1. GENERAL:

A. The "General Conditions of the Contract for Construction," AIA Document A201, latest edition, and these Specifications as applicable are part of this Contract.

B. All applicable codes, laws and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these Specifications, and their provisions shall be carried out by the Contractor who shall inform the Owner, prior to submitting a Proposal, of any work or material which violates any of the above laws and regulations. Any work done by the Contractor causing such violation shall be corrected by the Contractor.

C. Investigate each space through which equipment must be moved. Where necessary, equipment shall be shipped from manufacturer in sections of size suitable for moving through available restrictive spaces. Ascertain from building Owner and Tenant at what times of day equipment may be moved through all areas.

D. Drawings are diagrammatic and indicate general arrangement of systems and work. Conduit routing is shown diagrammatically and does not show all offsets, drops and rises of runs. The Contractor shall allow in his price for routing of conduit to avoid obstructions. Coordination with existing services, including those of other trades, is required. Maintain headroom and space conditions.

E. Install work to be readily accessible for operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes that involve extra cost shall not be made without approval.

F. Removal and relocation of certain existing work may be necessary for the performance of the general work. Not all existing conditions can be completely detailed on the drawings. The Contractor shall survey the site and include all changes and charges in making up the work Proposal.

G. Connections to existing work: Install new work and connect to existing work with minimum interference to existing facilities. Temporary shutdowns of existing services shall be performed at no additional charges, at times not to interfere with normal operation of existing facilities and only with written consent of Owner. Alarm and emergency systems shall not be interrupted. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition, including maintenance of wiring continuity as required.

H. Disconnect, remove and/or relocate existing material, equipment and other work as noted or required for proper installation of new work.

I. The Contractor shall keep all equipment and materials, and all parts of the building, exterior spaces and adjacent streets, sidewalks and pavements, free from material and debris resulting from the execution of this work. Excess materials will not be permitted to accumulate either on the interior or on the exterior.

J. Seal openings through partitions, walls and floors with mineral wool or other noncombustible material. All penetrations through new and existing rated fire and smoke partitions and/or floors shall be completely sealed using materials and methods described in subsequent "FIRE STOPPING" Specifications Section.

K. Provide all necessary flashing and counterflashing to maintain the waterproofing integrity of the building as required by the installation or removal of conduit and equipment.

M. All existing material, equipment and construction debris to be removed under this contract shall become the property of the Contractor with the exception of specific equipment and apparatus requested by the building representative, Architect or as noted to be relocated on the drawings. Removed equipment shall be properly disposed of by this Contractor.

N. The Contractor's Proposal for all work shall be predicated on the performance of the work during regular working hours. When so directed, however, the Contractor shall install work during overtime hours and the additional cost to be charged therefore shall be only the "premium" portion of the wages paid.

O. Unless otherwise specifically noted or specified, include all cutting and patching of existing floors, walls, partitions and other materials in the existing building. The Contractor shall restore these areas to original condition.

P. All material and equipment shall be new unless otherwise noted and shall be in accordance with building standards.

Q. Submission of a Proposal shall be construed as evidence that a careful examination of the portions of the existing building, equipment, etc., which affect this work, and the access to such paces, has been made and that the Contractor is familiar with existing conditions and difficulties that will affect the execution of the work. The Contractor is responsible to indicate any discrepancies between the contract drawings and actual field conditions prior to submittal of bid. Submission of a Proposal will be construed as evidence that such an examination has been made. Later claims shall not be made for labor; equipment or materials required because of difficulties encountered which could have been foreseen during such an examination. The on-site inspection shall verify existing conduit (sizes, clearances, etc) and conditions.

R. Insurance: In accordance with building requirements and shall include a Hold Harmless clause for Owner and Engineer.

S. All work shall be done when and as directed by the Client and in a manner satisfactory to the Building Owner. Work shall be performed so as to cause the least possible inconvenience and disturbance to other building occupants.

T. The final acceptance shall be made after the Contractor has adjusted his equipment, tested the various systems, demonstrated that it fulfills the requirements of the drawings and specifications and has furnished all the required certificates of inspection and approval.

