

GENERAL ELECTRICAL NOTES

PART 1 - GENERAL

1.1 GENERAL REFERENCE

- A. THE GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, OWNER'S REQUIRED SUPPLEMENTAL GENERAL CONDITIONS AND DIVISION 1 OF THESE SPECIFICATIONS ARE HEREBY INCLUDED AS PART OF THIS SECTION.

1.2 DESCRIPTION

- A. THE ELECTRICAL WORK INCLUDES THE FOLLOWING:
1. FUEL SYSTEM, POWER/CONTROL WIRING.
2. INSTALLATION OF TEMPORARY POWER AND LIGHT

- 3. UNDERGROUND SITE UTILITIES.
4. SECONDARY POWER DISTRIBUTION SYSTEM.
5. LIGHTING SYSTEM.
6. EMERGENCY LIGHTING SYSTEM.
7. VIDEO SYSTEM.
8. VOICE SYSTEM.
9. DATA SYSTEM.
10. FIRE ALARM SYSTEM (IF REQUIRED BY TOWN ORDINANCE).
11. DOOR ACCESS AND MONITORING SYSTEM (RACEWAY ONLY).
12. GROUNDING SYSTEM.
13. TESTING.

- B. PROVIDE ALL CONDUIT FITTINGS, OUTLET SWITCHES AND FITTINGS CONDUIT HANGERS CLAMPS AND SUPPORTS; PULL BOXES; SPLICE BOXES; WIRES AND CABLES; INSULATING MATERIALS; WIRE CONNECTORS AND RECEPTACLES; DISCONNECTING SWITCHES AND FUSES; CIRCUIT BREAKERS; PILOT DEVICES; IDENTIFICATION NAMEPLATES; TAGS; PANELBOARDS AND ALL OTHER EQUIPMENT AND ACCESSORIES NECESSARY, IMPLIED OR SPECIFIED HEREIN OR INDICATED ON THE DRAWINGS OR SCHEDULES, INCLUDING ALL NECESSARY ANCHORS, SLEEVES, HANGERS AND SUCH OTHER ITEMS AS MAY BE REQUIRED FOR ATTACHING OR CONNECTION THIS WORK ID THE WORK OF OTHERS.

- C. WORK TO BE PERFORMED, FURNISHED, INSTALLED, LOCATED, SET OR CONNECTED BY OTHERS AS LISTED OR DESCRIBED HEREIN OR IN OTHER SECTIONS OF THESE SPECIFICATIONS SHALL BE COORDINATED WITH THE ELECTRICAL CONTRACTOR.

- D. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE EXISTING FACILITIES AND DIFFICULTIES BY VISITING THE JOB SITE AND SHALL BE RESPONSIBLE FOR THE EXECUTION OF ALL THE WORK RELATED TO THESE SPECIFICATIONS. NO CLAIMS WILL BE ALLOWED RESULTING FROM ANY DISCREPANCIES.

1.3 RELATED WORK DESCRIBED ELSEWHERE

- A. RESPONSIBILITY FOR ELECTRICAL WORK AND ITEMS IN CONNECTION WITH ELECTRICALLY OPERATED EQUIPMENT FURNISHED BY OTHERS OR UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS IS AS FOLLOWS:
1. HEATING, VENTILATING AND AIR CONDITIONING (HVAC) SYSTEM WILL BE ACCOMPLISHED UNDER MECHANICAL WORK.

1.4 MATERIAL AND WORKMANSHIP

- A. ALL MATERIALS SHALL BE NEW AND SHALL CONFORM TO THE STANDARD OF THE UNDERWRITERS' LABORATORIES, INC. IN EVERY CASE WHERE SUCH A STANDARD LISTING OR LABEL HAS BEEN ESTABLISHED FOR THE PARTICULAR MATERIAL IN QUESTION.

- B. LAWS AND REGULATION. THE INSTALLATION, INCLUDING TEMPORARY POWER AND LIGHTING FOR CONSTRUCTION SHALL COMPLY WITH ALL STATE AND LOCAL LAWS AND REGULATIONS APPLYING TO ELECTRICAL INSTALLATIONS, WITH ALL APPLICABLE REQUIREMENTS OF THE LATEST EDITIONS OF THE NATIONAL ELECTRICAL CODE.

- C. THE ELECTRICAL CONTRACTOR SHALL OBTAIN ALL PERMITS, PAY ALL FEES AND GIVE ALL PROPER AUTHORITIES ALL NECESSARY NOTICES.

