

SECTION 16121 - BASIC MATERIALS AND METHODS

- 1. GENERAL
 - A) SECTION 16A APPLIES TO ALL WORK HEREUNDER AND SHALL INCLUDE CONDUIT, BOXES, WIRE, WIRING DEVICES, LIGHTING FIXTURES AND RELATED MATERIALS.
- 2. MATERIALS
 - A) CONDUIT
 - 1) CONNECTIONS TO EQUIPMENT WHICH SHALL BE MADE WITH THREE FEET FLEXIBLE LIQUIDTIGHT CONDUIT WITH LIQUIDTIGHT CONNECTORS.
 - 2) CONNECTIONS TO RECESSED LIGHTING FIXTURES SHALL BE MADE WITH SIX FEET OF FLEXIBLE CONDUIT FROM A BOX. LOCATE BOX TO PROVIDE RELOCATION OF FIXTURES.
 - 3) INTERMEDIATE GRADE CONDUIT WITH THREADED FITTINGS SHALL BE PROVIDED IN SLAB-ON-GRADE, OUTSIDE BUILDING, BURIED BELOW GRADE AND IN WET LOCATIONS.
 - 4) "MC" CABLE MAY BE USED IN NON-VISIBLE LOCATIONS.
 - 5) RIGID GALVANIZED CONDUIT MUST BE USED IN EXPOSED AREAS OF THE DINING ROOM.
 - 6) ALL OTHER CONDUIT SHALL BE ELECTRIC METALIC TUBING WITH COMPRESSION TYPE FITTINGS. EXCEPT EXTERIOR EXPOSED CONDUIT SHALL BE RIGID GALVANIZED CONDUIT.
 - B) BOXES
 - 1) CONCEALED BOXES SHALL BE 4 INCH SQUARE GALVANIZED STEEL WITH GALVANIZED EXTENSION RINGS, TOTAL DEPTH OF NOT LESS THAN 2-1/2".
 - 2) SURFACE MOUNTED BOXES SHALL BE PRESSED GALVANIZED STEEL, UTILITY TYPE.
 - C) WIRE & CABLE (600V AND LESS)
 - 1) THE WIRE MEETING REQUIREMENTS BELOW SHALL BE SUITABLE FOR SECONDARY POWER AND LIGHT CIRCUITS AND CONTROL CIRCUITS WITHIN THE LIMITATIONS OF THESE SPECIFICATIONS.
 - 2) INSULATED WIRE NO. 8 AWG AND LARGER SHALL BE STRANDED.
 - 3) ALL WIRE SHALL BE BROUGHT TO THE JOB IN UNBROKEN PACKAGES, AND SHALL BEAR THE DATE OF MANUFACTURING AND SHALL NOT BE OLDER THAN TWELVE MONTHS.
 - 4) TYPE OF WIRE SHALL BE AS FOLLOWS:
 - A. UNLESS OTHERWISE SPECIFIED OR INDICATED OTHERWISE ON DRAWINGS, ALL #12 AND #10 WIRE SHALL BE THW OR THHN AND ALL WIRE #8 AND LARGER SHALL BE THHN-THWN TYPE.
 - B. WIRING ADJACENT TO HEAT PRODUCING EQUIPMENT SHALL BE TYPE AVA.
 - C. NO WIRE SMALLER THAN #12 GAUGE SHALL BE USED, EXCEPT FOR SIGNAL OR CONTROL SYSTEMS, OR WHERE OTHERWISE INDICATED. WIRE SHALL BE COPPER, 600 VOLT MINIMUM RATING, EXCEPT FOR SPECIAL SYSTEMS.
 - D. LOW VOLTAGE WIRING USED IN UNDERGROUND CONDUIT AND OTHER AREAS SUBJECT TO EXTREME DAMPNESS SHALL BE RHW OR XHHW TYPE INSULATION.
 - E. UNLESS NOTED OTHERWISE, ALL CONDUCTORS SHALL BE SOFT DRAWN COPPER CONFORMING TO THE LATEST ASTM SPECIFICATIONS AND THE LATEST REQUIREMENTS OF NEC. UNLESS OTHERWISE NOTED OR SPECIFIED, ALL INSULATION SHALL BE RATED 600 VOLT.
