Conduit Systems.**
    - **a. General.**
      - **1)** Install conduit in a direct line between lighting units cabinets and handholes (unless trees or other obstructions require an alternate location) to a depth of 24 inches; by direct bury method unless otherwise noted.
      - **2)** All conduits that are to be placed under parking areas, driveways, streets, medians, and sidewalks that are not scheduled for removal shall be pneuma-gophered, directional bored, or another method approved by the Engineer, which will not damage or disturb the integrity of the surface above.
      - **3)** Jack or auger conduit under permanent surfaces.

4) Grout all resultant voids from abandoned augering or jacking attempts.
5) Maintain conduit runs on grade to provide definite drain to low points in the system.
6) Temporarily cap conduit ends during construction.
7) Install ground conductor in all conduit.
8) End bells will be required at all conduit terminations in handholes, poles, and service cabinets.
9) Following installation of cables and conductors, seal the open ends of conduit entering cabinets and pole foundations using duct seal compound NRTL classified under general use tapes.

b. Nonmetallic Conduit (PVC).
1) Solvent weld all conduit and fittings in accordance with manufacturer's instructions.
2) Shall be used for all underground conduit installations, in or beneath slabs under roads, sidewalks, parking lots, and driveways unless noted otherwise.
3) End bells/bushings shall be installed on all conduit ends prior to pulling conductors.

c. Nonmetallic Conduit (HDPE).
1) Except for under existing pavements, underground Continuous Type HDPE Conduit shall be placed by trenching, stitching, plowing, or other method approved by the Engineer. Under existing pavements, Continuous Type HDPE Non-Metallic Conduit shall be placed by directional boring.
2) Appropriate couplings shall be used to connect HDPE conduit to PVC conduit if required in underground runs. PVC cement or epoxy shall not be used to bond HDPE conduit to PVC conduit.

12. Handholes.
a. Install handholes as required to facilitate pulling of conductors.
b. Install a ground rod in each lighting handhole and bond to the grounding system with an exothermic weld.
c. Excavate minimum 12 inches below base depth and refill with river rock base.

13. Electrical Service.
a. The Contractor shall coordinate the installation of Electrical Service, provide power to the service cabinets, and verify the actual work to be done and all associated costs.
b. Proposed source of power are identified in the Plan.
c. Fees for the "Application for Electrical Service" and payment to the Utility Company for providing the electrical service connections shall be the responsibility of the Contractor.
d. The Contractor shall secure approval from the Engineer for any changes to the Electrical Service as reflected in the Plan.
e. No measurement will be made of the various items that constitute Electrical Service, however all such work will be construed to be included as part of the project (the electrical service costs will not be paid for as part of the pay item). The Contractor shall provide the Engineer a copy of the invoice from the power company. Payment will be made for the invoice cost paid to the power company plus 10%. The payment shall be compensation in full for all costs incidental thereto, including, but not limited to providing power to service cabinets, power company fees, Power Utility Company Coordination, notifying the City of ownership details, and all materials and labor necessary to construct the Electrical Service.

14. Labeling of Circuits.
a. Label all conductors in conduit in new service cabinet and handholes indicating the next termination point. For example, in lighting service cabinet, the label would read "TO POLE A12"; in the handhole the label would read "TO LIGHTING SERVICE CABINET" or "TO POLE A11".
b. Provide labels that consist of white vinyl adhesive tape wrapped around the cable or conductors. Hand write the labeling on the vinyl adhesive tape or produce with a label maker. If label marking is handwritten, accomplish the labeling by using a black permanent marker, in such a manner, that the markings are legible to the satisfaction of the Engineer.

Labels produced with a label maker shall be suitable for use in wet locations, and this label must wrap around the cable one complete revolution with some overlap.

15. **Clamps and Fasteners.**
    - **a.** All hangers, clamps and supports for electrical equipment and material shall be new and bear a recognized testing laboratory's label, where applicable. The type of equipment and/or material shall be designated by the location where it will be installed and so defined by NEMA / NFPA 70 standards.
    - **b.** Raceway Supports: As described in NECA 1 and NECA 101.
    - **c.** Conduit Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway to be supported.
    - **d.** Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to surfaces include the following:
    - **e.** Adhesive Anchors: for use in stone or hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and materials in which used.

16. **Injected Adhesive Anchor Systems.**
    - **a.** Submit product data and current ICC report or IAPMO report showing product is compliant with project code requirements for review. Contractor shall arrange for manufacturer's rep to train all installers on the complete installation process. A letter of procedure stating method of drilling, the product for use, the complete installation procedure, manufacturer training date and a list of the personnel trained on anchor installation shall be submitted to the Engineer.
    - **b.** Holes for anchors and rods shall be located to miss existing reinforcing steel wherever practical.
    - **c.** Maintain spacing as recommended by the manufacturer unless specifically noted otherwise.
    - **d.** Hole diameter shall be as specified in the applicable ICC Report for the size and type of anchor or dowel to be installed. Hole depth shall be as directed by adhesive manufacturer.
    - **e.** Holes shall be prepared as specified in the applicable ICC Report. At a minimum, holes shall be drilled using standard rotary-impact bits and cleaned of all dust and debris prior to installation of anchors or rods. Cleaning shall consist of removal of debris with oil free compressed air (90 psi, minimum), brushing of the hole twice in a twisting motion with a nylon brush and removal of debris with oil free compressed air (90 psi, minimum).
    - **f.** Except as noted, all anchors shall have intermittent special structural inspection by one of the following. Load tests shall be to 150% of service capacity or 50% of ultimate strength, with no appreciable slip or permanent deformation. Anchors which fail this test shall be replaced at no cost to the project. Two failures in a given installation shall result in mandatory load testing at double the rate noted below.
        - **1)** Witness installation according to manufacturer's recommendations and requirements of ICC report.
        - **2)** Load test of 10% of installed anchors by supplier or third party inspector.

