

## **ELECTRICAL AND TELECOMMUNICATIONS DESIGN NARRATIVE LIO ANCHORAGE STATE LEGISLATIVE OFFICE BUILDING RENOVATION**

### **Scope of Work Basis of Design**

Design and construction of the facilities will comply with the latest publications identified under the References section. In addition the apparatus, equipment, materials, and installation will conform to the standards of the National Electrical Manufacturers' Association (NEMA), Underwriters' Laboratories, Inc. (UL)\*, the Institute of Electrical and Electronic Engineers (IEEE), the Illuminating Engineers Society (IES), and the Occupational Safety and Health Administration (OSHA). \*All electrical devices and equipment will be listed by an acceptable certified testing laboratory.

The design will include calculations supporting the designed fault interrupting capacities, calculations supporting the total connected building load, panel loads and estimated building and panel feeder voltage drops.

The electrical design and construction will include, but is not limited to:

- Main distribution switchboards consisting of metering equipment and overcurrent protection for distribution and branch circuit panels.
- Feeders to distribution and branch circuit panels.
- Branch circuit panels for power, lighting, HVAC, etc.
- Branch circuit wiring systems for equipment, lighting, duplex receptacles, appliances, motors, motor starters, etc., as required.
- Wall switches, duplex receptacles and other wiring devices.
- All hangers, anchors, sleeves, chases, support for fixture, and electrical materials and equipment.
- Interior lighting fixtures, controls complete with all lamps.
- Wiring and connections to all equipment furnished by the owner.
- Exterior lighting and controls.
- Telecommunication system.
- Fire Alarm system with monitoring of sprinkler system.
- Door Access.
- CCTV System.
- Cable TV system.

### **References**

The following electrical codes and standards will be applicable to the electrical design of the facility:

- International Building Code (IBC)
- International Residential Code (IRC)
- Illumination Engineers Society (IES) Lighting Handbook
- NFPA 101 Life Safety Code
- NFPA 70 - NEC National Electrical Code
- NFPA 72, National Fire Alarm Code
- TIA/EIA 568A, Commercial Building Telecommunications Cabling Standard
- TIA/EIA 568B, Commercial Building Telecommunications Wiring Standard
- TIA/EIA 569A, Commercial Building Telecommunications Pathways and Spaces
- TIA/EIA 600, The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
- TIA/EIA-606
- TIA/EIA 607, Commercial Building Grounding and Bonding Requirements for Telecommunications

Design and construction of the facility will comply with the latest publications identified under the References section. In addition the apparatus, equipment, materials, and installation will conform to the standards of the National Electrical Manufacturers' Association (NEMA), Underwriters' Laboratories, Inc. (UL)\*, the Institute of Electrical and Electronic Engineers (IEEE), the Illuminating Engineers Society (IES), and the Occupational Safety and Health Administration (OSHA).

\*All electrical devices and equipment will be listed by an acceptable certified testing laboratory.

## **Power Distribution**

### *Electrical Service*

The current service is a 208V 3 Phase 1200 Amp. It is planned to replace the existing electrical service with a new 2500 Amp 208 Volt or a 1200 Amp 480V 3 phase service depending on which proves more cost effective. Verizon has existing equipment on the roof which must remain functional during the remodel. The load is 200 Amp 208V single phase and includes a natural gas fire generator.

### *Service Equipment - Main Distribution Switchboard*

Service entrance equipment will be dead front construction, equipped with circuit breakers and sized to accommodate 125% of building load. The building loads will be metered at the service entrance equipment. Meter will be digital and equipped with communication port for future remote energy monitoring. The digital meter will provide as minimum voltage and amps each phase, KW/KWH demand, KVA and usage. Meter provided will be equipped with an output connection to transmit the signal to a remote location via telephone lines at a later date. Transient voltage surge suppressor will be provided at the service equipment. Surge suppressor will meet the requirements of IEEE C62.41 and be UL listed and labeled as having been tested in accordance with UL 1449.

### *Standby Power*

A 150 KW standby power generator is planned to be installed on the alley side of the building. Generator to be installed in a weatherproof enclosure. An integral sub base fuel module will be provided in the unit.

