DIVISION SIXTEEN - ELECTRICAL
SECTION 16000

1. GENERAL

1.01 CONDITIONS OF THE CONTRACT: The requirements of the General Conditions and Division 1 of the Specifications apply to this Section. All work covered by this Section of the Specifications apply to this Section. All work covered by this Section of the Specifications shall be accomplished in accordance with all applicable provisions of the Contract Documents and any addenda or directives which may be issued herewith, or otherwise at a later time.

1.02 WORK INCLUDED: Electrical work required is indicated on the Drawings and/or specified herein and includes, but is not limited to:

Wiring
Raceways
Outlets
Cabinets and Boxes
Panel boards
Switches
Receptacles
Plates
Phase Fault Detector
Contactors, Relays
Lighting Fixtures
Fire Alarm Controls
Clocks
Speakers
Telephone System Rough-In

1.03 RELATED WORK DESCRIBED ELSEWHERE: Section 15010-Special Conditions for All Mechanical and Electrical Work.

1.04 STANDARD FOR WORK:

1.04.01 Materials: All materials shall be listed by the Underwriters' Laboratories, Inc. as conforming to its standards and be so labeled in every case where such a standard has been established for the particular type of material in question.

1.04.02 Installation: Workmanship shall be in accordance with the National Electrical Contractors Association "Standard of Installation" and the National Electrical Code.

1.05 TEMPORARY LIGHT AND POWER: Provide the necessary wiring, connections, meter, pole, and other accessories, etc., required for temporary light and power during construction of the project.

1.06 TYPE OF SERVICE: The new service shall be 120/208 volt, 4 - wire, 3 - phase as indicated on the Drawings.

2. PRODUCTS

2.01 RACEWAYS:

2.01.01 General: Raceways shall be galvanized steel rigid conduit where run exposed in areas subject to damage. For underground raceways 5 ft. outside of the building slab, provide UL labeled PVC conduit. Galvanized electric metallic tubing may be used as a raceway in other locations, except for motor connections.

2.01.02 Bends: Elbows shall be of the same material as the raceway. Except for PVC, elbows may be formed at the construction site, provided the cross section is not changed by bending, and the coating inside and out remains unharmed. Elbows used with PVC shall be factory made rigid galvanized elbows, primed and wrapped with Plicoflex tape as hereinafter specified.

2.01.03 Exposed Raceway : Raceways where exposed shall be run vertically or horizontally, parallel or at right angles to the line of the building. Raceways to outlets in areas without suspended ceilings shall be run overhead through steel joists and generally attached to the upper chord with suitable fasteners of approved type. Submit samples for approval.

2.01.04 Fittings: All fittings such as locknuts, couplings, and bushings shall be hop dip galvanized, cadmium plated or protected by an equivalent rust resisting finish. Fittings for EMT shall be of the gland ring, watertight type equal to T&B 5123-5623 Series. Set screw fillings will not be acceptable where concealed in building construction. Only fittings made of steel with zinc finish or malleable iron with cadmium finish will be acceptable. Conduit unions shall be equal to Crouse Hinds, T&B, Appleton, or Erikson. No raceway shall be run closer than 6" to a combustion vent, grease laden duct, or steam pipe. Raceways passing through expansion joints shall have approved Appleton or Crouse Hinds expansion joint fittings, connected to a minimum of 5' of rigid conduit. Flexible metallic raceway with accessible junction boxes may be utilized where acceptable to the Engineer.

2.02 CABINETS AND BOXES:

2.02.01 General: All cabinets, junction boxes, and pull boxes shall be code gage galvanized steel with edges turned to receive the trim. The cabinets and boxes shall be of the sizes required and placed in the locations indicated on the Drawings and as required for proper installation. Outlet boxes shall be provided at the terminal of each conduit or cable run to each outlet or device of any type and shall be of the size, type, and design best suited to accommodate the structural conditions, size, and number of raceways and conductors or cables entering, and the device or fixture served by it.

