SECTION 260000 - ELECTRICAL GENERAL CONDITIONS

PART 1 GENERAL
1.01 SUMMARY
A. This Section supplements all Sections of the Specifications for Division 26, Division 27, and Division 28 and shall apply to all phases of work hereinafter specified, shown on the Drawings, or required to provide a complete installation of approved electrical systems.
B. The Drawings, General Conditions and General Provisions of the Contract apply to this Section and the other Sections of Division 26, Division 27, and Division 28 of the specifications. Where conflicts arise between these documents, the more stringent provision will be applicable, subject to the interpretation of the Engineer.
C. Furnish all labor, material, services, and skilled supervision necessary for the construction, erection, installation, connections, testing, and adjustment of all materials and electrical equipment specified herein, or shown or noted on the Drawings, and its delivery to the Owner, complete in all respects and ready for use.
D. Where plans indicate fixtures or equipment will be furnished by this Contractor for installation by other Contractors, this Contractor shall furnish all such equipment, complete in all respects and ready for installation. Drawings, instructions, and manuals supplied with equipment shall be carefully preserved and turned over to the installing Contractor.
E. Where plans indicate fixtures or equipment will be furnished by others, this Contractor shall provide all rough-in and supplies and shall connect such equipment to the electrical system. Drawings, instructions, and manuals supplied with equipment shall be carefully preserved and turned over to the Architect.
1.02 DEFINITIONS
A. Work: The construction and services required by the Contract Documents whether completed or partially completed and includes all labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The work may constitute the whole or a part of the project.
B. Furnish: To supply and deliver, unload, and inspect for damage.
C. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, connect, and place into operation into the work.
D. Provide: To furnish and install.
E. Connect: To bring service to the equipment and make final attachment including necessary switches, outlets, boxes, terminations, etc.
F. Concealed: Hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces, or buried.
G. Exposed: Not installed underground nor concealed as defined.
H. Drawings: All plans, details, equipment schedules, diagrams, sketches, etc. issued for the construction of the work.
I. Conduit: Conduit, and all required fittings, pull boxes, hangers, and other supports and accessories related to such conduit.
1.03 CODES AND STANDARDS
A. Perform work in accordance with the applicable Building Code, Electrical Code, Fire Code, Mechanical Code, Plumbing Code, Energy Code, and all other applicable codes, amendments, and ordinances. Also perform all work in accordance with:
1. Occupational Safety and Health Administration (OSHA) Regulations.
2. Americans with Disabilities Act (ADA).
3. The Authority Having Jurisdiction.
4. Landlord requirements including Tenant Criteria Manuals and Lease Exhibits.
5. Utility company requirements.
B. Recognized Standards: Design, manufacture, testing and method of installation of all apparatus and materials furnished under the requirements of these Specifications shall conform to the latest publications or standard rules of Institute of Electrical and Electronic Engineers (IEEE), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories, Inc. (U.L.), National Fire Protection Association (NFPA), American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), National Electrical Code (NEC), National Electrical Safety Code (NESC), National Electrical Contractors Association (NECA), and American Institute of Steel Construction (AISC).
C. Code, Landlord, and utility company requirements supersede any requirements of the Drawings and/or Specifications. The Contract Documents take precedence where the Contract Documents exceed code, Landlord, utility, or recognized standards requirements.
1.04 PERMITS AND FEES: Permits, licenses, fees, inspections and arrangements required for the work under this Contract shall be obtained by the Contractor at his expense.
1.05 TEMPORARY SERVICES FOR CONSTRUCTION
A. Provide a temporary electrical service, including all required equipment such as transformers, generators and fuel, panelboards, etc. as required by all trades. Coordinate power requirements for the temporary service with the General Contractor and the utility company prior to the start of construction. The Contractor is responsible to develop all temporary service plans and specifications as required by the Authority Having Jurisdiction, submit those plans and specifications as required by the Authority Having Jurisdiction, and to pay for all temporary service energy consumption.
B. Provide all temporary lighting necessary to provide lighting levels in compliance with OSHA Regulations and as required by all trades.
1.06 CONTRACT DRAWINGS
A. Obtain, fully understand, and coordinate the work with the complete set of Contract Documents. Any required corrections, including all associated costs, arising from lack of coordination with the complete set of Contract Documents is the Contractor's sole responsibility.
B. Work under these Sections is diagrammatic and is intended to convey the scope of work and indicate the general arrangement of equipment, conduit, and outlets. Obtain instructions from the Architect/Engineer prior to rough-in wherever a question exists as to the exact intended location of outlets or equipment.
C. Promptly report and discrepancies discovered within the Contract Documents. Failure of the Contractor to report discrepancies shall result in the resolution becoming the Contractor's responsibility and subject to the Architect/Engineer's review and possible rejection. Should the Architect/Engineer reject a discrepancy resolution of which they were not notified, the Contractor is fully responsible to correct the installation, including all associated costs, until approval of the installation is given by the Architect/Engineer.
1.07 SUBMITTALS FOR ENGINEER REVIEW:
A. Furnish the following submittals to the Architect for review by the Engineer:
1. Product data for floor boxes and all associated cover plates and flanges.
2. Product data and shop drawings for remote control switching devices.
3. Product data for contactors and relays.
4. Product data and shop drawings for lighting control devices.
5. Product data and shop drawings for central dimming systems.
6. Shop drawings for low voltage transformers.
7. Shop drawings for switchboards.
8. Shop drawings for panelboards.
9. Shop drawings for motor control centers.
10. Product data and shop drawings for electrical service entrance equipment.
11. Product data for multi-outlet assemblies.
12. Product data for enclosed switches.
13. Product data for enclosed controllers.
14. Product data and shop drawings for variable frequency drives.
15. Product data and shop drawings for lighting inverters.
16. Product data and shop drawings for surge protective devices.
17. Product data for interior lighting.
18. Product data for exterior lighting.
19. Product data and shop drawings for telephone and data systems.
20. Product data and shop drawings for television systems.
B. Use manufacturer's specification sheets identified by number indicated on drawings or schedules.
C. Indicate catalog number on the cut sheets.
D. Submittals other than those listed above will not be reviewed and will be returned stating such.
E. Submittals are reviewed only for general compliance with the Contract Documents. Dimensions, quantities and details are not checked during submittal review. Review of the submittals does not relieve the Contractor of the responsibility for providing all materials, equipment and accessories necessary for a complete and operational system meeting the requirements of the project and the intent of the Contract Documents. The responsibility for coordination of substituted materials and equipment lies solely with the substituting Contractor.
1.08 QUALITY ASSURANCE
A. All components shall be listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose and free of all rust/corrosion or any visible damage. All items not complying with this requirement shall be replaced without any change in the Contract amount.
B. Unless otherwise specified, all equipment, devices, luminaires, and materials of the same type or classification and used for the same purpose shall be products of the same manufacturer. Use only new, un-weathered, and unused material, except as specifically noted.
C. Equipment performance and accessories shall be as indicated on the Drawings and/or specified herein. Inclusion in both locations is not a prerequisite to inclusion in the Contract; equipment and accessories specified in either location shall be included in the Contract. Provide all necessary accessories and components required for a complete, functional system, including all required components reasonably inferred to as necessary although such components may or may not be specifically indicated in the Contract Documents.
1.09 DELIVERY, STORAGE, AND HANDLING: Accept all materials on site and inspect for damage and protect from corrosion and entrance of debris. Handle all materials in accordance with manufacturer's instructions to avoid damage to internal components, enclosures, and finishes.
1.10 WARRANTY AND GUARANTEE: Provide complete parts and labor warranty and guarantee on all systems for a period of one year from Owner's acceptance of the completed facility. This warranty and guarantee shall cover all failures unless such failure is directly attributable to vandalism or causes other than defects in material or workmanship.

