

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 REFERENCE TO OTHER SECTIONS

1.02 General Conditions: Refer to the GENERAL CONDITIONS and GENERAL REQUIREMENTS for items that affect the work or administration of the work under DIVISION 26 - ELECTRICAL.

1.03 General Provisions: Electrical GENERAL PROVISIONS - specified herein-apply to all Sections of DIVISION 26 - ELECTRICAL.

1.04 DEFINITIONS

A Terms:

1. The following definitions of terms supplement those of the GENERAL CONDITIONS and are applicable to DIVISION 26 - ELECTRICAL:
 - a. "Provide" shall mean "furnish, install and connect complete".
 - b. "Wiring" shall mean "wire or cable, installed in raceway with all required boxes, fittings, connectors and accessories; completely installed".
 - c. "Work" shall be understood to mean "the materials completely installed, including the labor involved".
 - d. "Plans" shall be understood to mean "the complete set, including all trades".
 - e. "Specifications" shall be understood to mean "the complete documents, including all sections, addenda items, etc."
 - f. "Review of Shop Drawings": The Architect's and Engineer's review shall not change the requirements of the contract documents nor shall this review relieve the Contractor of errors in shop drawings. In the event there are deviations between the shop drawings and the contract documents, the contract documents shall apply.

1.05 Drawings:

- A The contractor shall specifically note that the electrical drawings are intended to indicate only the extent diagrammatically, general character and location of work included. Work intended but having minor details obviously omitted or not shown shall be furnished and installed complete to perform the required function. The equipment, conduit and device locations are approximate and any changes necessary to clear obstructions shall be made as approved by the Owner and at no additional cost to the Owner.
- B For building details, the architectural drawings and specifications shall be followed and the work of the electrical drawings and specifications shall be coordinated and fitted thereto.

- C It shall be the responsibility of the contractor to obtain a copy of the Interior Work drawings for location of furniture, counters, etc., for the locating of electrical convenience. Any outlets not located properly will be relocated to the complete satisfaction of the Architect at no additional cost to the Owner. Any questions arising as to locations, etc., will be directed to the Architect.
 - D The contractor shall review the drawings and specifications and should he find discrepancies, conflicts or omissions in the documents or be in doubt as to the intent thereof, he shall immediately obtain clarification from the Architect/Engineer prior to submitting his proposal for work in this Division.
 - E Coordination Drawings – Subcontractors shall develop their shop drawings to reflect an installation that is coordinated with the other trades including, at a minimum, adequate clearances between ductwork, piping, conduits, other site utilities, structural and architectural elements for the site and building. Include sections, plan views, elevations and reflected ceiling plans as required. All MEPS trades shall participate in the development of a “Composite Plan” wherein all the components of each MEPS and Structural system are overlaid. The composite plan shall be used to identify conflicts between systems. Drawings shall indicate size, location, elevations of all conduit, raceways, lighting and other components of the electrical system. Upon completion of drawings, coordination meetings will be held to resolve any and all conflicts and inconsistencies between the various designs. When completed, each trade Subcontractor will sign-off on the drawings that will then become part of the permanent record of the Project. Conflicts between these elements that may develop at a later date will be the responsibility of the trade Subcontractor who deviated from the Coordination Drawings.
- 1.06 Temporary Power and Lighting - Providing temporary power and temporary lighting as necessary throughout all construction phases. This is to include but not limited to:
- A Temporary power for Contractor’s office trailers, and temporary lay down yard.
 - (1) Provide temporary electrical setup for construction trailer, up to two times.
 - B Temporary trade power
 - (1) All temporary distribution panels. Two (2) per floor in building(s) and as needed throughout the building(s).
 - (2) Spider boxes shall be provided, until such time as GFI protected outlets are placed in corridors spaced where 75 feet of cord will reach any point of use.
 - (3) Provide a minimum of one (1) distribution panel containing no less than 6 GFCI protected receptacles with in 3 feet of each building entry point.
 - (4) Furnish and install meter jumpers, if allowed by local code, at the Contractor’s discretion.
 - C One (1) 400A /480V feeder to tower crane
 - D One (1) 100A/480V feeder to material lift
 - E Temporary lighting
 - (1) Lamp replacement as required.
 - (2) All temporary lighting in apartment units based on average of 6 lamps per unit.
 - (3) All temporary lighting in the parking garage.
 - (4) Temporary lighting for site lay down and parking areas.
 - (5) Temporary lighting in common areas.
 - (6) Temporary lighting in corridors and stairwells.

- (7) Temporary perimeter security lighting. Include two (2) lights on each side with street frontage.
- F Routine testing and maintenance of all temporary power and lighting during normal working hours. Switch-overs will be done on weekends so not to interrupt the project.
- G Removal of all temporary power and lighting once the need no longer exists. Removal will occur in phases or areas as directed by Contractor's Superintendent.
- H Temporary power to be configured in a manner that ensures no interruption through all four seasons. The means and methods required to ensure uninterrupted power shall be totally Subcontractor's responsibility to design and install.
- I Temporary power feeds for construction use of permanent elevators including any associated temporary permits as required by the authorities having jurisdiction..
- J Temporary power to permanent Fan Coil Units in the apartments to be used for temporary heating.
- K Contractor will provide one person who will do the following every work day to ensure that temporary power system is properly operational:
 - (1) Check each GFCI on every temporary power panel for proper operation.
 - (2) Maintain a log for documenting findings and submit a summary weekly the Contractor.
 - (3) Record on temporary panels the date checked and condition of plugs. Ensure that any malfunctioning plugs are repaired or taken out of service. Ensure panels and conduits are kept in good order.
 - (4) Turn in report to the Contractor's personnel for project files.
- L Power for temporary heating
 - (1) Temporary power to water heaters for the fire sprinkler system as required.
 - (2) Temporary power to permanent Roof Top Units to be used for temporary heating.
 - (3) Hook up generators and heaters provided by the Contractor to temporary services as needed.
- M Provide temporary power and a CAT 5 cable to temporary water alarms valves, such as Flo-Logic Valves on permanent and temporary water risers if provided by the Contractor.
- N Furnish and install temporary water and heat alarms as required

1.07 Materials:

- A All materials used in this work shall be new and shall bear the inspection label of Underwriters Laboratories, Inc.
- B The published standards and requirements of the National Electrical Manufacturers Association, the American National Standard Institute, the Institute of Electrical and Electronic Engineers and the American Society of Testing Materials, are made a part of this Specification and shall apply wherever applicable.
- C Catalog numbers and trade names in these Specifications and noted on the drawings are intended to describe the materials, devices or apparatus required. Within thirty days after the contract has been awarded or as otherwise directed, forward to the Engineer a complete list of all materials and equipment proposed for installation. List shall include sufficient information to permit ready and complete identification.

- D All support, attachment, vibration, and seismic control hardware necessary for the Work, including hangers, fasteners, poles, etc.
- (1) Fasten hanger rods, conduit clamps, outlet and junction boxes to building structure using vibration isolators.
 - (2) Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
 - (3) Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
 - (4) Install surface-mounted cabinets and panel boards with minimum of four anchors.
 - (5) Provide steel channel supports to stand cabinets 1 inch off wall in wet locations.
 - (6) Provide seismic bracing per SMACNA, or appropriate applicable codes.

