

DIVISION 16
ELECTRICAL SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

- A. THE GENERAL, SPECIAL, AND OTHER CONDITIONS OF THE ARCHITECTURAL DOCUMENTS SHALL BE CONSIDERED AN INTEGRAL PART OF THESE ELECTRICAL SPECIFICATIONS.
- B. REFERENCE TO "CONTRACTOR" IN THIS SPECIFICATION SHALL MEAN "ELECTRICAL CONTRACTOR," UNLESS OTHERWISE NOTED.

1.02 DRAWINGS AND DOCUMENTS

- A. THE ELECTRICAL DRAWINGS AND SPECIFICATIONS SHALL FORM A SET OF PLANS FOR THE ELECTRICAL WORK. NEITHER THE DRAWINGS NOR THE SPECIFICATIONS SHALL BE COMPLETE WITHOUT THE OTHER. ANY ITEM SHOWN ON THE DRAWINGS OR SPECIFIED IN THE SPECIFICATIONS SHALL BE CONSIDERED AS SHOWN AND SPECIFIED ON BOTH.
- B. ANY QUESTIONS REGARDING THE INTENT OF THE DRAWINGS OR SPECIFICATIONS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION AS SOON AS POSSIBLE. IF DIRECTION FROM THE ENGINEER CANNOT BE OBTAINED DUE TO TIME OR COMMUNICATION LIMITATIONS, THE GREATER QUANTITY, HIGHER QUALITY OR CONDITION MOST FAVORABLE TO THE OWNER SHALL BE ASSUMED. CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND MISCELLANEOUS ITEMS NECESSARY FOR A COMPLETE AND OPERATIONAL ELECTRICAL INSTALLATION, AS SHOWN ON THE DRAWINGS AND CALLED FOR IN THESE SPECIFICATIONS.
- C. CONTRACTOR SHALL FAMILIARIZE THEMSELVES WITH ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS AND SPECIFICATIONS, COORDINATE ALL SHAFTS, CHASES, FURRED SPACES, SUSPENDED CEILINGS, LOCATIONS OF EQUIPMENT, ETC.
- D. ELECTRICAL CONTRACTOR SHALL COORDINATE ROUTING OF ALL CONDUIT AND WIRE WITHIN SPACES PROVIDED BY THE GENERAL CONTRACTOR. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL SOFFIT NG REQUIRED TO COVER INSTALLATIONS NOT COORDINATED OR SPECIFICALLY APPROVED BY THE ARCHITECT AND ENGINEER.
- E. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND ARE INTENDED TO SHOW APPROXIMATE LOCATION ONLY. PLACEMENT OF ELECTRICAL EQUIPMENT AND DEVICES SHALL NOT INTERFERE WITH LOCATIONS OR CLEARANCES OF OTHER TRADES' MATERIALS OR EQUIPMENT.
- F. DIMENSIONS GIVEN ON THE DRAWINGS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS. DIMENSIONS, WHETHER GIVEN IN FIGURES OR SCALED, SHALL BE VERIFIED IN THE FIELD.
- G. CONTRACTOR SHALL VERIFY THAT THE EQUIPMENT TO BE FURNISHED UNDER CONTRACT WILL FIT WITHIN THE AVAILABLE SPACE.
- H. NOTIFY THE ARCHITECT AND ENGINEER OF ANY DISCREPANCIES BETWEEN ELECTRICAL, ARCHITECTURAL AND MECHANICAL DRAWINGS.
- I. VERIFY ITEMS SUCH AS DOOR SWEIGHS, WINDOW LOCATIONS, CASEWORK, ETC., BEFORE INSTALLING ANY ELECTRICAL EQUIPMENT. IF ANY DEVICES CONFLICT WITH AND OTHER TRADES WORK DUE TO LACK OF COORDINATION SHALL BE RELOCATED AT NO ADDITIONAL COST TO THE OWNER.

1.03 SCOPE OF WORK

- A. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, TOOLS, AND OTHER ITEMS NECESSARY FOR OR INCIDENTAL TO INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM AS REQUIRED FOR THIS PROJECT.

