

SECTION 16715

COMMUNICATIONS ELECTRICAL POWER DISTRIBUTION

PART 1 - GENERAL

1.01 SECTION DESCRIPTION AND BASIC REQUIREMENTS

- A. The Electrical Power Distribution System provides power distribution from the 3-phase, 4-wire, 120/208 Vac, primary power feed to the communications systems. The Electrical Power Distribution System described herein includes the following facilities:
 - 1. 120 Vac Emergency Power (from station UPS) for communications equipment in the Communications Equipment Rooms, and Kiosks.
 - 2. -48 Vdc power for communications equipment in the Communications Equipment Rooms.
- B. The 120 Vac Emergency Power Distribution System described herein includes for each Passenger Station, but is not limited to, the following components:
 - 1. In the Communications Equipment Room:
 - a. Power Distribution Panelboard.
 - b. AC Power Receptacles.
- C. In the Kiosk - AC Power Receptacles.
 - 1. Required conduits and fittings, junction boxes, feeder wires, branch circuit wiring, and cabling to apportion the 120 Vac power to the communications systems and facilities equipment.
- D. The -48 Vdc Power Distribution System described herein includes, but is not limited to, the following components:
 - 1. -48 Vdc Power Supply(s).
 - 2. -48 Vdc Status Panel.
- E. The -48 Vdc Power Distribution System provides fail-safe service by load-sharing several power supplies. Power supplies may be removed from the active -48 Vdc Power Distribution System for repair, or added for increased capacity, without disrupting communications services.
- F. The Status Panel provides voltage and current metering for the -48 Vdc Power Distribution System. The Status Panel also distributes -48 Vdc power to the Telephone (TEL), Carrier Transmission System(CTS) and Fiber Optic System(FOS) Systems equipment racks or, as needed, to any other communications equipment racks requiring a source of -48 Vdc power.

1.02 SECTION INCLUDES

- A. Power Distribution Panelboard.
- B. AC Power Receptacles.
- C. -48 VDC Power Supply(s).
- D. -48 VDC Status Panel.

1.03 UNIT PRICES

- A. Unit Prices include all Required conduits and fittings, junction boxes, feeder wires, branch circuit wiring, and cabling to apportion the 120 VAC power and -48VDC power to the communications systems and facilities and incidental items, not specifically mentioned, but required for complete and proper system operation.

1.04 RELATED SECTIONS

- A. Section 16706 - Communications System Submittals & Services.
- B. Section 16707 - Communications Systems Quality Assurance & Testing
- C. Section 16710 - Communications Grounding.
- D. Section 16721 -Communications Telephone System.
- E. Section 16771 -Communications Carrier Transmission System.
- F. Section 16776 -Communications Fiber Optics System.
- G. Section 16851 -Communications Closed Circuit Television System.

1.05 REFERENCES

- A. National Electrical Manufacturers Association (NEMA) Standard Publication 250-1997, Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. NEMA Standard AB-1, Molded Case Circuit Breakers and Molded Case Switches
- C. National Electric Code (NEC).
- D. Insulated Cable Engineers Association (ICEA) S-95-658/NEMA WC70, Nonshielded 0 - 2kV Cables; ICEA S-96-659/NEMA WC71, Nonshielded 2001 - 5kV Cables; ICEA S-93-639/NEMA WC74, Shielded Power Cables 5 - 46 kV; ICEA S-94-649, Concentric Neutral Cables Rated 5 - 46 kV; ICEA S-97-682, Utility Shielded Power Cable Rated 5 - 46 kV; ICEA S-105-692, 600V Single Layer Thermoset Insulated Utility Underground Distribution Cable; and ICEA S-81-570, Direct Burial, 600V, Ruggedized Insulation.