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1.08 CODES, PERMITS AND ORDINANCES

A Code:

- (1) The installation included under this DIVISION shall comply with the latest amended editions of the National Electrical Code, the Electrical Code of the Municipality having jurisdiction and State and Federal laws and regulations.
- (2) Referenced Codes and regulations are minimum standards. Where the requirements of these Specifications and the accompanying drawings exceed those of the codes and regulations, the drawings and specifications shall be followed.
- (3) The contractor shall obtain permits and licenses required for the installation of the work and shall pay all fees therefore.
- (4) At the completion of the work, the contractor shall obtain from the Local Building Authority a Certificate of Approval. This certificate shall be turned over to the Owner at the close of job.

1.09 In preparing his bid, the contractor shall carefully check the plans and specifications for compliance with applicable codes and other legal requirements. He shall inform the engineer, in writing, of any non-conformance before he submits his bid.

1.10 VISIT TO SITE

A All bidders shall visit the site and carefully examine the existing conditions before submitting bids, as no allowance will be made for lack of knowledge of existing conditions, where such conditions may reasonably be determined by observation.

1.11 SUBMITTALS

1.12 Procedure: Refer to the GENERAL CONDITIONS and supplements thereto for submittal procedure of items called for in the Contract Documents.

1.13 Shop Drawings:

A Shop drawings shall be submitted in accordance with the following:

- (1) All shop drawings shall be submitted after being checked and certified by the contractor that they comply with drawings and specifications in one single package. It is the intent to have the contractor submit the shop drawings in a face to face meeting, in the engineer's office in Atlanta, so that the various systems may be discussed and questions answered which will expedite the process and hopefully eliminate any confusion. Specific systems to be discussed will be emergency generator, switchboard, panelboards and power monitoring & control system.
- (2) The contractor shall be responsible for all dimensions and quantities.
- (3) Contractor's submittal shall include a list of the manufacturers of the principal items of material: Wire, raceways, devices, boxes, panelboards, connectors, etc. Full information shall be furnished on products of manufacturers not named in the Specifications.
- (4) Submittals shall be detailed in technical content to allow for adequate review. Information shall be furnished for all accessories and options required for a complete installation.
- (5) Submittals which are prepared by manufacturers or vendors shall be completed by the contractor to include any additional materials or work required to complete the installation. Lighting fixtures shall have complete information on the type, wattage, color and manufacturer for each lamp required. The term "by others" or "by Contractor" shall not be included in any submittal.
- (6) Submittals which do not comply with all of the requirements of this Section will be returned without review.

1.14 Shop Drawings List:

A Submit detailed shop drawings and/or catalog data for the following equipment for review:

- (1) Switchboards
- (2) Circuit breakers
- (3) Panelboards
- (4) Meter Centers
- (5) Busways

B Lighting Fixtures

C Lighting Control System

- 1.15 The following items of equipment and materials shall be submitted for approval by reference to the manufacturer and specific catalog and model number:
- A Safety switches
 - B Receptacles, switches, plates and devices
 - C Large junction boxes
 - D Lamps
 - E Fuses
- 1.16 WORKMANSHIP AND APPROVAL
- A Work under this Section shall be performed by skilled and qualified electricians. Work shall be subject to constant inspection and final approval by the Architect. Any inspections or approvals shall not relieve the contractor of responsibility for compliance with any and all requirements of the Contract documents.
- 1.17 Cutting & Patching
- A Subcontractor shall be responsible for making and sealing all penetrations through walls, floors, ceilings or other materials necessary for Subcontractor's Work. All penetrations made by Subcontractor through rated enclosures, fur downs, plenums, walls, floors, and ceilings shall be fire/smoke sealed by Subcontractor using only approved materials and methods.
 - B Subcontractor shall not cut any top or bottom plate of any bearing or non-bearing wall. Holes will be drilled only in strict conformance with the Structural drawings and Truss manufacturer's shop drawings. Subcontractor shall be responsible for making any structural corrections required by the Structural Engineer as a result of unacceptable cutouts during rough-in.
 - C Subcontractor shall also provide one qualified person during inspection walks capable of correcting Subcontractor's deficient fire/smoke caulking during the inspections.
 - D Use X-ray or penetrating radar technology to determine post tension cable locations for all penetrations thru post tensioned slabs or decks prior to coring, cutting, or drilling penetrations.
 - E Fastener type (and depth) for securing the Work to post-tensioned concrete requires specific prior approval by the Structural Engineer of Record.
- 1.18 GUARANTEE, CORRECTION OF WORK AFTER ACCEPTANCE
- 1.19 Specific attention is called to DIVISION 1 - GENERAL CONDITIONS on these subjects.
- 1.20 RECORD DRAWING PRINTS
- A Shall be submitted to the Architect at completion of the work.
 - B Shall be one CADD print of the Contract Drawings on which have been marked in red all additions of outlets and equipment to the original design and all relocations of outlets, raceways and equipment.
- 1.21 MAINTENANCE DATA
- A Furnish and deliver at final inspection complete copies of all data prepared by manufacturers detailing operation and maintenance instructions on all equipment requiring maintenance.

1.22 PAINTING

- A Equipment and materials not provided with factory-applied finish shall be painted as described in another Division of these Specifications. Electrical work which will be job-painted shall be clean of dirt, grease, rust, cement and plaster.
- B Equipment with a factory-applied finish shall have scratches, discoloration, chips, etc., repaired and refinished to the satisfaction of the Architect.

PART 2 PRODUCTS

2.01 MATERIAL

- A All material, apparatus and equipment shall be new and shall bear the label of the Underwriters Laboratories, Inc., where such labels are available.

2.02 MOTOR HORSEPOWER

- A The horsepower of motors indicated on the plans is the estimated horsepower requirements of equipment furnished under other sections of the specifications. All wiring, feeder protection devices and disconnect devices shall be of the size and ampacity for the horsepower of the respective motor actually installed. However, in no case shall these items be of smaller capacity than those indicated on the drawings. The contractor shall coordinate with the other trades and provide suitable equipment so that the above requirements shall be met without any additions to the contract price.

2.03 PROTECTION OF MATERIALS

- A Keep all conduit and other openings protected to prevent entry of foreign matter. Cover fixtures, equipment and apparatus for protection against dirt, water, chemical or mechanical damage before and during construction. The original finish, including shop coat of paint on fixtures, apparatus or equipment that has been damaged shall be restored prior to final acceptance.

2.04 UNIT RESPONSIBILITY

- A All distribution, lighting and appliance panelboards 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 a deviation from this requirement has been approved prior to bid date.

2.05 DEVIATIONS

- A No deviations from the plans and specifications shall be made without the full knowledge and consent of the Architect.
- B Should the Contractor find, at any time during the progress of the work, that, in his judgment, existing conditions make desirable a modification in requirements covering any particular item or items, he shall report such items promptly to the Architect for his decision and instructions.

2.06 REJECTION OF MATERIALS

- A The Architect shall have the authority to reject any material, equipment or workmanship not complying with these Specifications; and the Contractor shall replace defective work or materials immediately upon notification of rejection. Any material so rejected shall be removed from the job within 24 hours of such rejection; otherwise, the Architect may have same removed at the Contractor's expense.

