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| <p>1</p> <p>Gardner Bender duct seal, for each conduit entering the building from outside and for each conduit passing from one space into another which is normally at a lower temperature.</p> <p>L. Provide watertight conduit hubs on conduit terminating in a box or cabinet exposed to the weather.</p> <p>M. Space in sleeves or around conduit that pass through fire resistive or fire rated walls, partitions, floors or ceilings shall be closed by packing with an unlabelled fire resistive material that will maintain the rating of the barrier penetrated.</p> <p>3.2 FLEXIBLE CONDUIT</p> <p>A. PVC extruded cover flexible conduit shall be used in making short flexible connections to rotating or vibrating machinery or equipment. The flexible conduit at these locations shall be as short as possible, but shall have a minimum length of 12".</p> <p>B. A green stranded bonding jumper shall be installed outside of all flexible conduit that extends directly from a non-flex conduit to a rotating or vibrating machine. Where a junction box is used, the green stranded bonding jumper shall be installed inside the flexible conduit and attached to the junction box and to the machine. When the bonding jumper is installed outside of the flexible conduit, plastic wire straps shall be used 6" o.c. to secure the jumper to the flexible conduit.</p> <p>C. Flexible metal (MC) conduit system may be utilized where concealed in walls and/or millwork only. MC Cable shall run from point of exit from wall or millwork to nearest structurally supported junction box. MC cable will not be permitted to be installed in the above ceiling space and shall not pass through a fire rated partition. Conductor colors of the MC cable shall comply with 26 10 00 3.4 D.</p> | <p>2</p> <p>A. Where more than one device is indicated at a location, the devices shall be gang-mounted in combined multi-gang boxes and covered jointly by a common coverplate. Provide barriers as required by the devices and voltages being used.</p> <p>3.8 COVERPLATES</p> <p>A. All junction boxes, outlet boxes, multi-gang switch boxes, utility boxes, etc., shall be covered with a coverplate. The coverplate shall be a finished plate as specified unless designated otherwise.</p> <p>B. Coverplates shall be mounted vertically unless designated otherwise.</p> <p>3.9 GROUNDING</p> <p>A. Ground connections shall be in accordance with the National Electrical Code.</p> | <p>3</p> <p>A. All conductors shall be installed in conduit. No conductors shall be pulled into the conduit until the conduit system is completely and plaster had dried. Wire pulling lubricants shall be Gardner-Bender "Wireaide" or Ideal "Yellow 77".</p> <p>B. Conductors shall be continuous from outlet to outlet and from outlet to junction box or pull box. All splices and joints shall be carefully and securely made to be mechanically and electrically solid with pressure type connectors, Gardner Bender "Wingnuts" or Ideal "Wingnut". Tape shall be "Scotch" No. 33 for indoor and No. 88 for outdoor or Gardner Bender No. 95-661. Where connection is made to any terminals of more than 30 amperes capacity and where conductors larger than No. 10 are connected to any terminal, copper terminal lugs shall be bolted to the conductors. Where multiple connections are made to the same terminal, individual lugs for each conductor shall be used. Aluminum conductors, if used for service conductors, shall be made with high compression lugs as manufactured by Square D, Ideal or MAC.</p> <p>C. Each conduit shall have a minimum of two (2) conductors pulled in unless that particular conduit is noted as being for systems other than electrical circuitry and/or future use or unless noted otherwise.</p> <p>D. Conductors for lighting and receptacle circuits shall have color coded jackets. The wiring shall be color coded with the same color used with its respective phase through the entire job as follows:</p> | <p>4</p> <p>per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole.</p> <p>Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided.</p> <p>END OF SECTION</p> <p>SECTION 26 20 00</p> <p>SERVICE AND DISTRIBUTION</p> <p>PART 1 - GENERAL</p> <p>1.1 DESCRIPTION</p> <p>A. All work specified in this Section shall comply with the provisions of Section 26 01 00.</p> <p>B. Provide a complete electrical distribution system. The system shall include the service entrance, main switchboard, feeders, transformers, distribution panels, panelboards, busway, remote control switches, contactors, etc., to provide a complete system.</p> <p>C. All distribution switchgear (branch circuit panelboards, switchboard, distribution panelboards, transformers, busway, etc.) shall be the unit responsibility of one manufacturer. All component parts of the above listed items shall be of the same manufacturer except where a written request for deviation from this requirement has been approved prior to bid date.</p> <p>D. Shop drawings for equipment specified in this Section shall show that all specified requirements have been incorporated.</p> <p>E. Coordination studies shall be done prior to shop drawing submittals. Shop drawings shall include all breakers that meet the coordination study. If study is performed after the shop drawings are submitted, any revisions to breakers or panels shall be at no additional cost to the project.</p> <p>F. All floor mounted distribution equipment shall be mounted on a 4" high concrete pad.</p> <p>1.2 ELECTRICAL SERVICE (From pad mounted transformer)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the underground primary service and the pad mounted transformer.</p> <p>C. Provide the pad for the pad-mounted transformer in accordance with the power company specification.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.</p> <p>1.3 ELECTRICAL SERVICE (From pole, underground)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the transformers on the pole and the connection of the secondary conductors to the transformers.</p> <p>C. Provide the trench and backfill for the underground secondary service.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.</p> <p>1.4 ELECTRICAL SERVICE (From pole, overhead)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the secondary conductors, overhead from the pole terminating at the weatherhead, and the connection of the overhead conductors to the service conductors.</p> <p>C. Provide the insulated terminals for the overhead conductors, the weatherhead(s), and the conduit and wire for the service entrance, terminating at the main switchboard.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC.</p> <p>1.5 METERING (From pole, underground)</p> <p>A. Metering equipment
will be by the power company. The power company will furnish the meter base for installation at a location as directed by the power company. The power company will provide meter, control wires to the meter, and the current transformers.</p> <p>B. Provide the current transformers cabinet and a 1" conduit with fish-wire to the meter base. Install all equipment as directed by the power company.</p> <p>1.6 METERING (From pole, overhead)</p> <p>A. Provide a 1" conduit with a weather-head from the point of attachment of the service conductors to the meter base.</p> <p>1.7 METERING (From pad mounted transformer)</p> <p>A. Metering equipment will be by the power company. The power company will furnish the meter cabinet for installation at a location as directed by the power company and as detailed at the pad-mounted transformer.</p> <p>B. Provide a 1" conduit from the transformer to the meter cabinet as shown. The power company will provide the control wires to the meter.</p> <p>PART 2 - PRODUCTS</p> <p>2.1 BRANCH CIRCUIT PANELBOARDS</p> <p>A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the manufacturer of the circuit breakers. Panels shall be for the voltage indicated with the quantity of poles and ampacity of circuit breakers shown.</p> <p>B. Boxes and trim shall be made from code gauge steel. Boxes shall be sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5 3/4" depth.</p> <p>C. Hinged door covering all device handles shall be included in all panel trim. Doors shall have flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall be furnished each panel door.</p> <p>D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when</p> | <p>5</p> <p>per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole.</p> <p>Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided.</p> <p>END OF SECTION</p> <p>SECTION 26 20 00</p> <p>SERVICE AND DISTRIBUTION</p> <p>PART 1 - GENERAL</p> <p>1.1 DESCRIPTION</p> <p>A. All work specified in this Section shall comply with the provisions of Section 26 01 00.</p> <p>B. Provide a complete electrical distribution system. The system shall include the service entrance, main switchboard, feeders, transformers, distribution panels, panelboards, busway, remote control switches, contactors, etc., to provide a complete system.</p> <p>C. All distribution switchgear (branch circuit panelboards, switchboard, distribution panelboards, transformers, busway, etc.) shall be the unit responsibility of one manufacturer. All component parts of the above listed items shall be of the same manufacturer except where a written request for deviation from this requirement has been approved prior to bid date.</p> <p>D. Shop drawings for equipment specified in this Section shall show that all specified requirements have been incorporated.</p> <p>E. Coordination studies shall be done prior to shop drawing submittals. Shop drawings shall include all breakers that meet the coordination study. If study is performed after the shop drawings are submitted, any revisions to breakers or panels shall be at no additional cost to the project.</p> <p>F. All floor mounted distribution equipment shall be mounted on a 4" high concrete pad.</p> <p>1.2 ELECTRICAL SERVICE (From pad mounted transformer)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the underground primary service and the pad mounted transformer.</p> <p>C. Provide the pad for the pad-mounted transformer in accordance with the power company specification.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.</p> <p>1.3 ELECTRICAL SERVICE (From pole, underground)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the transformers on the pole and the connection of the secondary conductors to the transformers.</p> <p>C. Provide the trench and backfill for the underground secondary service.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.</p> <p>1.4 ELECTRICAL SERVICE (From pole, overhead)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the secondary conductors, overhead from the pole terminating at the weatherhead, and the connection of the overhead conductors to the service conductors.</p> <p>C. Provide the insulated terminals for the overhead conductors, the weatherhead(s), and the conduit and wire for the service entrance, terminating at the main switchboard.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC.</p> <p>1.5 METERING (From pole, underground)</p> <p>A. Metering equipment will be by the power company. The power company will furnish the meter cabinet for installation at a location as directed by the power company and as detailed at the pad-mounted transformer.</p> <p>B. Provide a 1" conduit from the transformer to the meter cabinet as shown. The power company will provide the control wires to the meter.</p> <p>PART 2 - PRODUCTS</p> <p>2.1 BRANCH CIRCUIT PANELBOARDS</p> <p>A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the manufacturer of the circuit breakers. Panels shall be for the voltage indicated with the quantity of poles and ampacity of circuit breakers shown.</p> <p>B. Boxes and trim shall be made from code gauge steel. Boxes shall be sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5 3/4" depth.</p> <p>C. Hinged door covering all device handles shall be included in all panel trim. Doors shall have flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall be furnished each panel door.</p> <p>D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when</p> | <p>6</p> <p>per side in the base or base frame of the equipment item, then there shall be one anchor for each anchor hole.</p> <p>Exception No. 2: If the equipment manufacturer recommends a particular quantity greater than two (2) per side, then that quantity of anchors shall be provided.</p> <p>END OF SECTION</p> <p>SECTION 26 20 00</p> <p>SERVICE AND DISTRIBUTION</p> <p>PART 1 - GENERAL</p> <p>1.1 DESCRIPTION</p> <p>A. All work specified in this Section shall comply with the provisions of Section 26 01 00.</p> <p>B. Provide a complete electrical distribution system. The system shall include the service entrance, main switchboard, feeders, transformers, distribution panels, panelboards, busway, remote control switches, contactors, etc., to provide a complete system.</p> <p>C. 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transformer)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the underground primary service and the pad mounted transformer.</p> <p>C. Provide the pad for the pad-mounted transformer in accordance with the power company specification.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC. Provide all conduit and wire as specified from the secondary terminals of the transformer to the main switchboard.</p> <p>1.3 ELECTRICAL SERVICE (From pole, underground)</p> <p>A. Make all arrangements with the power company and pay all charges made by the power company for permanent electric service. 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In the event that the power company's charges are not available at the time the project is bid, the bids shall be qualified to notify the Owner that such charges are not included.</p> <p>B. The power company will provide the secondary conductors, overhead from the pole terminating at the weatherhead, and the connection of the overhead conductors to the service conductors.</p> <p>C. Provide the insulated terminals for the overhead conductors, the weatherhead(s), and the conduit and wire for the service entrance, terminating at the main switchboard.</p> <p>D. The secondary service to the building shall be (277/480), (120/208) volts, 3 phase, 4 wire, 60 Hertz AC.</p> <p>1.5 METERING (From pole, underground)</p> <p>A. Metering equipment will be by the power company. The power company will furnish the meter base for installation at a location as directed by the power company. The power company will provide meter, control wires to the meter, and the current transformers.</p> <p>B. Provide the current transformers cabinet and a 1" conduit with fish-wire to the meter base. Install all equipment as directed by the power company.</p> <p>1.6 METERING (From pole, overhead)</p> <p>A. Provide a 1" conduit with a weather-head from the point of attachment of the service conductors to the meter base.</p> <p>1.7 METERING (From pad mounted transformer)</p> <p>A. Metering equipment will be by the power company. The power company will furnish the meter cabinet for installation at a location as directed by the power company and as detailed at the pad-mounted transformer.</p> <p>B. Provide a 1" conduit from the transformer to the meter cabinet as shown. The power company will provide the control wires to the meter.</p> <p>PART 2 - PRODUCTS</p> <p>2.1 BRANCH CIRCUIT PANELBOARDS</p> <p>A. Panelboards (panels) shall be general purpose enclosures and shall be surface or flush mounted as indicated. Panels shall be of the automatic circuit breaker type, factory assembled by the manufacturer of the circuit breakers. Panels shall be for the voltage indicated with the quantity of poles and ampacity of circuit breakers shown.</p> <p>B. Boxes and trim shall be made from code gauge steel. Boxes shall be sufficient size to provide a minimum gutter space of 4" on all sides. Boxes shall be minimum 20" width and 5 3/4" depth.</p> <p>C. Hinged door covering all device handles shall be included in all panel trim. Doors shall have flush-type cylinder lock and catch, except that doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to flush-type cylinder lock and catch. Door hinges shall be concealed. All locks shall be keyed alike. Directory frame and card having a transparent cover shall be furnished each panel door.</p> <p>D. Trims for flush panels shall overlap the box by at least 3/4" all around. Surface trims shall have the same width and height as the box. Trims shall be mountable by a screwdriver without the need for special tools. After installation, trim mounting mechanism or hardware shall not be accessible when</p> | <p>7</p> <p>panel door is closed and locked.</p> <p>E. All exterior and interior steel surfaces of the trim shall be cleaned and finished with gray paint over a rust-inhibiting phosphatized coating.</p> <p>F. All interiors shall be completely factory assembled with protective devices, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper or aluminum wire.</p> <p>G. Interiors shall be so designed that devices can be replaced without disturbing adjacent units and without removing the main bus connectors, and shall be so designed that devices may be changed without machining, drilling or tapping.</p> <p>H. Bus bars for the mains shall be of copper sized in accordance with U.L. standards. Full size bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices.</p> <p>I. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.</p> <p>J. The neutral bus shall utilize setscrews to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.</p> <p>K. Spaces for future devices shall be included as indicated and shall be bussed for the maximum rated device that can be fitted into them.</p> <p>L. All circuit breakers (except as listed below) shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break, both on handle going to a position between ON and OFF to indicate automatic tripping. All multi-pole breakers shall have internal common trip. The minimum interrupting capacity of the breakers furnished shall be 10,000 amperes RMS symmetrical for 120/208 volt and 14,000 amperes RMS symmetrical for 480/277 volt unless indicated otherwise on the riser diagram. The breakers furnished shall be determined by the specifications and by the minimum U.L. labeled RMS symmetrical amperes interrupting capacity at circuit voltage. All circuit breakers shall be bolted on and rigidly braced.</p> <p>M. All circuit breakers feeding an emergency panel or main breaker for an emergency panel shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>N. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>O. Provide arc-fault circuit breakers for all branch circuits supply areas defined by NEC 210.12 in all dwelling units.</p> <p>P. Panels having sub-feed lugs for feeding through shall have 8" minimum extra gutter space at the lug end and on one side.</p> <p>Q. Each panel as a complete unit shall have a short-circuit current rating equal to or greater than the equipment rating indicated.</p> <p>R. All circuit breakers serving the fire alarm system shall include red marking and a listed locking mechanism per NFPA 72.</p> <p>S. Panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.2 DISTRIBUTION PANELBOARDS</p> <p>A. Distribution panelboards (panels) shall be of the circuit breaker type, factory assembled by the manufacturer of the circuit breakers, complete with front door cover. The main breaker and the branch circuit breakers shall be as indicated. The main bus shall be 98% conductivity silver plated copper, rated as and of capacity equal to or greater than the rating or setting of the under-current protective device next back in the line. Panel shall be suitable for the voltage and phase indicated. Provide 25% ground bus.</p> <p>B. Panels shall be flush or surface mounted as indicated, with baked-on enamel trim, adjustable trim clamps and door with chromium plated combination cylinder lock and catch, all locks keyed alike. Provide a specified nameplate for each device and a blank (not engraved) nameplate for each spare breaker or space.</p> <p>C. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.</p> <p>D. The neutral bus shall utilize setscrews to bond the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be
acceptable.</p> <p>E. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break both on manual and on automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between "ON" and "OFF" to indicate automatic tripping. All multi-pole breakers shall have internal common trip.</p> <p>F. The minimum interrupting capacity of the breakers furnished shall be 10,000 amperes RMS symmetrical for 120/208 volt and 14,000 amperes RMS symmetrical for 480/277 volt unless indicated otherwise on the riser diagram.</p> <p>G. All main circuit breakers (except as listed below) shall be molded case and vertically mounted. All vertically mounted molded case circuit breakers shall be mounted so that the handle is up for "ON" and down for "OFF", when viewed from the normal standing position. All vertically mounted molded case main circuit breakers shall be UL approved for feeding in the bottom and out the top.</p> <p>H. All circuit breakers feeding an emergency panel or main breaker for an emergency panel shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>I. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>J. All circuit breakers, including any connectors to the main bus, shall be bolted and rigidly braced.</p> <p>K. Spaces for future installation of molded case circuit breakers are specifically by range of trip rating and by range of trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>L. Distribution panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.3 TRANSFORMERS</p> <p>A. Branch circuit and distribution transformers shall be the dry type and shall have the ratings indicated.</p> <p>B. Single phase transformers shall be 480 volt primary and 120/208 volt secondary. Three phase transformers shall be 480 volt delta primary and 120/208 volt grounded type secondary. Transformers 25 kVA and larger shall have a minimum of four (4) 2.5% full capacity primary taps.</p> <p>C. Transformers shall have a U.L. recognized 220 degree insulation system and shall be designed so that under full load, the average conductor temperature rise does not exceed 115 degree C. rise above a 40 degree C. ambient and the enclosure does not exceed a 50 degree C. rise at any point.</p> <p>D. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities shall be kept well below the saturation point. The core laminations shall be clamped together</p> | <p>8</p> <p>panel door is closed and locked.</p> <p>E. All exterior and interior steel surfaces of the trim shall be cleaned and finished with gray paint over a rust-inhibiting phosphatized coating.</p> <p>F. All interiors shall be completely factory assembled with protective devices, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper or aluminum wire.</p> <p>G. Interiors shall be so designed that devices can be replaced without disturbing adjacent units and without removing the main bus connectors, and shall be so designed that devices may be changed without machining, drilling or tapping.</p> <p>H. Bus bars for the mains shall be of copper sized in accordance with U.L. standards. Full size bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices.</p> <p>I. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.</p> <p>J. The neutral bus shall utilize setscrews to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.</p> <p>K. Spaces for future devices shall be included as indicated and shall be bussed for the maximum rated device that can be fitted into them.</p> <p>L. All circuit breakers (except as listed below) shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break, both on handle going to a position between ON and OFF to indicate automatic tripping. All multi-pole breakers shall have internal common trip. The minimum interrupting capacity of the breakers furnished shall be 10,000 amperes RMS symmetrical for 120/208 volt and 14,000 amperes RMS symmetrical for 480/277 volt unless indicated otherwise on the riser diagram. The breakers furnished shall be determined by the specifications and by the minimum U.L. labeled RMS symmetrical amperes interrupting capacity at circuit voltage. All circuit breakers shall be bolted on and rigidly braced.</p> <p>M. All circuit breakers feeding an emergency panel or main breaker for an emergency panel shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>N. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>O. Provide arc-fault circuit breakers for all branch circuits supply areas defined by NEC 210.12 in all dwelling units.</p> <p>P. Panels having sub-feed lugs for feeding through shall have 8" minimum extra gutter space at the lug end and on one side.</p> <p>Q. Each panel as a complete unit shall have a short-circuit current rating equal to or greater than the equipment rating indicated.</p> <p>R. All circuit breakers serving the fire alarm system shall include red marking and a listed locking mechanism per NFPA 72.</p> <p>S. Panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.2 DISTRIBUTION PANELBOARDS</p> <p>A. Distribution panelboards (panels) shall be of the circuit breaker type, factory assembled by the manufacturer of the circuit breakers, complete with front door cover. The main breaker and the branch circuit breakers shall be as indicated. The main bus shall be 98% conductivity silver plated copper, rated as and of capacity equal to or greater than the rating or setting of the under-current protective device next back in the line. Panel shall be suitable for the voltage and phase indicated. Provide 25% ground bus.</p> <p>B. Panels shall be flush or surface mounted as indicated, with baked-on enamel trim, adjustable trim clamps and door with chromium plated combination cylinder lock and catch, all locks keyed alike. Provide a specified nameplate for each device and a blank (not engraved) nameplate for each spare breaker or space.</p> <p>C. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.</p> <p>D. The neutral bus shall utilize setscrews to bond the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.</p> <p>E. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break both on manual and on automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between "ON" and "OFF" to indicate automatic tripping. All multi-pole breakers shall have internal common trip.</p> <p>F. The minimum interrupting capacity of the breakers furnished shall be 10,000 amperes RMS symmetrical for 120/208 volt and 14,000 amperes RMS symmetrical for 480/277 volt unless indicated otherwise on the riser diagram.</p> <p>G. All main circuit breakers (except as listed below) shall be molded case and vertically mounted. All vertically mounted molded case circuit breakers shall be mounted so that the handle is up for "ON" and down for "OFF", when viewed from the normal standing position. All vertically mounted molded case main
circuit breakers shall be UL approved for feeding in the bottom and out the top.</p> <p>H. All circuit breakers feeding an emergency panel or main breaker for an emergency panel shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>I. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>J. All circuit breakers, including any connectors to the main bus, shall be bolted and rigidly braced.</p> <p>K. Spaces for future installation of molded case circuit breakers are specifically by range of trip rating and by range of trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>L. Distribution panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.3 TRANSFORMERS</p> <p>A. Branch circuit and distribution transformers shall be the dry type and shall have the ratings indicated.</p> <p>B. Single phase transformers shall be 480 volt primary and 120/208 volt secondary. Three phase transformers shall be 480 volt delta primary and 120/208 volt grounded type secondary. Transformers 25 kVA and larger shall have a minimum of four (4) 2.5% full capacity primary taps.</p> <p>C. Transformers shall have a U.L. recognized 220 degree insulation system and shall be designed so that under full load, the average conductor temperature rise does not exceed 115 degree C. rise above a 40 degree C. ambient and the enclosure does not exceed a 50 degree C. rise at any point.</p> <p>D. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities shall be kept well below the saturation point. The core laminations shall be clamped together</p> | <p>9</p> <p>panel door is closed and locked.</p> <p>E. All exterior and interior steel surfaces of the trim shall be cleaned and finished with gray paint over a rust-inhibiting phosphatized coating.</p> <p>F. All interiors shall be completely factory assembled with protective devices, wire connectors, etc. All wire connectors, except screw terminals, shall be of the anti-turn solderless type and all shall be suitable for copper or aluminum wire.</p> <p>G. Interiors shall be so designed that devices can be replaced without disturbing adjacent units and without removing the main bus connectors, and shall be so designed that devices may be changed without machining, drilling or tapping.</p> <p>H. Bus bars for the mains shall be of copper sized in accordance with U.L. standards. Full size bars shall be included. Bus bar taps for panels with single pole branches shall be arranged for sequence phasing of the branch circuit devices.</p> <p>I. Phase bussing shall be full height without reduction. Cross and center connectors shall be of the same material as the bus.</p> <p>J. The neutral bus shall utilize setscrews to bond the neutral wire to the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.</p> <p>K. Spaces for future devices shall be included as indicated and shall be bussed for the maximum rated device that can be fitted into them.</p> <p>L. All circuit breakers (except as listed below) shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break, both on handle going to a position between ON and OFF to indicate automatic tripping. All multi-pole breakers shall have internal common trip. 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With the plug removed, it shall not be possible to close the breaker.</p> <p>N. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>O. Provide arc-fault circuit breakers for all branch circuits supply areas defined by NEC 210.12 in all dwelling units.</p> <p>P. Panels having sub-feed lugs for feeding through shall have 8" minimum extra gutter space at the lug end and on one side.</p> <p>Q. Each panel as a complete unit shall have a short-circuit current rating equal to or greater than the equipment rating indicated.</p> <p>R. All circuit breakers serving the fire alarm system shall include red marking and a listed locking mechanism per NFPA 72.</p> <p>S. Panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.2 DISTRIBUTION PANELBOARDS</p> <p>A. Distribution panelboards (panels) shall be of the circuit breaker type, factory assembled by the manufacturer of the circuit breakers, complete with front door cover. The main breaker and the branch circuit breakers shall be as indicated. The main bus shall be 98% conductivity silver plated copper, rated as and of capacity equal to or greater than the rating or setting of the under-current protective device next back in the line. Panel shall be suitable for the voltage and phase indicated. Provide 25% ground bus.</p> <p>B. Panels shall be flush or surface mounted as indicated, with baked-on enamel trim, adjustable trim clamps and door with chromium plated combination cylinder lock and catch, all locks keyed alike. Provide a specified nameplate for each device and a blank (not engraved) nameplate for each spare breaker or space.</p> <p>C. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.</p> <p>D. The neutral bus shall utilize setscrews to bond the neutral bus through holes drilled in the neutral bar. A sheet copper neutral bus utilizing flathead screws to hold the neutral wires will not be acceptable.</p> <p>E. All circuit breakers shall be manually operated, thermal-magnetic, automatic, of the ampacity and poles as indicated. They shall be quick-make, quick-break both on manual and on automatic operation. Breakers shall be over-the-center toggle operating type, with the handle going to a position between "ON" and "OFF" to indicate automatic tripping. All multi-pole breakers shall have internal common trip.</p> <p>F. The minimum interrupting capacity of the breakers furnished shall be 10,000 amperes RMS symmetrical for 120/208 volt and 14,000 amperes RMS symmetrical for 480/277 volt unless indicated otherwise on the riser diagram.</p> <p>G. All main circuit breakers (except as listed below) shall be molded case and vertically mounted. All vertically mounted molded case circuit breakers shall be mounted so that the handle is up for "ON" and down for "OFF", when viewed from the normal standing position. All vertically mounted molded case main circuit breakers shall be UL approved for feeding in the bottom and out the top.</p> <p>H. All circuit breakers feeding an emergency panel or main breaker for an emergency panel shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>I. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the
breaker electrically and mechanically while in service without dismantling equipment and with minimum down time.</p> <p>J. All circuit breakers, including any connectors to the main bus, shall be bolted and rigidly braced.</p> <p>K. Spaces for future installation of molded case circuit breakers are specifically by range of trip rating and by range of trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker.</p> <p>L. Distribution panels shall be as manufactured by ABB - General Electric, Square D, Siemens, or Eaton.</p> <p>2.3 TRANSFORMERS</p> <p>A. Branch circuit and distribution transformers shall be the dry type and shall have the ratings indicated.</p> <p>B. Single phase transformers shall be 480 volt primary and 120/208 volt secondary. Three phase transformers shall be 480 volt delta primary and 120/208 volt grounded type secondary. Transformers 25 kVA and larger shall have a minimum of four (4) 2.5% full capacity primary taps.</p> <p>C. Transformers shall have a U.L. recognized 220 degree insulation system and shall be designed so that under full load, the average conductor temperature rise does not exceed 115 degree C. rise above a 40 degree C. ambient and the enclosure does not exceed a 50 degree C. rise at any point.</p> <p>D. Transformer coils shall be of the continuous wound construction and shall be impregnated with non-hygroscopic, thermosetting varnish. All cores to be constructed of high grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Magnetic flux densities shall be kept well below the saturation point. The core laminations shall be clamped together</p> |
| <p>208/120 Volt System</p> <p>480/277 Volt System</p> <p>Phase A - Black Phase A - Brown
Phase B - Red Phase B - Orange
Phase C - Blue Phase C - Yellow
Neutral - White Neutral - Gray