2.02.02 Box Extensions : Mount all outlet boxes flush with the surface, in finished areas. Box extensions may be approved as approved by the Engineer. In no case shall a device be installed in a box or box extension which is over *1/8"* behind the finished surfaces. Use concrete boxes of depth required in slabs to avoid raceway bends.

2.02.03 Exposed Boxes: Exposed conduit, junction and outlet boxes in finished areas or exposed to weather shall be cast aluminum with threaded hubs.

2.02.04 Masonry: Boxes installed in masonry walls shall be of sufficient depth (not less than 2 1/2") to permit conduits to be installed without cutting into the outer web of masonry and shall be located to come adjacent to joints in masonry units where applicable, exact heights cannot be determined until construction.

2.02.05 Location in Panel and Other Architectural Features: All outlets occurring in panels or other architectural features shall be centered accurately as approved by the Engineer. Outlets shall clear trims and comers by 4" where possible. Where a receptacle and telephone outlet or junction boxes, etc., are shown on the drawings adjacent to each other, they shall be spread apart with a minimum distance of 2".

2.02.06 Location of Switch Outlets: Switch outlets located immediately inside the door shall be placed on the strike side of the door, except where the outlet is shown in the partition at right angles to the partition in which the door is located. The outlet shall in such cases clear the door when opened, by 6". Coordinate the location of all switches indicated with the door installations indicated on Architectural Drawings.

2.02.07 Outlets for Light Fixtures: Outlet boxes provided for lighting fixtures shall be equipped with 3/8" or larger fixture studs. Ceiling and wall outlets for fixtures of sizes warranting greater support than that can be obtained by a 3/8" stud, provided with hangers designed to sustain the weight of the proposed fixture as indicated on the Drawings plus 200 lb.. All fixtures and outlets boxes in or on suspended ceilings shall be rigidly attached to structural members capable of carrying the weight of the fixture plus 200 lb.. at each hanger or attachment without sagging. Recessed troffers shall be provided with approved hanging devices as required for proper installation in the ceiling furnished, and a flexible conduit connection between the fixture and a branch circuit wiring junction or outlet box.

2.02.08 Outlet Boxes in Concrete: Holes in concrete for outlet boxes and conduits not cast in place or sleeved for shall be core drilled as approved by the Engineer. The use of impact type tools is prohibited.

2.03 CONDUCTORS:

2.03.01 General: All conductors or individual wires making up a conductor shall be tinned soft annealed copper which will meet all the physical and electrical requirements of the ASTM and the IEEE as approved by the Engineer. Only where specifically indicated where wire size indication is accompanied by "AL" will aluminum conductors be permissible. Otherwise conductors shall be copper. Bare aluminum conductors will not be permitted under any circumstances. Connectors for aluminum cables shall be hydraulic compression type utilizing an approved anti- oxidant compound performed in accordance with the manufacturer's instructions.

2.03.02 Insulation: Insulation of conductors shall be TW, 600 Volt, unless otherwise indicated. Conductors No.6 AWG and larger shall be Type THW, 600 Volt. Conductors No.8 and smaller shall be solid and No.6 and larger shall be stranded. Conductors in fixtures, heating

equipment, and conductors in other high temperature areas shall have insulation suitable for the temperature encountered.

2.03.03 Sizing: No wire smaller than No.12 AWG shall be used for lighting and power. All wire shall be of such a size that the drop in potential to the most distant point of the circuit will not exceed the code requirements. Unless otherwise indicated on the Drawings, all 120/240 Volt conductors exceeding 75 ft. in total length between circuit panel and connection of load shall be No.10 AWG, and all over 110 ft. shall be No.8 AWG. Control and signal wiring shall not be smaller than No.14 AWG.

