

6. ENGINEERING SYSTEMS REQUIREMENTS

D50 ELECTRICAL

SYSTEM DESCRIPTION

This project includes the construction of buildings and structures as listed below. Refer to site plans for building locations.

Marine Security Augmentation Unit Headquarters and Bachelors Enlisted Quarters (MSAU HQ-BEQ)

Marine Corps Embassy Security Group Administration Annex (MCESG Annex)

Compound Access Control (CAC)

Provide an interior electrical system consisting of Service Entrance Wiring and Equipment, Distribution and Lighting Panelboards, Dry Type Transformers as required, Conduits, Feeder and Branch Circuits, Motor Control Equipment, Lighting and Branch Wiring, Communications and Alarm Systems, Emergency Lighting, Grounding and Lightning Protection as required, including accessories and devices as necessary and required for a complete and usable system. This section covers installations out to the building 1.5 meter (5 foot) line.

Each building shall have a single utility service with radial power distribution.

Select electrical characteristics of the power system to provide a safe, efficient and economical distribution of power based upon the size and types of electrical loads to be served. Use distribution and utilization voltages of the highest level that is practical for the load to be served.

Provide a minimum of 20% spare circuit and load capacity at all levels of the power distribution system including any stand-by power systems.

The interior distribution system shall consist of insulated conductors in conduit.

GENERAL SYSTEM REQUIREMENTS

Provide an Electrical System complete in place, tested and approved, as specified throughout this RFP, as needed for a complete, usable and proper installation. All equipment shall be installed per the criteria of PTS Section D50 and the manufacturer's recommendations. Where the word "should" is used in the manufacturer's recommendations, substitute the word "shall".

This section of the RFP includes all electrical work on or within the building out to the five (5) foot line. Electrical site work outside the five (5) foot line is covered in section G40.

SUSTAINABILITY

Provide electrical systems and components that support project sustainability and energy goals.

ANTITERRORISM

Provide bracing of electrical equipment that is suspended and weighs more than 31 pounds.

SEISMIC BRACING

Bracing of electrical equipment is not required to resist seismic events. This is based on a Risk Category of "II" and a Seismic Design Category of "B".

ELECTRICAL TESTING

New electrical equipment shall be tested in accordance with NETA acceptance testing specifications. Existing electrical equipment remaining in service shall be tested in accordance with NETA maintenance testing specifications.

COMMISSIONING

Commission all systems in accordance with RFP Part 3 Chapter 2, Section 01 33 29.05 20 *Sustainability Requirements for Design Build* and UFC 01-200-02 *High Performance and Sustainable Buildings*.

Design of Electrical systems shall provide a safe, efficient, and an economical distribution of power selected based upon the size and types of loads served. All equipment and material shall be commercial specification grade and conform to the requirements of the American National Standards Institute (ANSI), American Society of Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA), National Fire Protection Association (NFPA) and other national association as applicable. Materials and equipment shall bear the label and be listed by the Underwriters Laboratories, Inc. (UL) or recognized testing organization. All materials and equipment shall meet the minimum energy efficiency standards of the 2005 Energy Policy Act including the purchase of Energy Star Products. Design and installation shall meet the National Electrical Code NFPA 70, NFPA 101 Life Safety Code, ASHRAE-90.1, and all documents of the United Facilities Criteria (UFC) including UFC 4-721-10, *Navy and Marine Corps Bachelor Housing*.

COORDINATION REQUIREMENTS

Provide an Electrical System that is fully coordinated with all other trades including but not limited to mechanical equipment, architectural, interior casework, and furniture. Locate receptacles, power drops, data drops, telephone drops and lighting fixtures and controls based on locations of GFGI, contractor furnished equipment and architectural appurtenances. Collocate a receptacle adjacent to each telecommunication and CATV outlet.

Illuminance (lighting) calculations shall take into account the proposed colors of interior finishes, locations of desks and partitions as well as other work surfaces. Lack of coordination shall not be grounds for change orders or time extensions.

During the installation process, the power/electrical downtime for any downstream loads shall be limited to 8hr timeframes. The Contractor shall notify and request downtime in written form 72 hour prior to the anticipated system outage. The request shall be made to the Contracting Officer. The Contracting Officer shall notify the Contractor of approval.

Provide calculations compliant with UFC 3-501-01 and FC 1-300-09N. A detailed analysis of the electrical design shall be conducted. The electrical analyses to be performed shall include, but not limited to, illuminance, lightning risk assessment, voltage drop/load flow, short circuit, shock hazard, and arc fault hazard, NEC demand calculations for switchboards, panelboards, feeders, and protective devices coordination. The method for performing the electric power system analyses shall be EasyPower; hand calculations for complex, electric distribution systems shall not be used since hand calculations tend to require simplifying assumptions that limit accuracy and usefulness of the results. Protective devices coordination analyses shall utilize computer-generated time-current curves and may be limited to multi-pole devices rated greater than 100A continuous, except those protecting transformers and integral horsepower, multiphase motors regardless of the device continuous rating. Arc flash calculations shall use the methods of IEEE 1584 and PPE (personal protective equipment) required for calculated hazard/risk categories shall be in accordance with the requirements in UFC 3-560-01 Electrical Safety, O&M. Provide NFPA 70E compliant arc flash labels on all electrical equipment that list the hazard category and PPE requirements.

The available fault current at the point of connection for each building shall be assumed to be an infinite bus unless the available fault current is provided by Quantico.

Illuminance (lighting) calculations shall be performed using computer software that utilizes IES photometry files and shall be a point by point calculation with sufficient points to give meaningful data.

Lightning risk assessments shall be performed and may be hand calculated showing all assumptions.

Submit partial calculations with each submittal and current with the design at time of submittal, so that the progress may be reviewed. Each calculation/analysis submitted shall be of adequate size when printed and shall be legible.

During construction the Contractor shall keep accurate as-built drawings of this project as field changes are made which are different than the construction set of drawings. The Contractor shall provide final as-built drawings accurately representing the final installed system.

D5010 ELECTRICAL SERVICE AND DISTRIBUTION

Building electrical service entrance characteristics for the project will be 480Y/277 volt, three-phase, four-wire, 60-hertz. Provide 13.2kV-480Y/277V transformer for each building; the guard house shall be fed from one of the buildings. Provide a new pad to accommodate each oil filled transformer. Provide one 13.2kV-480Y/277V oil filled pad mounted transformer for MSAU HQ-BEQ and one for MCESG Annex, each sized for the demand load of the building plus 25% spare capacity.

D501001 MAIN TRANSFORMERS

Main transformer(s) are defined in Section G40, *Site Electrical Utilities*.

