ELECTRICAL SPECIFICATIONS

SECTION 16050: GENERAL ELECTRICAL

The Drawings, General Conditions, Supplementary Conditions, and Division 1 apply to work under this Section.

PART 1 GENERAL:

1.01 DESCRIPTION

A. General: Furnish all labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working electrical installation, as shown on the drawings or described in these specifications.

B. Work included:
1. Installation and assembly of Owner furnished lighting fixtures and lamps.
2. Grounding.
3. Installation of duct smoke detectors.
4. Provide panelboards and overcurrent devices.
5. Branch circuit wiring.
6. Exit signs and emergency lighting system.
7. Installation of convenience outlets.
8. Installation of telephone and data outlets and raceways.
9. Furnishing, support and installation of new transformer.
10. Rough–in wiring for display case lighting.
11. Demolition and removals.
12. Lighting controls, and time switches.
13. Connections of, and power wiring to, HVAC equipment:
14. Conduit for data, telephone and alarm systems.

C. Related Work Specified Elsewhere:

1. Perform the following work, in accordance with appropriate sections of the specifications cited, where and as necessary to furnish a complete, working electrical installation.

a. Concrete:	Division 3
b. Painting:	Division 9
c. Door hardware:	Division 11
d. Mechanical:	Division 15
e. Food Service Equipment:	Division 15

D. Related Work Not Included in Contract:

1. Installation of primary and secondary utility cables.
2. Installation of telephone instruments and equipment.
3. Installation of data cable or computer equipment.
4. Installation of security alarm equipment.

1.02 CODES AND STANDARDS:

A. Specific

1. Comply with all codes enforced by the state and local jurisdictions.

2. Equipment and materials specified under this division shall conform to the following standards where applicable.

a. UL Underwriters' Laboratories.
b. ASTM American Society for Testing Materials.
c. CBM Certified Ballast Manufacturers.
d. ANSI American National Standards. Institute.
e. NEMA National Electrical Manufacturers Association

1.03 DRAWINGS:

A. Layout: General layout shown on the drawings shall be followed except where other work may conflict with the drawings.

B. Accuracy:

1. Drawings for the work under this Section are diagrammatic and complete details of the building which affect the electrical installationare not shown. Coordinate with drawings of all other trades.

2. Contractor shall verify lines, levels and dimensions shown on the Drawings and shall be responsible for the accuracy of the setting out of work and for its strict conformance with existing conditions at the site.

1.04 SUBSTITUTIONS: Substitutions of specified devices and equipment shall not be allowed.

1.05 SUBMITTALS:

A. General: Refer to the General Conditions, Supplementary General Conditions and Division 1 for requirements.

B. Format: Furnish submittal data neatly bound in an 8–1/2" X 11" folder or binder with a table of contents listing in order of specification section and paragraph number.

C. Submittals shall consist of detailed shop drawings, specifications, catalog "cuts" and data sheets containing physical and dimensioned information, performance data, electrical characteristics, materials used in fabrication, material finish and those optional accessories which are included and those which are excluded.

D. Each submittal shall be thoroughly reviewed by the Contractor. The cover letter accompanying submittal letter shall list in full the items and data submitted and shall contain a statement acknowledging that the Contractor has performed a detailed review of the submittal documents prior to submission. Failure to comply with this requirement shall constitute grounds for return of data for resubmission without review.

E. Contractor agrees that Shop Drawing submittals processed by the engineer are not change orders, that the purpose of Shop Drawing submittals by the Contractor is to demonstrate to the engineer that the Contractor understands the design concept, that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING: Equipment and materials shall be properly stored and adequately protected and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturers's recommendations and as approved by the Owner's Representative. Electrical conduit shall be stored to provide protection from the weather and accidental damage. Plastic conduit shall be stored on even supports and in locations not subject to direct sun rays or excessive heat. Cables shall be sealed, stored and handled carefully to avoid damage to the outer covering or insulation and damage from moisture and weather. Damaged or defective items, in the opinion of the Owner's Representative, shall be replaced with new items at the expense of the contractor.

1.07 PERMITS AND FEES: Provide, procure and pay for all permits, licenses and fees required to carry on and complete the work.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION:

3.01 TESTS:

A. Tests shall be conducted during the construction period and at completion to determine conformity with applicable Codes and with these Specifications. Tests shall be performed in the presence of the Architect and shall include, but are not limited to, the following:

1. Insulation Resistance: Perform 500–volt D.C. tests for one minute on all feeder conductors, including the neutral, and make a typed record of all readings to be included in the maintenance instructions. Repair or replace circuits showing less than 40 megohms resistance to ground. Make tests using Biddle Insulation Resistance Megger, or equal.