1.04 CODES, INSPECTIONS, AND FEES

- A. THE COMPLETED ELECTRICAL INSTALLATION SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AS WELL AS ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES, REGULATIONS, AND STANDARDS, INCLUDING INTERPRETATIONS OF THESE BY APPROPRIATE AUTHORITIES HAVING JURISDICTION, WHERE THE DRAWINGS AND SPECIFICATIONS CALL FOR WORKMANSHIP OR MATERIALS IN EXCESS OF CODE OR REGULATORY REQUIREMENTS, THE DRAWINGS AND SPECIFICATIONS SHALL GOVERN.
- B. THE WORK SPECIFIED HEREIN SHALL BE SUBJECT TO INSPECTION AND APPROVAL BY AUTHORIZED REPRESENTATIVES OF THE NATIONAL BOARD OF FIRE UNDERWRITERS, STATE AND LOCAL AUTHORITIES HAVING JURISDICTION, AND THE ENGINEER. THE CONTRACTOR SHALL MAKE THE NECESSARY ARRANGEMENTS TO HAVE THE ELECTRICAL WORK INSPECTED BY APPROPRIATE INSPECTOR(S) AND SHALL PROVIDE TWO (2) COPIES OF EVERY FINAL SIGNED "CERTIFICATE OF INSPECTION" TO THE OWNER.
- C. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL LICENSES AND PERMITS, PAY ALL FEES AND CHARGES FOR ALL WORK INSTALLED BY THE CONTRACTOR, AND PAY ALL FEES AND CHARGES LEVIED BY THE ELECTRIC UTILITY COMPANY FOR CONNECTION TO ELECTRIC SERVICES.

1.05 INSPECTION OF SITE

- A. DIVISION 16 CONTRACTOR SHALL VISIT SITE PRIOR TO BID AND FAMILIARIZE HIMSELF WITH ALL EXISTING CONDITIONS IN REGARDS TO THE REQUIREMENTS OF THIS CONTRACT. ANY VISIBLE OR EASILY ATTAINABLE INFORMATION AVAILABLE AT THE SITE, EVEN IF DIFFERING FROM THESE DOCUMENTS, WILL NOT RESULT IN EXTRA COMPENSATION AFTER TIME OF BID. ANY DISCREPANCIES FROM THESE DOCUMENTS, SHOULD BE REPORTED TO THE ARCHITECT/ENGINEER AS SOON AS POSSIBLE.

1.06 TEMPORARY ELECTRICAL SERVICE

- A. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN A TEMPORARY LIGHTING AND POWER SYSTEM AT A LOCATION SPECIFIED BY THE GENERAL CONTRACTOR. THE SERVICE SHALL BE 100-AMP, 120/208-VOLT, SINGLE-PHASE, 3-WIRE, WITH APPROPRIATE METERING AND PROTECTIVE EQUIPMENT. COMPONENTS OF THE TEMPORARY SYSTEM SHALL BE AS REQUIRED BY THE GENERAL CONTRACTOR. THE SYSTEM SHALL COMPLY WITH ALL APPLICABLE CODES AND REGULATIONS. THE CONTRACTOR SHALL REMOVE THE TEMPORARY SYSTEM WHEN IT IS NO LONGER NEEDED.

1.07 MATERIALS AND EQUIPMENT

- A. UNLESS OTHERWISE SPECIFIED, ALL MATERIAL AND EQUIPMENT SHALL BE NEW AND MANUFACTURED BY RECOGNIZED MANUFACTURERS. ALL MATERIALS AND EQUIPMENT SHALL MEET THE REQUIREMENTS OF GOVERNING CODES.
- B. ALL MATERIAL AND EQUIPMENT SHALL BE LISTED AND LABELED BY UNDERWRITERS LABORATORIES, INC. (UL), AS CONFORMING TO ITS STANDARDS. IN EVERY CASE WHERE SUCH A STANDARD HAS BEEN ESTABLISHED FOR THAT TYPE OF MATERIAL OR EQUIPMENT.
- C. THE CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL TO USE ANY PROPOSED SUBSTITUTE MATERIAL OR EQUIPMENT BEFORE CONTRACTING TO PURCHASE SUCH SUBSTITUTES. THE OWNER RESERVES THE RIGHT TO REQUIRE THE REMOVAL OF ANY MATERIAL OR EQUIPMENT WHICH DOES NOT HAVE THIS WRITTEN APPROVAL AND WHICH DOES NOT COMPLY WITH THE SPECIFICATIONS, REGARDLESS OF THE STATE OF INSTALLATION OF SUCH EQUIPMENT.
- D. WHERE EQUIPMENT SUPPLIED BY THE CONTRACTOR HAS CHARACTERISTICS OTHER THAN AS SPECIFIED THEREIN, THE CONTRACTOR SHALL, AT NO ADDITIONAL COST TO THE OWNER, MAKE ALL CHANGES IN THE ELECTRICAL WORK NECESSITATED BY THE SUBSTITUTION.

1.08 WORKMANSHIP

- A. THE INSTALLATION SPECIFIED HEREIN SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER BY PERSONS EXPERIENCED AND SKILLED IN THE TRADE. ONLY THE BEST QUALITY WORKMANSHIP WILL BE ACCEPTED. ALL EXPOSED COMPONENTS OF THE ELECTRICAL SYSTEMS SHALL BE SQUARE AND TRUE WITH BUILDING LINES AND SURFACES.