End

SECTION 260502 - BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 DESCRIPTION

- A Description of Systems: This Section encompasses products, assemblies and methods which are required by more than one of the project systems encompassed by the Sections of DIVISION 26.
- B Other items of basic materials and methods are specified in the following Sections:
- | | | |
|-----|--|----------------|
| (1) | "RACEWAYS" | SECTION 260533 |
| (2) | "CONDUCTORS" | SECTION 260519 |
| (3) | "OUTLET BOXES" | SECTION 260534 |
| (4) | "WIRING DEVICES" | SECTION 262726 |
| (5) | "ENCLOSED SWITCHES AND CIRCUIT BREAKERS" | SECTION 262816 |

1.02 QUALITY ASSURANCE

- A Design Criteria:
1. All apparatus for the various systems shall be of proper rating for the voltage of the systems.
 2. All equipment components shall be of such physical size to be easily introduced into the space available in the building.
 3. All equipment shall readily fit in the spaces indicated on the drawings. If any equipment proposed is of larger size than the design selection or involves larger controls or any contingent difference which requires additional space, its use is not permitted.

PART 2 - PRODUCTS

1.01 WOOD BACKBOARDS

- A Wood: Backboards shall be made of 3/4" Grade B-C plywood.
- B Paint: Backboards shall be painted with two (2) coats of fire inhibiting gray finish or color as approved by Architect of Record.

1.02 NAMEPLATES

- A Provide laminated black, whitecore bakelite nameplates for all devices. Letters on nameplates shall be block style, of height as specified herein.
- B The following letter size shall be provided for each piece of the following equipment:
- | | | |
|-----|--------------------------|------|
| (1) | Service Switchboard | |
| (2) | Designation: | 1/2" |
| (3) | Voltage: | 1/4" |
| (4) | Switches in Switchboard: | 1/4" |

(5)	Branch Circuit Panelboards:	-
(6)	Designation:	1/2"
(7)	Voltage:	1/4"
(8)	Safety Switches:	1/4"
(9)	Enclosed Circuit Breakers:	1/4"
(10)	Starters:	1/4"

1.03 SPARE FUSES

- A 25% of each type and rating shall be provided for spares with a minimum of two and a maximum of six for each type and rating.
- B Fuses shall be turned over to Owner at completion of job.

PART 3 - EXECUTION

1.01 CUTTING AND REPAIRING

- A Refer to the DIVISION 1 - GENERAL CONDITIONS.
- B Provide all sleeves required for proper installation of work included under this heading.

1.02 EXCAVATION AND BACKFILLING

- A Do all trenching, excavation and backfilling required for the electrical work indicated on the Drawings, including repairing, shoring, bracing and pumping.
- B Backfilling shall be done in layers of 12" fill, wetted down and tamped for each consecutive layer to grade. Refer to Division 2 for compaction requirements.
- C Repairing shall be comparable to work cut and shall have final approval of authorities having jurisdiction.
- D Contractor shall locate and avoid any existing facilities during excavation and shall give written notification of any unforeseen conditions.

1.03 NAMEPLATES

- A Starters and Controllers: Provide nameplates for each individually enclosed circuit breaker, safety switch and for each starter or controller. The usage of each switch and starter shall be etched on the plate and the plate mounted on the switch and starter cover after all painting has been completed.
- B Service Switchboard and Branch Circuit Panelboards: Provide nameplates for the service switchboard and branch circuit panelboards with the designation shown on the drawings etched on the plate along with the supply voltage rating to the equipment mains. Provide nameplates on the service switchboard indicating the usage for each fusible switch and/or circuit breaker.
- C Sheet metal screws or epoxy shall be used as the means of affixing nameplates to their respective devices.

1.04 WOOD BACKBOARDS

- A Telephone / CATV Equipment: Provided by DIVISION 27.

- B Power Backboards: Provide as required for power equipment. Mount starters, breakers, gutters or other apparatus indicated on the backboards.
- C Wiring on wood backboards shall be done in screw-cover wireways and rigid galvanized steel conduit.
- D Fasten to wall with 1/4 inch or larger toggle bolts on concrete block walls or with bolts in expansion shields or preset inserts, in poured concrete walls with 1/2" spacers between wall and board.

1.05 APPARATUS CONNECTIONS

- A Where connection is to be made to an item of equipment, such as a motor, which is not located near a wall or column, a vertical conduit attached to the floor and ceiling shall be installed and the wiring brought out of this conduit by means of condulets.
- B Connections to vibrating equipment, such as motors, duct heaters, etc., shall be made with a short length of liquid tight flexible conduit eighteen (18) inches minimum and thirty six (36) inches maximum, in length.

1.06 FINAL TESTS

- A Extent of Testing: Upon completion of the work, test the individual systems, including all feeders, service, branches, outlets, lighting motors, apparatus and appliances.
- B Equipment: Provide all instruments, labor and materials required for any essential intermediate and final tests designated.
- C Results: Tests shall indicate full compliance with specifications, drawings and applicable codes. All tests will be observed by the Owner's representative.

End

SECTION 260519 - CONDUCTORS

PART 1 GENERAL

1.01 DESCRIPTION

A Description of System: Provide a complete system of wiring with all feeders and branches as shown on the drawings. The wiring system shall be complete to each and every outlet and apparatus shown on the drawings which requires electrical connections.

1.02 QUALITY ASSURANCE

A Acceptable Manufacturers: Wire shall be General Cable, Ace Wire Company, Triangle Wire and Cable, Inc., Okonite, Prysmian Cables and Systems Ltd., O-Z Gedney, Thomas & Betts or Southwire or approved equal.

B Standards: Specified conductor gauge sizes refer to American Wire Gauge.

PART 2 PRODUCTS

2.01 CONDUCTORS

A Conductor Material: Conductors shall be copper, 98.5% conductivity, unless noted aluminum conductors are otherwise indicated on the drawings.

B All new wire and cable routed in conduits shall have copper conductors and shall have 600 volts NEC Type THWN or THHN insulation for branch circuits and Type XHHW for feeders. Type SE cable allowable for branch circuits in all other construction types and in air plenum rooms or spaces. Type SE cable not allowed in Amenities and Leasing per NEC 518.4(B).

C All branch circuits for lighting, receptacles and HVAC units will utilize THHN type cable with grounding conductor. Type NM cable (with ground) is acceptable in type III, IV, or V construction if acceptable to the local jurisdiction having authority. Type MC cable allowable for branch circuits in all other construction types and in air plenum rooms or spaces. Type NM cable not allowed in Amenities and Leasing per NEC 518.4(B).

D Wire #8 AWG and larger shall have stranded conductors. Wire #10 AWG and smaller shall be solid conductor type.

E No wire shall be smaller than #12 AWG, unless otherwise specified or allowable by local authority having jurisdiction.

F Branch circuit wiring which supplies more than one fluorescent fixture through the wiring of other fixtures shall be 90°C, insulation Type THHN or TFFN.

G Cable pulling compound shall be the type manufactured for use with plastic insulated wires. Yellow #77 or equal.

H If aluminum conductors are utilized they must be compact aluminum.

2.02 ACCESSORIES

- A Wire Joints: Thomas & Betts "Sta-Kon", 3M "Scotchlock Type R", Ideal Industries Wing-Nut #452, 454 or "B-Cap" wire connector or approved equal.
- B Cable Connectors: Solder-less type, O-Z Gedney "circular clamp type" or Thomas & Betts "lock-tite" appropriate for the particular application involved. Two-way connectors and "T-Taps" shall have molded thermoplastic covers.

