SECTION 16A: ELECTRICAL

16A1 GENERAL INSTRUCTIONS

16A 1-1 GENERAL REQUIREMENTS

ALL REQUIREMENTS UNDER DIVISION 1 AND THE GENERAL AND SUPPLEMENTAL CONDITIONS OF THESE SPECIFICATIONS APPLY TO THIS SECTION AND DIVISION. WHERE THE REQUIREMENTS OF THIS SECTION AND DIVISION EXCEED THOSE OF DIVISION 1, THIS SECTION AND DIVISION TAKE PRECEDENCE. BECOME THOROUGHLY FAMILIAR WITH ALL THEIR CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION, SECTION OR BOTH, WORK REQUIRED UNDER THIS DIVISION INCLUDES ALL MATERIAL, EQUIPMENT, APPLIANCES, AND LABOR REQUIRED TO COMPLETE THE ENTIRE ELECTRICAL SYSTEM AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS, OR REASONABLY INFERRED TO BE NECESSARY TO FACILITATE EACH SYSTEMS FUNCTIONING AS IMPLIED BY THE DESIGN AND THE EQUIPMENT SPECIFIED.

THE SPECIFICATIONS AND DRAWINGS FOR THE PROJECT ARE COMPLEMENTARY, AND PORTIONS OF THE WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN THE EVENT OF DISCREPANCIES, NOTIFY THE ENGINEER AND REQUEST CLARIFICATION PRIOR TO PROCEEDING WITH THE WORK INVOLVED.

DRAWINGS ARE GRAPHIC REPRESENTATIONS OF THE WORK UPON WHICH THE CONTRACT IS BASED. THEY SHOW THE MATERIALS AND THEIR RELATIONSHIP TO ONE ANOTHER, INCLUDING SIZES, SHAPES, LOCATIONS, AND CONNECTIONS. THEY ALSO CONVEY THE SCOPE OF WORK, INDICATING THE INTENDED GENERAL ARRANGEMENT OF THE EQUIPMENT, FIXTURES, OUTLETS AND CIRCUITS WITHOUT SHOWING ALL OF THE EXACT DETAILS AS TO ELEVATIONS, OFFSETS, CONTROL LINES, AND OTHER INSTALLATION REQUIREMENTS. USE OF THE DRAWINGS AS A GUIDE WHEN LAYING OUT THE WORK AND TO VERIFY
THAT MATERIALS AND EQUIPMENT WILL FIT INTO THE DESIGNATED SPACES, AND WHICH, WHEN INSTALLED PER MANUFACTURES' REQUIREMENTS, WILL ENSURE A COMPLETE, COORDINATED, SATISFACTORY AND PROPERLY OPERATING SYSTEM.

SPECIFICATIONS DEFINE THE QUALITATIVE REQUIREMENTS FOR PRODUCTS, MATERIALS, AND WORKMANSHIP UPON WHICH THE CONTRACT IS BASED.

16A 1-2 PRE-BID SITE INSPECTION

PERSONALLY INSPECT THE SITE OF THE PROPOSED WORK AND BECOME FULLY INFORMED OF CONDITIONS UNDER WHICH THE WORK IS TO BE DONE. FAILURE TO DO SO WILL NOT BE CONSIDERED SUFFICIENT JUSTIFICATION TO REQUEST OR OBTAIN EXTRA COMPENSATION OVER AND ABOVE THE CONTRACT PRICE.

16A 1-3 MATERIAL AND WORKMANSHIP

PROVIDE ALL MATERIAL AND EQUIPMENT NEW AND IN FIRST CLASS CONDITION. PROVIDE MARKINGS OR A NAMEPLATE FOR ALL MATERIAL AND EQUIPMENT IDENTIFYING THE MANUFACTURER AND PROVIDING SUFFICIENT REFERENCE TO ESTABLISH QUALITY, SIZE AND CAPACITY. ALL WORKMANSHIP SHALL BE OF THE FINEST POSSIBLE BY EXPERIENCED MECHANICS OF THE PROPER TRADE. IN GENERAL, PROVIDE COMMERCIAL SPECIFICATION GRADE QUALITY FOR ALL MATERIALS AND EQUIPMENT. LIGHT DUTY AND RESIDENTIAL TYPE EQUIPMENT WILL NOT BE ACCEPTABLE. PROVIDE ALL HOIST, SCAFFOLDS, STAGING, RUNWAYS, TOOLS, MACHINERY AND EQUIPMENT REQUIRED FOR THE PERFORMANCE OF THE ELECTRICAL WORK. STORE AND MAINTAIN MATERIAL AND EQUIPMENT IN CLEAN CONDITION, AND PROTECTED FROM WEATHER, MOISTURE, AND PHYSICAL DAMAGE.

FURNISH ONLY MATERIAL AND EQUIPMENT THAT ARE LISTED. LABELED, OR BOTH, BY A NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), WHENEVER ANY LISTING OR LABELING EXIST FOR THE TYPES OF MATERIAL AND EQUIPMENT SPECIFIED.

16A 1-4 COORDINATION

COORDINATE ALL WORK WITH OTHER DIVISION AND TRADES SO THAT THE VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. REFER TO ALL DRAWINGS, INCLUDING, BUT NOT LIMITED TO, CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PLUMBING, AND TO RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF THE CLEAR SPACES. MAKE ALL OFFSETS
REQUIRED TO CLEAR EQUIPMENT, BEAMS AND OTHER STRUCTURAL MEMBER, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM HAT WILL FIT PROPERLY THE TYPES OF CEILING, WALL OR FLOOR FINISHES ACTUALLY INSTALLED.

16A 1-5 DEFINITIONS

WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, THE FOLLOWING TERMS SHALL HAVE THE INDICATED MEANINGS.

FURNISH: 'TO SUPPLY AND DELIVER TO THE PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLING, INSTALLING, AND SIMILAR
OPERATIONS.'

INSTALL: 'TO PERFORM ALL OPERATIONS AT THE PROJECT SITE, INCLUDING, BUT NOT LIMITED TO, AND AS REQUIRED, UNLOADING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, TESTING, COMMISSIONING, STARTING UP AND SIMILAR OPERATIONS, COMPLETE, AND READY FOR THE INTENDED USE.'