PART 2 PRODUCTS
2.01 CONDUCTOR TERMINATIONS: Provide conductor terminations rated at a minimum of 75 degrees C in all equipment.
2.02 SUBSTITUTIONS: The products specified in the Contract Documents constitute the Basis of Design for the Construction Documents and the minimum standards for quality, design, and functionality. Other products are permitted to be submitted, at the Contractor's option, during shop drawing review unless indicated otherwise. Any substitute products shall meet or exceed all requirements specified. Any costs and coordination issues arising out of any substitution, including coordination with all other contractors and subcontractors and any associated costs is the substituting contractor's sole responsibility.

PART 3 EXECUTION
3.01 COORDINATION OF WORK
A. Work lines and established heights shall be in strict accordance with architectural drawings and specifications. Verify all dimensions shown and establish all elevations and detailed dimensions not shown prior to rough-in.
B. Promptly report any difficulties encountered in the installation of the work which might prevent prompt and proper installation. Failure to report shall constitute an acceptance of the work of other trades as being fit and proper for the execution of this work.
C. Coordinate the work with all trades so that it proceeds without delay and minimizes interference to work that is in progress or has not been completed. Conflicts arising from lack of coordination shall be this Contractor's responsibility. The Electrical Contractor shall pay for all extra cutting and patching necessary by any lack of coordination.
D. Arrange all conduit runs in such a manner that it does not interfere with grilles, diffusers, outlet boxes, luminaires, or other items while providing for maximum headroom. Maintain access to equipment requiring service when selecting mounting elevations.
E. Afford other trades reasonable opportunity for the execution of their work and connect the work of other trades as to not delay or interfere with their work.
F. Explicitly follow all manufacturer's installation instructions and promptly report any conflicts between the manufacturer's installation instructions and the Contract Documents.
G. Provide all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure and complete installation.
H. Verify and coordinate all requirements and installation details of all materials and equipment prior to rough-in. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other Sections. Determine connection locations and requirements, sequence rough-in of electrical connections to coordinate with installation of equipment, sequence electrical connections to coordinate with start-up of equipment, and verify that proper power supply is available prior to subcontractor's ordering equipment. Verify proper voltage, phase, and current rating of power supply and report any discrepancies prior to order, connection of equipment, or start-up. Responsibility for verification of proper power supply voltage and any damage resulting from incorrect connections shall rest with this Contractor and any conflicts arising from lack of coordination shall be this Contractor's responsibility.
3.02 ACCESS TO EQUIPMENT: Install all equipment, starters, switches, receptacles, and boxes so that all parts are easily accessible for inspection, operation, maintenance, and repair. Provide access doors, fire rated where required, for concealed equipment.
3.03 CUTTING, PATCHING, AND PIERCING
A. Cut all openings in a neat workmanlike manner, only as large as required for the installation, and leave surfaces around openings smooth and finished to match surrounding surface.
B. Patch existing finished surfaces and building components using new materials matching existing materials.
C. Fire and/or Smoke Rated Assemblies: Become familiar with all fire and/or smoke rated construction and install work to maintain the integrity of those ratings.
D. Roof Penetrations: Coordinate with the Roofing Contractor to provide any required roof penetrations.
3.04 FIELD QUALITY CONTROL
A. Install all equipment, devices, luminaires, and materials plumb, level, securely, and in a neat and workmanlike manner in accordance with NFPA 70 and all applicable NECA and NEMA standards.
B. Adjust all flush mounted equipment, boxes, cabinets, and enclosures such that they are flush with finished wall or flooring material.
C. Replace or refinish damaged equipment, devices, luminaires, materials, and surfaces where marring or disfigurement has occurred.
D. Clean electrical parts to remove harmful materials. Clean exposed surfaces of all equipment, devices, luminaires, and materials and the interior of all boxes, enclosures, and cabinets of all foreign materials.
E. Paint all electrical equipment and materials located on exterior walls, on the roof where exposed to view, where visible from 6'-0" above grade from any property line, and all exposed conduit to match the surrounding surfaces. Coordinate paint color with the Architect.
3.05 TESTING AND INSPECTION
A. Testing: Test the entire system under operating conditions over a sufficient period of time to establish the adequacy, quality, safety, completed status, and suitable operation of all equipment, devices, systems, etc.
B. Inspection: Obtain all required certificates of inspection and approval.