2. Ground Resistance: Test ground resistance per IEEE Standard No. 81.

3. Circuits Continuity: Test all feeder and branch for continuity. Test all neutrals for improper grounds.

4. Equipment Operations: Test lighting circuits for correct operation through their control devices. Test electric baseboard heaters for correct operations through their control relays/thermostats.

5. Lighting Control Circuits: Perform operation tests for all lighting circuits.

6. Product Failure: Any products which fail during the tests or are ruled unsatisfactory by the Owner's Representative shall be replaced, repaired, or corrected as prescribed by the Owner's Representative at the expense of the Contractor. Tests shall be performed after repairs, replacements or corrections until satisfactory performance is demonstrated.

7. Physical Inspection of Electrical Equipment and Cables: Inspection shall be made of all equipment to insure proper assembly and construction.

3.02 INSTRUCTIONS AND MANUALS

A. Refer to Division 1.

B. At the time of completion, an adequate period shall be allotted by the contractor for instruction of building operating and maintenance personnel in the use of all systems. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with manufacturers's representatives. The equipment manufacturer shall provide product literature and application guides for the Users' reference.

C. Costs, if any, for the above service shall be paid by the Contractor.

3.03 PROJECT RECORD DOCUMENTS (AS–BUILT)

A. Provide Project Record Drawings and Specifications as required by other Sections of Specifications and as required herein. Such drawings shall fully represent installed conditions including actual location of outlets, correct conduit and wire sizing as well as routing, revised fixture scheduling listing the manufacturer and products actually installed.

B. All changes to drawings shall be made by qualified draftspersons to match existing line work and lettering as closely as possible.

3.04 WORKMANSHIP

A. Preparation, handling and installation shall be in accordance with manufacturer's written instructions and technical data particular to the product specified and/or approved except as otherwise specified. Coordinate work and cooperate with other in furnishing and placing this work. Work to approved shopdrawings for work by others and to field measurements as necessary to properly fit the work.

B. Conform to the National Electrical Contractor's Association Standard of Installation for general installation practice.

3.05 SCHEDULE OF WORK: Arrange work to conform to the schedule which has been established for the progress of the work. Advise regarding shipping schedule of major equipment.

3.06 SUPERVISION: Contractor shall personally or through an authorized and competent representative constantly supervise the work from beginning to completion and, within reason, keep the same workmen and foreman on the project throughout the project duration.

3.07 PROTECTION: Keep conduits, junction boxes, outlet boxes, and other openings closed to prevent entry of foreign matter. Cover fixtures, equipment and apparatus and protect against dirt, paint, water, chemical or mechanical damage, before and during construction period. Restore to original condition any fixture, apparatus, or equipment damaged prior to final acceptance. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.

3.08 SPECIAL TOOLS: All special tools for proper operation and maintenance of the equipment provided under this section shall be delivered to the Owner's representative.

3.09 CUTTING AND PATCHING

A. Install all required sleeves, forms and insets before walls or partition are built. Cutting and patching of walls, partitions, ceilings and floor necessary for reception of work, caused by failure to provide or properly located sleeves, forms and insets, incorrect location of work or failure to cooperate with other trades, shall be done at expense of trade responsible.

B. No cutting of finished or structural work may be done without acceptance. When necessary to have finished material or stuctural work cut, furnish necessary drawings to trade whose materials are out to be cut.

3.10 CLEARANCES: Provide working clearance in front of, in back of, and to sides for all electrical equipment as required by National Electrical Code Article 110.

3.11 DEMOLITION: Demolition and removal of existing electrical services to the existing tenant space to be by the Contractor.

3.12 ACCESS PANEL

A. Elec. contractor shall provide all access panels required for code required access to electrical devices and junction boxes.

B. Access panels shall not be allowed in Sales Area ceiling or walls. Devices and equipment that normally would be concealed from view shall be located at normally accessible areas such as above ceiling, near HVAC diffusers or in back rooms in accessible ceiling areas.

END OF SECTION

SECTION 16100: BASIC MATERIALS AND METHODS

The General Conditions, Supplementary Conditions, and Division 1 apply to work under this Section.

PART 1 GENERAL

1.01 DESCRIPTION

A. Work specified in this section encompasses products, assemblies and basic installation methods required for electrical project systems specified under this Division and includes, but is not limited to:

1. Conduit, raceways, and fittings.
2. Wire and cables.
3. Wire connections and devices.
4. Outlet boxes.
5. Pull and junction boxes.
6. Switches and receptacles.
7. Device plates.
8. Overcurrent protective devices.
9. Telephone terminal backboard.
10. Door buzzer and pushbutton system.
11. Background sound system equipment installation and wiring.
12. Empty raceway provisions for burglar alarm and security system detection units and switches.
13. Panelboards and associated equipment

B. Work Not Included:

1. Background sound system equipment furnished by Brinkman Audio.
2. Burglar alarm and security system equipment and wiring.