PROVIDE: 'TO FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.'

FURNISHED BY OWNER (OR OWNER-FURNISHED) OR FURNISHED BY OTHERS: 'AN ITEM FURNISHED BY THE OWNER OR UNDER OTHER DIVISIONS OR CONTRACTS, AND INSTALLED UNDER THE REQUIREMENTS OF THIS DIVISION, COMPLETE AND READY FOR THE INTENDED USE, INCLUDING ALL ITEMS INCIDENTAL TO THE WORK NECESSARY FOR PROPER INSTALLATION AND OPERATION. INCLUDE THE INSTALLATION UNDER THE WARRANTY REQUIRED BY THIS DIVISION.

ENGINEER: WHERE REFERRED TO IN THIS DIVISION, 'ENGINEER' IS THE ENGINEER OF RECORD AND THE DESIGN PROFESSION FOR THE WORK UNDER THIS DIVISION, AND IS A CONSULTANT TO, AND AN AUTHORIZED REPRESENTATIVE OF, THE ARCHITECT, AS DEFINED IN THE GENERAL AND/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION, IT MEANS INCREASED INVOLVEMENT BY, AND OBLIGATIONS TO, THE ENGINEER, IN ADDITION TO INVOLVEMENT BY, AND OBLIGATIONS TO THE 'ARCHITECT'.

AHJ: THE LOCAL CODE AND/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER THE WORK.

NRTL: NATIONALLY RECOGNIZED TESTING LABORATORY, AS DEFINED AND LISTED BY OSHA IN 29 CFR 1910.7 (E.G., UL, ETL, CSA), AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

THE TERMS 'APPROVED EQUAL', 'EQUIVALENT', OR 'EQUAL', ARE USED SYNONYMOUSLY AND SHALL MEAN 'ACCEPTED BY OR ACCEPTABLE TO THE ENGINEER AS EQUIVALENT TO THE ITEM OR MANUFACTURER SPECIFIED'. THE TERM 'APPROVED' SHALL MEAN
LABELED, LISTED, OR BOTH, BY AN NRTL AND ACCEPTABLE TO THE AHJ OVER THIS PROJECT.

16A 1-6 DIMENSION AND LAYOUTS

DRAWINGS ARE SCHEMATIC IN NATURE, SHOW THE VARIOUS COMPONENTS OF THE SYSTEMS APPROXIMATELY TO SCALE AND ATTEMPT TO INDICATE HOW THEY WILL BE INTEGRATED WITH OTHER PARTS OF THE WORK. FIGURED DIMENSIONS TAKE PRECEDENCE TO SCALED DIMENSIONS. DETERMINE EXACT LOCATIONS BY JOB MEASUREMENTS, BY CHECKING THE REQUIREMENTS OF OTHER TRADES, AND BY REVIEWING ALL CONTRACT DOCUMENTS, CORRECT ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING AND INSPECTION, AT NO ADDITIONAL COST TO THE OWNER.

16A 1-7 ORDINANCES AND CODES

COMPLY, AT A MINIMUM, NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) CODES, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE,
WORKMANSHIP, EQUIPMENT, AND MATERIALS. ADDITIONALLY, COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.

WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT. WHEREVER REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, EXCEED THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, SHALL GOVERN CODE COMPLIANCE, AT A MINIMUM, IS MANDATORY. CONSTRUE NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THESE CODES.

BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.

PROVIDE AND MAINTAIN ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS DIVISION.

16A 1-8 MANUFACTURERS

IN OTHER ARTICLES WHERE LIST OF MANUFACTURERS ARE INTRODUCED, THE FOLLOWING REQUIREMENTS APPLY TO PRODUCT SELECTION:

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE MANUFACTURERS SPECIFIED.

WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.

16A 1-9 SUBMITTALS

ASSEMBLE AND AND SUBMIT TO THE ARCHITECT, FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR MATERIAL AND EQUIPMENT TO BE FURNISHED, INSTALLED, OR WITH, UNDER THIS DIVISION, INCLUDING SHOP DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, SAMPLES, AND OTHER
SUBMITTALS REQUIRED BY THIS DIVISION. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1. BEFORE SUBMITTING, VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, AND FIT THE AVAILABLE SPACES, AND ALLOW AMPLE AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL CONTAIN THE FOLLOWING INFORMATION. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION:

A. THE PROJECT NAME.
B. APPLICABLE SPECIFICATION SECTION AND PARAGRAPH.
C. THE SUBMITTAL DATE.
D. THE CONTRACTOR'S STAMP, SHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, COMPLY WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.

TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME, PLUS MAILING TIME, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF REQUIRED. TRANSMIT SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES OR OMITTING COMPONENTS OR FITTINGS OR COORDINATING ITEMS WITH ACTUAL BUILDING CONDITION.

16A 1-10 ADJUSTING, ALIGNING AND TESTING

ADJUST, ALIGN, AND TESTALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION, FOR PROPER OPERATION.

TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA ATS (LATEST EDITION).

MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMMETER, AND A MEGOHMMETER INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.

16A 1-11 OPERATION AND MAINTENANCE INSTRUCTIONS

SUBMIT TO THE ARCHITECT, FOR ENGINEER'S REVIEW, COPIES EACH OF OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS, APPROPRIATELY BOUND INTO MANUAL FORM INCLUDING APPROVED COPIES OF THE FOLLOWING, REVISED IF NECESSARY TO SHOW SYSTEM AND EQUIPMENT AS ACTUALLY INSTALLED. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1 AND INCLUDE AT A MINIMUM THE FOLLOWING INFORMATION:

A. MANUFACTURERS' CATALOG AND PRODUCT DATE SHEETS
B. WIRING DIAGRAMS
C. MAINTENANCE INSTRUCTIONS
D. OPERATING INSTRUCTIONS
E. PARTS LISTS
F. TEST REPORTS AS DEFINED IN NETA ATS FOR THE SYSTEMS AND EQUIPMENT PROVIDED AND INSTALLED UNDER THIS CONTRACT.
G. NAMES, ADDRESSES, TELEPHONE NUMBERS AND E-MAIL ADDRESSES OF LOCAL CONTACTS FOR WARRANTY SERVICES AND SPARE PARTS.