2.03.04 Color Coding: Conductors shall be color coded in accordance with the requirements of the N.E.C. and as follows:

COLOR PHASE TABLE FOR INSULATED WIRE

277/480 Volt	120/208/240 Volt	Phase
Brown	Black	A
Orange	Red	B
Yellow	Blue	C
Gray	White	Neutral
	Green	Ground
	Yellow	Switch Leg Return

2.03.05 Splices and Terminals: All conductors shall be continuous without splices or joint between cabinets, junction boxes and outlets. Sufficient length shall be left at device for connections to apparatus of devices without strain. All conductor terminals, lugs, etc. shall be of a type acceptable to the Engineer. Splices of wire shall be eliminated whenever possible and necessary splices shall be made only at readily accessible pull and outlet boxes. Joints, taps, and splices in wire No. 8 and smaller shall be mechanically tight by use of compression connectors or equip to 3 M Co. Type R, G, or B "Scotch Lok" spring connectors. Joints, taps and splices in wire No.6 and larger shall be by means of brass or copper Al - Cu rated pressure connectors applied after the conductor have been cleaned, then made tight and fully insulated with 3M Co. No.33 or Plymouth Rubber Co. Slipknot gray vinyl plastic electric tape, and friction tape to raise flashover of insulation value of joints at lease 100 % in excess of the wire insulation. Where terminals permit, all connections for wire No.8 and larger to switches, panel boards, etc., shall be made with soldered or solderless copper lugs or terminals of proper style and size to handle full wire capacity. Mechanical lugs of approved type may be used if the Contractor so elects. Aluminum connections shall be as previously specified.

2.03.06 Wiring through Fixtures: Branch circuit wiring shall not be run through fixtures unless specifically indicated.

2.04 SWITCHES:

2.04.01 Safety Switches: Service and motor disconnect switches shall be Westinghouse, ITE, GE or Square D Type “Heavy Duty," horsepower rated, fusible or nonfusible of the size and type indicated on the drawings, or as required by the motor or device served. Switches shall

be rated 240 Volts A.C. for use on the 120/240 Volt system. Switches shall be designed for locking in "ON" or "OFF" position, UL approved for duty shown, and be of the NEMA class for the location required. Switches shall be provided with cover interlock. Switches indicated on the Drawings by specific type and manufacturer shall be furnished as noted. Paralleling of fuses per phase will not be acceptable. Switches shall be rated for a minimum of 20,000 Amperes RMS interrupting rating.

2.04.02 Local Wall Switches: Switches shall be of the single pole, three way and four way flush tumbler type, and connected to provide control of outlets as indicated on the Drawings. Switches in paneled walls shall have finish as directed by the Engineer. Single pole switches shall be installed so that the lever is in the down position when "OFF." Switches shall be specification grade. Switches as manufactured by P&S, Arrow-Hart, Bryant, Hubbell, Lutron, Leviton & Slater will be acceptable. Despard type switches of equivalent quality may be provided where space will not permit installation of single gang switches. Verify with Engineer. Single pole - Bryant CS 120 - BI; Three Way -Bryant CS 320 - BI.

Toggle Switches: 20 ampere rated, extra hard use specification grade as follows: Single Pole - P&S 2OACI - I; Three Way - P&S 20AC3 - I

Timer Switches : 20 ampere rated, Mark Time 90281, 0-2 hrs. without hold.

Motor Switches: Motor switches for 120 Volt, single phase motor, 1 HP or less shall be Westinghouse MSTO1, single pole, single phase, complete with cover plate and heater element, and shall be suitable for flush mounting. Similar switches as manufactured by GE, Square D, or ITE will be acceptable. Motor switches for 240 volt, single phase motors, 1 HP or less, shall be Westinghouse MSTO2, double pole, single phase, complete with cover plate and heater element, and shall be suitable for flush mounting. Similar switches as manufactured by GE, Square D, or ITE will be acceptable. Motor switches for 208 Volt, Three phase motors, 3 HP or less, not requiring overload protection within the switch may be P&S No.7813 in suitable NEMA enclosure.