Ground - Green Ground - Green</p> <p>E. The feeder and service entrance conductors shall be color coded by the use of colored plastic tape applied within 6" of each conductor ends.</p> <p>F. Branch circuit conductors shall not be smaller than No. 12 and where the home run from center of load exceeds 100'-0", the conductors from home run outlet to panel shall be No. 10 minimum.</p> | <p>3.10 TELEPHONE CONDUIT SYSTEM</p> <p>A. Telephone service shall include wood backboards and equipment cabinets with service entrance conduit as shown.</p> <p>B. Telephone service entrance cable, all branch cabling and telephone instruments shall be provided by the telephone equipment vendor.</p> <p>C. Provide an outlet and conduit system for the telephones as shown and leave the same in readiness for wiring by others. Provide pull line in all telephone conduit. Terminate all conduit at a uniform height with smooth insulated bushings at the telephone wood backboards.</p> <p>D. Telephone wall outlets shall be pressed steel sectional switch boxes, wall mounted at the locations indicated. Coverplate shall have a bushed hole.</p> <p>E. Telephone floor outlets shall be floor boxes as specified at the locations indicated.</p> <p>3.11 CONNECTION TO EQUIPMENT</p> <p>A. Equipment furnished by the Owner or under other Sections, such as mechanical equipment, elevators, escalators, signs, kitchen equipment, etc., will be installed by others. Provide electrical service and make the electrical circuit connection to this equipment.</p> <p>B. Provide PVC insulated flexible cord sets for all cord and plug connected building appliances and equipment. Cords shall be sized in accordance with electrical circuits indicated. Multiple conductor cords shall be "SO" cable with PVC jacket and green insulated ground conductor.</p> <p>3.12 CORING, CUTTING AND PATCHING</p> <p>A. Set sleeves for conduit accurately before the concrete floors are poured, or set boxes on the forms so as to leave openings in the floors in which the required sleeves can be subsequently located. Fill in the voids around the sleeves with concrete.</p> <p>B. Should the performance of this preliminary work be neglected and should cutting be required in order to install conduit, then the expense of the cutting and restoring of surfaces to their original conditions shall be accomplished without incurring additions to the Contract.</p> <p>3.13 EQUIPMENT ANCHORING</p> <p>A. All items of electrical equipment, such as switchboards, motor control centers, transformers, standby generator, etc., shall be securely anchored to the building structure. The anchoring shall be accomplished by utilizing a minimum size of 3/8" steel anchor bolts in the structure and to the item of equipment. A minimum of two (2) anchor bolts shall be provided on each side of each item of equipment with the following exceptions:</p> <p></p> | |
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H	with structural steel angles. The completed core and coil shall then be bolted to the base of the enclosure but isolated therefrom by means of rubber, vibration-absorbing mounts. There shall be no metal-to-metal contact between the core and coil and the enclosure. On transformers 500 kVA and smaller, the vibration isolating system shall be designed to provide a permanent fastening of the core and coil to the enclosure. Sound isolating systems requiring the complete removal of all fastening devices will not be acceptable. Sound levels shall be guaranteed by the manufacturer not to exceed the following: 25 to 50 kVA – 45 DB; 51 to 150 kVA – 50 DB; 151 to 300 kVA – 55 DB; 301 to 500 kVA – 60 DB.		25. Trip unit shall provide local trip indication. 26. Ground-fault protection shall be available for solidly grounded three-phase, three-wire or three-phase, four-wire systems. Trip unit shall be capable of the following types of ground-fault protection: residual, source ground return, and modified differential. Ground-fault sensing systems may be changed in the field. 27. Ground-fault settings for circuit breaker sensor sizes 1200 A or below shall be in nine bands from 0.2 to 1.0 times In. The ground-fault settings for circuit breakers above 1200 A shall be nine bands from 500 to 1200 A. 28. Trip units shall be available to provide real time metering. Metering functions include current, voltage, power and frequency. Metering accuracy shall be 1.5% current, 0.5% voltage, and 2% power. These accuracy's shall be total system including CT and meter and shall be of reading not full scale in a range of 5 = 500%. 29. Energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.		21. Adjustable long-time pickup (tr) and delay shall be available in an adjustable rating plug that is UL Listed as field-replaceable. Adjustable rating plug shall allow for nine long-time pickup settings from 0.4 to 1 times the sensor plug (In). Other adjustable rating plugs shall be available for more precise settings to match the application. Long-time delay settings shall be in nine bands from 0.5–24 seconds at six times Ir. 22. Short-time pickup shall allow for nine settings from 1.5 to 10 times Ir. Short-time delay shall be in nine bands from 0.1–0.4 I 2/ t ON and 0–0.4 I 2/ t OFF. 23. Instantaneous settings on the trip units with LSI protection shall be available in nine bands from 2 to 15 times In. The instantaneous setting shall also have an OFF setting when short-time pick-up is provided. 24. All trip units shall have the capability for the adjustments to be set and read locally by rotating a switch.		a label on each breaker in a switchboard or distribution panelboard with the same level of circuit identification details. B. Provide all necessary hardware to level and secure the switchgear as required by the manufacturer's instructions. Make all electrical connections for supply and load circuits and leave in operating condition. C. Clean enclosure of all switchgear of all foreign matter, including dust. D. Remove all rust marks and repaint to leave switchgear in new condition.		O. Ballast shall provide normal rated lamp life as stated by lamp manufacturers. P. Rapid start ballasts are series wired and shall maintain full cathode heat during operation. Q. Rapid start ballast shall have less than a 1.5 Lamp Current Crest Factor (LCCF) and instant start ballasts have less than a 1.7 LCCF. R. Instant start ballast shall have parallel lamp operation. S. Ballast factor standard is .875+0.025 on all normal light output products. T. Ballasts for "PL" fluorescent lamps shall be coordinated with lamps and 2-pin or 4-pin configuration ballasts shall be provided to match lamps. Manufacturer for "PL" fluorescent fixtures shall be Advance, Roberson, Lightolier or Lutron. U. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with minimum power factor of 0.9.																																				
H	E. Transformers 24 kVA and larger shall be in a heavy gauge, sheet steel, ventilated enclosure. The ventilating openings shall be designed to prevent accidental access to live parts in accordance with UL, NEMA, and National Electrical Code standard for ventilated enclosures. Transformers 25 kVA through 112.5 kVA shall be designed so that they can be either floor or wall mounted. Above 112.5 kVA, they shall be floor-mounted design. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with a gray, baked enamel.		E. Distribution Circuit Breakers 1. Electrical circuits shall be protected by molded case circuit breakers. Each pole shall provide inverse time delay and instantaneous circuit protection. 2. Circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal circuits. Tripping due to overload or short circuit shall be indicated by the handle automatically assuming a position midway between ON and OFF positions. 3. Breakers must be completely enclosed in a molded case. Non-interchangeable trip breakers shall have wire trip units to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be of the non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. 4. All circuit breakers with frame sized 600 amps and larger shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker. 5. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time. 6. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.		1. Electrical circuits shall be protected by molded case circuit breakers. Each pole shall provide inverse time delay and instantaneous circuit protection. 2. 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As a requirement for the project documents to be delivered by the contractor, provide a complete short circuit and selective coordination study from the service entrance to all end devices. The study shall be provided by the switchgear manufacturer or their vendor and shall utilize time current curves that are developed by the gear manufacturer selected for use in the building. The study shall be made available for review by the engineer and local code enforcement authorities no later than at the times they deem necessary for certificates of occupancy to be issued. Obtain critical dates from the inspections department of the local code enforcement department during the inspection process to determine when presentation of the selective coordination study to the inspections department is necessary for timely issuance of the certificate of occupancy. B. The selective coordination study shall be broken into parts where the systems described in NEC Articles 700.27, 701.18, 708.54 and 620.62 are isolated in the report to simplify the review of those isolated systems. C. As a minimum requirement for the details that are necessary in the selective coordination study, refer to the requirements for selective coordination in the NEC Articles 700.28, 701.27, 708.54 and 620.62. D. The minimum NEC requirement for the selective coordination study is applicable to the systems described in NEC Articles 700.28, 701.27, 708.54, 620.62, and as indirectly referenced for essential electrical systems in Article 517. The minimum project requirement described in A. above shall not be scaled back to the minimum NEC code requirement unless agreed to by all parties associated with the construction of the project including, but not limited to, the owner, architect, engineer, developer, etc. D. The minimum NEC requirement for the selective coordination study is applicable to the systems described in NEC Articles 700.28, 701.27, 708.54, 620.62, and as indirectly referenced for essential electrical systems in Article 517. The minimum project requirement described in A. above shall not be scaled back to the minimum NEC code requirement unless agreed to by all parties associated with the construction of the project including, but not limited to, the owner, architect, engineer, developer, etc.		T. Ballasts for "PL" fluorescent lamps shall be coordinated with lamps and 2-pin or 4-pin configuration ballasts shall be provided to match lamps. Manufacturer for "PL" fluorescent fixtures shall be Advance, Roberson, Lightolier or Lutron. U. Ballasts for High Intensity Discharge (HID) lamps shall be Constant Wattage Autotransformer (CWA) type or equal type with minimum power factor of 0.9.																																				
G	F. Transformers shall be compliant with the 2016 DOE efficiency standards: Table I.6—Electrical Efficiencies for All Low-Voltage Dry-Type Distribution Transformer Equipment Classes <table border="1"> <thead> <tr> <th>Equipment Class</th> <th>Equipment Class 3 (Single-Phase)</th> <th>Equipment Class 4 (Three-Phase)</th> </tr> <tr> <th></th> <th>kVA % kVA %</th> <th>kVA %</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>97.70</td> <td>15 97.89</td> </tr> <tr> <td>25</td> <td>98.00</td> <td>30 98.23</td> </tr> <tr> <td>37.5</td> <td>98.20</td> <td>45 98.40</td> </tr> <tr> <td>50</td> <td>98.30</td> <td>75 98.60</td> </tr> <tr> <td>75</td> <td>98.50</td> <td>112.5 98.74</td> </tr> <tr> <td>100</td> <td>98.60</td> <td>150 98.83</td> </tr> <tr> <td>167</td> <td>98.70</td> <td>225 98.94</td> </tr> <tr> <td>250</td> <td>98.80</td> <td>300 99.02</td> </tr> <tr> <td>333</td> <td>98.90</td> <td>500 99.14</td> </tr> <tr> <td></td> <td>750 99.23</td> <td>1,000 99.28</td> </tr> </tbody> </table>	Equipment Class	Equipment Class 3 (Single-Phase)	Equipment Class 4 (Three-Phase)		kVA % kVA %	kVA %	15	97.70	15 97.89	25	98.00	30 98.23	37.5	98.20	45 98.40	50	98.30	75 98.60	75	98.50	112.5 98.74	100	98.60	150 98.83	167	98.70	225 98.94	250	98.80	300 99.02	333	98.90	500 99.14		750 99.23	1,000 99.28		1. Electrical circuits shall be protected by molded case circuit breakers. Each pole shall provide inverse time delay and instantaneous circuit protection. 2. Circuit breakers shall be operated by a toggle type handle and shall have a quick-make, quick-break mechanism that is mechanically trip free from the handle so that the contacts cannot be held closed against short circuits and abnormal circuits. Tripping due to overload or short circuit shall be indicated by the handle automatically assuming a position midway between ON and OFF positions. 3. Breakers must be completely enclosed in a molded case. Non-interchangeable trip breakers shall have wire trip units to prevent tampering. Ampere ratings shall be clearly visible. Contacts shall be of the non-welding silver alloy. Arc extinction must be accomplished by means of arc chutes. 4. All circuit breakers with frame sized 600 amps and larger shall have solid state trip units that are insensitive to changes in ambient temperature and a push-to-trip button to mechanically check the trip mechanism or for the use under emergency trip conditions. Interchangeable rating plugs shall establish the continuous current rating of each breaker. An interlock in the rating plug shall trip the breaker if an attempt is made to remove the plug with the breaker in the ON position. With the plug removed, it shall not be possible to close the breaker. 5. The solid state trip breakers shall provide long delay and magnetic tripping similar to thermal magnetic breakers. In addition, the magnetic trip shall include a short time delay permitting coordination and selective tripping with downstream devices. It shall be possible to check the breaker electrically and mechanically while in service without dismantling equipment and with minimum down time. 6. Provide energy reducing active arc flash mitigation system to comply with NEC 240.87 for all breakers rated 1200 amps or can be adjusted to 1200 amps or higher.		END OF SECTION				
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167	98.70	225 98.94																																											
250	98.80	300 99.02																																											
333	98.90	500 99.14																																											
	750 99.23	1,000 99.28																																											
G	G. Transformers that are of the floor-mounted type shall be mounted on Korfund Vibration Eliminators of the pad type. H. Transformers shall be as manufactured by ABB – General Electric, Square D, Siemens, or Eaton.		F. Ground Fault Protection 1. An adjustable ground fault protection system shall be provided as an integral part of the main circuit breaker or main fused switch, designated feeder breakers and fused switches. 2. The ground fault protection system shall consist of a current sensor enclosing all phase and neutral conductors of the circuits to be monitored, appropriate relaying equipment to provide the desired ground current sensitivity and time-current response characteristics, and equipped to function in conjunction with the other elements of the system. 3. The current sensor shall be of sufficient size to encircle the phase and neutral conductors of the circuit to be monitored. Current sensor output shall be coordinated with the required input to the delay. The current sensor shall have a ground fault current pick-up range of 200 to 1200 amperes. A test winding shall be included to simulate the flow of ground fault current through the sensor to test the operation of the ground fault protection system. The frame of the current sensor shall be constructed so that one leg can be opened to allow removal or installation around cable without disturbing that cable. 4. The ground fault relay shall be solid state construction, except that a coil operated output relay may be provided to control 120 volt power to operate a fusible bolted pressure contact switch. The relay shall have an adjustable current sensitivity for ground fault pick-up currents from 200 amperes to 1200 amperes. 5. Provide a monitor panel on the switchboard, including a push-to-test button for the test circuit and a red ground fault indicator light to indicate the circuit interrupter has opened due to a ground fault condition. The unit shall operate on a 120 volt AC source. 6. Provide a pulsating audible horn that is activated when a ground fault condition occurs. Horn shall stop when ground fault protection system is reset. Horn shall operate during testing of ground fault protection system.		1. An adjustable ground fault protection system shall be provided as an integral part of the main circuit breaker or main fused switch, designated feeder breakers and fused switches. 2. The ground fault protection system shall consist of a current sensor enclosing all phase and neutral conductors of the circuits to be monitored, appropriate relaying equipment to provide the desired ground current sensitivity and time-current response characteristics, and equipped to function in conjunction with the other elements of the system. 3. The current sensor shall be of sufficient size to encircle the phase and neutral conductors of the circuit to be monitored. Current sensor output shall be coordinated with the required input to the delay. The current sensor shall have a ground fault current pick-up range of 200 to 1200 amperes. A test winding shall be included to simulate the flow of ground fault current through the sensor to test the operation of the ground fault protection system. The frame of the current sensor shall be constructed so that one leg can be opened to allow removal or installation around cable without disturbing that cable. 4. The ground fault relay shall be solid state construction, except that a coil operated output relay may be provided to control 120 volt power to operate a fusible bolted pressure contact switch. The relay shall have an adjustable current sensitivity for ground fault pick-up currents from 200 amperes to 1200 amperes. 5. Provide a monitor panel on the switchboard, including a push-to-test button for the test circuit and a red ground fault indicator light to indicate the circuit interrupter has opened due to a ground fault condition. The unit shall operate on a 120 volt AC source. 6. Provide a pulsating audible horn that is activated when a ground fault condition occurs. Horn shall stop when ground fault protection system is reset. Horn shall operate during testing of ground fault protection system.		SECTION 26 30 00																																						
F	2.4 MAIN SWITCHBOARD A. General 1. Provide where indicated, a front and rear accessible dead front type, completely metal enclosed, self-supporting structure independent of wall supports. It shall consist of the required number of vertical sections bolted together to form one rigid switchboard approximately 90° high incorporating switching and protective devices of the number, ratings and type noted herein or shown with necessary interconnections, instrumentation and control wiring. The sides, top and rear shall be covered with removable screw-on plates. Front plates shall be sectionalized and removable. All covers shall be secured by self-tapping screws. Ventilation openings shall be provided where required. The switchboard shall be vermin proof. 2. All sections of the switchboard shall be 20 inches deep except service sections containing large ampacity main circuit breaker or pressure contact type main fusible switch which may be deeper. All section of the switchboard shall align so that the back of the complete structure may be placed flush against a wall. Construction shall allow maintenance of incoming line terminations, main device connections and all main bus bolted connections to be performed with front and rear access. 3. The feeder or branch devices shall be removable from the front and shall be panel mounted with the necessary device line and load connections front accessible. 4. All exterior and interior steel surfaces of the switchboard shall be cleaned and finished with gray hard dried enamel over a rust-inhibiting phosphatized coating. 5. Small wiring, necessary fuse blocks and terminal blocks within the switchboard shall be furnished when required. All groups of control wires leaving the switchboard shall be provided with terminal blocks with numbering strips.		G. Short Circuit Current Rating 1. The switchboard as a complete unit shall be given a single short circuit current by the manufacturer of the rating as shown. Such a rating shall be established by actual test in accordance with UL specifications. H. Provide integral digital meter in the switchboard to display at a minimum the following measured values: Real-Time Readings, Energy Readings, Demand Readings, and Harmonics. The meter shall have an Ethernet Communications device. I. Provide ammeter with selector switch and voltmeter with selector switch and all associated internal wiring. Ammeter, voltmeter and associated selector switches shall be flush mounted on front of switchboard. J. Main switchboards shall be as manufactured by ABB – General Electric, Square D, Siemens, or Eaton.		LIGHTING PART 1 – GENERAL 1.1 DESCRIPTION A. All work in this Section shall comply with the provisions of Section 26 01 00. B. Provide all lighting fixtures and lamps as specified herein and as shown. C. All lamps shall be operating at the time of the final inspection and for a period of six (6) months after the final acceptance of the project by the Owner. D. Confirm exact locations of all lighting fixtures by coordination with the Architects Reflected Ceiling Plans and mechanical equipment above or on the ceiling. E. Confirm all ceiling types before ordering lighting fixtures. F. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed. G. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed. H. Each lighting fixture shall have been tested and certified for proper operation by the fixture manufacturer for the type mounting and ceiling on/in, which it is installed. I. 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Emergency illumination shall meet or exceed the requirements set forth in the National Electric Code, Life Safety Code and UL 90-Minute Requirements.																																				
E	B. Bussing 1. The bus shall be tin plated aluminum or silver plated copper adequately braced and supported to withstand mechanical forces exerted during short circuit conditions. The main horizontal bus bars shall be mounted on glass polyester insulators with all three phases arranged in the same vertical plane. The main bus shall be braced for short circuits up to the RMS amperes value as shown. 2. A ground bus shall be provided firmly secured to each vertical structure and shall extend the entire length of the switchboard. A ground lug shall be furnished attached to the ground bus in an accessible location. 3. Provide a removable link (solid bar) in the neutral bus where the main disconnect device is provided. 4. Provide a bonding strap from the neutral bus to the switchboard frame. The bonding strap shall be located on the line side of the removable neutral link. C. Main Circuit Breaker 1. Circuit breaker shall be draw-out type [manually] [electrically] operated. Acceptable manufacturers are Square D Masterpact or equal by GE, Siemens, Eaton. 2. The case of the circuit breaker shall be a polyester thermostat material providing high dielectric strength. 3. Interrupting rating shall be available up to 200,000 amperes RMS symmetrical without fuses. 4. All circuit breaker operating mechanisms are to be two-step, fully-stored energy devices for quick-make, quick-break operation with a maximum of a five-cycle closing time. Open-close-open (O-C-O) cycle shall be possible without recharging. Motor operator shall automatically charge when required. Actuation of the operating handle or an operation cycle of the circuit breaker motor is to charge the closing springs (step one) and operation of a local "close" button is to close the circuit breaker contact (step two). Closing the circuit breaker contacts shall automatically charge the opening springs. 5. Current-carrying components shall be completely isolated from the accessory mounting area and double insulated from the operator with accessory cover in place. 6. Each phase inside the circuit breaker shall be completely isolated from other phases and ground by polyester thermostat material. 7. Padlocking provisions shall be furnished to receive up to three padlocks when circuit breaker is in the disconnected position, positively preventing unauthorized closing of the circuit breaker contacts. 8. Provisions for up to two key locks shall be furnished allowing locking in the disconnected position. Provisions for locking in the connected, test and disconnected positions by padlock or key lock shall be available as an option. 9. Located on the face of the circuit breaker shall be buttons, with optional lockable clear cover, to open and close the circuit breaker and indicators to show the position of the circuit breaker contacts, status of the closing springs, and circuit breaker position in the cell. An indicator shall show "charged-not OK to close" if closing springs are charged but circuit breaker is not ready to close. Circuit breaker locking system must have positive stops at the connected, test, disconnected and withdrawn positions. 10. Circuit breaker must be equipped with an interlock to discharge the stored energy spring before the circuit breaker can be withdrawn from its cell. Circuit breaker must provide a positive ground contact check between the circuit breaker and cell when the accessory cover is removed while the circuit breaker is in the connected, test or disconnected positions. 11. Primary connectors that can be rotated to provide flexible vertical or horizontal connections shall be available as an option. Front connections shall also be available for shallow depth equipment designs. 12. Ready-to-close contact must be available to indicate remotely that the circuit breaker is "ready to close." The circuit breaker is ready to close when it is open, spring mechanism is charged, a maintained closing order is not present, a maintained opening order is not present, and the circuit breaker is in an operational position. 13. Secondary wiring shall be front accessible and available in cage clamp or ring terminal connections. Secondary wiring must not be accessible when switchgear door is closed. 14. Circuit breaker shall provide long service life. The 3200 A circuit breaker frame and those of lower ratings must be certified to perform a minimum of 10,000 operations without maintenance. The 4000 A and 5000 A frames must be certified to 5,000 operations without maintenance. 15. Circuit breaker shall be equipped with a visual contact wear indicator. 16. Low-voltage power circuit breaker arc chutes containing asbestos will NOT be accepted. 17. Circuit breaker trip system shall be an electronic trip unit. 18. All trip units shall be removable to allow for field upgrades. 19. Trip Units shall incorporate "True RMS Sensing", and have LED long-time pickup indications. 20. Trip unit functions shall consist of adjustable long-time pickup and delay, optional short-time pickup and delay, instantaneous and ground-fault pickup and delay. 21. Adjustable long-time pickup (tr) and delay shall be available in an adjustable rating plug that is UL Listed as field-replaceable. Adjustable rating plug shall allow for nine long-time pickup settings from 0.4 to 1 times the sensor plug (In). Other adjustable rating plugs shall be available for more precise settings to match the application. Long-time delay settings shall be in nine bands from 0.5–24 seconds at six times Ir. 22. Short-time pickup shall allow for nine settings from 1.5 to 10 times Ir. Short-time delay shall be in nine bands from 0.1–0.4 I 2/ t ON and 0–0.4 I 2/ t OFF. 23. Instantaneous settings on the trip units with LSI protection shall be available in nine bands from 2 to 15 times In. The instantaneous setting shall also have an OFF setting when short-time pick-up is provided. 24. All trip units shall have the capability for the adjustments to be set and read locally by rotating a switch.		H. Busway shall be of the same manufacturer as the main switchboard where connected to switchboard. Busway not connected to switchboard shall be ABB – General Electric, Square D, Siemens, or Eaton. 2.6 SINGLE PHASE PROTECTION A. Provide Taylor Electronics Model #PND-3, 6, 9, 12 ADJ-REM LED's, or equal, single phase relay behind hinged panel in switchboard. Provide green and amber LED's on a plug in cable for mounting on face of switchboard. Provide snap on lenses and labels identifying the green LED as 'SYSTEM NORMAL' and the amber LED as 'SINGLE PHASE CONDITION'. B. Provide shunt trip coils on all main devices, operated by the phase failure relay. C. Provide capacitive trip unit to guarantee relay and shunt trip operation during a single phase occurrence. PART 3 – EXECUTION 3.1 INSTALLATION A. Provide a typewritten directory under plastic for all panelboards with apertures marked in pencil. Circuit identification shall include sufficient detail to allow each circuit to be distinguished from all others. Include specific tenant suite numbers in multi-tenant buildings in the circuit description. Provide		2.1 LIGHTING FIXTURES A. Each lighting fixture shall be as specified in the Lighting Fixture Schedule corresponding with its fixture type indication (letter). B. Most lighting outlets are lettered or groups of outlets are indicated by a letter. C. Each lighting fixture shall have a manufacturer's label affixed and shall comply with the requirements of all authorities having jurisdiction. D. The lighting fixtures that are indicated by the letters shall be as indicated on the Lighting Fixture Schedule. 2.2 LAMPS A. The type lamps shall be as specified for each lighting fixture in the lighting fixture schedule. B. The lamp catalog number is the catalog number is generally for Sylvania Lighting and is given as a standard of the quality and performance required. Equal lamps by General Electric or Philips will be acceptable. When a lamp manufacturer's name is used along with the catalog number in the lighting fixture schedule, it is considered unequalled by any other lamp and shall not be substituted for. The lamp performance with energy conserving ballasts furnished under this Section shall be certified by a nationally recognized independent testing laboratory. C. Fluorescent lamps shall be as specified in the Lighting Fixture Schedule. D. Incandescent lamps shall be as specified in Lighting Fixture Schedule. E. All incandescent lamps, except quartz tubes, shall be rated for 130 volt operation. F. High Intensity Discharge (HID) lamps shall be as specified in the Lighting Fixture Schedule. 2.3 BALLASTS A. Fluorescent ballast shall be electronic type manufactured by Motorola, MagneTek or Advance. B. Ballast shall operate lamps at a frequency or 25 KHz or higher with less than 2% lamp flicker. C. Ballast shall operate at an input voltage of 108 – 132 Vac (120V line) or 249 – 305 Vac (277V line) at an input frequency of 60 Hz. Light output shall remain constant for line voltage fluctuation of + 5%. D. Ballast shall comply with EMI and RFI limits set by the FCC (CFR 47 part 18) for non-residential applications and not interfere with normal electrical equipment. E. Ballast shall withstand transients as specified by ANSI C.62.41 for location category A3 in the normal mode and location category A1 in the common mode. F. Ballast shall meet applicable ANSI standards. G. Ballast shall have a minimum power factor of 0.99. H. Ballast shall not be potted or weigh more than 1.3 pounds. I. Ballast shall have less than 10% Total Harmonic Distortion. J. Ballast shall have less than 6% Third Harmonic Distortion. K. Ballast height shall be less than or equal to 1.5 inches. L. Ballast shall have a poke-in wiretrap connector. M. Ballast shall meet sound rating "A". N. Ballast must be Underwriters Laboratories (UL) listed Class P, Type 1 Outdoor.		2.6 LIGHT FIXTURE TRIM A. Each recessed lighting fixture shall have a trim to match the type of ceiling (plaster, exposed grid, concealed spline, exposed panel, etc.) in which it is being installed, regardless of catalog number given. Coordinate with the Architect's reflected ceiling plan to provide the right trim for the type of ceiling the fixture is to be installed in. B. Each lighting fixture recessed in a plastered ceiling of any type shall have a plaster frame. 2.7 RECESSED INCANDESCENT FIXTURES A. All recessed incandescent fixtures shall comply with Article 410-65, C of the N.E.C. 2.8 FLUORESCENT FIXTURES A. All indoor fluorescent fixtures utilizing double ended lamps or that are supplied from multi-wire branch circuits, shall have a disconnecting means that complies with Article 410-73, G of the N.E.C. PART 3 – EXECUTION 3.1 SUPPORT OF LIGHTING FIXTURES A. All lighting shall be supported from the building structure. The fixtures shall be supported in a manner that will insure the fixture weight being equally distributed from each support and the fixture remaining in a level position. B. Fluorescent fixtures installed recessed in a suspended ceiling system shall be supported from the building structure with four (4) 12 gauge wires on each corner of the fixture. In addition, the fixture shall be clipped to members of the ceiling suspension system. C. Fluorescent fixtures installed in or on any ceiling other than a suspended ceiling system specifically mentioned above shall be supported with concealed steel rods. Rods shall be 1/4" diameter minimum and shall be located where recommended by the fixture manufacturer. Provide a minimum of two (2) supports for each 4' or 8' fixture chassis. Supports shall be maximum of 48" centers. For incandescent fixtures, steel hanging wire may be used by attaching the wire to the fixture mounting frame. D. Pendant mounted incandescent fixtures shall be stem supported by a fixture stud mounted in the outlet box. Suspended fluorescent fixtures shall have mounting stems located as per the manufacturer's recommendations, but in no case shall have less than two (2) stems per chassis. 3.2 AIMING OF ADJUSTABLE LIGHT FIXTURES A. All fixtures with lamp position, tilt, shutters, rotation, or other types of adjustments during the final inspection. Fixtures serving areas where day lighting is predominant will be adjusted after sunset. 3.3 LIGHTING FIXTURES IN MILLWORK A. Special attention shall be given to lighting fixtures indicated to be mounted within, under, on or otherwise incorporated into millwork or cabinetry. B. Refer to the Architectural drawings and details for specific dimensions. This coordination shall occur prior to ordering fixtures to assure fixtures will fit the space limitations of the millwork. C. This requirement is intended to preclude incurring additions to the Contract due to fixtures being too small or too large for the space. 3.4 FINAL PREPARATION A. All plastic covers shall be removed from fluorescent fixtures. B. Clean all lens and reflectors from debris, fingerprints, dust, etc.																																						
C																																													
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DRAWING NO.
CFD-XXX-E-004-XXXXX