SUBMIT MANUALS PRIOR TO REQUESTING THE FINAL PUNCHLIST AND BEFORE ANY REQUEST FOR SUBSTANTIAL COMPLETION. ALSO PROVIDE ADEQUATE VERBAL INSTRUCTIONS OF SYSTEM OPERATIONS TO OWNER'S REPRESENTATIVE AT THE COMPLETION OF, AND BEFORE FINAL ACCEPTANCE OF, THE WORK.

16A 1-12 SYSTEM START UP

PRIOR TO STARTING UP THE ELECTRICAL SYSTEMS, CHECK ALL COMPONENTS AND DEVICES, ADJUST THE ITEMS ACCORDINGLY, AND TIGHTEN SCREWS AND BOLTS FOR CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURE'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A. ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE. CHECK AND RECORD BUILDING'S SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE, AND PROPER PHASING. BALANCE ALL SINGLE PHASE LOADS AT EACH PANELBOARD, REDISTRIBUTING BRANCH CIRCUIT CONNECTIONS UNTIL BALANCE IS ACHIEVED. DO NOT TYPE UP FINAL PANELBOARD DIRECTORIES UNTIL ALL RE-BALANCING AND REDISTRIBUTION OF CIRCUITS ARE COMPLETE. REPLACE ALL BURNED-OUT LAMPS AND LAMPS USED FOR TEMPORARY CONSTRUCTION LIGHTING IN PERMANENT LIGHT FIXTURES. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATION FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

16A 1-13 WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS AND DIVISION 1. ALSO WARRANT THE FOLLOWING ADDITION ITEMS:

A. ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES CRUSHING, OR BREAKS OF ANY NATURE.
B. ALL RACEWAY SEALS ARE EFFECTIVE
C. THE ENTIRE ELECTRICAL SYSTEM IS FREE FORM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.

THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITION COST TO THE OWNER.

PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER
ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE COMMENCEMENT DATE AND TERM.

16A 2 ELECTRICAL WORK

16A 2-3 CUTTING AND PATCHING

FOLLOWING THE REQUIREMENTS IN DIVISION 1, CUT WALLS, FLOORS, CEILINGS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED TO PERFORM WORK UNDER THIS DIVISION. OBTAIN PERMISSION OF THE ENGINEER, OWNER, OR BOTH, BEFORE DOING ANY CUTTING. CUT ALL HOLES AS SMALL AS POSSIBLE. PATCH WALLS, FLOORS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED BY WORK UNDER THIS DIVISION. ALL PATCHING SHALL BE THOROUGHLY FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION, INCLUDING FIRE RATINGS IF APPLICABLE.

16A 2-4 ROUGH-IN

COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH OTHER DIVISION. CONCEAL ALL RACEWAYS EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE INDICATED ON THE DRAWINGS.

16A 2-5 RACEWAYS

METALLIC CONDUIT AND TUBING:

A. ELECTRICAL METALLIC TUBING AND FITTINGS (EMT): ANSI C80.3, UL 797
B. FLEXIBLE METAL CONDUIT (FMC): ZINC-COATED STEEL, UL 1
C. INTERMEDIATE METAL CONDUIT (IMC): HOT-DIPPED GALVANIZED RIGID STEEL CONDUIT: ANSI C80.6, UL 1242
D. LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET: UL 360
E. RIGID METAL CONDUIT (RMC):
   1. HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS): ANSI C80.1 UL 6
   2. RIGID ALUMINUM CONDUIT (RAC): ANSI C80.5, UL6A
F. PLASTIC-COATED IMC, RMC, AND FITTINGS: NEMA RN 1, UL LISTED.
G. IMC AND RMC FITTINGS: NEMA FB 1+- COMPATIBLE WITH CONDUIT TYPE AND MATERIAL, UL LISTED.

NON-METALLIC CONDUIT AND TUBING:

A. ELECTRICAL NONMETALLIC TUBING (ENT): NEMA TC13 UL LISTED.
B. LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC): UL 1660
C. RIGID NONMETALLIC CONDUIT (RNC): SCHEDULE 40 PVC: NEMA TC2, UL 651
D. ENT AND RNC FITTINGS: NEMA TC 3, TC 6+- UL 514, COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, UL LISTED.

16A 2-6 RACEWAY INSTALLATION

INSTALL ALL CIRCULAR RACEWAYS CONCEALED ABOVE SUSPENDED CEILINGS OR CONCEALED IN WALLS OR FLOORS WHEREVER POSSIBLE EXCEPT WHERE OTHERWISE INDICATED. PROVIDE GRS FOR ALL CONDUITS RUN UNDERGROUND, EXPOSED TO WEATHER, OR EXPOSED TO OTHER HAZARDOUS CONDITIONS. PROVIDE GRS INSTALLED BELOW GRADE WITH CORROSION RESISTANT BONDED-PLASTIC OR APPROVED MASTIC COATING. THIS SHALL INCLUDE THE 90-DEGREE ELBOW BELOW GRADE AND THE ENTIRE VERTICAL TRANSITION TO ABOVE GRADE. ALL OTHER RACEWAY MAY BE EMT WHERE APPROVED BY LOCAL CODE. USE COMPRESSION TYPE FITTINGS FOR EMT, WITH ALL FITTINGS UL LISTED
FOR THE ENVIRONMENT IN WHICH THEY ARE USED. AT CONTRACTOR'S OPTION, PVC CONDUIT MAY BE USED UNDERGROUND WHERE PERMITTED BY LOCAL CODE AND WHERE NOT SPECIFICALLY RESTRICTED BY THESE DOCUMENTS.

USE FMC FOR FINAL CONNECTION TO EACH MOTOR AND TRANSFORMER, AND TO ANY DEVICE THAT WOULD OTHERWISE TRANSMIT MOTION, VIBRATION, OR NOISE. WHERE EXPOSED TO LIQUIDS, VAPORS OR SUNLIGHT, USE LFMC. PROVIDE ALL FMC AND LFMC WITH INSULATED GROUND WIRE.

INSTALL RACEWAYS PARALLEL TO BUILDING LINES.