2. SCOPE OF WORK:

A. Scope of Work shall consist of providing labor, materials, equipment, services and fees necessary for complete and safe installation in conformity with the regulations of the Massachusetts Electrical Code, Local Building Department, National Electrical Safety Code, the requirements of the Local Fire Department, Local Wiring Inspector, and all legally constituted codes/authorities having jurisdiction. Where the drawings and/or specification requirements exceed the requirements of the applicable codes the requirements specified in the contract documents shall take precedence. Where the drawings and specifications are in conflict, the greater requirement shall take precedence.

B. All drawings, plans, details, specifications and specification addenda are made part of this Contract and shall apply to all work under the Contract unless otherwise amended, modified, supplemented or specified herein.

C. The Contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred, for any workmanship and equipment in which defects develop within one year from the date of final certificate for payment and/or from date or actual use of equipment or occupancy of spaces by Owner, included under the various parts of the work, whichever date is earlier. This work shall be done as directed by the Owner. This guarantee shall also provide that where defects occur, the Contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the Contractor.

D. The Contractor shall give necessary notice, file drawings and specifications with all departments having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The Contractor shall arrange for inspection and tests of any or all parts of the work if so required by authorities and pay all charges for the same. The Contractor shall pay all costs for, and furnish to the Owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

E. Materials and equipment shall be new and comply with the applicable standards of the following authorities, except where the contract documents prescribe more rigorous qualifications, the documents shall govern:

Underwriters' Laboratories, Inc. (UL)
National Electrical Manufacturer's Association (NEMA)
Institute of Electric and Electronic Engineers (IEEE)
American Society for Testing Materials (ASTM)
American National Standards Institute (ANSI)
National Fire Protection Association (NFPA)
Insulated Power Cable Engineers Association (IPCEA)
Occupational Safety and Health Administration (OSHA)
American with Disabilities Act (ADA)

3. SHOP DRAWINGS

A. Prior to the installation of any work and procurement of equipment, Contractor shall provide complete sets of coordinated shop drawings of all new and existing equipment, indicating capacity, dimensions and sequence of operation for written approval by the Architect and Engineer.

B. Indicate on each shop drawings submitted:

1) Project name and location
2) Name of Architect and Engineer
3) Item identification
4) Approval stamp of prime contractor

C. Submissions:

1) Submissions 11 in. x 17 in. or smaller: If the submission is a catalog cut, then the Contractor shall submit one original and two copies. Otherwise, he shall submit three copies. The Architect will forward the original and one copy (two copies when no original is received) to the Engineer. All catalog cuts shall be complete.

2) Submissions larger than 11 in. x 17 in.: Submit two prints and one paper sepia to the Architect. The Architect will forward one print and the paper sepia to the Engineer.

D. Submit shop drawings for the following:

1) Switches
2) Fuses
3) Circuit breakers
4) Switchboard, distribution panels and panelboards (including dimensions, schedules, and catalog cuts).
6) Raceways
7) Wire and cable
8) Wall switches, dimmers and occupancy sensors
9) Receptacles
13) Surface metal raceway
14) Lighting fixtures and exit signs
15) Fire alarm devices and wiring diagram
16) Lighting control system
20) Test Procedures and Reports.

4. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

A. Upon completion and acceptance of work, Contractor shall furnish written instructions and equipment manuals and demonstrate to the Owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.

B. These instructions shall be typed on 8-1/2 in. x 11 in. paper and bound in three ring binders with clear acetate covers. Contractor shall give three copies of the instructions to the Owner and one copy to the Engineer.

C. The instruction booklet shall bear the name, address and telephone number of the project, Architect and Engineer.

D. Reproducible "As-Built" drawings shall be provided indicating the as installed conditions of the work. "As-Built" drawings shall be provided to the Architect after completion of the installation. "As-Built" drawings shall be in AutoCAD format (Release 2002 or later).

E. Written instructions, equipment manuals, and "As-Built" drawings (in AutoCAD format) shall be given to the owner on a CD when requested.

5. GENERAL PROVISIONS FOR ELECTRICAL WORK:

A. Specifications are of simplified form and include incomplete sentences. Words or phrases such as "the Contractor shall," "shall be," "furnish," "provide," "a," "the," and "all" have been omitted for brevity.