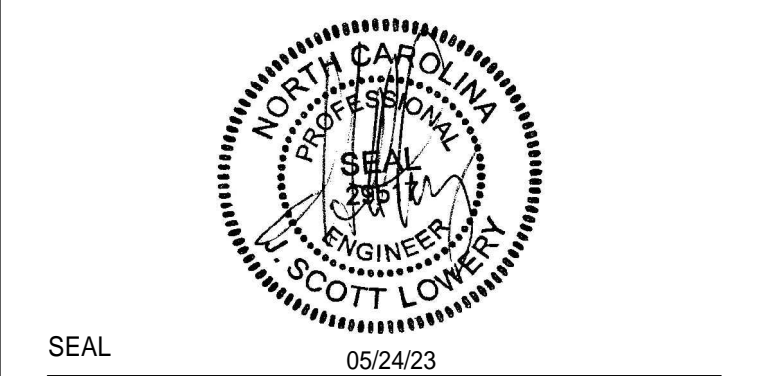


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Safety Expectations:

 Reduce Risk
 Remove Exposures to Hazards
 Reinforce Safe Behavior



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 BWA JOB # 2022-0632



DUNN OPERATIONS CENTER

1269 JONESBORO RD.
HARNETT COUNTY, NC 28334

OPERATIONS BUILDING

REVISION										ISSUED FOR CONSTRUCTION
DATE										05-24-23
DRN BY										
MARK										

PROJECT NO:
DRAWING NUMBER
CFD-XXX-E-004-XXXXX

ELECTRONIC FILE NAME:
DRAWN BY: JFE DATE:
CHK'D BY: JSL DATE:
E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:
SPECIFICATIONS - ELECTRICAL