1.09 CORRELATION OF WORK

- A. THE CONTRACTOR SHALL GIVE CAREFUL CONSIDERATION TO THE WORK OF THE GENERAL, MECHANICAL, AND ALL OTHER CONTRACTORS AND SUBCONTRACTORS ON THE PROJECT AND SHALL ORGANIZE THE ELECTRICAL WORK SO THAT IT WILL NOT INTERFERE WITH THE WORK OF OTHER TRADES.
- B. DRAWINGS AND SPECIFICATIONS FOR OTHER TRADES AND GENERAL CONSTRUCTION DRAWINGS SHALL BE CONSULTED FOR CORRELATION INFORMATION, DETAILS, DIMENSIONS, ETC.
- C. THE LOCATION OF ALL OUTLETS, WIRING, AND EQUIPMENT SHALL BE VERIFIED.
- D. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR MOVING MISPLACED ELECTRICAL SYSTEM COMPONENTS.

1.11 MAINTENANCE MANUAL

- A. THE CONTRACTOR SHALL FURNISH THE OWNER WITH TWO (2) COPIES OF A MANUAL COVERING THE OPERATION AND MAINTENANCE OF ALL EQUIPMENT PROVIDED UNDER THIS CONTRACT. THE MANUALS SHALL BE 3-RING, LOOSE-LEAF, HEAVY DUTY, STEEL, PIANO-HINGED NOTEBOOKS, HYTONE #8711 OR EQUAL, AND SUBMITTED TO THE ARCHITECT/ENGINEER FOR APPROVAL. EACH MANUAL SHALL CONTAIN THE FOLLOWING:
1. COMPLETE MANUFACTURER CATALOG DATA, MANUFACTURER'S LITERATURE, WIRING DIAGRAMS, DETAILED OPERATING INSTRUCTIONS, AND A COMPLETE LISTING OF SUPPLIERS AND DISTRIBUTORS WHERE REPLACEMENT PARTS AND MAINTENANCE SERVICES ARE AVAILABLE FOR ALL EQUIPMENT.
 2. INSPECTION CERTIFICATES, SIGNED BY THE APPROPRIATE INSPECTOR, SHALL BE FURNISHED IN THE MAINTENANCE MANUAL.
 3. AS WORK PROGRESSES, THE CONTRACTOR SHALL MARK A SET OF CONSTRUCTION DOCUMENTS TO SHOW ACTUAL CIRCUIT ROUTING AND MAKEUP, EQUIPMENT LOCATION CHANGES, AND ANY OTHER CHANGES OR DEVIATIONS BETWEEN PROJECT WORK, AS BUILT, AND THE CONTRACT DOCUMENTS. MARKINGS SHALL BE NEAT, LEGIBLE, AND PERMANENT. UPON COMPLETION OF THE WORK, THE CONTRACTOR SHALL SIMILARLY MARK A SECOND SET OF DOCUMENTS AND PROVIDE BOTH SETS OF AS-BUILT DOCUMENTS TO THE OWNER WITH THE MAINTENANCE MANUALS.

1.12 GUARANTEE

- A. THE CONTRACTOR SHALL FURNISH THE OWNER WITH A WRITTEN GUARANTEE FOR THE PERIOD OF ONE (1) YEAR AGAINST THE FAILURE OF ANY PART OF THE ELECTRICAL SYSTEMS INSTALLED UNDER THE SPECIFICATIONS DUE TO FAULTY MATERIAL OR WORKMANSHIP. GUARANTEE PERIOD SHALL START UPON SUBSTANTIAL COMPLETION OR AS SPECIFIED UNDER GENERAL AND SPECIAL CONDITIONS. LAMP BULBS SHALL BE OPERABLE ON THE START DATE OF, BUT EXCLUDED FROM, THE GUARANTEE.
- B. THE CONTRACTOR SHALL ASSURE THAT ANY EXTENDED WARRANTIES TO WHICH THE OWNER IS ELIGIBLE ARE PASSED ON TO THE OWNER.

1.13 CUTTING AND PATCHING

- A. THE CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING NECESSARY FOR THE COMPLETION OF THE ELECTRICAL WORK FOR THIS PROJECT. NO STRUCTURAL MEMBERS SHALL BE DISTURBED WITHOUT OBTAINING WRITTEN PERMISSION OF THE ENGINEER.
- B. ANY SURFACE WHICH IS DISTURBED IN ANY WAY BY THE CONTRACTOR SHALL BE REPAIRED AND REFINISHED TO PROVIDE A SURFACE EQUAL IN STRENGTH, DURABILITY, AND APPEARANCE TO THE ORIGINAL SURFACE.
- C. WHERE IT IS NECESSARY TO DRILL OR CUT CONCRETE SURFACES, THE EDGES SHALL BE SHARPLY DEFINED. HOLES SHALL BE MADE WITH A ROTARY DRILL. CUTS SHALL BE MADE WITH A CONCRETE SAW UNLESS SOME OTHER METHOD OF MAKING SPECIFIC CUTS IS APPROVED BY THE ENGINEER.
- D. PENETRATIONS THROUGH SMOKE, FIRE, HAZARDOUS AREA, OR OTHER RATED SEPARATIONS SHALL BE SEALED TO PRESERVE THE RATINGS OF THE SEPARATIONS.
- E. ALL CUTTING, DRILLING, PATCHING, REPAIRING, AND REFINISHING SHALL BE DONE BY PERSONS SKILLED IN APPROPRIATE TRADES.
- F. THE CONTRACTOR SHALL CLEAN AWAY ALL RUBBISH AND LITTER GENERATED DURING ELECTRICAL INSTALLATION.