B. Definitions:

1) "Provide": To supply, install and connect up complete and ready for safe and regular operation the particular work referred to unless specifically otherwise noted.

2) "Install": To erect, mount and connect complete with related accessories.

3) "Furnish" or "Supply: To purchase, procure, acquire and deliver complete with related accessories.

4) "Work": Labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.

5) "Wiring": Raceway, fittings, wire, boxes and related items.

6) "Concealed": Embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.

7) "Exposed": Not installed underground or "concealed" as defined above.

8) "Similar" or "Equal": Equal in materials, weight, size, design and efficiency of specified product.

C. Temporary light and power: Provide temporary light and power systems at earliest possible date within the construction areas for the requirements of all trades as herein described. Extend systems to new construction as soon as physically possible. Maintain system during working hours of all trades. Cost of energy will be paid for by Owner. Provide all required maintenance, including lamps and sockets.

D. Quality assurance

1) Quality and gauge of materials: New, best of their respective kinds, free from defects and listed by Underwriters Laboratories, Inc., or other nationally approved testing agency and bearing their label. Materials and equipment of similar application shall be of same manufacturer, except as noted.

2) Current characteristics:

a) Service: 277/480 volt, 3 phase, 4 wire, 60 hertz with grounded neutral.

b) Distribution: 277/480 volt and 120/208 volt, 3 phase, 4 wire, 60 hertz with grounded neutral.

3) Heights of outlets: Contractor shall be responsible for coordinating and confirming all mounting heights with Architect and Architectural drawings.

a) From finished floor to centerline of outlets for:

– Receptacles and telephones:	1 ft–6 in.
– Wall switches:	4 ft–0 in.
– Wall fixtures:	7 ft–0 in.
– Motor controllers:	5 ft–0 in.
– Clocks:	7 ft 6 in.
– Strobe lights and speaker/strobe:	6 ft–8 in. or 6 in. below ceiling (whichever is lower)
– Gongs and horns:	7 ft–6 in.
– Fire alarm pull stations:	4 ft–0 in.

b) Exceptions: At junction of different wall finish materials, on molding or break in wall surface, in violation of code, or as noted or directed.

E. Product delivery, storage and handling

1) Moving of equipment: Where necessary, ship in corted sections of size to permit passing through available spaces.

2) Accessibility: For operation, maintenance and repair. Minor deviations shall be permitted. Changes of magnitude or involving extra cost are not permissible without review. Group concealed electrical equipment requiring access with equipment freely accessible through access doors.

F. Materials

1) Nameplates: Provide black lamicoid sheet with 3/4 in. white lettering, fastened with epoxy cement for each disconnect switch, circuit breaker, panel, cabinet, transformer, enclosure, motor controller and the like. Nameplates shall describe the name and number of each component.

2) Cable tags: Tag each conductor passing through splice or pullbox with a white linen tag, indicating point of origin and destination of the circuit.

3) Inserts and supports:

a) Inserts: steel, slotted type, factory painted.

– Single rod: similar to Grinnell Fig. 281.

– Multi-rod: similar to Fee and Mason Series 9000 with end caps and closure strips.

– Clip form nails flush with inserts.

– Maximum loading 75 percent of rating.

b) Supports from building construction: Inserts, beam clamps, steel fishplates (in concrete fill only), cantilever brackets or other means. Submit for review.

c) Grouped lines and services: Trapeze hangers of bolted angles or channels.

d) Where building construction is inadequate: Provide additional framing. Submit for review.

G. Paint shall be the best grade for its purpose. Deliver in original sealed containers and apply in accordance with manufacturer's instructions. Colors shall be as selected by Architect or Engineer. Utilize galvanized iron primer on panel and pull boxes, after fabrication. Utilize hot dipped galvanized or dipped in zinc based primer for: outlet boxes, junction boxes, conduit hangers, rods, inserts and supports. Zinc based primer with finish to match surroundings shall be used for marred surfaces of steel equipment and raceways. A field-applied zinc based prime coat shall be utilized for steel or ironwork.

H. Brush and clean work prior to concealing, painting and acceptance. Painted exposed work soiled or damaged; clean and repair to match adjoining work before final acceptance. Remove debris from inside and outside of material and equipment.