- D. NAMES OF MANUFACTURERS, CATALOG NUMBERS, MODELS OR TYPES, WHEN LISTED IN THIS SECTION OF THE SPECIFICATIONS AND THE INCLUDED DRAWINGS ARE INTENDED TO INDICATE THE STANDARDS OF AND QUALITY OF MATERIAL, WHEN APPARATUS OR EQUIPMENT IS MENTIONED ANY FIRST CLASS PRODUCT MADE BY A REPUTABLE MANUFACTURER MAY BE USED PROVIDING IT CONFORMS TO THE REQUIREMENTS OF THE THESE SPECIFICATIONS AND MEETS WITH THE APPROVAL OF THE ARCHITECT/ENGINEER. WHERE TWO OR MORE UNITS OF THE SAME CLASS OF EQUIPMENT ARE REQUIRED THESE UNITS SHALL BE THE PRODUCTS OF A SINGLE MANUFACTURER. SHOULD THIS CONTRACTOR DESIRE TO SUBSTITUTE OTHER MAKES OF MATERIAL APPARATUS OR EQUIPMENT FOR SPECIFIC ITEMS MENTIONED HEREIN INDICATED ON THE DRAWINGS, CONTRACTOR SHALL MAKE THE REQUEST IN ONE OF THE FOLLOWING WAYS AND WITH THE FOLLOWING PROVISIONS:
1. BY A SEPARATE ALTERNATE PROPOSAL, BASED ON PROVIDING THE PROPOSED SUBSTITUTE. SUCH PROPOSAL SHALL BE ACCOMPANIED BY COMPLETE DRAWINGS AND SPECIFICATIONS OF THE SUBSTITUTE, INCLUDING MANUFACTURER, BRAND NAME, CATALOG NUMBER AND SUCH OTHER DATA, WHERE SUCH SUBSTITUTES ALTER THE DESIGN OR SPACE REQUIREMENTS, THE CONTRACTOR SHALL INCLUDE ALL ITEMS OF COST FOR THE REVISED DESIGN AND CONSTRUCTION INCLUDING COST OF ALL TRADES INVOLVED. REFER TO BASIC MATERIALS AND METHODS.
2. BY MAKING A REQUEST TO THE ARCHITECT/ENGINEER WITHIN 30 DAYS AFTER THE AWARD OF THE CONTRACTOR TO BE ALLOWED TO MAKE THE SUBSTITUTION. THIS SHALL BE ACCOMPLISHED BY COMPLETE DRAWINGS AND SPECIFICATIONS OF THE SUBSTITUTE OFFERED.

- E. ACCEPTANCE OR REJECTION OF THE PROPOSED SUBSTITUTIONS SHALL BE SUBJECT TO APPROVAL BY THE ARCHITECT ENGINEER.
F. THE SUBSTITUTE OFFERED SHALL NOT INVOLVE A CHANGE IN THE BASIC DESIGN OF THE SPECIFIED EQUIPMENT.

- G. THE CONTRACTOR SHALL SUBMIT SAMPLES OF BOTH THE SPECIFIED ITEM AND THE SUBSTITUTE WHEN SO REQUESTED BY THE ARCHITECT /ENGINEER.
H. IN THE EVENT THAT SUBSTITUTES ARE ACCEPTED, THE CONTRACT PRICE SHALL BE REDUCED BY AN AMOUNT EQUAL TO THE DIFFERENCE IN THE COSTS BETWEEN THEM.

- I. IF THE ITEM OFFERED FOR SUBSTITUTION IS, IN THE OPINION OF THE ARCHITECT/ENGINEER EQUAL TO OR BETTER THAN THOSE SPECIFIED, OR THE PRICE DIFFERENTIAL IS SUCH THAT THE SUBSTITUTE ITEM IS A BETTER INVESTMENT THAN THE SUBSTITUTE WILL BE GIVEN CONSIDERATION.

1.5 DRAWINGS

- A. THE DRAWINGS SHOW THE LAYOUT OF THE ELECTRICAL SYSTEM AND INDICATE THE APPROXIMATE LOCATIONS OF OUTLETS, APPARATUS AND EQUIPMENT. THE RUNS OF FEEDERS AND BRANCHES AS INDICATED ARE SCHEMATIC ONLY. THE EXACT ROUTING OF CONDUIT SHALL BE DETERMINED BY THE STRUCTURAL CONDITIONS AND OTHER OBSTRUCTIONS. THIS SHALL NOT BE CONSIDERED TO MEAN THAT THE DESIGN OF THE SYSTEMS MAY BE CHANGED BUT REFERS ONLY TO EXACT RUNS OF CONDUIT BETWEEN GIVEN POINTS.