1.14 DEMOLITION

- A. WHERE ELECTRICAL WORK TO REMAIN IS DAMAGED OR DISTURBED IN THE COURSE OF THE WORK, REMOVE DAMAGED PORTIONS AND INSTALL NEW PRODUCTS OF EQUAL CAPACITY, QUALITY, AND FUNCTIONALITY.
- B. ACCESSIBLE WORK INDICATED TO BE DEMOLISHED: REMOVE EXPOSED ELECTRICAL INSTALLATION IN ITS ENTIRETY.
- C. ABANDONED WORK: CUT AND REMOVE BURIED RACEWAY AND WIRING INDICATED TO BE ABANDONED IN PLACE, 2 INCHES BELOW THE SURFACE OF ADJACENT CONSTRUCTION. CAP AND PATCH SURFACE TO MATCH EXISTING FINISH.
- D. REMOVAL: REMOVE DEMOLISHED MATERIAL FROM THE PROJECT SITE.
- E. TEMPORARY DISCONNECTION: REMOVE, STORE, CLEAN, REINSTALL, RECONNECT, AND MAKE OPERATIONAL COMPONENTS INDICATED FOR RELOCATION.

1.15 GENERAL RACEWAY REQUIREMENTS

- A. ELECTRICAL CONDUCTORS INSTALLED UNDER THESE SPECIFICATIONS SHALL BE IN ELECTRICAL RACEWAY. ALL RACEWAYS SHALL BE INSTALLED IN ACCORDANCE WITH THESE GENERAL REQUIREMENTS.
- B. RACEWAY SHALL BE COMPLETE WITH NECESSARY COUPLINGS, CONNECTORS, BOXES, SUPPORTS, FITTINGS, AND ALL OTHER COMPONENTS NEEDED FOR A COMPLETE AND INTEGRAL RACEWAY SYSTEM. SYSTEM COMPONENTS SHALL BE DESIGNED FOR INTERCONNECTION AND SHALL BE INSTALLED TO PROVIDE A NEAT APPEARING, MECHANICALLY FIRM ASSEMBLY ADHERING TO CODES AND PRINCIPLES OF GOOD ELECTRICAL PRACTICE, AND CONFORMING WITH RECOMMENDATIONS OF THE RACEWAY AND CONDUCTOR MANUFACTURERS.
- C. RACEWAY RUNS SHALL ORIGINATE AND TERMINATE AT LOCATIONS APPROXIMATELY AS SHOWN ON THE DRAWINGS. RUNS SHALL BE STRAIGHT AND TRUE WITH ELBOWS, OFFSETS AND BENDS, UNIFORM AND SYMMETRICAL. IN GENERAL, EXPOSED RUNS OF RACEWAY SHALL BE PARALLEL OR PERPENDICULAR TO SURROUNDING BUILDING LINES AND SURFACES. RUNS SHALL BE INSTALLED SO THAT THEY DO NOT INTERFERE WITH AISLES, PASSAGEWAYS, DOORWAYS, HATCHWAYS, WORKING AREAS, AND FLOORS.
- D. SUFFICIENT PULL AND JUNCTION BOXES OF ADEQUATE SIZE SHALL BE LOCATED AS NECESSARY TO ENSURE EASY INSTALLATION AND SPlicing OF CONDUCTORS. BOXES SHALL BE SIZED TO PROVIDE ADEQUATE FREE SPACE FOR ALL ENCLOSED CONDUCTORS. BOX SIZES SHALL NOT BE DETERMINED BY SCALING THE DRAWINGS.

