

**SP-097010  
(New)**



**Iowa Department of Transportation**

**SPECIAL PROVISIONS  
FOR  
ELECTRICAL REQUIREMENTS**

**Harrison County  
Project No. SB-IA-CO43(062)--2T-43**

**Effective Date  
April 20th, 2010**

**THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

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### AA. BASIC ELECTRICAL REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Submittals for Review
- B. Project Record Documents.
- C. Operation and Maintenance Data.
- D. Warranties and bonds.

##### 1.02 RELATED SECTIONS

- A. Individual Product Sections: Specific requirements for operation and maintenance data.
- B. Individual Product Sections: Warranties required for specific products or Work.

##### 1.03 SUBMITTALS

- A. Submittals for review: As required in individual sections.
- B. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- C. Operation and Maintenance Manuals: Submit documents to Architect with claim for final Application for Payment.
- D. Warranties and Bonds:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
  - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

##### 1.04 MEASUREMENT AND PAYMENT

- A. Items in this special provision are included as part of the lump sum Electrical Bid Item.

#### PART 2 EXECUTION

##### 2.01 SUBMITTALS FOR REVIEW

- A. When the following are specified, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
- B. Submit 5 copies to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- C. Each submittal copy to include, (In this order):
  - 1. Cover sheet identifying the contents of the submittal, Contractor information, and Vendor information. Leave a minimum 8-1/2 inch x 4 inch blank space for Architect/Engineer review stamps.
  - 2. Bill of material for all items submitted and lead times for each.
  - 3. Table of Contents listing all items submitted and corresponding page numbers.
  - 4. Original printed cut-sheets and/or shop drawings of items submitted. Items submitted for consideration shall be clearly marked. Submit only information that is relevant to the project.
- D. Submit different systems separately or separated and identified by tabs.
- E. Systems at minimum consist of all items within a common specification section and may consist of items from multiple specification sections submitted under a common heading, ie: "Electrical Distribution Equipment" (electric utility services, dry-type transformers, enclosed switches, panelboards, etc.)
- F. All items required to be submitted from a single specification section shall be contained within a common submittal. Partial submittals are not acceptable.
- G. Bind each copy of submittal information within an 8-1/2 inch x 11 inch report cover with metal fasteners or a 3-ring binder.
- H. Fold and insert any oversized submittal drawings into clear pockets bound within the submittal cover.
- I. Label, via adhesive label, each submittal cover with a description of the submittal contents.

## **2.02 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set each of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Product substitutions or alternates utilized.
  - 2. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail.
  - 2. Details not on original Contract drawings.

## **2.03 OPERATION AND MAINTENANCE DATA**

- A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of equipment and systems. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

#### **2.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  - 1. Final reviewed submittal.
  - 2. Description of unit or system, and component parts.
  - 3. Identify function, normal operating characteristics, and limiting conditions.
  - 4. Complete nomenclature and model number of replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- C. Include manufacturer's printed operation and maintenance instructions.
- D. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- E. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- F. Additional Requirements: As specified in individual product specification sections.

#### **2.05 OPERATION AND MAINTENANCE MANUALS**

- A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- B. Prepare data in the form of an instructional manual.
- C. Binders: Commercial quality, 8-1/2 x 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- H. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
- I. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
    - a. Significant design criteria.
    - b. List of equipment.

- c. Parts list for each component.
- d. Operating instructions.
- e. Maintenance instructions for equipment and systems.
3. Part 3: Project documents and certificates, including the following:
  - a. Shop drawings and product data.

## **2.06 WARRANTIES AND BONDS**

- A. Electrical contractor and all related subcontractors to warranty the work to be free of defects for a period of one year from the date of Substantial Completion. Repair defects within the warranty period in a timely manner without additional charge to the Owner.
- B. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- C. Verify that documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Retain warranties and bonds until time specified for submittal.
- F. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

## **BB.CONDUCTORS AND CABLES**

### **PART 3 GENERAL**

#### **3.01 SECTION INCLUDES**

- A. Wire and cable for 600 volts and less.
- B. Wiring connectors and connections.

#### **3.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### **3.03 SUBMITTALS**

- A. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors if substituted for copper conductors.
- B. Project Record Documents: Record actual locations of components and circuits.

#### **3.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **PART 4 PRODUCTS**

#### **4.01 WIRING REQUIREMENTS**

- A. Exposed Dry Interior Locations: Use only building wire with Type THHN/THWN insulation in raceway.