- B. CONSULT ALL CONTRACT DRAWINGS, WHICH MAY AFFECT THE LOCATION OF ANY OUTLETS, APPARATUS AND EQUIPMENT TO AVOID POSSIBLE INTERFERENCE AND PERMIT FULL COORDINATION OF ALL WORK. THE RIGHT TO MAKE ANY REASONABLE CHANGE IN LOCATION OF OUTLETS, APPARATUS AND EQUIPMENT UP TO THE TIME OR ROUGHING-IN IS RESERVED BY THE ARCHITECT/ENGINEER AND SUCH CHANGES SHALL BE MADE WITHOUT ADDITIONAL EXPENSE TO THE OWNER.

- C. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO SEE THAT ALL ELECTRICAL EQUIPMENT SUCH AS JUNCTION AND PULL BOXES, PANELBOARDS, SWITCHES, CONTROLS AND OTHER APPARATUS THAT MAY REQUIRE MAINTENANCE AND OPERATION FROM TIME TO TIME IS MADE EASILY ACCESSIBLE. ALTHOUGH THE EQUIPMENT MAY BE SHOWN ON THE DRAWINGS IN CERTAIN LOCATIONS, CONSTRUCTION MAY DISCLOSE THE FACT THAT SUCH LOCATIONS DO NOT MAKE ITS POSITION READILY ACCESSIBLE. IN SUCH CASES, THE CONTRACTOR SHALL CALL TO THE ATTENTION OF THE ARCHITECT/ENGINEER THE CONDITION, BEFORE ADVANCING THE CONSTRUCTION TO A STATE WHERE A CHANGE WILL REQUIRE ADDITIONAL EXPENSES.

- D. RECORD DRAWINGS:
1. MAINTAIN AT THE JOB SITE. AT ALL TIMES, A COMPLETE SET OF BLUELINE PRINTS OF THE ELECTRICAL WORK ON WHICH SHALL BE MARKED CLEARLY, NEATLY, ACCURATELY AND PROMPTLY AS THE WORK PROGRESSES.

- 1.6 SHOP DRAWINGS AND SAMPLES
A. BEFORE ORDERING MATERIAL SHIPPED TO THE JOB, SUBMIT SHOP DRAWINGS FOR APPROVAL SHOWING ALL DIMENSIONS AND DETAILS, EACH DRAWING SHALL BE MARKED FOR THIS PROJECT.
B. DRAWINGS AND SAMPLES SHALL BE PROVIDED IN ACCORDANCE WITH 'BASIC MATERIALS AND METHOD'.
C. ELECTRICAL CONTRACTOR SHALL ALSO FURNISH SAMPLES OF DISCONNECT SWITCHES AND OTHER SMALL PARTS AS REQUESTED.

- D. GENERAL BULLETINS OF CATALOGS WILL NOT BE ACCEPTED AS SHOP DRAWINGS UNLESS THE EQUIPMENT ON WHICH APPROVAL IS TO BE OBTAINED IS SPECIFICALLY MARKED AND ALL INFORMATION PERTAINING TO THE ITEM INCLUDING DIMENSIONS WHERE REQUIRED FOR INSTALLATION, IS INCLUDED.

- E. IN CASE ANY OF THE ABOVE MATERIALS ARE DELIVERED OR INSTALLED ON THE JOB FOR WHICH SHOP DRAWINGS OR REQUESTED SAMPLES HAVE NOT BEEN APPROVED AND/OR WHICH ARE NOT IN ACCORDANCE WITH THE SPECIFICATION, THE CONTRACTOR WILL BE REQUIRED TO REMOVE SUCH MATERIALS AND SUBSTITUTE APPROVED MATERIALS AT HIS OWN EXPENSE AND AS DIRECTED.

1.7 GUARANTEE

- A. THE CONTRACTOR SHALL GUARANTEE ALL SYSTEMS, INCLUDING FIXTURES, TO BE FREE FROM SHORT CIRCUITS, OPEN CIRCUITS, LOOSE CONNECTIONS, OVER-HEATING AND SUCH OTHER DEFECTS.

