

DIVISION 16 - ELECTRICAL

16100 GENERAL PROVISIONS

PART 1 - GENERAL

1.01 SCOPE

A. General Conditions, Instructions to Bidders, and all applicable sections of the Architectural Specifications shall apply to this section.
B. The provisions of this specification section shall apply to all sections of Division 16.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Division 16 work includes all electrical work referred to in any part of the contract documents. Refer to other divisions' drawings and specifications for requirements.

1.03 CONFLICTS

A. Conflicts may occur between the provisions of Division 16 and those of other Divisions, or between the drawings and specifications. In such a case the portion of the documents that requires the higher quality, greater quantity, or item of higher installed cost shall apply.

1.04 DEFINITIONS

The following definitions apply only to Division 16 documents:

A. Furnish: Obtain and deliver to jobsite.
B. Install: Receive at job site, untied, stored, set in place, and put in operation.
C. Provide: Furnish and install.
D. Connect: Provide service to the equipment and make all necessary attachments including lugs, fittings, devices, etc.

1.05 WORK INCLUDED

A. Provide all material, equipment, labor, services, etc. as required for the installation of all electrical systems in compliance with the Contract Documents. These systems shall be left complete, functioning, and ready for use.
B. The omission of specific reference to any material or labor required for, or reasonably associated with the installation of a complete system shall not be considered authorization to omit such work.
C. Any changes or modifications that are required, because of a particular Manufacturer's or Subcontractor's requirements, shall be made at no additional cost to the Owner.
D. Provide all electrical work indicated in the Contract Documents except for that which is specifically indicated as excluded.

1.06 CODES AND STANDARDS

A. All work shall comply with the National Electrical Code and all applicable national, state, and local codes, regulations, and ordinances.
B. All materials and equipment used shall be listed and labeled by Underwriters Laboratories, Inc. where UL testing and listing are available for the materials or equipment.
C. All materials and equipment shall be installed in accordance with the manufacturers recommendations and instructions.
D. The installation shall comply with the regulations of the utility that serves the site.
E. All work shall be performed in a neat and workmanlike manner by licensed electricians.
F. The above requirements establish a minimum standard for the work. Where requirements of the Contract Documents exceed this minimum standard, comply with the requirements of the Contract Documents. If conflicts occur between the requirements of the Contract Documents and the minimum standards for the work, notify the Engineer before proceeding with the installation.

1.07 USE OF DRAWINGS

A. The drawings are diagrammatic in nature and indicate approximate locations and the general arrangement of equipment, systems, and building elements. Do not scale drawings of 1/4" = 1'-0" scale or smaller. Refer to dimensioned drawings for exact locations of building elements, equipment, etc. Field measurements shall take precedence over dimensioned drawings where applicable.
B. Any discrepancies between the electrical drawings and those of other Divisions shall be reported to the Engineer at once. The Engineer reserves the right to make minor changes in equipment locations as required to resolve such discrepancies, at no additional cost to the Owner.
C. Obtain clarifications from the Engineer before proceeding. If any questions arise regarding the intent of the Contract Documents. If a clarification cannot be obtained quickly enough, the higher quality, greater quantity or item of higher installed cost shall apply.
D. For locations of connections to equipment furnished by others, consult the supplier of the equipment.
E. Do not install equipment that exceeds the dimensions indicated on the drawings and do not reduce the clearances indicated on the drawings without first consulting the Engineer.

1.08 SPECIAL CHARGES

A. Obtain and pay for all permits, licenses, and inspections required for the electrical work.
B. Make all arrangements for and pay for all service charges for temporary and new power, telephone, and CATV service as required.
C. The General Contractor will pay the utility for all electricity used during the construction period.

1.09 MATERIALS

A. All materials and equipment used shall be new and of good quality. Do not reuse materials unless specifically indicated in the Contract Documents.

1.10 COORDINATION

A. Coordinate the work with that of other trades to avoid any conflicts or interferences. Inform other trades of clearances, openings, or restrictions required around electrical equipment. The layout of electrical systems may be altered to avoid conflicts prior to installation at no additional cost to the Owner. Report any conflicts to the Engineer immediately.
B. Field verify dimensions, mounting heights, and other conditions prior to installation of electrical systems immediately notify architect's project manager of any discrepancies.

1.11 SITE EXAMINATION

A. Verify all existing conditions at the site that may affect the execution of the work. Make provisions as required to accommodate such conditions.

