OGDEN SCHOOL DISTRICT
ELECTRICAL DESIGN NARRATIVE – T.O. SMITH ELEMENTARY SCHOOL

January 09, 2020

CODES AND STANDARDS

Codes, Standards, and Guidelines, which are applicable to the design of the electrical systems, are listed below. Comply with each of the latest adopted publications:

ADA, Americans with Disabilites Act
International Energy Conservation Code
EIA/TIA, Electronics Industries Association/Telecommunications Industry Association
IBC, International Building Code
IECC, International Energy Code
ANSI/ASHRAE/IES Standard 90.1-2010
IEEE 1100-1999, Recommended Practice for Power and Grounding Electronic Equipment
IESNA, Illuminating Engineering Society of North America
NFPA, National Fire Protection Association (applicable sections including but not limited to):
- NFPA 70, National Electrical Code
- NFPA 72, National Fire Code

UL, Underwriter's Laboratories
Utah State Fire Marshal Laws, Rules and Regulations

SITE UTILITIES

Medium Voltage Power Distribution

The serving electrical utility for the school site will be Rocky Mountain Power. The electrical engineer will submit load information to the Rocky Mountain Power planner and coordinate the connection requirements. Equipment to be specified will include the specification and design of vaults, conduits, CT cabinet, metering, etc. The new power will come from an existing power pole at the North side of the property on Monroe Boulevard.

Telecommunication Distribution

The electrical engineer will coordinate fiber and copper connections with Centurylink and Comcast. The new telecommunications will come from an existing in-grade box at the North side of the property on Monroe Boulevard.

CATV (Community Antenna Television) is not a requirement of Ogden School District projects. Equipment to be specified will include conduits, plywood backboards, grounding, etc.

ELECTRICAL DISTRIBUTION SYSTEMS

The main electrical room shall be constructed to house a 480/277-volt main distribution switchboard. This room is located as close as possible to the pad-mounted high voltage transformers to reduce the length of feeder conduit and conductors.

The 480Y/277-volt main distribution switchboard shall be free-standing and equipped with a digital multi-meter. This board shall be utilized to provide power to lighting panel boards, step-down transformers, 480-volt motors, elevators, and large mechanical equipment such as air handlers, pumps, chillers, fans, etc.

Electrical rooms shall be dedicated to electrical distribution and shall not be used for storage or any other purposes. Consideration will be given to the ease and accessibility of running new and future conduits out of each room. Electrical rooms shall have a minimum of 25 % additional space for future growth.

Main distribution switchboard, power distribution panels, and branch panelboards shall have 25% excess capacity for future growth and flexibility and shall also have sufficient capacity to serve any shelled space.

Service conductors shall be aluminum. Aluminum conductors shall be Alcan Stabiloy or equivalent. Bussing for switchboards shall be aluminum.

Feeder Distribution

To the greatest extent possible, different types of loads shall be separated onto different feeders and busses, such as HVAC equipment, vertical transportation, lighting, and convenience power. In general, large motors and equipment shall be served at 480V, 3 phase; lighting at 277V; outlets and small equipment at 120V.

480Y/277-volt lighting and appliance branch circuit panel boards shall be utilized to provide power for lighting, HVAC, and other electrical motor loads. Panel boards shall be dedicated to serve either lighting or HVAC loads but not both.

The 208Y/120-volt lighting and appliance branch circuit panelboards shall be utilized to provide power for low voltage lighting, computer equipment, owner furnished equipment, duplex outlets, small mechanical equipment, etc. Computers and any sensitive equipment shall be tied to separate panelboards to isolate them from other equipment such as small mechanical equipment and general-purpose duplex outlets. All 208Y/120-volt lighting and appliance branch circuit panelboards shall have 200% neutral busses and feeders.

Transformers that are used to supply 208 /120-volt panel boards shall meet the US Department of Energy’s Standard Level three (CSL-3) and treat power system harmonic. Transformers shall be equivalent to PowerSmiths T1000-C3.