I. Final locations and mounting orientations of all switches, receptacles and light fixtures shall be verified with Architect.

J. Provide access doors when concealed electrical equipment requires access. All access door locations shall be reviewed by Architect prior to installation.

6. DEMOLITION

A. "Selective Demolition": is hereby defined to include but is not necessarily limited to the removal of the following existing materials, items and equipment.

1) Refer to electrical demolition plan and related notes for extent of demolition.

2) Refer to existing drawings and site conditions for all removal of work necessary for completion of new work as shown. Each bidder shall carefully examine the premises and documents during the bidding period and ascertain the extent of removal of existing work. If additional work is noted by the Contractor, call it to the attention of the Architect prior to submitting bid. By submitting a bid, the Contractor will have deemed to have made such examination, to accept such conditions, and to have made allowances in preparing his bid.

3) Items of salvage shall be carefully removed without damage; nails and other fasteners removed that are not integral to their construction; and stored and protected at locations directed by the Owner. Identify and tag all salvage materials regarding location in existing building and relationship of parts.

4) All demolished and/or removed materials not required by Owner shall become the property of the Contractor and shall be removed from the premises, and shall be properly disposed of in a legal manner, off-site.

5) Care must be taken not to disturb existing wiring, which is not effected by demolition. Restore all circuits and equipment disrupted or disturbed by the removal of only parts of existing systems. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work. Alarm and emergency systems shall not be interrupted.

6) Plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing facilities. Temporary shutdowns when required are to be made only with written consent of Owner at times not to interfere with normal operation and no additional charge.

7) Connect new work to existing in a neat and approved manner. Restore existing work disturbed while installing new work to acceptable condition as determined by building Owner.

8) All raceways to be abandoned shall be reworked as defined within the demolition notes. Where it is impractical to remove raceway back to source, disconnect wiring at load (equipment) and at line side, cut and cap, flush to surface. Remove conductors from existing raceways to be rewired. Clean raceway as required prior to rewiring.

9) All required work for tie-in to the existing equipment shall be accomplished after hours, the exact day and time shall be directed by Owner, and at no additional charge.

7. CUTTING AND PATCHING

A. The Contractor shall be responsible for all cutting and patching of the existing and new construction work, which may be required for the proper installation of the electrical work. All patching shall be of the same materials, workmanship, and finish, and shall accurately match all surrounding work.

B. Core boring of concrete floors and/or walls if required, shall be provided by the Electrical Contractor.

8. COORDINATION

A. The Contractor shall verify locations of all equipment with architectural drawings. In centering outlets and locating boxes and outlets, allow for overhead pipes, ducts, and mechanical equipment, variations in fire proofing and plastering, window and door trim, paneling, hung ceilings, and the like, and correct any inaccuracy resulting from failure to do so without expenses to the Owner.

9. EQUIPMENT FURNISHED BY OTHERS

A. The Contractor shall furnish and install wiring for equipment furnished by others, as shown on drawings. Coordinate with all other trades or details for installation. The term "wiring" as used here-in, includes, but is not limited to, furnishing and installing conduit, wire, junction boxes, disconnects and making connections. Contractor shall check architectural, mechanical, and plumbing. Drawings and specifications for equipment to be installed by others. Contractor shall be responsible for proper wiring and necessary electrical adjustments to equipment to conform to specified requirements of the equipment.

10. LOW-VOLTAGE DISTRIBUTION EQUIPMENT:

A. Provide complete equipment including: Switches, fuses, circuit breakers, panels and transformers, etc.

B. All equipment shall conform to NEMA, ANSI and IEEE standards

D. Disconnect switches shall be fused or nonfused as noted. Voltage shall be as required. Switches shall be heavy duty, except as noted, and horsepower rated for motor loads.

1) Toggle type switches shall be nonfused, load break, utilized with a maximum ratings of 20 amp at 600 volts and 30 amp at 240 volts. Two-pole switches shall be similar to Leviton MS 302. Three-pole switches shall be similar to Leviton MS 303.

2) Knife-blade type switches shall be load break, quick-make-quick-break with arc quenchers, UL Class R up to 600 amp. Switches shall be similar to General Electric QMR. All switch enclosures shall be dead front, NEMA Type 1, except as noted.