PART 3 EXECUTION

3.01 PREPARATION

- A Lubricant: No grease, oil or lubricant other than powdered soapstone, or approved pulling compound, shall be used to facilitate the pulling of wires.
- B Raceway: Raceways shall be free of concrete, moisture or other foreign matter. Raceways shall be swabbed as necessary before pulling wire.
- C Aluminum Conductors: Provide anti-oxidation inhibiting compound.

3.02 INSTALLATION

- A Complete electrical systems shall be provided as shown on the drawings and/or as specified herein.
- B Wires shall be pulled without excessive strain to prevent damage to conductor or insulation.
- C Each raceway or cable indicated by symbol on drawings shall contain #12 AWG wires as indicated.
- D Branch circuit designations, as shown on the plans, are arbitrary and each circuit of multi-circuit home run shall be connected to a different phase of the distribution panel to balance the load within 10%.
- E Cable pulling compound shall be used in raceways.
- F No wire shall be smaller than #12, unless otherwise specified or allowable by local authority having jurisdiction.
- G At each fixture or device outlet a loop or end of wire not less than eight inches long shall be left for connection to fixture or device.
- H Wire in capped outlets shall have ends taped.
- I Splices, taps and connections shall be made up as follows:
 - 1. Wire sizes #8 AWG and smaller with mechanical connectors.
 - 2. Wire and cable of sizes #6 AWG and larger, with mechanical or indent connectors. Indent connectors are preferred on 350 MCM and 500 MCM

sizes.

- J Joints shall be covered with 7 mil thick electrical tape on branch circuit wiring connections and 10 mil thick electrical tape on mechanical and indent connectors on larger cables.
- K All wire shall be color coded to indicate the various phases and neutral. Where color coding is impractical, approved 3/4" wide tape bands, corresponding to Color Code, NEC SECTION 210.5, shall be provided.

End

SECTION 260526 - GROUNDING AND BONDING

PART 1 GENERAL

1.01 DESCRIPTION

- A This Section specifies the requirements for supplemental ground fields, system grounds and equipment grounds.

1.02 REGULATIONS

- A Minimum requirements for grounding shall be the National and Local Electrical Codes.

PART 2 PRODUCTS

2.01 GROUND CONDUCTORS

- A Provide all conduits with a separate green insulated grounding conductor for feeders and branch circuits. Unless otherwise specified or indicated, the ground conductor shall be a #12 AWG "THWN" as a minimum.
- B Unless otherwise indicated, all other ground leads shall be 600 volt N.E.C. Type "THWN".
- C Pool deck grounding included with this scope of Work.

2.02 CONNECTIONS

- A Connections in the supplemental ground field shall be made using a thermoweld process (Erico Cadweld or equal).
- B Other grounding connections shall be made with bonding clamps approved for the purpose.
- C Tighten electrical connectors and terminals according to UL 486A and UL 486B.

PART 3 EXECUTION

3.01 GROUNDING SYSTEM

- A A building grounding system, consisting of driven ground rods and interconnecting copper wiring, with bonding connections to cold water entrance pipe and ground bus in service switchboard, shall be provided as indicated on the drawings.
- B All building grounds shall be bonded together.
- C A supplemental ground field, as required by Art. 250.53, N.E.C., shall be bonded to the ground bus in the main Service Switchboard.
- D Provide isolated equipment grounding conductor for circuits supplying special items where indicated.

3.02 EQUIPMENT AND SYSTEM GROUNDS

- A All electrical equipment enclosures and conductor enclosures shall be grounded. All locknut connections to cabinets, pull boxes, junction boxes, etc., shall be wrench-tight, with locknut projection driven into the opposing metal surfaces.
- B A bonding jumper shall be installed inside of each flexible conduit on motor and mechanical equipment circuits. Jumper shall bond from outlet box at origin of flexible conduit to outlet box or equipment at its termination. It shall be sized according to Table 250.122, N.E.C.
- C Provide a grounding conductor (#6 AWG) for each telephone and television backboard to the nearest accessible effectively grounded cold water pipe or service ground for Telephone Company's ground.

End

SECTION 260529 - HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 SCOPE

- A. Full and proper support shall be provided for all items of electrical equipment, raceway, etc.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials used shall be good quality, made of steel or of other non-corroding material.
- B. Inserts in masonry shall be lead, plastic, or fiber type, installed in drilled holes. Lead only shall be used for exterior locations or for interior locations subject to moisture.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment and flat raceways attached to outside walls or interior walls subject to permanent moisture shall be shimmed out with non-corrodible material so as to provide 1/4" air space between wall and equipment or raceway.
- B. All materials, whether exposed or concealed, shall be firmly and adequately held in place. Fastening and support shall afford safety factor of three or higher.
- C. All fixtures, raceways, equipment shall be supported from the structure. Nothing may be supported on suspended ceilings or ceiling hangar wires unless definitely noted otherwise on the Drawings or specifically permitted by the Architect/ Engineer.
- D. Fixtures shall be supported with (minimum) 10 gauge steel wire, (independent of ceiling support wires) or with threaded steel rods, adjusted as necessary to level fixture. For troffer fixtures, use minimum of two supports for each opposite corner. Use one support for downlights and exit signs. See architectural ceiling plans for rated ceiling system fixture support requirements.
- E. Where installed recessed in grid type ceilings, attach each fixture to grid with minimum of two "earthquake clips" or other approved method. This requirement is in addition to dedicated support as described in "D" above.

End

SECTION 260533 - RACEWAYS

PART 1 GENERAL

1.01 DESCRIPTIONS

- A Description of System: Provide raceways and conduit indicated on the drawings, complete with all required accessories, hangers, supports, connections and fittings necessary to make the system complete. All raceway must be concealed, except in electrical/mechanical rooms.
- B This contractor is responsible for "all" conduit, including DIVISIONS 27, 28 & 29, coordinate with other subcontractors.
- C Definitions:
 - 1. Concealed Conduit: Conduit installed above suspended ceilings or within columns, slabs or walls.
 - 2. Exposed Conduit: Conduit exposed to view.

1.02 QUALITY ASSURANCE

- A Acceptable Manufacturers:
 - (1) Metallic Conduit: Triangle Wire and Cable, Inc., Allied Tube & Conduit, Wheatland Tube, Robroy Industries (Pittsburgh Standard), Jones and Laughlin Steel Company, Youngstown Tube Company or Wheeling-Pittsburgh Steel or approved equal.
 - (2) Non-Metallic Conduit: Thomas & Betts (Carlton) or approved equal..
 - (3) Surface Metal Raceways: Legrand (Walkerduct or Wiremold) or approved equal..
 - (4) Flexible Metal Conduit:
 - a. Greenfield (flexible metal conduit with no cover).
 - b. ANAMET Electrical, Inc. "Anaconda Sealtite" (liquid-tight conduit with PVC cover) or approved equal..

1.03 JOB CONDITIONS

- A Protection: Secure conduits in place and protect where necessary to prevent damage to the work during construction. Plug ends of all conduit runs with cork or oakum to avoid filling with mortar, etc.
- B Sequencing, Scheduling: The layout of conduit is diagrammatic only and where changes are necessary due to structural conditions, other apparatus or other causes, such changes shall be made as approved by the Architect and without any additional cost to the Owner.

