SECTION 01285 - CP CABINETS, RISERS, AND WEATHER EQUIPMENT

(Follow all instructions. If there are no instructions above a subsection, paragraph, sentence, or bullet, then include it in the project. The specifications may be modified to include project specific specifications, but all additions, deletions, or modifications must be sent to the ODOT Technical Resource and State Specifications Engineer for review and approval.)

Section 01285, which is not a Standard Specification, is included in this Project by Special Provision.

Description

01285.00 Scope - In addition to the requirements of Section 01201 and Section 01210, furnish and install custom-built CP cabinets, risers, and weather Equipment as shown and as directed.

01285.01 Timing - Notify the Engineer 21 Calendar Days prior to scheduling shipping, to allow for quality assurance testing at the manufacturing facility.

Prepare mounting surfaces for CP cabinets prior to their delivery to the Project Site.

Provide Agency access for quality assurance testing and CP system testing during installation.

Do not power up any portion of the CP system.

01285.02 Submittals - Submit descriptions of Materials to be used according to 00150.37. Data published by manufacturers is acceptable. Submit shop drawings and electronic design schematics according to 00150.37 at least 21 Calendar Days before fabrication begins. Redlined Plans are acceptable.

Submit detailed procedures for this Work according to 00150.37 at least 21 Calendar Days before the scheduled start of Work under this Section.

Submit as-built cabinet drawings according to 00150.37 upon delivery of the cabinets.

Materials

01285.10 Materials - Furnish Materials meeting the following requirements:

Conduit and Fittings 01201.12
Non-Conductive Resin and Spray 01201.11
Non-Conductive Sealant 01201.12

Provide an expanding spray foam.

Use Class 3300 structural concrete meeting the requirements of Section 02001 and the requirements of Table 02001-1.

Use reinforcement complying with Section 00530 and Section 02510.

01285.11 General - Furnish all similar products from the same manufacturer and of the same quality. Verify that all Equipment is permanently marked with the manufacturer's name and the appropriate Equipment ratings. Correct faulty workmanship and Materials immediately upon discovery.

Ensure that all items conform to NFPA 70 (NEC) requirements.

Protect all Materials from damage and corrosion during shipping and storage.

01285.12 Stainless Steel Fasteners - Provide stainless steel fasteners and mechanical anchors according to ASTM F593 Group 2 Condition CW and nuts according to ASTM F594 Group 2 Condition CW.

Equipment

01285.20 General - Store all electronic Equipment in a dry, clean location protected from condensation. Protect all Equipment from physical damage and contaminants such as moisture, dust, fingerprints, and dirt.

01285.21 Cabinet and Risers - Provide cabinets with a NEMA 250-4X rating constructed from 12 gauge, Type 316 stainless steel. Do not drill holes in cabinets for any purpose other than mounting the cabinets. The cabinets shall include:

- A heavy-duty 3-point door latch with external locking rings on the handle. Include continuous hinges on the cabinet doors. Use Type 316 stainless steel for all external metal hardware (e.g.; padlock hasp, hinges, latches). Include a continuous lip around the door opening to provide a tight seal against a gasket approved for use in a NEMA 250-4X enclosure. Perform all welding according to AWS D1.6.
- Mechanisms that hold each cabinet door in place when in the open position. This item may be constructed from any industry standard Material.
- One 15 watt (maximum), 700 lumen (minimum) light fixture mounted to the cabinet ceiling. Include two door interlock switches wired in parallel to activate the light when either door is opened. The switches may be of any industry standard construction.

Provide risers constructed from 12 gauge Type 316 stainless steel. Provide riser access covers constructed from 6 gauge Type 316 stainless steel. Weld locking hasps, lock eyes, and stiffeners according to AWS D1.6.

01285.22 Equipment Rack - Provide four-post, 19-inch Equipment racks with 17-inch (± 1 inch) depth conforming to CEA-310-E specifications. Include:

- Five shelves with a minimum 50-pound capacity, placed at the spacing shown
- A 12 gauge aluminum AC power distribution panel attached to the lower rear of the rack

- A 12 gauge aluminum control panel above the AC panel hinged on the rack to open in the same direction as the adjacent door. Include a door stop that does not allow Equipment to contact the adjacent door when the panel is opened. Include three latching points to secure the door closed without the use of tools other than a standard screw driver.
- Mounts for diodes constructed of a thermally conductive Material. Utilize shelves or the control panel as a heat sink for the diodes.
- A documentation drawer designed to work with the 19-inch Equipment rack, no larger than 2 inches in height and 17 inches deep. Include a hinged cover providing a writing surface when the drawer is extended.