D501002 SERVICE ENTRANCE EQUIPMENT

All service into the facility shall be underground.

Circuit breakers 250A and over shall be LSI adjustable. The interior distribution system shall fully support all facility loads plus 25% spare capacity as well as a minimum of 20% space-only cubicles and bus provisions for future device additions. Switchboards shall be in accordance with NEMA PB 2 and UL 891.

For the MSAU HQ-BEQ Provide a switchboard with 480Y/277V, three-phase, 4-wire plus ground, service entrance rated, with MICROPROCESSOR-BASED METERING EQUIPMENT and with an insulated case main breaker as service entrance disconnect. Provide 10% spare breakers plus 15% space only cubicles and 25% spare capacity for the switchboard. Main distribution switchboard shall be front accessible with copper busses.

For the MCESG Annex provide a main distribution panel (MDP) with 480Y/277V, three-phase, 4-wire plus ground, service entrance rated, with MICROPROCESSOR-BASED METERING EQUIPMENT and with a molded case main breaker as service entrance disconnect. Provide 10% spare breakers plus 15% space only cubicles and 25% spare capacity for the MDP.

A surge protection device (SPD) shall be provided at the service entrance to each building.

D501003 INTERIOR DISTRIBUTION TRANSFORMERS

Provide dry type transformers as required to step down secondary voltages for general purpose outlets and other low voltage equipment. Evaluate the effect of nonlinear loads on the project and specify the percentage of electronic loads in the design calculations. Where the connected load is less than 35 percent of nonlinear electronic loads provide a K-4 rated transformer. Where the connected load is less than 75 percent but more than 35 percent of nonlinear electronic loads provide a K-13 rated transformer. As a minimum all dry type transformer shall be K-4 rated with a 200% rated neutral on the secondary side. Provide neutral wires sized for 200 percent of rated current from the K-rated transformers to their respective panelboards. Do not wall mount Dry type transformers nor place them above the reflected ceiling. Place all Dry Type transformers inside the electrical rooms and provide housekeeping pads.

D501004 PANELBOARDS

Provide distribution and branch circuit panelboards to serve loads as required. Provide paneboards with a minimum of 25% spare breakers and 25% spare capacity. Panelboards served from k-rated transformers shall be provided with a 200 percent rated neutral bus. Panelboards shall have no more than 42 spaces. All Panelboards shall be provided with a tumbler lock and hinged door in door cover. All panelboards shall be keyed alike. Panelboards shall be three-phase, four-wire, with a ground bus. The busses of the Panelboards shall be made of copper. All panelboards shall be UL listed. Panelboards for non-linear loads shall be UL listed, and heat rise tested, in accordance with UL 67, except with neutral assembly installed and carrying 200 percent of the phase bus current testing. All panelboards shall be located in electrical rooms. Do not mount panelboards in hallways, behind doors, or in public spaces. Do not flush mount panelboards in fire rated walls. Series rated circuit breakers shall not be used on this project. Provide arc fault circuit breakers where required by codes and UFCs.

Circuit breakers for fire alarm panels and fire protection equipment shall be red colored and shall be provided with a lock capable of being locked in the "ON" position.

Comply with UFC 3-580-10 and provide dedicated panelboards in Telecommunication Rooms where required.

D501005 ENCLOSED CIRCUIT BREAKERS

Provide enclosed circuit breakers as required for provided equipment. Coordinate with D30 and other trades to size the circuit breakers.

Enclosed Circuit Breakers for Elevators: Provide enclosed circuit breaker with shunt trip for the elevator disconnect. Provide elevator and elevator equipment room IAW ITG 2013-01 – NAVFAC ELEVATOR DESIGN GUIDE, dated 01 August 2013.

D501006 MOTOR CONTROL CENTERS

Provide individual motor starters with disconnect switches, variable speed drives and manual motor starters for motor controls as required by mechanical equipment.

D501090 OTHER SERVICE AND DISTRIBUTION

Provide surge protective devices (SPD) at the service entrance, panels serving Telecommunication Rooms, A/V equipment, and for power panels serving exterior equipment. Ensure compliance with UFC 3-520-01 surge protection requirements.

Provide SPD devices as follows:

SPD devices shall have 10 modes of protection. SPD equipment shall comply with UL 1449 and UL 1283 and designed, manufactured, tested and installed in compliance with IEEE C62.41, IEEE C62.45, NFPA 70, NFPA 75 and NFPA 780. All Panelboards shall have a SPD.

Provide Surge Protection Devices (SPD) in three tiers at the following locations:

1. Service entrance equipment level shall be sized not less than 240kA per mode.
2. Distribution and Lighting Panelboard level shall be sized not less than 120kA per mode.
3. Receptacle Panelboard level shall be sized not less than 80kA per mode.
4. Telecommunication room Panelboard shall be sized not less than 80kA per mode.

Provide metering and interface with the Building Control System to monitor and trend overall power usage. Provide a measurement and verification plan to meet LEED requirements and Sustainability goals.

D5020 LIGHTING AND BRANCH WIRING

Provide electrical connections for all systems requiring electrical service.

Provide lighting and general purpose receptacles throughout all spaces as required.

Provide dedicated circuits and connections for the following special outlets: see Chapter 5, "Room Requirements".

Provide dedicated electrical outlet power connections to all telecommunications equipment in the Telecommunications Rooms, VTC equipment in the Conference Rooms, CATV equipment, CCTV equipment, IDS, and Security/Alarm equipment. The exact location of the services shall be coordinated with equipment suppliers and with the government during design.

D502001 BRANCH WIRING

All branch wiring shall be insulated conductors in conduit.

All conductors shall be copper.

Provide NEMA 14-30R receptacles and plugs for clothes dryers.

Include 25% spare capacity in all voltage drop calculations.

Conductors shall be copper THHN/THWN-2 insulated. Rigid steel conduit (RGS), intermediate metal conduit (IMC), and electric metallic conduit (EMT) shall be used for interior dry applications. RGS or IMC shall be used in damp locations or where subject to possible physical damage, such as in mechanical rooms below 15 feet, exterior locations, and other similar areas. Schedule 40 PVC may be used in exterior direct buried applications up to 1-1/2 inches. Underground exterior conduit 2 inches and greater shall be type EB conduit encased in a minimum of 3 inches of minimum 3000 psi concrete unless otherwise indicated. Minimum size conduit shall be 3/4-inch. No conduit shall be installed in on-grade or above grade slabs. Conduits shall be concealed in finished walls and above dropped ceilings.