2.04.03 Dry Type Transformers:

1. Dry type transformers shall be two winding of the size and electrical characteristics, as scheduled, in conformance with ANSI - C89. 1 and NEMA STl-4 standards and Underwriters Laboratories listing UL *506.*

2. Each transformer shall be guaranteed to have sound ratings not to exceed ANSI standard decibel levels. Transformer 25 KVA and under shall a UL rating limiting system temperature to 115 degrees C., 30 KVA and above shall have UL ratings limiting system temperature to 150 degrees C., both with respect to a 40- degree C. ambient.

3. Transformers 30 KVA and above shall have core and coil assembly completely isolated from enclosure with neoprene rubber pads, and six primary voltage taps rated (4) 2 1/2 percent below normal and (2) 2 ½ percent taps above normal. Transformers 25 KVA and under shall have four primary voltage taps rated (2) 2 1/2 percent taps above normal.

4. Make necessary tap adjustments on transformers to ensure that the secondary voltages at the transformer terminals will be as close as possible to 120 volts phase-to-neutral, and 208 or 240 Volts, phase-to-phase, when the building is in normal operation.

5. Transformers shall have heat barriered termination compartment arranged for feeder termination for side or bottom entrance of flexible metallic raceways.

6. Transformers shall have a bonding jumper installed between the secondary neutral terminal and the metal case and shall include a ground terminal of proper size to receive ground conductor.

7. Provide brackets to mount transformer on C.M.U. wall, 8' A.F.F.

2.05 RECEPTACLES:

2.05.01 Interior Duplex Receptacles: P&S No. 5352-I. 20 ampere rated, specification grade.

2.05.02 Exterior Weatherproof Receptacles: P&S No. CR-6307. 20 ampere, specification grade.

2.05.03 Ground Fault Circuit Interrupters: P&S No. 2091-FHG-I.

2.05.04 Mounting: Unless otherwise noted or where conditions prohibit, duplex convenience receptacles shall be mounted in a vertical position, 18" A.F.F.

2.05.05 Acceptable Manufacturers: P&S, Arrow-Hart, Bryan, Hubbell, Slater, and Leviton.

2.06 SWITCH. RECEPTACLE. AND OUTLET PLATES:

2.06.01 General: Flush tumbler switch and convenience outlet plates, blank outlet plates, and other plates in finished areas shall be 0.35 inch thick Type 302 stainless steel equal to P&S Sierra "N" Series, as selected. Similar plates shall be provided for switches with pilot lights and miscellaneous devices and outlet boxes.

2.06.02 Interior Toggle Switches: P&S S-l-N, S-2-N, S-3-N, S-4-N, and S-5-N for one, two three, four, and five gang switch plates, respectively.

2.06.03 Interior Duplex Receptacles: P&S No. S-8N and S-82N for one and two gang receptacle plates, respectively.

2.06.04 Ground Fault Interrupter Outlet: P&S No. S-26N

2.06.05 Weatherproof Switch: P&S WP-l

2.06.06 Telephone Outlets: P&S No. S-12N

2.06.07 Weatherproof Outlet: P&S No.4510.

2.07 FLOOR AND SPECIAL OUTLETS:

2.07.01 Floor Outlets: Provide as detailed or specified on the Drawings. Floor outlets not shown by type number shall be as required by the installation of the device or be as required by the installation of the device or service involved as approved by the Engineer.

2.07.02 Special Outlet: Boxes with twist - lock or special purpose receptacles shall be provided as indicated on the drawings or as required by the equipment furnished.

2.08 PANEL BOARDS:

2.08.01 General: Panel boards shall be one section panels and shall be of the automatic circuit breaker, dead front type, and shall be in accordance with U.L. "Standard for Panel boards," and "Standards for Cabinets and Boxes" and shall be so labeled. Panel boards sizes shall be as specified on Drawings.