INSTALL RACEWAYS TO REQUIREMENTS OF STRUCTURE AND TO REQUIREMENTS OF ALL OTHER WORK ON THE PROJECT. INSTALL RACEWAYS TO CLEAR ALL OPENINGS, DEPRESSIONS, PIPES, DUCTS, REINFORCING STEEL, AND OTHER IMMOVABLE OBSTACLES. INSTALL RACEWAYS SO AS TO CONFORM TO STRUCTURE IN SUCH A MANNER THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF STRUCTURE. EXCEPT WHERE APPROVED IN WRITING BY THE ENGINEER, INSTALL NO RACEWAY IN A SLAB-ON-GRADE. LOCATE RACEWAY BELOW GRADE WELL BELOW SLABS-ON-GRADE.

INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTION TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45- AND 90- DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH AND EVEN AND WITHOUT FLATTENING RACEWAY OR FLAKING GALVANIZED OR ENAMEL. RADII OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE CORRESPONDING TRADE ELBOW. USE LONG RADIUS ELBOWS WHERE NECESSARY, INDICATED, OR BOTH.

SECURELY FASTEN RACEWAYS IN PLACE WITH APPROVED STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. ATTACH RACEWAY SUPPORTS TO THE BUILDING STRUCTURE. HANG SINGLE RACEWAYS OR FEEDERS WITH MALLEABLE SPLIT RING HANGERS WITH ROD AND TURNBUCKLE SUSPENSION FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. CLAMP GROUPS OF HORIZONTAL FEEDER FACEWAYS TO STEEL CHANNELS THAT ARE SUSPENDED FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. SECURELY CLAMP VERTICAL FEEDER RACEWAYS TO STRUCTURAL STEEL MEMBERS ATTACHED TO STRUCTURE. INSTALL CABLE CLAMPS FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. ADD RACEWAY SUPPORTS WITHIN 12 INCHES OF ALL BENDS, ON BOTH SIDES OF THE BENDS. DO NOT SUPPORT RACEWAYS FROM SUSPENDED CEILING COMPONENTS.

REAM RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLIN CONDUCTORS WIRES. PROVIDE RACEWAYS OF AMPLE SIZE FOR PULLING OF WIRE AND NOT SMALLER THAN CODE REQUIREMENTS AND NOT LESS THAN 1/2-INCH IN SIZE, UNLESS INDICATED OTHERWISE ON DRAWINGS.

PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGHING-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITION COST TO THE OWNER.

ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL, EQUIPMENT AND JUNCTION BOXES.

INSTALL APPROVED EXPANSION/DEFLECTION FITTINGS WHERE RACEWAYS PASS THROUGH OR ACROSS EXPANSION JOINTS.

INSTALL A PULL WIRE IN EACH EMPTY RACEWAY THAT IS LEFT FOR INSTALLATION OF CONDUCTORS OR CABLES UNDER OTHER DIVISIONS OR CONTRACTS. USE POLYPROPYLENE OR MONOFILAMENT PLASTIC LINE WITH NOT LESS THAN 200-LB TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES OF SLACK AT EACH END OF OF PULL WIRE.

MAKE ALL JOINTS AND CONNECTIONS IN A MANNER THAT WILL ENSURE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY. INSTALL CONDUIT-SEALING FITTINGS IN ALL RACEWAYS PASSING FROM NON-HEATED TO HEATED SPACES.

16A 2-7 BUSHINGS AND LOCKNUTS

RIGIDLY CLAMP CONDUITS ENTERING SHEET METAL BOXES TO THE BOX WITH A BUSHING AND LOCKNUT ON THE INSIDE AND A LOCKNUT ON THE OUTSIDE. CONDUIT SHALL ENTER THE BOX SQUARELY. PROVIDE BUSHINGS AND LOCKNUTS MADE OF GALVANIZED MALLEABLE IRON WITH SHARP, CLEAN-CUT THREADS. WHERE EMT ENTERS A BOX, PROVIDE APPROVED EMT COMPRESSION CONNECTORS.
USE INSULATED AND/OR GROUNDING BUSHINGS WHEREVER CONNECTION IS SUBJECT TO VIBRATION OR MOISTURE, WHEN REQUIRED BY NFPA 70, OR BOTH.

16A 2-8 SUPPORT SYSTEMS

STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH COPPER B-LINE ERICO INTERNATIONAL CORPORATION, POWER-STRUT, THOMAS BETTS CORPORATION, UNISTRUT.

FINISHES:

METALLIC COATING: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3

NONMETALLIC COATINGS: MANUFACTURER'S STANDARD PVC, POLYURETHANE, OR POLYESTER COATING APPLIED ACCORDING TO
MFMA-3.

PAINTED COATINGS: MANUFACTURER'S STANDARD PAINTED COATING APPLIED ACCORDING TO MFMA-3.

STAINLESS STEEL? TYPE 304, PER ASTM A240.

ALUMINUM (EXTRUDED)? TYPE 6063-T6, PER ASTM B221

FIELD FABRICATION

WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.

FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G. FILE, GRINDING STONE, OR SIMILAR) AND CLEANER TO REMOVE OILS, RUST, SHARP EDGES AND SHARDS.

FOR CHANNEL WITH FACTORY-APPLIED COATING, RE-FINISH CUT EDGES EIGHT COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).

16A 2-9 CONDUCTORS

PROVIDE COPPER CONDUCTORS, WITH UL LABEL, AND 600V INSULATION.

SERVICE LATERAL CONDUCTORS? TYPE THWN OR XHHW WITH STRANDED CONDUCTORS.

ALL FEEDER AND BRANCH CIRCUIT CONDUCTORS NO. 8 AWG AND LARGER? STRANDED, TYPE THWN OR XHHW INSULATION.

ALL CONDUCTORS, NO 10 AWG AND SMALLER, USED FOR POWER AND LIGHTING CIRCUITS? SOLID COPPER, TYPE THW (WET OR DAMP
LOCATIONS, OR IN CONDUIT BELOW GRADE OR SLAB), TYPE THHN (DRY LOCATIONS ONLY AND ABOVE GRADE) INSULATION, OR DUAL-RATED TYPE THHN/THWN.

ALL BRANCH CIRCUIT WIRING? NOT SMALLER THAN NO. 12 AWG. IF NO CONDUCTOR SIZE IS INDICATED ON THE DRAWINGS FOR A BRANCH CIRCUIT, PROVIDE NO. 12 AWG CONDUCTORS AND A 20A CIRCUIT BREAKER.