1.12 SUBMITTALS

A. Submit 5 copies of all required shop drawings to the Engineer for approval before installation of material or equipment. Check, stamp, and approve all shop drawings prior to submittal to the Engineer.
B. Submit to Engineer one set of record drawings ("as-built") showing all changes made from the Contract Documents during construction. These drawings must be kept current as work progresses.

1.13 SUBSTITUTIONS

A. In order to gain approval to substitute for specified equipment, submit a request in writing 10 calendar days prior to the bid date. Submittals shall include all information necessary to show that the equipment's characteristics and performance are equal to those of the specified equipment. Approvals will be made by addendum.
B. The Contractor shall bear all responsibility for any changes caused by the use of approved substitutes, including the cost of additional work required by other trades.
C. The Engineer may, at any time, require the Contractor to remove any equipment or material when it is not approved as a substitution, or does not meet the specifications. This work must be completed in a timely manner and at no additional cost or inconvenience to the Owner.

1.14 TEMPORARY POWER AND LIGHTING

A. Provide and maintain a 100 AMP, 120/240 volt, single phase, temporary power and lighting system.
B. The temporary service shall be located 15 ft. from the building and will include: pole, meter, socket, panel, circuit breakers, and adequate GFI receptacles, for continuous uninterrupted power during the construction period. A second temporary inside service power coming from the outside temporary service shall be centered and located on the inside of the building as soon as construction permits. Temporary shall include: panel, circuit breakers, adequate lighting, and adequate GFI receptacles for continuous uninterrupted power during construction.
C. Electrical Contractor shall remove all temporary wiring when tenant's permanent system and lighting are complete.

1.15 GUARANTEE

A. The Contractor shall be responsible for all work performed by him during the period of one year from date of final acceptance of the work. The Contractor shall repair or correct any defective work or develop in any part of the system due to faulty material, equipment, or installation at no additional cost or inconvenience to the Owner.

16100 BASIC MATERIALS & METHODS

PART 1 - GENERAL

1.01 SCOPE

A. The provisions of this specification section shall apply to all sections of Division 16.

1.02 SHOP DRAWINGS

A. Submit shop drawings for safety switches as per specification section 16101, Article 1.12 SUBMITTALS.

PART 2 - PRODUCTS

2.01 CONDUIT AND FITTINGS

A. Rigid Steel Conduit
1. Conduit shall be hot-dip galvanized rigid steel.
2. Fittings shall be threaded type rigid galvanized steel.
B. Intermediate Metal Conduit
1. Conduit shall be hot-dip galvanized, intermediate metal conduit.
2. Fittings shall be threaded type, concrete-tight compression type, or concrete-tight set screw type.
C. Electrical Metallic Tubing (EMT)
1. Conduit shall be electro-galvanized steel, with an interior coating of aluminum lacquer or enamel. Do not thread tubing.
2. Fittings shall be steel concrete-tight compression type or steel set screw type. Die-Cast fittings are not allowed.
D. Flexible Metal Conduit
1. Conduit shall be hot-dipped galvanized steel interlocked banding.
2. Fittings shall be clamp type steel or malleable iron. Die-Cast fittings are not allowed.
E. Liquid-Tight Flexible Metal Conduit
1. Conduit shall be hot-dipped galvanized steel interlocked banding with an extruded PVC jacket.
2. Fittings shall be water-tight compression type steel or malleable iron. Die-Cast fittings are not allowed.
F. Rigid nonmetallic Conduit
1. Conduit shall be heavy wall, schedule 40, virgin poly vinyl chloride (PVC).
2. Fittings shall be heavy wall PVC, solvent weld type.

2.02 WIRE WAYS

A. Wire ways shall be formed, code gauge, galvanized or baked enamel pointed steel.
B. Covers shall be continuous, hinged type with screw type closures.
C. All hardware shall be corrosion resistant.