1.8 EQUIPMENT AND SCAFFOLDING

- A. THE CONTRACTOR PERFORMING WORK UNDER THIS SECTION SHALL BE RESPONSIBLE FOR FURNISHING ALL TOOLS AND EQUIPMENT, SCAFFOLDING AND OTHER TEMPORARY CONSTRUCTION EQUIPMENT REQUIRED FOR THE EXECUTION OF THE WORK.

1.9 TEMPORARY POWER AND LIGHT

- A. THE ELECTRICAL CONTRACTOR SHALL PROVIDE A TEMPORARY ELECTRICAL SERVICE FOR THE POWER AND LIGHTING REQUIREMENTS DURING CONSTRUCTION.

- B. EACH TRADE SHALL PROVIDE AND MAINTAIN, AT ITS OWN EXPENSE, ALL TEMPORARY WIRING, EXTENSION CORDS, LIGHTING, APPURTENANCES AND ACCESSORIES FOR LIGHTS OR POWER TOOLS REQUIRED IN ADDITION TO AND BEYOND THE OUTLETS MENTIONED ABOVE FOR THEIR OWN RESPECTIVE WORK REQUIREMENTS FOR TEMPORARY POWER AND LIGHTING.

- C. THE COST OF ELECTRICAL ENERGY USED FOR TEMPORARY POWER AND LIGHTING FOR THE WORK OF ALL TRADES SHALL BE BORNE BY THE GENERAL CONTRACTOR.

- D. UPON COMPLETION OF THE WORK OF ALL TRADES AND BEFORE FINAL ACCEPTANCE OF THE ENTIRE PROJECT, EACH TRADE SHALL REMOVE, AT HIS OWN EXPENSE ALL WIRING APPURTENANCES AND ACCESSORIES USED IN THE PERFORMANCE OF ITS RESPECTIVE WORK TO THE COMPLETE SATISFACTION OF THE ARCHITECT/ENGINEER.

1.10 TESTING AND INSPECTION

- A. THE GROUNDING INSTALLATION SHALL BE TESTED AND THE RESISTANCE BETWEEN GROUND AND ABSOLUTE EARTH SHALL NOT EXCEED 7 OHMS AND SHALL BE MEASURED BY THIS CONTRACTOR BEFORE EQUIPMENT IS PLACED IN OPERATION.

1.11 TYPES OF SERVICE

- A. SECONDARY DISTRIBUTION SYSTEM SHALL BE 208Y/120 VOLT THREE PHASE, 4 WIRE.

1.12 COORDINATION

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FULLY COORDINATING ALL OF THE VARIOUS PARTS OF THE WORK INCLUDED UNDER THIS SECTION AND SUCH OTHER WORK OF THIS CONTRACT AS IT MAY AFFECT THE WORK OF THIS SECTION, THROUGHOUT VARIOUS PHASES OF CONSTRUCTION AND BEFORE THE ORDERING OR FABRICATION OF THE VARIOUS PARTS OF THE WORK, AS TO ENSURE COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS AND AS NECESSARY TO PROVIDE THE INSTALLATIONS COMPLETE AND IN SATISFACTORY OPERATING CONDITION.

PART 2 - BASIC MATERIALS AND METHODS

2.1 GENERAL

- A. THE GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, OWNER'S REQUIRED SUPPLEMENTAL GENERAL CONDITIONS AND DIVISION 1 OF THESE SPECIFICATIONS ARE HEREBY INCLUDED AS PART OF THIS SECTION.

2.2 SUBMITTALS

- A. SUBMIT THE FOLLOWING:

- 1. MANUFACTURER'S CATALOG DATA:
a. RECEPTACLES
b. CIRCUIT BREAKERS
c. SWITCHES
d. CONDUIT AND FITTINGS (EACH TYPE)
e. SURFACE METAL RACEWAY
f. GROUND RODS
g. DEVICE PLATES
h. WIRES AND CABLES
i. OUTLET BOXES AND COVERS
j. JUNCTION BOXES
k. SPLICES AND TERMINATION COMPONENTS
l. ENCLOSED CIRCUIT BREAKERS
m. FIRESTOPPING MATERIALS
2. DRAWINGS:
a. PANELBOARDS
b. CABLE TRAYS
c. WIREWAYS
3. FIELD TEST REPORTS
a. GROUNDING SYSTEM TEST
4. OPERATION AND MAINTENANCE MANUALS
a. ELECTRICAL SYSTEMS

2.3 QUALITY ASSURANCE

- A. IN EACH STANDARD REFERRED TO HEREIN, CONSIDER THE ADVISORY PROVISIONS TO BE MANDATORY, AS THOUGH THE WORD 'SHALL' HAS BEEN SUBSTITUTED FOR 'SHOULD' WHEREVER IT APPEARS.