1.01 SUBMITTALS

A. Submit in conformance with the requirements of Section 16050 the following items:

1. Switches, receptacles and device plates.
2. Conductors and cables.
3. Overcurrent protective devices.
4. Raceways.
5. Door buzzers and pushbutton.
6. Panelboards and transformer

PART 2 PRODUCTS

2.01 CONDUIT AND FITTINGS

A. Rigid Steel Conduit
1. Conduit, rigid steel: full weight, threaded, hot–dip galvanized, inside enameled, conforming to ANSI C80.1.
2. Three–piece couplings: electroplated, cast malleable iron. Efcor 165 series, O.Z./Gedney 4–50 series or equal.
3. Threadless couplings: electroplated, cast malleable iron, with integral conduit stop. Efcor 1760.
4. Threadless connectors: electroplated, cast malleable iron, on threaded male hub plastic insulated throat rated 90 degrees C minimum. Efcor 1750B series, O.Z./Gedney 31–050 1T series or equal.
5. Insulated bushings: threaded polypropylene or thermosetting phenolic rated 150 degrees C minimum.
6. Insulated grounding bushings: threaded cast malleable iron body with insulated throat and steel, "lay–in" ground lug with compression screw. O.Z./Gedney BLG series, Thomas & Betts 3870 series or equal.
7. Insulated metallic bushings: threaded cast malleable iron body with plastic insulated throat rated 105 degrees C. O.Z./Gedney Type B, Thomas & Betts 1222 series or equal.

B. Electrical Metallic Tubing (EMT)
1. Conduit: Shall be formed of cold rolled strip steel, electrical resistance welded continuously along the longitudinal seam and hot–dip galvanized after fabrication. Conduit shall conform to ANSI C80.3 specifications and shall meet U.L. requirements.
2. Couplings: Electroplated, cast malleable iron, gland compression type, U.L. listed rain and concrete tight through 1–1/4 inch trade size, O.Z./Gedney 6050W series, 760 series or equal. Set screw type couplings may be used in dry locations, Efcor O.Z./Gedney 5050 series or equal.
3. Connectors: Gland compression type with cast malleable iron body with male hub and insulated plastic throat 150 degrees C. temperature rated. O.Z./Gedney 4050 series or equal.

C. Flexible Metallic Conduit
1. Conduit: Shall be fabricated in continuous lengths from galvanized steel strip, spirally wound and formed to provide an interlocking design. 6' MAX. LENGTH Flexible conduit is not permitted in walls.
2. Fittings: Connectors shall be made of the screw clamp with cast malleable iron bodies and threaded male hubs with insulated throats.
2. Flexible conduit shall only be allowed in the lengths and for applications as allowed by the jurisdiction. Contractor shall be responsible for correcting installation that is not in compliance with the jurisdictional requirements

D. Liquid Tight Flexible Metallic Conduit
1. Conduit: Anaconda Type U.A., Coleman Type Uxt1 or equal.
2. Fittings: Connector body and gland nut shall be of cadmium plated cast malleable iron, with insulated throat, MAX. 24", T & B 5331 series, O.Z./ Gedney 4Q–38–1T series,or equal.

E. Minimum acceptable conduit size shall be 1/2 inch.

C. MC Cabling
1. Metal clad cable shall be constructed in strict accordance with UL 1569. The cable shall bear the UL label and manufacturer's "E" number
2. Acceptable Sizes for MC Cable: 12/2 through 12/9; 10/2 through 10/ 9 and shall contain copper conductors only, no aluminum allowed
3. Manufacturer – AFC or equal
4. Conductors: Copper; solid or stranded
5. Insulation: Thermoplastic (THHN) or equivalent; voltage rating 600V; temperature rating 90°C
6. Armor: Aluminum; corrugated or smooth tube
7. Not used
8. Cable shall be fire rated, 1 hour minimum or higher as required by specific installation area, UL listed, rated for use in cable tray, and for use in environmental air plenums
9. Connectors: Furnish only UL listed MC connectors manufactured for MC cable. Connectors shall be steel; die cast not allowed.
10. MC Cabling Supports: Caddy, or approved equal. All supports shall be U.L. listed for the application, and shall comply with the NEC. Tie–wraps and staples are not acceptable. Utilize the following:
1. Snap–in supports to framing stud, Caddy #MAC2.
2. Strap to framing stud, Caddy #FXC20
3. Drop–wire supports, Caddy #PCS1.
4. Cable snap clip for attachment to structure, Caddy #SC.
5. Cable support for attachment to framing stud, Caddy #CJ6.
6. Support and anti–rattle clip for MC through studs, Caddy #781.
11. MC Cabling shall only be allowed for applications as allowed by the jurisdiction and the landlord. Prior to installation, contractor shall confirm with both agencies, that MC is permitted. For installations that have not been approved by both agencies, the contractor shall be responsible for the removal of the MC and replacement with EMT, at the expense of the contractor.
12. MC cabling shall not be allowed to run into the panelboards. Transition to EMT by means of a wireway above panrlboards, and run branch circuits in EMT from wireway to panelboards – no exceptions
13. Contractor's bid shall reflect costs for utilizing MC Cabling and/or EMT installation as permitted by the jurisdiction and landlord.
14. MC cable shall not be permitted in areas open to public view.