2.03 BOXES

A. Boxes shall be 4" square, galvanized steel, knockout type, for all outlets and fixtures, unless noted otherwise. Acceptable manufacturers: Steel City, Racor, Applon, or equal.
B. FS and FD boxes shall be Steel City type CW, Racor number 580, or equal.
C. Pull boxes shall be sized as indicated and/or as required by the NEC, constructed of code gauge baked enamel pointed or galvanized steel, with hinged or screw covers. Screws shall be corrosion resistant. Boxes flush mounted in walls shall have oversized, flush type covers. Acceptable manufacturer: Hoffman or equal.
D. Floor Boxes
1. All boxes shall be concrete light and fully adjustable before and after the concrete is poured. Size boxes as required and/or indicated on drawings.
2. Boxes shall be cast iron, with flush brass coverplates and carpet or tile flanges unless indicated otherwise.
3. Boxes shall be one gang or multi-gang type as indicated. Flush type duplex receptacle covers shall be flip type. Flush communication outlet covers shall have concrete threaded spacers. Blank plates shall be flush brass.
4. Above floor service fittings shall be as indicated.
5. All components shall be UL listed.
6. Acceptable manufacturers: Hubbell, Walker, Steel City, or equal.

2.04 WIRE AND CABLE

A. Wire or cable insulation shall be UL listed for the specific application. The voltage rating of the wire or cable shall be greater than or equal to the applied system voltage.
B. #12 AWG to #10 AWG copper wire shall be solid or stranded with type THHN, THWN, or XHHW insulation. Acceptable manufacturers: Rama, Anconco, South wire, or approved equal.
C. #8 AWG and larger copper wire shall be stranded with type THHN, THWN, or XHHW insulation. Acceptable manufacturers: Rama, Anconco, South wire, or approved equal.
D. Aluminum wire shall not be permitted.
E. Metal Clad (MC) Cable
1. Sheathing shall be continuous corrugated or smooth, aluminum. Interlocked type is not allowed.
2. Conductors shall be solid or stranded copper, rated 600 volts with type THHN, 90° C insulation.
3. Cable shall conform to UL standard 1569.
4. Cable shall include a full size grounding conductor. The grounding conductor shall be insulated for isolated ground or GFI circuits. Sheathing shall not be used in lieu of a grounding conductor.
5. Fittings shall be UL listed for use with the appropriate type of MC cable. Connectors intended for types NW, MC, SE, USE, UF, or AC cable are not allowed.
6. Acceptable manufacturers: Rockbestos, Interflex, Okanite, AFC, or approved equal.
F. Metal Clad Jacketed (MCJ) Cable
1. Sheathing shall be continuous corrugated or smooth, aluminum with a 40 mil thick, minimum PVC jacket. Interlocked type is not allowed.
2. Conductors shall be solid or stranded copper, rated 600 volts with type THHN, 90° C insulation.
3. Cable shall conform to UL standard 1569.
4. Cable shall include a full size grounding conductor. The grounding conductor shall be insulated for isolated ground or GFI circuits. Sheathing shall not be used in lieu of a grounding conductor.
5. Fittings shall be UL listed for type MCJ cable in wet locations. Other types of connectors are not allowed.
6. Acceptable manufacturers: Rockbestos, Interflex, Okanite, AFC, or approved equal.

2.06 CONDUCTOR TERMINATION'S

A. Connectors for #8 and smaller wire shall be self-insulating, spring action mechanical connectors. Acceptable manufacturers: 3M (Scotchlok), T & B (Pli series), Sackno, or equal.
B. Connectors for #8 and larger copper wire shall be crimp on connectors, hydraulic compression connectors or set screw box lugs. Acceptable manufacturers: AMP, Burndy, O.Z. Gedney, 3M, T & B, Racor, or approved equal.
C. Electrical tape shall be 3M (Scotch) or Plymouth.

2.07 WIRING DEVICES

A. Provide a specification grade wiring device for each outlet indicated on the drawings. All devices shall be of the same manufacturer. Devices shall be heavy unless noted otherwise. Acceptable manufacturers: Hubbell, Leviton, Square D, P & S, Eagle, or approved equal.
B. Receptacles
1. 20amp receptacles shall be 125 volt A.C., duplex, self grounding type with wrap around mounting strap.
2. Isolated ground receptacles shall be 15 or 20 amp, 125 volt A.C., duplex, with wrap around mounting strap and orange face. Ground slots shall be electrically insulated from the mounting strap.
3. Ground fault interrupter receptacles shall be 20amp, 5 ma trip, 120 volt, duplex, with through type.
C. Special purpose receptacles shall be as indicated on drawings.
1. Switches
2. Toggle switches shall be 20amp, 120/277 volt A.C., wet type.
3. Pilot light type toggle switches shall be 20amp, 120/277 volt A.C., quiet type with neon lamp.
D. Coverplates
1. Provide stainless steel cover plates for all boxes and enclosures and cover plates for unused device boxes.
2. Surface mounted device covers shall be oversized flush mounted device covers.
3. Weatherproof device covers shall be cast aluminum with cover and gasket, or external lever. Covers shall have wet location label.