PART 2 PRODUCTS

2.01 METALLIC CONDUIT

- A Material: Conduit shall be of best quality steel, of standard pipe size, smooth inside and out and shall be hot dipped galvanized or sherardized.
- B Rigid Steel Conduit:
- (1) Fittings and couplings shall be hot dipped galvanized or sherardized. Aluminum alloy fittings shall not be used.
 - (2) Make threaded joints in exposed conduit with anti-seize compound applied to the male threads only.
 - (3) Use Bakelite, insulated bushings with separate locknuts on all rigid conduits entering panel cabinets, outlet boxes, etc.
 - (4) All connections in areas exposed to weather shall be made using watertight hubs.
- C Thin-wall Steel Conduit (Electrical Metallic Tubing):
- (1) All E.M.T. entering panel cabinets, outlet boxes, etc., shall be provided with an all steel insulated throat connector.
 - (2) Connectors, couplings and fittings for electrical metallic tubing shall be UL approved as raintight and concrete tight, of the interlocking compression-ring type. Each connector shall have a factory-installed insulated throat bushing.
- D Flexible Conduit: Flexible conduit shall be single strip, shall have bonding jumper installed inside all flexible conduits and shall be bonded beyond each end of the flexible conduit to provide ground continuity.
- E Liquid-tight Flexible Conduit: ANAMET Electrical, Inc. "Anaconda Sealtite," Type "EF," PVC jacketed flexible metal conduit.
- F Expansion Fittings: Provide expansion fittings with bonding jumpers in conduit at building expansion joints.
- G NON-METALLIC CONDUIT
- (1) Material: Thomas & Betts Carlon Type 40 heavy wall rigid "PV-Duit" polyvinyl chloride conduit or approved equal..
 - (2) Accessories: For fittings, couplings, bends, etc., T&B Carlon shall be approved manufacturer or approved equal..

2.02 SMOKE AND FIRE-STOP METHODS

- A Openings in floor slabs or fire rated walls and ceilings through which cables, conduits or piping must pass shall be sealed by U.L. recognized fire barrier assembly with a rating equal to or greater than the rating of the wall, floor or ceiling which is penetrated. Such penetrations are not specifically indicated on the drawings and shall be located and verified by the Contractor.
- B The method utilized for construction and installation of fire stops and barriers shall be in strict accordance with details and directives described in the U.L. Building Materials Directory, 1984.
- C The materials utilized for construction of fire stopping and barriers shall be commercially manufactured caulks, wrapping, foams or strips, installed specifically per the manufacturers U.L. approved instructions. Materials shall be by 3M, Chase Technologies Corporation or Dow Corning.
- D Only E.M.T. or rigid steel conduit or I.M.C. shall be used for any penetration of fire rated construction, except as noted on drawings.
- E Interiors of large empty raceways for computer cables shall be filled with a fire sealant foam which remains soft, pliable and self-sealing throughout its life.

PART 3 EXECUTION

3.01 LOCATION

- A Layout: In general, the conduit installation shall follow the layout indicated on the drawings.
- B Conduits will be utilized only as indicated on plans.
 - a. Conduit sleeves shall be used thru fire walls.
 - b. Conduit will be used for vertical runs in blocks in cells of stair wells and elevator shaft.
 - c. Conduit will be utilized for circuits that have large size conductors (individual) in lieu of "NM" cable.
 - d. Conduit sleeves shall be used thru exterior walls and sealed for waterproofing purposes.
- C Generally, all conduit shall be concealed, unless otherwise directed or indicated on the drawings.
- D Offsets in conduits are not indicated and must be furnished as required.
- E Schedule:
 - (1) Metal conduit shall be used as a raceway system only as indicated for all wiring, except as specified otherwise herein or otherwise shown on drawings.

- (2) Non-metallic conduit shall be used where non-metallic conduit or plastic conduit (PVC) is specified herein or shown on the drawings. At the Contractor's option, raceways installed underground or below slabs on grade, may be Schedule 40 heavy wall rigid PVC conduit. Such raceways which carry electrical circuits shall be provided with separate ground wires as required by NEC Article 250 and 344. All elbows that turn up from below grade to above grade or above slab shall be rigid galvanized steel.
- (3) Where National and local codes prohibit use of electrical metallic tubing or rigid non-metallic conduit (Schedule 40 PVC), rigid hot-dipped galvanized steel conduit shall be used.

F Sizes:

- (1) Unless otherwise indicated, all conduit shall be 1/2" trade diameter, minimum. Larger sizes shall be used where indicated or where required due to conductor quantity.
- (2) Conduit concealed in slabs shall not exceed 1-1/4" nor be less than 3/4".
- (3) No bends shall be made with a radius less than six (6) times the diameter of the conduit or more than 90°.

G SUPPORTING DEVICE INSTALLATION

- (1) Spacing and Attachment: Support exposed or concealed conduit from walls or ceilings, at intervals required by Code but not to exceed intervals of 5'-0" for electrical metallic tubing and 10'-0" for rigid steel conduit, with approved galvanized iron clamps or hangers. Devices attached to masonry or slabs shall be secured with inserts or bolts or lead expansion sleeves. Where two or more conduits run adjacent, they shall be installed on gang hangers.
- (2) Cable Clamps: Provide cable clamps in vertical conduit riser at intervals prescribed by the National Electric Code.
- (3) Limitations: Wire, pipe straps, nails, ceiling construction or other means shall not be used for supporting conduit runs, exposed or in suspended ceilings, nor shall they be strapped to other piping.

3.02 CONDUIT AND RACEWAY INSTALLATION

- A Larger Sizes: The conduit sizes indicated on the drawings may be increased, if required, to facilitate the pulling of cables.
- B Accessories: Provide junction boxes or pull boxes where shown on the drawings and where necessary to avoid excessive runs or too many bends between outlets. Where raceways are routed concealed in above grade concrete or masonry construction, pull boxes shall be provided if the total number of bends exceeds 180° or the length of run exceeds 100 feet. Additional pull boxes shall be provided as necessary to facilitate installation of cables or conductors. All such pull boxes shall be accessible after completion.

- C Grouting: Grout around all conduits passing through walls, except where fire stops are used.
 - D Fire Stops: Provide fire stops wherever conduits pass through fire rated walls (elevator shaft and stairwells) or floor slabs. Install in strict accordance with manufacturer's instructions.
 - E Empty Raceways: Provide empty raceways where indicated on the drawings. An insulated plastic pull wire shall be pulled into each empty raceway and left for future use.
 - F Raceways run underground shall be a minimum of 36 inches below grade or paving.
 - G Where raceways are run below grade and in parallel configuration (e.g. service entrance or feeders exceeding 400 amps), such raceways shall be racked on conduit spacers manufactured for this purpose. Spacers shall be located at maximum spacing of 5'-0" along conduit run. Spacers shall be constructed so that conduits maintain a separation of 7.5 inches center to center.
- 3.03 Site/Exterior Electrical
- A Furnish and install all conduits and pull strings for site primary power distribution. Coordinate conduit sizes, quantity and locations with the electrical power service provider. Provide conduit as necessary for primary power to the provider's pole or other service connection point.
 - B Transformers will be placed on pads in the Electrical Vault/Room or exterior in the designated easement area. Coordinate with the electrical utility service provider, Architect and other Design Consultants the space and access requirements of the service provider. This includes, but is not limited to, HVAC and ventilation requirements, concrete pad layouts and sizes, door locations, and required clearances around equipment.
 - C Provide conduit as necessary for CATV and Phone service entries into the building to the terminal pole or other service connection point.
 - D Provide concrete or colored concrete for electrical duct bank as/if required.
 - E Furnish and install all conduit, electrical wiring, raceways with pull strings, controllers and equipment required to operate site lighting and miscellaneous site work requiring power.
 - F Provide excavation, backfill and compaction for all underground installations related to the Work in accordance with the geotechnical report prepared for the project. Provide handwork as required. Provide a certified competent person during all trenching and excavation Work.
 - G Stockpiling of spoils generated from the Work at a location specified by the Contractor.
 - H Coordinate the location of utility service lines, boxes, hand holes, and other site work so as not to interfere with building structures, wet utility work, landscape and hardscape.
 - I Power outlets at roof for maintenance of equipment.
 - J Air traffic lighting at roof as required.
 - K Power service to lighted bollards at the passenger drop off area at the main entry and in the garage.
 - L Provide power to exterior building signs and lights.