3.06 PROJECT CLOSEOUT
A. Project Record Documents: Provide one printed copy and one electronic copy of project record drawings to the Owner. Project record drawings shall reflect the actual "as-built" conditions and shall include locations of all equipment, devices, and luminaires, circuiting arrangements, routing of all underfloor conduits, routing of conduits larger than 2 inches, locations and mounting heights of all outlet, pull, and junction boxes, locations of all items requiring maintenance and inspection, and locations of components and circuiting and switching arrangements of lighting controls.
B. Operation and Maintenance Data: Provide one printed copy and one electronic copy of operation and maintenance data for all equipment, devices and luminaires to the Owner. Operation and maintenance data shall include manufacturer's cut sheets, maintenance procedures, recommended maintenance intervals, wiring diagrams, parts lists, manufacturers' warranties, certificates, and test reports of each item installed.
C. Maintenance Materials: Provide to the Owner two keys for each different enclosure and cabinet, including panelboards, two spare fuses of each type and size, and one fuse puller.
D. Test Reports: Provide one printed copy and one electronic copy of all completed test reports to the Owner.

END OF SECTION

SECTION 260501 - ELECTRICAL DEMOLITION

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 MATERIALS AND EQUIPMENT: Materials and equipment for patching and extending work as specified in individual Sections.

PART 3 EXECUTION
3.01 EXAMINATION
A. Visit the project site, review existing conditions against the Contract Documents, and familiarize himself with the work prior to bidding and start of the work. Verify existing conditions, field measurements, and circuiting arrangements are as indicated and that abandoned wiring and equipment serve only abandoned facilities. By signing the Contract, the Contractor acknowledges the site visit has been completed and the existing conditions are accepted.
B. Promptly report any field discrepancies. The Contractor assumes full responsibility for adjusting for discrepancies of which the design team is not informed.
C. Any demolition work indicated on the Drawings is intended to convey the scope of the demolition work involved. If demolition plans are not included with the Drawings, the Contractor is responsible to demolish existing as required to allow for installation and construction of the work.
D. Commencement of work means Contractor accepts existing conditions.
3.02 PREPARATION
A. Disconnect electrical systems in walls, floors, and ceilings that are removed.
B. Protect and safeguard any existing service lines and utility structures.
C. Coordinate utility service outages with utility company and the Owner.
D. Provide temporary wiring and connections to maintain existing systems in service as required for the sequencing of the work or the Owner's need for continued operations.
E. Maintain all existing power, telephone, and fire alarm systems in service until new system is fully operational, tested, and ready for service. Notify all stakeholders (Owner, Authority Having Jurisdiction, utility company, Landlord, etc.) at least 48 hours before partially or completely disabling system, disable systems only to make switchovers and connections, and minimize all outage durations.
3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK
A. Maintain continuity of circuits as needed to provide power to remaining devices, fixtures, or equipment not being removed.
B. Remove, relocate, and extend existing installations as required to accommodate new construction. Extend existing installations using materials and methods compatible with existing electrical installations or as specified and required by Code.
C. Remove all abandoned wiring, including all abandoned telecommunications and other low voltage cabling, to source of supply.
D. Remove exposed abandoned conduit and abandoned conduit above accessible ceilings. Cut abandoned concealed conduit flush with walls and floors.
E. Disconnect and remove all devices, boxes, distribution equipment, luminaires, and all associated mounting hardware and appurtenances that are not required to remain.
F. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.
G. Dispose of all equipment not reused as part of the work. The Owner shall have first salvage rights on all materials and equipment.
3.04 CLEANING AND REPAIR
A. Repair construction and finishes damaged during demolition and extension work.
B. Patch all openings resulting from the installation or removal of electrical equipment or materials.
C. Clean and repair existing materials and equipment that remain or that are to be reused.
D. Existing and Relocated Panelboards: Clean exposed surfaces, remove all foreign material from interiors, check tightness of electrical connections, replace damaged circuit breakers, and provide closure plates for vacant positions.
E. Existing and Relocated Luminaires: Clean luminaire reflectors and lenses per manufacturer's recommendations, replace all lamps with new, replace any expired ballasts, and repair any broken electrical parts. Replace any existing luminaires with identical luminaire for any existing luminaires that are damaged beyond repair.