17. **Grounding.**
    Ground all metallic conduits, supports, cabinets, non-current carrying equipment parts and the neutral conductor in accordance with the National Electrical Code.

18. **Rust Inhibitor.**
    - **a.** A thorough application of an approved rust inhibitor shall be used to grease or otherwise protect the threads of the anchor rod, prior to pouring the concrete foundation to ensure that the concrete does not mold to the threaded portion of the rod.
    - **b.** All threaded stainless steel hardware and dissimilar metal, threaded hardware shall be coated with an approved zinc-based anti-seize compound by the Contractor prior to assembly.

D. Field Quality Control.

1. Testing.
- **a.** Test completed system for unwanted grounds.
- **b.** Conduct megohm meter test (at 500 volts D.C.) indicating resistance of each circuit.
- **c.** Allowable Results:
  - **1)** Phase Conductor Insulation Resistance: Not less than 100 megohms.
  - **2)** Neutral Conductor Insulation Resistance: Not less than 5 megohms.
  - **3)** Circuit Insulation Resistance: Not less than 5 megohms.
- **d.** Provide necessary corrections and retest.

2. Demonstration.
Demonstrate proper operation of completed system.

3. Field Service.
- **a.** Provide full instruction and demonstration in the adjustment, operation, and maintenance of all components of the system.
- **b.** Provide instruction and demonstration to the City's employees during regular working hours.

E. Painting.

1. Paint all exposed metal surfaces or areas damaged during construction.

2. Match original paint type and color.

F. As-Built Plans and O & M Manual.

1. Contractor shall supply accurate as-built plans of the project to the Engineer. Drawings shall indicate location and setback of conduit, and pole locations within the project measured from a reliable location. Work must be completed under the direct supervision the Engineer.

2. The Contractor shall collect, gather, and assemble into one book the installation details, instructions, schematics of actual equipment and operations directions supplied by the manufacturer with all equipment. Final acceptance of the work will be withheld until such data has been presented complete to the Engineer. The manual shall be available for instruction of operations and maintenance of equipment and systems.

230195.04 METHOD OF MEASUREMENT.

A. Removal of Concrete Foundations.
Measure as individual units.

B. Remove Conduit and Conductors.
Measure as individual units.

C. Remove handhole.
Measure as individual units.

D. Salvaged Lighting Units.
Measure as individual units.

E. Conductor System.

1. Measure by length in feet.

2. Measure each type and size separately.

3. Measure between terminal point centers along the centerline of the conductor.

4. Add 5 feet at each terminal point for connections.

F. Conduit System.

1. Measure by length in feet.

2. Measure each type and diameter separately.

3. Measure between end terminals along the centerline of the conduit.

G. Precast Light Bases.
Measure as individual units.

H. Lighting Units.
Measure as individual units.

I. Underpass Luminaire.
Measure as individual units.

J. Service Cabinets.
Measure as individual units.

K. Equipment Pad.
Measure as individual units.

L. Handhole
Measure as individual units.

230195.05 BASIS OF PAYMENT.

A. System Components.

1. Remove of Concrete Foundations shall include the excavation required to remove the in place light foundations, ground rods, backfill and restoration of the area as indicated in the plan.

2. Remove Conduit and Conductors shall include the disconnection of circuits, excavation required to remove the in-place cables or conduit, backfill and restoration of the area as indicated in the plan.

3. Remove Handhole item includes shall include the excavation required to remove the in place handhole, backfill and restoration of the area as indicated in the plan.

4. Salvaged lighting unit item includes disconnecting and salvaging luminaire, arm, pole, transformer base, photo-clock (photo control), fusing, and internal wiring, from pole and delivery to location specified.

5. Conduit item includes conduit, fittings, fasteners, sealing, accessories, trenching, directional boring methods, backfill, jacking, augering, and restoration as required to provide a complete installation.

6. Precast Light Base item includes concrete, galvanized anchor bolts, nuts and washers, conduit stubs, reinforcing bars, ground rod and wire with exothermic weld, conduit duct seal, excavation

and backfill, restoration and accessories as required to provide a complete unit.

7. Lighting Unit item includes LED luminaire, arm, pole, breakaway transformer base, fusing, connections, and accessories as required, to provide a complete and operational unit.

8. Underpass Luminaire item includes LED luminaire, mounting bracket (where required), mounting hardware, adhesive anchors, fusing, connections, and accessories as required, to provide a complete and operational unit.

9. Service Cabinet item includes cabinet, circuit breakers, photo control, lighting contactors, selector switches, surge arrestor, wiring, conductors, ground rods with exothermic welds, conduit duct seal, and accessories as required to provide a complete installation.

10. Equipment Pad unit item includes anchor bolts, nuts and washers, conduit stubs, concrete base, concrete form, ground rod, and bonding material, excavation and backfill, restoration and accessories as required to provide a complete unit.

11. Handhole item includes handhole, cover with stainless steel bolts, ground rod with exothermic weld, excavation, river rock base, backfill, restoration, and accessories as required to provide a complete installation.

B. Payment for the site electrical system components shall be at the contract unit price as listed on the Bid Form.