ELECTRICAL SPECIFICATIONS

GENERAL ELECTRICAL REQUIREMENTS

1.1 Requirements:
A. The work covered by this Section of the specification includes furnishing of all labor, equipment, supplies and materials and performing all operations including excavation and backfilling, cutting, channeling and chasing necessary for the installation of wiring systems, as shown on the drawings, as hereinafter specified, and as directed by the Engineer.

B. The Contractor shall perform all work hereunder in strict accordance with the rules and regulations of all applicable municipal, state and other local codes, and in accordance with applicable provisions of the 2008 edition of the National Electrical Code.

C. The Contractor shall make application for all necessary permits, licenses and inspections as required under the above codes and shall pay all fees and charges appurtenant thereto.

D. The electrical contractor shall make application for electrical service with the local electrical utility and forward anticipated electrical loads for the project. In addition, the electrical contractor shall be responsible for coordinating the installation of the permanent electrical service with the utility company to assure completion at the earliest possible date so as not to delay the project.

E. The general arrangement of conduit, wiring and equipment shall be as shown on the contract drawings. The Contractor shall carefully examine all contract drawings and shall be responsible for the proper fitting of materials and equipment in each location as indicated, without substantial alteration. In as much as the drawings are generally diagrammatic and due to the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories, as may be required. The Contractor shall carefully investigate the site, structural, and finish conditions affecting his work and shall arrange such work accordingly, furnishing such fitting and accessories as may be required to meet such conditions, at no additional cost to the Owner. The right to make any reasonable change in location of apparatus, equipment, outlets or routing of conduit and wiring, up to the time of roughing–in is reserved by the Engineer without involving any additional expense to the Owner.

1.2 Materials:
A. All materials shall be new and the best of their respective kinds, suitable for the conditions and duties imposed on them after installation. All such material shall be as found in the approved list of the National Board of Fire Underwriters. All equipment and systems shall be UL approved.

B. Where material or equipment is identified by proprietary name, model number and/or manufacturer, furnish the named item or equal thereof, subject to acceptance by the Engineer. Substituted items shall be equal or better in quality and performance and must be suitable for the available space, required arrangement and application. Submit any and all data necessary to determine the suitability of substituted items. The suitability of only the named item has been verified. Where more than one item is named, only the first item has been verified as suitable.

1.3 Examination of Premises:
A. The Contractor shall visit the site and observe the conditions under which the work shall be done or other circumstances which will affect the contemplated work. No allowance will be made subsequently in this connection for any error or negligence in the Contractor's part.

1.4 Shop Drawings:
A. The Contractor shall prepare and submit detailed shop drawings. In general, catalog cuts, specification sheets, descriptive data, etc., shall be acceptable for submittal of all equipment specified by standard catalog numbers, unless directed otherwise by the Engineer.

1.5 Low Voltage Testing:
A. The Contractor shall furnish all labor, materials, instruments, fuel and power required to perform all necessary tests. All tests shall be performed to the satisfaction of the Engineer. All defective materials and/or workmanship discovered as a result of these tests, shall be removed and replaced at the Contractor's expense and the test repeated.

B. A thorough test shall be made to demonstrate that the system is entirely free from ground faults, short circuits, and open circuits; that the resistance to ground all non–grounded circuits, before and after connection of equipment meets the requirements of the National Electrical Code.

1.6 Identification:
A. Mark and permanently identify all motor starters, switches, controls, panelboards and other equipment in accordance with the project nomenclature. Identification plates shall be laminated plastic, black and white engraved letters. Lettering for panels and other equipment shall be 3/8" high. Attach identification plates by permanent means.

B. No embossed plastic tape markers or hand written marker pens will be permitted for use in marking equipment.

1.7 Guarantee:
A. The material and workmanship of all parts of the electrical installation specified herein shall be guaranteed unconditionally for a period of one (1) year from date of acceptance against mechanical and electrical defects arising from faulty materials or workmanship. Either replacement or repairs shall be made promptly on any defective materials or workmanship without charge during that period.

1.8 Record Drawings:
A. Upon completion of the electrical installation, the Contractor shall deliver to the Owner one (1) set of prints of electrical contract drawings which shall be legibly marked in red pencil to show all additions, changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of Record Drawings.