1.16 METAL CONDUIT RACEWAY

- A. RIGID METAL CONDUIT SHALL BE INSTALLED WHERE EXPOSED TO WEATHER, OR WHERE IMBEDDED OR PASSING THROUGH CONCRETE. NONMETALLIC CONDUIT MAY BE USED FOR PILING SIGN AND PARKING LOT LIGHTING ONLY. FLEXIBLE METALLIC CONDUIT SHALL BE USED FOR FINAL CONNECTION TO ELECTRICAL EQUIPMENT SUBJECT TO MOVEMENT. EMT SHALL BE USED ELSEWHERE UNLESS OTHERWISE NOTED.
- B. ALL COMPONENTS OF CONDUIT RACEWAY SYSTEMS SUCH AS CONDUIT, SEAL TIGHT CONDUIT, BOXES, SUPPORTS AND FITTINGS SHALL MEET THE LATEST APPLICABLE STANDARD OF UNDERWRITERS LABORATORIES, INC. ALL STEEL COMPONENTS OF CONDUIT RACEWAY SYSTEMS SHALL BE HOT-DIPPED GALVANIZED, METALLICALLY GALVANIZED, SHEARDED, OR ZINC-COATED BY SOME OTHER APPROVED MEANS. SEAL TIGHT CONDUIT AND PVC CONDUIT SHALL HAVE SEPARATE GROUND CONDUCTOR.

1.17 PULLBOXES

- A. PULLBOXES SHALL BE INSTALLED AS REQUIRED IN LONG RUNS OR WHEN MORE THAN FOUR QUARTER BENDS OCCUR IN ANY CONDUIT RUN. ALL PULLBOXES SHALL BE SIZED TO CONFORM TO THE REQUIREMENTS OF ARTICLE 370 OF THE NATIONAL ELECTRIC CODE. PULLBOXES SHALL BE RECESSED IN ALL FINISHED PORTIONS OF THE BUILDING.
- 1.18 OPERATING INSTRUCTIONS & TESTING
- A. THE CONTRACTOR SHALL FURNISH INSTRUCTION IN THE CARE, ADJUSTMENT, OPERATION, AND MAINTENANCE OF ALL PARTS OF THE ELECTRICAL EQUIPMENT. INSTRUCTION SHALL BE GIVEN TO EMPLOYEES DESIGNATED BY THE OWNER, AT NO ADDITIONAL COST TO THE OWNER, AND AT A TIME ACCEPTABLE TO THE OWNER, JUST PRIOR TO ACCEPTANCE OF THE EQUIPMENT BY THE OWNER.
- B. THE CONTRACTOR SHALL TEST THE EQUIPMENT INSTALLED UNDER THIS SPECIFICATION AND SHALL DEMONSTRATE ITS PROPER OPERATION TO THE ENGINEER. NO EQUIPMENT SHALL BE TESTED OR OPERATED FOR ANY PURPOSE UNTIL IT HAS BEEN FULLY PREPARED, CONNECTED, AND READIED FOR NORMAL OPERATION. ANY EQUIPMENT DAMAGED BY IMPROPER OR LIMITED OPERATION OR TESTING SHALL BE REPAIRED OR REPLACED, AT THE CONTRACTOR'S EXPENSE, BEFORE FINAL INSPECTION AND ACCEPTANCE.
- 1.19 OTHER

- A. ALL CIRCUITS SPECIFIED ARE DESIGNED ON THE BASIS OF LOAD REQUIREMENTS AND CONTROL PROCEDURES AS INDICATED. THE CONTRACTOR SHALL MAKE THE NECESSARY CHANGES TO THE CIRCUITS AND CONTROL EQUIPMENT WHERE MOTORS, APPLIANCES, AND DEVICES FURNISHED BY THE CONTRACTOR HAVE OTHER RATINGS THAN THOSE INDICATED.

PART 2 - PRODUCTS

2.01 DISCONNECT SWITCHES

- A. THE CONTRACTOR SHALL FURNISH AND INSTALL DISCONNECT SWITCHES HAVING THE NUMBER OF POLES AND AMPERE RATINGS AS SHOWN ON THE DRAWINGS AND AS SPECIFIED IN THE EQUIPMENT SCHEDULE.
- B. DISCONNECT SWITCHES SHALL BE HEAVY-DUTY, AC, SINGLE THROW SAFETY SWITCHES, BUILT IN ACCORDANCE WITH NEMA REQUIREMENTS WITH A VOIDABLE FULL COVER INTERLOCK AND QUICK-MAKE, QUICK-BREAK MECHANISM. EACH SWITCH SHALL BE FUSIBLE UNLESS NONFUSIBLE (NF) IS SPECIFICALLY INDICATED. SWITCHES SHALL BE IN NEMA 1 ENCLOSURES IN DRY LOCATIONS AND NEMA 3 WHERE EXPOSED TO THE WEATHER. DISCONNECT SWITCHES SHALL BE "HEAVY-DUTY" AS MANUFACTURED BY WESTINGHOUSE, OR SQUARE-D.
- C. DISCONNECT SWITCHES RATED AT 20A SHALL BE GENERAL USE, 20A, AC, SNAP SWITCH WIRING DEVICES.