- M Provide power to all site equipment and appurtenances. This includes but is not limited to:
 - (1) Separate circuits instead of GCFI for irrigation systems.
- N Furnish labor and equipment necessary to install site lights, including wiring, bases and poles and any miscellaneous items for a complete installation.
- O Furnish and install all conduit, electrical wiring, and raceways with pull strings, controllers and equipment required to operate site lighting and miscellaneous site work requiring power.

End

SECTION 260534 - OUTLET BOXES

PART 1 GENERAL

1.01 DESCRIPTION

- A Description of System: Standard galvanized steel boxes shall be provided at all outlets for lights, switches, receptacles, etc., except as specified herein.

1.02 QUALITY ASSURANCE

- A Acceptable Manufacturers: Outlet boxes shall be Emerson (Appleton), Hubbell-RACO, National Electric Products Company or Steel City Electric Company or approved equal.

1.03 JOB CONDITIONS

- A Protection: Anchor boxes securely to formwork. Provide necessary protection to prevent entry of concrete.
- B Sequencing, Scheduling: Locations of outlets shown on the drawings are relative and approximate. Exact locations shall be determined on the job and the outlets accurately set according to the Architectural drawings, dimensions, building conditions and Architect's direction. The right is reserved to change the exact location of any switch, ceiling outlet or other outlet in any room before it is permanently installed. Coordination of Work with associated trades shall be the responsibility of this Subcontractor including but not limited to door casings, door swings, framing, fitness equipment, access control, AV, location of HVAC and Plumbing equipment, backsplashes, etc.

PART 2 PRODUCTS

2.01 OUTLET BOXES

- A Standard Outlet Boxes: Boxes and covers shall be galvanized steel, not less than 1/16" thick and, in every instance, of such form and dimensions as to be adapted to its specific use and location, kind of fixtures to be used and number, size and arrangement of conduits or cables connecting thereto.
- B Non-metallic boxes are acceptable in multi-family buildings.
- C Ceiling outlet boxes shall be 1-1/2 or 2-1/8 inches deep, 4 inches octagonal or 4 inches square when required due to number of wires. Plaster rings or device covers need not be provided on ceiling boxes.
- D Wall outlet boxes for toggle switches and convenience outlets shall be 1-1/2 or 2-1/8 inches deep, 4 inches square. Provide with single device plaster rings (or two-device plaster rings where needed). Plaster rings shall be raised type to compensate for thickness of plaster or gypsum board wall finish. All outlet boxes shall be set to within 1/8" of finished wall surface.

- E Junction boxes shall be as specified for ceiling and wall outlet boxes. Provide flat steel covers on ceiling outlets painted to match surrounding ceilings. Provide blank device-type cover plates on wall outlets, of same materials and exact color as specified for device plates in same room or area.
- F Outlet boxes for exposed conduit exposed to weather or dampness shall be cast ferrous alloy, galvanized.
- G Covers: Where outlet boxes are to be capped, blank cover plates shall be used.
- H Outlet boxes for use in masonry walls shall be not less than 1/16" steel with square corners, minimum 4" square x 2-1/2" deep, designed to be used in masonry walls.

PART 3 EXECUTION

3.01 INSPECTION

- A The location of all wall outlets, including light fixtures, receptacles switches, etc., shall be verified to see that the outlet will clear any wall fixture, shelving, work tables, sinks, baseboard and fin type convectors, bulletin boards, etc., before they are installed.
- B Coordination: Exact locations of outlet boxes shall be coordinated with other trades, so that outlet will not be covered by ductwork, piping, etc.
- C The approximate locations of outlets are indicated on the drawings. The exact locations shall be determined during construction. The right is reserved to change, without additional cost, the exact location of any outlet, a maximum of 10 feet before it is permanently installed.

3.02 PREPARATION

- A Architectural Placement: Outlets occurring in architectural features shall be accurately centered in same. Space wall switch outlets equi-distant from door trims on the strike side of doors as actually installed.

(1) Mounting Height:

- a. Unless otherwise required, indicated or directed, outlet boxes shall be placed with center lines at the following distances above the finished floor. Dimensions indicated below do not reflect Fair Housing Requirements. See drawings for Fair Housing mounting heights:

a.	Wall Switches	48"
	Wall Convenience	18"
	Outlets	18"
	Wall Telephone	18"
	Outlets	18"
	Thermostats	60"
	Special Outlets	As noted on the drawings.

- (b) Exit Signs

(Wall) 12" above door header

- (c) Install all outlet boxes in finished areas flush with wall or ceiling finish.
- (d) All outlet boxes for switches at same level shall be installed with each center line on one horizontal line as shown on drawings.
- (e) Wall mounted controls, including temperature controls, in a room shall be grouped at the same location and at same mounting heights.

3.03 INSTALLATION

- A At all concealed outlets for lighting fixtures, wall switches, wall receptacles, etc., installed in gypsum board construction, standard galvanized steel outlet boxes shall be provided. Provide plaster rings where required.
- B Outlet boxes shall be firmly anchored in place and shall be provided with approved fixture studs where required.
- C Outlet boxes installed in masonry construction shall be set plumb and flush with finished wall on all sides. Openings for boxes shall be cut to the same outside dimensions as the box or shall be finished with grout flush to the edges of the box.
- D The edge of all outlet boxes shall be flush with the surface in which they are recessed. The devices that fit into the outlet boxes shall be screwed tight before the cover plate is installed and the cover plate shall not be used as a means of tightening the devices in place. The openings for each box shall be cut or finished so that the supporting ears for each device will be completely supported on top and bottom by the wall surface.
- E Coordinate location of floor mounted receptacles with other trades including but not limited to fitness equipment and Clubhouse/Amenity design.

End

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish and install power distribution panelboards as scheduled on the drawings and as herein specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Panelboards shall be manufactured by Square D or approved equivalents by Siemens, General Electric or Cutler-Hammer.
- B. Panelboard types indicated on the drawings are those of Square D, and the standard construction features of those types shall be considered as minimum requirements, with additional requirements as specified herein.