1.9 Record and Information Manual:
A. The Contractor shall have prepared three (3) copies of the Record and Information Manual and deliver three copies of the booklet to the Owner. The manuals shall include copies of all specifications, shop drawings and maintenance instructions for all electrical equipment provided.

1.10 Cutting and Patching:
A. All cutting and patching necessary for the installation of the electrical work shall be done by the electrical contractor. Any damage done to the work already in place by reason of this work shall be repaired at the Contractor's expense. Patching shall be uniform in appearance and shall match with the surrounding surface.

1.11 Mounting Heights:
A. The following mounting heights of the various electrical outlets and devices are for guidance, the Contractor shall study the Architectural and Electrical Drawings for exact locations coordinated with door swings, glass partitions, etc.

Switches & Pull Stations ..... 48" to center of outlet box above floor.

Receptacles ..... 18" to center of outlet box above floor (unless otherwise noted).

Voice/Data Outlets ..... 18" to center of outlet box above floor (unless otherwise noted).

Fire Alarm Horns/Flashing lights.... 80" min to 84" max to top of device.

1.12 Motor Connections and Control Wiring:
A. Provide all power wiring and connections from source to starter, starter to disconnect, and disconnect to motor or device, except where such wiring is provided by equipment manufacturer. All automatic temperature control wiring shall be furnished and installed under Division 15 – Mechanical, unless indicated or specified otherwise. However, Electrical Contractor shall provide and install all starters and make all power connections. Manual control switches shall be furnished and/or installed by the Electrical Contractor as indicated.

B. Furnish and install a disconnect for each motor. Disconnects shall be fused or unfused safety switches as required.

1.13 Connections and Alterations To Existing Work:
A. Any electrical work which will interfere with the normal use of the building in any manner shall be done at such times as mutually agreed upon between the Contractor and the Owner's representative.

B. All existing electrical systems in occupied areas shall be kept in operation during the progress of the work. Temporary electrical connections shall be provided to all systems and equipment where necessary to maintain continuous operation until the new systems and equipment are ready for operation.

C. When existing electrical work is removed, all conduit, ducts, wiring and appurtenances shall be removed to a point below the finished floors or behind finished walls and capped. Such points shall be far enough behind finished surfaces to allow for the installation of the normal thickness of finish material.

D. When the work specified herein connects to any existing conduit, wiring or other equipment, the Contractor shall perform all necessary alterations, cutting and fitting of the existing work as may be necessary or required to make satisfactory connections between the new and existing work and shall leave the completed work in a finished and workmanlike condition, to the entire satisfaction of the Engineer.

E. When the work specified herein or under other divisions of this contract necessitates relocation of existing conduit, wiring or electrical equipment, the Contractor shall perform all work and make all necessary changes to existing work as may be required to leave the completed work in a finished and workmanlike condition to the entire satisfaction of the Engineer.

F. All existing electrical materials not reused under this division and not salvaged by the Owner shall become the property of the Contractor and shall be disposed of in a proper manner off the project site.

G. Removal of existing equipment and feeder renovations shall be closely coordinated with the Owner's representative where they impact critical areas. Interruption of electrical service to critical equipment shall be kept to a minimum and performed on off hours as designated by the Owner's representative.

1.14 Electrical Demolition:
A. In areas indicated to be renovated, remove that portion of the existing electrical installation to complete the new work and all equipment, wiring, conduits and appurtenances not required in the completed installation. All unused conduit and wiring exposed after demolition shall be removed back to the point of concealment.

B. Where electrical systems pass through the renovated areas to serve other portions of the facility, they shall be suitably relocated and the system restored to normal operation.

C. The extent of electrical demolition and relocation is not specifically indicated on the drawings. The contractor shall visit the site prior to submitting his bid to thoroughly review the existing installations and the proposed construction to include the full scope of electrical demolition and relocation. The contractor shall review all areas of the proposed renovation and the required removal and relocation of existing electrical work. In addition, the contractor shall review in detail, the architectural drawings for areas of demolition and removal of existing construction and review in detail, the associated existing electrical installations at the site. This review shall include all necessary costs in the bid to make the necessary adjustments to the existing electrical work to meet the proposed building construction. No allowances or change orders will be made after the bid for insufficient review and/or cost for the electrical demolition.