All 3-phase motor starters shall be provided with phase failure protection. Variable frequency drives shall be provided with harmonic filtering.

Feeder conductors shall be aluminum where #1/0 AWG or greater and copper where less the #1/0 AWG. Aluminum conductors shall be Alcan Stabiloy or equivalent. Mechanical-type lugs are acceptable for both aluminum and copper conductors. All grounding electrode conductors and equipment grounding conductors shall be copper only. Bussing for power panel boards, lighting and appliance branch circuit panel boards and motor control centers shall be aluminum.

Power panels and lighting and appliance panel boards shall have 25% excess capacity for future growth and flexibility and shall also be provided complete with branch breakers with sufficient capacity to serve any shelled spaces.

Surge Suppression

To provide protection against damage to sensitive electronic equipment, due to surges, surge suppression devices (SPD) shall be provided at the main distribution switchboards, power distribution panels, and at branch circuit panelboards serving sensitive electronic equipment.

Fault Current, Coordination, and Arc Flash Study

A fault current and coordination study shall be performed by a licensed electrical engineer to indicate available fault current at all points in the 15 kV and building distribution systems. New equipment shall be adequately rated for the amount of available fault current. System coordination shall be studied, and fuses or breakers selected to ensure minimum system outage due to overloads or fault currents. Breakers with adjustable long time, short time, instantaneous and / or ground fault settings shall be set at levels for optimum system coordination. In addition, an arc flash study shall be provided; electrical equipment shall be provided with labeling per all NEC requirements.

Branch Circuits

Branch circuits shall be loaded to no more than 80% of what is allowed by NFPA 70. Where outlets are intended for a specific piece of equipment, the load of the outlet shall be based on the equipment nameplate. Otherwise, allow no more than 4 convenience outlets per circuit in instructional lab spaces and for computer workstations, and 6 convenience outlets per circuit for general purpose use. Outlets with dedicated branch circuits (one outlet per circuit) are required for vending machines, copy machines, break room counters, A/V cabinets and where the equipment nameplate requires it. Each branch circuit homerun shall have no more than 3 circuits per raceway. All branch circuits shall be provided with an oversized neutral (one AWG size larger than the largest phase conductor); multi-pole breakers shall be utilized to meet all NEC requirements regarding shared neutrals. Conductors for branch circuits shall be sized to prevent voltage drop exceeding 3% at the farthest load. The total voltage drop on both feeders and branch circuits shall not exceed 5%. When calculating the voltage drop, the load shall be assumed to be 80% of the ampacity of the branch circuit.

Branch circuit conductor shall be copper installed in conduit, ¾” minimum. Type MC Cable is allowed only when concealed in ceiling or gypsum board walls. MC Cable shall

not be utilized in CMU. MC cables must be protected from physical damage and supported directly from the building or structure by use of a listed support. MC Cable home runs are not allowed. Home runs must be in conduit from the electrical panel or cabinet to the first junction or pull box. MC Cable used for Fire Alarm System Signaling or Initiation Circuits must have an overall outer coating with red finish.

Uninterruptible Power System (UPS)

It is anticipated that a small UPS's will be used to backup telephone and data systems for the new building. Uninterruptible power system shall be backed up by a building diesel back-up generator. The UPS's will be furnished by Ogden School District and installed and connected by the contractor.

A small UPS shall be provided by the contractor for the school communication system.

Power Factor Correction

Power factor correction shall not be provided at this time. Space will be provided in the main electrical room for future power factor correction equipment after loading and power factor is known. Space will also be provided in the main switchboard for a future breaker.