2.08 DISCONNECTING MEANS

Provide one of the following disconnecting means where "disconnects" are called for in the Contract Documents. Note the type of disconnecting means that is specifically called for if such is the case:
A. Safety switches shall be heavy-duty with quick-make, quick-break, positive interlock mechanism, mounted in a NEMA 1 enclosure unless indicated otherwise. Fused safety switches shall be suitable for disconnecting circuit breakers. Acceptable manufacturers: IIE Siemens, Square D, or Cutler Hammer.
B. Molded case circuit breakers shall consist of a ball-on, molded case circuit breaker mounted on a NEMA 1 enclosure unless otherwise indicated. Enclosures to be surface or flush mount, as required or indicated. Acceptable manufacturers: IIE Siemens, Square D, or Cutler Hammer.
C. Plug type "S" fused disconnects shall consist of a toggle switch in series with a type S fuse, mounted on a temporary device plate. Acceptable manufacturers: Busman or Cutler Hammer.
D. Manual Starter switches shall consist of an on-off, 1, 2, or 3 pole toggle switch, with or without overload protection as required or indicated. Acceptable manufacturers: IIE Siemens, Square D, or Cutler Hammer.

2.09 IDENTIFICATION

A. Engroved name plates shall be laminated black on white, plastic with minimum 1/4" high letters. Provide only where indicated.
B. Marking pens shall be permanent, quick drying, waterproof type.
C. Engroved device covers shall be factory engroved with contrasting color, minimum 3/16" high letters.

PART 3 - EXECUTION

3.01 GENERAL

A. All raceways, cables, boxes, devices, and equipment shall be concealed above finished ceilings, behind finished walls, or below finished floors, unless otherwise indicated.
B. All raceways, boxes, devices, and equipment installed in unfinished areas are to be surface mounted or exposed unless otherwise indicated. In areas with exposed roof structure, mount raceways, supports, boxes, etc. above bottom of roof structure if at all possible. In areas with exposed precast concrete ceilings, mount raceways, boxes, etc. light to the precast ceilings.
C. All raceways, boxes, devices, and equipment mounted on "I-Beam" type columns shall be mounted on inside surface of I-Beams for physical protection.
D. Maintain 7'-6" A.F.F. minimum clearance height below all electrical raceways, boxes, devices, equipment, etc. unless indicated otherwise.
E. Where applicable, refer to architectural reflected ceiling plans for locations of light fixtures and other electrical devices and equipment.

3.02 CUTTING AND PATCHING

A. Cut and patch all building materials as required to complete the installation of the electrical systems. Repair all building surfaces and materials that are altered by the electrical work. Seal around all conduit penetrations through walls, floors, and ceilings. Seal penetrations through fire rated walls or smoke barriers so as to maintain the rating of the barrier.
B. Core drill all openings through precast concrete.
C. Do not cut, penetrate, or otherwise alter any structural member without the written approval of the Engineer/Architect.

3.03 SLEEVES

A. Provide schedule 40 galvanized steel pipe sleeves for all conduit penetrations through floors or exterior walls. The openings around the conduits and around the sleeves shall be made waterproof.
B. Sleeves shall be positioned to be plumb, level, and true to building lines.
C. Provide pitch pockets for all roof penetrations. Coordinate with General Contractor.

3.04 SUPPORTS

A. Support electrical materials and light fixtures from the structural framing of the building. Do not use metal roof decking or metal floor decking for support.
B. Speakers, smoke detectors, other ceiling mounted equipment, and raceways may be supported from the lay-in ceiling grid support system, as long as no more than 20 pounds of load is placed on any "T" bar member, and is allowed by code.
C. Support wall mounted equipment from masonry or metal framing. Anchors, hangers, and fasteners shall be adequate for the load to be supported. Plastic anchors are not allowed.