01285.23 Zone Power Supplies, Diodes, and Shunts:

(a) Power Supplies - Provide one of the following variable output DC power supplies:

- Instek SPS3610
- Sorensen XPD33-16
- TDK Lambda Zup20-10/u

(b) Diodes – Provide 1N3881 diodes,

(c) Shunts - Provide one of the following measurement shunts:

- Crompton Instruments FN-10-100
- Empro Shunts HA-10-100
- Murata Power Solutions 3020-01107-0

01285.24 Circuit Protection:

(a) Surge Protectors - Provide one of the following surge protectors:

- Allen Bradley 4983-DH300-25 (requires 3 units per cabinet)
- Schneider Electric PMP3XS-B
- Sola Heavy-Duty STV 100K-10S

(b) Circuit Breakers - Provide one of the following circuit breakers:

- Allen Bradley 1489-A2D 200
- Altech 2DU20UL
- Schneider Electric/Square D 60164

01285.25 Terminal Blocks and Conductors - Provide barrier type, standard screw terminals for the incoming 240/120VAC single phase electrical service, meeting the following requirements:

- Four feed-thru terminals
- An insulating protective cover that is clear to allow for visual inspection

- Compatible with #4-#12 AWG wire
- Rated for at least 600 volts

Provide control panels and AC Bus terminal blocks, including fused blocks, meeting the following requirements:

- IEC 60715 dimensions
- Din rail mounting
- Compatible with #8-#16 AWG wire
- Rated for 600 volts
- Compatible with 1 1/4-inch automotive fuses (fused blocks only). Include 5A fuses.

Use #16 AWG stranded copper conductors conforming to UL 1015 standards.

Use slotted PVC wire ducts to organize wiring.

Use printed labels conforming to 01201.17.

01285.26 Campbell Scientific Equipment - Provide the following Equipment from Campbell Scientific with appropriate connectors, as applicable, indicated in the electronic Equipment schedule in the Plans:

- CR 1000 Datalogger
- PS100 Power supply w/battery backup
- AM16/32B Multiplexer
- MD485 Network interface module
- COM220 Telephone modem (analog line)
- 3315 Type T Thermocouple
- VDIV10:1 Voltage Divider

01285.27 Weather Equipment - Provide HMP155-L Relative humidity/temperature sensor with pigtail terminations. Determine proper lead length from the Plans. Include a 14-gill radiation shield.

01285.28 Additional Panel Mounted Equipment - Provide the following:

- A ground fault interrupting (GFI) duplex receptacle rated for 20 A which conforms to UL 514C standards
- One of the following high-efficiency 12VDC switching type power supplies:
    - Allen Bradley 1606-XLP30B
    - Rhino PSP12-024S
    - Sola Heavy-Duty SCP30S12-DN
- One of the following cabinet heaters:

- Hammond ELHT200A230
- Hoffman DAH2002a
- Rittal 3105.180 (requires 3110.000 thermostat)

01285.29 Manual Override Control Box - Provide a custom-built manual override control box that will mount on the control panel. This may be constructed of any standard enclosure Material with a removable face/cover. Do not exceed a 9 by 7 inch device footprint, 4 inches deep. Include a rubber-lined entry/exit hole for wires. Include the following devices, as applicable:

- A standard single-pole, double-throw (SPDT), panel mounted, toggle switch rated for 5 amps or greater
- A standard double-pole, double-throw (DPDT), panel mounted, toggle switch rated for 5 amps or greater
- 1N4004 diode
- 1N4937 diode
- 5 mm to 10 mm diameter light emitting diode (LED) of the color shown. Bias the diodes with properly sized resistors or provide units with proper integral resistors. Identify diodes and resistors in shop drawings.
- One of the following solid state relays:
    - Crydom D1D07
    - NTE Electronics, Inc. RS3-1D12-41M
    - Omron Electronic Components G3NA-D210B-DC5-24

6-pole, double-throw (6PDT) relays (R1 and R2 as shown in the Plans) are only required on zone power supplies that utilize a contact closure to activate the remote output disable function. If this function requires a TTL level input, the output of the solid state relay may be wired in parallel to these inputs. Include this design with submittals to be approved by the Engineer. If applicable, provide one of the following:

- Magnecraft & Struthers-Dunn W67RCSX-12
- NTE Electronics, Inc. R16-23D5-12
- Tyco Electronics/Potter & Brumfield

Labor

01285.30 Panel Shop Qualifications - Perform all Work included in this Section using a panel shop certified by the Underwriters Laboratories (UL), or have the final product certified by means of UL inspection.