Emergency and Optional Standby Power Distribution System

The emergency system shall consist of a diesel generator with skid-mounted tank in a weather-protective and Level 2 sound attenuated enclosure. The fuel tank shall be sized for 24 hours of engine operation at full load. Two automation transfer switch shall be provided, one for emergency power (egress lighting) and the other for standby power (lighting for equipment rooms, telephone/data equipment, HVAC for communications rooms, BAS system, refrigerators and freezers, intrusion detection systems, CCTV systems, access control system, and fire alarm system). Remote monitoring shall be via the BAS system. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers' installation instruction, that it is functioning properly, and that it is properly reporting to the BAS system.

Transformers that are used to supply 208Y /120-volt panel boards shall meet the US Department of Energy's Standard Level three (CSL-3) and treat power system harmonic. Transformers shall be equivalent to PowerSmiths T1000-C3.

LIGHTNING PROTECTION

A lightning protection system is not a requirement for Ogden School District projects.

OUTLETS

Generally, all convenience outlets shall tamper resistant, per NEC requirements, and provided with stainless steel cover plates. Convenience outlets in corridors and in other areas where vacuums and floor cleaners are anticipated shall be hospital grade. Where outlets for equipment such as vending machines and electric water coolers are required to be GCFI-protected, GFCI breakers shall be utilized in lighting and appliance panel boards in lieu of GFCI outlets.

Grounding: Grounding Conductors

Grounding conductors shall be installed with all feeder and branch circuits.

A grounding riser system shall be provided throughout the telecommunication rooms consisting of a grounding bus mounted on the wall in each room near the telecommunications boards and two grounding conductors (one extending to the main ground bus of the main distribution panel and the other extended to building steel).

INTERIOR LIGHTING

General Design Criteria

LED light fixtures shall be used exclusively throughout the building to meet the illumination requirements to maintain high efficiency and require minimal maintenance. All fixtures shall have a minimum of 50,000-hour life at 70% lumen maintenance and be tested in accordance with IESNA LM79. Daylight harvesting with variable dimming shall be employed in all spaces that receive nature light. Lamps are specified to have a Kelvin Temperature of 3,500 degrees.

Task Illuminance

Lighting levels shall be in accordance with the Recommended Illuminance Categories and Illuminance Values for Lighting Design, IES Lighting Handbook. The lighting levels listed below in footcandles should be used for design purposes. The values listed are average maintained illuminance levels using a maintenance factor of 75%. The numbers listed are target values and should be adjusted to meet the special requirements of individual areas.

Function / Space	Illuminance (Avg. Footcandles)
Classrooms	50 FC
Collaboration Spaces	50 FC
Commons	20 FC
Dining	20 FC
Stairs	10 FC
Vestibules	10 FC
Reception	50 FC

Offices	50 FC
Teacher's Lounges	30 FC
Conference Rooms	50 FC
Teacher's Prep	50 FC
Work Rooms	50 FC
Storage Rooms	10 FC
Corridors	10 FC
Media Center	25 FC
Large Restrooms:	
General	5 FC
Fixtures	15 FC
Toilet Rooms	15 FC
Gymnasium:	
Assembly	7.5 FC
Competitive Sports	25-50 FC
General	15 FC
Physical Education	25 FC
Platform:	
General	20 FC
Performance	50 FC
Kitchen	50 FC
Janitor's Closet	20 FC
Receiving	30 FC

Interior Lighting Control

Lighting Controls:

General: The lighting control system will be designed to provide a high level of control by individual occupants or groups in multi-occupant spaces and promote their productivity, comfort and well-being. Various lighting control systems are currently being considered including The Wattstopper DLM and Acuity N-light Systems as the basis of design. Depending upon the ability to access and control these systems via the building automation system, the District may choose to control lighting in spaces such as the commons areas, corridors, and collaboration spaces via the building automation system. This is currently under evaluation. Parking lot lights and building-mounted exterior lights will be controlled with building-automation system-controlled contactors.