3.05 CONDUIT INSTALLATION

A. Route exposed conduits parallel or perpendicular to the building walls and structure.
B. Conduit shall be firmly supported from the building structure by means of corrosion resistant straps, clamps, or hangers. Support multiple parallel conduit runs from trapeze hangers. Conduit above 1'-0" grid ceilings may be attached to ceiling support wires by conduit clips.
C. Do not mount conduit on mechanical ducts or penetrate mechanical ducts unless indicated otherwise.
D. Mount conduit on mechanical equipment only as required to serve the equipment. Break all vibration mountings with flexible conduit.
E. Conduit shall not be installed so as to block or restrict access to equipment for normal maintenance or repair of the equipment.
F. All connections to motors, transformers, and appliances with moving parts shall be made with flexible conduit.
G. Maintain a minimum of 6" clearance between conduits and any hot piping and surfaces including hot water lines.
H. Provide expansion fittings for all conduits crossing building expansion joints.
I. Cap or plug ends of conduits that are to remain empty. Cap or plug ends of conduits during construction.
J. All conduits shall be 1/2" unless indicated otherwise, except for home runs, which shall be 3/4" unless indicated otherwise.
K. Do not install conduit in concrete unless indicated otherwise.
L. Seal conduits to prevent condensation wherever conduits pass through barriers between areas with a possible temperature difference of 30° F or greater.
M. All conduits in contact with earth shall be PVC coated or protected with two coats of bituminous paint or by vinyl tape.
N. Route conduits so that they do not interfere with the lifting out of lay-in ceiling panels, or with ceiling access panels.

3.06 WIRE WAYS

A. Install wire ways plumb and level.
B. Install wire ways so that covers are easily removed or opened.

3.07 BOXES

A. Mount boxes plumb and level. Flush mount boxes unless indicated otherwise.
B. Rigidly support boxes independently of the conduit system.
C. Close up boxes to prevent moisture during construction. Do not use newspaper.
D. Do not mount boxes back-to-back or use through-the-wall type boxes.
E. Do not cut insulation in order to install boxes.
F. Close up all unused knockouts or openings in boxes.
G. Coordinate box sizes and depths with the architectural documents for wall, floor, and ceiling depths, clearances, etc.
H. Make all connections and openings in boxes watertight prior to concrete pour.
I. Boxes shall be mounted at the following heights above finished floor unless indicated otherwise. In masonry walls, heights may be adjusted up to 2" to line up with ceiling, but all other type devices on the same wall must be of the same height. All heights indicated in the Contract Documents.
1. Receptacles:
a. 12" in finished areas
b. 12" outside
c. 48" in unfinished areas (such as loadings, storage areas, etc.)
d. Switches: 48"
3. Telephones, intercoms, volume controls, other communication outlets:
a. 12" in finished areas
b. 54" where indicated as wall mounted
c. 54" in unfinished areas

3.08 WIRE AND CABLE

A. Install all wire in raceway unless indicated otherwise. Type MC cable, where allowed, may be installed without a raceway except where indicated otherwise or required by codes.
B. Examine wire and cable before installing. Do not install wire with damaged insulation or conductors.
C. Install wire in accordance with manufacturers recommendations. Do not damage the conductors or insulation during installation.
D. All wiring shall be coded in accordance with the National Electrical Code.
E. Wire size indicated on the drawings are based on copper wire with 75% ampacity. Do not substitute smaller or lower ampacity wire without the Engineer's approval.
F. Conduit and cable shall be minimum of #12 (except for control wiring) and copper unless indicated otherwise. All wire shall be listed and UL approved.
G. Conductors shall be identified by color impregnated insulation or by taping. Tape shall be overlapped, solid color electrical tape. 3 or more inches of marking tape shall be visible at all terminations and boxes.
H. Three phase electrical equipment shall have the phases arranged as follows:
1. A,B,C - Top to bottom
2. A,B,C - Front to back
3. A,B,C - Left to right (when facing front of equipment).
I. Type MC & MCJ cable may be used only for lighting circuits where concealed above accessible ceilings. Do not use MC or MCJ cable for equipment wiring, in areas with no ceilings, or in gyp board walls or ceilings. Do not use where not permitted by local codes.

3.09 CONDUCTOR TERMINATION'S

A. Provide connectors, lugs, etc. as necessary to make all electrical splices, lugs, and termination's required.
B. Use self-insulating, spring action mechanical connectors for splices and taps in wire #8 AWG or smaller.
C. Use crimp-on type, hydraulic compression type or box lug type connectors for stranded copper conductors.
D. Ensure that all strands of conductors are enclosed within lugs or connectors.