2.08.02 Cabinets: The cabinets shall be of sufficient size to provide ample gutter space in accordance with the National Electrical Code and in no case less than 4" on all sides. All recessed cabinets installed in masonry walls shall be of sufficient depth to accommodate all conduits and have a minimum clearance of 1" from the face of the finished wall to the conduit. Gutters shall be increased in size as required by the conductor splice for connections to mechanical lugs on the circuit breakers. Fronts shall have indicating or self-aligning trim clamps and doors equipped with flush type combination lock and catch. Cabinets shall be of flush or surface type as scheduled.

2.08.03 Breakers: Circuit breakers shall be quick make and quick break on manual operation. Automatic tripping (overload and short circuit) shall be clearly indicated by the operating handle assuming a neutral (center) position. Multi-pole circuit breakers shall be of the common trip type. Breakers shall be UL approved for the panel board voltage and thermally compensated to carry rated load at 40 degrees C. ambient with 45 degrees C. rise. Breakers shall be bolted type or plug in. Circuit breakers shall have interrupting capacity as scheduled, but shall in no case be less than 10,000 Ampere symmetrical. Locking type breakers or guards shall be provided for circuits supplying lights controlled by light control relays, outside lighting, electric drinking fountains, and such equipment which may cause confusion or inconvenience if inadvertently de-energized.

2.08.04 Type: The panelboards shall be the factory assembled type equal to Westinghouse Types NQB, WEB, WEHB, FDP, or CDP as required.

2.08.05 Acceptable manufacturers: Westinghouse, GE, Square D, ITE, Cutler Hammer, Challenger.

2.08.06 Light Fixture Breaker with No Wall Switch: Breakers serving lighting fixtures which are not controlled by wall switches shall have the end of each breaker lever painted with yellow enamel.

2.08.07 Directory: Each panel board circuit breaker shall be identified by a separate number. numbering of poles will not be acceptable. Panel board directory shall be typed.

3. EXECUTION

3.01 MOUNTING HEIGHTS: Standard Mounting Heights: Measured from finished floor or grade to centerline of device.

Wall Switches	48"	
Convenience Receptacle	18"	(finished area)
Convenience Receptacle	6"	(above counter)
Convenience Receptacle	36"	(storage areas)
Desk Telephone Outlets	18"	
Disconnect Switches:	66"	
Clock Outlets:	90"	
Thermostat:	48"	

3.02 INSTALLATION AND FABRICATION:

3.02.01 Conduits: Raceways shall be reamed, burrs removed, and shall be cleaned inside before the introduction of wire. Raceways ends shall be capped and plugged with standard accessories as soon as same have been permanently installed in place. Conduit entering boxes and fittings without threaded hubs shall have two (2) locknuts and bushings. All conduit 1-1/4" and larger shall be provided with insulating type bushings equal to O.Z. products. Running threads will not be permitted.

3.02.02 Work in Masonry: Where electrical work occurs in masonry walls, the installation shall be accomplished sufficiently in advance of the masonry construction. Conduits, outlet boxes, switch boxes, etc. shall be installed in such a manner and at such locations as to avoid unnecessary cutting of masonry. Work erected in advance of the masonry shall be securely supported and held in position to prevent displacement. Cutting and fitting of masonry around properly located outlets shall be accomplished by the masonry trades.

3.02.03 Empty Raceway Systems: Pull wires shall be furnished and installed in all empty raceways for future installation of conductors. Each pull wire shall be identified by a suitable permanent tag giving information as to the service and locations of the other end of the wire.

3.02.04 Miscellaneous: The contractor shall keep the forms clean of cutting oil and other debris incidental to the installation. Outlet boxes shall be set flush with Finnish surfaces. Box extensions may be used as required.

3.02.05 Color Coding of Junction Boxes: Junction boxes located above the ceiling in concealed locations shall be spray painted with a color code as follows to aid in rapid identification:

Power and Lighting:	No color
Temperature Controls:	Blue
Telephone:	Green
Computer:	Brown

3.03 Grounding: The electrical system shall be grounded in accordance with Article 250 of the National Electrical Code. All electrical materials and equipment shall be grounded. Provide a continuous ground from all outlets and devices and connect to ground lugs on the appropriate panel. For all circuits provide a continuous ground conductor.