2.2 CONSTRUCTION FEATURES

- A. Types, sizes, capacities, and characteristics shall be as shown on riser diagrams or in schedules on the drawings.
- B. Equipment shall be built on NEMA Standards where such standards exist.
 - 1. House/common area panels shall be commercial panel board construction
 - 2. Apartment panels shall be load center type construction.
- C. Housing shall be constructed of galvanized sheet steel and shall be securely fabricated with screws, bolts, rivets, or by welding. Housings for panelboards shall be a minimum 20" wide and 5-3/4" deep, unless noted otherwise. Top or bottom gutter space shall be increased 6" where feeder loops through panel. Housing dimensions shall not exceed those of specified panelboards without written approval of Engineer.
- D. Covers shall be constructed of high grade flat sheet steel with:
 - 1. Door flush with face and closed against a full inside trim stop. Hinges shall be inside type.
 - 2. A flush latch and tumbler type lock, so panel door may be held closed without being locked. All such locks on same job shall be keyed alike. Furnish two keys with each lock.
 - 3. Four or more cover fasteners of a type which will permit mounting plumb on box. Cover shall also have inside support studs to rest on lower edge of can while being fastened. For flush mounted panelboards, cover fastener hardware shall be concealed behind the hinged door.
- E. A means of readily adjusting projection of panel interior assembly with all connections in place shall be provided. A method requiring stacking of washers is not acceptable.
- F. Interior trim shall fit neatly between interior assembly and cover leaving no gaps between the two. Where (2) section panels are specified, both panel trims shall be the same height.
- G. Busses shall be of 98% conductivity copper.
- H. Minimum interrupting capacity rating of any panelboard assembly shall be 10,000A (120/208V systems). Furnish panelboards with higher rating where so noted or where evidently intended by specification of circuit breaker frame types, etc.

- I. Where drawing schedules indicate spaces for addition of future circuit breakers, furnish all necessary bussing, brackets, hardware, etc.
- J. Breakers in distribution or branch circuit panelboards shall be physically arranged in locations shown in panel schedules on the drawings. They shall be connected to the phases as shown.
- K. All panels shall be supplied with copper ground bars.
- L. All house/common area circuit breakers shall be bolt-on type; apartment circuit breakers shall be plug-on.
- M. All 120V, 15 or 20 amp breakers serving receptacles located in bedrooms shall be arc fault interrupting type.
- N. Service equipment shall be labeled "UL approved for Service Entrance Use."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment, either surface or flush mounted, shall be perfectly plumb and level. Maximum height of panels shall be such that the highest position of uppermost circuit breaker typically be 5'-10" AFF, shall not exceed 6'-7" AFF; for type A and B handicapped units, highest position shall not exceed 4'-0" AFF.
- B. All openings in boxes, cabinets, or gutters shall be cut or sawed with tools made for that purpose. Burning of openings is absolutely unacceptable.
- C. All unused openings shall be closed.
- D. Only one solid wire is allowable under a screw. Provide an approved lug for connecting stranded wire or more than one solid conductor.
- E. Front edges of all flush mounted panel housings shall be exactly flush with finished wall.

3.2 LABELING

- A. For branch circuit power panelboards, directory cards shall be neatly typed to indicate load served by each breaker or fuse. Directory cards shall indicate circuits in a manner analogous to the physical circuit breaker arrangement (eg. odd numbered circuits in one column, even numbered circuits in another). Mount cards behind heavy plastic shields in metal frames. Mark spares and spaces in pencil only.
- B. Next to each breaker within main or distribution panel boards, attach a label indicating load served. Wording shall be as shown on its diagram or schedule on the drawings.
- C. Attach a label indicating panel designation centered above the door in each panelboard. Add voltage, for example, "DPI - 120/ 208V." Use black letters on white background.

End

SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

- A Description of System: Provide wiring devices complete with all required accessories as indicated on the drawings and specified herein.

1.02 QUALITY ASSURANCE

- A Acceptable Manufacturers: Wiring devices and cover plates shall be Cooper Wiring Devices (Arrow-Hart), General Electric, Hubbell (Hubbell-Bryant), or Leviton.
- B Wiring devices shall comply with applicable sections of NEMA Standard WD-1.
- C All special purpose receptacles shall be NEMA standard configuration.

PART 2 PRODUCTS

2.01 WALL SWITCHES

- A Wall switches shall be rocker type, flush mounted, specification grade, totally enclosed, self-grounding type, designed for quiet operation. Switches shall be rated 20 amperes, for operation at 120/277 volts and shall be of type as follows:
 - (1) Single Pole: Hubbell #1221
 - (2) Double Pole: Hubbell #1222
 - (3) Three-Way: Hubbell #1223
 - (4) Four-Way: Hubbell #1224
- B Color shall be ivory, gray, beige, white, red, black or brown as selected by the Architect. Comparative switches by Leviton, Cooper Wiring Devices (Arrow-Hart), Eagle or Legrand (Pass & Seymour) are acceptable as equal.
- C Switches utilized as local equipment or motor disconnect switch shall be as specified in SECTION 262817 "DISCONNECT SWITCHES".

2.02 RECEPTACLES

- A Receptacles shall be specification grade, straight blade or locking, grounding type, of ampere and voltage rating and NEMA configuration as indicated on the Drawings. Receptacles shall be manufactured by Hubbell, Eagle, Arrow-Hart, Leviton or Pass & Seymour, per the following Hubbell Catalog Numbers:

<u>Device Type</u>	<u>Volts, Phase, Amps</u>	<u>Hubbell #</u>
NEMA 5-15R Duplex	120V, 1 Phase, 15A	5262
NEMA 5-15R Single	120V, 1 Phase, 15A	5261
NEMA 5-20R Duplex	120V, 1 Phase, 20A	5362
NEMA 5-20R Single	120V, 1 Phase, 20A	5361

NEMA 5-15R GFI Duplex	120V, 1 Phase, 15A	GF-5262
NEMA 5-15R IG Duplex	120V, 1 Phase, 15A	IG-5262
NEMA 6-20R (Single)	208V, 1 Phase, 20A	5461

- B Other convenience outlets of different configuration or rating are indicated by special symbol and notes on the drawings.
- C Color shall be ivory, gray, beige, white, red, black or brown as selected by the Architect.
- D Comparative receptacles by Leviton, Cooper Wiring Devices (Arrow-Hart), Eagle or Legrand (Pass & Seymour) are acceptable as equal.

2.03 DEVICE COVER PLATES

- A Cover plates for flush-mounted devices shall be plastic, smooth surface, mid-way size. Color shall be ivory, gray, beige, white, red, black or brown as selected by the Architect.
- B Cover plates shall be manufactured by Hubbell, Arrow-Hart, Leviton or Pass & Seymour. Material, style, and color as directed by architect.
- C Telephone outlet cover plates shall have an RJ-45 jack connected to cable.
- D Where more than one device is indicated at a location, the devices shall be mounted in combined sectional gang boxes and covered jointly by a common plate.
- E Cover plates for surface mounted devices shall be formed steel with cadmium plating.
- F Weatherproof receptacles shall be equipped with double-life gasketed weatherproof plate, Arrow-Hart #4500, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A Cover Plates: Cover plates shall be provided for all devices, including wall switches, wall telephone outlets and receptacles. Where more than one flush device occurs at the same location, arrange in gangs, under one cover plate.
- B Wall Receptacles: Provide an 8" long flexible pig-tail green ground wire from grounding lug of all grounding type receptacles to a suitable bonding device on the conduit or the outlet box. Ground wire shall not be connected to screw which attaches receptacle to outlet box.
- C For all device types other than NEMA 5-15R, 5-20R and 6-20R provide a matching cord and plug for each receptacle installed. Deliver such plugs to the Owner at completion of construction.
- D All devices installed in outlet boxes shall be screwed tight to the box before the cover plate is installed. Cover plate shall not be used as a means of tightening the device in place.