2.02 FUSES

- A. THE CONTRACTOR SHALL FURNISH AND INSTALL FUSES OF THE TYPES AND RATINGS DESIGNATED IN THE DRAWINGS AND SPECIFICATIONS IN EACH FUSIBLE DEVICE INSTALLED BY THE CONTRACTOR. IN ADDITION, THE CONTRACTOR SHALL FURNISH AND STORE, AT A LOCATION DIRECTED BY THE OWNER, THREE (3) SPARE FUSES OF EACH SIZE AND TYPE INSTALLED DURING THIS PROJECT. THE CONTRACTOR SHALL PROVIDE TWO (2) COPIES OF THE A SPARE FUSE LIST TO THE OWNER FOR OWNER'S RECORDS. THE SPARE FUSE LIST SHALL BE TYPED ON THE CONTRACTOR'S LETTERHEAD.
- B. FUSES SHALL BE ONE-TIME CARTRIDGE FUSES MANUFACTURED BY BUSSMAN, GULF SHAWMUT, OR LITTLE FUSE.
- 2.03 WIRE AND CABLE
- A. ELECTRICAL CONDUCTORS SHALL BE BUILDING WIRE, EXCEPT WHERE SOME OTHER TYPE OF WIRE OR CABLE IS SPECIFICALLY INDICATED.
- B. BUILDING WIRE CONDUCTORS SHALL BE SOFT-DRAWN ANNEALED COPPER, HAVING A CONDUCTIVITY OF NOT LESS THAN 98% PURE COPPER. CONDUCTOR SIZES ARE AMERICAN WIRE GAUGE (AWG) OR CIRCULAR MILS (CMC). MINIMUM CONDUCTOR SIZE SHALL BE #12 UNLESS OTHERWISE SPECIFIED. CONDUCTORS LARGER THAN #10 SHALL BE STRANDED. CONDUCTORS #10 AND SMALLER SHALL BE SOLID WIRE.
- C. BUILDING WIRE INSULATION SHALL BE 600-VOLT. CONDUCTORS SHALL HAVE TW, THW, THWN, OR THHN INSULATION UNLESS SPECIFICALLY NOTED OTHERWISE OR REQUIRED BY CODE OR APPLICATION TO BE OTHERWISE.

2.04 WIRING DEVICES

- A. WIRING DEVICES SHALL BE INSTALLED IN METAL CONDUIT DEVICE BOXES.
- B. SWITCHES AND RECEPTACLES SHALL BE HUBBELL, BRYANT LEVITON, PASS & SEYMOUR, OR APPROVED EQUAL SUBJECT TO APPROVAL BY THE ARCHITECT. COLOR SHALL BE WHITE.
- C. SWITCHES SHALL BE SPECIFICATION GRADE, AC QUOTE TYPE, 20-AMP, 120/277-VOLT, WITH SILVER ALLOY CONTACTS, EQUAL TO HUBBELL #1221.
- D. GENERAL PURPOSE DUPLEX RECEPTACLES SHALL BE SPECIFICATION GRADE NEMA 5-20R, 20-AMP, 125-VOLT, 3-WIRE GROUNDING TYPE DEVICES, EQUAL TO HUBBELL #5362, WITH THE THIRD POLE GROUNDING TO THE OUTLET BOX. EACH RECEPTACLE SHALL BE RIGIDLY POSITIONED WITHIN THE BOX SO THAT THE EXPOSED FACE OF THE RECEPTACLE PROTRUDES BEYOND THE FACE OF THE COVER PLATE.
- E. GROUND FAULT CIRCUIT INTERRUPTER (GFI) DUPLEX RECEPTACLES SHALL BE SPECIFICATION GRADE, 20-AMP DEVICES, EQUAL TO HUBBELL #GF5362, WIRE SO THAT EACH UNIT IS SELF-CONTAINED. GFI RECEPTACLES SHALL NOT BE CONNECTED TO FEED THROUGH UNLESS SPECIFICALLY SO NOTED ON THE DRAWINGS.
- F. WEATHERPROOF DUPLEX RECEPTACLES SHALL BE GFCI PROTECTED WITH "WHILE-IN-USE" WEATHERPROOF COVERPLATES.

2.05 WALL AND COVER PLATES

- A. THE CONTRACTOR SHALL FURNISH AND INSTALL WALL PLATES FOR ALL FLUSH MOUNTED WIRING DEVICES AND ALL FLUSH MOUNTED SPECIAL SYSTEM OUTLETS. SECTIONAL WALL PLATES SHALL NOT BE USED. BLANK PLATES SHALL BE INSTALLED OVER ALL OUTLETS PROVIDED FOR FUTURE USE. WALL PLATES SHALL BE STAINLESS STEEL AS MANUFACTURED BY EAGLE, BRYANT, GENERAL ELECTRIC, HUBBELL OR LEVITON. WALL PLATES SHALL BE SECURED WITH MATCH NG SCREWS. ENGRAVED WALL PLATES SHALL HAVE BACK FILL.
- B. COVER PLATES FOR TELEPHONE, SHALL BE AS SPECIFIED ABOVE.