BASIC ELECTRICAL MATERIALS AND METHODS

1.1 Conduits and Fittings:
A. General:
1) Install all wiring in conduit (except where noted under Wire and Cable) or metal clad (mc) cable and provide empty conduit for special systems described elsewhere. ⚠1

2) Minimum conduit size shall be 1/2". All conduit embedded in concrete shall be 3/4" minimum. All exterior underground conduit shall be 1" minimum.

3) In finished areas, install all conduit concealed unless otherwise indicated. Where conduit cannot be concealed utilized surface metal raceway as manufactured by Wiremold. All surface metal raceway shall be run inconspicuously and painted to match adjacent wall/ceiling finishes. Conduit may be run exposed on unfinished walls, in mechanical equipment spaces and elsewhere as indicated.

4) Support all conduit not embedded in concrete or masonry so that strain is not transmitted to outlet boxes and pull boxes, etc. Supports to be sufficiently rigid to prevent distortion of conduits during wire pulling.

B. Conduit:
1) Provide hot–dip galvanized, rigid steel conduit for work exposed to weather and for embedded work in concrete or masonry and in or below the concrete slab on grade (above the vapor barrier).

2) Provide galvanized, (inside and out) electrical metallic tubing (EMT) for interior exposed work, for concealed work above suspended ceilings and within interior partitions or non–masonry walls.

3) Provide polyvinylchloride (PVC) schedule 40 conduit for exterior underground direct burial and exterior underground concrete encased installation.

C. Supports:
1) All parts and hardware used for support of equipment, conduits and fittings, shall be galvanized.

2) Support single runs of suspended feeder conduit with adjustable hangers using threaded rods attached to the structure above.

3) Support groups of suspended conduits run in parallel on trapeze hangers constructed of "Kindorf" channels and conduit straps suspended with threaded hanger rods attached to the structure above. No tie wires or building wire shall be used for strapping conduits.

4) Support surface runs of conduit using one hold pipe straps or two hold pipe straps. Strap spacing maximum 6 ft. on centers.

5) Fasten pipe straps and hangers to concrete using inserts or expansion bolts and to hollow masonry using toggle bolts. Wooden plugs and shields will not be permitted. All supports in bar joist construction shall be attached to the top cord of the joists using suitable clamps approved for the purpose.

6) Support conduits from joists and beams using clamps and/or Caddy clips approved for the purpose.

1.2 Wire and Cable (600 Volt):
A. Building wire, unless otherwise indicated, shall be 600 volt, type THHN/THWN–2 insulation for interior use and exterior use within conduit. Conductors shall be sized and run as indicated. Conductors shall be soft drawn copper of not less than 98% conductivity. Branch circuits (rated 60 amperes or less), installed above ceilings and within walls, where permitted by code, may be type MC cable (with ground wire). No Romex or BX cable is permitted.

B. No wire smaller than number twelve (12) AWG shall be used unless otherwise indicated. The wire size indicated in the homerun shall be used throughout the circuit. Conductors shall be continuous from outlet to outlet and from terminal board to point of final connection, and no splice shall be made except within outlet or junction boxes. All conductors shall be of the sizes as indicated. All wires number eight (8) AWG and larger shall be stranded. The Contractor shall make wiring connections of all electrical equipment requiring electric service. Wires and cables shall be as manufactured by Plastic Wire & Cable Corporation, Okonite Company, General Electrical or equivalent.

C. A color coding system, as listed below, shall be used for throughout the building's network of feeders and circuits and used as a basis of balancing the load. Selection shall be based on applicable work covered by this Contract.

System	Phase A	Phase B	Phase C	Neutral	Ground
120/208V	Black	Red	Blue	White	Green

D. All control wiring shall be color coded with wires of colors different from those to designate phase wires. All isolated ground conductors shall be green with a yellow tracer.

1.3 Disconnects (Safety Switches):
A. Furnish and install safety switches where indicated and as required for motor outlets or other equipment. Switches shall be of size, number of poles and fused or nonfused, as required for job conditions and the National Electrical Code.

B. Switches shall be equipped with fuse contacts and jaws which insure positive fuse and jaw contact by means of reinforcing spring clips or other approved means. All current carrying parts shall be silver plated. Hinges shall be non–current carrying. Switches shall be so designed that they can be locked in either open or closed position. Switches used with Class R fuses installed shall have rejection clip provisions.