All branch wiring shall be individually insulated copper conductors in conduit. Do not use MC Cable for feeder circuits. MC Cable shall only be used for (power and lighting) branch circuits. When MC Cable is used to serve multiple 1-phase circuits, a maximum of one shared neutral per three circuits shall be

allowed. A dedicated neutral is required for each circuit when it applied to serve the computer circuits, AFCI circuits, and systems furniture circuits. Conductors shall be derated where required by NEC 310.15. MC Cable shall only be used where concealed; it shall not be used in exposed applications. MC Cable shall be secured and supported as required by the NEC and as required by the manufacturer.

Provide one severe duty, GFI, weatherproof while-in-use receptacle every 75' around building perimeters, with a minimum of one (1) per wall. Provide minimum of four (4) GFI, weatherproof while-in-use duplex receptacles on the wall near the site of the slab immediately to the east of the athletic training area and two (2) at the equipment washdown area.

Dedicated circuits shall be provided to the following equipment: microwaves, refrigerators, copiers, motors, coffee makers, toasters, and all other equipment requiring an outlet rating of 20A or above.

Corridor receptacles shall be on a separate dedicated branch circuit.

Office receptacles intended to serve computers shall be on a separate branch circuit for general purpose receptacles within the offices.

Where systems furniture is utilized: provide branch circuits coordinated with the furniture provider, make final connections to the system furniture infeed whip, and adjust the length of the whip to suit the field conditions and as directed by the furniture supplier/installer. The systems furniture infeed whip shall be furnished as part of the systems furniture. Systems furniture shall be pre-wired and provided with electrical and telecom devices. Provide outlet boxes with cover plates with 2" bushed openings located adjacent to the systems furniture to make connections to the whips. Provide a flush wall-mounted outlet box or flush mounted floor box when furniture is not directly against a wall for base feed connections. Do not use power poles, power poles are unacceptable. Coordinate location and connection requirements with furniture contractor prior to rough-in. Limit loads to a maximum of three (3) systems furniture workstations per single phase 20A circuit or fewer, based upon load calculations for connected equipment.

Receptacle locations shall be coordinated with the furniture and equipment layout in each space so that each workstation and piece of equipment is provided with appropriate receptacles. Provide at least one quad receptacle adjacent to each telecommunications outlet. If the telecommunications outlet has more than one network (such as SIPRNet and NIPRNet), then provide two quad receptacles. Place no more than three quad receptacles on a single 20A, 120v circuit.

Provide a dedicated twist-lock receptacles above each rack or cabinet for GFGI UPS and provide a duplex 5-20R on a dedicated circuit above each rack or cabinet in each telecommunications room. Comply with UFC 3-580-10 *Navy and Marine Corps Intranet (NMCI) Standard Construction Practices, with Changes 1-3.*

D502002 LIGHTING EQUIPMENT

Provide a complete lighting system consisting of LED lighting including exit, egress, emergency egress, switches and automatic controls including occupancy sensors, vacancy sensors, daylighting controls, automatic lighting shutoff systems and dimming systems. Lighting systems shall be designed in compliance with UFC 3-530-01 *Interior and Exterior Lighting Systems and Controls* and ASHRAE/IESNA Standard 90.1. The lighting design shall achieve LEED and Sustainability goals. All lighting shall be solid state LED.

Interior ambient illumination shall provide a glare free, high quality lighting environment, shall conform to IESNA Lighting Handbook, Ver. 10 and UFC 3-530-01 and shall exceed the energy savings requirements of ASHRAE 90.1. Local manual controls shall supplement automatic controls in all offices and multi-occupant areas such as open offices, conference rooms, and classrooms. Conference rooms, classrooms, bedrooms, multi-purpose rooms, squad rooms, and other

multi-occupant spaces shall be provided with lighting fixtures with dimming ballast capable of dimming to 5 percent and with manual dimming controls.

Provide Emergency and Egress fixtures throughout the facility to meet the light level requirements of NFPA 101. Provide central battery inverters with Nickel Cadmium in the electrical rooms to power the emergency and egress lighting; provide with 90 minutes of backup battery and 20% spare capacity and 20% spare output circuit breakers. Exit lights shall be LED type.

Lighting in the bedroom areas shall simulate a "home-like" atmosphere with a warmer color temperature of 2700K. A separately switched ceiling fan shall be provided in each sleeping room. Occupants shall manually turn on lights and fan and an occupancy sensor shall deactivate the lights and the fan after a set time delay. Provide manual dimming and switching with separate controls for each side of the sleeping room.

All interior and exterior lighting shall be LED with a maximum drive current of 550mA. Maximum CCT shall be 4000 for both interior and exterior luminaires. Interior color rendering index shall be 80 or higher; exterior color rendering index shall be 70 or higher. All LED lighting shall include a minimum 5-year warranty.

Provide occupancy sensor controls in all private offices, lounges, restrooms, laundry rooms, locker rooms, and similar spaces. Select sensors with the appropriate technology to control the space. Provide ultrasonic occupancy sensors to control lighting in restrooms, Provide ultrasonic, infrared, or dual-technology occupancy sensors to control lighting storage closets, offices, and janitor closets. The contractor is responsible for providing suitable occupancy sensor type for the type of space in which they will be installed. Provide daylight responsive dimming in all perimeter offices, multipurpose rooms, and all other perimeter spaces with windows, except the sleeping units.

Provide exterior LED building mounted lights (full cutoff) at all building entry/exit doors, and for safety and security lighting around the building perimeter. All exterior lighting shall be controlled by photoelectric sensor and time clock from a lighting control panel, except that an un-switched fixture with emergency ballast shall be provided at each entrance to the building and at the entrance to the arms vault. The contractor shall design the exterior lighting in accordance with the IESNA Lighting Handbook and UFC 3-530-01. Connect to the exterior lighting control system as indicated in Section G402001 Exterior Lighting Fixtures and Controls.

Lighting fixtures in restrooms shall be corrosion-resistant with a UL damp label. Lighting fixtures in showers shall be corrosion resistant with a UL wet label. Lighting fixtures in offices shall be LED direct/indirect volumetric.

D5030 COMMUNICATIONS AND SECURITY

The Room Requirements Section identifies locations for communications and security systems and equipment, unless noted otherwise in the following sub-elements.

D503001 TELECOMMUNICATIONS SYSTEMS

Provide Gigabit Passive Optical Network (GPON) solution for a complete Outside Plant (OSP), horizontal distribution systems, backbone distribution systems, telecommunications spaces (Telecommunications Rooms (TRs), Telecommunications Enclosures (TEs), Equipment Rooms (ERs) and building Entrance Facility (EF)) including, but not necessarily limited to, all wiring, pathway systems, cable tray, grounding and bonding, backboards, connector blocks, protectors for all copper service entrance pairs, patch panels, fiber optic distribution panels, terminators for all fiber optic cables, outlet boxes, telephone jacks, data jacks, cover plates, patch cords, Dual Passive Optical Splitters, and system furniture support. All copper horizontal telecommunication cables shall be CAT-6. The telecommunications systems provided are to meet all activity requirements and allow for future

telecommunications system flexibility. This facility will have services for NIPRNET, SIPRNET and Commercial services.