3.10 WIRING DEVICES

A. Mount devices plumb, level, and light to the wall or device box.
B. Mount single pole switches so that the handle is up when the load is energized.
C. Mount receptacles so that the grounding slot is down or to the right when facing the device.

3.11 DISCONNECTING MEANS

A. Mount switches at 54" A.F.F. or as required by field conditions, unless indicated otherwise.
B. Mount switches in an accessible location, adjacent to the equipment, unless indicated otherwise.

3.13 IDENTIFICATION

A. Identify switchboards (including individual switches or circuit breakers), motor control centers (including individual starters or overcurrent devices), panelboards, transformers, starters, and contactors with the specified type engroved nameplates. Attach with contact cement.
B. Neatly identify pull boxes and junction boxes for feeders, communication systems or future systems with marking pens as specified.
C. Provide engroved device covers where indicated in the documents.

3.14 EQUIPMENT CONNECTIONS

A. Make connections to all electrical equipment indicated in the documents unless indicated otherwise.
B. Obtain rough-in information and installation requirements from equipment supplier. Verify voltages and load information with equipment supplier prior to installation.

3.15 ADJUSTING AND TESTING

A. Adjust, test, and leave in operating condition all electrical equipment and systems.
B. Test all wiring for open circuits, defective insulation, and unintentional grounds and correct any such conditions.
C. All grounding systems shall be tested and shown to be adequate for proper service.
D. Balance loads on all panels so that the current draw in each leg is within 5% of the average current in the hot legs. Reconnect circuits as required and correct panel schedules accordingly.

16200GROUNDING

PART 1 - GENERAL

1.01 SHOP DRAWINGS - NONE REQUIRED

PART 2 - PRODUCTS

2.01 GROUND RODS

A. Provide 5/8" diameter x 10' long, copper clad steel ground rods.

2.02 CONDUCTORS

A. Grounding conductors shall be identified by green insulation or green marking tape.

2.03 CLAMPS AND CONNECTORS

A. Clamps and connectors shall be copper, copper alloy, or bronze alloy. All clamps and connectors shall be suitable for use with copper or aluminum. Use O.Z. Gedney type ABS clamps, or equal for connections to conduit or pipe. Use O.Z. Gedney type K&M clamps, or equal for connections to flat bars or metal.

2.04 WELDED CONNECTIONS

A. Welded connections shall use exothermic processes, Coldweld or equal.

PART 3 - EXECUTION

3.01 SERVICE GROUND

A. Provide a grounding electrode conductor from the service equipment ground bus to the water service entrance to the building, if the water service entrance is a suitable grounding electrode. Provide a second grounding electrode conductor between the ground bus in the service equipment and the building steel or other suitable grounding electrode. Install the grounding electrode conductor PVC conduit where conduit is required. Do not splice grounding electrode conductors. Install main grounding jumper between the service neutral and the ground bus in the service equipment.

3.02 EQUIPMENT GROUND

A. All raceways, boxes, cabinets, fixtures, enclosures, equipment, and other conductive parts of electrical systems shall be grounded. The equipment grounding system shall be permanent and continuous and shall have sufficiently low impedance to safely and effectively conduct ground fault currents.
B. Equipment ground circuits shall consist of separate grounding conductors, EMT, rigid steel, or conduit, with bonding jumpers and grounding bushings where required to maintain electrical continuity. Tighten all threaded connections with a wrench.
C. All flexible conduit over 6' long shall include grounding conductors inside, bonded to the enclosure at the closest box on each end and the flexible conduit.
D. All surface raceways, plugstrips, and wire ways, shall include an equipment ground inside, bonded to the raceway.
E. Grounding conductors in raceways shall be bonded to grounding conductors inside of each panel shall be bare.

1640SERVICE & DISTRIBUTION

PART 1 - GENERAL

1.01 SHOP DRAWINGS

A. Submit shop drawings for all equipment specified in this section as per specification section 16101, Article 1.12 "Submittals".