PART 3 - PRODUCTS

3.1 MATERIALS AND EQUIPMENT

- A. MATERIALS, EQUIPMENT, AND DEVICES SHALL, AS MINIMUM, MEET REQUIREMENTS OF UL, WHERE UL STANDARDS ARE ESTABLISHED FOR THOSE ITEMS AND REQUIREMENTS OF NFPA 70.

3.2 CONDUIT AND FITTINGS

- A. SHALL BE RIGID STEEL (ZINC-COATED) CONDUIT, RIGID NONMETALLIC CONDUIT, AND INTERMEDIATE METAL CONDUIT (IMC), ELECTRICAL METALLIC TUBING (EMT), AND FLEXIBLE METAL CONDUIT, LIGHT TIGHT FLEXIBLE CONDUIT, CONFORMING TO THE FOLLOWING:
1. RIGID STEEL CONDUIT (ZINC COATED) ANSI C80-1, UL 6.
2. RIGID NONMETALLIC CONDUIT PVC TYPE EOC-40 AND EPO-80, IN ACCORDANCE WITH NEMA TC 2 OR FIBERGLASS CONDUIT IN ACCORDANCE WITH NEMA T014.
3. INTERMEDIATE METAL CONDUIT (IMC) UL 1242, ZINC-COATED STEEL ONLY.
4. ELECTRICAL METALLIC TUBING (EMT) UL 797, ANSI C80.3
5. FLEXIBLE METAL CONDUIT UL 1.
a. LIQUID TIGHT FLEXIBLE METAL CONDUIT, STEEL UL 360.
b. FITTINGS FOR METAL CONDUIT, EMT AND FLEXIBLE METAL CONDUIT UL 514B. FERROUS FITTINGS SHALL BE CADMIUM- OR ZINC-COATED IN ACCORDANCE WITH UL 514B.
c. FITTINGS FOR RIGID METAL CONDUIT AND IMC THREADED-TYPE, SPLIT COUPLINGS ARE UNACCEPTABLE.
d. FITTINGS FOR EMT STEEL SET-SCREW TYPE. DIE CAST FITTINGS ARE UNACCEPTABLE.
7. FITTINGS FOR RIGID NONMETALLIC CONDUIT, NEMA TC 3, UL 514B, UL 651.

3.3 OUTLET BOXES AND COVERS

- A. UL 514A, CADMIUM- OR ZINC COATED, IF FERROUS METAL AND UL 514C IF NONMETALLIC.

3.4 CABINETS, JUNCTION BOXES AND PULL BOXES

- A. VOLUME GREATER THAN 100 CUBIC INCHES, UL 50, HOT-DIP, ZINC-COATED, IF SHEET STEEL.

3.5 WIRES AND CABLES

- A. WIRES AND CABLES SHALL MEET APPLICABLE REQUIREMENTS OF NFPA 70 AND UL FOR TYPE OF INSULATION, JACKET AND CONDUCTOR SPECIFIED OR INDICATED. WIRES AND CABLES MANUFACTURED MORE THAN 12 MONTHS PRIOR TO DATE OF DELIVERY TO SITE SHALL NOT BE USED.
B. CONDUCTORS: CONDUCTORS NO.10 AWG AND LARGER DIAMETER SHALL BE STRANDED. CONDUCTORS NO. 12 AWG AND SMALLER DIAMETER SHALL BE SOLID, EXCEPT THAT CONDUCTORS FOR REMOTE CONTROL, ALARM AND SIGNAL CIRCUITS, CLASSES 1, 2 AND 3 SHALL BE STRANDED UNLESS SPECIFICALLY INDICATED OTHERWISE. CONDUCTOR SIZES AND AMPACITIES SHOWN ARE BASED ON COPPER, UNLESS OTHERWISE INDICATED OTHERWISE: ALL CONDUCTORS:
1. MINIMUM CONDUCTOR SIZES: MINIMUM SIZE FOR BRANCH CIRCUITS SHALL BE NO.12 AWG; FOR CLASS 1 REMOTE CONTROL AND SIGNAL CIRCUITS, NO.14 AWG; FOR CLASS 2 LOW-ENERGY, REMOTE-CONTROL AND SIGNAL CIRCUITS, NO.16 AWG; FOR CLASS 3 LOW-ENERGY, REMOTE-CONTROL, ALARM AND SIGNAL CIRCUITS, NO.22 AWG.
2. COLOR CODING: PROVIDE FOR DEVICE, FEEDER, BRANCH, CONTROL, AND SIGNALING CONDUCTORS. COLOR SHALL BE GREEN FOR GROUNDING CONDUCTORS AND WHITE FOR NEUTRALS; EXCEPT WHERE NEUTRALS OF MORE THAN ONE SYSTEM ARE INSTALLED IN SAME RACEWAY OR BOX, OTHER NEUTRAL SHALL BE WHITE WITH COLORED (NOT GREEN) STRIPE.
3. INSULATION: UNLESS SPECIFIED OR INDICATED OTHERWISE OR REQUIRED BY NFPA 70, POWER AND LIGHT WIRES SHALL BE 600-VOLT, TYPE THWN/THHN; REMOTE-CONTROL AND SIGNAL CIRCUITS SHALL BE TYPE TW, TH, OR TF. CONDUCTORS SHALL CONFORM TO UL 83, WHERE LIGHTING FIXTURES REQUIRE 90 °C CONDUCTORS, PROVIDE ONLY CONDUCTORS WITH 90 °C INSULATION OR BETTER.
4. BONDING CONDUCTORS: ASTM B1, SOLID BARE COPPER WIRE FOR SIZES NO. 8 AWG AND SMALLER DIAMETER; ASTM B8, CLASS B, STRANDED BARE COPPER WIRE FOR SIZES NO. 6 AWG AND LARGER DIAMETER.
5. METAL-CLAD CABLE: UL 1569; NFPA 70, TYPE MC CABLE.