 - F. ALL WIRE SHALL BE AS MANUFACTURED BY GENERAL CABLE CO., PHELPS DODGE, ANACONDA, OR A CABLE EQUIVALENT.
 - G. ALL WIRE SHALL BE INSTALLED IN CONDUIT AND COLOR CODED. ALL WIRE SHALL BE 98% CONDUCTIVE COPPER, RATED FOR MAXIMUM OF 600 VOLTS.
 - D) WIRE CONNECTORS
 - 1) WIRE CONNECTORS FOR SIZED #10 AWG AND LESS SHALL BE "PRESS-SNURE", IDEAL "WRAP-CAP", T & B "STAKONS" OR 3M "SCOTCHOLK". CONNECTORS FOR WIRE SIZE #8 AND LARGER SHALL BE T & B OR BURNDY METHODS USING HYDRAULIC PRESSES.
 - E) ELECTRIC TAPE SHALL BE JOHNS-MANVILLE "DUCH-BRAND". 3M "SCOTCH BRANCH" OR PLYMOUTH "SUPKNOT BRAND".
 - F) WALL SWITCHES SHALL BE IVORY OR BROWN AND SHALL BE AS FOLLOWS OR APPROVED EQUAL:
 - 1) 20A, SP, 125/27N. HUBBELL #1221.
 - 2) 20A, 3W, 125/277V. HUBBELL #1223.
 - 3) 20A, 4W, 125/277V. HUBBELL #1224.
 - 4) 20A, SP, 125/277V. WITH PILOT LIGHT - HUBBELL #1221-PL
 - 5) 20A, SP, 125/277V. WEATHERPROOF - HUBBELL #1281/1795.
 - 6) 20A, SP, 125/277V. KEY SWITCH, HUBBELL #1221-L
 - G) RECEPTACLES SHALL BE IVORY, EXCEPT BROWN SHALL BE INSTALLED TO MATCH FINISHES AND SHALL BE AS FOLLOWS OR APPROVED EQUAL PROVIDE OTHER RECEPTACLES AS INDICATED ON THE DRAWINGS.
 - 1) 20A, 125V., DUPLEX - HUBBELL #5362 (I).
 - 2) 20A, 250V., 2W+G - HUBBELL #5461.
 - 3) 50A, 250V., 3W+G - ARROW-HART #5700, BRYANT #9630FPR OR P & S #5950.
 - 4) GROUND FAULT (20A/125V) - HUBBELL #GF-5362, PROVIDE SPRING LOADED WEATHERPROOF COVERS WHERE INDICATED.
 - 5) CLOCK AND SIGN HANGER - ARROW-HART #5700, BRYANT #2828-GS OR HUBBELL
 - H) PLATES
 - 1) PROVIDE FACE PLATES FOR ALL DEVICES INCLUDING WALL SWITCHES, RECEPTACLES, TELEPHONE JACKETS AND ALL WALL OUTLETS. FACE PLATES SHALL BE SATIN FINISHED STAINLESS STEEL IN ALL FOOD PREPARATION AREAS AND COMMERCIAL GRADE SMOOTH UNBREAKABLE PLASTIC IN LOBBY/DINING, OR DARK BROWN WOOD GRAIN TO MATCH DEVICES AND WALLS.
 - I) LIGHTING FIXTURES
 - 1) LIGHTING FIXTURES SHALL BE FURNISHED BY CONTRACTOR AS SCHEDULED ON DRAWINGS EXCEPT FOR THOSE INDICATED TO BE FURNISHED BY OWNER. CONTRACTOR SHALL INSTALL ALL LIGHTING FIXTURES. PROVIDE NECESSARY MOUNTING HARDWARE. ALL RECESSED LIGHTING FIXTURES SHALL BE THERMALLY PROTECTED AS REQUIRED BY CODE.
 - J) LAMPS
 - 1) OWNER SHALL FURNISH AND CONTRACTOR SHALL INSTALL ONE COMPLETE SET OF LAMPS FOR ALL LIGHTING FIXTURES. PROVIDE LABEL IN EACH FIXTURE INDICATING SIZE AND TYPE OF LAMP CORRESPONDING WITH SCHEDULE ON DRAWING. SIZE SHALL BE MARKED "MAXIMUM WATTAGE".