Classrooms: Lighting controls in each classroom will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at the main entry door and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A four-button switch will be provided at the teaching station adjacent to the white board. It will be programmed to have various scenes including a standard daylight harvesting mode, all full on, all off, all lights at 50%, or A/V mode where the front row of lights adjacent to the white

board is completely off and the back two rows are dimmed to 50%. It will also have the ability to act as a dimmer to raise and lower each scene. In the daylight harvesting mode, the row of lights closest to the window will be dimmed depending upon the amount of light entering the room; the remaining rows will be programmed to be at full on. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture.

Large Circulation Spaces: Lighting in the commons area will consist of white LED lights that will provide general illumination and decorative fixtures to enhance the aesthetic of the space. Lighting controls for the white LED flood lights will consist of time of day scheduling, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at the main entry doors and programmed as an override. A four-button switch will be provided at a location accessible only to authorized personnel. It will be programmed to have various scenes including daylight harvesting mode, all full on, all off, and all at 50%. In the daylight harvesting mode, all lights within a zone of 15 feet from the skylight will be dimmed down depending upon the amount of light entering the room; the remaining fixtures will be programmed to be at full on. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in these spaces. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Stairs/Vestibules: Lighting controls in the Stairs and Vestibules will consist of ceiling-mounted occupancy sensors and light level sensors for daylight harvesting. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed down depending upon the amount of light entering the room; the remaining fixtures will be programmed to be at full on. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in these spaces. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on. The LED color-changing pendants in the Stairs will set for various programmed color changing operations and will be programmed to switch on-off at pre-programmed times.

Reception: Lighting controls in the reception area will consist of ceiling-mounted occupancy sensors and low voltage switches. A single-button momentary contact switch will be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A dimmer switch with master on/off will be provided at a readily accessible location to the occupant users. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be

continuous via LED driver in each light fixture. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Offices: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Where such spaces have windows, light level sensors will also be included for daylight harvesting; the wall box occupancy sensor will be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed depending upon the amount of light entering the room; the remaining fixtures (if any) will be programmed to be at full on.

Teachers Lounges/Conference Rooms/Teachers Prep: Lighting controls in these spaces will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at the secondary entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A four-button switch will be provided at the main entry door. The four-button switch will be programmed to have various scenes including daylight harvesting mode, all full on, all off, all at 50%. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed depending upon the amount of light entering the room; the remaining rows will be programmed to be at full on (if any). Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture.

Work Rooms/Storage Rooms: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes.

Corridors: Lighting controls in Corridors will consist of ceiling-mounted occupancy sensors. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Media Center: Lighting controls the Media Center will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage

switches. A single-button momentary contact switch will be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A four-button switch will be provided at a readily accessible location at each of two locations. It will be programmed to have various scenes including daylight harvesting mode, all full on, all off, and all at 50%. In the daylight harvesting mode, all lights within a zone of 15 feet from the window will be dimmed depending upon the amount of light entering the room; the remaining fixture including the pendant lights over the main counter will be programmed to be at full on. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in these spaces. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Large Restrooms: Lighting controls in Large Restrooms will consist of ceiling-mounted occupancy sensors with a low voltage switch at the door. Where such spaces have windows, light level sensors will also be included for daylight harvesting. A single-button manual on/off low voltage switch be provided at the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. In the daylight harvesting mode, all lights within a zone of 15 feet from a window will be dimmed depending upon the amount of light entering the room; the remaining fixtures will be programmed to be at full on. All lights in Large Restrooms will be circuited to emergency power for ease of switching. A generator transfer device will be specified so that the emergency lighting will switch on to full bright in the event of a power outage.