SHEET NO.
E-004

1	2	3	4	5	6	7	8	9
H	PART 1 – GENERAL	3. Line to Line: [1800 V for 480Y/277 V] [1200 V for 208Y/120 V]	lead length. Do not bond neutral and ground.	END OF SECTION	END OF SECTION	END OF SECTION	END OF SECTION	END OF SECTION
	1.1 DESCRIPTION	F. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits shall not exceed the following:	E. Use crimped connectors and splices only. Wire nuts are not acceptable.	E. Use crimped connectors and splices only. Wire nuts are not acceptable.	SECTION 28 72 10	SECTION 28 72 10	SECTION 28 72 10	SECTION 28 72 10
G	A. All work in this Section shall comply with the provisions of Section 260100.	1. Line to Neutral: 700V 2. Line to Ground: 700 V 3. Line to Line: 1200V	3.2 STARTUP SERVICES	3.2 STARTUP SERVICES	LIFE SAFETY SYSTEMS	LIFE SAFETY SYSTEMS	LIFE SAFETY SYSTEMS	LIFE SAFETY SYSTEMS
	1.2 DEFINITIONS	G. Unit shall have a short-circuit current rating of 200 kA.	A. Complete startup checks according to manufacturer's written instructions.	A. Complete startup checks according to manufacturer's written instructions.	PART 1 – GENERAL	PART 1 – GENERAL	PART 1 – GENERAL	PART 1 – GENERAL
F	A. I/nominal: Nominal discharge current	H. Unit shall have an I/nominal rating of 20 kA and shall comply with all UL96A requirements for ac surge protection.	B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is over.	B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests, and reconnect them immediately after the testing is over.	1.1 DESCRIPTION	1.1 DESCRIPTION	1.1 DESCRIPTION	1.1 DESCRIPTION
	B. MCOV: Maximum continuous operating voltage	I. Unit shall survive a minimum of 14,000 repetitive category C3 (20kV/10kA) surges with no more than 10% deterioration. Calculated repetitive surge values will not be accepted. Manufacturer shall provide repetitive surge test report.	C. Energize SPDs after power system has been energized, stabilized, and tested.	C. Energize SPDs after power system has been energized, stabilized, and tested.	A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, and coordinated system.	A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, and coordinated system.	A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, and coordinated system.	A. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, and coordinated system.
E	C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies	J. Unit shall be able to withstand a minimum of 100 temporary over voltage events, defined as: 30A available fault current, 30 cycles duration, 10 second interval between events.	D. Train owner's maintenance personnel to operate and maintain SPDs.	D. Train owner's maintenance personnel to operate and maintain SPDs.	B. The fire alarm system shall comply with requirements of the NFPA Standard 72 for Protected Premises Signaling Systems and all local codes and regulations. The system shall be electrically supervised and monitor the integrity of all conductors. The manufacturer shall confirm all codes have been met and all necessary devices provided prior to submitting price.	B. The fire alarm system shall comply with requirements of the NFPA Standard 72 for Protected Premises Signaling Systems and all local codes and regulations. The system shall be electrically supervised and monitor the integrity of all conductors. The manufacturer shall confirm all codes have been met and all necessary devices provided prior to submitting price.	B. The fire alarm system shall comply with requirements of the NFPA Standard 72 for Protected Premises Signaling Systems and all local codes and regulations. The system shall be electrically supervised and monitor the integrity of all conductors. The manufacturer shall confirm all codes have been met and all necessary devices provided prior to submitting price.	B. The fire alarm system shall comply with requirements of the NFPA Standard 72 for Protected Premises Signaling Systems and all local codes and regulations. The system shall be electrically supervised and monitor the integrity of all conductors. The manufacturer shall confirm all codes have been met and all necessary devices provided prior to submitting price.
	D. MOV: Metal-oxide varistor; an electronic component with a significant non-ohmic current-voltage characteristic	K. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 23 unless specifically shown on the electrical drawings.	E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 23 unless specifically shown on the electrical drawings.	E. All control wiring required for automatic starting and stopping of motors shall be provided under Division 23 unless specifically shown on the electrical drawings.	C. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto the Signaling Line Circuits.	C. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto the Signaling Line Circuits.	C. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded onto the Signaling Line Circuits.
D	E. OCPD: Overcurrent protective device	L. The basis of design for this unit is the Select SL3 series.	END OF SECTION	END OF SECTION	D. The system shall be an active/interrogative type system where each transponder is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel/node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.	D. The system shall be an active/interrogative type system where each transponder is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel/node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.	D. The system shall be an active/interrogative type system where each transponder is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel/node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.	D. The system shall be an active/interrogative type system where each transponder is repetitively scanned, causing a signal to be transmitted to the local fire alarm control panel/node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.
	F. SCCR: Short-circuit current rating	M. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	SECTION 26 92 00	SECTION 26 92 00	E. The system shall be arranged such that not less than 20 percent additional transponders may be inserted into any network communication loop.	E. The system shall be arranged such that not less than 20 percent additional transponders may be inserted into any network communication loop.	E. The system shall be arranged such that not less than 20 percent additional transponders may be inserted into any network communication loop.	E. The system shall be arranged such that not less than 20 percent additional transponders may be inserted into any network communication loop.
C	G. SPD: Surge protective device	N. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	MOTOR CONTROLS AND WIRING	MOTOR CONTROLS AND WIRING	F. The FACP and peripheral devices shall be manufactured by Notifier, Edwards, or Siemens.	F. The FACP and peripheral devices shall be manufactured by Notifier, Edwards, or Siemens.	F. The FACP and peripheral devices shall be manufactured by Notifier, Edwards, or Siemens.	F. The FACP and peripheral devices shall be manufactured by Notifier, Edwards, or Siemens.
	H. VPR: Voltage protection rating	O. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	PART 1 – GENERAL	PART 1 – GENERAL	G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site. To guide the final checkout and to ensure the systems integrity, the submitting company shall employ NICET Level IV minimum managers and engineers. Proof of NICET level training shall be included as part of submittal package and kept on site with personnel.	G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site. To guide the final checkout and to ensure the systems integrity, the submitting company shall employ NICET Level IV minimum managers and engineers. Proof of NICET level training shall be included as part of submittal package and kept on site with personnel.	G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site. To guide the final checkout and to ensure the systems integrity, the submitting company shall employ NICET Level IV minimum managers and engineers. Proof of NICET level training shall be included as part of submittal package and kept on site with personnel.	G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site. To guide the final checkout and to ensure the systems integrity, the submitting company shall employ NICET Level IV minimum managers and engineers. Proof of NICET level training shall be included as part of submittal package and kept on site with personnel.
B	1.3 CODES AND REGULATIONS	P. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1.1 SCOPE	1.1 SCOPE	H. The installing company shall be UL listed for fire alarm installations. UL certificate shall accompany submittal package. The certification listing category shall be UUUJ and shall be indicated in the project submittal.	H. The installing company shall be UL listed for fire alarm installations. UL certificate shall accompany submittal package. The certification listing category shall be UUUJ and shall be indicated in the project submittal.	H. The installing company shall be UL listed for fire alarm installations. UL certificate shall accompany submittal package. The certification listing category shall be UUUJ and shall be indicated in the project submittal.	H. The installing company shall be UL listed for fire alarm installations. UL certificate shall accompany submittal package. The certification listing category shall be UUUJ and shall be indicated in the project submittal.
	A. The following codes and regulations shall govern the design of the surge protection device:	Q. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	A. All work specified in this Section shall comply with the provisions of Section 26 01 00.	A. All work specified in this Section shall comply with the provisions of Section 26 01 00.	I. The Contractor shall make arrangements and pay all fees in connection with the testing of the Life Safety System. All system devices shall be tested for their correct operation, except non-restorable type heat detectors which shall be sample tested. All tests carried out shall meet the requirements of the local authority having jurisdiction.	I. The Contractor shall make arrangements and pay all fees in connection with the testing of the Life Safety System. All system devices shall be tested for their correct operation, except non-restorable type heat detectors which shall be sample tested. All tests carried out shall meet the requirements of the local authority having jurisdiction.	I. The Contractor shall make arrangements and pay all fees in connection with the testing of the Life Safety System. All system devices shall be tested for their correct operation, except non-restorable type heat detectors which shall be sample tested. All tests carried out shall meet the requirements of the local authority having jurisdiction.	I. The Contractor shall make arrangements and pay all fees in connection with the testing of the Life Safety System. All system devices shall be tested for their correct operation, except non-restorable type heat detectors which shall be sample tested. All tests carried out shall meet the requirements of the local authority having jurisdiction.
A	1. Underwriters Laboratories, Inc. Standard No. 1449 – Third Edition	R. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	A. Unit shall be listed as a Type I or Type II surge protection device per UL 1449, 3rd/ edition.	A. Unit shall be listed as a Type I or Type II surge protection device per UL 1449, 3rd/ edition.	J. The system shall have proper listing and/or approval from the following nationally recognized agencies:	J. The system shall have proper listing and/or approval from the following nationally recognized agencies:	J. The system shall have proper listing and/or approval from the following nationally recognized agencies:	J. The system shall have proper listing and/or approval from the following nationally recognized agencies:
	2. Underwriters Laboratories, Inc. Standard No. 1283	S. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	B. Unit shall have the following features:	B. Unit shall have the following features:	1. Factory Mutual Systems 2. Underwriters Laboratories	1. Factory Mutual Systems 2. Underwriters Laboratories	1. Factory Mutual Systems 2. Underwriters Laboratories	1. Factory Mutual Systems 2. Underwriters Laboratories
Z	3. National Electrical Manufacturers Association (NEMA LS1)	T. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. It shall consist of parallel connections only. Series elements shall not be used.	1. It shall consist of parallel connections only. Series elements shall not be used.	1.2 SCOPE	1.2 SCOPE	1.2 SCOPE	1.2 SCOPE
	4. IEEE 587 A&B Waveforms, IEEE C62.41	U. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	2. The primary suppression path shall not be to ground.	2. The primary suppression path shall not be to ground.	A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.	A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.	A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.	A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.
Y	5. National Electrical Code – NFPA 70	V. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	3. The unit shall not short or crowbar the power flow resulting in an interruption to the load.	3. The unit shall not short or crowbar the power flow resulting in an interruption to the load.	B. Basic Performance	B. Basic Performance	B. Basic Performance	B. Basic Performance
	a. Article 110.9 – Interrupting Capacity	W. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	4. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	4. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	1. Each SLC loop shall be wired NFPA 72 Class B, Survivability Level 1.	1. Each SLC loop shall be wired NFPA 72 Class B, Survivability Level 1.	1. Each SLC loop shall be wired NFPA 72 Class B, Survivability Level 1.	1. Each SLC loop shall be wired NFPA 72 Class B, Survivability Level 1.
X	b. Article 240.21 – Equipment complying with tap conductor rules	X. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	5. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	5. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	2. Initiation Device Circuits (IDC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit.	2. Initiation Device Circuits (IDC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit.	2. Initiation Device Circuits (IDC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit.	2. Initiation Device Circuits (IDC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit.
	c. [Only applies to NEC 2014]Article 700.8 – Required SPD for Emergency Systems	Y. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	6. Form-C contacts, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or an opening of any current-limiting device. [Coordinate connection requirements with building power monitoring and control system.]	6. Form-C contacts, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or an opening of any current-limiting device. [Coordinate connection requirements with building power monitoring and control system.]	3. Notification Appliance Circuits (NAC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit or a panel circuit.	3. Notification Appliance Circuits (NAC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit or a panel circuit.	3. Notification Appliance Circuits (NAC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit or a panel circuit.	3. Notification Appliance Circuits (NAC) shall be wired NFPA Class B, Survivability Level 1 as part of an addressable device connected by the SLC circuit or a panel circuit.
W	1.4 SUBMITTALS	Z. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	7. Compression lugs that can accept up to #2 AWG wire.	7. Compression lugs that can accept up to #2 AWG wire.	4. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, which ever is greater.	4. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, which ever is greater.	4. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, which ever is greater.	4. NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone, which ever is greater.
	A. For each different model of device to be used, submit the following:	AA. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	8. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to the electrical system. Cabling system shall utilize a minimum wire size of #6 AWG.	8. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to the electrical system. Cabling system shall utilize a minimum wire size of #6 AWG.	5. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.	5. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.	5. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.	5. NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
V	1. Dimensional drawings and installation instructions for the specified parallel connected unit.	AB. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	8. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to the electrical system. Cabling system shall utilize a minimum wire size of #6 AWG.	8. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to the electrical system. Cabling system shall utilize a minimum wire size of #6 AWG.	C. Basic System Functional Operation	C. Basic System Functional Operation	C. Basic System Functional Operation	C. Basic System Functional Operation
	2. The rated capacities, operational characteristics, electrical characteristics, and all furnished accessories and options.	AC. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	9. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	9. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	1. As part of the fire alarm; when a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:	1. As part of the fire alarm; when a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:	1. As part of the fire alarm; when a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:	1. As part of the fire alarm; when a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
U	3. Copy of the UL Category Code certification, listing the tested values for VPRs, I/nominal ratings, MCOVs, type designations, any OCPD requirements, model numbers, system voltage, and modes of protection.	AD. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	10. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	10. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	a. FACP will sound and display the alarm condition showing the device address, location, zone information, time/date, and device type.	a. FACP will sound and display the alarm condition showing the device address, location, zone information, time/date, and device type.	a. FACP will sound and display the alarm condition showing the device address, location, zone information, time/date, and device type.	a. FACP will sound and display the alarm condition showing the device address, location, zone information, time/date, and device type.
	1.5 WARRANTY	AE. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	11. No audible noise shall be generated.	11. No audible noise shall be generated.	b. The remote annunciator will sound and display the same information as shown on the FACP display unit.	b. The remote annunciator will sound and display the same information as shown on the FACP display unit.	b. The remote annunciator will sound and display the same information as shown on the FACP display unit.	b. The remote annunciator will sound and display the same information as shown on the FACP display unit.
T	A. Manufacturer's Warranty: Manufacturer agrees to replace or replace SPDs that fail in materials or workmanship within specified warranty period of each Type of device.	AF. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	12. No appreciable magnetic fields shall be generated. All units shall be capable of use in any location (in a computer room) without danger to disc units, disc packs or tapes.	12. No appreciable magnetic fields shall be generated. All units shall be capable of use in any location (in a computer room) without danger to disc units, disc packs or tapes.	c. Via system programming, the horn/bell outputs for all zones will activate and sound in temporal 3-3 pattern in synchronized fashion until silenced from FACP panel.	c. Via system programming, the horn/bell outputs for all zones will activate and sound in temporal 3-3 pattern in synchronized fashion until silenced from FACP panel.	c. Via system programming, the horn/bell outputs for all zones will activate and sound in temporal 3-3 pattern in synchronized fashion until silenced from FACP panel.	c. Via system programming, the horn/bell outputs for all zones will activate and sound in temporal 3-3 pattern in synchronized fashion until silenced from FACP panel.
	1. Warranty period for all Type 1 SPDs shall be twenty (20) years.	AG. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	13. Operating Conditions:	13. Operating Conditions:	d. All strobes on floors with activated horn/bell outputs shall flash in a synchronized pattern per floor until silenced from the FACP panel.	d. All strobes on floors with activated horn/bell outputs shall flash in a synchronized pattern per floor until silenced from the FACP panel.	d. All strobes on floors with activated horn/bell outputs shall flash in a synchronized pattern per floor until silenced from the FACP panel.	d. All strobes on floors with activated horn/bell outputs shall flash in a synchronized pattern per floor until silenced from the FACP panel.
S	2. Warranty period for all Type 2 SPDs shall be fifteen (15) years.	AH. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. -40 – 185 degrees F	1. -40 – 185 degrees F	e. Automatic functions including, but not limited to: elevator(s) recall, smoke evacuation, smoke door release and supply/return fan shutdown shall be activated via system programming as directed by codes and/or drawings.	e. Automatic functions including, but not limited to: elevator(s) recall, smoke evacuation, smoke door release and supply/return fan shutdown shall be activated via system programming as directed by codes and/or drawings.	e. Automatic functions including, but not limited to: elevator(s) recall, smoke evacuation, smoke door release and supply/return fan shutdown shall be activated via system programming as directed by codes and/or drawings.	e. Automatic functions including, but not limited to: elevator(s) recall, smoke evacuation, smoke door release and supply/return fan shutdown shall be activated via system programming as directed by codes and/or drawings.
	1.6 MANUFACTURERS	AI. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	2. 5% – 95% humidity non-condensing	2. 5% – 95% humidity non-condensing	f. Release all magnetically held smoke doors.	f. Release all magnetically held smoke doors.	f. Release all magnetically held smoke doors.	f. Release all magnetically held smoke doors.
R	A. The surge protection system shall be manufactured by Current Technology.	AJ. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	2.5 ENVIRONMENTAL REQUIREMENTS	2.5 ENVIRONMENTAL REQUIREMENTS	g. Provide signals to the mechanical controls including smoke dampers to shut down or reroute air-handling systems to prevent the recirculation of smoke.	g. Provide signals to the mechanical controls including smoke dampers to shut down or reroute air-handling systems to prevent the recirculation of smoke.	g. Provide signals to the mechanical controls including smoke dampers to shut down or reroute air-handling systems to prevent the recirculation of smoke.	g. Provide signals to the mechanical controls including smoke dampers to shut down or reroute air-handling systems to prevent the recirculation of smoke.
	B. The specific series of surge protection device shall be as defined by the application or as defined on the drawing.	AK. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	A. The unit shall not add appreciably to air conditioning load. Heat load shall not exceed 0.2 kVA (0.682 BTU/hr.).	A. The unit shall not add appreciably to air conditioning load. Heat load shall not exceed 0.2 kVA (0.682 BTU/hr.).	h. Provide a DACT (Digital Alarm Communicator Transmitter) and a signal via DACT for connection to a central station or local municipal fire department (connection and leased line, if required, shall be provided by building owner).	h. Provide a DACT (Digital Alarm Communicator Transmitter) and a signal via DACT for connection to a central station or local municipal fire department (connection and leased line, if required, shall be provided by building owner).	h. Provide a DACT (Digital Alarm Communicator Transmitter) and a signal via DACT for connection to a central station or local municipal fire department (connection and leased line, if required, shall be provided by building owner).	h. Provide a DACT (Digital Alarm Communicator Transmitter) and a signal via DACT for connection to a central station or local municipal fire department (connection and leased line, if required, shall be provided by building owner).
Q	PART 2 – PRODUCTS	AL. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	C. No audible noise shall be generated.	C. No audible noise shall be generated.	i. Initiate a preprogrammed timing sequence.	i. Initiate a preprogrammed timing sequence.	i. Initiate a preprogrammed timing sequence.	i. Initiate a preprogrammed timing sequence.
	2.1 GENERAL	AM. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	D. Provide a control terminal strip in the Motor Control Center. The control wiring from these terminal strips, external to the Motor Control Center, to the respective control device, shall be included in Division 23.	D. Provide a control terminal strip in the Motor Control Center. The control wiring from these terminal strips, external to the Motor Control Center, to the respective control device, shall be included in Division 23.	j. Additionally, actuation of a lobby elevator smoke detector shall cause immediate non-stop return of all automatic elevators served by that lobby to the primary discharge level; except that, when the alarm has been initiated on the primary discharge level, the elevators, shall be returned to the designated alternate discharge level per the requirements of ANSI ASME A17.1.	j. Additionally, actuation of a lobby elevator smoke detector shall cause immediate non-stop return of all automatic elevators served by that lobby to the primary discharge level; except that, when the alarm has been initiated on the primary discharge level, the elevators, shall be returned to the designated alternate discharge level per the requirements of ANSI ASME A17.1.	j. Additionally, actuation of a lobby elevator smoke detector shall cause immediate non-stop return of all automatic elevators served by that lobby to the primary discharge level; except that, when the alarm has been initiated on the primary discharge level, the elevators, shall be returned to the designated alternate discharge level per the requirements of ANSI ASME A17.1.	j. Additionally, actuation of a lobby elevator smoke detector shall cause immediate non-stop return of all automatic elevators served by that lobby to the primary discharge level; except that, when the alarm has been initiated on the primary discharge level, the elevators, shall be returned to the designated alternate discharge level per the requirements of ANSI ASME A17.1.
P	A. All units shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.	AN. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	E. All circuit breakers, motor starters, push buttons and pilot lights shall be of the same manufacturer as the main switchboard.	E. All circuit breakers, motor starters, push buttons and pilot lights shall be of the same manufacturer as the main switchboard.	k. Additionally, actuation of any elevator equipment room or shaft smoke detector shall cause immediate non-stop return of all automatic elevators served by that equipment room or shaft, to the primary discharge level per the requirements of ANSI ASME A17.1. Provide all required signals from FACP to elevator controls for smoke detector in elevator machine room per the requirements of ANSI ASME A17.1	k. Additionally, actuation of any elevator equipment room or shaft smoke detector shall cause immediate non-stop return of all automatic elevators served by that equipment room or shaft, to the primary discharge level per the requirements of ANSI ASME A17.1. Provide all required signals from FACP to elevator controls for smoke detector in elevator machine room per the requirements of ANSI ASME A17.1	k. Additionally, actuation of any elevator equipment room or shaft smoke detector shall cause immediate non-stop return of all automatic elevators served by that equipment room or shaft, to the primary discharge level per the requirements of ANSI ASME A17.1. Provide all required signals from FACP to elevator controls for smoke detector in elevator machine room per the requirements of ANSI ASME A17.1	k. Additionally, actuation of any elevator equipment room or shaft smoke detector shall cause immediate non-stop return of all automatic elevators served by that equipment room or shaft, to the primary discharge level per the requirements of ANSI ASME A17.1. Provide all required signals from FACP to elevator controls for smoke detector in elevator machine room per the requirements of ANSI ASME A17.1
	B. The MCOV of the SPD shall be the nominal voltage of the system to which it is connected. The MCOV of the device shall be a tested value per section 37.7.3 of UL 1449.	AO. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V]	F. Each starter shall have a laminated nameplate engraved to indicate Division 23 unit number, function and Motor Control Center circuit number.	F. Each starter shall have a laminated nameplate engraved to indicate Division 23 unit number, function and Motor Control Center circuit number.	l. Additionally, actuation of any smoke detector located in the air handling units and/or equipment rooms shall activate signals to the mechanical controls indicating the floor of occurrence.	l. Additionally, actuation of any smoke detector located in the air handling units and/or equipment rooms shall activate signals to the mechanical controls indicating the floor of occurrence.	l. Additionally, actuation of any smoke detector located in the air handling units and/or equipment rooms shall activate signals to the mechanical controls indicating the floor of occurrence.
O	2.2 SERVICE ENTRANCE [AND TRANSFER SWITCH] SURGE PROTECTION	AP. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	G. The Motor Control Center shall be General Electric, Square D, Siemens, or Eaton.	G. The Motor Control Center shall be General Electric, Square D, Siemens, or Eaton.	m. It shall be possible to silence the alarm signals by operating the signal silence switch. However, the activation of another zone shall repeat the entire alarm process, thus causing the signals to resound.	m. It shall be possible to silence the alarm signals by operating the signal silence switch. However, the activation of another zone shall repeat the entire alarm process, thus causing the signals to resound.	m. It shall be possible to silence the alarm signals by operating the signal silence switch. However, the activation of another zone shall repeat the entire alarm process, thus causing the signals to resound.	m. It shall be possible to silence the alarm signals by operating the signal silence switch. However, the activation of another zone shall repeat the entire alarm process, thus causing the signals to resound.
	A. Unit shall be listed as a Type I surge protection device per UL 1449, 3rd/ edition.	AQ. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V]	PART 3 – EXECUTION	PART 3 – EXECUTION	n. Silencing the alarm shall cause all speakers to silence. Firelights will continue to flash.	n. Silencing the alarm shall cause all speakers to silence. Firelights will continue to flash.	n. Silencing the alarm shall cause all speakers to silence. Firelights will continue to flash.
N	B. Unit shall have the following features:	AR. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. It shall consist of parallel connections only. Series elements shall not be used.	1. It shall consist of parallel connections only. Series elements shall not be used.	o. Fire pump (if applicable) normal power availability, fire pump phase reversal and fire pump run status shall be monitored. Loss of normal power, phase reversal shall annunciate as supervisory alarms and pump running shall annunciate as an alarm.	o. Fire pump (if applicable) normal power availability, fire pump phase reversal and fire pump run status shall be monitored. Loss of normal power, phase reversal shall annunciate as supervisory alarms and pump running shall annunciate as an alarm.	o. Fire pump (if applicable) normal power availability, fire pump phase reversal and fire pump run status shall be monitored. Loss of normal power, phase reversal shall annunciate as supervisory alarms and pump running shall annunciate as an alarm.	o. Fire pump (if applicable) normal power availability, fire pump phase reversal and fire pump run status shall be monitored. Loss of normal power, phase reversal shall annunciate as supervisory alarms and pump running shall annunciate as an alarm.
	1. Integral disconnect switch – unit shall not require disconnection of power to customer equipment for testing and/or maintenance.	AS. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	1. Line to Neutral: [1200 V for 480Y/277 V] [700 V for 208Y/120 V]	2. The primary suppression path shall not be to ground.	2. The primary suppression path shall not be to ground.	p. Provide a signal to activate the elevator shunt trip breaker upon activation of the heat detector(s) in the elevator shaft or elevator machine rooms.	p. Provide a signal to activate the elevator shunt trip breaker upon activation of the heat detector(s) in the elevator shaft or elevator machine rooms.	p. Provide a signal to activate the elevator shunt trip breaker upon activation of the heat detector(s) in the elevator shaft or elevator machine rooms.
M	2. Integral disconnect switch – unit shall not require disconnection of power to customer equipment for testing and/or maintenance.	AT. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	3. The unit shall not short or crowbar the power flow resulting in an interruption to the load.	3. The unit shall not short or crowbar the power flow resulting in an interruption to the load.				
	3. The primary suppression path shall not be to ground.	AV. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	4. The unit shall not short or crowbar the power flow resulting in an interruption to the load.	4. The unit shall not short or crowbar the power flow resulting in an interruption to the load.				
L	4. The unit shall not short or crowbar the power flow resulting in an interruption to the load.	AW. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	5. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	5. Internal thermal protection that disconnects the unit before damaging internal suppressor components.				
	5. Internal thermal protection that disconnects the unit before damaging internal suppressor components.	AX. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	6. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	6. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.				
K	6. Indicator LED light display for power and protection status. Lights indicating only internal component failure while continuing to allow the main power flow are NOT acceptable.	AY. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	7. Form-C contacts, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or an opening of any current-limiting device. [Coordinate connection requirements with building power monitoring and control system.]	7. Form-C contacts, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or an opening of any current-limiting device. [Coordinate connection requirements with building power monitoring and control system.]				
	7. Form-C contacts, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or an opening of any current-limiting device. [Coordinate connection requirements with building power monitoring and control system.]	AZ. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	8. Compression lugs that can accept up to #2 AWG wire.	8. Compression lugs that can accept up to #2 AWG wire.				
J	8. Compression lugs that can accept up to #2 AWG wire.	BA. Unit shall be able to prevent common temporary over voltages from damaging the MOVs. Voltages shall be limited per the following:	9. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to the electrical system. Cabling system shall utilize a minimum wire size of #6 AWG.	9. A low impedance cabling system shall be provided with unit, thereby improving the connection of the SPD to				

2. General Operation

a. Power failures, opens, grounds or any disarrangement of the system wiring or components shall be indicated by a visual and audible trouble signal. The audible trouble signal may be silenced, however, the trouble LED shall remain lit until the system has been returned to normal operating condition. 1.3 SUBMITTALS

H A. General

1. Copies of all submittals shall be submitted to the Architect/Engineer for review prior to acceptance of system. 2. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.

3. The authority having jurisdiction shall be notified prior to installation of equipment and wiring. Complete information regarding the system including specifications, wiring diagrams, battery and power supply calculations, floor plans and graphics shall be submitted for approval.

4. If submittals, upon review by the Owner and/or the Owners Representative, are found not to conform with the performance, type and quality of products as well as all other requirements of these specifications; the Contractor shall be required to resubmit. The Contractor shall be responsible for the Owner's extra expenses for subsequent review(s) of rejected submittals. Such extra fees shall be deducted from payments by the Owner to the Contractor. Approval of the submittals by the Owner shall, in no case, relieve the Contractor of the responsibility to meet the requirements of this specification.