- 2) FLUORESCENT LAMPS SHALL BE STANDARD COOL WHITE, ENERGY EFFICIENT.
- 3) INCANDESCENT LAMPS SHALL BE INSIDE FROSTED WITH 2500 HOUR LAMP LIFE RATED 130 VOLTS.
- K) FLUORESCENT BALLASTS SHALL BE ENERGY EFFICIENT, CLASS "P".
- 3. EXECUTION
 - A) RACEWAY SYSTEM
 - 1) ALL WIRE SHALL BE (INSTALLED IN A METAL RACEWAY AND SHALL BE) CONCEALED WHERE POSSIBLE. WHERE NECESSARY TO EXPOSE THE WIRING THE RACEWAY SHALL BE INSTALLED AS INCONSPICUOUSLY AS POSSIBLE AND IN STRAIGHT LINES WITH 90-DEGREE BENDS, PARALLEL WITH BUILDING LINES. RACEWAYS SQUARE, REAM SMOOTH AND MAKE-UP TIGHT. PLUG ENDS OF RACEWAYS FURRING CONSTRUCTION AND SWAB CLEAN BEFORE PULLING WIRE OR CABLE. SUPPORT RACEWAYS FROM BUILDING STRUCTURE MEMBERS ONLY WITH APPROVED FASTENERS DESIGNED FOR THE PURPOSE.
 - 2) RACEWAY SYSTEM SHALL BE INSTALLED TO MAINTAIN THE MAXIMUM HEADROOM WITH REQUIRED SUPPORTS FOR THE LOAD. ALL ANCHORS, STRAPS AND CLIPS SHALL BE THE TYPE DESIGNED FOR THE PURPOSE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. COMMON SUPPORTS SHALL BE USED FOR MECHANICAL AND ELECTRICAL EQUIPMENT BY COORDINATING THE WORK WITH ALL TRADES.
 - 3) ALL ELECTRICAL BOXES SHALL BE SUPPORTED FROM BUILDING STRUCTURAL MEMBERS INDEPENDENTLY OF THE CONDUIT RACEWAYS. MECHANICAL SYSTEMS OR SUSPENDED CEILING SUPPORTS. RECESSED BOXES SHALL BE FLUSH WITH SURROUNDING SURFACES. ALL BOXES AND CABINETS SHALL BE PROTECTED DURING CONSTRUCTION AND SHALL BE CLEANED BEFORE PULLING WIRE AND INSTALLING DEVICES.
 - 4) SIZE OF CONDUIT SHALL NOT BE LESS THAN 1/2" AND NOT LESS THAN REQUIRED BY THE NATIONAL ELECTRICAL CODE. SUBCONTRACTOR SHALL INSTALL LARGER SIZE CONDUITS THAN DETAILED WHERE THERE IS AN EXCESSIVE LENGTH OF UNBROKEN RUN OR AN EXCESSIVE NUMBER OF BENDS.
 - B) WIRE
 - 1) USE ONLY APPROVED TYPE WIRE-PULLING LUBRICANTS FOR WIRE #4 AWG OR LARGER. SPICE WIRE ONLY IN ACCESSIBLE BOXES. MAKE WIRE JOINTS MECHANICALLY STRONG BEFORE APPLYING THE CONNECTOR AND WHERE TAPE IS USED, WRAP EACH JOINT TO THE THICKNESS OF THE ORIGINAL INSULATION. CLEAN AND POLISH METALIC SURFACES BEFORE INSTALLING CONDUCTORS. APPLY PRESSURE TYPE LUGS ON STRANDED CONDUCTORS CONNECTED TO SCREW OR BOLT TYPE CONNECTIONS.
 - C) WIRING DEVICES
 - 1) UNLESS NOTED OTHERWISE, RECEPTACLES SHALL BE INSTALLED 18" ABOVE THE FINISHED FLOOR, SWITCHES SHALL BE 48" AND CLOCK HANGERS 8'-0". RECEPTACLES NOTED ABOVE WORK COUNTERS AND CABINETS (AC) SHALL BE MOUNTED ABOVE THE SPLASH BACK. WEATHERPROOF RECEPTACLES SHALL BE INSTALLED SO THAT THE COVER PROTECTS THE DEVICE IN THE OPEN POSITION. PROVIDE A BONDING JUMPER BETWEEN THE BOX AND ALL RECEPTACLES.
 - D) EQUIPMENT CONNECTIONS
 - 1) PROVIDE ALL NECESSARY MOTOR STARTERS, DISCONNECT SWITCHES, CONTROLS, CONDUIT, BOXES, WIRE, ETC. AND CONNECT COMPLETE TO EACH PIECE OF EQUIPMENT REQUIRING ELECTRICAL CONNECTIONS INDICATED ON THE DRAWINGS. WHERE EQUIPMENT RATINGS DIFFER FROM THAT INDICATED, CONSULT OWNER CONSULT WITH EQUIPMENT SUPPLIER TO DETERMINE ROUGH-IN REQUIREMENTS. WHERE EQUIPMENT IS NOTED AS FUTURE, TERMINATE CIRCUIT IN JUNCTION BOX AND TAPE ENDS OF THE CONDUCTORS.