- B. Exterior Locations above grade: Use only building wire with Type THWN insulation in raceway.
- C. Underground or Direct-Bury Installations: Use only building wire with Type UF insulation in raceway or direct burial cable.
- D. Use solid conductor for feeders and branch circuits 12 AWG and smaller.
- E. Use conductor not smaller than 12 AWG for power and lighting circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet. Increase one size for every subsequent 100 feet in length.
- G. Conductor sizes are based on copper unless indicated as aluminum or "AL".
- H. If aluminum conductor is substituted for copper conductor, size to match circuit requirements for conductor ampacity and voltage drop.

#### **4.02 BUILDING WIRE**

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: NFPA 70, Type THHN/THWN

#### **4.03 DIRECT BURIAL CABLE**

- A. Description: NFPA 70, Type UF.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 90 degrees C.
- E. Underground Warning Tape: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

#### **4.04 WIRING CONNECTORS**

- A. Compression Connectors: Listed for specific use. Provide listed insulating shrink-sleeves for exterior or underground splice connections.

### **PART 5 EXECUTION**

#### **5.01 EXAMINATION**

- A. Verify that raceway installation is complete and supported.
- B. Verify that field measurements are as indicated.

#### **5.02 PREPARATION**

- A. Completely and thoroughly swab raceway before installing wire.

#### **5.03 INSTALLATION**

- A. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Route wire and cable as required to meet project conditions.
- C. Use wiring methods indicated.
- D. Pull all conductors into raceway at same time.

- E. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- F. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- G. Clean conductor surfaces before installing lugs and connectors.
- H. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- I. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with anti-oxidant compound before installing conductor.
- J. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.
- K. Trench and backfill for direct burial cable installation as specified in Sections GG and MM . Install warning tape along entire length of direct burial cable, within 3 inches of grade, as specified in Section GG.
- L. Identify and color code wire and cable under provisions of NEC.

## **CC.GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

### **PART 6 GENERAL**

#### **6.01 SECTION INCLUDES**

- A. Grounding and bonding components.
- B. Provide all components necessary to complete the grounding system(s) consisting of:
  - 1. Rod electrodes.

#### **6.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### **6.03 SUBMITTALS**

- A. Project Record Documents: Record actual locations of components and grounding electrodes.

#### **6.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **PART 7 PRODUCTS**

#### **7.01 ELECTRODES**

- A. Rod Electrodes: Copper-clad steel.
  - 1. Diameter: 5/8 inch.
  - 2. Length: 8 feet.

#### **7.02 CONNECTORS AND ACCESSORIES**

- A. Mechanical Connectors: Bronze.
- B. Wire: Solid copper.

### **PART 3 EXECUTION**

#### **7.01 EXAMINATION**

- A. Verify that final backfill and compaction has been completed before driving rod electrodes.

## **7.02 INSTALLATION**

- A. Install ground electrodes at locations indicated.
- B. Provide bonding to meet requirements described in Quality Assurance.
- C. Bond together reinforcing steel and metal accessories in Light Bollard structures.

## **DD.HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

### **PART 8 GENERAL**

#### **8.01 SECTION INCLUDES**

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

#### **8.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### **8.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### **PART 9 PRODUCTS**

#### **9.01 MATERIALS**

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
  - 1. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
  - 2. Solid Masonry Walls: Use expansion anchors.
  - 3. Wood Elements: Use wood screws.

### **PART 10 EXECUTION**

#### **10.01INSTALLATION**

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
  - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- B. Install surface-mounted cabinets and panelboards with minimum of four anchors.



## EE. CONDUIT

### PART 11 GENERAL

#### 11.01 SECTION INCLUDES

- A. Conduit, fittings and conduit bodies.

#### 11.02 RELATED REQUIREMENTS

- A. Section CC - Grounding and Bonding for Electrical Systems.
- B. Section DD - Hangers and Supports for Electrical Systems.
- C. Section GG - Identification for Electrical Systems.
- D. Section FF - Boxes.

#### 11.03 REFERENCE STANDARDS

- A. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT); 2005.
- B. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### 11.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual routing of conduits.

#### 11.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

#### 11.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

### PART 12 PRODUCTS

#### 12.01 CONDUIT REQUIREMENTS

- A. Conduit Size: Comply with NFPA 70.
  - 1. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:
  - 1. Install all conduit below grade at 36 inches minimum depth. Use SCH40 PVC.
  - 2. Within 5 Feet from Foundation Wall: Use rigid steel conduit.
- C. Exterior, exposed locations Above Grade: Use rigid steel conduit.
- D. Wet and Damp Locations: Use electrical metallic tubing.
- E. Dry Locations:
  - 1. Exposed: Use electrical metallic tubing.

## **12.02 METAL CONDUIT**

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

## **12.03 ELECTRICAL METALLIC TUBING (EMT)**

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron compression type.