END OF SECTION

SECTION 260519 - CONDUCTORS AND CABLES

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 BUILDING WIRE AND CABLES
A. Provide single conductor building wire installed in raceway unless indicated otherwise, otherwise permitted, or otherwise required.
B. All conductors shall be copper conductors with 600V insulation; type THHN for dry and damp locations and type THWN-2 for wet locations.
C. Metal Clad Cable (Type MC): Permitted only for branch circuits in concealed locations and only when approved by applicable codes and amendments and the Authority Having Jurisdiction. Exposed MC Cable is not permitted; no exceptions.
1. All MC Cable sheaths shall be listed and identified for grounding.
2. All MC Cable shall be equipped with copper equipment grounding conductor. No exceptions.
D. Nonmetallic-Sheathed Cable (Type NM): Type NM-B permitted only for branch circuits in concealed locations within individual dwelling units and only when approved by applicable codes and amendments and the Authority Having Jurisdiction. Exposed NM Cable and NM Cable used outside individual dwelling units is not permitted; no exceptions.
E. Use solid or stranded conductors for all conductors 10 AWG and smaller. Use stranded conductors for all conductors 8 AWG and larger.
F. Wire Sizes:
1. Use 12 AWG conductors, minimum, for all circuits unless indicated otherwise or as modified as follows:
a. 20A, 120V circuits longer than 75 feet: 10 AWG to offset voltage drop.
b. 20A, 120V circuits longer than 150 feet: 8 AWG to offset voltage drop.
c. 20A, 277V circuits longer than 150 feet: 10 AWG to offset voltage drop.
2. Wire sizes indicated on the Drawings or indicated above shall be carried through the entire circuit to the furthest outlet box on the associated circuit unless indicated otherwise.
a. Where a circuit splits into multiple branches, the wire size shall be carried through the entirety of each branch to the furthest outlet box on each branch unless indicated otherwise.
2.02 CONTROL CABLES
A. All control cable conductor sizes, quantities, stranding, and shielding as recommended by the manufacturer and required for the installation but no smaller than 18 AWG.
B. Horizontal Applications in Conduit: Type CL2 unless otherwise required.
C. Horizontal Applications not in Conduit: Type CL2P unless otherwise required.
D. Riser Applications: Type CL2R unless otherwise required.
2.03 COMMUNICATIONS CABLES: See Section 271005.
2.04 WIRING CONNECTORS
A. Use twist-on insulated spring connectors, mechanical connectors, or compression connectors for conductor sizes 8 AWG and smaller. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
B. Use mechanical connectors or compression connectors for conductor sizes 6 AWG and larger.
C. Use crimped terminals for all control circuit conductor connections.