G B. Shop Drawings

1. Drawings shall include the following minimum requirements for submittal:

- a. Point-to-point wiring/conduit layout for all devices on 1/8" scale plans.
b. Device placement showing all addresses and device ID.
c. All panel and equipment terminations.
d. All circuit voltage drop and current calculations spread sheets.
e. All battery calculation spreadsheets.
f. Legend reflecting device description, manufacturer, model number, and back-box requirement.
g. Wiring legend reflecting wire function, type, and recommended manufacturer's part number.
h. Full sequence of operations.
i. Power supply and amplifier calculations.

F 2. Specification data sheets on each individual system component.

C. Data Sheets

- 1. Submit simultaneously with the shop drawings, complete manufacturer's technical data sheets showing product description, listings, and specs.
2. Copies of NICET II and IV certifications.
3. Copy of company UL listing certificate.

E 1.4 APPLICABLE STANDARDS AND SPECIFICATIONS:

A. The specifications and standards listed below form a part of this specification. The system shall comply with the latest standards. 1. National Fire Protection Association (NFPA), 2000 Edition - USA:

- No. 13 Sprinkler Systems
No. 13A Halon 1301 Extinguishing Systems
No. 17 Dry Chemical Extinguishing Systems
No. 17A Wet Chemical Extinguishing Systems
Clean Agent Extinguishing Systems
No. 70 National Electrical Code
Specifically Article 760
No. 72 National Fire Alarm Code
No. 101 Life Safety Code

D 2. International Building Code

3. American National Standard A17.1-1980

4. Underwriter's Laboratories Fire Resistance Directory

5. Local and State Building Codes

6. ADA Public Law 101-336

C 7. All requirements of the Authority Having Jurisdiction (AHJ)

1.5 APPROVALS

A. The system shall have proper listing, approval and labeling from the following nationally recognized agencies:

- FM Factory Mutual Systems
UL Underwriters Laboratories

1.6 SYSTEM FEATURES

A. The system shall include the following features as a minimum:

- 1. During an alarm condition, the LCD annunciator shall display the activated alarm until acknowledged. This shall allow determination of where the last alarm has taken place.
2. Ground fault detection in wiring on either plus or minus side.
3. Separate alarm and trouble shall be displayed on the LCD annunciator.

B 4. Resound feature.

5. Dead Front" design control panel with all LED alarm trouble and power on indicators and all switches located behind a locked tempered glass door.

6. Solid state construction.

7. All alarm initiating circuit wiring, signal circuit wiring, speaker circuit wiring shall be supervised.

8. Automatic transfer to standby batteries upon power failure.

9. Lightning and surge protection.

A 9. LIGHTNING AND SURGE PROTECTION

PART 2 - PRODUCTS

2.1 CONDUIT AND WIRE

A. All fire alarm wiring shall be installed in conduit. Conduit shall be installed as required by specification Section 26 10 00.

B. Wiring shall be in accordance with local, state and National codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system.

C. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes from the 120 volt normal power source or from a generator powered source if available.

E. All junction boxes and conduit utilized for fire alarm system cabling shall be painted red.

F. All circuit breakers serving the fire alarm system shall include red marking and a listed locking mechanism per NFPA 72.

2.2 MAIN FIRE ALARM CONTROL PANEL:

A. The FACP shall be completely microprocessor based.

B. System Capacity and General Operation:

1. Configure size of panel to operate number of SLC circuits in a fashion so that each circuit handles no greater than 70% load of capacity or a maximum of 5 floors per circuit.

2. The fire alarm control panel shall include a full-featured operator interface and backlit 80-character Liquid Crystal Display (LCD).

3. The system shall be fully field programmable from the display panel. Panels requiring the use of external keyboards for programming and changes are not acceptable.

4. The FACP shall provide the minimum following features:

- a. Drift compensation to extend detector accuracy over life.
b. Detector sensitivity test, per NFPA 72, Chapter 7.
c. Maintenance alert, to warn of excessive smoke detector dirt or dust accumulation.
d. Multiple sensitivity levels for alarm, selected by detector.
e. System status reports to display and printer. Provide printer.
f. Alarm verification, with verification counters.
g. Cross zoning with the capability of counting two detectors in alarm.
h. Walk test.

i. UL-1076 security monitor points.

j. Control-by-time with holiday schedules.

k. Day/night automatic adjustment of detector sensitivity.

l. Device blink control for sleeping areas.

m. Releasing capability.

n. Pre-Alarm.

o. Selectable sensitivity levels, three minimum.

p. History Storage, with a minimum of 400 events.

q. Point Enable/Disable.

r. Point Read (status and level of obscuration).

s. Output point for connection to any building EMS.

C. Signaling Line Circuits (SLC)

1. Each SLC interface shall provide power to communicate with 99 intelligent detectors (ionization, photoelectric or thermal) and 99 intelligent modules (monitor or control).

2. Each SLC circuit shall not exceed 70%, load capacity or cover more than 5 floors.

D. Serial Interface

1. The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Electronic Data Processing (EDP) peripherals.

a. One serial port shall support a serial printer.

b. One serial port shall support a CRT/NRT device.

c. The system shall include an EIA-485 port for the serial, connection of annunciators and remote LCD displays.

E. Field Charging Power Supply (FCPS): The FCPS is a device designed for use as either a remote 24-volt power supply or used to power Notification Appliances.

1. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24-volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries. Provide batteries to support 60-hour standby with ten minutes of alarm indication at the end of this period. Battery charger shall be capable of recharging all batteries to seventy percent capacity in twelve hours.

2. The Field Charging Power Supply shall have four outputs (Survivability Level 1) and shall be available for connection to the Notification devices.

3. Provide 20-watt spare capacity in each electrical room on each floor for tenant audible circuits. Locate in a junction box clearly labeled "tenant fire alarm audible circuits".

4. Provide 1ea. Field Charging Power Supply (DC) per floor to allow for tenant build-out expansion of NAC devices. At no time shall there exceed 70% load capacity of any FCPS on any of the common levels. Provide power capacity as follows:

Table with 2 columns: Floor Size, Capacity. Row 1: <25,000 gross sq. ft., 6 amps DC. Row 2: 25,001 to 35,000 gross sq. ft., 10 amps DC. Row 3: 35,001 gross sq. ft. and greater-consult engineer

5. Locate audible (where required) and visual power supplies adjacent to one another and in a location within each room approved by the engineer.

6. Provide battery capacity and amplifier capacity in the main fire control panel for addition of tenant devices described above.

F. Provide and install ceiling mounted smoke detector within 5 horizontal feet of FACP.

2.3 SYSTEM COMPONENTS

A. Horns/Bells

1. All Horns/Bells shall be installed as shown on drawings and in accordance with NFPA 72 and local codes.

2. Provide photoelectric smoke detector heads with bases as required. Detectors shall be of the solid state photoelectric type utilizing a stable LED light source and a silicone photo diode as the receiving element to form a highly accurate means of smoke detection. Internal detector circuits shall be shielded against electrical interference and resistant to transients, noise and RF interference. Detector shall be low profile, the complete unit including base shall not exceed 1.875 inches in depth.

2. Horns in corridors and all public spaces shall produce a nominal sound output of 15 dBA above average ambient noise levels with a minimum sound output of 15 dBA.

3. Horns shall be UL-464 listed for fire evacuation and operate on 12 or 24 voltage in a temporal 3-3 pattern.

4. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

5. Speakers shall be bone white in color.

6. Provide a unit cost to add 2 speakers per 25,000 sq.ft. This unit cost shall be applied to additional speakers that may be required at the request of the Fire Marshal during field inspections.

B. Strobe Lights

1. All strobe lights shall meet the requirements of the ADA, UL Standard 1971.

2. Strobe intensity and flash rate shall meet the requirements of UL 1971, ADA and NFPA 72.

3. Combination horn/strobe devices shall meet all above requirements as well as horn/bell requirements listed herein.

4. Strobe unit shall mount to a four inch square electrical outlet box. The strobe light shall have a white lens with red "FIRE" imprinted on it. When the unit is combination speaker/strobe, the speaker portion shall comply with the requirements stated in A. above.

5. All strobes shall have selectable output intensities from 15 to 110 cd. The intensity selected shall meet NFPA 72 requirements for the layout shown on the drawings.

6. Strobe spacing shall be as follows:

- a. Strobes shall be spaced a maximum of 100' apart in corridors and within 15' of the end of every corridor to comply with the requirements of NFPA 72.
b. Strobes in open areas shall be provided to comply with NFPA 72.

c. Provide strobes in public spaces such as restrooms, kitchens, breakrooms, cafeterias, conference rooms, training rooms and any other space where six or more people are likely to gather.

7. Provide a unit cost to add 5 strobes including required signal circuits per 25,000 sq.ft. This unit cost shall be applied to additional strobes that may be required at the request of the fire marshal during field inspections.

C. Manual Fire Alarm Stations

1. Manual fire alarm stations shall be dual-action, non-coded, non-break glass type, equipped with key lock so that they may be tested without operating the handle.

2. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset. Units shall be master keyed with control equipment.

3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side. This shall be achieved with the pull lever remaining at a right angle to the station body until reset.

4. The station body shall be constructed so that chips and scratches will not expose metal.

5. Manual fire alarm stations shall be located as required by NFPA 101 and the International Building Code.

D. Duct Smoke Detectors

1. Duct smoke detectors shall be addressable type with visual alarm and power indicators. Provide remote LED/test stations where duct detectors are mounted in non-visible areas such as above ceiling.

2. Each detector shall be installed upon the composite supply/return air duct(s), with properly sized air sampling tubes where required. Provide smoke detectors in each return air path of any mechanical equipment that moves air in excess of 2000 CFM to meet the requirements of NFPA 72 and 90A. Provide smoke detectors in each supply and return air path of any mechanical equipment that moves air in excess of 15,000 CFM to meet the requirements of NFPA 72 and 90A. Confirm quantities of smoke detectors required for mechanical equipment with Division 23. Room detectors may be used to accomplish smoke detection in the supply/return air paths if the application permits.

3. Each duct detector shall be installed along with addressable control module as needed for fan shutdown and/or smoke control. Detectors zoned with other devices shall be capable of operating its control module even if all other devices on their circuit have gone into alarm.

4. Duct detectors shall be provided by this division, installed by the mechanical contractor and electrically connected to the fire alarm system by the electrical contractor.

E. Smoke Dampers

1. Smoke dampers shall be provided by Division 23.

2. Provide a smoke detector at each smoke damper location to meet the requirements of NFPA 72. Confirm quantities and locations of smoke detectors required for smoke dampers with Division 23. Provide 120 volt power as required for operation of smoke dampers.

F. LCD Alphanumeric Display Remote Annunciator

1. The alphanumeric display annunciator shall be a supervised, backlit LCD display containing a minimum of eighty, (80) characters for alarm annunciation in clear English text. Annunciator shall be located as shown on the drawings or at the location selected by the local fire department.

2. The LCD annunciator shall display all alarm, supervisory, and trouble conditions from the FACP via the serial card.

2.4 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices - General

1. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel signaling line circuits.

2. Addressable photoelectric smoke and thermal detectors shall provide alarm and power/polling LEDs. LED(s) shall flash under normal conditions and LED(s) shall be placed into steady illumination by the control panel, indicating an alarm condition.

3. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system.

4. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.

5. All field wiring is to be terminated on the detector base, not on the sensor head. Addressing of detectors shall be via integral decade switches built into sensor. Devices requiring separate addressing means will not be accepted.

6. Any additional equipment required to program devices are not acceptable.

B. Intelligent Photoelectric Smoke Detector

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

2. Provide photoelectric smoke detector heads with bases as required. Detectors shall be of the solid state photoelectric type utilizing a stable LED light source and a silicone photo diode as the receiving element to form a highly accurate means of smoke detection. Internal detector circuits shall be shielded against electrical interference and resistant to transients, noise and RF interference. Detector shall be low profile, the complete unit including base shall not exceed 1.875 inches in depth.

Detector shall have a dual purpose red LED that flashes continuously to show that the device is operating and, that comes on steady to show that the device is in alarm.

3. Nominal detector sensitivity shall be 1.4% per foot obscuration with a range of 1% to 1.84%. Regardless of sensitivity settings, the detector's stability shall be unaffected by high air velocity. No radioactive materials shall be used.

4. Provide smoke detectors in elevator lobbies, at stairwell doors, in telephone rooms, electrical rooms, mechanical rooms, elevator pits, the top of the elevator shaft, adjacent to the fire alarm control panel, fire pump room, computer rooms as defined by NFPA 90, chiller plants, pump rooms, UPS rooms and elevator machine rooms.

C. Linear Beam Smoke Detector

1. Each beam shall be comprised of a solid state infrared (IR) transmitter, photodiode receiver and microprocessor based control module. Should IR output be attenuated below the desired alarm obscuration level as a result of smoke interference an alarm will be annunciated. Total obscuration of the beam is annunciated as a beam blockage trouble signal. All wiring from the control module to the transmitter and receiver heads is supervised.

2. The projected beam smoke detector system shall have an operating range of 10M. (33 ft.) to 100M. (330 ft.) and be listed for spacing the beam 30 ft. from a wall and 60 ft. on center. The transmitter and receiver optical elements shall be adjustable +/- 90 degrees horizontally and +/- 30 degrees vertically. The sensitivity shall be field selectable from 7% to 50% obscuration.

D. Intelligent Thermal Detectors

1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device such as flow, tamper, release systems, etc.) to one of the fire alarm control panel SLCs.

2. The IDC zone shall be suitable for Survivability Level 1 operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

3. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include an LED.

4. Monitor module shall be provided for all sprinkler flow and tamper switches. Switches are furnished and installed by others and electrically connected to the fire alarm system by the electrical contractor. Verify quantities and locations and coordinate installation of devices required with fire protection shop drawings. Provide connections to devices per fire protection shop drawings.

F. Addressable Control Module:

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contact relay. Each relay shall have a red LED mounted on its cover to indicate if that relay has been activated.

2. The control module NAC may be wired for Class (A/B) Survivability Level 1 with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

G. Door Holders

1. Provide door holders for wall mounting and for floor mounting. Door holders shall operate on 24 volt dc power and each holder shall not draw more than 70 millamps of power.

2. Coordinate quantities of door holders required with architect's door schedule.

2.5 BATTERIES

A. The batteries shall be sealed, 12 volt nominal (two required).

B. The battery shall have sufficient capacity to power the fire alarm system for the time required in NFPA 72. This time shall be based on the type of system installed. At the end of this period the system shall be capable of operating all alarm notification appliances used for evacuation or to direct aid to the location of an emergency for 5 minutes upon a normal AC power failure.

2.6 ELEVATOR VISUAL SIGNAL (NC & FLA)

A. Provide 1/8" diameter minimum red LED mounted in a single gang polished stainless steel coverplate. Engrave nameplate "DO NOT USE ELEVATOR" with 1/8" high black filled letters. Coordinate installation of this device with the architect prior to rough-in to assure this component is integrated into the architecture of all elevator lobbies.

B. Provide gasketed coverplate for elevator lobbies in parking decks and similar damp locations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all equipment, wiring, conduit and outlet boxes required for the erection of a complete and operating system in accordance with applicable local, state and national codes, the manufacturer's recommendations, these plans and specifications. Color code shall be used throughout.

3.2 TEST

A. The manufacturer's authorized representative shall provide supervision of final system panel connections, perform a complete functional test of the system and submit a written report to the contractor attesting to the proper operation of the system.

3.3 FINAL INSPECTION

A. Upon completion of the installation, the electrical contractor shall provide to the architect, with a copy to the manufacturer's representative, a signed written statement attesting that all system equipment was installed in accordance with these specifications and in accordance with wiring diagrams, instructions and directions provided to the contractor by the manufacturer.

3.4 INSTRUCTION

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components shall be provided and shall include one session for a period of 8 hours. Additional time that may be required for end-user training will be at added cost to owner.

3.5 GUARANTEE

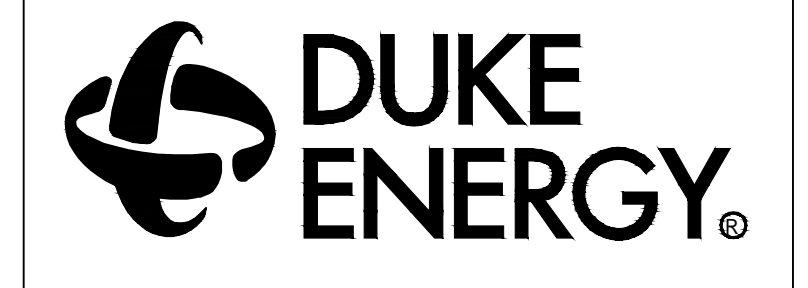
A. All equipment and wiring shall be guaranteed against defects in materials and workmanship for a two year period from the start up and beneficial use of the system. Warranty service for the equipment shall be provided by the manufacturer's factory trained representative during normal working hours, Monday through Friday excluding holidays. Emergency service provided at times other than as stipulated above shall be available from the same source at additional cost to the owner.

3.6 INSPECTIONS

A. Upon satisfactory completion of the system test, the manufacturer's representative shall present for the owner's consideration, a proposal to provide semi-annual inspection and tests of the system.

END OF SECTION

CFD-XXX-E-007-XXXXX



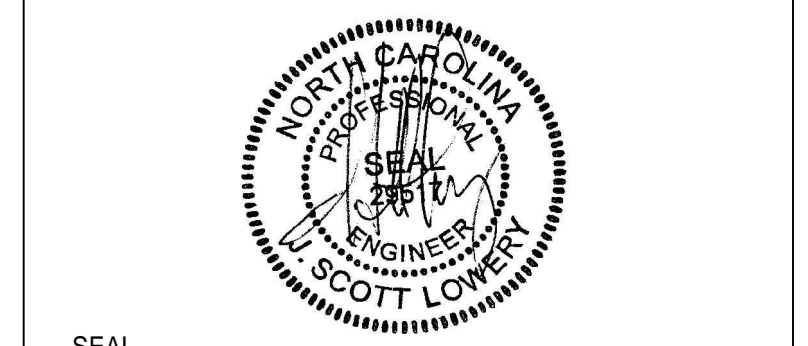
MAILING ADDRESS: P.O. BOX 1007 CHARLOTTE, NC 28201

Safety Expectations:



BW & A Barrett, Woodyard and Associates, Inc. License # C-2225 420 Minnet LN. Charlotte, North Carolina 28217 (p) 704-357-9333 (f) 704-357-9385

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DUNN OPERATIONS CENTER

1269 JONESBORO RD. HARNETT COUNTY, NC 28334

OPERATIONS BUILDING

Table with columns: MARK, DATE, DRAWN BY, REVISION, and a vertical column on the right: ISSUED FOR CONSTRUCTION. Includes a grid for revisions and a date stamp: 05-24-23.

PROJECT NO:

DRAWING NUMBER

CFD-XXX-E-007-XXXXX

ELECTRONIC FILE NAME:

DRAWN BY: JFE

CHK'D BY: JSL DATE:

E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:

SPECIFICATIONS - ELECTRICAL

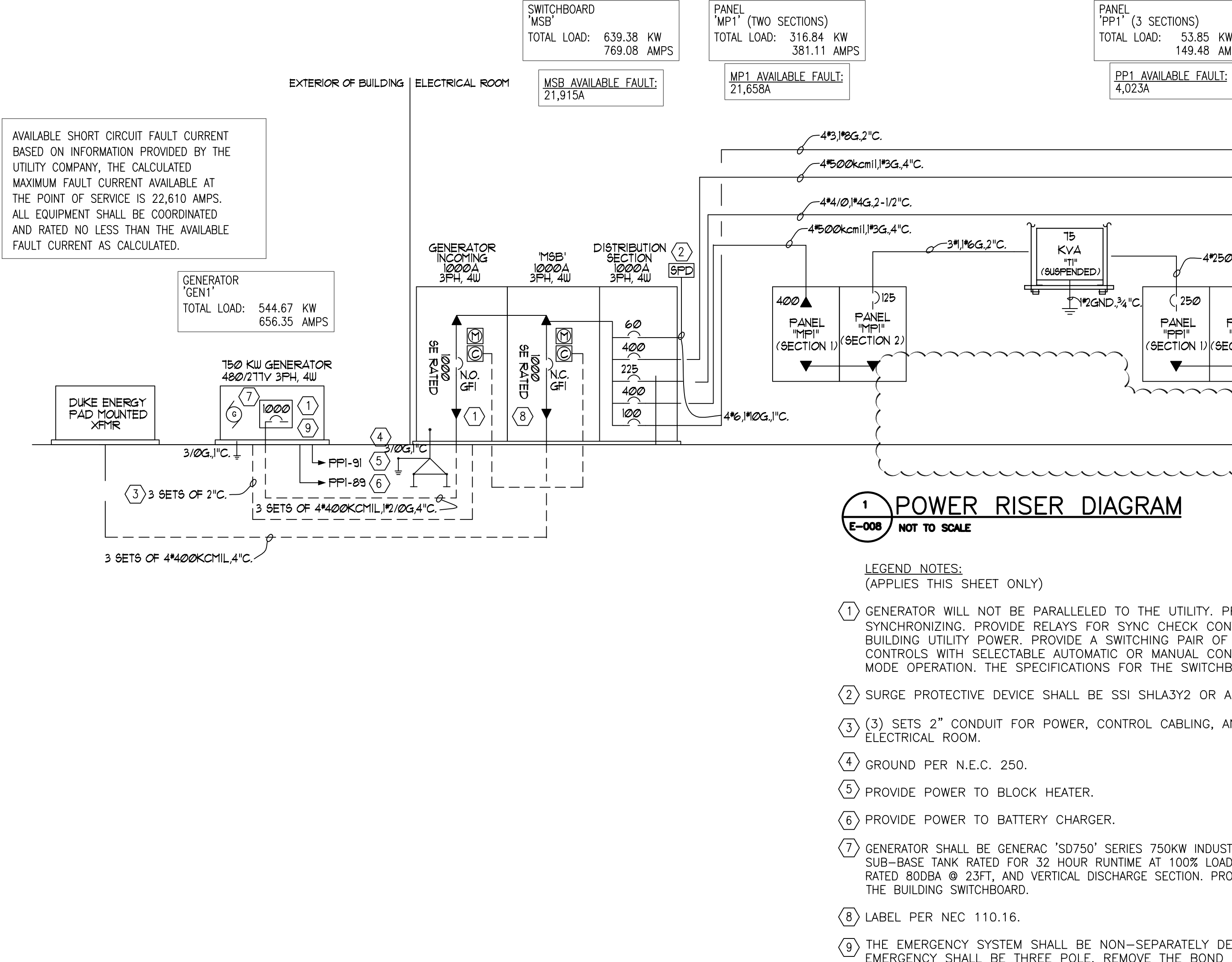
SHEET NO.