## **12.04 NONMETALLIC CONDUIT**

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

## **PART 13 EXECUTION**

### **13.01 EXAMINATION**

- A. Verify that field measurements are as shown on drawings.
- B. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### **13.02 INSTALLATION**

- A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install steel conduit as specified in NECA 101.
- C. Install nonmetallic conduit in accordance with manufacturer's instructions.
- D. Arrange supports to prevent misalignment during wiring installation.
- E. Support metal conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- H. Arrange conduit to maintain headroom and present neat appearance.
- I. Route exposed conduit parallel and perpendicular to walls.
- J. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- K. Cut conduit square using saw or pipecutter; de-burr cut ends.
- L. Bring conduit to shoulder of fittings; fasten securely.
- M. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations.
- N. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one shot bender to fabricate bends in metal conduit larger than 2 inch size.
- O. Provide suitable pull string in each empty conduit except sleeves and nipples.
- P. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Q. Ground and bond conduit under provisions of Section CC.

## **FF. BOXES**

### **PART 14 GENERAL**

#### **14.01 SECTION INCLUDES**

- A. Pull and junction boxes.

#### **14.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2003.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### **14.03 SUBMITTALS**

- A. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

#### **14.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### **PART 15 PRODUCTS**

#### **15.01 PULL AND JUNCTION BOXES**

- A. Precast composite-concrete Handholes:
  - 1. Traffic rated box:
    - Quazite PG1118BA18.
    - Highline Products PHA132418
    - Oldcastle Precast
  - 2. Cover: Precast weatherproof cover with nonskid finish marked "Electric":
  - 3. Cover: Provide with stainless steel tamper-proof pentahead bolts:
  - 4. Provide to the Owner one pentahead socket:

### **PART 16 EXECUTION**

#### **16.01 INSTALLATION**

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- C. Install boxes in accordance with Manufacturer's instructions.
- F. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.

#### **16.02 ADJUSTING**

- A. Install knockout closures in unused box openings.

**16.03 CLEANING**

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

**GG. IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 17 GENERAL**

**17.01 SECTION INCLUDES**

- A. Wire and cable markers.

**17.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

**17.03 SUBMITTALS**

- A. Product Data: Provide catalog data for nameplates, labels, and markers.

**17.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

**PART 18 PRODUCTS**

**18.01 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
- C. HellermannTyton: [www.hellermanntyton.com](http://www.hellermanntyton.com).

**18.02 WIRE MARKERS**

- A. Description: tape or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, and junction boxes each load connection.
- C. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

**18.03 UNDERGROUND WARNING TAPE**

- A. Description: 4 inch wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

**PART 19 EXECUTION**

**19.01 INSTALLATION**

- A. Identify underground conduits or direct-buried cable using underground warning tape. Install one tape per trench at 3 inches below finished grade.

## II. ELECTRIC CONTROLS AND RELAYS

### PART 20 GENERAL

#### 20.01 SECTION INCLUDES

- A. Electronic clock timer control

#### 20.02 REFERENCE STANDARDS

- A. NEMA ICS 6 - Industrial Control and Systems: Enclosures; National Electrical Manufacturers Association; 1993 (R2006).
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### 20.03 SUBMITTALS

- A. Product Data: Provide for each component showing electrical characteristics and connection requirements.

#### 20.04 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and indicated.

### PART 21 PRODUCTS

#### 21.01 COMPONENTS

- A. Clock Timers: NEMA ICS 2, Class A300, 24 hour timer.
  - 1. Contacts: NEMA ICS 2, Form C.
  - 2. Product:
    - Paragon EL72.
    - Intermatic ET8215C
    - Tork DZS200BP

#### 21.02 ENCLOSURES

- A. Control Station Enclosures: NEMA ICS 6; Type 1.

### PART 22 EXECUTION

#### 22.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Make electrical wiring interconnections as indicated.

## JJ. PANELBOARDS

### PART 23 GENERAL

#### 23.01 SECTION INCLUDES

- A. Lighting and appliance panelboards.

#### 23.02 RELATED REQUIREMENTS

#### 23.03 REFERENCE STANDARDS

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

**23.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**PART 24 PRODUCTS**

**24.01 LIGHTING AND APPLIANCE PANELBOARDS - (By Owner)**

- A. Manufacturers:
  - 1. Cutler Hammer
  - 2. Siemens
  - 3. Square D
- B. Description: New 200A, 120/240V panelboard supplied and installed by Owner.
- C. Panelboard Bus: Copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.
- D. Minimum Integrated Short Circuit Rating: As indicated.
  - 1. 240 Volt Panelboards: 10,000 amperes rms symmetrical.
- E. Provide with twenty (20) 20A, single pole circuit breakers.
- F. Enclosure: NEMA PB 1, Type 1.
- G. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt and less panelboards, 20 inches wide for 480 volt panelboards.
- H. Description: Circuit breaker load center, Square D NQOD.
- I. Box: Surface type. Finish in manufacturer's standard gray enamel.