3.6 SPLICES AND TERMINATION COMPONENTS

- A. UL 466A AND UL488B, AS APPLICABLE FOR WIRE CONNECTORS AND UL 510 FOR INSULATING TAPES, CONNECTORS FOR NO.10 AWG AND SMALLER DIAMETER WIRES SHALL BE INSULATED, PRESSURE-IN ACCORDANCE WITH UL 488A OR UL 488C (TWIST-ON SPLICING CONNECTOR). PROVIDE SOLDERLESS TERMINAL LOGS ON STANDARD CONDUCTORS.

3.7 DEVICE PLATES

- A. PROVIDE UL LISTED, ONE-PIECE DEVICE PLATES FOR OUTLETS TO SUIT THE DEVICE INSTALLED. FOR METAL OUTLET BOXES, PLATES ON UNFINISHED WALLS SHALL BE OF ZINC-COATED SHEET STEEL OR CAST METAL HAVING ROUND OR BEVELED EDGES. FOR NONMETALLIC BOXES AND FITTINGS, OTHER SUITABLE PLATES MAY BE PROVIDED. PLATES ON FINISHED WALL SHALL BE SATIN FINISH STAINLESS STEEL OR BRUSHED-FINISH ALUMINUM, MINIMUM 0.03-INCH THICK. SCREWS SHALL BE MACHINE TYPE WITH COUNTERSUNK HEADS IN COLOR TO MATCH FINISH OF PLATE. SECTIONAL TYPE DEVICE PLATES WILL NOT BE ACCEPTED. PLATES INSTALLED IN WET LOCATIONS SHALL BE GASKETED AND UL LISTED FOR 'WET LOCATIONS'. FINISH PLATES SHALL BE TYPE 430 STAINLESS STEEL PART NUMBERS SHALL BE SS STYLE MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

3.8 SWITCHES

- A. TOGGLE SWITCHES: FS W-5-896 TOTALLY ENCLOSED WITH BODIES OF THERMOSETTING PLASTIC AND MOUNTING STRAP. HANDLES SHALL BE IVORY. WIRING TERMINALS SHALL BE SCREW-TYPE, SIDE-WIRED. SWITCHES SHALL BE RATED QUIET-TYPE AC ONLY, 120/277 VOLTS, WITH CURRENT RATING AND NUMBER OF POLES INDICATED. SWITCHES SHALL BE HUBBELL PRO SERIES CATALOG NUMBER 12211,12221,12231,12241 MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