E-007

LIGHTING FIXTURE SCHEDULE										
FIXTURE TYPE	MANUFACTURER AND CATALOG INFORMATION	QTY.	LAMPS		BALLAST/DRIVER		TOTAL WATTS	INPUT VOLTAGE	DESCRIPTION	MOUNTING
			TYPE	WATTS	TYPE	WATTS				
☐	MANUFACTURER: METALUX MODEL#: CRUZE ST 24C22	-	LED 5500LUM 4000K 80+CRI	50.1W	1 LED DRIVER 0-10V DIMMING	50.1W	50.1W	UNIVERSAL	RECESSED 2X4 LED TROFFER. REFER TO ARCHITECT RCP PLAN FOR MOUNTING LOCATIONS.	RECESSED/SURFACE
☐	SAME AS TYPE ABOVE EXCEPT PROVIDED WITH A 90 MIN EMERGENCY BATTERY.	-								
☐	MANUFACTURER: METALUX MODEL#: CRUZE ST 22C22	-	LED 5500LUM 4000K 80+CRI	39.4W	1 LED DRIVER 0-10V DIMMING	39.4W	39.4W	UNIVERSAL	RECESSED 2X2 LED TROFFER	RECESSED
☐	SAME AS TYPE ABOVE EXCEPT PROVIDED WITH A 90 MIN EMERGENCY BATTERY.	-								
☐	MANUFACTURER: LUMENWERX MODEL#: VIOLA 4" DOWNLIGHT	-	LED 1849LUM 4000K 80+CRI	19.7W	1 LED DRIVER 0-10V DIMMING	19.7W	19.7W	UNIVERSAL	RECESSED 4" SQUARE DOWNLIGHT.	RECESSED
☐	SAME AS TYPE ABOVE EXCEPT PROVIDED WITH A 90 MIN EMERGENCY BATTERY.	-								
☐	MANUFACTURER: AXIS LIGHTING MODEL#: BEAM SQUARE 2	-	LED 1200LUM/FT 4000K 80+CRI	10W/FT	1 LED DRIVER 0-10V DIMMING	10W/FT	10W/FT	UNIVERSAL	PENDANT AND RECESSED LINEAR LED. REFER TO ARCHITECT RCP PLAN FOR MOUNTING LOCATIONS.	PENDANT/RECESSED
☐	SAME AS TYPE ABOVE EXCEPT PROVIDED WITH A 90 MIN EMERGENCY BATTERY.	-								
☐	MANUFACTURER: LIGHT ART MODEL#: COIL PENDANT	-	LED 2000LUM	25W	1 DRIVER 0-10V DIMMING	25W	25W	120V	LINEAR LED PENDANT. 120V. REFER TO ARCHITECTURAL DETAILS FOR MOUNTING HEIGHT.	PENDANT
☐	MANUFACTURER: METALUX MODEL#: UHB	-	LED 24000LUM 4000K	197W	1 DRIVER 0-10V	197W	197W	UNIVERSAL	LED HIGH BAY FIXTURE. UNIVERSAL VOLTAGE. REFER TO ARCHITECTURAL DETAILS FOR MOUNTING HEIGHT. PROVIDE INTEGRAL OCCUPANCY SENSORS IN FIXTURE.	SUSPENDED
☐	SAME AS ABOVE EXCEPT EQUIPPED WITH AN EMERGENCY BATTERY PACK.	-								
☐	WET LOCATION LISTED DOWNLIGHT. MANUFACTURER TO BE DETERMINED.	-	LED 2000LUM	60W	1 DRIVER 0-10V	60W	60W	UNIVERSAL	WET LOCATION LISTED.	CEILING
☐	EXTERIOR WALL PACK. COOPER LUMARK WP LED SERIES. OR APPROVED EQUAL.	-	LED 2000LUM	60W	1 DRIVER 0-10V	60W	60W	UNIVERSAL	WET LOCATION LISTED.	WALL
☐	SAME AS ABOVE EXCEPT EQUIPPED WITH AN EMERGENCY BATTERY PACK.	-								
☐	MANUFACTURER: LUMARK MODEL#: PREVAL DISCRETE LED	-	LED 52086LUM 4000K	366W	1 LED DRIVER 0-10V DIMMING	366W	366W	UNIVERSAL	POLE LIGHT.	RECESSED
☐	MANUFACTURER: LUMARK MODEL#: PREVAL DISCRETE LED	-	LED 52086LUM 4000K	732W	1 LED DRIVER 0-10V DIMMING	732W	732W	UNIVERSAL	POLE LIGHT. TWO HEADS.	RECESSED
☐	RECESSED EMERGENCY FIXTURE. COOPER AEL2 SERIES OR APPROVED EQUAL. PROVIDED WITH 90 MINUTE BATTERY PACK.	-	LED 5W	5W	1 LED DRIVER	5W	5W	UNIVERSAL	RECESSED EMERGENCY FIXTURE ABOVE DOOR MULLION. UNIVERSAL VOLTAGE.	AS REQUIRED.
☐	MANUFACTURER: SURE-LITES MODEL#: ES SERIES	-	LED 5W	5W	1 LED DRIVER	5W	5W	UNIVERSAL	EXISTING AND NEW EXIT SIGNS. RED LETTERING. CONFIRM FINISH WITH ARCHITECT. EQUIPPED WITH 90 MIN BATTERY BACKUP.	AS REQUIRED.

LIGHT FIXTURE SCHEDULE NOTES:

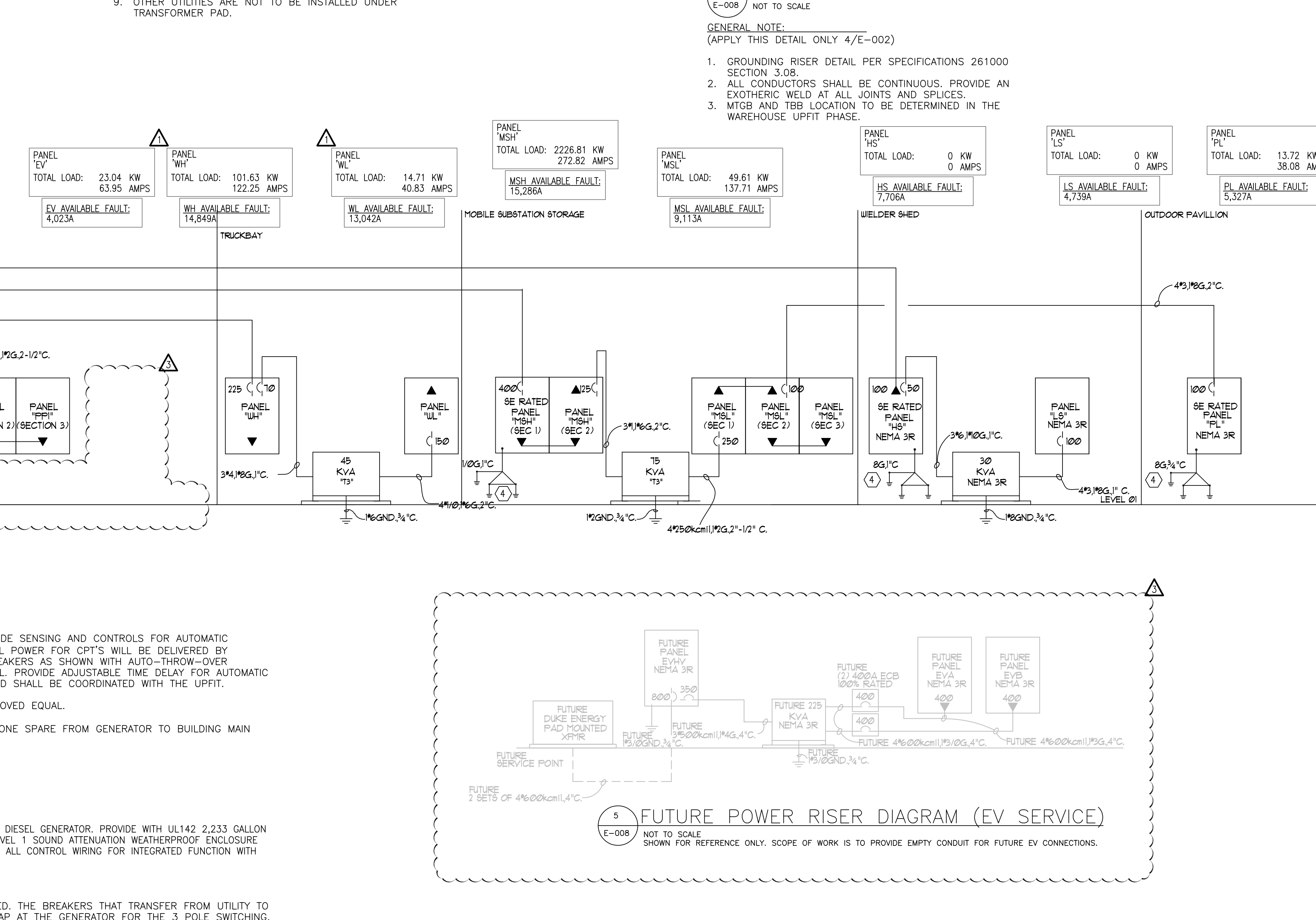
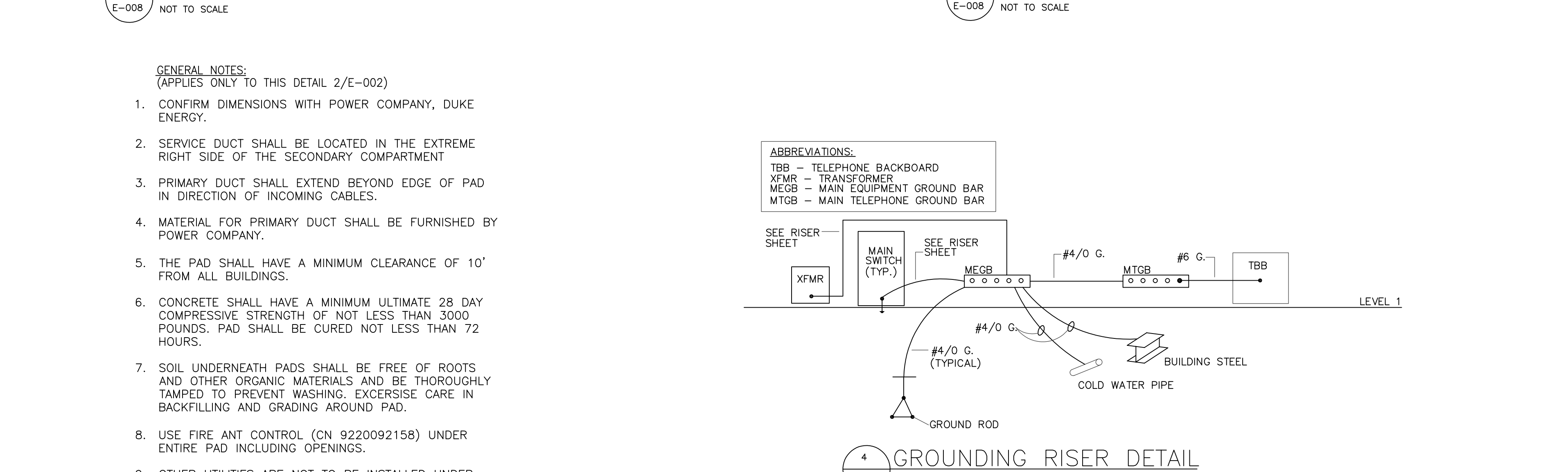
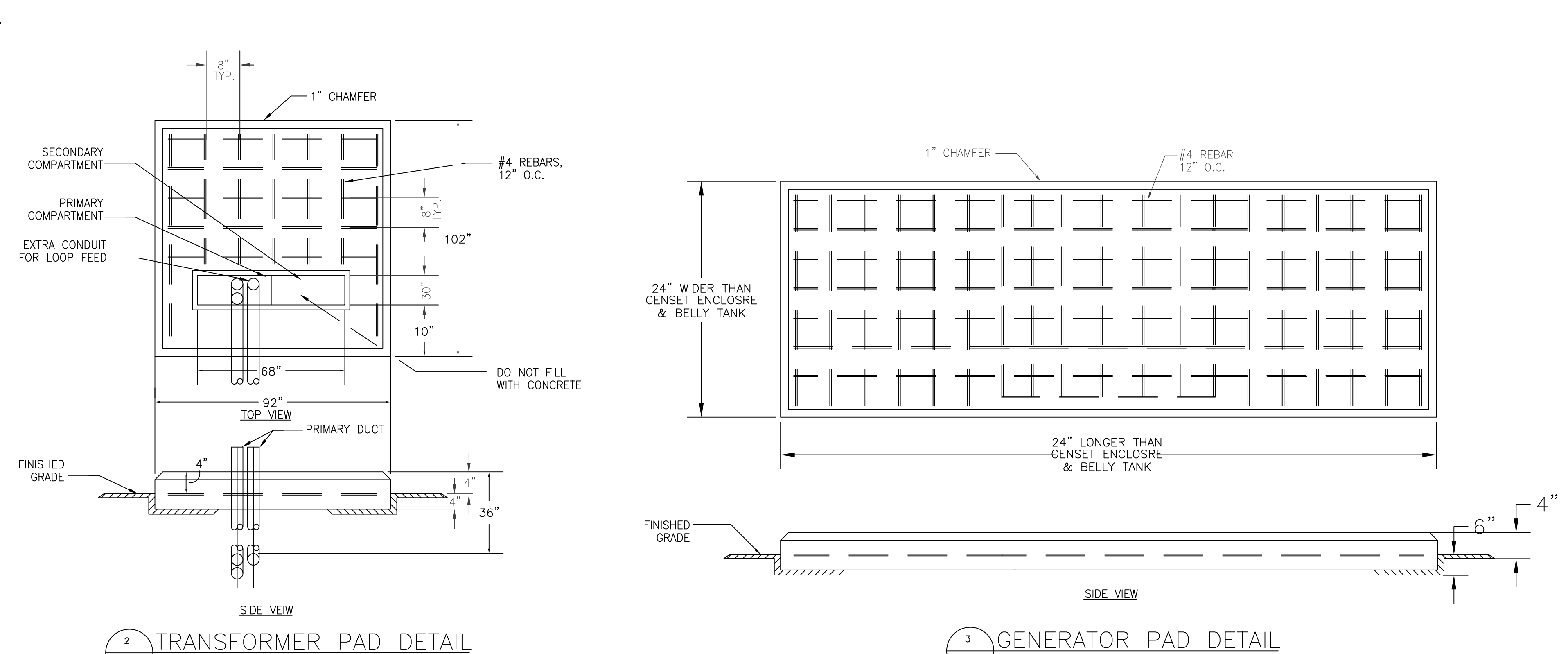
- ALL FINISH TYPES SHOULD BE COORDINATED WITH THE ARCHITECT/INTERIOR DESIGNER(S).
- ALL TRIMS AND INSTALLATION REQUIREMENTS SHALL BE COORDINATED WITH THE CEILING TYPE IN WHICH IT IS TO BE INSTALLED. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT CEILING TYPE FOR WHICH THE FIXTURE IS TO BE INSTALLED.
- REFER TO THE ARCHITECTURAL REFLECTED CEILING PLANS AND MILLWORK DETAILS, WHERE APPLICABLE, FOR THE INTENDED MOUNTING LOCATION OF ALL LIGHT FIXTURES WITHIN.
- ALL FLUORESCENT FIXTURES TO BE PROVIDED WITH INTERNAL BALLAST DISCONNECTING MEANS.
- FIXTURE TYPES NOTED ON PLAN WITH SUFFIX 'E' INDICATES FIXTURE TO BE PROVIDED WITH 90 MINUTE MINIMUM BATTERY BACK-UP. (E.G. L1E, L2E, ETC...). ALL EXIT AND EMERGENCY FIXTURES SHALL BE FED FROM LOCAL LIGHTING BRANCH CIRCUIT PER NEC 700.12(1)(2).
- ANY LOW-VOLTAGE CLASS 2 WIRING OUTSIDE THE LIGHT FIXTURE HOUSING SHALL BE PLENUM RATED, I.E. TYPE CL-2P, IN COMPLIANCE WITH NEC ARTICLE 725.179. THIS APPLIES TO POWER WIRING AND CONTROL WIRING.



1 POWER RISER DIAGRAM
E-008 NOT TO SCALE

LEGEND NOTES:
(APPLIES THIS SHEET ONLY)

- GENERATOR WILL NOT BE PARALLELED TO THE UTILITY. PROVIDE SENSING AND CONTROLS FOR AUTOMATIC SYNCHRONIZING. PROVIDE RELAYS FOR SYNC CHECK CONTROL POWER FOR CPT'S WILL BE DELIVERED BY BUILDING UTILITY POWER. PROVIDE A SWITCHING PAIR OF BREAKERS AS SHOWN WITH AUTO-THROW-OVER CONTROLS WITH SELECTABLE AUTOMATIC OR MANUAL CONTROL. PROVIDE ADJUSTABLE TIME DELAY FOR AUTOMATIC MODE OPERATION. THE SPECIFICATIONS FOR THE SWITCHBOARD SHALL BE COORDINATED WITH THE UPFIT.
- SURGE PROTECTIVE DEVICE SHALL BE SSI SHL3Y2 OR APPROVED EQUAL.
- (3) SETS 2" CONDUIT FOR POWER, CONTROL CABLING, AND ONE SPARE FROM GENERATOR TO BUILDING MAIN ELECTRICAL ROOM.
- GROUND PER N.E.C. 250.
- PROVIDE POWER TO BLOCK HEATER.
- PROVIDE POWER TO BATTERY CHARGER.
- GENERATOR SHALL BE GENERAC 'SD750' SERIES 750KW INDUSTRIAL DIESEL GENERATOR. PROVIDE WITH UL142, 2,233 GALLON SUB-BASE TANK RATED FOR 32 HOUR RUNTIME AT 100% LOAD. LEVEL 1 SOUND ATTENUATION WEATHERPROOF ENCLOSURE RATED 80DBA @ 23FT, AND VERTICAL DISCHARGE SECTION. PROVIDE ALL CONTROL WIRING FOR INTEGRATED FUNCTION WITH THE BUILDING SWITCHBOARD.
- LABEL PER NEC 110.16.
- THE EMERGENCY SYSTEM SHALL BE NON-SEPARATELY DERIVED. THE BREAKERS THAT TRANSFER FROM UTILITY TO EMERGENCY SHALL BE THREE POLE. REMOVE THE BOND STRAP AT THE GENERATOR FOR THE 3 POLE SWITCHING.