**PART 25 EXECUTION**

**25.01 INSTALLATION - (By Owner)**

- A. Provide circuit breakers listed for use with Panelboard.
- B. Provide knock-out in panelboard back-box to facilitate conduit entry.
- C. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard.

**KK. MAIN ELECTRICAL EQUIPMENT**

**PART 26 GENERAL**

**26.01 SECTION INCLUDES**

- A. Meter bases.
- B. Main service disconnect and distribution.

**26.02 RELATED REQUIREMENTS**

- A. **Section II - Electrical Controls and relays.**

**26.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association; 2006.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

**26.04 SYSTEM DESCRIPTION**

- A. System Characteristics: 120/240 volts, single phase, three-wire, 60 Hertz.

**26.05 SUBMITTALS (By Owner)**

- A. Submit utility company-prepared drawings.

**26.06 QUALITY ASSURANCE (By Owner)**

- A. Utility Company: MidAmerican Energy
- B. Perform work in accordance with utility company written requirements and NFPA 70.
  - 1. Maintain one copy of each document on site.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**PART 27 PRODUCTS**

**27.01 MANUFACTURERS**

- A. Square D: [www.squared.com](http://www.squared.com).
- B. Milbank
- C. AMP Industries.

**27.02 COMPONENTS**

- A. Meter Base: Rated 200 amperes continuous duty with the following features:
- B. 4 jaws
- C. Non-circuit closing type
- D. Horn type bypass
- E. Other Components: As required by utility company.

**PART 28 EXECUTION (BY OWNER)**

**28.01 PREPARATION (By Owner)**

- A. Arrange with utility company to obtain permanent electric service to the Project.
- B. Owner is responsible for Utility Service Fees.

**28.02 INSTALLATION (By Owner)**

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

## **LL. EQUIPMENT WIRING**

### **PART 29 GENERAL**

#### **29.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

#### **29.02 RELATED REQUIREMENTS**

- A. Section EE - Conduit.
- B. Section BB - Conductors and Cables.
- C. Section FF - Boxes.

#### **29.03 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008.

#### **29.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
  - 2. Determine connection locations and requirements.

#### **29.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### **29.06 COORDINATION**

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence electrical connections to coordinate with start-up of equipment.

### **PART 30 PRODUCTS**

#### **30.01 MATERIALS**

- A. Wire and Cable: As specified in Section BB.
- B. Boxes: As specified in Section FF.

### **PART 31 EXECUTION**

#### **31.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

#### **31.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Provide receptacle outlet to accommodate connection with attachment plug.
- C. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.



**MM. TRENCHING**

**PART 32 GENERAL**

**32.01 SECTION INCLUDES**

- A. Trenching, backfilling and compacting for utilities outside the building to site electrical equipment.

**32.02 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.

**PART 33 PRODUCTS**

**33.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
- B. Granular Fill - Pea Gravel: Natural stone; free of clay, shale, organic matter.

**PART 34 EXECUTION**

**34.01 EXAMINATION**

**34.02 PREPARATION**

- A. Locate, identify, and protect utilities that remain and protect from damage.
- B. Protect existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- C. Protect plants, lawns, rock outcroppings, and other features to remain.

**34.03 TRENCHING**

- A. Notify RDG Planning & Design of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or cable, or impede consistent backfilling or compaction.
- G. Remove excavated material that is unsuitable for re-use from site.
- H. Remove excess excavated material from site.

**34.04 PREPARATION FOR UTILITY PLACEMENT**

- A. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- B. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.

**34.05 BACKFILLING**

- A. Fill up to finish grade elevations unless otherwise indicated.
- B. Employ a placement method that does not disturb or damage other work.
- C. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or

spongy subgrade surfaces.

- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- F. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- G. Correct areas that are over-excavated.
  - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- H. Compaction Density Unless Otherwise Specified or Indicated:
- I. Reshape and re-compact fills subjected to vehicular traffic.

#### **34.06 BEDDING AND FILL AT SPECIFIC LOCATIONS**

- A. Conduits and Direct-Bury Cable:
  - 1. Bedding: Use granular fill.
  - 2. Cover with general fill.
  - 3. Fill up to finish grade elevation.
  - 4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density.

#### **34.07 TOLERANCES**

- A. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

#### **34.08 CLEANING**

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**