3) Switches 800 amp and above shall be pressure type switches, manually operated similar to Pringle bolted pressure switch, type QA with a minimum interrupting capacity of 7 ½ times the continuous current rating. Short circuit current carrying capacity shall be 200,000 Ampere.

E. Fuses:

2) Circuits 0 to 600 amperes shall be protected by fuses similar to current limiting BUSSMAN LOW-PEAK Dual-Element Time-Delay LPN-RK/SP (250V) /LPS-RK/SP (600V) or LPJ/SP (600V) (UL class RK1 or class J in restricted space only), and be listed by UL with an interrupting rating of 200,000 amperes RMS symmetrical.

3) Motor Circuits – All individual motor circuits with full load ampere ratings (FLA) of 480 amperes or less shall be protected by fuses similar to current limiting BUSSMANN LOW-PEAK Dual-Element Time-Delay LPN-RK/SP (250V) /LPS-RK (AMP) SP (600V) or LPJ (AMP) SP (600V) (UL Class RK1 or Class J in restricted space only) and be listed by UL with an interrupting rating of 200,000 amperes RMS symmetrical.

4) All fuses shall be provided by same manufacturer.

5) Provide 1 spare matching fuse for each set of 3 and a minimum of 3 spare per size and type.

F. Circuit breakers: Molded case breakers shall be thermal-magnetic, quick-make-quick-break, bolt-on type, manually operated with insulated trip-free handle. Multi-pole type breakers shall contain internal trip bar. Terminals shall be suitable for copper or aluminum cable. Provide interchangeable trip for 225A frame and above. Furnish auxiliary devices where required for shunt tripping, open and close motor operator and alarm indication. Enclosures shall be dead front, NEMA Type 1, except as noted. Frames aic rating shall meet the available fault at the point o of installation.

1) 120/240 volts, 100-amp frame: 10,000 amps minimum.
2) 120/240 volts, 225-amp frame: 22,000 amps minimum.
3) 277/480 volts, 100-amp frame: 14,000 amps minimum.
4) 277/480 volts, 225-amp frame: 25,000 amps minimum.
5) Over 225 amp frame: 65,000 amps minimum.

K. Contactors for lighting control shall be similar to ASCO model no. 917 with required accessories and mounted in a NEMA 1 enclosure. Contactors for panelboards shall be similar to ASCO model no. 920, matching bus size, with required accessories and mounted in a NEMA 1 enclosure or internal to panel as required.

L. Balance the load over phases to within +10% when new circuits are added to new or existing panels. Loading shall be balanced with all lamps operating equipment in operation after the space is occupied.

M. Provide multi-cable lugs where required. Double lugging shall not be permitted.

N. Mounting height shall be a maximum of 6 ft–6 in. from floor to top switch unit.

O. Update directories on existing panelboards where circuiting is changed.

P. Tests: Open and close load break switching devices under load.

11. RACEWAYS:

A. Provide raceways complete with boxes, fittings and accessories. Conduit or tubing sizes referred to in specifications and on drawings are nominal diameters. Minimum diameter shall be 3/4 in. Raceways shall run concealed, except as noted.

B. Materials

1) Raceways:

a) Rigid steel conduit: full-weight pipe, galvanized, threaded, conforming to UL Standard No.6 as manufactured by Republic Steel, Allied Tube or equal.

c) Electrical Metallic Tubing (EMT): thin wall pipe, galvanized, threadless, conforming to UL Standard 797 as manufactured by Republic Steel, Allied Tube or equal.

d) Flexible Metal Conduit: Flexible metal conduit shall be single strip, continuous, flexible, interlocked double wrapped steel, galvanized inside and outside, forming smooth wiring channel. Flexible metal conduit shall be as manufactured by Pyle-National, American Flexible Conduit or equal.

f) Liquidtight Flexible Metal Conduit: shall be similar to flexible metal conduit, but with extruded moisture and oil-proof/sunlight resistant outer jacket of polyvinyl chloride plastic, with a flexible metal core and be as manufactured by Liquidtite, Anaconda Sealtite or equal.

g) Non-metallic conduit and fittings shall be schedule 40 PVC 90°C conforming to NEMA Standard TC2 and UL Standard No. 651. Non-metallic conduit shall be as manufactured by Carlon Electrical Products Co., or equal.