DRAWING NO.
CFD-XXX-E-008-XXXX

DUKE ENERGY

MAILING ADDRESS:
P.O. BOX 1007
CHARLOTTE, NC 28201

Safety Expectations:

ILLNESS ZERO INJURY ZERO
Reduce Risk
Remove Exposures to Hazards
Reinforce Safe Behavior

LS3P

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BWA JOB # 2022-0632

SCOTT SCOTT
REGISTERED PROFESSIONAL ENGINEER
EXERCISE NO. 12345
EXPIRES 12/31/2024
SEAL 04/30/2024

DUNN OPERATIONS CENTER

1269 JONESBORO RD.
HARNETT COUNTY, NC 28334

OPERATIONS BUILDING

MARK	DATE	DRN BY	REVISION
1	04/30/24	JFE	ISSUED FOR CONSTRUCTION
2	04/30/24	JFE	ISSUED FOR CONSTRUCTION
3	04/30/24	JFE	ISSUED FOR CONSTRUCTION
4	04/30/24	JFE	ISSUED FOR CONSTRUCTION
5	04/30/24	JFE	ISSUED FOR CONSTRUCTION
6	04/30/24	JFE	ISSUED FOR CONSTRUCTION
7	04/30/24	JFE	ISSUED FOR CONSTRUCTION
8	04/30/24	JFE	ISSUED FOR CONSTRUCTION
9	04/30/24	JFE	ISSUED FOR CONSTRUCTION
10	04/30/24	JFE	ISSUED FOR CONSTRUCTION
11	04/30/24	JFE	ISSUED FOR CONSTRUCTION
12	04/30/24	JFE	ISSUED FOR CONSTRUCTION
13	04/30/24	JFE	ISSUED FOR CONSTRUCTION
14	04/30/24	JFE	ISSUED FOR CONSTRUCTION
15	04/30/24	JFE	ISSUED FOR CONSTRUCTION
16	04/30/24	JFE	ISSUED FOR CONSTRUCTION
17	04/30/24	JFE	ISSUED FOR CONSTRUCTION
18	04/30/24	JFE	ISSUED FOR CONSTRUCTION
19	04/30/24	JFE	ISSUED FOR CONSTRUCTION
20	04/30/24	JFE	ISSUED FOR CONSTRUCTION

PROJECT NO:
DRAWING NUMBER
CFD-XXX-E-008-XXXX

ELECTRONIC FILE NAME:
DRAWN BY: JFE
CHK'D BY: JSL DATE:
E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:
POWER RISER DIAGRAM & DETAILS

SHEET NO.
E-008

NEW PANEL MSB SECTION 1										AIC 42K SE RATED	
VOLTAGE: 277/480 3		AMP: MAIN: 1000 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
MP1	91.898	400/3	1	A	2	-/3	0	SPACE			
MSH	80.177	400/3	7	A	8	-/3	0	SPACE			
WH	35.562	280/3	13	A	14	-/3	0	SPACE			
PANEL HS	0	100/3	19	A	20	-/3	0	SPACE			
SPD	0	60/3	25	A	26	-/3	0	SPACE			
SPACE	0	-/3	31	A	32	-/3	0	SPACE			
SPACE	0	-/3	35	A	36	-/3	0	SPACE			
SPACE	0	-/3	39	B	40	-/3	0	SPACE			
SPACE	0	-/3	41	C	42	-/3	0	SPACE			

A TOTAL	207.64	VLL	PH	70.90
B TOTAL	202.65	480	3	RECEPTACLES
C TOTAL	204.11			0.00 HEATING
CONN. kW	614.40			250.47 AC/MOTORS
CONN. Amps	739.03			22.21 LIGHTING
				19.24 MISC.
				15.20 WATER HEATERS
				0.00 ELEVATORS
				0.00 KITCHEN EQUIP

NEW PANEL PP1 SECTION 1										AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 250 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
DED REC BREAKROOM	0.18	20/1	1	A	2	20/1	0.72	FLOORBOX TOWNHALL			
DED REC BREAKROOM	0.18	20/1	3	B	4	20/1	0.72	FLOORBOX TOWNHALL			
DED REC BREAKROOM	0.18	20/1	5	C	6	20/1	0.72	FLOORBOX TOWNHALL			
DED REC BREAKROOM	0.18	20/1	7	A	8	20/1	0	SPARE			
DED REC BREAKROOM	0.18	20/1	9	B	10	20/1	0.72	FLOORBOX TOWNHALL			
DED REC BREAKROOM	0.18	20/1	11	C	12	20/1	0.72	FLOORBOX TOWNHALL			
DED REC BREAKROOM	0.18	20/1	13	A	14	20/1	0.72	REC TOWNHALL CLOSET & CLOSET			
DED REC FRIDGE	0.6	20/1	15	B	16	20/1	0.18	DED REC AV CLOSET			
DED REC FRIDGE	0.6	20/1	17	C	18	20/1	0.18	DED REC AV CLOSET			
REC BREAKROOM	0.72	20/1	19	A	20	20/1	0.18	DED REC WATER FOUNTAIN			
REC OFFICE	0.9	20/1	21	B	22	20/1	0.36	REC Bathrooms			
REC OFFICE	0.9	20/1	23	C	24	20/1	1.08	REC OFFICES			
MOD FURN OPEN AREA	0.9	20/3	25	A	26	20/1	1.08	REC OFFICES			
MOD FURN OPEN AREA	0.9	20/3	27	B	28	20/1	1.08	REC OFFICES			
MOD FURN OPEN AREA	0.9	20/3	29	C	30	20/1	0.9	DED REC COPIER			
MOD FURN OPEN AREA	0.9	20/1	31	A	32	20/1	0.9	DEC REC PLOTTER			
REC CONFERENCE & PHONE RM	1.08	20/1	33	B	34	20/1	0.18	DED REC COPY			
REC CONFERENCE	0.9	20/1	35	C	36	20/1	0.18	DED REC COPY			
REC TOWN HALL	0.72	20/1	37	A	38	20/1	0.18	DED REC WELLNESS			
DED REC TOWNHALL	0.18	20/1	39	B	40	20/1	0.18	DED REC WELLNESS			
DED REC TOWNHALL	0.18	20/1	41	C	42	20/1	0.18	DED REC WELLNESS			

A TOTAL	7.56	VLL	PH	18.18
B TOTAL	7.44	208	3	RECEPTACLES
C TOTAL	7.80			0.00 HEATING
SECTION 2 TOTAL kW	35.87			0.00 AC/MOTORS
SECTION 3 TOTAL kW	10.25			0.00 LIGHTING
CONN. kW	68.92			4.62 MISC.
CONN. Amps	191.31			0.00 WATER HEATERS
				0.00 ELEVATORS
				0.00 KITCHEN EQUIP

NEW PANEL WH SECTION 1										AIC 22K	
VOLTAGE: 277/480 3		AMP: MAIN: 225 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
FAN	1.67	20/3	1	A	2	20/3	4.3	UH-A			
LTS	3.612	20/1	7	A	8	20/3	4.3	UH-A			
UH-A	4.3	20/3	9	B	10	-/3	4.3	UH-A			
UH-A	4.3	20/3	11	C	12	-/3	4.3	UH-A			
UH-A	4.3	20/3	13	A	14	20/1	0	SPARE			
UH-A	4.3	20/3	15	B	16	20/1	0	SPARE			
UH-A	4.3	20/3	17	C	18	20/1	0	SPARE			
UH-A	4.3	20/3	19	A	20	20/1	0	SPARE			
UH-A	4.3	20/3	21	B	22	20/1	0	SPARE			
UH-A	4.3	20/3	23	C	24	20/1	0	SPARE			
UH-A	4.3	20/3	25	A	26	20/1	0	SPARE			
UH-A	4.3	20/3	27	B	28	20/1	0	SPARE			
UH-A	4.3	20/3	29	C	30	20/1	0	SPARE			
UH-A	4.3	20/3	31	A	32	20/1	0	SPARE			
UH-A	4.3	20/3	33	B	34	20/1	0	SPARE			
UH-A	4.3	20/3	35	C	36	20/1	0	SPARE			
PANEL WL	4.48	70/3	37	A	38	20/1	0	SPARE			
SPARE	5.504	-/3	39	B	40	20/1	0	SPARE			
SPARE	4.724	-/3	41	C	42	20/1	0	SPARE			

A TOTAL	35.56	VLL	PH	1.80
B TOTAL	32.97	480	3	RECEPTACLES
C TOTAL	32.19			77.40 HEATING
CONN. kW	100.73			17.72 AC/MOTORS
CONN. Amps	121.16			3.61 LIGHTING
				0.20 MISC.
				0.00 WATER HEATERS
				0.00 ELEVATORS
				0.00 KITCHEN EQUIP

NEW PANEL MP1 SECTION 1										AIC 22K	
VOLTAGE: 277/480 3		AMP: MAIN: 400 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
HALLWAY LTS	2.983	20/1	1	A	2	20/3	2	P-5			
CREW ROOM & STORAGE LTS	2.87	20/1	3	B	4	-/3	2	P-5			
OFFICE AND BATHROOM LTS	3.025	20/1	5	C	6	-/3	2	P-5			
TEAM MEETING & BREAK RM LTS	2.585	20/1	7	A	8	20/3	2	P-6			
EXTERIOR LTS	1.36	20/1	9	B	10	-/3	2	P-6			
RTU 1	27.33	120/3	11	C	12	-/3	2	P-7			
RTU 1	27.33	-/3	13	A	14	20/1	2.5	P-7			
RTU 2	5.8	20/3	15	B	16	20/3	1.67	P-8			
RTU 2	5.8	-/3	17	C	18	-/3	1.67	P-8			
WH-A	12.2	60/1	23	C	24	-/3	1.83	P-9			
PANEL PP1	23.18	120/3	25	A	26	-/3	1.83	P-10			
P-1	22.29	-/3	27	B	28	20/3	4.67	P-10			
P-2	20.56	-/3	29	C	30	20/3	4.67	P-11			
P-3	4	20/1	31	A	32	-/3	4.67	P-11			
P-4	1.83	20/3	33	B	34	-/3	4.67	P-12			
P-5	1.83	20/3	35	C	36	40/3	5.33	P-12			
P-6	1.83	-/3	37	A	38	-/3	5.33	P-13			
P-7	1.83	-/3	39	B	40	-/3	5.33	P-13			
P-8	4	20/1	41	C	42	20/1	0	SPARE			

A TOTAL	87.71	VLL	PH	40.68
B TOTAL	84.99	480	3	RECEPTACLES
C TOTAL	92.25			0.00 HEATING
SECTION 2 TOTAL kW	46.08			181.78 AC/MOTORS
CONN. kW	311.02			12.84 LIGHTING
CONN. Amps	374.11			17.44 MISC.
				12.20 WATER HEATERS
				0.00 ELEVATORS
				0.00 KITCHEN EQUIP

NEW PANEL PP1 SECTION 2										AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 250 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
DED REC IT	0.36	20/1	43	A	44	20/3	0.9	MOD FURN TEAM RM			
JBOX SECURITY PANEL	0.5	20/1	45	B	46	-/3	0.9	MOD FURN TEAM RM			
DED REC IT	0.36	20/1	47	C	48	-/3	0.9	MOD FURN TEAM RM			
DED REC IT	0.36	20/1	49	A	50	20/1	0.9	MOD FURN TEAM RM			
DED REC IT	0.36	20/1	51	B	52	20/1	0.9	MOD FURN TEAM RM			
JBOX SECURITY PANEL	0.5	20/1	53	C	54	20/3	0.9	MOD FURN TEAM RM			
DED REC IT	0.36	20/1	55	A	56	-/3	0.9	MOD FURN TEAM RM			
DED REC IT	0.36	20/1	57	B	58	-/3	0.9	MOD FURN TEAM RM			
REC HALLS & ADA BATHROOM & JAN CLOSET	1.08	20/1	59	C	60	20/1	0.9	REC TEAM RM			
REC TEAM RM	0.9	20/3	61	A	62	20/1	0.9	MOD FURN TEAM RM			
MOD FURN TEAM RM	0.9	-/3	63	B	64	20/3	0.9	MOD FURN TEAM RM			
MOD FURN TEAM RM	0.9	-/3	65	C	66	-/3	0.9	MOD FURN TEAM RM			
MOD FURN TEAM RM	0.9	20/1	67	A	68	-/3	0.9	MOD FURN TEAM RM			
REC TEAM RM	0.9	20/1	69	B	70	20/1	0.9	MOD FURN TEAM RM			
REC TEAM RM	0.72	20/1	71	C	72	20/1	0.72	REC STORAGE			
MOD FURN TEAM RM	0.9	20/1	73	A	74	20/1	1.08	REC STORAGE & HALLWAY			
MOD FURN TEAM RM	0.9	20/1	75	B	76	20/1	1.08	REC STORAGE & HALLWAY			
MOD FURN TEAM RM	0.9	20/3	77	C	78	20/1	1.08	REC STORAGE & HALLWAY			
REC TEAM RM	0.9	-/3	79	A	80	20/2	1.98	CU-2			
REC TEAM RM	0.9	-/3	81	B	82	-/3	1.97	CU-2			
REC TEAM RM	0.9	20/1	83	C	84	0.5	RP-A				

A TOTAL	12.24	VLL	PH	21.60
B TOTAL	12.37	208	3	RECEPTACLES
C TOTAL	11.26			0.00 HEATING
CONN. kW	35.87			3.95 AC/MOTORS
CONN. Amps	99.57			0.00 LIGHTING
				10.32 MISC.
				0.00 WATER HEATERS
				0.00 ELEVATORS
				0.00 KITCHEN EQUIP

NEW PANEL WL SECTION 1										AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 150 MCB		DESCRIPTION						DESCRIPTION	
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION	KW	DESCRIPTION	
VEHICLE BAY DOORS	0.35	20/2	1	A	2	20/2	0.35	VEHICLE BAY DOORS			
VEHICLE BAY DOORS	0.35	20/2	3	B	4	-/3	0.35	VE			

NEW PANEL MSH SECTION 1											AIC 22K SE RATED	
VOLTAGE: 277/480 3		AMP: MAIN: 400 MCB										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
WAREHOUSE LTS	3.612	20/1	7	A	2	16/3	0.663	EP-A				
WAREHOUSE LTS	1.422	20/1	3	B	4		0.663					
FAN	1.67	20/3	5	C	6		0.663					
	1.67		7	A	8	16/3	0.663	EP-A				
	1.67		9	B	10		0.663					
10 TON CRANE	7.59	40/3	11	C	12		0.663					
	7.58		13	A	14	16/3	0.663	EP-A				
	7.58		15	B	16		0.663					
UH-A	4.3	20/3	17	C	18		0.663					
	4.3		19	A	20	16/3	0.663	EP-A				
	4.3		21	B	22		0.663					
WALLPACK LTS	1.62	20/1	23	C	24		0.663					
UH-A	4.3	20/3	25	A	26	20/1	3	WATER HEATER				
	4.3		27	B	28	20/1	3.2	SITE LIGHTING				
	4.3		29	C	30	20/1	3.2	SITE LIGHTING				
UH-A	4.3	20/3	31	A	32	20/1	3.2	SITE LIGHTING				
	4.3		33	B	34	20/1	0	SPARE				
	4.3		35	C	36	20/1	0	SPARE				
UH-A	4.3	20/3	37	A	38	20/1	0	SPARE				
	4.3		39	B	40	20/1	0	SPARE				
	4.3		41	C	42	20/1	0	SPARE				
75KVA	18.42	180/3	SD/B	A								
XPR TO	22.07		FE	B								
PANEL MSL	18.39		ED	C								

A TOTAL	57.33	VLL	PH
B TOTAL	55.79	480	3
C TOTAL	52.32		
SECTION 2 TOTAL KW	79.39		
CONN. kW	244.84		
CONN. Amps	294.50		

TOTAL DEMAND LOAD	
RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= 19.03 KVA
HEAT: 100% :	= 138.945 KVA
AC/MOTORS: 125% LARGEST + 100% REMAINING:	= 56.38 KVA
LIGHTING: 125%:	= 20.3175 KVA
MISC: 100%:	= 2.2 KVA
WATER HEATER: 125%:	= 3.75 KVA
ELEVATORS: PER NEC:	= 0 KVA
KITCHEN EQUIP: PER NEC :	= 0 KVA
TOTAL DEMAND LOAD KW:	= 240.6225 KVA
TOTAL DEMAND LOAD AMPS:	= 289.43 AMP

NEW PANEL MSL SECTION 1											AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 250 MCB										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
VEHICLE BAY DOORS	0.35	20/2	7	A	2	20/2	0.35	VEHICLE BAY DOORS				
	0.35		3	B	4		0.35					
VEHICLE BAY DOORS	0.35	20/2	5	C	6	20/2	0.35	VEHICLE BAY DOORS				
	0.35		7	A	8		0.35					
VEHICLE BAY DOORS	0.35	20/2	9	B	10	20/2	0.35	VEHICLE BAY DOORS				
	0.35		11	C	12		0.35					
VEHICLE BAY DOORS	0.35	20/2	13	A	14	20/2	0.35	VEHICLE BAY DOORS				
	0.35		15	B	16		0.35					
VEHICLE BAY DOORS	0.35	20/2	17	C	18	20/2	0.35	VEHICLE BAY DOORS				
	0.35		19	A	20		0.35					
VEHICLE BAY DOORS	0.35	20/2	21	B	22	20/2	0.35	VEHICLE BAY DOORS				
	0.35		23	C	24		0.35					
VEHICLE BAY DOORS	0.35	20/2	25	A	26	20/2	0.35	VEHICLE BAY DOORS				
	0.35		27	B	28		0.35					
VEHICLE BAY DOORS	0.35	20/2	29	C	30	20/2	0.35	VEHICLE BAY DOORS				
	0.35		31	A	32		0.35					
VEHICLE BAY DOORS	0.35	20/2	33	B	34	20/2	0.35	VEHICLE BAY DOORS				
	0.35		35	C	36		0.35					
VEHICLE BAY DOORS	0.35	20/2	37	A	38	20/2	0.35	VEHICLE BAY DOORS				
	0.35		39	B	40		0.35					
CEILING REC	0.9	20/1	41	C	42	20/1	0.72	CEILING REC				

A TOTAL	4.90	VLL	PH
B TOTAL	4.90	208	3
C TOTAL	5.82		
SECTION 2 TOTAL KW	35.60		
SECTION 3 TOTAL KW	7.66		
CONN. kW	58.88		
CONN. Amps	163.44		

NEW PANEL LS SECTION 1											AIC 10K SE RATED	
VOLTAGE: 277/480 3		AMP: MAIN: 100 MLO										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
SPARE	0	20/1	1	A	2	20/3	0	PANEL LS				
SPARE	0	20/1	3	B	4		0					
SPARE	0	20/1	5	C	6		0					
SPARE	0	20/1	7	A	8	20/1	0	SPARE				
SPARE	0	20/1	9	B	10	20/1	0	SPARE				
SPARE	0	20/1	11	C	12	20/1	0	SPARE				
SPARE	0	20/1	13	A	14	20/1	0	SPARE				
SPARE	0	20/1	15	B	16	20/1	0	SPARE				
SPARE	0	20/1	17	C	18	20/1	0	SPARE				
SPARE	0	20/1	19	A	20	20/1	0	SPARE				
SPARE	0	20/1	21	B	22	20/1	0	SPARE				
SPARE	0	20/1	23	C	24	20/1	0	SPARE				
SPARE	0	20/1	25	A	26	20/1	0	SPARE				
SPARE	0	20/1	27	B	28	20/1	0	SPARE				
SPARE	0	20/1	29	C	30	20/1	0	SPARE				
SPARE	0	20/1	31	A	32	20/1	0	SPARE				
SPARE	0	20/1	33	B	34	20/1	0	SPARE				
SPARE	0	20/1	35	C	36	20/1	0	SPARE				
SPARE	0	20/1	37	A	38	20/1	0	SPARE				
SPARE	0	20/1	39	B	40	20/1	0	SPARE				
SPARE	0	20/1	41	C	42	20/1	0	SPARE				

A TOTAL	0.00	VLL	PH
B TOTAL	0.00	480	3
C TOTAL	0.00		
CONN. kW	0.00		
CONN. Amps	0.00		

TOTAL DEMAND LOAD	
RECEPTS: 100% 1ST 10 KW + 50% REMAINING:	= 0 KVA
HEAT: 100% :	= 0 KVA
AC/MOTORS: 125% LARGEST + 100% REMAINING:	= 0 KVA
LIGHTING: 125%:	= 0 KVA
MISC: 100%:	= 0 KVA
WATER HEATER: 125%:	= 0 KVA
ELEVATORS: PER NEC:	= 0 KVA
KITCHEN EQUIP: PER NEC :	= 0 KVA
TOTAL DEMAND LOAD KW:	= 0 KVA
TOTAL DEMAND LOAD AMPS:	= 0.00 AMP

NEW PANEL MSH SECTION 2											AIC 22K	
VOLTAGE: 277/480 3		AMP: MAIN: 400 MCB										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
UH-A	4.3	20/3	43	A	44		0	SPACE				
	4.3		45	B	46		-1	0	SPACE			
	4.3		47	C	48		-1	0	SPACE			
UH-A	4.3	20/3	49	A	50		-1	0	SPACE			
	4.3		51	B	52		-1	0	SPACE			
	4.3		53	C	54		-1	0	SPACE			
UH-A	4.3	20/3	55	A	56		-1	0	SPACE			
	4.3		57	B	58		-1	0	SPACE			
	4.3		59	C	60		-1	0	SPACE			
UH-A	4.3	20/3	61	A	62		-1	0	SPACE			
	4.3		63	B	64		-1	0	SPACE			
	4.3		65	C	66		-1	0	SPACE			
UH-A	4.3	20/3	67	A	68		-1	0	SPACE			
	4.3		69	B	70		-1	0	SPACE			
	4.3		71	C	72		-1	0	SPACE			
UH-A	4.3	20/3	73	A	74		-1	0	SPACE			
	4.3		75	B	76		-1	0	SPACE			
	4.3		77	C	78		-1	0	SPACE			
EP-A	0.663	16/3	79	A	80		-1	0	SPACE			
	0.663		81	B	82		-1	0	SPACE			
	0.663		83	C	84		-1	0	SPACE			

A TOTAL	26.46	VLL	PH
B TOTAL	26.46	480	3
C TOTAL	26.46		
CONN. kW	79.389		
CONN. Amps	95.49		

NEW PANEL MSL SECTION 2											AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 250 MLO										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
VEHICLE BAY DOORS	0.35	20/2	43	A	44	20/2	0.35	VEHICLE BAY DOORS				
	0.35		45	B	46		0.35					
VEHICLE BAY DOORS	0.35	20/2	47	C	48	20/2	0.35	VEHICLE BAY DOORS				
	0.35		49	A	50		0.35					
VEHICLE BAY DOORS	0.35	20/2	51	B	52	20/1	0.54	CEILING REC				
	0.35		53	C	54	20/1	0.9	CEILING REC				
VEHICLE BAY DOORS	0.35	20/2	55	A	56	20/1	0.72	CEILING REC				
	0.35		57	B	58	20/1	0.72	CEILING REC				
VEHICLE BAY DOORS	0.35	20/2	59	C	60	20/1	0.54	CEILING REC				
	0.35		61	A	62	20/1	1.08	WALL REC				
VEHICLE BAY DOORS	0.35	20/2	63	B	64	20/1	1.08	OFFICE REC				
	0.35		65	C	66	20/1	0.72	OFFICE REC				
VEHICLE BAY DOORS	0.35	20/2	67	A	68	20/1	0.72	OFFICE REC				
	0.35		69	B	70	20/1	0.54	BATHROOM REC				
VEHICLE BAY DOORS	0.35	20/2	71	C	72	20/1	0.18	DED REC				
	0.35		73	A	74	100/3	4.72	PANEL PL				
VEHICLE BAY DOORS	0.35	20/2	75	B	76		7.18					
	0.35		77	C	78		5.54					
VEHICLE BAY DOORS	0.35	20/2	79	A	80	20/1	0.6	TEP-A				
	0.35		81	B	82	20/1	0.6	TEP-A				
CEILING REC	0.72	20/1	83	C	84	20/1	0.1	LOUVER CONTROL				

A TOTAL	10.99	VLL	PH
B TOTAL	13.46	208	3
C TOTAL	11.15		
CONN. kW	35.6		
CONN. Amps	98.82		

NEW PANEL LS SECTION 1											AIC 10K	
VOLTAGE: 120/208 3		AMP: MAIN: 100 MCB										
DESCRIPTION	KW	BKR	CK	PH	CK	BKR	KW	DESCRIPTION				
SPARE	0	20/1	1	A	2	20/1	0	SPARE				
SPARE	0	20/1	3	B	4	20/1	0	SPARE				
SPARE	0	20/1	5	C	6	20/1	0	SPARE				
SPARE	0	20/1	7	A	8	20/1	0	SPARE				
SPARE	0	20/1	9	B	10	20/1	0	SPARE				
SPARE	0	20/1	11	C	12	20/1	0	SPARE				
SPARE	0	20/1	13	A	14	20/1	0	SPARE				
SPARE	0	20/1	15	B	16	20/1	0	SPARE				
SPARE	0	20/1	17	C	18	20/1	0	SPARE				
SPARE	0	20/1	19	A	20	20/1	0	SPARE				
SPARE	0	20/1	21	B	22	20/1	0	SPARE				
SPARE	0	20/1	23	C	24	20/1	0	SPARE				
SPARE	0	20/1	25	A	26	20/1	0	SPARE				
SPARE	0	20/1	27	B	28	20/1	0	SPARE				
SPARE	0	20/1	29	C	30	20/1	0	SPARE				

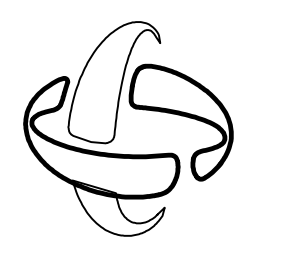


SITE PLAN - ELECTRICAL

1" = 70'-0"
 LEGEND NOTES:
 (APPLY TO THIS SHEET ONLY)

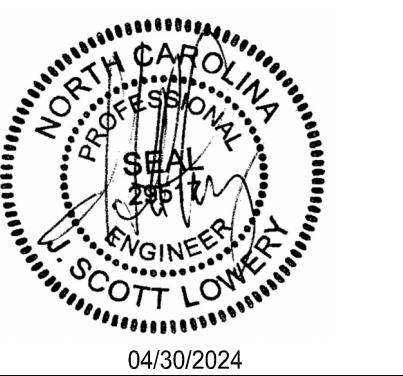
- ① (2) 30"x48"x36" TIER 22 RATED HANDHOLE FOR TELECOM/FIBER CONDUIT. COORDINATE EXACT LOCATION WITH DUKE TELECOM IN FIELD PRIOR TO INSTALLATION.
- ② (3) 4" EMPTY CONDUIT WITH PULLSTRING FROM TELECOM ROOM TO HANDHOLE. (1) 4" CONDUIT WILL BE ROUTED TO THE "B" HANDHOLE AND THE OTHER (2) 4" CONDUITS WILL BE ROUTED TO THE "A" HANDHOLE. ALL 90° TURNS SHALL BE SWEEPING. COORDINATE EXACT STUB-UP LOCATION IN TELECOM ROOM AND ROUTING WITH TELECOM AND CIVIL DRAWINGS.
- ③ (1) 4" EMPTY CONDUIT WITH PULLSTRING FROM TELECOM ROOM TO CADMIUM POLE LOCATION IN YARD. COORDINATE EXACT STUB-UP LOCATION IN TELECOM ROOM AND ROUTING WITH CIVIL DRAWINGS. COORDINATE EXACT LOCATION OF CADMIUM POLE IN YARD WITH DUKE TELECOM PRIOR TO INSTALLATION.