1.06 SYSTEM DESCRIPTION

- A. Description: The Communication Electrical Power Distribution provides power distribution from the 3-phase, 4-wire, 120/208 VAC, primary power feed to the communications systems.
- B. Capacity:
 - 1. The Power Distribution Panelboard shall be sized to provide separate power circuits to each freestanding or wall-mounted equipment rack and cabinet, and any other equipment requiring an ac circuit feed. The Panelboard shall also include at least 20% unused (spare) circuit-breaker spaces.

2. The AC Power Disconnect Switch shall be rated to switch the calculated worst-case ac current load, plus 50% spare capacity.
 3. The Communications Equipment -48 Vdc Power Supply shall be rated to provide the calculated worst-case dc current load, plus 100% spare capacity.
 4. The -48 VDC Power System Status Panel shall be chosen to be fully compatible with the -48 Vdc Power Supply throughout its rated operating range.
- C. The -48 VDC Power Distribution System provides fail-safe service by load-sharing two, or more, power supplies. At least one power supply may be removed from the active -48 VDC Power Distribution System for repair, or added for increased capacity, without disrupting communications services.
- D. The Status Panel provides voltage and current metering for the -48 VDC Power Distribution System. The Status Panel also distributes -48 VDC power to the Telephone System (TEL), Carrier Transmission System (CTS) and Fiber Optic System (FOS) Systems equipment racks or, as needed, to any other communications equipment racks requiring a source of -48 VDC power.
- E. The GETS system includes an existing personal computer (PC) (located in the Jackson Graham Building) equipped with software to interrogate the Emergency Telephones and telephone circuits to assure reliable emergency communications. The PC software also provides for remote programming of the Emergency Telephones in the parking garages.

1.07 SUBMITTALS

- A. Submit under provisions of Section 16706.
- B. Shop Drawings: Indicate electrical characteristics and connection requirements, including system wiring diagram.
- C. Product Data: Provide showing electrical characteristics and connection requirements for each component.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- E. Calculate full load ac power requirements per branch circuit and shall configure each panelboard for an optimum phase load balance. Submit the calculations to the Engineer for approval. The calculations shall indicate the full load ac power requirements for each item of equipment connected to each branch circuit.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Supplier: Authorized distributor of specified manufacturer with minimum three years documented experience.
- C. Installer: Service facilities within 50 miles of Project.

1.08 MAINTENANCE SERVICE

- A. Furnish service and maintenance of Electrical Power Distribution System until Final Completion.

PART 2 - PRODUCTS

2.01 POWER DISTRIBUTION PANELBOARD

- A. Manufacturers:
 - 1. Square D Co., Model No. NQOD424L100CU (or approved equal).
- B. Type: NQOD, 3-phase, 4 wire, 120/208 Vac, main lugs only with isolated solid neutral bus and a ground bus.
- C. Enclosure: NEMA Type 12 surface mounting and surface screw front cover with hinged door and flush lock.
- D. Minimum Ratings:
 - 1. Capacity: 20 single-pole branch circuit breakers.
 - 2. Panel Amperage: 750,000.
 - 3. Power Requirements: Main Lugs, 100 Amps.
 - 4. Minimum Circuit Breakers: 16 single-pole NEMA Standard AB-1.

2.02 TERMINAL SUPERVISOR'S AC POWER DISCONNECT SWITCH

- A. Manufacturers:
 - 1. Square D Co., Model No. H221NAWK, (or approved equal).
- B. Minimum Ratings:
 - 1. Type: NEMA Type 12 surface mounting and surface screw front cover with hinged door and flush lock.
 - 2. Amperage Rating: 30 Amps.

2.03 10 - OUTLET AC POWER RECEPTACLE

- A. Manufacturers:
 - 1. Wiremold Company, Multi-outlet System/Plugmold 2000, Series GB, Model No. 20GB506, (or approved equal).
- B. Minimum Ratings:
 - 1. Pre-wired receptacles on 6-inch centers.
 - 2. 3-wire circuit, insulated ground conductor.
 - 3. Receptacles grounded to raceway.