The DB contractor shall coordinate design requirements and connectivity during design development with the NAVFAC ROICC, USMC G6, NMCI G6 Contract Technical Representative (CTR) and NMCI infrastructure specialists, commercial installers, and NAVFAC Capital Improvements -Design (Communications Specialist and Design Manager), and the Marine Corps Base Quantico (MCBQ) Engineer In Charge.

For conflicts (conflicting requirements) between UFC 3-580-01 and UFC 3-580-10, the requirements of 3-580-01 take precedence.

The telecommunications designer shall be a Registered Communications Distribution Designer (RCDD) with a minimum of five (5) years' experience in each of the telecommunications systems identified herein including Gigabit Passive Optical Network (GPON). The telecom installers shall be BICSI (Building Industry Consulting Services International) Registered Cabling Installers Technician Level or a NICET Technician Level Four (IV). The scope of work covered under this statement of work shall consist of the D/B Contractor furnishing all necessary Engineering, Labor, Material, Equipment, and Testing to provide voice and multiple Data Network Telecommunication and Information Technology systems, for the facility. The D/B Contractor shall be responsible for providing all structured cabling, pathways, connectors, jacks, racks, cabinets, entrance protectors, cross-connects, patch panels, fiber optic distribution panels, passive optical splitters, patch cords, and all required accessories for a complete end to end information transport and structured pathway and cabling system, for each telecommunication system. There are multiple networks required. They include:

- Voice
- NMCI (admin)
- OpenNet (DOS Sensitive but Unclassified (SBU) network).
- SIPRNet

Network color-coding for connectors and cables shall be as follows:

- Voice 1: Ivory
- Voice 2: Gray
- NMCI 1: Orange
- NMCI 2: Black
- OpenNet: Blue
- SIPRNet: Red

The D/B Contractor shall provide a complete structured cabling and pathway distribution for each telecommunication system indicated herein including security, and audiovisual systems. Each system shall be a complete end-to-end system. These systems shall be made ready with complete end-to-end telecommunications Information Transport Systems (ITS), including but not limited to, information transport media (copper and fiber optic cabling), patch panels, cabinets, racks, jacks, cross-connects, connectors, fiber optic distribution panels, optical splitters, etc., for the Government to install their equipment, connect, and then "plug and play/operate." Government Furnished Government Installed (GFGI) equipment includes items such as encrypting/ decrypting equipment, encoding/decoding equipment, Optical Network Terminal (ONT), Optical Line Terminal (OLT), servers, computers, routers and firewalls. Each telecommunications system shall include complete end to end connectivity and pathway and information transport system, racks, cabinets, patch panels, dual input optical splitters, terminations, etc. Where the Room Data Sheets and this section differ in

requirements, the more stringent shall be provided. Provide telecommunication systems indicated as follows:

Telecommunications Spaces

Telecommunications Entrance Facility (TEF) (NMCI) - These rooms serve as the demarcation for outside plant cabling services and service providers. Refer to floor plans for the locations of the TEFs. The MCESG Annex first floor G6 Telecommunications Room 109 shall be utilized as the OSP TEF and G6 Telecom Room (TR) for the MCESG Annex building. The D/B contractor shall provide the TEF as required in the applicable referenced standards. Unless required otherwise in the referenced standards, provide rooms with the following:

Size TEF to accommodate immediate and future growth requirements and to ensure compliance with cable bend radius limitations.

The TEF shall house the primary protector blocks, main cross-connect for copper backbone, Telecommunications Main Ground Busbar (TMGB) and the NMCI cabinet. NMCI cabinets and final connection to the main cross connect shall be provided by the NMCI Contractor. This room shall also be used for the first level commercial horizontal distribution terminations for commercial services and the commercial backbone to the second, third and fourth levels. Terminate the OSP fiber on rack-mounted fiber patch panel insuring adequate maintenance loop. The OSP copper cables shall be terminated on primary protector blocks with solid state modules. Provide required patch cords. .

Provide TEF with a minimum of one dedicated non-switched duplex receptacle.

The TEF room as a minimum shall be provided with ¾ inch thick, 8 feet high AC grade or better, void free fire resistant plywood backboard on all walls. The backboard should be painted with at least two coats of fire-retardant paint. Plywood backboard bottoms shall be mounted to permit access to outlets.

Provide bonding and grounding in accordance with ANSI-J-STD-607-A, NFPA 7 and "Bonding and Grounding System" section elsewhere in this document. All equipment and cables entering the TEF shall conform to the bonding and grounding requirements described in the above technical guide and standards. The ground shall consist of copper-clad ground rods, Main Telecommunications Ground Busbar (MTGB), Telecommunications Bounding Backbone (TBB), cabinet, minimum #6 AWG bare and insulated copper cabling, and connectors.

Telecommunications Rooms (TRs) - Telecommunications rooms serve as spaces that provide a connection point between backbone and horizontal distribution pathways and are considered to be floor-serving spaces. Size TRs in accordance with TIA/EIA-569-B. The D/B contractor shall coordinate with G6 and DOS and provide the following telecom rooms:

MSAU HQ-BEQ Telecom Rooms

- Two (2) TRs on the first floor (one for G6 and one for DOS/MSAU),
- Two (2) TRs on the second floor (one for G6 and one for DOS/MSAU)
- One (1) TR on third floor for distribution of commercial services.
- One (1) TR on fourth floor for distribution of commercial services.

MCESG Annex Telecom Rooms

- One (1) TR on the first floor (for G6 TEF/TR)
- One (1) TR on second floor for DOS.

Provide a minimum of three (3) 4-inch conduit risers or equivalent floor slots where telecom rooms are stacked. Unless required otherwise in the referenced standards, provide rooms with the following:

Dedicated HVAC systems shall be provided for the first floor G6 and DOS/MSAU and the second floor DOS/MSAU TRs in MSAU HQ-BEQ and all TEF/TRs in MCEG Annex to maintain proper temperature and where necessary, relative humidity levels control (24 hours per day, 365 days per year) for the safe and effective operation of the equipment as required by TIA/EIA-569-B standard.

Provide one (1) dedicated circuit NEMA 5-20R, and three (3) 110/120 VAC quad receptacles in each TR.