2.06 MANUAL MOTOR STARTERS

- A. MANUAL STARTERS SHALL BE TOGGLE SWITCH TYPE STARTERS, WHERE A RED PILOT LIGHT IS INDICATED, THE LIGHT SHALL BE A NEON BULB INTEGRAL WITH THE STARTER. FLUSH MOUNTING UNITS SHALL HAVE ENGRAVED WALL PLATES. SURFACE MOUNTING UNITS SHALL BE IN NEMA 1 ENCLOSURES, UNLESS SOME OTHER TYPE OF ENCLOSURE IS INDICATED. MANUAL STARTERS SHALL BE CUTLER HAMMER BULLETIN 9101 OR SQUARE-D CLASS 2510.

2.08 PANELBOARDS

- A. PANELBOARDS SHALL BE SQUARE-D #14-LINE.
- B. PANELBOARDS SHALL BE DEAD FRONT SAFETY TYPE WITH ENCLOSURES OF CODE GRADE STEEL. OVERSIZE GUTTERS SHALL BE PROVIDED FOR FEED THROUGH WHERE INDICATED OR REQUIRED, WHERE DOUBLE LUGS ARE NOT PERMITTED BY LOCAL CODE, A SUITABLE PULL BOX OR GUTTER ADJACENT TO PANELS SHALL BE PROVIDED FOR CONNECTIONS. TOP OF PANELBOARD TUBS SHALL BE 6" ABOVE FINISHED FLOOR.

- C. PANELBOARDS SHALL HAVE TRIM AND FLAT LOCKING DOORS WITH BOTH HINGES AND TRIM CLAMPS COMPLETELY CONCEALED. DOOR LOCKS SHALL BE FLUSH WITH THE COVER. ALL DOOR LOCKS SHALL BE COMMON KEYED. TWO (2) KEYS SHALL BE PROVIDED FOR EACH PANELBOARD. A CLEAR PLASTIC-COVERED TYPEWRITTEN CIRCUIT DIRECTORY SHALL BE MOUNTED IN A CARD HOLDER ATTACHED TO THE INNER SIDE OF THE DOOR. PANELBOARDS SHALL HAVE BLACK MICARTA PLATES WITH 1/2-INCH HIGH WHITE CUT LETTERS STATING PANELBOARD NUMBER AND VOLTAGE. WHERE PANELBOARDS ARE IN PUBLIC AREAS, IDENTIFICATION PLATES SHALL BE INSIDE DOOR.
- D. BUSES SHALL BE MADE FROM 98 PERCENT ELECTROLYTIC COPPER. THE USE OF ALUMINUM SHALL NOT BE ALLOWED, AND SHALL BE INDEPENDENTLY SUPPORTED (WITHOUT DEPENDENCE UPON THE CIRCUIT BREAKERS). SOLDERLESS LUGS ONLY SHALL BE PROVIDED. ALL MAINS UNLESS NOTED OTHERWISE IN THE PANELBOARD SCHEDULE. ALL MAIN LUGS SHALL BE CRIMP COMPRESSION TYPE. WHERE BREAKERS AND/OR SWITCHES ARE LISTED IN THE SCHEDULES AS "SPACE ONLY", THIS SHALL INCLUDE EXTENDED BUS AND MOUNTING PROVISIONS.
- E. CIRCUIT BREAKERS SHALL BE BOLT-ON AND SHALL HAVE BOLTED LINE AND LOAD TERMINALS. ALL BRANCH CIRCUIT BREAKERS SHALL BE QUICK-MAKE, QUICK-BREAK, THERMAL MAGNETIC, COMMON TRIP ON ALL MULTIPOLE BREAKERS AND HAVE A MINIMUM UL SHORT CIRCUIT RATING OF 10,000 SYMMETRICAL R.M.S. AMPS. EACH BREAKER SHALL HAVE ITS CURRENT RATING ENGRAVED, IN EASY TO READ NUMBERS, ON THE TOGGLE HANDLE. ALL BREAKERS USED FOR FLUORESCENT LIGHTING SWITCHING DUTY, SHALL BE UL LISTED "SWD" SWITCHING DUTY.
- F. CIRCUIT NUMBERS APPEARING ON DRAWINGS SHALL BE USED FOR REFERENCE ONLY. ACTUAL CONNECTIONS SHALL BE IN ACCORDANCE WITH PHASING OF THE CABINET, LOAD BALANCE, AND COMMON NEUTRAL REQUIREMENTS. ROOM NUMBERS OR NAMES USED FOR CIRCUIT IDENTIFICATION SHALL CORRESPOND TO NAME PLATES INSTALLED ON ROOM DOORS BY THE GENERAL CONTRACTOR OR AS SELECTED BY THE OWNER AND SHALL BE VERIFIED AS THESE MAY NOT BE THE SAME AS ROOM TITLES ON THE DRAWINGS.