C. All safety switches shall be quick–make, quick–break, and have interlocking cover with handle that may either be front or side operating with a padlocking provision, as manufactured by Square "D" or approved equal. Provide NEMA 3R enclosures where required to be weatherproof.

1.4 Motor Starters:
A. Provide starters, H–O–A switches and pilot lights for all motors. All temperature control wiring and components shall be under Division 15 – Mechanical.

B. Thermal manual motor starting switches shall be provided for all fractional horsepower, single phase motors, unless otherwise specified. Manual motor starters shall be of the snap–switch type containing thermal overload protection and a self–indicating trip–free handle. Starting switches shall be combined with a three–position hand–off–automatic selector switch when motor is controlled automatically. (Refer to mechanical equipment schedules.) Pilot indicating light shall be mounted in all starter enclosures where noted. The starters shall be Square D Company, Class 2510, Allen Bradley Bulletin 600, or approved equal. Enclosures shall be NEMA 1 for interior use.

C. Magnetic motor starters shall be provided for all three phase motors unless otherwise specified. Motor starters shall be 3 pole, 60 hertz, full–voltage, magnetic type with NEMA 1 enclosures, as required. Starters shall be provided with three element overloads. Where shown, starters shall be of the combination fused or unfused disconnect type as noted. Starters shall be equipped with hand–off–automatic selector switch when automatically controlled, a pilot indicating light and auxiliary contacts. Each magnetic starter shall have a 120 volt coil, an individual control power transformer and a fuse for protection of control wiring. Starters shall be Square D Company, Class 8536 and Class 8538 as required or approved equal.

1.5 Wiring Devices:
A. The following wiring devices shall be furnished and installed where called for on the drawings. Miscellaneous items not included below shall be Underwriters' Laboratories Standard conforming to the N.E.C. All devices shall be of the same manufacturer. Devices shall be Arrow Hart, General Electric, Circle F, or Hubbell or equal.

1) Wall Switches: Toggle switches shall be of the silent mechanical type rated 20 ampere. Three and four–way switches shall be of the same manufacturer and grade.

2) Receptacles: Receptacles for wall outlets shall be rated 20 ampere, 125 volts, duplex, three–wire with third pole grounded. GFCI shall be rated 20 ampere, 120 volt. Isolated ground (IG) receptacles shall be orange in color and be isolated ground type.

3) Special Wiring Devices: Shall be provided as shown on the drawings.

4) Dimmers: Shall be solid state, full wave, incandescent or fluorescent (based on the load controlled), rated 120 volt 1000/1500/2000 watts as required by the circuit. Provide Lutron "Nova" slide series or Prescolite "P" series.

5) Ground, phase and neutral conductors shall be pig–tailed in outlet boxes or multi–outlet assembly for receptacles so that ground and electrical service will not be disturbed to other receptacles on the same multi–wire circuit if receptacle is removed.

6) Device Plates: A device plate shall be provided for each outlet requiring one. All plates shall be manufactured of satin finish, .032 stainless steel, Type 430, except where specifically called for to be otherwise in these specifications. Telephone blank plates shall be of similar construction.

7) Where wiring devices are noted to be weatherproof, they shall be mounted with clear Lexan, hinged lid type covers which allow the plug to remain in while the cover is closed (Intermatic or equal).

1.6 Grounding:
The main service grounding system shall consist of three branches, one being a grounding conductor to the water piping system which shall be sized in accordance with the National Electrical Code, the second being a grounding conductor to the reinforcing steel and the concrete footings, the third being a grounding conductor to the electrode grounding system (driven ground rods) which shall be sized in accordance with the National Electrical Code. In all instances, the grounding conductor shall be bonded at both ends to the conduit which it is installed. The main service ground to the water piping system shall be connected on the street side of the water meter, or on a cold water pipe as near as practicable to the water service entrance to the building. Bonding jumpers shall be provided where required by the National Electrical Code. Bond all structural steel of the building to the main service ground bus.

B. Contractor shall provide a grounding system consisting of driven ground rods with interconnecting cables. Ground rods shall be installed with two feet of cover and cables exothermically welded. Ground rods shall be 3/4" diameter by 10 feet long copper clad steel, one piece, Copperweld #9450, or approved equal. Ground grid conductors shall be #1/0 bare direct buried. The ground system shall be so constructed that the resistance between the equipment and the ground shall not exceed 25 ohms.