PART 2 - PRODUCTS

2.01 CIRCUIT BREAKER PANELBOARDS

A. Panelboard cabinets shall be code gauge, galvanized steel, and meet the requirements of UL 50.
B. Panelboard trim shall be surface, or flush mount as indicated. They shall be cold-rolled steel, painted with ANSI #99, baked enamel. Hinges shall be concealed. All locks shall be keyed alike. Provide key spares at all keys. Provide card holder inside door for panelboard directory.
C. Interiors shall be factory assembled. Bus bars shall be plated copper or tin-plated aluminum. Provide individual circuit breaker number button with an embossed number next to each breaker or position. Numbers shall match the numbers indicated in the Contract Documents.
D. Circuit breakers shall be molded-case, non-adjustable bolt-on type. Where multi-pole breakers are required, do not use handle ties. Minimum RMS symmetrical interrupting capacities of breakers shall be 10,000 amps at 240 volt, unless otherwise indicated.
E. Panelboard doors shall be bolted, non-adjustable bolt-on type.
F. Panelboards shall be UL listed and labeled and meet all applicable UL and NEMA standards.
G. Panelboards shall have bus rating and A.I.C. rating greater than fault current value at point of application.
H. Circuit breakers used for light switching shall be listed "Switching Duty Breakers."
I. Acceptable manufacturers: IIE Siemens, Square D, or Cutler Hammer.

2.02 FUSES

A. Provide as indicated. All fuses shall be provided by one manufacturer.
B. Provide the type of fuses indicated below. Busman catalog numbers are used as a reference.
1. Over 100 amps:
a. 250 volt: LPN-RK
2. 100 amps and below:
a. 250 volt: FRN-R
b. 125 volt, 30 amps, and below: Type S
C. Acceptable manufacturers: Busman, Showmut, or Littelfuse.

PART 3 - EXECUTION

3.01 PANELBOARDS

A. Support panelboards independently of conduits and raceways. Mount panelboards plumb and level.
B. Close up all unused device spaces with blank-offs.
C. Provide a neatly typed circuit directory on the interior of each panelboard door.
D. Stub four empty 3/4" conduits up into the ceiling space from each flush mounted panelboard. Cap each conduit and mark each one "spare".

3.02 FUSES

A. Install fuses so that ratings and catalog numbers are visible.

16500 LIGHTING

PART 1 - GENERAL

1.01 SHOP DRAWINGS

A. Submit shop drawings for all equipment specified in this section as per specification section 16101, Article 1.12 "Submittals".

1.02 SUBSTITUTIONS

A. No Substitutions shall be allowed. See note at bottom of Lighting & Building Signage plan sheet E-2.

PART 2 - EQUIPMENT

2.01 LIGHT FIXTURES

A. Provide fixtures and lamps, unless indicated otherwise, for all light fixtures indicated.
B. All light fixtures shall be UL listed and labeled.
C. Provide all hangers, supports, boxes, stems, clamps, flanges, support wires etc. for mounting the fixtures in the applicable ceiling system.
D. Provide aligner clips for all industrial reflectors where reflector ends butt up to each other.
E. All lenses shall be 100% virgin acrylic unless otherwise indicated.

2.05 CONTACTORS

A. Provide electrically held, multi-pole lighting contactors where indicated. Coils shall be 120 volt. Contactors shall be rated minimum 20 amps at 277 volts.
B. Acceptable manufacturers: ASCO, IIE Siemens, Square D, or Cutler Hammer.

PART 3 - EXECUTION

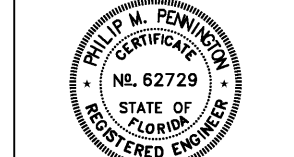
3.01 LIGHT FIXTURES

A. Coordinate fixture locations with architectural reflected ceiling plans where applicable. Notify the Architect/Engineer of any conflicts prior to the installation.
B. Support fixtures securely from the building structure unless indicated otherwise. Span structure with support if required.
C. Fixtures shall be level, plumb, and aligned in straight rows.
D. Support fixtures as required and recommended by the Manufacturer.
E. Install square fluorescent fixtures so that all of the lamps in the same space run the same direction.
F. Provide 6' flexible whip for each recessed lay-in type light fixture.



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FLA REG. FE 62729 JOB NO. 202016

DQ GRILL & CHILL US HWY 90 (LOT 2) GLEN ST MARY, FL 32040



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BUILDING TYPE: DAIRY QUEEN GRILL & CHILL STORE #66 STORE NO. 456461

DRAWN, CHECKED, & APPROVED BY: ADG DESIGN-ARCHITECTURE-CONSTRUCTION (DAC) DEPARTMENT

THIS