3.04 Fuses: Fuses shall be provided for the over current protection of all conductors, except as otherwise specified herein or on the Drawings. Fuses shall be of the dual element cartridge type. When the installation is completed and ready for acceptance each fuse holder shall be supplied with Bussman Fusetron of proper rating. Fuses for equipment rated over 600 amperes shall be Class L fuses. Paralleling of fuses will not be acceptable.

3.05 Motor Starters: Motor starters shall be Westinghouse A/200 Series AC magnetic full voltage non reversing across the line starters with overload protection in each ungrounded phase leg. Each starter shall be mounted in a suitable NEMA type enclosure with a reset button; line voltage magnetic coil; and "HAND-OFF-AUTO" switch and pilot light in the cover. Auxiliary contacts shall be provided with starters as required for the interlock wiring plus two extra auxiliary contacts for future use. Each starter shall be provided with starting circuit relay. Similar starters as manufactured by ITE, Square D, Cutlet Hammer, GE or Allen-Bradley will be acceptable. At Contractor's option, starting circuit relay may be provided in separate NEMA enclosure mounted adjacent to the starter and connected thereto.

3.06 Surge Protection: Provide surge protection for all circuits in Electrical Panel as shown on Drawings.

3.07 Magnetic Contactors and Relays: Provide magnetic and magnetically held relays and contactors of the sizes, manufacturer, and catalog number indicated and scheduled on the Drawings. Relays and contactors shall be mounted in suitable NEMA enclosures. Provide necessary relays and devices as required for proper control operation.

3.08 Empty Conduit Systems: The Contractor shall install an empty raceway system for telephones, fire alarms, clocks, speakers, and other signal Systems indicated, complete with all necessary boxes, cabinets, fittings, etc. as indicated on the Drawings. The telephone installation shall be in accordance with the accepted standard of the telephone company. Telephone outlets shall be furnished with 4" outlet boxes and bushed one-hole Uniline Plates. All other outlets shall be furnished with blank outlet plates as here-in-before specified. Provide all material required, leaving an identified nylon pull chord for use by others in all empty conduits.

3.09.01 Conduit Size: Telephone conduit shall be not less than 3/4". Conduit shall extend from each outlet and be routed individually or grouped with other outlets back to the telephone terminal board. The following table indicates the size of conduit for grouping of telephone outlets:

Size	No. of Outlets
3/4"	1-4
1"	5-9
1-1/4"	10-14

1-1/2"	15-20
2”	21-40

3.10 EMERGENCY LIGHTS AND EXIT SIGNS: Emergency lights and exit signs indicated on the Drawings shall be connected to the indicated emergency light or exit light circuit. Branch circuit wiring shall be no smaller than No.10 TW.

3.11 LIGHTING FIXTURES AND EQUIPMENT

3.11.01 General: Lighting fixtures of the type indicated by symbols on the Drawings for single unit, continuous rows, or patterns, and specified in the Fixture Schedule shall be installed at each lighting outlet and fixture location, complete with hangers and accessories. Where continuous rows or patterns are indicated, the type symbol designates the individual units making up the row or pattern. All necessary connectors, hangers, trim pieces, etc., required to connect individual fixtures into an integral unit shall be provided. Should any type designation be omitted on the Drawings, the fixtures shall be of the same type as used in rooms of similar usage. Where 4 ft. fixtures are indicated in continuous rows, they shall be furnished in 8 ft. tandem chassis.

3.11.02 Lamps: Lamps on the project shall be new, delivered to the job site in original packing cases and sleeves, and shall be of the same manufacturer. Incandescent lamps not scheduled otherwise shall be inside frosted, high duty service, 130 volt. Fluorescent lamps not scheduled otherwise shall be F32-T8, 32 watt energy saver, rapid start, F32TB/SP41/RS, 77CRI. High intensity discharge (H.I.D.) lamps shall be of the type scheduled and shall be color corrected. Submit lamps by brand, wattage, color and style to be used in each fixture.