Provide TR cabinets/racks for all LAN system(s) terminations and patching/patch cords in each TR.

The TR rooms as a minimum shall be provided with $\frac{3}{4}$ inch thick, 8 feet high AC grade or better, void free fire resistant plywood backboard on all walls. The backboard should be painted with at least two coats of fire-retardant paint. Plywood backboard bottoms shall be mounted to permit access to outlets.

Provide bonding and grounding in accordance with ANSI-J-STD-607-A, NFPA 70 and elsewhere in this document. All equipment and cables entering the TRs shall conform to the bonding and grounding requirements described in the above technical guide and standards. The ground shall consist of copper-clad ground rods, Telecommunications Ground Busbar (TGB), Telecommunications Bonding Backbone (TBB), minimum #6 AWG bare and insulated copper cabling, and connectors.

Distribution Device (DD) - Provide a Distribution Device (DD) in each MSAU HQ-BEQ residence sized to house the resident's Category 6 patch panel, CATV splitter, patch cords and the commercial service provider's router. Provide a dedicated 15-ampere (A), 120 VAC non-switchable duplex electrical outlet inside the DD. The height of the electrical outlet should be suitable for the DD and associated equipment being installed and shall be in compliance with applicable codes.

SIPRNET - MSAU HQ-BEQ: SIPRNet shall be provided for Multi-Purpose area (room 108) for training purposes DOS/MSAU first floor and all DOS/MSAU spaces on the second level excluding DOS Open Office 245. All SIPRNet communications wiring shall be terminated in a 48 RU free standing lockable equipment cabinet in TOC Room 141. All SIPRNet cabling leaving the Compartment Area Type 1 Perimeter (See Concept Area Sheets A-101 and A-102) shall be placed inside an aesthetically pleasing Protective Distribution System (PDS) (See D503005 Security Systems for additional information on PDS requirements) and shall be terminated at outlets within PDS enclosures..

SIPRNET - MCEG Annex: All SIPRNet communications wiring from the first and second floor SIPRNet outlets shall be terminated in a 48 RU free standing lockable equipment cabinet in the second floor communication Room 210. All SIPRNet cabling shall be placed inside an aesthetically pleasing Protective Distribution System (PDS) (See D503005 Security Systems for additional information on PDS requirements) and shall be terminated at outlets within PDS enclosures.

MSAU HQ-BEQ Copper Backbone Cabling

One (1) 25 pair Category 5 cable from TEF to first floor G6 Telecom Room 112. Terminate cable on Category 5 patch panel.

One (1) 25 pair Category 5 cable from TEF to first floor DOS/MSAU Telecom Room 107. Terminate cable on Category 5 patch panel.

One (1) 25 pair Category 5 cable from first floor DOS/MSAU Telecom Room 107 to second floor DOS/MSAU Telecom Room 203. Terminate cable on Category 5 patch panel.

One (1) 25 pair Category 5 cable from TEF to second level Commercial telecom room. Terminate cable on Category 5 patch panel.

One (1) 25 pair category cable from TEF to third level Commercial telecom room. Terminate cable on Category 5 patch panel.

One (1) 25 pair category cable from TEF to fourth level Commercial telecom room. Terminate cable on Category 5 patch panel.

MCESG Annex Copper Backbone Cabling

One (1) 25 pair Category 5 cable from TEF/TR 109 to second floor DOS Telecom Room 210. Terminate cable on Category 5 patch panel.

MSAU HQ-BEQ Fiber Backbone Cabling

One (1) 12SM fiber cable from TEF to first floor G6 Telecom Room 112. Terminate cables on rack mounted patch panel.

One (1) 12SM fiber cable from first floor G6 Telecom Room 112 to second floor G6 Telecom Room 212. Terminate cable on rack mounted patch panel. Provide dual optical distribution network splitters.

One (1) 12SM fiber cable from TEF to first floor DOS/MSAU Telecom Room 107. Terminate cable on rack mounted patch panel.

One (1) 12SM fiber cable from first floor DOS/MSAU Telecom Room 107 to second floor DOS/MSAU Telecom Room 203. Terminate cable on rack mounted patch panel. Provide dual optical distribution network splitters.

One (1) 12SM fiber cable from TEF to third level Commercial telecom room. Terminate cables on rack mounted patch panel.

One (1) 12SM fiber cable from TEF to fourth level Commercial telecom room. Terminate cables on rack mounted patch panel.

One (1) 4MM fiber cable from TOC (Room 141) to Post 1 (Room 101).

MCESG Annex Fiber Backbone Cabling

One (1) 12SM fiber cable from TEF/TR 109 to first floor DOS Telecom Room 114. Terminate cables on rack mounted patch panel.

One (1) 12SM fiber cable from TEF/TR 109 to second level G6 Telecom Room 210. Terminate cables on rack mounted patch panel.

Horizontal Cabling

Copper horizontal cabling shall be CAT 6, plenum-rated and shall conform to EIA/TIA 568. Terminate on RJ45 connectors. Copper horizontal cable connections (voice and data) shall be terminated to Pin/Pair Assignment T568A in accordance with the TIA/EIA 568 and on Category 6 patch panels using 110-style back planes. Horizontal Cross-Connects shall be built to conform to the requirements of the ANSI/TIA/EIA-569B standard.

The D/B contractor shall provide two (2) Category 6 for voice, two (2) Category 6 for data and two (2) CATV outlets in each MSAU HQ-BEQ residential unit. Terminate cables in each residence in the Distribution Device (DD).

Horizontal Cabling (SIPRNet): Provide two CAT 6, plenum-rated cables in PDS where necessary per each SIPRNet outlet. SIPRNet horizontal cable connections shall conform to EIA/TIA 568. Terminate on RJ45 connectors. SIPRNet horizontal cable connections shall be terminated to Pin/Pair Assignment T568B in accordance with the TIA/EIA 568 and on Category 6 patch panels using 110-style back planes. Horizontal Cross-Connects shall be built to conform to the requirements of the ANSI/TIA/EIA-569B standard.

Horizontal cable shall be installed in conduit or in dedicated cable tray. ESS, CCTV and FA cabling shall not be placed in telecommunications cable tray. Minimum conduit size shall be 1-inch. Conduits shall be terminated with insulated ground bushings. Where cable tray is not used, individual conduits shall be installed from the Telecommunications Room to each outlet. Wall penetrations shall be fire-stopped in accordance with ANSI/TIA/EIA-569-B.

Cable homeruns shall be routed to the closest associated Telecommunications Room (G6, OS/MSAU) on the same floor unless otherwise noted.

