D. ELECTRICAL DESIGN NARRATIVE

Introduction

The codes governing the electrical systems are the latest additions of the National Electric Code, NFPA 70, the National Fire Alarm Code, NFPA 72, and the Life Safety Code, NFPA 101 and local codes and amendments. These codes will be followed through the design and construction phases of the project.

Service and Distribution

Seward Electric System purchases its electricity from Chugach Electric Association along with having six standby diesel generators provides the electrical utility. Three-phase power shall be tapped from the overhead primary power running down the alleyways between Fourth and Fifth Avenues by inserting a new pole and riser. The exact location to be coordinated with the utility company and the location of the pad mount transformer. Provide new primary conductors from the new pole riser underground to a new 120/208V, 500kVA pad mounted transformer located on the facilities property.

The secondary service entrance may be run in (5) 4”C., 4#600 MCM & 1#250MCM GND underground from the 120/208V pad mounted transformer to the approximate center of the building at the Building Services Room G11. Where the secondary feeder is run underground, it will be routed in metallic conduit and a spare conduit will also be provided. That portion of the feeder that extends underneath the building will also be encased in concrete.

The secondary will be routed to the Main Distribution Panel (MDP) located in the Building Services Room G11. It is estimated that the MDP will be a 2000-ampere, 120/208-volt, three-phase, four-wire panelboard having an estimated 1400-ampere demand load. The service entrance will be sized for 125% of the building and anticipated future demand load. 225A, 208-volt, three-phase panelboards will be distributed on each floor to provide electrical power to the lighting, elevators, and mechanical equipment requiring this voltage. Sub-panels will be spaced throughout the facility to reduce home run lengths and voltage drops. Separate panels will be used to segregate stand-by power from normal power. Stand-by power will be configured similar to normal power (as described above) with the addition of an automatic transfer switch connected to the generator and a stand-by distribution panel.

A transient voltage surge suppressor (TVSS) will be provided for the MDP and the SDP to remove surges from the incoming power protecting equipment sensitive to these anomalies.

The service will be grounded at the main distribution panel and the grounding system will be extended to telecommunications equipment and racks.

Circuit breakers will be bolt-on type and rated for 125% of the connected load with a minimum of 20 ampere rating on 120-volt circuits and 15 ampere rating on 208-volt circuits.

All circuits will be routed in conduit raceways. All feeders and exposed conduits will be routed in rigid metallic conduit. Concealed circuits may be run in electric metallic tubing (EMT) with a minimum size of ¾". Connections to vibrating equipment will be made with flexible metallic conduit with the exception that liquid tight flexible metallic conduit will be used in all locations exposed to weather, water, oil or grease. All raceways penetrating fire separation walls will be fire stopped and those penetrating thermal barriers will be thermally stopped.

The conductors for all feeders and branch circuits in unheated spaces will have insulation type XHHW. Branch circuits in heated spaces will have insulation type THHN. The minimum conductor size for branch circuits will be #12 AWG. Circuits will be sized so that the maximum voltage drop from the secondary side of the utility transformer to the terminal device is within the 5% allowed by the NEC. All circuit conductors will be identified at each panelboard, junction box and receptacle or other terminal device.

Standby Power Generation

A standby power generation system will be installed to provide electrical power in the event of a normal power interruption. This shall be a complete system with a diesel-powered generator, daytank, ventilation/mechanical systems, controls, electrical panel, diesel fuel storage, and fuel pumping.

In the event of normal power outage the entire building will not be brought up on standby power but only those systems that would allow the agencies in this facility to continue to function on a limited scale. The necessary systems that will be placed on the standby generator will include the mechanical heating systems, the lighting systems, the main telecommunications equipment, the security systems, fire alarm system, fire pump controller and any other system that is identified by the users as critical to their function in the event of the loss of normal power.

Should normal power be interrupted, the generator controller will interface with the fire pump controller and fire alarm system to determine their status. If there is no emergency need to supply power to the fire pumps then, and only then, the standby power will be automatically transferred and distributed throughout the facility for standby operations.

With this system the circuits supplying power for the emergency equipment can be supplied with the same circuits that supply normal power. However, the emergency light fixtures will need to be supplied with emergency ballasts having battery backup.

The estimated size of the standby generator is 250 kW at 208-volt, 3-phase, 4-wire, contained within a dedicated space on the second level terrace in the Northwest corner of

the building. The dedicated generator space will include the fuel oil day tank, heater, generator ventilation system, and generator controls.

Wiring Devices

General use receptacles will be provided throughout the facility, and special purpose receptacles will be provided for special equipment. Ground fault circuit interrupter (GFCI) receptacles will be provided at those locations requiring receptacles to be located within 3 feet of a wall or floor mounted sink or hose bib and receptacles located above countertops containing sinks. Weatherproof GFCI receptacles with while-in-use covers will be provided on the exterior of the facility near each exit door with a minimum of two outlets per exterior wall.

All general use duplex receptacles throughout the facility will be mounted 18 inches above the floor. Some occupancyies will require quad receptacles located near the desks. Should there be any classified areas within the facility the receptacles will be rated for the specific location.