3.11.03 Enclosures: Where acrylic enclosures are specified, only virgin acrylic 1/8" minimum thickness will be acceptable. Where polystyrene enclosures are specified, only light stabilized polystyrene will be acceptable. Submit with the Shop Drawings a statement from the lighting fixture manufacturer stating the above conditions have been met.

3.11.04 Ballast: FLUORESCENT LAMP BALLAST'S (ELECTRONIC)

Ballast's shall be thermally protected against overheating by a built-in overheat protector sensitive to both winding temperature and current which will prevent ballast case temperature from exceeding 90 deg.C. in accordance with U.L. test requirements.

Ballast's shall not exceed 90 deg.C. operating temperature in a 55 deg.C. heat box. Test shall be conducted at a minimum of 15 deg.C. over CBM and U.L. testing procedures. Ballast shall be electronic energy saving type, meet Class P approval, Motorola “1M" series Magnetek Triad Series, or equal approved by ETTA Corp.

Ballast shall be sound rated "A" for and suitable for use with T-8, 32 watt fluorescent lamps.

Ballast's shall meet the limits of Federal Communications Commission Part 1 5J for electromagnetic interference and have an FCC identification number.

Ballast's shall be continuous or modulated high frequency (above 20K Hz.) sinusoidal with power factor above 90% and shall be internally protected from line transients defined in IEEE 587, Category A.

Ballast shall be warranted by the manufacturer to the owner that ballast's will be free from defects in material and workmanship for a period of three years, including replacement labor.

Submit ballast manufacturer, type and catalog number used in each fixture with lighting fixture submittal.

3.11.05 Hangers and Supports: The locations shown for outlet boxes for fluorescent fixtures are diagrammatic. Outlets shall be located as required to coincide with suspension hangers where they occur and with structural and architectural elements of the building. Fixture supports shall be capable of carrying the weight of the fixture plus 200 lb. at each support without sagging. Provide the necessary supports for hangers located between structural members.

3.11.06 Ceiling: The recessed light fixtures shall be compatible with ceiling system specified under Division 9 of the Specifications and as indicated on the Drawings.

3.11.07 Acceptable Manufacturers:

Fluorescent Fixtures: Daybrite, Lithonia, Columbia, Benjamin. Exterior Lights: Kim,

Crouse Hinds, Lithonia Wade Lite, Hi-Tek, McPhilben.

Emergency & Exit Lights: Emergi-Lite, Lithonia, Elan, DynaRay, Crouse-Hinds, Chloride.

Vandal Resistant Fixtures: Kennall, Lithonia, Marco, Luminaire.

3.14 CONNECTORS FOR OTHERS: Review the plumbing, heating, ventilating, air conditioning, architectural and all other Drawings to determine locations of all motors, control wiring, outlets, appliances, electrical equipment, etc., and provide the necessary wiring and make the electrical connections required to provide for the proper operation of the equipment specified or indicated elsewhere. Set in place all starters, switches, and electrical control devices that are part of equipment specified or indicated elsewhere. Furnish supports, boxes, wiring, etc., as necessary and install all interconnecting wiring and make all connections required for proper operation.

3.15 INDEMNIFICATION AND LABELING: Provide labeling for all panels, safety switches and other items of electrical equipment in accordance with Section 15010. Provide neatly typed circuit directory cards for all panels.

3.16 TESTS: At the time of Final Acceptance and tests, all connections at panels shall be completed and all splices shall be made. All fuses and breakers shall be in place, and the circuits continuous from service switches to each and every outlet. Test each system to prove it is free from short circuits and from grounds, and prove it has an insulation level between conductors and grounds. Provide all testing equipment necessary to satisfactorily conduct the above tests. See Section 15010
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3.17 CLEANING AND PAINTING : Where required for touchup purpose, equipment shall be painted with factory furnished paint. Refer to Section 15010.

END OF SECTION