Telecommunications Work Area Outlet Requirements

Combination NIPRNET data and voice Outlet: 4-inch square by 2-1/8" deep outlet box with a 6-port outlet faceplate that includes four (4) RJ-45 connectors and two (2) blank covers. Provide four (4) cables per outlet to the cable tray or to the rack/cabinet.

OpenNet Outlet (Wall-mounted Telephone): 2" by 4" by 2-1/8" deep outlet box with a 2-port outlet faceplate that includes two (2) RJ-45 connector and mounting brackets. Provide two (2) cable per outlet to the cable tray or to the rack/cabinet.

Voice Outlet (Wall-mounted Telephone): 2" by 4" by 2-1/8" deep outlet box with a 1-port outlet faceplate that includes one (1) RJ-45 connector and mounting brackets for telephone. Provide one (1) cable per outlet to the cable tray or to the rack/cabinet.

SIPRNET Outlet: 4-11/16" square by 2-1/8" deep outlet box with a 4-port outlet faceplate that includes two (2) RJ-45 connectors and two (2) blank covers.

System Furniture: Where system furniture is utilized, provide telecommunications devices in systems furniture utilizing knockouts provided. Provide cabling in raceway to system furniture devices and make final connections. Utilize components of the systems furniture including integrated systems furniture raceways, voice/data poles, and combination-type voice/data poles for pulling wire to devices. Connection to systems furniture infeed shall be made using a flexible raceway whip, of appropriate length to suit the field conditions and as directed by the system furniture supplier/installer. Provide outlet box with a cover plate with 2-inch bushed opening located adjacent to systems furniture to terminate flexible raceway whip. Provide a flush wall-mounted outlet box for base-mounted infeed connections and an outlet box located above the accessible ceiling for voice/data pole connections.

Refer to Room Requirement Sheets for telecommunication device type and quantity. Coordinate location and connection requirements with furniture contractor prior to rough-in. Refer to Part 6, Attachment R. Workstation Typical for systems furniture requirements. Telecommunication outlet locations shall be coordinated with the furniture and equipment layout in each space so that each workstation and piece of equipment is provided with the appropriate outlets.

Provide a minimum of one combination NIPRNET and voice outlet in each system furniture workstation and two in each private office. In addition, for spaces where system furniture is utilized, provide a minimum of two (2) combination NIPRNET and voice outlets located on permanent walls to accommodate reconfiguration of space.

Floor Boxes: Where equipment or furniture is located away from a wall, install outlets and/or connections in multi-service floor boxes. All floor boxes and associated conduits on the first level excluding the areas with raised floor shall be installed in slab. Use of power poles is not permitted. Refer to Room Requirement Sheets.

Cable Tray

Provide cable tray throughout the facility for pathway distribution of cabling. Voice and data cables shall be separated in the tray via cable straps. Cable tray shall be sized to provide no less than one square inch of cross-sectional area per duplex outlet served. Sizes shall be increased as necessary to accommodate all cables installed. The cable tray fill ratio shall be 50% where practical. The cable trays shall be capable of supporting 110 pounds per foot. Provide a cable tray system looped from Telecommunications Rooms around the building above corridor accessible ceiling to serve all outlet locations. Provide a minimum of 20% spare capacity for future cabling changes or additions. Electrical Metallic Tubing (EMT) conduit shall be provided from the cable tray to each outlet. Conduit shall be a minimum of 1-inch per standard outlet. Conduit sizes will be designed for an optimal fill ratio of 40% (maximum 60%). Where empty conduits are provided, provide pull cord for future installation of cables.

Testing

Conduct tests on copper and fiber-optic cable in accordance with ANSI/TIA/EIA standards. Submit a written test plan to the Contracting Officer at least 30 days prior to testing. The Government will review and comment on the test plan.

Notify the Contracting Officer, in writing, and at least 10 working days prior to testing and coordinate testing with the Contracting Officer's representative to ensure that testing is observed by the Contracting Officer's representative and/or designated personnel.

Test Telecommunications grounds. Category 6 testing shall be for Basic Link and not Channel.

Submit hard and soft copies (MS Office 2007 compatible) of test results to the contracting Officer.

D503004 TELEVISION SYSTEMS

CATV

One (1) 2-inch underground conduit shall be provided from the Telecommunications Entrance Facility (TEF) to five (5) feet outside the building for incoming CATV service. A commercial CATV provider shall provide the incoming service cables and head end equipment in the TEF, including amplifiers and splitters. Coordinate with commercial CATV provider to ensure CATV system is properly grounded and bonded to the building grounding system. The D/B Contractor shall provide all necessary CATV components in the building including, splitters, directional couplers, outlet boxes, jacks, faceplates, and cables from the point of demarcation in the TEF on the first floor to each individual CATV outlet in the building (Refer to Room Requirement Sheets). Each outlet shall have an individual home run to the junction boxes in the TEF, third and fourth floor commercial TR. All CATV homeruns shall be concealed in finished spaces. Individual RG-11/U coax cabling shall be provided from the telecommunications backboard to each MSAU HQ-BEQ resident unit's DD. Individual RG-6/U coax cabling shall be provided from the resident units DD to each CATV outlet. Coaxial cables shall be bonded foil with tri-shield construction, 77% braid, non-bonded tape, with flame retardant PVC jacket and shall meet National Electrical Code 820 V rating. F type Connectors shall be provided. All TV outlets shall be located adjacent to a power receptacle. Flush mount boxes, jacks, adaptors, and covers for all CATV outlets shall be provided, and all CATV cables shall be connected to all outlets. All work shall meet CATV service provider Standards.

IPTV

Provide rough-in only for the IPTV outlets in accordance with following requirements. Provide one (1) 4-11/16" square by 2-1/8" deep outlet box with a blank cover plate for each IPTV outlet in the project. Provide one (1) 1-inch conduit with pull wire from IPTV outlet to the A/V cabinet located in the multi-purpose room. Procurement and installation of the IPTV system components shall be by others, performed outside of this contract.

CATV and IPTV outlet locations shall be coordinated with the A/V equipment layout in each space so that each piece of equipment is provided with the appropriate outlets.

D503005 SECURITY SYSTEMS

An Electronic Security System (ESS) is the integrated electronic system that includes one or more of the following subsystems: access control system (ACS), intrusion detection system (IDS) and closed circuit television (CCTV) systems.

The ESS shall meet requirements of UFC 4-021-02NF, Security Engineering Electronic Security Systems (latest edition), and SECNAV M-5510.36 Department of Navy Information Security Program for open secret storage areas.

The ESS shall consist of a Live System and a Training System, operating independently of one another. The Live System will consist of an IDS that is programmed to report alarm conditions to Base Security. The connection to the Base Security will be provided via the G-6 Telecommunications infrastructure.