h) Wireways: Wireways shall be of the totally enclosed type constructed of code gague galvanized steel, minimum No.16 gague, with ground continuity and hinged cover. Provide all fittings, tees, elbows, wire retainers, closure plates, hangers and component parts for a complete installation. Wireways shall be manufactured by Hoffman or equal.

i) Cable tray shall be of the aluminum ladder type. Cable tray shall be a complete continuous system with all fittings supports and accessories. Cable tray shall be as manufactured by Thomas & Betts, B-Line Systems or equal.

j) Surface Metal Raceway: Size as noted. Base 0.04 inch, cover 0.25 inch, Material shall be steel. Finish shall be baked enamel. Covers shall be screw-on.

2) Fittings and accessories:

a) Rigid steel: Rigid steel and intermediate metal conduit fittings, couplings, bushings, locknuts and connectors shall be threaded and galvanized or cadmium plated and shall be as manufactured by O/Z Gedney, Thomas & Betts or equal. Zinc die cast not permitted.

b) Electrical Metallic Tubing: shall be galvanized steel compression type with insulated throat and shall be as manufactured by O/Z Gedney, Thomas & Betts or equal. Galvanized rigid steel elbows, 2 in. or larger.

c) Flexible metal conduit: shall be steel or malleable iron zinc plated with center stop & wedge type with insulated throat as manufactured by O/Z Gedney, Thomas & Betts or equal.

d) Bushings: Metallic insulated type.

f) Liquidtight Flexible Metal Conduit: shall be malleable iron zinc plated suitable for grounding with sealing ring and insulated throat as manufactured by O/Z Gedney, Thomas & Betts or equal.

h) Surface metal, raceway, fittings, couplings, supports and boxes shall be manufactured by Wiremold.

j) Metal clad type MC, armored cable, and fire alarm cable are to use 2-screw malleable iron, zinc plated connectors. Connectors to be provided with insulated throat and be manufactured by Raco, O/Z Gedney or equal.

3) Boxes:

a) Concealed Interior Outlet boxes: Except as otherwise required by construction, devices or wiring, boxes shall be stamped steel, 4 in. square or octagon for fixtures. Boxes above ceiling shall be 1-1/2 in. deep. Boxes in ceiling or slab shall be 3 in. deep. Boxes in wall for fixtures shall be 2-3/4 in. deep. Boxes in wall for receptacles and switches shall be 1-1/2 in. deep. Furnish with raised covers and fixture studs where required. Without fixture or device: furnish blank cover. Offset back-to-back outlets with minimum 6 in. separation. Devices shall be manufactured by Raco or equal.

b) Interior exposed or surface mounted outlet and junction boxes shall be of cast metal with Threaded Hubs, Killark, O/Z Gedney or Crouse Hinds Condulet Type. Covers shall be cast metal.

c) Exterior surface mounted outlet and junction boxes shall be of cast metal with threaded Hubs, O/Z Gedney, Crouse-Hinds or equal. Covers shall be cast metal and shall be gasketed raintight exterior type.

d) Junction and pull boxes: Galvanized sheet steel with screw-on covers, except as noted. Furnish with insulated supports for cables. Locations shall be as noted or required and accessible. Provide barriers in new and renovated boxes between 120/208 volt and 277/480 volt wiring. Devices shall be manufactured by Hoffman or equal.

e) Floor boxes shall be suitable for conduit and devices noted. Raised outlets shall be Hubbell #B2414 Series with above floor fitting. Flush outlets shall be Hubbell #B2414 Series with flush floor fitting. Increase size to suit as necessary. Provide raceways only as herein specified, except as noted. Raceways shall be run concealed, except as noted.

4) Provide raceway support utilizing ceiling trapeze, strophangers, or wall brackets. Provide U-bolts at each floor level of riser raceways and connected to acceptable supports. Provide riser clamps at each floor level of riser raceways resting on slab. Spacing of supports shall be a minimum of 10 ft on center for metallic raceway and as required for nonmetallic raceway. Spacing shall be 5 ft on center for wireways and per code and as noted for others. Mount supports to structure masonry with toggle bolts on hollow masonry, expansion shields or inserts in concrete and brick, machine screws on metal, beam clamps on framework, wood screws on wood, and pan through straps in metal deck. Nails, rawl plugs or wood plugs shall not be permitted. Where required by structure, furnish through bolts and fishplates.