CONDUCTORS FIELD-INSTALLED WITHIN FLUORESCENT LIGHT FIXTURE CHANNELS: TYPE THHN.

CONTROL WIRING: STRANDED COPPER CONDUCTORS, 600V INSULATION, OF THE PROPER TYPE, SIZE AND NUMBER AS REQUIRED
TO ACCOMPLISH SPECIFIED FUNCTION. MINIMUM SIZE : NO. 18 AWG, UNLESS OTHERWISE NOTED.

16A 2-10 WIRING INSTALLATION

EXCEPT WHERE SPECIFIED OR INDICATED, FOR LOW-VOLTAGE WIRING, INSTALL ALL WIRING IN APPROVED RACEWAY AND ENCLOSURES.

SUPPORT ALL CONDUCTORS AND CABLES IN VERTICAL INSTALLATIONS, AS REQUIRED BY NFPA 70, BY INSTALLING CABLE SUPPORTS OR PLUG-TYPE CONDUIT RISER SUPPORTS, OR WIRE-MESH SAFETY GRIPS.

INSTALL ALL CONDUCTORS AND CABLE IN RACEWAYS CONTINUOUS WITHOUT TAPS OR SPLICES. SPLICE OR TAP ONLY IN APPROVED BOXES AND ENCLOSURES WITH APPROVED SOLDERLESS CONNECTORS, OR CRIMP CONNECTORS AND TERMINAL BLOCKS FOR CONTROL WIRING, AND KEEP TO THE MINIMUM REQUIRED. INSULATE ALL SPLICES, TAPS, AND JOINTS AS REQUIRED BY CODES.

ALL MATERIAL USED TO TERMINATE, SPLICE, OR TAP CONDUCTORS: DESIGNED FOR, PROPERLY SIZED FOR, AND UL LISTED FOR SPECIFIC APPLICATION AND CONDUCTORS INVOLVED, AND INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, USING THE MANUFACTURER'S RECOMMENDED TOOLS.

WHERE WIRING IS INDICATED AS INSTALLED, BUT THE CONNECTION IS INDICATED 'FUTURE' OR 'BY OTHER DIVISION, TRADES, OR CONTRACTS', LEAVE A MINIMUM 3-FOOT 'PIGTAIL ' AT THE BOX, TAPE THE ENDS OF THE CONDUCTORS, AND COVER THE BOX.

THE NUMBER OF THE CONDUCTORS IN A SPECIFIC RACEWAY 'HOME RUN'
IS INDICATED WITH CROSS LINES (TICK MARKS) ON EACH 'CIRCUIT RUN' ON THE DRAWINGS. IN GENERAL, THE DIRECTION OF BRANCH CIRCUIT 'HOME RUN' ROUTING IS INDICATED ON THE DRAWINGS COMPLETE WITH CIRCUIT NUMBERS AND PANELBOARD DESIGNATION. CONTINUE ALL SUCH 'HOME RUN' WIRING TO THE DESIGNATED PANELBOARD, AS THOUGH 'CIRCUIT RUNS' WHERE INDICATED IN THEIR ENTIRETY.

WHEN MULTIPLE HOME RUNS ARE COMBINED INTO A SINGLE RACEWAY SUCH THAT THE NUMBER OF CONDUCTORS EXCEEDS FOUR (CONDUCTOR COUNT IS MADE UP OF ANY COMBINATION OF PHASE AND NEUTRAL CONDUCTORS), THE FOLLOWING RESTRICTIONS APPLY, WHICH ARE IN ADDITION TO THOSE IN NFAP 70.

NORMAL OR NONESSENTIAL CIRCUITS

MAXIMUM OF 16 CONDUCTORS IN A SINGLE RACEWAY, FOR UP TO EIGHT CONDUCTORS IN A RACEWAY, MINIMUM RACEWAY SIZE? 3/4 -INCH FOR GREATER THAN EIGHT CONDUCTORS, MINIMUM RACEWAY SIZE: 1-INCH. DO NOT INSTALL ANY OTHER TYPE OF CIRCUIT IN THIS RACEWAY.

THE MINIMUM WIRE SIZE FOR ALL CONDUCTORS IN THIS RACEWAY: NO. 10 AWG. ONLY 15A AND 20A BRANCH CIRCUIT HOMERUNS MAY BE COMBINED INTO ONE RACEWAY.

GFCI CIRCUITS

DO NOT USE MULTI-CONDUCTOR CIRCUITS, WITH A SHARED NEUTRAL, FOR ANY GFCI CIRCUIT BREAKER OR RECEPTACLE CIRCUIT.

FOR BRANCH CIRCUITS FED FROM GFCI CIRCUIT BREAKERS, LIMIT THE ONE-WAY CONDUCTOR LENGTH TO 100 FEET BETWEEN THE PANELBOARD AND THE MOST REMOTE RECEPTACLE OR LOAD ON THE GFCI CIRCUIT.

WIRING SHALL HAVE INSULATION OF THE PROPER COLOR TO MATCH COLOR CODE SYSTEM IN THE TABLE BELOW. IN LARGER SIZES, WHERE PROPERLY COLORED INSULATION IS NOT AVAILABLE, USE VINYL PLASTIC ELECTRICAL TAPE OF THE APPROPRIATE COLOR AROUND EACH CONDUCTOR AT LL TERMINATION POINTS, JUNCTION AND PULL BOXES.

SYSTEM VOLTAGE	CONDUCTOR TYPE	COLOR
208Y/120	PHASE A	BLACK
	PHASE B	RED
	PHASE C	BLUE
	NEUTRAL	WHITE
	EQUIPMENT GROUND	GREEN
	ISOLATED GROUND	GREEN W/YELLOWSTRIPE
480Y/277	PHASE A	BROWN
	PHASE B	ORANGE
	PHASE C	YELLOW
	NEUTRAL	GREY
	EQUIPMENT GROUND	GREEN
	ISOLATED GROUND	GREEN W/YELLOWSTRIPE

PROPERLY NUMBER ALL TERMINAL BLOCKS AND WIRE TERMINALS FOR CONTROL WIRING FOR IDENTIFICATION WITH VINYL STICK-ON MARKERS OR EQUIVALENT.
PROVIDE AN EQUIPMENT-GROUNDING CONDUCTOR, OR BONDING JUMPER, AS APPLICABLE, IN ALL BRANCH CIRCUITS AND FEEDERS, SIZED IN ACCORDANCE WITH NFPA 70 TABLES 250.66 OR 250.122, AS APPLICABLE, UNLESS INDICATED AS LARGER ON THE DRAWINGS.