PART 3 EXECUTION
3.01 PREPARATION: Clean raceways thoroughly to remove foreign materials before installing conductors and cables.
3.02 COLOR CODING
A. Color code conductors as follows and maintain consistent color coding throughout project including branch circuit conductors.
1. 480Y/277 V, 3 Phase, 4 Wire System
a. Phase A: Brown
b. Phase B: Orange
c. Phase C: Yellow
d. Neutral/Grounded: Gray
2. 208Y/120 V, 3 phase, 4 Wire System
a. Phase A: Black
b. Phase B: Red
c. Phase C: Blue
d. Neutral/Grounded: White
3. Equipment Ground: Green
3.03 INSTALLATION
A. Circuit routing indicated is diagrammatic. Arrange circuiting to minimize splices and include circuit lengths required to install connected devices within 10 feet of location shown.
B. Combining branch circuits in a single raceway is permitted under the following conditions:
1. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
2. Increase size of conductors as required to account for ampacity derating.
3. Size raceways, boxes, etc. to accommodate conductors.
C. Neutral Conductors:
1. Provide separate neutral conductors for:
a. Branch circuits protected by ground fault circuit interrupter (GFCI) circuit breakers.
b. Branch circuits protected by arc fault circuit interrupter (AFCI) circuit breakers.
c. Branch circuits protected by shunt trip circuit breakers.
d. Branch circuits fed from feed-through protection of GFCI receptacles.
e. Branch circuits with dimming controls.
f. Branch circuits that serve emergency lighting equipment such as emergency batteries or emergency lighting unit equipment.
g. Where indicated by the wire counts shown on the Drawings.
2. Multiwire branch circuits (shared neutrals) are permitted where not otherwise indicated.
a. Locate all multiwire branch circuits in vertically adjacent panelboard pole spaces and provide circuit breaker handle ties to simultaneously disconnect all ungrounded circuit conductors.
D. Pull all conductors together into raceway at same time, do not damage conductors or exceed manufacturer's recommended maximum pulling tension or sidewall pressure, and use suitable wire pulling lubricant where recommended by the manufacturer.
E. Secure and support conductors and cables in accordance with NFPA 70 using supports and methods approved by the Authority Having Jurisdiction. Provide independent support from building structure; do not support from raceways, piping, ductwork, suspended ceiling support systems, or other systems and do not allow conductors or cables to lay on ceiling tiles.
F. Cut all cables per the manufacturer's recommendations and terminate using suitable fittings including anti-short, insulated bushings where applicable.
G. Provide a minimum of 12 inches of slack at each outlet. Provide a minimum of 5 feet of slack where conductors are installed in enclosures for future termination by others.
H. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
I. Make wiring connections using specified wiring connectors and make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies.
J. Do not remove conductor strands to facilitate insertion into connector. Provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device, where conductors are larger than the equipment terminations can accommodate.
K. Insulate splices and taps that are made with uninsulated connectors using insulating covers specifically designed for the connectors, or electrical tape for dry or damp locations. Use heat shrink tubing for wet locations.
L. Provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.
M. Provide all control wiring and communications cabling, whether or not shown on the Drawings, per manufacturer's recommendations and as required for a complete and operational system.

END OF SECTION

SECTION 260526 - GROUNDING AND BONDING

PART 1 GENERAL
1.01 MAXIMUM GROUNDING SYSTEM RESISTANCE: 5 ohms.

PART 2 PRODUCTS
2.01 ROD ELECTRODES: Copper, 3/4 inch diameter, 10 foot long solid rods. Sectional rods are not permitted.
2.02 CONCRETE ENCASED ELECTRODES: 4 AWG, 20 foot long bare copper wire.
2.03 WIRE: Copper wire sized to meet NFPA 70 requirements.
2.04 CONNECTORS AND ACCESSORIES: Copper, copper alloy, or bronze mechanical connectors.

PART 3 EXECUTION
3.01 INSTALLATION OF GROUNDING ELECTRODE SYSTEM
A. As applicable to the project, provide all components required for a complete grounding electrode system including bonding of metal underground water pipe, metal frame of the building, concrete-encased electrode, metal aboveground water piping system, metal aboveground gas piping system, and rod electrode(s) per NFPA 70 requirements.
3.02 INSTALLATION OF EQUIPMENT GROUNDING SYSTEM
A. Without exception, provide insulated equipment grounding conductor sized per NFPA 70 requirements within each feeder and branch circuit raceway and terminate each end on suitable lug, bus, or bushing.
3.03 INSTALLATION OF ISOLATED GROUNDING SYSTEM
A. Provide an additional isolated grounding conductor for circuits serving isolated ground receptacles. Isolated grounding conductors shall be isolated from the isolated grounding receptacle to the isolated ground bus in the upstream panelboard.
3.04 TESTING
A. Measure grounding resistance using Fall of Potential Method or Signal Injection Method. Provide additional rod electrodes as required to reduce grounding resistance to less than the specified maximum permitted value.

END OF SECTION

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 HANGERS AND SUPPORTS
A. Corrosion-resistant materials of size and type adequate to carry the supported weight, including the weight of wire in conduit; do not use perforated pipe strap as a means of support.
2.02 ANCHORS AND FASTENERS
A. Use precast inserts, preset inserts, expansion anchors, or self-drilling anchors as approved by the Structural Engineer for concrete elements.
B. Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners for steel elements.
C. Use toggle bolts or hollow wall fasteners for hollow masonry, plaster, and gypsum board partitions.
D. Use expansion anchors or preset inserts for solid masonry walls.
E. Use sheet metal screws for sheet metal elements and wood screws for wood elements.

PART 3 EXECUTION
3.01 INSTALLATION
A. Provide all required blocking and supplemental framing required to secure support all materials.
B. Fasten supports to building structure and surfaces only. Do not fasten supports to pipes, ducts, mechanical equipment, conduit, or ceiling suspension wires.
C. Obtain permission from Structural Engineer before drilling or cutting structural members or before using powder-actuated anchors.
D. Rigidly weld support members or use hex-bolts to present neat appearance with adequate strength and rigidity. Provide lock washers under all nuts.
E. Install surface-mounted cabinets and panelboards with minimum of four anchors.
F. Provide steel channel supports behind cabinets and panelboards located in damp or wet locations to stand enclosures off wall.
G. Provide supports for all low voltage wiring not routed in conduit.