2.02 WIRE AND CABLE

A. General

1. Acceptable manufacturers: General Electric Co., Rome Cable, Southwire, Triangle, PWC Inc., or equal.

2. Conductor material: All wire and cable shall be insulated copper conductors for all wire sizes. Aluminum wire and cable shall not be used.

3. Insulation: Insulation shall be THWN–THHN for wire sizes through size 1/0 AWG. For larger wire sizes insulation shall be THWN, XHHW, THW or as required to suit application.

4. Fixture wire: Type AF.

5. Minimum conductor size:
Power and lighting branch circuits: #12 AWG
Signal and control circuits under 100 volts: #14 AWG.
Any 120V./ 20A. circuits over 75 L.F. must be: #10 AWG.

6. Color code. Color code all conductors in accord with NEC as follows:

	120/208V	277/480V
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Gray

2.03 OUTLET BOXES AND COVERS

A. Standard Outlet Boxes: Galvanized, one–piece, drawn steel, knock–out type of size and configuration best suited to the application indicated on the plans. Minimum box size, 4 inch square by 1–1/2 inch deep.

B. Switch Boxes: Two inch by 3–inch long, galvanized steel switch boxes shall be used only for the installation of single switches, Install multiple switches in standard gang boxes with raised device covers suitable for the application indicated.

2.04 SWITCHES AND RECEPTACLES

A. General: Color of devices shall be white unless otherwise noted. Orange for dedicated I.G. receptacles .

1. All general purpose 20 ampere, 125–250 volt receptacles and 120–277 volt switches shall conform to NEMA WD 1 and applicable U.L. tests.

B. Receptacles:

1. Ground fault circuit interrupter receptacle: NEMA type 5–20R LEVITON #6898–HG or equal.

2. Duplex receptacles: NEMA type 5–20R, heavy duty specification grade, side wired only, LEVITON 5243 or equal.

3. Cash register receptacles: NEMA type 5–20R, heavy duty specification grade, side wired only, Hubbell #IG–5362, provided with green insulated ground wire, and with engraved cover plate ""For Cash Registers Only"".

C. Switches: Twenty ampere, 120–277 volts, fast make–slow break, quiet type switch with silver cadmium alloy contacts, binding head terminal screws, side wired only. All switches shall be white in color.

1. Single pole, single throw, LEVITON #1221 or equal.

2. Three–way, LEVITON #1223 or equal.

2.05 DEVICE PLATES

A. Flush Device Plates: Plates shall be smooth plastic, color to match device, LEVITON #8600 series or equal.

B. Surface Mounted Devices, indoor: Galvanized metal to fit box.

C. Outdoor, Weatherproof: Die cast aluminum construction, corrosion resistant, heavy duty, hinged cover flap, and gasket, LEVITON #6196, horizontal mounting.

2.06 DISCONNECT SWITCHES

A. Switch Interior: Dead–front construction with hinged arc suppressor and switch blades which are fully visible in the "OFF"" position and with door open.

B. Switch Mechanism: Quick–make and quick–break operating handle and mechanism with dual cover interlock to prevent unauthorized opening of the switch door in the "ON" position or closing the switch mechanism while the door is open.

C. Ratings: Switches shall be horsepower rated for the operating voltage and with fused or non–fused arrangements as shown on the drawings.

D. Enclosures: NEMA 1, code gauge sheet steel with hinged cover, or NEMA 3R as shown on Drawings, and as required by application.

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3250 Van Ness Avenue
San Francisco, CA 94
T 415 616 8602
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Reviewed for Code Compliance
Approved as Noted
Date: 04/26/17
City of Portland Maine
Building Inspection

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State of Registration MAINE
Firm Registration No. N/A
EEA Project No. 20166538

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PROJECT #006-160335.00

ISSUED / REVISED	DATE
PRELIMINARY SET	09/08/16
LL COORDINATION SET	11/08/16
LL/PERMIT SET	11/21/16

ELECTRICAL SPECIFICATIONS

E-901