A single 600 Amp 4 pole automatic transfer switch with distribution for the elevators, telecommunication equipment in each telecom room, heating equipment, partial lighting and misc power receptacles deemed critical.

### *Interior Electrical Power Distribution*

Complete interior electrical distribution system will be provided as required by the National Electrical Code. Voltage drop will be in accordance to National Electrical recommendation. An electrical room will be provided on each floor. Each floor will be provided with a 480Y/277V lighting panel and two 208Y/120V power panel for receptacles etc.

### *Panelboards*

All panels will be sized for the load served plus 25% spare capacity and 15% space. Only bolt-on circuit breakers will be used. All panels located in finished areas will be recessed and all panels and conduits located in unfinished areas will be surface mounted. Separate electrical rooms will be provided to the greatest extent possible and on each floor of multi-story buildings.

### *Conduit and Raceways*

All interior wiring in the building will be run in conduit. Raceways will be specified of the type suited for the applications and locations. Raceways installed for future systems will include pull wire. To the maximum extent practical, conduit will be installed concealed in all areas except utility spaces.

### *Conductors*

Conductors will be copper. Conductor #12 or smaller will be solid. Conductor #10 or larger will be stranded. All building wiring (line-voltage between 100-600 volts) will have type THHN, or XHHW 75 ° C (167 ° F) insulation and be rated at 600 volts unless some other type is specifically required for a particular application. Power conductors will not be smaller than #12 AWG.

A separate insulated grounding conductor will have green color or marking insulated and be sized and installed per NEC requirements, in all secondary, distribution, feeder and branch circuit conduits.

### *Branch Circuits for Receptacle and Lighting Circuits*

Lighting and convenience outlets will be run on separate circuits. Dedicated circuits for loads greater than 50% of the circuit capacity will be provided.

Circuits for computers and electronic devices will be designed to have a dedicated neutral and the panels and transformers rated accordingly.

### *Devices*

All duplex receptacles will be 20 amp, 125 volt, three pole grounded type specification grade duplex receptacles NEMA 5-20R are acceptable unless type of equipment requires different configuration. Impact resistant plastic plates will be provided for boxes and devices. Ground fault interrupt (GFI) type duplex receptacles will be provided in locations as required by the NEC and provided with weatherproof device plate covers at exterior locations. At least one GFI receptacle will be provided in each restroom and janitor's closet. Arc-fault circuit interrupter protection will be provided in accordance with NEC.

Provide the minimum power outlets required by NEC but not less than a duplex outlet on each wall. In office and administration areas provide double-duplex receptacles at each location and near a data outlet.

## **Lighting**

### Exterior Lighting

#### *General*

All lighting shall comply with the recommendations of the Illumination Engineering Society of North America (IESNA). All exterior site and area lighting will be LED.

### Interior Lighting

#### *General*

Illumination levels will be in accordance with the recommendations of the latest Illuminating Engineering Society (IES) Lighting Handbook.

The lighting systems will be designed to provide comfortable visibility conditions having adequate intensities for the safe and effective accomplishment of the tasks to be performed. The finish and color of room surfaces will be coordinated with the lighting system design to reduce glare, increase light utilization, and attain an acceptable brightness ratio recommended by Illuminating Engineering Society (IES) Lighting Handbook. Light sources and fixtures will be selected to provide the most efficient and economical system practicable. Lineal fluorescent and compact fluorescent lighting will be provided as the primary source of illumination. Lighting calculations will be based on the actual finish material reflectance or a maximum of 80% for ceiling, 50% for the wall and 20% for floor whichever is lower. Light fixture schedules including lamp type, voltage, wattage, type of mounting, manufacturer name and catalog number will be provided.

All conference rooms will include 5% dimming ballast.

Refer to architectural reflected ceiling plans and catalog cuts for additional information.

#### *Lighting Control*

Control switches for general room lighting will be located at room entrances and other locations for control of lighting fixtures and systems. Typically, rooms with more than one door will have three or four-way switches as required.