END OF SECTION

SECTION 260534 - CONDUIT AND WIREWAYS

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 CONDUIT
A. Size: As required by NFPA 70 for the conductors installed but no smaller than specified.
1. Sizes Indicated on the Drawings:
a. Any conduit sizes indicated to a utility transformer are based on Schedule 80 PVC conduit.
b. Any conduit sizes indicated to the primary or secondary of a dry-type transformer are based on Flexible Metal Conduit (FMC).
c. All other conduit sizes are based on Electrical Metallic Tubing (EMT).
d. The Contractor is responsible to adjust conduit sizes as required when a different conduit type is used.
B. Underground: 3/4 inch minimum rigid metal conduit, intermediate metal conduit, Schedule 80 PVC, or Schedule 40 PVC. Metal conduits shall be galvanized or PVC coated.
C. Outdoor Locations above Grade: 1/2 inch minimum rigid metal conduit or intermediate metal conduit. Nonmetallic conduit is not permitted above grade. Conduits shall be galvanized or PVC coated.
D. Within Slabs above Grade: 3/4 inch minimum rigid metal conduit, intermediate metal conduit, or Schedule 80 PVC. Metal conduits shall be galvanized or PVC coated. Coordinate with the Structural Engineer for restrictions and limitations on conduits installed in slabs above grade.
E. Exposed Wet and Damp Locations: 1/2 inch minimum rigid metal conduit or intermediate metal conduit. Conduits shall be galvanized or PVC coated.
F. Connections to Vibrating Equipment and Luminaires in Dry Locations: 1/2 inch minimum flexible metal conduit.
G. Connections to Vibrating Equipment and Luminaires in Damp and Wet Locations: 1/2 inch minimum liquidtight flexible metal conduit.
H. All Other Dry Locations: 1/2 inch minimum rigid metal conduit, intermediate metal conduit, or electrical metallic tubing.
2.02 FITTINGS: Provide listed fittings identified for use with the conduit.
2.03 WIREWAYS: Square D Class 5100 Type LDB for dry locations or Square D Class 5100 Type LDR for damp and wet locations unless indicated otherwise; size as required by NFPA 70 based on conductor fill and bending radius requirements.

PART 3 EXECUTION
3.01 INSTALLATION
A. Conceal all conduit in all interior and exterior areas, including exposed structure areas, unless the Architect provides specific approval permitting the use of exposed conduit.
B. Route any exposed conduit parallel and perpendicular to walls.
C. Subject to the Architect's approval, conduit located above ceilings is permitted to be routed point-to-point provided it is secured and supported per NFPA 70 requirements and complies with all applicable Codes and other requirements of the specifications.
D. Do not embed conduit in slabs-on-grade. Locate conduit a minimum of 2 inches below the bottom surface of the slab to avoid future damage from cutting of the floor slab.
E. Route conduit in slabs-above-grade from point-to-point. Do not cross conduits embedded in slabs.
F. Route underground conduit from point-to-point and at a burial depth in compliance with NFPA 70, local code, and utility company requirements.
G. Arrange conduit to maintain headroom and present neat appearance and arrange supports to prevent misalignment during wiring installation.
H. Secure and support all conduit in compliance with NFPA 70 requirements and group adjacent conduits on steel channel racks and trapezes.
I. Provide 12 inches of clearance between conduit and piping or surfaces with temperatures exceeding 104 degrees F.
J. Install no more than equivalent of three 90 degree bends between boxes.
K. Provide sleeves when penetrating footings, masonry walls and floors and seal all penetrations through footings and floors water tight.
L. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
M. Provide suitable pull string in each empty conduit except sleeves and nipples.
N. Provide caps to protect installed conduit against entrance of dirt and moisture.
O. Secure wireway to building surfaces and close ends of wireway and unused conduit openings.
P. Ground and bond conduit and wireways as required by NFPA 70.

END OF SECTION

SECTION 260537 - BOXES

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 ALL BOXES
A. Nonmetallic boxes are not permitted unless indicated otherwise or without specific written approval from the Architect.
B. Provide all required box hangers and supports, extension rings, mud rings, etc. for a complete and secure installation.
C. Use gang boxes where more than one device is mounted together; do not use sectional boxes.
2.02 OUTLET AND SMALL JUNCTION BOXES
A. Dry and Damp Locations: Galvanized NEMA OS 1 stamped steel box rated for the weight of the equipment supported and sized per NFPA 70 requirements for the device(s) and conductors installed within.
B. Wet Locations: Galvanized cast metal NEMA FB 1 Type FD box with gasketed cover and threaded hubs and sized per NFPA 70 requirements for the device(s) and conductors installed within.