 - E) LIGHTING FIXTURES
 - 1) PROVIDE ALL NECESSARY MOUNTING HARDWARE AND RELATED ITEMS TO PROPERLY INSTALL THE LIGHTING FIXTURES. FIXTURES SUPPORTED IN EXPOSED GRID CEILINGS SHALL BE PROVIDED WITH CUPS. FIXTURES MOUNTED IN OR ON TILE CEILINGS SHALL BE ALIGNED WITH TILES. LIGHTING FIXTURES SHALL BE SUPPORTED FROM THE BUILDING STRUCTURAL MEMBERS EXCEPT FOR EXPOSED GRID CEILINGS WHERE A CEILING SUPPORTING WIRE SHALL BE PROVIDED AT EACH FIXTURE CORNER.
 - F) CLEANING
 - 1) ALL EQUIPMENT INCLUDING PANELBOARDS, SWITCHES, WIRING DEVICES, LIGHTING FIXTURES, WALL PLATES, ETC. SHALL BE FREE OF CORROSION, DIRT, PAINT SPLATTER OR DAMAGE OF ANY SORT AT FINAL ACCEPTANCE OF THE WORK. CONTRACTOR SHALL CLEAN, REPAIR OR REPLACE SAME AS INSTRUCTED BY THE OWNER BEFORE FINAL PAYMENT.
 - G) POWER AND LIGHTING PANELS
 - 1) BREAKERS SHALL BE INDIVIDUAL MOLDED CASE BOLT-IN STYLE, SIZED AS SCHEDULED. TWO POLE AND THREE POLE BREAKERS SHALL BE COMMON TRIP SINGLE POLE UNITS WITH HANDLE TIES WHERE NOTED AS SUITABLE.
 - 1) FURNISH WHEN REQUIRED EQUIPMENT TO LUTHER ROTARY DIMMERS. SIZE AS SHOWN ON PLANS. UL LISTED. FURNISH WITH SWITCH PLATE. DO NOT CUT OR REDUCE HEAT FINNS ON DIMMERS.
 - I) GROUNDING
 - A. EQUIPMENT GROUNDING:
 - 1) THE EQUIPMENT GROUNDING SYSTEM SHALL BE SUCH THAT METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT AND OTHER CONDUCTIVE ITEMS ASSOCIATED WITH ELECTRICAL CIRCUITS OPERATE CONTINUOUSLY AT GROUND POTENTIAL AND PROVIDE A LOW IMPEDANCE PATH FOR POSSIBLE GROUND FAULT CURRENTS.
 - B. WIREWAYS, SWITCHGEAR, PANELBOARDS AND MOTOR CONTROL PANELS SHALL BE PROVIDED WITH AN EQUIPMENT GROUND BUS (INCLUDING LUG OR SCREW TERMINALS) SECURELY BONDED TO THE ENCLOSURE. JUNCTION BOXES AND OTHER ENCLOSURES (SIZES ABOVE 6" X 6") SHALL UTILIZE AN EQUIPMENT GROUND BUS OR LUG AS REQUIRED TO SECURELY BOND THE EQUIPMENT GROUND CONDUCTOR TO THE ENCLOSURE.
 - C. ALL BRANCH CIRCUITS FOR POWER AND LIGHT SHALL INCLUDE A GREEN INSULATED GROUNDING CONDUCTOR. THE EQUIPMENT GROUND CONDUCTOR SHALL BE ELECTRICALLY AND MECHANICALLY CONTINUOUS FROM THE SOURCE OF SUPPLY TO THE EQUIPMENT TO BE GROUNDED.
 - D. LIGHTING FIXTURES SHALL BE SECURELY CONNECTED TO THE EQUIPMENT GROUND CONDUCTOR. A CONTINUOUS ROW OF FLUORESCENT FIXTURES MECHANICALLY JOINED TO PROVIDE A GOOD ELECTRICAL CONTACT MAY BE CONSIDERED AS ONE FIXTURE WITH THE EQUIPMENT GROUND CONDUCTOR CONNECTED AT ONLY ONE POINT.
 - E. MOTORS SHALL BE CONNECTED TO THE EQUIPMENT GROUND CONDUCTOR WITH A CONDUIT GROUNDING BUSHING AND WITH A BOLTED SOLDERLESS LUG CONNECTION ON THE METAL FRAME. BOLTS, NUTS AND WASHERS SHALL BE BRONZE, CADMIUM PLATED STEEL OR OTHER NON-CORROSIVE MATERIAL
 - F. ALL CONDUIT SHALL BE CONNECTED TO THE EQUIPMENT GROUND BUS BY MEANS OF A GROUNDING BUSHING.
 - 2) SYSTEM GROUND:
 - A. THE SERVICE GROUND SHALL BE SOLIDLY CONNECTED TO THE NEUTRAL BUS AND GROUND BUS AND ROUTED VIA GROUNDING ELECTRODE CONDUCTOR TO THE INCOMING BUILDING WATER SERVICE AHEAD OF THE MAIN CUTOFF VALVE.