VOLTAGE DROP IN BRANCH CIRCUITS SHALL NOT EXCEED 2 PERCENT.

16A 2-11 JUNCTION BOXES, PULL BOXES, CABINETS, AND WIREWAYS

PROVIDE JUNCTION BOXES, PULL BOXES, CABINETS AND WIREWAYS WHEREVER NECESSARY FOR PROPER INSTALLATION OF VARIOUS ELECTRICAL SYSTEMS ACCORDING TO NFPA 70 AND WHERE INDICATED ON THE DRAWINGS. SIZE AS REQUIRED BY THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. CONSTRUCTION SHALL BE OF A NEMA DESIGN SUITABLE FOR THE ENVIRONMENT INSTALLED.

JUNCTION BOXES INSTALLED BEHIND WALL CASES, AND/OR ON OTHER STORE FIXTURES, EXCEPT WHERE OTHERWISE SPECIFIED, SHALL BE 4-INCH SQUARE OR LARGER, WITH GALVANIZED COVERS.

16A 2-12 OUTLET BOXES

ALL OUTLETS INCLUDING LIGHT FIXTURE, SWITCH, RECEPTACLE, AND SIMILAR OUTLETS: NATIONAL ELECTRICAL, APPLETON, STEEL CITY, RACO, OR APPROVED EQUAL, GALVANIZED STEEL KNOCKOUT BOXES, SUITABLE IN DESIGN TO THE PURPOSE THEY SERVE AND THE SPACE THEY OCCUPY. SIZE AS REQUIRED FOR THE SPECIFIC FUNCTION OR AS REQUIRED BY NFPA 70, WHICHEVER IS LARGER. SET ALL OUTLET BOXES IN WALLS, COLUMNS, FLOORS, OR CEILINGS SO THEY ARE FLUSH WITH THE FINISHED SURFACE, ACCURATELY SET, AND RIGIDLY SECURED IN POSITION. PROVIDE PLASTER RINGS, EXTENSION RINGS AND/OR MASONRY RINGS AS REQUIRED FOR FLUSH MOUNTING. PROVIDE APPROVED CAST OUTLET BOXES, WITH HUBS AND WEATHERPROOF COVERS, IN ALL AREAS SUBJECT TO DAMP, WET, OR HARSH CONDITIONS.

16A 2-13 OUTLET LOCATIONS

COORDINATE LOCATIONS OF OUTLETS BOXES, OUTLETS ARE ONLY APPROXIMATELY LOCATED ON THE SMALL SCALE DRAWINGS. USE GREAT CARE IN THE ACTUAL LOCATION BY CONSULTING THE VARIOUS LARGE SCALE DETAILED DRAWINGS USED BY OTHER DIVISION TRADES, AND BY SECURING DEFINITE LOCATIONS FROM THE ARCHITECT.

16A 2-14 MOUNTING HEIGHTS

UNLESS NOTED OTHERWISE, INSTALL WIRING DEVICES AS INDICATED BELOW (NOTE: ALL DIMENSIONS ARE TO THE BOTTOM OF THE OUTLET BOX UNLESS NOTED OTHERWISE):

A. RECEPTACLES:

1. GENERAL:
   A. VERTICALLY WITH THE GROUND SLOT MOUNTED AT THE TOP: 16 INCHES ABOVE FINISHED FLOOR.
   B. HORIZONTALLY , WITH NEUTRAL SLOT MOUNTED AT THE BOTTOM: 16 INCHES ABOVE FINISHED FLOOR.
2. ABOVE COUNTERS:
   A. FOR 36-INCH HIGH COUNTER TOPS: 44 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
   B. FOR 34-INCH HIGH COUNTER TOPS: 40 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
3. MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS AND JANITORS CLOSETS: 44 INCHES ABOVE FINISHED FLOOR, VERTICALLY.
4. WEATHERPROOF EXTERIOR RECEPTACLES: 24 INCHES ABOVE FINISHED GRADE OR AS INDICATED ON DRAWINGS, VERTICALLY.
5. GFCI RECEPTACLES: SAME AS GENERAL RECEPTACLES.
6. ISOLATED GROUND RECEPTACLES: SAME AS GENERAL RECEPTACLES.
7. TVSS RECEPTACLES: SAME AS GENERAL RECEPTACLES.
8. CONCRETE BLOCK WALLS: DIMENSIONS ABOVE MAY BE ADJUSTED SLIGHTLY, AS REQUIRED TO COMPENSATE FOR VIABLE JOINT DIMENSIONS, SUCH THAT BOTTOM OR TOP OF BOXES, AS APPLICABLE, ARE AT BLOCK JOINTS.

B. SWITCHES:

1. GENERAL: 44 INCHES ABOVE FINISHED FLOOR.
2. ABOVE COUNTERS, SAME AS FOR RECEPTACLES.
3. CONCRETE BLOCK WALLS: 40 INCHES ABOVE FINISHED FLOOR (DIMENSIONS MAY BE ADJUSTED SLIGHTLY, AS REQUIRED TO COMPENSATE FOR VARIABLE JOINT DIMENSIONS, SUCH THAT BOTTOM OF BOXES ARE AT BLOCK JOINTS).

C. TELEPHONE/DATA OUTLET BOXES:

1. GENERAL: MATCH MOUNTING HEIGHT OF ADJACENT WIRING DEVICE LISTED ABOVE.
2. WALL-MOUNTED TELEPHONE: 40 INCHES ABOVE FINISHED FLOOR.