C. Provide equipment grounding conductors in all raceways and cables sized in accordance with the NEC.

SERVICE AND DISTRIBUTION

1.1 Electrical:
A. Electrical service to the site is underground 120/208 volt, 3 phase, 4 wire service. Coordinate metering requirements with utility company. All work shall be in accordance with the utility companies Commercial Construction Handbook – latest edition. All charges for permanent service by the utility company shall be paid for by the Owner.

1.2 Panelboards:
A. Furnish and install, where indicated on the drawings, automatic circuit breaker panelboards complete with enclosing cabinets. Enclosures shall be NEMA 1 for recessed or surface mounting as indicated. Where panelboards are recessed mounted, they shall be provided with a minimum of 3 @ 3/4" spare conduits per backbox to the accessible ceiling space above and terminated for future use. Panelboards and enclosing cabinets shall conform to standards established by Underwriters' Laboratories, Inc., and requirements of the NEC.

B. The Contractor shall balance the loading on all panelboards as closely as possible and to the satisfaction of the Engineer.

C. All panelboards interiors shall be factory assembled, complete with circuit breakers as scheduled on the drawings. All circuit breakers shall be quick–make and shall be trip indicating.

D. The circuit numbers used on the drawings are for identification only and the circuit number in the panel need not necessarily correspond. Each circuit in the panels, however, shall be accurately indexed as specified herein. Circuits shall be arranged in panels so that all lighting circuits are together, motor circuits are together, etc.

E. As specifically designated on the drawings, panelboards shall be 120/208 volt, three phase employing bolt–on breakers of not less than the symmetrical A.I.C. ratings indicated on the drawings. Provide isolated ground bus and 200% neutral bus as designated on the drawings. Furnish type Square D, General Electric or Westinghouse as indicated on the panelboard schedule as follows:

Manufacturer	120/208V
Square D	NQOD
General Electric	AQ
Cutler–Hammer	POW–R–LINE

F. Distribution panels 600 amperes and larger shall be provided as scheduled on the drawings and shall accept branch breakers up to the mains rating of the panel. Panels shall be as manufactured by Square D – I–Line construction or equal.

1.3 Fuses:
A. Fuses for service entrance and distribution equipment shall be U.L. listed class RK–1 and L current limiting type. All fused switches shall incorporate rejection clips to insure only current limiting replacement fuses. Provide Bussmann "low peak" or equal by Gould–Shawmut. Provide a spare set of three fuses to the owner for each ampere size and type used.

LIGHTING

1.1 Scope:
A. Furnish and install a complete lighting fixture for each lighting fixture symbol shown on the drawings, of the type and quality described herein. Fixtures shall be installed complete with lamps of the wattage indicated, sockets, housing, ballast (if required), shades, diffusers, supports, etc., and wired for operation.

1.2 Requirements:
A. The Contractor shall be completely responsible for the proper and accurate position of sockets in all fixtures so that the filament of the size and type lamps specified, when installed in such sockets, will be in correct relation to the center of the fixture as specified by the manufacturer of the various lighting fixtures and glass units specified.

B. All sockets shall be approved by Underwriters' Laboratories, Inc. Fluorescent sockets shall be thru–slot type and incandescent lamp sockets shall be 250 volt code standard, medium base for lamps up to 200 watts inclusive and Mogul base for lamps 300 watts and larger. They shall be of Bryant, Hubbell, Arrow, Benjamin, General Electric or approved equal.

C. All fixtures shall be wired for polarized system with one wire in each fixture to be distinctly marked for its entire length. Wire shall bear the label of approval of the Underwriters Laboratories, Inc. Fixture wiring for fluorescent fixtures and branch circuit wiring in fluorescent fixture channels shall be type THHN or THW (90 degree C. rated). All channels in fluorescent lighting fixtures shall be approved for through wiring. Type AF wire shall only be used for interior incandescent fixture wiring.

D. All fixtures shall be in accordance with all local Municipal and State Requirements governing same and shall be U.L. approved.

E. All plastic diffusers shall be 100 percent virgin acrylic (nominal 1/8 inch thick) and all Lexan diffusers shall be Lexan Type MR–4000, or equal.