End

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonfusible switches.
 - 2. Molded-case circuit breakers (MCCBs).
 - 3. Enclosures.

1.2 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. [Eaton Electrical Inc.; Cutler-Hammer Business Unit.](#)
 - 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - 3. [Siemens Energy & Automation, Inc.](#)
 - 4. [Square D; a brand of Schneider Electric.](#)
 - 5. Or Approved Equal.

- B. Type GD, General Duty, Single Throw, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- C. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Lugs: Suitable for number, size, and conductor material.

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. [Eaton Electrical Inc.: Cutler-Hammer Business Unit.](#)
 - 2. [General Electric Company; GE Consumer & Industrial - Electrical Distribution.](#)
 - 3. [Siemens Energy & Automation, Inc.](#)
 - 4. [Square D; a brand of Schneider Electric.](#)
 - 5. Or Approved Equal.
- B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.
- C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- D. Features and Accessories:
 - 1. Standard frame sizes, trip ratings, and number of poles.
 - 2. Lugs: Suitable for number, size, trip ratings, and conductor material.
 - 3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 - 4. Auxiliary Contacts: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - 5. Alarm Switch: One NO, NC contact that operates only when circuit breaker has tripped.

2.3 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - 2. Outdoor Locations: NEMA 250, Type 3R.
 - 3. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Comply with NECA 1.

3.2 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

End

SECTION 265100 - LIGHTING

PART 1 GENERAL

1.01 DESCRIPTION

- A This Section specifies the lighting system requirements.
- B All fixtures shall be properly installed, completely wired, connected to current source, provided with lamps, ready to use.
- C Where indicated on the drawings, certain lighting circuits shall be controlled by time switches for automatic operation.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A Refer to another Division for the ceiling systems.
- B The lighting system shall be coordinated with ceiling systems and other architectural finishes in which the fixtures are installed or to which they are attached. The Contractor shall obtain all appropriate architectural plans and details to insure that all trims and mounting hardware are completely compatible with each application.

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES

- A The general specifications for each lighting fixture type are as indicated on the lighting fixture schedule. Where a manufacturer's name and catalog number are indicated, the manufacturer's specification for that product is incorporated herein by reference.
- B Each fixture shall be furnished with all required trim and mounting hardware required to install the fixture in, on or suspended from, the ceiling or other architectural finish.
- C Suspended fixtures shall be furnished with pendants or cables specifically designed for each application. Stem or cable canopies shall be furnished to fit flush with the ceiling or wall finish regardless of attaching method.
- D Fluorescent troffer type fixtures shall have a post-fabrication applied white enamel finish with a minimum reflectance of 86%. Lenses shall be as indicated in the lighting fixture schedule, some are special.
- E Surface mounted fluorescent strips or industrial fixtures shall be provided with 1-1/2" offset mounting brackets. Provide a minimum of two for each fixture and not less than two per 4 feet of length for continuous rows or for fixtures longer than 4 feet.

2.02 BALLASTS

- A All electromagnetic fluorescent lamp ballasts shall be low-loss, high power factor,

Class "P", with "A" sound rating and shall bear UL and CBM certifications. Ballasts shall be Valmont "Maxi-Miser I," Advance "Mark III" or Universal "SLH".

- B Electronic ballasts shall be solid state, full light output, Class "P" and shall bear U.L. certification. Ballasts shall be Universal "Triad", or equal by Advance, Thomas Industries or Valmont.
- C Ballasts for compact fluorescent (PL or Biax) lamps shall be high power factor.
- D Ballasts for fluorescent fixtures installed in unheated spaces or for exterior applications, shall be low temperature start, rated 0°F.

2.03 LAMPS

- A Fluorescent lamps shall be energy saving type, of size, 35K and wattage as scheduled on the drawings. They shall be General Electric "Watt-Miser", or equal as manufactured by Sylvania or Philips-Norelco.
- B Incandescent lamps shall be of type and size as scheduled on the drawings. They shall be rated 130 volts for longer life.
- C Other lamps, such as high intensity discharge or quartz, shall be of size and type as scheduled on the drawings and shall in all cases be compatible with the fixture in which they are to be used.

2.04 AUTOMATIC LIGHTING CONTROLS

- A See electrical drawings for specification for Automatic Lighting Control System.

PART 3 EXECUTION

3.01 INSTALLATION AND SUPPORTING METHODS

- A Surface mounted fixtures on suspended acoustical ceilings shall be firmly mounted on an outlet box which has pre-manufactured support brackets which span a minimum of two T-bars or support runners and attach to T-bars or support runners at a minimum of four (4) points (or continuously). Surface mounted linear fluorescent fixtures shall be attached to T-bars with caddy clips at a maximum of 4' on center. (Fluorescent strips shall use 1-1/2" offset brackets).
- B Surface mounted (wall or ceiling) fixtures on hard finish construction such as gypsum board, stucco, plaster or E.I.F.S. shall be attached to outlet boxes which are supported by a pre-manufactured brace which spans a minimum of two ceiling (or wall) structural members. Outlet boxes which support fixtures weighing 20 pounds or more shall have two (2) such braces.
- C Recessed fixtures shall be installed utilizing pre-manufactured mounting brackets which span a minimum of two (2) ceiling structural members at a minimum of four (4) points (or continuously). Conduit, wire or pipe strapping may not be used for such purposes. Fixtures which weigh more than 20 pounds shall additionally be supported from building structure by a minimum of four (4) safety wires or cables (minimum 12 Ga. Steel).
- D Suspended fixtures shall be mounted to outlet boxes and ceiling structural

members installed as described for surface mounted fixtures using pendants or cables as indicated. There shall be not less than two (2) such pendants or cables for each 8 foot long fixture. Pendants or cables shall be designed to allow suspended fixtures to hang plumb and level for their entire length (or length of continuous rows), regardless of ceiling slope or irregularities. Canopies shall fit flush with ceiling finish on all sides.

3.02 FIXTURE TRIM

- A All fixtures, regardless of specified catalog number or mounting shall be provided with the proper trim and hardware for each application. Fixture trims shall completely cover all rough openings and fit flush with surface on all sides.

3.03 FIXTURE WIRING

- A Fixtures in non-accessible ceilings shall be directly wired using "THHN (or THWN in wet locations)" cable.
- B Outlet boxes for surface mounted or suspended fixtures shall be wired using "THHN (or THWN in wet locations)" cable.
- C Surface mounted or suspended continuous rows of fluorescent fixtures may use pre-manufactured plug-in wiring systems which utilize polarized fully rated nylon connectors in each fixture for continuous row energizing. Un-switched circuits for lamps connected to onboard emergency battery packs shall be directly wired using conduit.

3.04 LAMPS

- A All lamps shall be new and burning at the time of substantial completion. Fluorescent lamps which have been in use by the Contractor for 180 days or more shall be replaced. Lamps which are flickering, discolored or producing deficient color or lumen output shall be replaced. Incandescent lamps in use for 100 hours or more shall be replaced.

3.05 BALLASTS

- A All ballasts shall be new and operational at the time of substantial completion. All ballasts which are noisy or producing reduced lighting levels shall be replaced. Ballasts shall be covered by the Contractor's warranty.

End