- B. THE SERVICE GROUND SHALL BE MADE AT THE SERVICE OVER CURRENT MAIN SWITCH.
- C. TRANSFORMER GROUND (XO TERMINAL) SHALL BE CONNECTED TO THE NEAREST METALLIC COLD WATER PIPE OR BUILDING STEEL.
- 3) INSTALLATION:
 - A. ALL GROUNDING CONDUCTORS SHALL BE SIZED AS PER THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE.
 - B. GROUND RODS: GROUND RODS SHALL BE THE COPPER CLAD STEEL TYPE AND SHALL BE A MINIMUM OF 8 FEET IN LENGTH AND 1/2" IN DIAMETER. GROUND RODS SHALL BE AS MANUFACTURED BY COPPERWELD STEEL COMPANY. OR AN ACCEPTABLE EQUIVALENT.
 - C. GROUNDING ELECTRODE CONDUCTORS SHALL BE BARE STRAND COPPER. EQUIPMENT GROUND WIRE SHALL BE THW INSULATED AND SHALL BE GREEN IN COLOR.
 - D. CONNECTIONS TO WATER SERVICE SHALL BE MADE WITH SUITABLE GROUND CLAMP OF LUG CONNECTION AHEAD OF THE BUILDING METER OR CUTOFF VALVE.
 - E. CONNECTIONS TO GROUND RODS SHALL BE MADE BY A THERMAL WELD OF MECHANICAL COMPRESSION CLAMP.
 - F. GROUNDING CABLES EMBEDDED IN THE FLOOR SHALL BE MADE IN RIGID CONDUIT.
 - G. GROUND RODS SHALL BE DRIVEN FULL LENGTH DIAGONALLY INTO THE EARTH AND HAVE A ONE (1) FOOT MINIMUM COVER.
 - H. ALL CONDUCTOR CONNECTIONS SHALL BE MADE UP TIGHT TO PROVIDE CONTINUITY OF METALLIC GROUND.
 - I. GROUND WIRES NOT IN CONDUIT SHALL NE SUPPORTED EVERY FIVE (5) FEET.
 - 4) TEST:
 - A. THE CONTRACTOR SHALL RUN A GROUND RESISTANCE TEST AND IF THE RESISTANCE TO GROUND IS GREATER THAN 25 OHMS, ADDITIONAL GROUNDING ELECTRODES SHALL BE INSTALLED. THE TEST SHALL NOT BE MADE WITHIN FIVE (5) DAYS AFTER A RAIN.
 - B. THE CONTRACTOR SHALL PROVIDE OWNER WITH A COPY OF THE TEST PROCEDURE AND RESULTS OF THE TEST.
 - C. THE GROUND TEST SHALL BE MEASURED IN THE PRESENCE OF AN AUTHORIZED REPRESENTATIVE OF THE ARCHITECT. NO EQUIPMENT SHALL BE OPERATED UNTIL GROUND POTENTIAL IS VERIFIED.
- 4. WORKMANSHIP
 - A) ALL WORK SHALL BE PERFORMED BY WORKMEN SKILLED IN THEIR TRADES AND SHALL BE TYPICAL OF THE BEST TRADE PRACTICES.
- SECTION 16113 - SERVICE AND DISTRIBUTION
 - 1. GENERAL
 - A) SECTION 16113 APPLIES TO ALL WORK HEREUNDER AND SHALL INCLUDE SERVICE AND DISTRIBUTION.