The D/B contractor shall provide a Live System for MSAU HQ-BEQ facility and Training System for both MSAU HQ-BEQ and MCESG ANNEX facilities.

The Training System will consist of an IDS, ACS, CCTV and Training Annunciation System that will report alarm conditions to the Post 1 unit on the first level (Room 101) and Building P621. The Training ESS must integrate and be seamlessly compatible with the existing system located at Building P621. The Live and Training ESS will operate independently of one another.

Provide empty raceways with pull strings, recessed junction boxes, NEMA 4X enclosures, cover plates, and associated power outlets, for Live and Training ESS systems under the base construction contract. A dedicated independent infrastructure shall be provided for each system. All other components of the Live and training ESS will be Government Furnished Government Installed (GFGI) by the base security contractor.

Locations of ESS devices shall be as indicated in the RRS (Room Requirement Sheets). Refer to these security drawings and equipment layouts for specific device locations, equipment, raceway and rough-in requirements. The Training ESS Contractor shall be responsible to verify the design post award to achieve Government requirements.

The Live IDS will require BMS (Balanced Magnetic Switch) position switches, key pads, PIR (Passive Infra-Red) volumetric motion sensors, and duress buttons.

The Training IDS will require BMS position switches, key pads, PIR, and duress buttons. The duress buttons shall be labeled as training devices. The Training CCTV system will require cameras on the building interior and exterior as well as the site. Provided underground conduits to facilitate installation by the Training ESS Installer. Provide 4" square steel poles with round concrete bases for pole-mounted site locations. Head-end CCTV equipment and monitoring workstations shall be located in the Post 1 (Room 101).

The Training ACS will use a combination of card readers and electric strikes. Credentials must be presented to the card reader in order to gain access to the controlled spaces. Post 1 shall have ability to remotely open doors on the exterior of building. The ACS shall be interfaced with the CCTV system

to archive unauthorized entry attempts.

The Training Annunciation System will use a combination of a master intercom and ceiling mounted speakers. This system will be used to issue commands from the Post 1 unit. All cabling and conduits for the system shall terminate in the Post 1 (Room 101).

The Training ACS will use a combination of card readers and electric strikes. Credentials must be presented to the card reader in order to gain access to the controlled spaces. Post 1 shall have ability to remotely open doors on the exterior of building. The ACS shall be interfaced with the CCTV system to archive unauthorized entry attempts.

The Training Annunciation System will use a combination of a master intercom and ceiling mounted speakers. This system will be used to issue commands from the Post 1 unit. All cabling and conduits for the system shall terminate in the Post 1 (Room 101).

All ESS conduits for the Training System shall be continuous and terminate in the DOS Telecom rooms, unless otherwise noted.

All ESS conduits for the Live ESS system shall be continuous and terminate in a cabinet in the G6 Telecom Room. Provide NEMA 1 cabinet for this propose, coordinate size with SPAWAR. Provide 30" x 30" x 8" stainless steel NEMA 4X outdoor enclosure with back plate for mounting circuit board and devices for live system. Coordinate rough-in location and conduit routing with SPAWAR prior to any work.

Provide a Protected Distribution System (PDS) for SIPRNET raceways located outside open-secret storage areas. Secure raceway shall be used to provide a more aesthetically pleasing PDS specifically designed for command and administrative office environments. The secure steel raceway shall include an interlocking "Clam-Shell" design that enhances security and flexibility in that it can be securely closed and locked, then re-opened for security inspections, network changes or enhancement. The PDS raceway shall also include an electrostatic power coating from the manufacturer that provides an aesthetically pleasing appearance The Protected Distribution Systems shall be in accordance with USN/USMCIA PUB 5239-22, UFC 3-580-10 and IA PUB-5239-22, Information Assurance Protected Distribution System (PDS) Guide Book, NSTISS No. 7003, NAVSO P-5239-22, CNSSAM TEMPEST/1-13 and Government Approval.

The Training ESS installer must have direct experience in installing/integrating the new system and must have performed Integrated Security Management System (ISMS)/Electronic Security System (ESS) projects for the Navy for the past 18 months. The ESS installer must have a current certification as a Value Added Reseller, as both supplier of the base approved (security department) Electronic Security System (ESS) equipment, and installer of the approved base ESS. The ESS Contractor shall currently hold certification in both the LENEL Enterprise Architecture and the Panasonic CCTV Management System. The ESS Contractor must also show experience in maintaining these systems. The ESS Contractor as a company must have at least 10 years' experience with LENEL and Panasonic equipment and individuals with at least 5 years' experience with LENEL and Panasonic equipment. The ESS Contractor must have a documented safety plan. Any licenses for the system software upgrades must be included in this installation. A complete design indicating all major equipment in the ESS shall be provided to the Government (user) for review. This drawing package shall be a controlled document and shall be updated as needed. Training ESS drawings are found in Part 6 of the RFP and are conceptual. Provide the Government at the first review all floor plans and electrical drawings including infrastructure conduit drawings in the AutoCAD format. The AutoCAD drawings shall be provided in the version that the Government has at the time of award. These drawings shall be marked up to include the necessary conduit and junction box infrastructure to support the Live ESS. The Government's Security (ESS) Sub-Contractor shall develop a separate Installation and Design Package (IDP) for the Live ESS. The Contractor is responsible for complete and usable systems and is required to provide fully operational systems.

The Government will review the drawings to ensure the infrastructure conduit will meet the requirements to support the security equipment that is to be installed through the ESS Sub-Contractor. The General Contractor shall provide the infrastructure for a complete security and access control system as marked up during the review.

The General Contractor shall anticipate the need for 2-inch conduit for long runs and minimum 3/4" from the junction box to the actual device locations for the Live ESS installation. All 3/4" runs shall be limited to 20 feet unless otherwise noted on the Government reviewed drawings. The Contractor shall provide infrastructure for all electronic door strikes as identified during the Government drawing review. For doors which require electric door strikes, the contractor shall order the frames already cut out from the factory to accept the door strike. The procurement, installation, and associated power and wiring to energize these door strikes shall be accomplished by the Security Sub-Contractor.

The ESS sub-contractor shall be allowed access to the site during construction to ensure conduit/junction boxes are placed in the proper location for ESS device installation. The acceptance of the security system infrastructure including the conduit, door strikes, and associated junction boxes shall be scheduled prior to closing the walls so that if they are not in the proper location they can be moved. For long lead items, the ESS contractor shall order equipment up to nine months prior to Building Occupancy Date (BOD) of the facility. The Training ESS shall be installed, tested, accepted, and operational prior to BOD of the facility. The General Contractor and the ESS Contractor must be in constant communications so that the ESS can be completed prior to facility BOD.