01285.31 Electricians - Perform all DC wiring, reference cell wiring, and telecommunications wiring Work using Oregon licensed electricians holding a Class “A” or Class “B” Limited Energy Technician license, a General Journeyman License, or a General Supervising license.

Perform all AC power wiring using electricians complying with 01201.30.

01285.32 Supervisor Qualifications - Supervise all Work of this Section using an Oregon licensed electrician holding a General Supervising license.

Construction

01285.40 Pads For CP Cabinets - Construct pads as shown. Remove debris from pads prior to cabinet installation.

01285.41 Mount Risers and CP Cabinets - Mount risers and CP cabinets in the locations shown, using stainless steel fasteners. Apply non-conductive sealant between washers and cabinet and tighten fasteners while sealant is wet.

01285.42 Conduits - Terminate conduit runs from the Work of Sections 01265, 01270, and 01280 in the sides of the cabinet riser where they do not interfere with the hatch of the riser. Route conduits so that conduits containing AC conductors enter the riser in separate locations from conduits containing DC, monitoring, and communications conductors.

01285.43 Wiring:

(a) General - Arrange all wiring neatly in the cabinet. Handle conductors carefully to avoid kinking the wire or damaging insulation during installation. Remove and replace all kinked or damaged wire. Terminate all wiring connections at wire terminals. Follow the terminal block manufacturer's specifications for the number of wires per terminal. Tighten the terminal screw to the terminal block manufacturer's recommended torque.

(b) AC Wiring - Provide a hole in the bottom of the CP cabinet(s) large enough to accommodate the branch circuit conductors located as close to the AC barrier terminals as possible. Install a PVC fitting using non-conductive sealant as shown for this entry after removing any sharp edges.

Pull branch conductors from the Work of Section 01280 through this hole and terminate them at the appropriate terminals. Verify proper voltage at the terminal with the cabinet main disconnect in the off position.

Seal the hole as shown with expanding spray foam and non-conductive resin after voltage has been verified.

Energize cabinet heaters and set to 60 °F.

(c) DC, Monitoring, and Communications Wiring - Provide a hole in the bottom of the CP cabinet(s) large enough to accommodate all DC, monitoring, and communications wiring, located as far from the AC wiring as possible. Install a PVC fitting using non-conductive sealant as shown for this entry after removing any sharp edges.

Pull DC, monitoring, and communications wiring installed under Sections 01265 and 01270 through this hole, routing away from AC circuits, and terminate at the appropriate terminals on the control panel.

Seal the hole with expanding spray foam and non-conductive resin after the Engineer has performed quality assurance testing of the system.

01285.44 CP Cabinet Layout - Arrange Equipment within the CP cabinet in a logical and orderly manner following and as shown. Provide as much separation as possible between 120/240 VAC Equipment and sensor and DC wiring. Secure all electrical components to shelves or electrical panels. Secure the Equipment rack to the cabinet using welds or threaded fasteners that do not protrude beneath the cabinet.

01285.45 Weather Equipment Wiring - Wire Equipment in accordance with the Campbell Scientific product manuals and the wiring schedule shown. Use Campbell Scientific cables whenever a multi-pin connector is specified in the product manuals.

Provide grounding for shielded cable drain wires at one end of the cable only.

01285.46 Labeling - Attach permanent labels to all wires. Use a labeling designation scheme that indicates the adjacent termination name at each end of the wire.

Label each power supply to indicate the zone with lettering a minimum of 3/16 inches high.

01285.47 Temperature/Relative Humidity Sensor - Mount the sensor as shown.

01285.48 Testing - Provide access for the Engineer to perform quality assurance testing before shipping the cabinets to the jobsite.

01285.49 Documentation - Provide a copy of as-built drawings in the documentation drawer of each cabinet. Provide a copy of the technical data sheet along with installation instructions for each unique electronic component in the documentation drawer of each cabinet.

Measurement

01285.80 Measurement - No measurement of quantities will be made for Work performed under this Section.

Payment

01285.90 Payment - The accepted quantities of CP cabinets, risers, and weather Equipment will be paid for at the Contract Lump Sum amount for the item "Provide CP Cabinets, Risers, and Weather Equipment".

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor and Incidentals necessary to complete the Work as specified.

No additional payment will be made for as-built drawings, datasheets, or operations manuals.