F. Each fixture shall be completely equipped with lamps of the size, type, wattage and shape indicated and specified. All lamps shall be manufactured by the General Electric Co., Westinghouse Mfg., Co., Sylvania or approved equal, of standard schedule make. Lumen output and life of lamps shall be proper voltage for the building. Exact voltage shall be checked before ordering fixtures.

G. Fluorescent lamps shall be Sylvania F032T84100K or approved equal, unless otherwise specified. Lamps shall be energy saver type.

H. All fluorescent lighting fixtures shall have energy saving, solid state electronic ballasts.

I. At the location of outlets indicated on the various drawings, the type of fixture required is designated by a type letter. All fixtures shall be furnished in the quantities, sizes and types as indicated on the drawings.

J. Recessed incandescent and fluorescent fixtures in ceilings may not be supported from the suspended ceiling construction. Box and fixture supports shall be fastened securely to concrete slab or bar joist except as noted. Where fixtures are surface mounted, neat holes shall be cut in the hung ceilings as required for the fixture supports. All support hangers, channels, bolts, etc., shall be galvanized or Galv–Krom.

K. Provide adequate supports for all fixtures separate from the suspended ceiling system. Contractor shall furnish and install all necessary accessories, as required, to support the fixtures. Provide a minimum of two (2) galvanized steel #12 gauge hanger wires (alternate corners) on all recessed fixtures.

COMMUNICATION SYSTEMS

1.1 Scope:
A. The Contractor shall furnish and install all material, labor and incidentals necessary for the complete installation and successful operation of the following systems:
(1) Telephone (conduit rough–in)

1.2 Telephone System:
A. Telephone service shall be extended by Telephone Company. Provide wall and floor telephone outlet boxes, conduits, backboards, sleeves, receptacles, and other equipment shown on the drawings for use by the Telephone Company. All charges by the Utility Company shall be paid by the Owner.

B. Wall outlets for telephone shall consist of 4" square boxes with single gang ring coverplate and 3/4" empty conduit to the nearest accessible ceiling.

C. Furnish 3/4" plywood backboard for telephone equipment, where indicated on drawings or as directed in field.

D. All elbows in conduit runs shall be wide sweep field bends. Install pull boxes as required and where directed by the Telephone Company and/or as required by the National Electrical Code.

E. Provide nylon pull wire in all conduits left empty. All conduits shall be terminated with nylon insulating bushings.

FIRE ALARM SYSTEM

1.1 Scope:

A. The Contractor shall furnish and install all material, labor and incidentals necessary for the new fire alarm system throughout the existing and new building. All work shall be coordinated with the existing building and the local fire marshall.

1.2 Fire Alarm System:

A. Provide an integrated, automatic fire/smoke detection system complete with all wiring, conduit, boxes, controls, automatic and manual initiation devices, annunciators, microphone stations, audible speaker/horns and visual devices.

B. The system shall be manufactured by Notifier, Gamewell, Edwards or approved equal. Match existing system when applicable. New system shall be a microprocessor based, multiplex type with "addressable" initiating devices and be 100% compatible with existing system.

C. The voice evacuation portion (if required) of the system shall be a continuous voice/tone speaker alarm type. The voice evacuation shall include an electronic pre–recorded message and remote microphone stations in locations shown on the drawings.

D. The system shall meet all requirements of the NFPA and local requirements. The manufacturer shall submit shop drawings to the fire marshall or authority having jurisdiction and obtain approval prior to starting any rough–in work.

E. The contractor and his fire alarm vendor shall prepare equipment cuts and rough–in drawings showing all devices and associated wiring requirements and zoning. Submit this information to the engineer for approval and to the authority having jurisdiction for approval.