3.9 RECEPTACLES

- A. UL 498 AND NEMA WD1, HEAVY-DUTY, GROUNDING TYPE. RATINGS AND CONFIGURATIONS SHALL BE AS INDICATED. BODIES SHALL BE OF IVORY THERMOSETTING PLASTIC SUPPORTED ON A METAL MOUNTING STRAP. WIRING TERMINALS SHALL BE SC9W-TYPE, SIDE-WIRED. CONNECT GROUNDING POLE TO MOUNTING STRAP.
1. GENERAL PURPOSE RECEPTACLES, UNLESS OTHERWISE NOTED SHALL BE OF THE FLUSH, DUPLEX TYPE, COMMERCIAL SPECIFICATION GRADE. GENERAL PURPOSE RECEPTACLES SHALL BE OF THE FLUSH, DUPLEX 3 WIRE GROUNDING TYPE. RECEPTACLES SHALL HAVE A RATING OF 20 AMPERES AT 125 VOLTS AND SHALL HAVE FIRE-RESISTANT NON-ABSORPTIVE HOT-MOLDED COMPOSITION BODIES AND METAL PLASTER CARB INSULATION WITH THE SUPPORTING MEMBERS. RECEPTACLES SHALL BE ARRANGED FOR EITHER BACK OR SIDE WIRING AND EQUIPPED WITH U-SHAPED SLOTS FOR GROUND BLADE AND SHALL ALSO BE SUITABLE FOR USE WITH STANDARD2 WIRE REGULAR OR POLARIZED CAPS IN THE CONVENTIONAL WAY. RECEPTACLES SHALL CONFORM TO OSHA REQUIREMENTS. RECEPTACLES SHALL BE HUBBELL PRO SERIES, CATALOG NUMBERS282 MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.
B. RECEPTACLES SHALL BE HUBBELL PRO SERIES CATALOG NUMBER 5362 MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.
C. ISOLATED GROUND RECEPTACLES, DENOTED WITH SUBSCRIPT (IG) ON THE DRAWINGS SHALL BE TRANSIENT VOLTAGE SURGE SUPPRESSOR (TVSS) DUPLEX TYPE RATED 20 AMPERE AT 125 VOLTS. SURGE RECEPTACLES SHALL BE HUBBELL K5362SA MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

- D. UL 943, GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES, DENOTED WITH SUBSCRIPT (GFI) ON THE DRAWINGS SHALL BE DUPLEX TYPE RATED 20 AMPERES AT 125 VOLTS FOR MOUNTING IN A STANDARD BOX. DEVICE SHALL BE DUPLEX RATED 20 AMPERES AT 125 VOLTS, FOR MOUNTING IN STANDARD OUTLET BOX. DEVICE SHALL BE CAPABLE OF DETECTING CURRENT LEAK OF 6 MILLIAMPERES OR GREATER AND TRIPPING PER REQUIREMENTS OF UL 943 FOR CLASS A GFCI DEVICES. GFCI RECEPTACLES SHALL BE HUBBELL GF20LA TYPE, MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

- E. EXTERIOR GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES, DENOTED WITH SUBSCRIPT (WP) ON THE DRAWINGS SHALL BE DUPLEX TYPE RATED 20 AMPERES AT 125 VOLTS. PROVIDE IN CAST METAL BOX WITH GASKETED, WEATHERPROOF, CAST-METAL COVER PLATE AND GASKETED SPRING-HINGED FLAP CAP OVER EACH RECEPTACLE OPENING. WEATHERPROOF GFCI RECEPTACLES SHALL BE HUBBELL GFR TYPE MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

- F. TAMPER RESISTANT RECEPTACLES SHALL BE DUPLEX TYPE RATED 15 AMPERES AT 125 VOLTS. TAMPER RESISTANT RECEPTACLE SHALL BE HUBBELL BR20TR- MANUFACTURED BY HUBBELL WIRING DEVICES OR APPROVED EQUIVALENT.

3.10 ENCLOSED CIRCUIT BREAKERS

- A. UL 489, INDIVIDUAL MOLDED CASE CIRCUIT BREAKERS WITH VOLTAGE AND CONTINUOUS CURRENT RATINGS, NUMBER OF POLES, OVERLOAD TRIP SETTING AND SHORT CIRCUIT CURRENT INTERRUPTING RATING AS INDICATED. ENCLOSURE AS INDICATED. PROVIDE SOLDER NEUTRAL.