5) Exposed raceways shall be run parallel with or at right angles to walls. Provide clearance with water, steam or other piping (minimum 3 in. separation from steam and hot water pipes, except 1 in. from pipe cover at crossings and 18 in. for parallel runs). For hung ceiling outlets, run in hung ceiling and connect to ceiling support channels. In masonry and poured concrete, run vertically only.

6) Maintain grounding continuity of interrupted metallic raceways with ground conductor, and in flexible conduit for feeders and motor terminal connections.

7) Empty raceways over 10 ft long: Provide fish or pull wire, galvanized or nylon rope.

8) Raceway and Cable Installation: Rigid steel conduit shall be permitted for feeders and branch circuits. Paint male threads of field-threaded conduit with graphite-base pipe compound and butt conduit ends. Touch up marred surfaces and field-cut threads, CRC-cold galvanized.

a. Raceways concealed in the concrete slab – RIGID STEEL.

b. Raceways installed exposed in mechanical and unfinished spaces – RIGID STEEL OR EMT.

c. Raceways installed exposed in finished areas – surface metal raceway

d. Raceways installed in wet or damp areas – RIGID STEEL CONDUIT OR LIQUIDTIGHT.

e. Flexible taps from junction boxes above hung ceilings to recessed fluorescent lighting fixtures shall be in flexible metal conduit. Provide minimum 4 ft and maximum 6 ft lengths. For final connection to motor terminal box, transformer and other vibrating equipment: provide with polyvinyl sheathing and ground conductor. Minimum length: 18 in. with slack. Connect ground conductor to enclosure or raceway at each end.

f. Branch circuit wiring installed concealed in ceilings, furred or stud walls – EMT OR METAL CLAD CABLE TYPE MC (CONCEALED).

g. Feeders in dry locations – RIGID STEEL OR EMT.

h. Fire alarm system is to be in a rigid conduit system. Type of conduit system to be as required by locations. Cable installed concealed in ceiling in walls is to be type – MC FIRE ALARM CABLE.

9) Cut conduit ends square. Ream smooth. Paint male threads of field threaded raceways with graphite base pipe compound. Draw up tight with raceway coupling.

10) Expansion fittings shall be installed at right angles with clip joint centered in expansion joint. Provide a length of run in accordance manufacturer's recommendations. Preset fittings shall allow for temperature variation. For expansion joint crossings, cross at right angles and anchor ends. For raceway not in slab, provide flexible conduit with external bonding jumper strip. In slab, provide O.Z. Type "AX" or Appleton type "XJ" or "XJF" with ground continuity.

C. For through-the-floor systems, utilize an assembly similar to Hubbell or Wiremold fire rated poke-through-floor box system. For above floor fittings power shall be duplex receptacle or other as noted. Provide separation barrier between power and telephone compartments. Provide junction box on underside of floor. Pack fitting to restore fire rating of floor.

D. Erect wall and switch outlets in advance of furring and fireproofing. Outlet boxes shall be set square and true with building finish. Secure to building structure by adjustable strap iron or grout in with masonry. Verify outlet locations in finished spaces with architectural drawings of interior details and finishes. Provide barriers between switches connected to different phases for voltages exceeding 150 volts to ground.

HARRIMAN
AUBURN PORTLAND MANCHESTER

WHOLE FOODS MARKET

PUB DEVELOPMENT AND DEPARTMENT RELOCATIONS
2 SOMERSET ST
PORTLAND, ME

Harriman Project No.	15103
Key Plan	Proj North

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Issues and Revisions

Mark	Date	Description
–	09-28-15	ISSUED FOR PERMITTING

STATE OF MAINE
DAVID
COUNTEMANCHE
No. 10586
LICENSED
PROFESSIONAL ENGINEER

Drawing Scales
N.T.S.

0 4' 8' 12'

PA / PE: ***
Drawn By: ***

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ELECTRICAL SPECIFICATIONS SHEET 1 OF 2

E80.

Date: 10/01/15