Special use receptacles will be provided for equipment that has special power requirements. Care will be taken to ensure that there are adequate circuits and outlets for equipment sensitive areas such as the projection booth, audiovisual rooms, data and telephone rooms. Grounding lugs will be provided for equipment requiring this feature. Exhibit areas will also have floor receptacles spaced along the floor grids for exhibit use.

Headbolt heater outlets will be provided for ten parking spaces in the agency lot across Fifth Avenue. These circuits will have weatherproof outlet covers and ground-fault circuit interruption protection.

Switches will be used for all lighting circuits. Circuit breakers will not be used as switches.

Lighting *(See also in this document Section H. Lighting Design Narrative)*

Energy efficient, commercial grade lighting fixtures will be used throughout this facility. The lighting levels for each area will meet the requirements as published in the latest edition of the Illuminating Engineering Society of North America, IESNA. The types of bulbs used in the fixtures will be standardized to reduce the types of bulbs needed for replacement. In addition to following these lighting standards and using energy efficient ballasts and lamps other types of energy savings methods will be utilized.

Daylight sensors will be used along the perimeter of the facility to take advantage of the effects of daylight. These sensors will switch the perimeter light fixtures on and off during occupied times to compensate for the effects of daylight. Occupancy sensors will also be used to switch the lights on and off as occupants enter and leave offices, meeting rooms, classrooms, restrooms, storage and utility areas. Three-level switching of the

fluorescent light fixtures will also be used in offices, meeting rooms, and classrooms to vary the foot-candle level of illumination in these types of spaces. This lighting method will also be employed in those rooms with computer terminals to reduce the glare. The lighting for the auditorium and distance-learning classroom will be controlled with dimmer switches to allow multiple levels of illumination to suit their needs. The illumination for exhibits will be accomplished in such a means so that the light fixtures are hidden from the normal viewing angles and designed to enhance the displays. The location of the fixtures will be as flexible as possible to allow for changes to the exhibits. Those lighting systems that will not be necessary during unoccupied periods can be controlled through the building's automated control system to turn the lights off during those unoccupied periods and turn them on during occupied periods.

Since there is not an energy code currently adopted in Alaska, we will use ASHRAE/IES 90.1-1999 as a baseline for design. The goal of the lighting design is to be 20% below this baseline.

Emergency lighting will be provided throughout the facility as an integral part of the normal room fixtures. The facility will also have night lighting to provide light in passage areas throughout the facility. Exit discharge lighting will be provided at all exit locations as well as security lighting illuminating the entrances to the facility and parking areas. The exterior lighting will be controlled from a selector switch that will allow manual or photocell control of the lights.

Telecommunications

Two telephone companies serve the community of Seward, GCI and Interior Telephone Company. Both companies are located on the 300 block of 4th Avenue. Both companies mentioned that they have fiber optics capability and that the fiber can be routed to this facility. The local telecommunication service will be routed underground to the facility telecommunication room. A spare conduit will also be installed with pull string. Space requirements will be coordinated with the serving telephone company.

Each agency in the facility will be provided with a stand-alone data system. Data and telephone jacks will be placed in the most convenient locations to serve each space's needs. Each agency's server equipment in their respective data closet will be provided with UPS back-up system to protect the storage data. Due to the size of this facility it will be necessary to utilize multiple data closets to minimize the length of the data cabling. Fiber optic cabling will be used to interconnect the data closets.

Each user area will have its own telephone system to facilitate intercommunication between offices and intercom abilities for their own users.

Both the data and telephone cabling will be Category 6. This will add to the diversity of the telecommunication system by allowing each outlet device the flexibility of being used

as a data outlet or to be switched over to a phone outlet at some other time without pulling new cabling.

Certain offices will require base radio station extensions to their main offices. We are anticipating that each user will provide their own radio equipment and power and other radio needs will be supplied to their equipment.

Fire Alarm System – NFPA

The Multi-Agency Center will include an addressable Fire Alarm system with a Main Fire Alarm Control Panel (FACP) and remote Fire Alarm Indicating Panel (FAIP). The FAIP will be located at the main entrance of the facility. The system will utilize intelligent and addressable fire detection devices consisting of pull stations, smoke and heat detectors, duct mounted smoke detectors and sprinkler flow monitor and tamper switch monitors. Output devices will include combination visual and audible alarm indicators as well as visual only alarm indicators. The visual only alarms will be used in areas such as handicap accessible restrooms where, although the alarm can be heard from other indicators, the ADA requires a visual alarm. An alarm signal will be transmitted locally and through the telephone lines to the Seward Volunteer Fire Department.

Security System

Along with the security lighting the facility will be equipped with an access control system that will control the access doors into the facility with contactless card readers.

The Law Enforcement area of the facility will be equipped with a security system that will feature digital recording and consist of security cameras at each access door, contactless card readers, a monitor for CCTV display, and buzzer for the security officer to electronically unlock a specific access door.

The systems will transmit an intrusion alarm condition both locally and through a telephone dialer to the proper authorities. The system will also be equipped with tamper switches so that tampering with any device will transmit a local alarm condition.

Sound System

Specific areas of the facility will require independent sound systems. These areas are the multi-purpose room, the meeting rooms, and the exhibit areas. Each of these areas will be provided with an amplifier, speakers, volume controls, and microphone inputs to serve the client's specific needs.

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