2.10 LIGHTING FIXTURES

- A. ALL LIGHTING FIXTURES AND LAMPS SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. REFER TO LIGHT FIXTURE SCHEDULE ON DRAWINGS FOR LIGHT FIXTURE MANUFACTURES AND FEATURES. LAMPS SHALL BE BY OSRAM-SYLVANIA, GENERAL ELECTRIC, OR PHILIPS.

2.11 GROUNDING SYSTEMS

- A. CIRCUITS, METAL RACEWAY SYSTEMS, AND ALL OTHER PERMANENTLY INSTALLED ELECTRICAL EQUIPMENT SHALL BE SOLIDLY GROUNDING IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE TO FORM A CONTINUOUS, PERMANENT AND EFFECTIVE GROUNDING SYSTEM.
- B. GROUNDING CONDUCTOR CONNECTIONS SHALL BE MADE WITH SOLDERLESS PRESSURE-TYPE FITTINGS, WHERE WELDED CONNECTIONS ARE PRACTICAL. CONNECTIONS MAY BE MADE BY THE USE OF A SUITABLE WELDING PROCESS. ALL CONNECTIONS SHALL BE MADE IN STRICT CONFORMANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
- C. TO MAINTAIN UNINTERRUPTED ELECTRICAL CONTINUITY, FLEXIBLE RACEWAY SECTIONS MUST HAVE CONDUCTANCE EQUAL TO THAT OF THE SYSTEMS INFLEXIBLE RACEWAY. RACEWAY FITTINGS MUST BE SUCH AS TO ENSURE EXISTENCE OF A PERMANENT BOND. GROUNDING BUSHINGS SHALL BE PROVIDED TO GROUND CONDUITS TO CONTROL CENTER GROUND. ALL NEW EQUIPMENT SHALL BE GROUNDING TO THE EXISTING GROUNDING SYSTEM.
- D. PROVIDE SERVICE GROUNDING AS INDICATED ON ONE-LINE DIAGRAM.
- E. INCLUDE A SEPARATE BARE GROUND CONDUCTOR IN ALL TYPE NM CABLE OF THE SAME SIZE AS PHASE CONDUCTOR.
- F. INCLUDE A SEPARATE GROUND CONDUCTOR IN ALL PVC RACEWAY.

2.12 IDENTIFICATION AND LABELING OF ELECTRICAL EQUIPMENT

- A. ALL CONTROL DEVICES AND DEVICE ENCLOSURES SHALL BE LABELED WITH INDIVIDUAL NAME PLATES OR LEGEND PLATES.
- B. INDIVIDUAL NAME OR LEGEND PLATES SHALL BE BLACK LAMINATED PLASTIC OR MICARTA PLATES WITH WHITE CUT LETTERS. PAPER, FOIL OR TAPE.
- C. MARKERS ATTACHED WITH ADHESIVES SHALL NOT BE USED.

2.13 SERVICE TO ELECTRICALLY-POWERED EQUIPMENT

- A. THE CONTRACTOR SHALL FURNISH AND INSTALL OUTLETS FOR AND MAKE PILOT LIGHTS IS INDICATED, THE LIGHT SHALL BE A NEON BULB INTEGRAL WITH THE STARTER. FLUSH MOUNTING UNITS SHALL HAVE ENGRAVED WALL PLATES. SURFACE MOUNTING UNITS SHALL BE IN NEMA 1 ENCLOSURES, UNLESS SOME OTHER TYPE OF ENCLOSURE IS INDICATED. MANUAL STARTERS SHALL BE CUTLER HAMMER BULLETIN 9101 OR SQUARE-D CLASS 2510.
- B. THE CONTRACTOR SHALL OBTAIN EXACT INFORMATION PERTAINING TO LOCATION, ELECTRICAL CHARACTERISTICS, AND WIRING FOR EQUIPMENT FURNISHED BY OTHERS FROM THE CONTRACTOR FURNISHING THE EQUIPMENT. THIS INFORMATION SHALL BE VERIFIED BY EXAMINING NAMEPLATES AND MANUFACTURER'S WIRING DIAGRAMS. ANY DISCREPANCY BETWEEN THE EQUIPMENT REQUIREMENTS AND THE PROVISIONS MADE BY THESE SPECIFICATIONS SHALL BE REPORTED. EQUIPMENT DAMAGED AS A RESULT OF THE CONTRACTOR'S FAILURE TO OBSERVE MANUFACTURER'S REQUIREMENTS SHALL BE REPLACED OR REPAIRED BY THE CONTRACTOR. THE THERMAL PROTECTION ELEMENTS IN MANUAL STARTERS SHALL BE RECHECKED WITH NAME PLATE DATA AT THE SITE BEFORE OPERATION OF THE EQUIPMENT.

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SHEET TITLE
ELECTRICAL SPECIFICATIONS

1906