16A 2-15 WIRING DEVICES

PROVIDE THE FOLLOWING WIRING DEVICES WHERE SHOWN ON DRAWINGS OR REQUIRED. MINOR CHANGES RELATIVE TO THE LOCATION OF ELECTRICAL EQUIPMENT MAY BE MADE TO COMPLY WITH STRUCTURAL AND BUILDING REQUIREMENTS AS DETERMINED IN THE COURSE OF CONSTRUCTION. PROVIDE ALL WIRING DEVICES OF THE SAME MANUFACTURER AND NOT MIXED ON THE PROJECT, TO THE MAXIMUM EXTENT POSSIBLE. PROVIDE THE COLOR OF TOGGLES AND RECEPTACLES AS REQUESTED BY THE ENGINEER.

TYPE OF DEVICE	HUBBELL	SEYMOUR	LEVITON	COOPER WIRING DEVICES
SIMPLEX RECEPTACLE	HBL 5361	5361	5361	5361
DUPLEX RECEPTACLE	HBL 5362	5362	5362	5362
SINGLE POLE SWITCH	HBL 1221	PS 20 AC1	1221-2	1221
THREE-WAY SWITCH	HBL 1223	PS 20 AC3	1223-2	2223

16A 2-16 SWITCH AND OUTLET COVER PLATES

SWITCH AND OUTLET PLATES: COLORED, SMOOTH NYLON BY THE SAME MANUFACTURER AS THE WIRING DEVICES, WHEREVER POSSIBLE. VERIFY DESIRED MATERIALS AND COLORS WITH ENGINEER BEFORE INSTALLATION. SWITCH PLATES IN UNFINISHED ROOMS AND SPACES: STAMPED STEEL, CADMIUM PLATED. INSTALL GROUPS OF SWITCHES UNDER ONE GANGED-PLATE, USUALLY HORIZONTALLY OR, WHERE REQUIRED BY DETAILS, VERTICALLY.

SET ALL COVER PLATES PLUMB, PARALLEL, AND FINISHED FLUSH WITH THE WALL.

16A 2-18 FIRESTOPPING FLOOR AND WALL PENETRATIONS

FIRE-RESISTANT PENETRATION SEALANTS: TWO-PART, FOAMED-IN-PLACE, SILICONE SEALANT FORMULATED FOR USE IN THROUGH-PENETRATION FIRE-STOPPING AROUND CABLES, RACEWAYS, AND CABLE TRAY PENETRATIONS THROUGH FIRE-RATED WALLS AND FLOORS. SEALANTS AND ACCESSORIES SHALL HAVE FIRE-RESISTANT RATINGS INDICATED, AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES IN ACCORDANCE
WITH ASTM E 814, BY UNDERWRITERS' LABORATORIES, INC, OR OTHER NRTL ACCEPTABLE TO AHJ.

PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. '3M FIRE STOP FOAM 2001,' 3M CORP.
2. 'METACAULK 835,' RECTORSEAL
3. 'SPECSEAL PENSIL 200 SILICONE FOAM,' SPECIFY TECHNOLOGY INC.
4. 'FIRE STOP SYSTEM,' UNITED STATES GYPSUM COMPANY.

16A 2-19 EQUIPMENT IDENTIFICATION

PROVIDE EQUIPMENT IDENTIFICATION NAMEPLATES ON ALL PANELBOARDS, SWITCHES, AND WHERE INDICATED ON THE DRAWINGS.

NAMEPLATES:
A. ENGRAVED, CONTRASTING COLOR, THREE-LAYER, LAMINATED PLASTIC INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE DRAWINGS AND IN THE SPECIFICATIONS.
B. FIELD APPLIED PERMANENT EPOXY ADHESIVE, COMPATIBLE WITH THE EQUIPMENT FINISH, ATTACHMENT METHOD SHALL BE ACCEPTABLE TO THE MANUFACTURERS OF THE EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED.
C. COLOR: BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER: LETTER HEIGHT: 1/2-INCH MINIMUM.

16A 3 ELECTRICAL SERVICE AND GROUNDING

16A 3-3 GROUNDING

GROUND TO BUILDING STEEL.

PERMANENTLY AND EFFECTIVELY GROUND AND BOND THE ELECTRICAL INSTALLATION IN A THOROUGH AND EFFICIENT MANNER, AND IN CONFORMANCE, AT A MINIMUM, WITH NFPA 70, OR THESE DOCUMENTS, WHERE THEY EXCEED CODE REQUIREMENTS.

16A 4 DISTRIBUTION AND CONTROL EQUIPMENT

16A 4-3 LIGHTING AND APPLIANCE PANELBOARDS

PANELBOARDS: SQUARE D TYPE NQOD (FOR 240/208V SERVICE) OR NF (FOR 480V SERVICE) OR APPROVED EQUAL BY SIEMENS, CUTLER HAMMER, OR GENERAL ELECTRIC, AS SCHEDULED ON THE DRAWINGS, COMPLETE WITH COPPER BUSSING AND BOLT-ON THERMAL MAGNETIC, MOLDED CASE CIRCUIT BREAKERS ASSEMBLED IN A DEAD-FRONT FINISHED CABINET CONTAINING A CIRCUIT BREAKER CONTROLS, FULLY-RATED AND WITH THE INTEGRATED SHORT CIRCUIT CURRENT RATINGS INDICATED ON THE DRAWINGS. PLUG-IN TYPE BREAKERS WILL NOT BE ACCEPTABLE. ALL TWO AND THREE POLE BREAKERS: COMMON TRIP TYPE BREAKERS USED AS SWITCHES FOR 120V OR 211V LIGHTING CIRCUITS: APPROVED FOR THE PURPOSE AND MARKED 'SWD'. BREAKERS USED FOR THE PROTECTION OF HVAC AND REFRIGERATION EQUIPMENT: HACR TYPE.

CONTRACTOR SHALL BALANCE PANEL TO WITHIN 10 PERCENT AND PROVIDE REPORT TO MALL MANAGEMENT.

16A 4-4 DISCONNECT SWITCHES

DISCONNECT SWITCHES: SQUARE D, SIEMENS, CUTLER HAMMER, OR GENERAL ELECTRIC FUSED OR NON-FUSED (AS INDICATED ON DRAWINGS OR REQUIRED) NEMA KS1, HEAVY DUTY, EXTERNALLY OPERATED, VISIBLE-BLADE SAFETY SWITCHES, CLASS R REJECTION FEATURE WHEN APPLICABLE, NEMA ENCLOSURE TYPE INDICATED ON THE DRAWINGS OR SUITABLE FOR THE ENVIRONMENT IN WHICH INSTALLED.