 - B) SERVICE: THE ELECTRICAL DISTRIBUTION IS 120/208 VOLTS, 3 PHASE, 4 WIRE 3 CYCLE. CONTRACTOR SHALL VERIFY SERVICE VOLTAGE WITH UTILITY COMPANY AND PROVIDE NECESSARY REVISIONS AND MODIFICATIONS REQUIRED. SERVICE ENTERS SPACE UNDERGROUND.
 - INSTALLATION OF EQUIPMENT AND FIXTURES
 - A) INSTALL ALL EQUIPMENT AND FIXTURES FORMING PART OF THE WORK OF THIS SECTION IN COMPLETE ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND ALL PERTINENT CODES AND REGULATIONS.
 - 3. LAMPING
 - A) LAMP ALL FIXTURES WITH LAMPS OF THE DESIGNED RATING AND PATTERN.
 - 4. TESTING
 - A) GENERAL: UPON COMPLETION OF THIS PORTION OF THE WORK, FURNISH ALL EQUIPMENT AND PERSONNEL AND CONDUCT ALL TEST REQUIRED TO SECURE APPROVAL OF THE INSTALLATION FROM ALL AGENCIES HAVING JURISDICTION.
 - B) CRITERIA:
 - 1) ALL SYSTEMS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS SHALL BE FREE FROM MECHANICAL AND ELECTRICAL DEFECTS AND SHALL SHOW AN INSULATION RESISTANCE BETWEEN PHASE CONDUCTORS AND GROUND OF NOT LESS THAN THAT REQUIRED BY THE NATIONAL ELECTRICAL CODE.
 - 2) ALL SYSTEMS SHALL SHOW PROPER NEUTRAL CONNECTIONS.
 - 7. CLEAN UP
 - A) ALL EQUIPMENT AND EXPOSED SURFACES SHALL BE LEFT SMOOTH AND CLEAN. ALL PLATE WORK SHALL BE POLISHED AND THE ENTIRE PREMISES SHALL BE CLEANED OF UNUSED MATERIALS, RUBBISH, DEBRIS AND GREASE SPOTS.



Design + Inc. Bardonia - Eastern Building 1449 Bardonia Rd. Suite 200 Louisville, KY 40204 (502) 454-0011

TEXAS Woodhouse 1570 W. KOGER CENTER DRIVE RICHMOND, VA 23235

PERMIT SET		
DRAWN BY	LAJ	
CHECKED BY	KRB	
DATE	6/22/2017	
REV.	DATE	DESCRIPTION

The Construction Documents shall consist of all drawings, specifications, surveys, soils reports, addenda and other documents which are a part of the contract. It is the responsibility of the contractor to review the entire set of Construction Documents to determine their particular scope of work. Any interpretation of the Construction Documents shall be interpreted at the sole discretion of the Architect.

SHEET TITLE SPECIFICATIONS

SP6.0

SLAB THICKNESS / SNOW GUARDS / EGRESS / BLDG CODES / ADA / QUALITY CONTROL CHECK