Gymnasium: Lighting controls in the gymnasium will consist of ceiling-mounted occupancy sensors with wire guards, light level sensors for daylight harvesting, and low voltage switches. A single-button momentary contact switch will be provided at each main entry door and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A five-button switch will be provided at the switching cabinet. It will be programmed to have various scenes including a standard daylight harvesting mode, all full on, all off, all lights at 50%, or A/V mode where the front two rows of lights adjacent to the projection screen are completely off and the back two rows are dimmed to 50%. It will also have the ability to act as a dimmer to raise and lower each scene. In the daylight harvesting mode, all lights will be dimmed depending upon the amount of light entering the room from the skylights. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 5 minutes. All dimming will be continuous via LED driver in each light fixture. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Platform: Lighting controls on the platform will consist of ceiling-mounted occupancy sensors, light level sensors for daylight harvesting, and low voltage switches. It is anticipated that motorized blinds will also be controlled via this system. A single-button momentary contact switch will be provided at each of the main entry doors and programmed as a vacancy switch (lights will not be switched on automatically via the occupancy sensor). A five-button switch will be provided at the switching cabinet. It will be programmed to have various scenes including a standard daylight harvesting mode, all full on, all off, all lights at 50%, or A/V mode where the front two rows of lights adjacent to the projection screen are completely off and the back two rows are dimmed to 50%. It will also have the ability to act as a dimmer to raise and lower each scene. In the daylight harvesting mode, all lights will be dimmed depending upon the amount of light entering the room from the windows. Occupancy sensors will be set to switch all lights completely off if movement is not detected within 30 minutes. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Kitchen: Lighting controls in the kitchen will consist of single-pole, three-way, and/or four-way toggle switches depending upon the application only with only one level of lighting. The kitchen will not have automatic shut-off as this would endanger the occupants. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Mechanical/Electrical Rooms: Lighting controls in mechanical and electrical rooms will consist of single-pole, three-way, or four-way switches dependent upon the application. These spaces will not have automatic shut-off as this would endanger the occupants. Digital timer switches could be utilized and will be evaluated as design progresses.

Janitors Rooms: Lighting controls in these spaces will consist of wall box type occupancy sensors with manual on/off control. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes.

Receiving: Lighting controls in the receiving room will consist of ceiling-mounted occupancy sensors and low voltage switches. A single-button momentary contact switch will be provided at each of the main entry doors. Occupancy sensors will be set to switch all lights on when motion is detected and to switch all lights completely off if movement is not detected within 5 minutes. Emergency lighting will be required in this space. A generator transfer device will be specified so that the emergency lighting will be controlled similarly to the other lights on normal power; however, during a power outage, the lights will switch on to full-on.

Yard: Lighting in the yard will be controlled via the building automation system and will be programmed to receive a switched input via a single-pole toggle switch at door on the interior side closest to the yard. The building automation system shall control the lights, so the lights switched on at dusk and are timed to switch off at 11:00 pm.

Exterior-Mounted Building Lights: Lighting for exterior-mounted building lights shall be controlled via the building automation system so the lights are switched on at dusk and switched completely off at a pre-programmed time. Selected building-mounted light fixtures shall have occupancy sensors to switch lights completely off if movement is not detected within 5 minutes.

Parking Lot Lights: Lighting for parking lot shall be controlled via the building automation system so the lights are switched on at dusk, dimmed at time as designated by the district (no later than 10 pm) to need current IECC requirements and switched off at a pre-programmed time as directed by the district.

EXTERIOR LIGHTING

Design Criteria

The exterior lighting fixtures should be selected to harmonize with the architectural style of the building. In general, all outdoor lighting shall have full cut-off optics as defined by the IESNA. Wall mounted decorative fixtures may be used to draw attention to main entry or circulation areas. Fixtures for parking surface areas are to be pole mounted. All fixtures shall be LED and have a minimum of 50,000-hour life at 70% lumen maintenance and be tested in accordance with IESNA LM79. All exterior light fixtures should be robust and suitable for the harsh exterior environment. Preference should be given to fixtures that have design features such as hinging reflectors and removable ballast trays that reduce the cost of lamp replacement and fixture repairs.

Illuminance

Lighting levels should be in accordance with the Recommended Illuminance Categories and Illuminance Values for Lighting Design, IES Lighting Handbook. The lighting levels listed below in footcandles should be used for design purposes. The values listed are average maintained illuminance levels using a maintenance factor of 75%.