PART 3 EXECUTION
3.01 INSTALLATION
A. Install in locations indicated and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
B. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
C. Install outlet boxes for all wall-mounted wiring devices at heights indicated in Section 262726 unless indicated otherwise. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes prior to rough-in.
D. Use flush boxes in finished areas. Do not install flush boxes back-to-back in walls; provide minimum 6 inches and one stud separation.
E. Locate flush boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
F. Install all wall-mounted boxes plumb and level.
G. Install all ceiling-mounted boxes level and oriented parallel with building lines and ceiling grid tees where applicable.
H. Install all floor boxes level and oriented parallel with building lines and tile grout lines where applicable.
I. Vertically align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
J. Install concealed boxes within 6 inches from ceiling access panels, air distribution diffusers, or removable recessed luminaires.
K. Support boxes independently of conduit; do not support boxes from ceiling support wires.
L. Install knockout closures in unused box openings.
M. Install cover plates on boxes; see Section 262726 for cover plate specifications.
N. Ground and bond boxes as required by NFPA 70.

END OF SECTION

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 NAMEPLATES: Engraved laminated plastic with 1/8 inch letters on contrasting background.
2.02 LABELS: As required by regulatory agencies.
2.03 WIRE MARKERS: Cloth, tape, split sleeve, or tubing type.

PART 3 EXECUTION
3.01 NAMEPLATES: Provide nameplates with the unique equipment designation at each electrical distribution and control equipment enclosure, communication cabinet, and control device station.
3.02 WARNING LABELS: Provide all regulatory required and industry standard warning labels on all electrical equipment, including high-voltage, tested series rated combination, and arc flash hazard labeling.
3.03 WIRE MARKERS: Provide wire and cable markers at panelboard gutters, pull boxes, outlet boxes, and junction boxes for each load connection. Indicate branch circuit or feeder number indicated on Drawings and control wire number indicated on shop drawings.
3.04 COLOR CODE LEGEND: Provide identification label identifying conductor color codes at each piece of feeder or branch-circuit distribution equipment.
3.05 INSTALLATION
A. Install nameplates and labels parallel to equipment lines.
B. Secure nameplates for distribution equipment visible to the public to the inside surface of door.
C. Secure nameplates for distribution equipment not visible to the public to the front of the enclosure using screws, rivets, or adhesive.

END OF SECTION

SECTION 260595 - FIRE STOPPING

PART 1 GENERAL
1.01 PREPARATION: Examine the complete set of Drawings and identify all fire rated partitions, floors and assemblies and identify appropriate firestopping method for the assembly.

PART 2 PRODUCTS
2.01 FIRESTOPPING ASSEMBLIES: Use only systems listed by UL or FM or tested in accordance with ASTM E 814 or ASTM E 119 that have F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating.
2.02 MATERIALS: Elastomeric silicone firestopping, foam firestopping, fibered compound firestopping, fiber packing material, mechanical firestop devices, intumescent putty, and firestop pillows are permitted.

PART 3 EXECUTION
3.01 INSTALLATION
A. Comply with firestopping manufacturer's recommendations for temperature and other environmental conditions before, during, and after installation. Provide ventilation in areas where solvent-cured materials are being installed.
B. Protect adjacent surfaces from damage by material installation.
C. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material. Remove incompatible materials which may affect bond. Install backing materials to arrest liquid material leakage.
D. Apply the appropriate fire stopping materials and systems to maintain the fire rating of the partition, floor, or ceiling assembly being penetrated.
E. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
F. Do not cover installed firestopping until inspected by Authority Having Jurisdiction.
G. Install any labeling required by code.
H. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 260913 - CONTACTORS AND RELAYS

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 CONTACTORS
A. Description: Square D Class 8903, Type L or Type S unless indicated otherwise or otherwise required.
B. Contacts:
1. Provide with quantity of normally open and normally closed contacts as required and a minimum of two spare poles.
a. Provide multiple contactors connected in parallel with one another when the number of contacts required exceeds the maximum capability of a single contactor.
2. Coordinate contact rating to match branch circuit overcurrent protection, considering derating for continuous loads, but no less than 30 amps.
C. Coil: Coordinate with the voltage of the control circuit.
D. Enclosure: Manufacturer's standard enclosure suitable for the environment in which the contactor is installed.
2.02 RELAYS
A. Description: Square D Class 8501 Type C unless indicated otherwise or otherwise required.
B. Contacts: Form C contacts rated at 30 amperes unless indicated otherwise.
C. Coil: Coordinate with the voltage of the control circuit.
D. Enclosure: Manufacturer's standard enclosure suitable for the environment in which the relay is installed.

PART 3 EXECUTION
3.01 INSTALLATION
A. Install individual controls and relays in enclosures adjacent to panelboard serving controlled circuits and make electrical wiring interconnections.
B. Provide all relays, contactors, interposing relays, and controls that are required but may not be shown to switch the loads in the manner indicated on the Drawings.
C. Provide nameplate for contactors indicating contactor number.