2.04 6-OUTLET AC POWER RECEPTACLE

- A. Manufacturers:
 - 1. Wiremold Company, Multi-outlet System/Plugmold 2000, Series GB, Model No. 20GB306, (or approved equal).
- B. Minimum Ratings:

1. Pre-wired receptacles on 6-inch centers.
2. 3-wire circuit, insulated ground conductor.
3. Receptacles grounded to raceway.

2.05 DUPLEX AC POWER RECEPTACLE

- A. Manufacturers:
1. Arrow Hart Division, Cooper Industries, Model No. IG5362 with Model No. IG8248 wall plate, (or approved equal).
- B. Minimum Ratings:
1. Rated for 20 Amps, 125 VAC.
 2. Isolated ground receptacle.
 3. Color: Orange.

2.06 WIRE

- A. Manufacturers:
1. Triangle PWC, Inc., Everene, Model No. USE/RHW, (or approved equal).
- B. Minimum Ratings:
1. Insulation Type: Cross-linked Polyethylene in accordance with ICEA S-95-658/NEMA WC70, ICEA S-96-659/NEMA WC71, ICEA S-93-639/NEMA WC74, ICEA S-94-649, ICEA S-97-682, ICEA S-105-692, and ICEA S-81-570.
 2. Conductor: 12 AWG or larger Class B stranded copper.
 3. Voltage Rating: 600 volts.

2.07 GROUND CLAMP

- A. Manufacturers:
1. Wiremold Company, Multi-outlet System/Plugmold 2000, Model No. 2009, (or approved equal).
- B. Ratings:
1. Compatible with Plugmold 2000.
 2. For use on multi-outlet systems.
 3. Plated.

2.08 COMMUNICATIONS EQUIPMENT -48 VDC POWER SUPPLY

- A. Manufacturers:
1. Power Conversion Products, Model No. PS-19 shelf complete with PCP Model No. MOD-4812 rectifier modules (quantity of 2 per shelf), (or approved equal).
- B. Minimum Ratings:
1. Input: 95-130 VAC, 60-Hz (nominal), Power Factor: PF>90%.
 2. Output: -48 VDC, 24-amp (load sharing).
 3. Alarms: Rectifier Output Failure indicator with Form "C" alarm contacts.
 4. High dc voltage shutdown.
 5. Mounting: 19-inch rack complete with 23-inch rack mount adapters and hardware.

2.09 -48 VDC POWER SYSTEM STATUS PANEL

- A. Manufacturers:
 - 1. Power Conversion Products, Mini Load Center Model No. MDM-48-75, complete with 6 appropriately-sized alarm breakers, (or approved equal).
- B. Minimum Features:
 - 1. Metering: Voltage and current.
 - 2. Alarms: High/low dc voltage Form-C contacts.
 - 3. Alarm breaker power distribution center: 6-position
 - 4. Mounting: 19-inch rack complete with 23-inch rack mount adapters and hardware.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Calculate full load ac power requirements per branch circuit and configure each panelboard for an optimum phase load balance.
- B. Communications Equipment Room
 - 1. Surface mount the completely assembled Communications Equipment Room Power Distribution Panelboard adjacent to the Communications Equipment Room feeder disconnect switch. Install power feeders (power phases, neutral and equipment ground) from the Communications Equipment Room feeder disconnect switch to the Communications Equipment Room Power Distribution Panelboard using appropriately sized steel conduit and make the necessary connections.
 - 2. Install an ac power receptacle strip on each equipment rack and in each equipment cabinet. Install the required mounting hardware to secure the ac power receptacle strips to the equipment racks and cabinets. Install a ground clamp in each raceway of the ac power receptacle strips to ensure that the raceway base is grounded to the equipment rack or cabinet. The ac power receptacle strips shall be installed so that they do not create obstructions to mounted equipment within the equipment racks and equipment cabinets and so that all outlets are accessible.
 - 3. Install the branch circuit conductors (power phases and neutral) from the Communications Equipment Room Power Distribution Panelboard to each ac power receptacle strip on the equipment racks and in the equipment cabinets, using appropriately sized rigid steel conduit.
 - 4. Install branch circuit conductors (power phases, neutral and equipment ground) from the Communications Equipment Room Power Distribution Panelboard to the Power Isolation Transformer of the passenger station Closed Circuit Television System using appropriately sized rigid steel conduit. Install branch circuit conductors (power phases and neutral) from the Power Isolation Transformer to the Closed Circuit Television Camera Power Distribution Panel(s) using appropriately sized rigid steel conduit.
 - 5. Install and wire the -48 VDC Communications Equipment Power Supplies and status panel in the telephone equipment rack. The -48 VDC power supplies shall be paralleled for load sharing operation.
 - 6. Install the appropriate wiring to distribute -48 VDC power from the power distribution center in the status panel to the following locations within the Communications Equipment Room:
 - a. Fuse, Alarm and Distribution Panel(s) in the CTS equipment rack(s).
 - b. Fuse, Alarm and Distribution Panel(s) in the FOS equipment rack(s).
 - c. Fuse, Alarm and Distribution Panel in the TEL equipment rack.