Electronic Security System installation and maintenance will be accomplished by U.S. citizens with a minimum of secret clearance and who have been subjected to a trustworthiness determination per SECNAVINST 5510.30B. Certain infrastructure site work such as digging trenches and running additional conduit may not require a clearance. However, this will be determined on case-by-case basis by the Government. All personnel shall be subject to a background check.

ESS Acceptance Tests and Inspections

The Training ESS installer shall develop a test plan to test the Training ESS with at least the user, and a designated base security department representative. All testing shall be documented and the results recorded for Government records indicating the test results, the test performer, the test verifier, and acceptance. All functions of the equipment must be tested even if some of those functions are not going to be used initially. Also, perform acceptance tests and inspections on Uninterruptable Power Supply (UPS) Systems back-up power for the Training ESS.

The Contractor is responsible for a complete and usable Training ESS system and is required to provide fully operational systems.

The Training ESS installer shall provide as-built drawings 45 days after turnover and acceptance of the ESS by the Government. A hard copy and a soft copy in AutoCAD format shall be provided to base security and users. Ten percent spare parts will be required to be held by the user.

The Training ESS installer will provide the Government a minimum of three (3) days training on the new ESS for administrative and maintenance personnel. A record of this training will be required. This record will indicate the time, dates, instructor, and students of this training and shall be performed by an Enterprise certified system integrator. All necessary operating manuals shall be turned over to the Government.

If there is a failure of the Training ESS system within the first year, the Training ESS installer shall respond within 24 hours and ensure the system is operational within 48 hours of notification.

The Training ESS installer shall provide system maintenance for one (1) year following acceptance by the Government.

D503090 OTHER COMMUNICATIONS AND ALARM SYSTEMS

Provide an Individual Inhabited Facility/Building Subsystem type Mass Notification System (MNS).

D5090 OTHER ELECTRICAL SERVICES

D509001 GENERAL CONSTRUCTION ITEMS (ELECTRICAL)

Provide General Construction Items (Electrical) including, but not necessarily limited to, all connections, fittings, boxes and associated equipment needed by this and other sections of this RFP as required for a complete and usable system.

Conduits and cable trays that penetrate fire-rated walls, fire-rated partitions, or fire-rated floors shall be firestopped in accordance with Section C10, Interior Construction.

D509002 EMERGENCY LIGHTING

Provide power and wiring for emergency lights and exit lights throughout the facility.

D509003 GROUNDING SYSTEMS

A grounding system shall be provided throughout the facility for telecommunications. The ground shall consist of copper-clad ground rods; main telecommunications ground bar, additional telecommunications ground bars, cabinet connections to the raised access floor system ground stringer system, #6 AWG bare and insulated copper cabling minimum, and connectors. The ground system is designed and specified to comply with NFPA 70, ANSI/J-STD-607. As per MIL-HDBK 419A, in order to protect personnel and equipment a design goal of 5 ohms resistance for the Telecommunication system is required. The electrical distribution system for the new facility will be grounded in accordance with the NEC Article 250. All grounding media in or on the building structure shall be interconnected to provide a common ground potential. This shall include electrical service, telephone system grounds, as well as underground metallic piping systems, if available. The facility shall be provided with a ground counterpoise around the building exterior and around electrical service transformers and medium voltage switches. The grounding system will consist of #4/0 AWG copper cabling installed 30 inches below grade with 3/4" x 10' copper clad ground rods (every 60 linear feet), and two test wells. All welding connections shall be exothermic type. Grounding resistance will be specified not to exceed 5 ohms, minimum. All telecommunication cabinets and backing boards within the facility shall be provided with a ground bar and be directly bonded to the building service ground with a low impedance conductor. The down conductors of the lightning protection system, if utilized, shall be bonded to the counterpoise. Each utility service shall be bonded to the counterpoise. Each metallic exterior lighting pole and luminary shall be bonded to an individual ground rod with a minimum #6 AWG copper conductor. A metallic fencing and gates shall also be bonded together and grounded.

D509004 LIGHTNING PROTECTION

Provide a complete lightning protection system with a UL Lightning Protection Inspection Certificate certified to UL 96A. Provide strike termination devices, conductors, ground terminals, interconnecting conductors, surge protection devices, and other connectors and fittings required for a complete and usable system. All materials, air terminals, and conductors shall be copper; except aluminum components shall be allowed in locations where system components are mounted to aluminum surfaces.

Lightning Protection Systems shall not void the roof warranty.

Provide lightning protection system certified with a UL Lightning Protection Inspection Certificate to UL 96A and IAW NFPA 780 and IEEE C2 for the WTBn Switchyard.

D509005 ELECTRIC HEATING

Provide power wiring and connections as required for heater in the Elevator Equipment room, the Electrical and Mechanical Rooms, and all other electric heating systems and equipment. Coordinate with mechanical work.

D509006 ENERGY MANAGEMENT CONTROL SYSTEM

Provide power wiring and connections as required for all systems and equipment. Coordinate connection requirements with metering. Electrical meters shall be Nexus model 1272.

The Energy Management Control System (EMCS) shall be an open protocol system with two-way communication with Advanced Metering Infrastructure (AMI) system. Switchboard metering shall have digital smart meter capability in accordance with EPACT 2005. Coordinate connection between switchboard meter and the Advanced Meter Infrastructure (AMI) system.

Contractor shall provide and install AMI capable meters for all utilities utilized during facilities construction and utilized for the completed facilities. Additionally, until contractor provided facility meter is integrated into existing AMI system, the contractor shall take monthly readings on all utilities on or about the 15th of every month. Utility meter readings taken monthly shall be provided to MCB Quantico Energy Management team for analysis and energy reporting purposes. All new metering shall seamlessly integrate into the existing primary MCB Quantico AMI application database utilizing existing communication infrastructure, network protocols, and data storage. If existing communication infrastructure is not available then contractor shall provide. New metering shall integrate seamlessly into the existing MCB Quantico AMI Cybersecurity Authority to Operate (ATO). Existing cybersecurity package for AMI shall simply require an update for all new AMI to be added to existing AMI system. Contractor shall provide update and all support needed to achieve approval for updated cybersecurity ATO for existing AMI system.

Refer to Section D30 for further information.

D509007 PHOTOVOLTAIC ENERGY SYSTEM

Not Used

D509090 OTHER SPECIAL SYSTEMS AND DEVICES

Provide power wiring and connections for the following special systems: DDC HVAC Controls Systems. Coordinate with D30.