#### *Emergency Lighting System*

Emergency lighting will be provided per NFPA 101. Emergency lighting will be designed as an integral part of the facility lighting system, and will be incorporated as part of the system lighting fixture. As a minimum, emergency lighting will be provided for building corridors, stairs and common areas.

#### *Exit Signs*

Exit signage will conform to NFPA 101. Exit signs will be glass green edge light emitting diode (LED).

#### **Grounding**

Provide a building grounding electrode system consisting of a ground ring, metal underground water pipe, building structural steel, concrete encased electrodes, and copper clad steel rod electrodes. A ring ground of #1/0 AWG bare copper buried within the building foundation interconnecting to a 3-meter minimum length ground rods and foundation every interior/exterior corner 2 meters from the building.

All line voltage circuit wiring will contain a separate bare or green insulated grounding conductor. Conduit raceways will not be utilized as the only grounding method. A min #6 AWG copper will be provided from service equipment ground to main telecommunication closet per TIA/EIA 607 requirements.

#### **Other Requirements**

##### *Mechanical Connections*

Mechanical connections for mechanical equipment. See mechanical narrative.

Provide option to provide power for fire pump as sized by mechanical engineer.

##### *Conference Rooms*

Conference rooms will include wall flat screens with network connections, laptop interface, video conferencing and power/telecom under the conference tables.

Lighting in conference room will be dimmable.

##### *Seismic and Testing Requirements*

Design, calculations, and testing of all seismic requirements for electrical and communications equipment shall be provided. All electrical equipment shall be tested in accordance with applicable specification for each type of equipment. Testing shall include any required factory testing, field testing, and operating testing. As a minimum, testing shall include, transformers, wiring, switches, light fixtures, circuit breakers, contactors, and head bolt outlets.

#### **Telecommunications (Voice and Data)**

Cat 6 horizontal Telecommunication cabling system will be provided with all cables routed back to dedicated telecommunication room on each floor.

Vertical Telecommunication system will include 200 pair copper voice cable and 24 strand fiber optic riser.

Distribution will be design in compliance with ANSI/EIA/TIA standards. The telecommunications system will be complete and include the telephone/data and cable system backboards, punch down blocks, and all associated raceways, cable tray, j-hooks, outlets and cabling.

Equipment racks shall be floor mounted 19 inch wide. Provide minimum 50 foot-candle lighting level and minimum two dedicated 20-ampere 110 volt power branch circuits in the communications room. A wall-mounted telephone near the entry door of each main communications rooms will be provided.

Cable tray will be used for interior distribution of com systems.

Provide 24 port, rack mounted fiber optic patch panel with coupling plates and ST connector ports  
Distribution of fiber optic cables throughout the new building will be by others.

Copper cable distribution shall be 4-pair 24 AWG, 100-ohm unshielded twisted pair (UTP) in 1 inch conduit. All copper pairs and fiber optic strands shall be terminated and tested. Copper connectors will be EIA/TIA Cat 6 8-pin/8-position insulation displacement terminations wired per T568B. Fiber optic connectors will be EIA/TIA "SC" type 568SC. A minimum of two 8-pin modular RJ45 type connectors will be provided in each outlet box. In finished areas standard outlet boxes will be 4-11/16 x 4-11/16 double gang electrical box with the faceplate flush with the wall surface. In unfinished areas the outlets shall be surface mounted.

One outlet in each main mechanical and electrical room of the buildings for official communications. Communications outlets will be provided in all private offices, platoon offices, conference rooms. Number of outlets will be per the requirements of the RFP in each area.

#### **Cable TV (CATV) System**

Cable television connection will be provided to all buildings. Service will be coordinated with GCI. Each office suite and conference rooms will include outlets.

#### **Fire Alarm**

The building will be equipped with an addressable fire alarm system with a fire alarm panel and dialer panel  
A remote annunciator will be provided at the building entrance.

#### **Access Control System**

Door access control system will be required for approximately 20 doors. System to be compatible with existing State of Alaska systems at other facilities.

#### **CCTV Security**

A CCTV system will be required with an assumed 20 cameras with recording DVR's for a 2 week period.