F. SYSTEM COMPONENTS:
1. Strobe lights and horn/speaker notification devices shall meet the requirements of the ADA as defined in UL Standard 1971 and shall consist of a xenon flash tube and associated lens/reflector. Strobe shall produce one flash per second with continuously applied minimum voltage. Audibility shall meet the requirements of NFPA over the facility's ambient level.
2. Manual Fire Alarm Stations shall be non–break glass type, equipped with key lock for testing without operating the handle. Station shall be constructed of red Lexan and the word Fire shall appear on the front of the station in raised white letters.
3. Ionization Type Area Smoke Detectors shall be two–wire, 24 VDC type using a dual unipolar chamber. Each detector shall contain an LED output and a built–in test switch. Visual indication of an alarm shall be provided by a latching Light Emitting Diode (LED), on the detector, which may be seen from floor level.
4. Duct Smoke Detectors shall be 24 VDC, ionization type with visual alarm and power indicators, and a reset switch. Each detector shall be installed upon the composite supply/return air ducts(s), with properly sized air sampling tubes. Detector shall be provided with a remote alarm LED and test switch flush mounted on the ceiling below.
5. Automatic Heat Detectors shall be combination rate of rise and fixed temperature rated at 135 degrees Fahrenheit for areas where ambient temperatures do not exceed 100 degrees, and 200 degrees for areas where the temperature does not exceed 150 degrees.

G. INSTALLATION:
1. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, as directed by the fire marshall and as recommended by the major equipment manufacturer.
2. All conduit, junction boxes, conduit supports and hangers shall be independent of all other wiring systems. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

H. TEST:
1. Provide the service of a factory–trained engineer or technician to supervise and participate during all of the adjustments and tests for the system.

I. INSTRUCTION:
1. Provide instruction as required to the building personnel and fire and safety personnel. "Hands–on" demonstrations of the operation of the system shall be provided.

J. WIRING:
1. The Contractor shall furnish and install non–specified equipment required to make each system fully functional as per stated intent, without additional cost. This shall include major components, if required.
2. The installation and design of the fire alarm and detection system shall comply with Chapter 2, "Basic Requirements" of NFPA Standard 72. ⚠2
3. Install fire alarm and detection system wiring in conduit (3/4 inch minimum). Fire alarm BX cable (or plenum rated cable may be provided for all circuits concealed above ceilings and within walls. ⚠3
4. Minimum wire size: No. 18 AWG solid copper for initiation and annunciator circuits: No. 14 AWG solid copper for indicating circuits: No. 12 AWG solid copper for 120 volts circuits.
5. No wiring other than that directly associated with the fire alarm or auxiliary functions shall be permitted in the fire alarm conduits or cables. Wiring splices are to be avoided to the extent possible. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one shall be color coded and be labeled on each end with "E–Z Markers" or equivalent. All fire alarm junction boxes shall be painted red. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded. All controls, functions switched, etc. shall be clearly labeled on all equipment panels.
6. Location for all ceiling – mounted equipment shall be coordinated with lights, air outlets and other ceiling fixtures and shall be acceptable to the Engineer.
7. Mount end–of–line device for each indicating and indicating circuit in a separate box located not more than 6 feet above the finished floor. Device shall be mounted on a terminal strip attached to the box cover with an engraved phenolic plate.

K. PROJECT ACCEPTANCE, GUARANTEE AND MAINTENANCE:
1. Testing procedures for the acceptance of the alarm and detection system shall be conducted in accordance with provisions of Chapter 2 and 4 of NFPA 72. ⚠2
2. As–built drawings in conformance with the provision of Chapter 1 of NFPA 72 shall be provided prior to the acceptance test. Drawings provided shall be reproducible vellum or sepia with a minimum scale of 1/8 inch equal to 1 foot. Three sets of maintenance manuals and a complete acceptance test report shall be provided.
3. The Contractor shall guarantee labor, materials and equipment provided under this contract against defects for a period of 1 year after the date of the final acceptance of this work by the Owner.

SDI Design, LLC.
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ISSUED FOR BUILDING PERMIT

TENANT RENOVATIONS FOR:
Access Center
1733 Lastchester Road
Bronx, NY 10461

Lifeline Vascular Access

InSync
ARCHITECTURAL DESIGNS, INC.
12113 Old Pylesville Road Whiteford, MD 21160
Office 410–452–8006 Fax 410–452–8046

0" 1" 2" 3"
1/8"=1'–0" 8' 16' 24'
1/4"=1'–0" 4' 8' 12'

ELECTRICAL SPECIFICATIONS

REVISIONS		
REV#	DATE	DESCRIPTION
⚠1	7/16/13	OWNER'S REVISION

DRAWING NO. E–105.00
SHEET OF
DATE 4/19/13 DRAWN BY DJC
JOB NUMBER 11206 CHECKED BY SMM
SDI# 2013–01H