Function	Iluminance (Avg. Footcandles)
Parking	1
Walkways	1
Building Perimeter - Entrances	5

Emergency Illuminance

Standard building lighting shall be selected as may be required to achieve the illuminance criteria set forth in the NFPA Life Safety Code, IBC, and local codes. These fixtures shall be designed as egress lighting fixtures. Dedicated branch circuiting from the emergency power branch shall be provided. Emergency lighting shall be provided on all paths of egress including but not necessarily limited to corridors, large open office or instructional spaces, restrooms, mechanical rooms, electrical rooms, and communication rooms.

Illuminated exit signs shall be provided in locations as required by the NFPA Life Safety Code, IBC, and local codes. Exit sign shall be cast aluminum LED type. Dedicated branch circuiting from the emergency power branch shall be provided.

FIRE ALARM SYSTEM

Fire alarm system shall be designed to comply with Utah State Fire Marshall's “Rules and Regulations" and other applicable codes. An addressable fire alarm system shall be provided. The fire alarm system manufacture shall be FCI or as directed by Ogden School District.

Strobes shall be located to be visible from all locations. Horn installation shall comply with NFPA including for higher ambient noise requirements. Duct smoke detectors shall be provided, and fans shall be shut down where required by NFPA and the IMC, including detection of smoke at all return air shafts servicing multiple floors. Smoke detectors shall be provided in corridors, in elevator lobbies, and in machine rooms. Heat detectors shall be provided in machine rooms. The location of the fire alarm control panel and remote annunciator shall be coordinated with the State Fire Marshall and Ogden School District.

TELECOMMUNICATION SYSTEM

General

The voice and data system shall consist of two main categories: 1) Pathways and Spaces to support the voice and data system, and 2) The structured cabling system.

Pathways and Spaces

Communication room shall be provided in quantities and in locations as shown on the electrical drawings.

Each floor shall have a cable tray system that covers each floor. The cable tray system shall connect communication rooms on the same floor. Generally, it shall be routed in corridors and coordinated with ducts, piping, and electrical conduits. Basket-type cable tray shall be provided. It is anticipated that a 12” wide by 4” deep tray should be

sufficient; however, this should be carefully evaluated during design. The tray should be trapeze-hung and seismically braced; center-hung trays will not be specified. Mechanical fire stop systems shall be utilized where the cable tray passes through fire rated partitions to allow for moves, additions, and changes in a flexible and easy manner. The cable tray in communication rooms shall be a minimum of 18" wide with a 4" loading depth.

Each telephone/data outlet shall utilize a 4" square by minimum 2-1/8" deep junction box with a single-gang plaster –ring. One ¾" conduit with nylon pull rope shall be run from each junction box to the accessible ceiling space and a protective bushing should be provided at the end of the conduit. J-hooks shall be utilized for routing of cables between stub-ups and the cable tray. Wall Sleeves shall be provided for routing of cables through wall that extend above ceilings.

In small offices, one (1) telephone/data outlet shall be provided. In larger offices where it is anticipated that there could be two (2) workstations or varying locations for a single workstation, at least two (2) telephone/data outlets shall be provided.

STRUCTURED CABLING SYSTEM

General

The structured cabling system shall be designed to support high-speed voice/data/video and future high bandwidth applications. The system should be a Category 6A solution and shall be equivalent to Hitachi Plus in accordance with Ogden School District specifications however, an equivalent system from another manufacture through a reputable local vendor will also be considered.

The backbone cable shall be single-mode and/or multimode fiber-optic in accordance with Ogden School District specification. Horizontal cabling to each telephone/data outlet shall be unshielded twisted pair. All backbone cables shall be terminated in a rack-mounted fiber break out enclosure. All horizontal cabling shall be terminated in patch panels located in 7'-0" high, 19" floor-standing four-post and double-post racks. Each communication room shall be provided with floor-standing racks as indicated on the electrical drawings.