PROVIDE SWITCHES WHERE NOT FURNISHED WITH THE STARTING EQUIPMENT, AT ALL OTHER POINTS REQUIRED BY NFPA 70, OR WHERE INDICATED ON THE DRAWINGS.

16A 4-6 FUSES

PROVIDE EACH CIRCUIT AND SET OF FUSE CLIPS THROUGHOUT THE WORK WITH BUSSMANN, FERRAZ SHAWMUT, OR LITTLEFUSE FUSES, SIZES AND TYPES AS REQUIRED OR INDICATED. ALL FUSES LARGER THAN 600A: UL CLASS L, SIMILAR TO TYPE KRP-C BUSSMANN LOW PEAK OR EQUAL. FUSES USED TO PROTECT MOTORS: UL CLASS RK5, BUSSMANN FUSETRON OR EQUAL. ALL FUSED DEVISES SHALL BE LABELED AS TO TYPE AND SIZE OF FUSE
REQUIRED.

FURNISH THREE SPARE FUSES OF EACH SIZE AND TYPE USED ON THE PROJECT (EXCEPT FOR MAIN SWITCH FUSES, FURNISH ONE SPARE), NEATLY CONTAINED IN A PROPERLY LABELED CABINET.

16A 5 LIGHT FIXTURES, LAMPS AND BALLASTS

16A 5-2 LIGHT FIXTURES

REFER TO LIGHT FIXTURE SCHEDULE ON SHEET E1.1 FOR LIGHTING INFORMATION. PROVIDE ALL NECESSARY ACCESSORIES, MATERIAL AND LABOR TO SECURELY HANG, CLEAN, AND MAKE LIGHT FIXTURES COMPLETELY READY FOR USE. LIGHT FIXTURE MODEL NUMBERS SCHEDULED ON THE DRAWINGS SHOW ONLY THE MANUFACTURER, GRADE AND STYLE OF LIGHT FIXTURES REQUIRED. PROVIDE: ALL HANGERS, SUPPORTS, AND MISCELLANEOUS HARDWARE REQUIRED TO INSTALL LIGHT FIXTURES, PROPER TRIM TO FIT EACH CEILING CONDITION ACTUALLY ENCOUNTERED, ADDITIONAL TIE WIRES CONNECTED TO STRUCTURE TO CONFORM TO UBC 25-213 SEISMIC REQUIREMENTS WHERE REQUIRED.

SURFACE-MOUNT ALL FLUORESCENT LIGHT FIXTURES LOCATED IN AREAS WITHOUT SUSPENDED CEILINGS UNLESS OTHERWISE INDICATED ON THE DRAWINGS. PROVIDE RIGID METAL SPACERS FINISHED IN WHITE ENAMEL BETWEEN THE TOP OF EACH LIGHT FIXTURE AND THE CEILING ABOVE TO MAINTAIN A 1-1/2 INCH SPACE. SPACERS SHALL BE APPROVED BEFORE INSTALLATION.

INSTALL ALL FLUORESCENT LIGHT FIXTURES LOCATED IN AREAS WITHOUT CEILINGS IMMEDIATELY BELOW THE ROOF FRAMING MEMBERS, OR SUSPENDED FROM CHAIN HANGERS SUITABLE IN LENGTH TO PROVIDE THE INDICATED MOUNTING HEIGHT. HANGERS: 'HYDEE' HANGER TYPE FOR OUTLET BOX MOUNTING, COMPLETE WITH GROUNDING RECEPTACLE, PLUG, 3-WIRE CORD AND NECESSARY CHAIN.

THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILING, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. THE WHIP SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE LIGHT FIXTURE TO BE RELOCATED WITHIN A 6-FOOT RADIUS.

16A 6 MISCELLANEOUS ELECTRICAL

16A 6-3 TELEPHONE SYSTEM PROVISIONS

PROVIDE INCOMING TELEPHONE SERVICE RACEWAYS AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING TELEPHONE COMPANY. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE-RETARDENT-TREATED AND STAMPED FRT, SECURELY ANCHORED TO THE WALL, AT THE LOCATION AND OF THE SIZE INDICATED ON THE DRAWINGS. PROVIDE FLUSH MOUNTED TELEPHONE OUTLET BOXES WITH 3/4-INCH EMT STUB-UP CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS.

16A 6-3 TELEPHONE SYSTEM PROVISIONS

PROVIDE INCOMING TELEPHONE SERVICE RACEWAYS AS INDICATED ON DRAWINGS OR AS REQUIRED BY THE SERVING TELEPHONE COMPANY. PROVIDE 3/4-INCH THICK PLYWOOD BOARD, FIRE-RETARDENT-TREATED AND STAMPED FRT, SECURELY ANCHORED TO THE WALL, AT THE LOCATION AND OF THE SIZE INDICATED ON THE DRAWINGS. PROVIDE FLUSH MOUNTED TELEPHONE OUTLET BOXES WITH 3/4-INCH EMT STUB-UP CONCEALED TO ACCESSIBLE CEILING SPACE AT LOCATIONS AS INDICATED ON THE DRAWINGS.

Architect:

Kevin L. Cooper Architect

316 South 1st Street
Rogers, AR 72756
(479) 633-8181 fax (479) 633-9204

Engineer/Other:

JOHN D. FERGUSON LICENSE No 67173 STATE OF FLORIDA PROFESSIONAL ENGINEER 9/8/17

CORE STATES GROUP
1700 Industrial Dr.
Rogers, AR 72756
Phone (479) 986-4400
FAX (479) 986-4401

Owner:

GENESCO

GENESCO CONSTRUCTION DIVISION
GENESCO PARK, SUITE 604
P.O. BOX 731
NASHVILLE, TENNESSEE 37202-0731
615-367-7003 FAX: 615-367-7845

Project:

JOURNEYS

SPACE # 1540
WESTLAND
MALL

HIALEAH,
FLORIDA

Sheet Contents:
ELECTRICAL
SPECIFICATIONS

Drawing Data:

Drawn By: MRS
Checked By: ASW
Revisions:

Date: 09/08/2017

E4.1