- C. Kiosk
 - 1. Install the duplex receptacles, associated enclosures and cover plates within the Kiosk cabinetry of the passenger station Kiosk. Install the required mounting brackets and hardware to secure the enclosures of the duplex receptacles to the Kiosk structure and/or Kiosk cabinetry. The duplex receptacles shall be installed so that they do not create obstructions to mounted equipment within the Kiosk cabinetry and so that all receptacles are accessible.
 - 2. Install branch circuit conductors (power phases, neutral and equipment ground) using appropriately sized, flexible, metallic conduit from the Kiosk Emergency Panelboard to the duplex receptacles within the Kiosk. Install the required conduit fittings, hardware, junction boxes, connectors and grounding hardware, and make the necessary connections.

- D. Dispatcher's Room
 - 1. Surface mount the Dispatcher's Facility ac power disconnect switch and panelboard in the vicinity of the Dispatcher's Facility. The Contractor shall install power feeders (power phases, neutral and equipment ground) from the Communications Equipment Room feeder disconnect switch to the Dispatcher's Facility ac power disconnect switch, and from the disconnect switch to the panelboard. Install appropriately sized rigid conduit, the required conduit fittings and hardware, and make the necessary connections. The power feeders to the Dispatcher's Facility ac power disconnect switch shall be connected to the Communications Equipment Room feeder disconnect switch at the input side.
 - 2. Install branch circuit conductors (power phases and neutral) from the Dispatcher's ac power panelboard to the ac receptacles in the Dispatcher's Facility using appropriately sized rigid conduit. Install the required conduit fittings, hardware, junction boxes, terminals, connectors, grounding hardware, and make the necessary connections and cross-connections.

- E. Grounding
 - 1. Electrically insulate all conduits from equipment racks and equipment cabinets; power ground shall be separate and isolated from the communications ground. Conduit containing branch circuit conductors shall be insulated from the equipment racks and cabinets by means of short lengths of non-conducting conduits.
 - 2. Provide short lengths of flexible metallic conduit in the equipment cabinets and on the equipment racks between the non-conducting conduit and the ac power receptacle strips. Each branch circuit shall contain a separate neutral conductor to the Communications Equipment Room Power Distribution Panelboard.

3.02 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 16707.
- B. Supervise final wiring connections and system adjustments.

3.03 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

3.04 DEMONSTRATION

- A. Demonstrate operation and maintenance of Products to designated WMATA personnel two weeks prior to date of Substantial Completion.
- B. Demonstrate Project equipment by a qualified person who is knowledgeable about the Project.
- C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with designated WMATA personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at equipment location.
- E. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- F. Demonstrate system operation
- G. Conduct walking tour of Project and briefly describe function, operation, and maintenance of each component.

END OF SECTION