Each telephone/data outlet shall have Category 6A RJ-45 4-pair ports (number as indicated on the electrical drawings) with dedicated horizontal Category 6A cable ran from the respective communication room on that level, area or wing to each port.

Telephone and date outlets shall be provided for the elevator panels, building automation system, wall phone and other required uses. Each telephone outlet shall have one Category 6 RJ-45 4-pair port with a dedicated horizontal Category 6A cable ran from the respective communication room on that level to each port.

Wireless

School projects will be provided with reliable wireless local area network coverage. Wireless access point data outlet shall be specified with one Shielded Category 6A, RJ-

45 data jack mounted in a 4" square by minimum 2-1/8" deep junction box with a cover plate. Routers shall be furnished and connected by Ogden School District.

SECURITY SYSTEMS

All security systems will comply with established Ogden School District standards.

Security System devices, cabling, control panels, monitors, terminations, etc. shall be furnished, installed, and connected by the contractor, unless otherwise noted below. The contractor shall also provide raceways, outlet boxes, 120-volt power connections, etc. The cable tray shall be utilized where possible for the routing of low voltage cables. All low voltage cable shall be plenum-rated. Raceways shall be provided for wall-mounted devices and stubbed into accessible ceiling areas. J-hooks shall be utilized for routing of cables between stub-ups and the cable tray. Wall Sleeves shall be provided for routing of cables through wall that extend above ceilings.

The following is a description of the security systems planned for this building:

Card Access

The facility will have an access control system consisting of proximity card readers, electric strikes, and door position switches shall be provided and will comply with the established Ogden School District Standards. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers' installation instruction and that it is functioning properly.

A complete access control system will control entry to perimeter entry/exit points as indicated on the electrical drawings. Card readers will be the proximity type. Card readers shall also be provided at Knox boxes at various locations.

The Card Access System manufacture shall be RBH or as directed by Ogden School District.

Video Surveillance

Ogden School District Standard will provide all cameras, hardware, software and servers for the CCTV System. The contractor will install a Category 6A cable to each camera location and install and aim cameras as directed by the District.

Intrusion Detection

The facility will have an intrusion detection system consisting of motion sensors, door position switches, and keypads with input into the building fire alarm system and connection into the telephone/data system for a remote monitoring station. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers' installation instruction, that it is functioning properly, and that it is properly reporting to the remote monitoring company.

A complete intrusion detection system will be installed for electronic monitoring and status reporting of select sensitive interior areas such as computer cart storage rooms,

computer rooms and other areas as designated by Ogden School District. Sensing devices will include door position switches and motion sensors. All sensing devices will report to a zoned monitoring panel for specific location identification of an alarm condition.

The Intrusion Detection manufacture shall be DSC or as directed by Ogden School District.

CLOCK SYSTEM

The clock system shall be Rauland. Each clock will be capable of receiving a signal from central system. Systems that use repeaters of Hopping technology are not approved.

Clocks shall have a black housing, 12” round, and be battery-operated with the exception that the clock in the gymnasium shall be 16” with a wire guard.

The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers’ installation instruction and that it is functioning properly.

SCHOOL INTERCOM SYSTEM

The School Intercom System will be IP based and consist of interior and exterior speakers, intercom call switches, main equipment cabinet, and volume control switches with a tie into the telephone system. The system will be required to be completely commissioned and tested to ensure that it has been installed in accordance with all manufacturers’ installation instruction and that it is functioning properly.

The head end equipment cabinet shall be located in the MDF telecommunication room with consoles in the Main Reception area. The system shall be Rauland IP-Based Telecenter.

A small UPS system shall be provided for the School Intercom System.

SUSTAINABLE ELECTRICAL DESIGN

Roof-Top PV System will be designed and bid as an Alternate.

Ogden School District is currently not pursuing LEED design / certification.

Sustainable building practices shall be employed where approved by the District.