END OF SECTION

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 GENERAL
1.01 PREPARATION
A. Hold meeting with the Owner prior to commencing work.
1. Review zoning and make adjustments requested by the Owner.
2. Determine all timeclock settings such as ON and OFF times for each day of the week, holiday settings, latitude and longitude of the project site for astronomic features, etc.
3. Determine all control settings such as on and off triggers, blink warnings, sweep settings, switch programming, etc.

PART 2 PRODUCTS
2.01 ALL LIGHTING CONTROL DEVICES
A. Provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
B. All sensors shall be suitable for the geometrical and environmental characteristics of the associated space and be suitable for the floor area to be covered. Provide multiple sensors when necessary to meet the required room coverage.
2.02 INDOOR OCCUPANCY SENSORS
A. Wall Switch:
1. Single-Relay: Wattstopper #DSW-301 unless indicated otherwise.
2. Dual-Relay: Wattstopper #DSW-302 unless indicated otherwise.
3. Finish: As selected by the Architect.
2.03 TIMECLOCKS
A. Tork DZS series unless indicated otherwise.
B. Input Voltage: Coordinate with the voltage of the control circuit.
C. Enclosure: Manufacturer's standard enclosure suitable for the environment in which the timeclock is installed.
2.04 TIMER SWITCHES: Tork #SS403 unless indicated otherwise.

PART 3 EXECUTION
3.01 GENERAL INSTALLATION REQUIREMENTS
A. Provide all control wiring and communications cabling, whether or not shown on the Drawings, per manufacturer's recommendations and as required for a complete and operational system.
B. Program the entire system as established in meeting with the Owner.
3.02 INSTALLATION OF TIMECLOCKS
A. Install timeclocks adjacent to panelboard serving controlled circuits and make electrical wiring interconnections.
B. Provide all relays, contactors, interposing relays, and controls that are required but may not be shown to switch the loads in the manner indicated on the Drawings.
C. Provide nameplate for timeclocks indicating timeclock number.
3.03 INSTALLATION OF OCCUPANCY SENSORS AND MOTION SENSORS
A. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
B. Install ultrasonic and dual technology occupancy sensors a minimum of 4 feet from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.
C. Program occupancy sensors as MANUAL-ON, AUTOMATIC-OFF unless indicated otherwise.
D. Mask sensor lenses using the manufacturer's masking material as required to prevent false triggers.
E. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.
3.04 INSTALLATION OF POWER PACKS
A. Install power packs on junction box in accessible location above ceiling at the associated sensor.
B. Do not switch power serving power packs. All required switching shall occur on the load side of the power pack relay.
3.05 CLOSEOUT
A. Demonstrate proper operation of lighting control devices to the Owner and correct deficiencies or make adjustments as directed.
B. Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
C. Provide a written report of all program settings and photosensor settings to the Owner.

END OF SECTION

SECTION 262416 - PANELBOARDS

PART 1 GENERAL - NOT USED

PART 2 PRODUCTS
2.01 LIGHTING AND APPLIANCE PANELBOARDS
A. Circuit Breakers:
1. Bolt-on thermal-magnetic molded case circuit breakers with common trip handle for all poles.
a. Provide Type SWD for lighting circuits.
b. Provide Type HACR for heating, air-conditioning, and refrigeration equipment circuits.
c. Provide Class A ground-fault circuit interrupter (GFCI) where indicated or otherwise required.
d. Provide ground-fault protection of equipment (GFPE) where serving heat tracing or otherwise required.
e. Provide combination type arc-fault circuit interrupter (AFCI) where indicated or otherwise required.
f. Provide dual-rated combination type arc-fault circuit interrupter (AFCI) and Class A ground-fault circuit interrupter (GFCI) where indicated or otherwise required.
2. Accessories:
a. Provide handle ties for circuit breakers serving multiwire branch circuits.
b. Provide Square D #HLO1 handle clamps for circuit breakers denoted as "HLO" and for all fire protection and fire alarm equipment and all circuits serving emergency lighting.
c. Provide Square D #QO•PAF fixed handle padlock attachment for circuit breakers denoted as "HPL" and for appliances without a local disconnecting means.
d. Provide shunt trip were denoted as "ST" or otherwise required.
3. Amp Interrupting Capacity (AIC) Rating: No less than the available fault current; fully rated or manufacturer tested series combination. The Contractor shall determine the available fault current where not indicated on the Drawings.
4. Do not use multi-pole circuit breakers that mount in a 1-pole circuit breaker space (i.e. half-size circuit breakers).

PART 3 EXECUTION
3.01 INSTALLATION
A. Provide typed circuit directory and nameplate for each panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
B. Provide five 1 inch spare conduits out of each flush-mounted panelboard to an accessible location above ceiling. Identify each as SPARE.
C. Measure steady state load currents at each panelboard feeder and rearrange circuits as required to balance the phase loads to within 10 percent maximum imbalance. Maintain proper phasing for multiwire branch circuits.
D. Provide nameplate indicating panelboard equipment designation for each panelboard.

END OF SECTION

SECTION 262717 - EQUIPMENT WIRING

PART 1 GENERAL
1.01 COORDINATION WITH OTHER TRADES
A. Meet with all other trades before commencing any work and obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's

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