DRAWING NO.
CFD-XXX-E-100-XXXXX



MAILING ADDRESS:
 P.O. BOX 1007
 CHARLOTTE, NC 28201

Safety Expectations:



DUNN OPERATIONS CENTER

1269 JONESBORO RD.
 HARNETT COUNTY, NC 28334

OPERATIONS BUILDING

MARK	DATE	DRN BY	REVISION
1	04.30.24	JFE	REV. CHANGES
2	03.22.23	JFE	REVISION
3	03.24.23	JFE	ISSUED FOR CONSTRUCTION

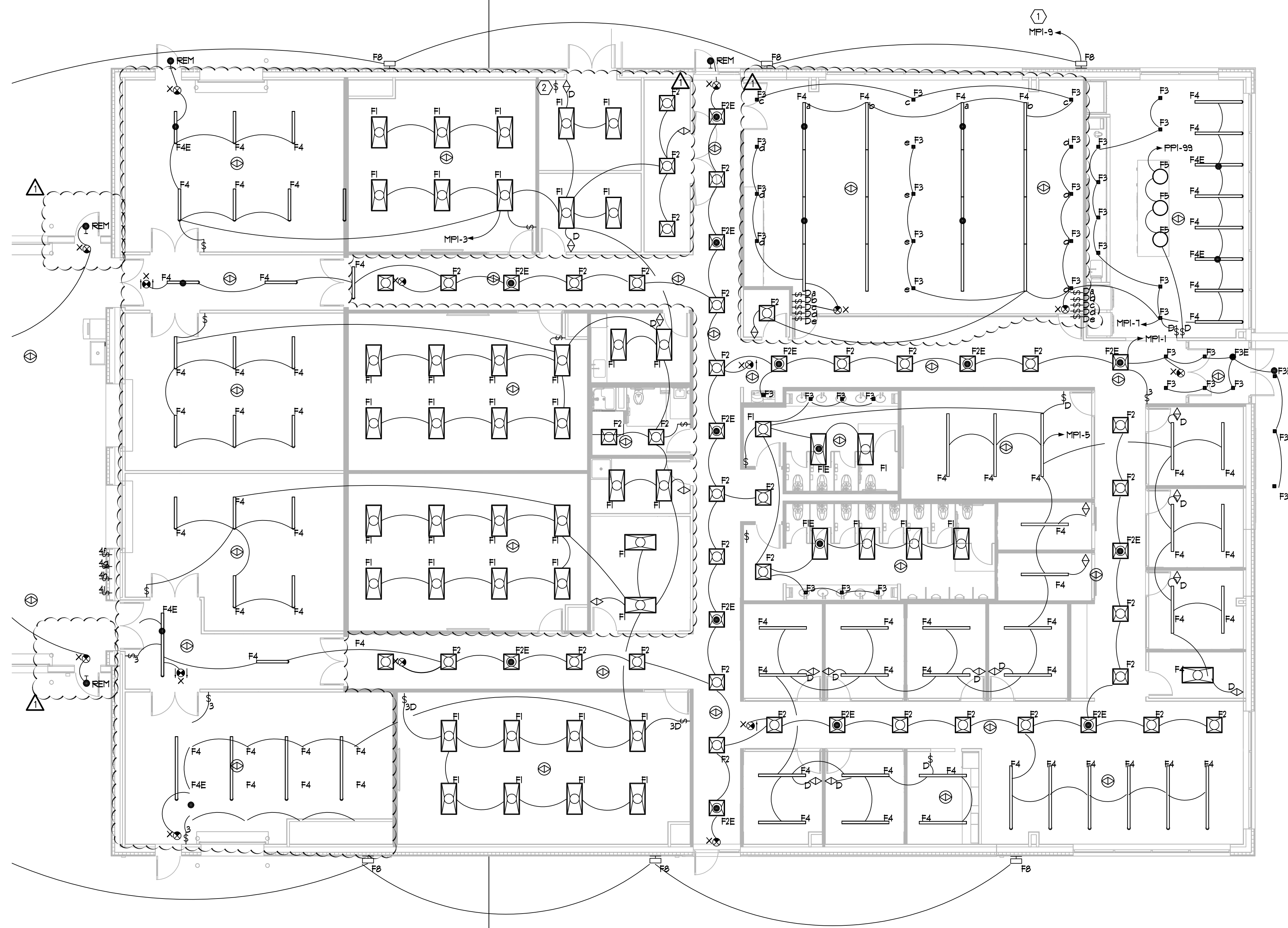
PROJECT NO:
 DRAWING NUMBER
CFD-XXX-E-100-XXXXX

ELECTRONIC FILE NAME:
 DRAWN BY: JFE
 CHK'D BY: JSL DATE:
 E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:
SITE PLAN - FIBER-TELCO CONDUIT

SHEET NO.
E-100.1



OPS CENTER FLOOR PLAN - LIGHTING
E-201B 1/8"=1'-0"

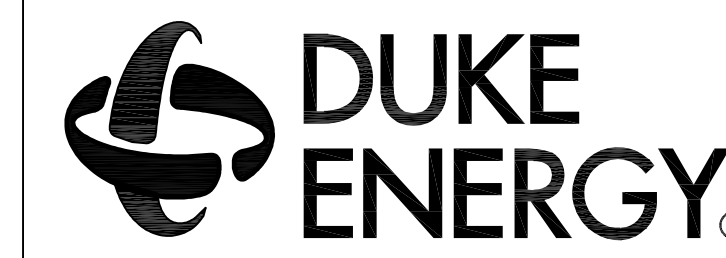
LEGEND NOTES:
(APPLY TO THIS SHEET ONLY)

- ① PROVIDE PHOTO CELL FOR CONTROL.
- ② OVERRIDE FOR EXTERIOR LIGHTS.

GENERAL NOTES:
(APPLY THIS SHEET ONLY)

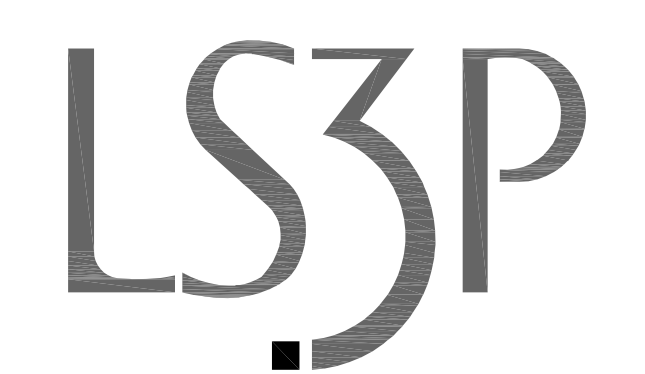
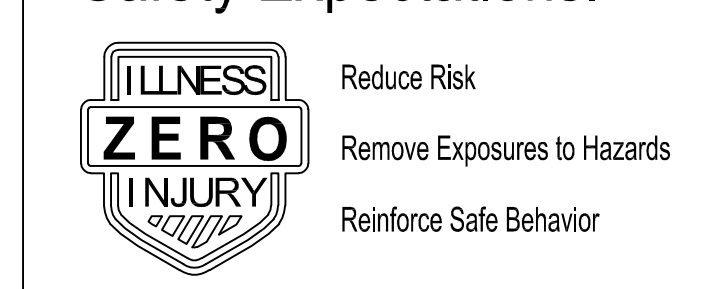
1. COORDINATE EXACT LOCATION AND MOUNTING HEIGHTS WITH ARCHITECTURAL PLANS. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS, DETAILS, AND LIGHTING NOTES FOR FURTHER INFORMATION OF DEVICE PLACEMENT AND OTHER RELEVANT INFORMATION.
2. ALL SWITCHES FOR LIGHTS, SHADES, ETC. WHICH ARE SHOWN TO BE MOUNTED IN THE SAME GENERAL AREA SHALL BE GANGED TOGETHER AND SHARE A MULTI-GANG COVER PLATE WHERE POSSIBLE.
3. REFER TO SHEET E-101B FOR LOCATION OF ELECTRICAL DISTRIBUTION PANELS.
4. ALL EXIT SIGNS ARE TYPE 'X' UNLESS OTHERWISE NOTED.
5. WALL MOUNTED OCCUPANCY SENSORS W/ SINGLE OVERRIDE SHALL BE LUTRON #MS-OPS6M2-DV-WH. WALL MOUNTED OCCUPANCY SENSORS W/ DUAL OVERRIDE SHALL BE LUTRON #MS-OPS6-DDV-WH.
6. THE CEILING MOUNTED OCCUPANCY SENSOR IS TO BE LUTRON LOS-CDT-2000-WH OR APPROVED EQUAL. PROVIDE POWER PACK AS REQUIRED TO COMPLETE SYSTEM. CONNECT TO THE SUPPLY SIDE OF THE SWITCH IN THIS SPACE. DEVICE SHALL CONTROL ALL SWITCHES IN THIS SPACE (I.E. SWITCHES SHALL BE ON THE LOAD SIDE OF THE SENSOR).
7. CONTRACTOR TO CLEAN AND RE-LAMP ALL EXISTING AND/OR RELOCATED FIXTURES.
8. PROVIDE NEW DISCONNECTING MEANS AS REQUIRED FOR ALL DISCONNECTED/ RECONNECTED RELOCATED FLUORESCENT LIGHT FIXTURES PER NEC 410.130.G.
9. LOWER CASE LETTERS IN LIGHTING FIXTURES AND ADJACENT TO SWITCHES IN EACH INDIVIDUAL ROOM/AREA INDICATE WHICH LIGHT FIXTURE IS TO BE CONTROLLED FROM EACH CORRESPONDING SWITCH IN THAT ROOM/AREA.
10. ALL CONTROL CABLING PROVIDED AS A PART OF ANY LIGHTING CONTROL SYSTEM SHALL BE PLENUM RATED.
11. CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES, WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION.

DRAWING NO.
CFD-XXX-E-201B-XXXXX



MAILING ADDRESS:
P.O. BOX 1007
CHARLOTTE, NC 28201

Safety Expectations:



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BWA JOB # 2022-0632



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OPERATIONS BUILDING

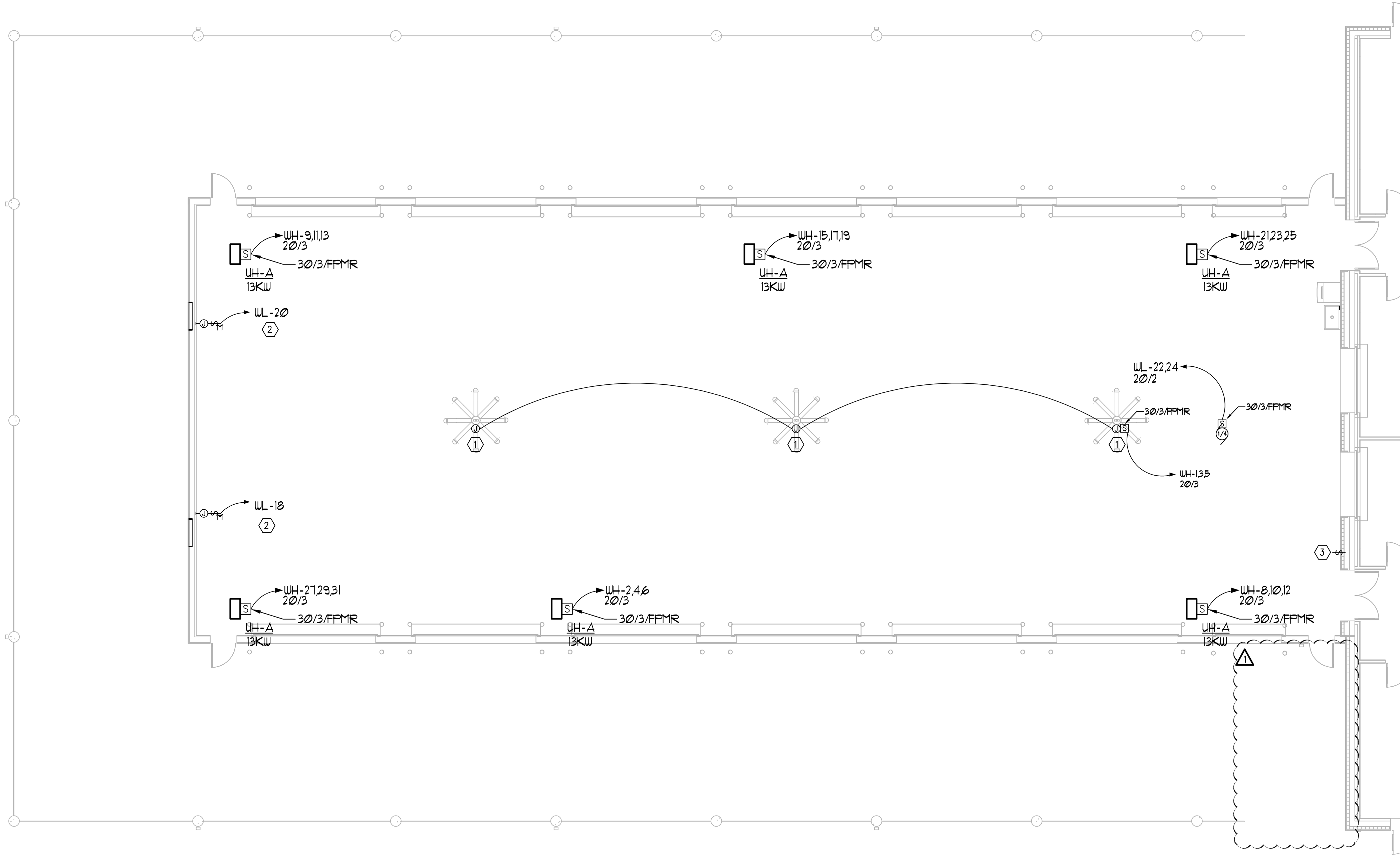
REVISION	DATE	ISSUED FOR CONSTRUCTION
	09/22/23	
	09/24/23	

PROJECT NO:
DRAWING NUMBER
CFD-XXX-E-201B-XXXXX

ELECTRONIC FILE NAME:
DRAWN BY: JFE
CHK'D BY: JSL DATE:
E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:
OPS CENTER PLAN - LIGHTING

SHEET NO.
E-201B

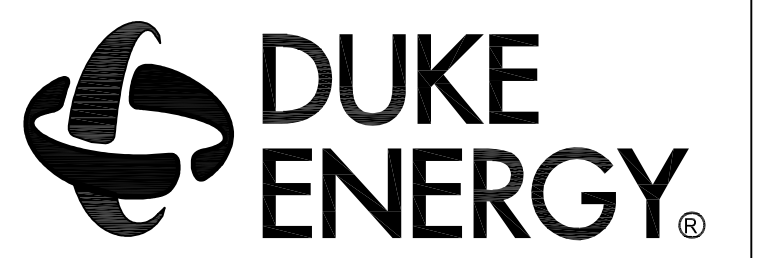


1 TRUCK BAY FLOOR PLAN – MECHANICAL CONNECTIONS
 E-301A 1/8"=1'-0"

- LEGEND NOTES:**
(APPLY THIS SHEET ONLY)
- ① PROVIDE JUNCTION BOX FOR CEILING FAN.
 - ② LOUVER MOTOR. PROVIDE 120V CONNECTION AND JUNCTION BOX. COORDINATE WITH HVAC CONTRACTOR.
 - ③ FAN CONTROL SWITCH. COORDINATE EXACT REQUIREMENTS WITH FAN MANUFACTURER.

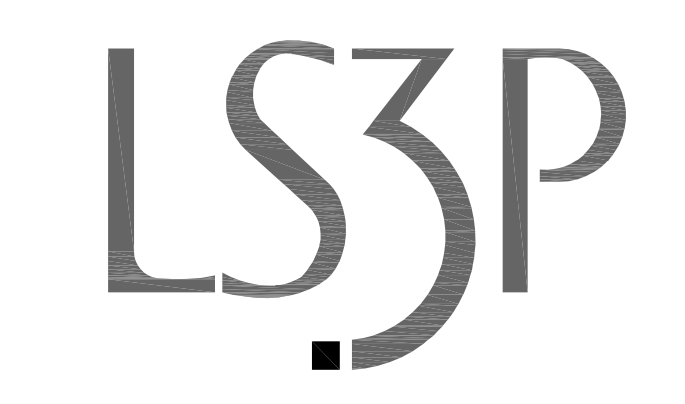
- GENERAL NOTES:**
(APPLY THIS SHEET ONLY)
1. COORDINATE ALL EQUIPMENT LOCATIONS AND CONNECTION REQUIREMENTS WITH THE HVAC CONTRACTOR (DIV23) AND/OR PLUMBING CONTRACTOR (DIV22) PRIOR TO INSTALLATION.
 2. HATCHED AREA NOT IN THIS SCOPE OF WORK.
 3. "E" DENOTES EXISTING DEVICE TO REMAIN. "R" DENOTES EXISTING DEVICE TO BE RELOCATED.
 4. CIRCUIT HOMERUN DESIGNATIONS ARE NOTED FOR DESIGN INTENT ONLY BASED ON FIELD OBSERVATIONS OF EXISTING PANEL SCHEDULES, WHERE AVAILABLE. CONTRACTOR TO CONFIRM ALL SPARE CIRCUIT BREAKERS AND THOSE MADE AVAILABLE DUE TO DEMOLITION.
 5. REFER TO SHEET E-101A FOR LOCATION OF ELECTRICAL DISTRIBUTION PANELS.

DRAWING NO.
CFD-XXX-E-301A-XXXXX

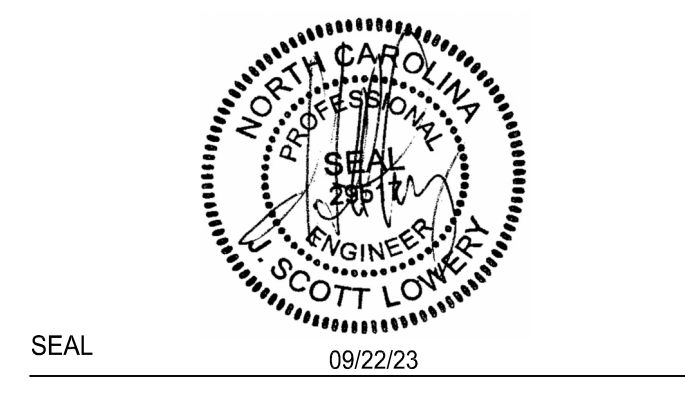


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Safety Expectations:



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 BWA JOB # 2022-0632



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HARNETT COUNTY, NC 28334

OPERATIONS BUILDING

REVISION	DATE	ISSUED FOR CONSTRUCTION
	09/22/23	
	09/24/23	

PROJECT NO:
DRAWING NUMBER
CFD-XXX-E-301A-XXXXX

ELECTRONIC FILE NAME:
DRAWN BY: JFE
CHK'D BY: JSL DATE:
E-MAIL: SLOWERY@BARRETTWOODYARD.COM

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SHEET TITLE:
TRUCK BAY FLOOR PLAN - MECHANICAL CONNECTIONS

SHEET NO.
E-301A