3.11 FUSES

- A. NEMA FU 1. PROVIDE COMPLETE SET OF FUSES FOR EACH FUSIBLE SWITCH. TIME-CURRENT CHARACTERISTICS CURVES OF FUSES SERVING MOTORS OR CONNECTED IN SERIES WITH CIRCUIT BREAKERS OR OTHER CIRCUIT PROTECTIVE DEVICES SHALL BE COORDINATED FOR PROPER OPERATION. SUBMIT COORDINATION DATA FOR APPROVAL. FUSES SHALL HAVE VOLTAGE RATING NOT LESS THAN CIRCUIT VOLTAGE.
1. CARTRIDGE FUSES, CURRENT LIMITING TYPE (CLASS R) UL198E, CLASS RK-5. ASSOCIATED FUSEHOLDERS SHALL BE CLASS R ONLY.
2. CARTRIDGE FUSES, CURRENT LIMITING TYPE (CLASSES J, L, AND CC) UL198C, CLASS J FOR ZERO TO 600 AMPS, CLASS L FOR 601 TO 6,000 AMPS AND CLASS CC FOR ZERO TO 30 AMPS.
3. CARTRIDGE FUSES, CURRENT LIMITING TYPE (CLASS T) UL 198H, CLASS T FOR ZERO TO 1,200 AMPS, 300 VOLTS; AND ZERO TO 800 AMPS, 600 VOLTS.

3.12 ENCLOSED SWITCHES

- A. PROVIDE NUMBER OF POLES REQUIRED FOR THE APPLICATION, SUITABLE FOR SURFACE MOUNTING WITH FUSE CLIPS DESIGNED TO ACCOMMODATE CLASS R FUSES. PROVIDE GENERAL DUTY MOTOR DISCONNECT SWITCHES FOR UP TO 240 VOLTS AND 1.5 HP, HEAVY DUTY FOR OVER 240 VOLTS OR 1.5 HP, QUICK MAKE/BREAK TYPE, FUSED OR NON-FUSED (NF) AS INDICATED. FOR 1/6 HP OR LESS, MOTOR RATED TOGGLE SWITCHES ARE PERMITTED.

3.13 DATA WIRING SYSTEM

- A. PROVIDE SYSTEM OF DATA WIRE-SUPPORTING STRUCTURES, INCLUDING: CONDUITS, CABLES, CABLE BAYS, TERMINAL BOXES, OUTLET AND JUNCTION BOXES, OTHER ACCESSORIES FOR TELECOMMUNICATIONS AND DATA OUTLETS, CABINETS, CLOSETS AND BACKBOARDS.
1. OUTLET BOXES FOR DATA SYSTEM: STANDARD TYPE, AS SPECIFIED HEREIN, 4 INCHES BY 4 INCHES WITH SINGLE GANG ADAPTER PLATE. MOUNT FLUSH IN FINISHED WALLS AT HEIGHT SPECIFIED FOR OUTLET RECEPTACLES. OUTLET BOXES FOR WALL-MOUNTED TELEPHONES SHALL BE 2 INCHES BY 4 INCHES BY 1 1/4 INCHES DEEP-MOUNTED AT HEIGHT 60 INCHES ABOVE FINISHED FLOOR.
2. CONDUIT SIZING: CONDUIT FOR SINGLE OUTLETS SHALL BE A MINIMUM OF 3/4 INCH AND FOR MULTIPLE OUTLETS A MINIMUM OF 1 INCH. SIZE CONDUITS FOR DATA RISERS TO CABINETS, JUNCTION BOXES, DISTRIBUTION CENTERS AND SERVICE AS INDICATED.
3. BACKBOARDS: INTERIOR GRADE PLYWOOD, 1/4 INCH THICK, 4 FEET BY 8 FEET MINIMUM.
4. RECEPTACLES FOR TELEPHONE SERVICE: PROVIDE RECEPTACLES, 125 VOLTS, 20 AMPS, SINGLE PHASE, 60 HZ, ADJACENT TO TELEPHONE BACKBOARDS, SERVED FROM PANELBOARD CIRCUIT AS INDICATED.

3.14 GROUNDING AND BONDING EQUIPMENT

- A. UL 467, GROUND RODS SHALL BE OF THE SECTIONAL TYPE COPPER-CLAD STEEL, WITH MINIMUM DIAMETER OF 3/4 INCH AND MINIMUM LENGTH OF 10 FEET.

3.15 NAMEPLATES

- A. FS L-P-387. PROVIDE AS INDICATED ON DRAWINGS.

3.16 FIRESTOPPING MATERIALS

- A. PROVIDE ASBESTOS FREE FIRESTOPPING SYSTEM WHERE INDICATED, CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME AND GASES. SYSTEM SHALL BE UL LISTED AND COMPLY WITH ASTM E 814. INCLUDE UL SYSTEM NUMBER WITH UL LISTED PRINT FROM MANUFACTURER FOR EACH TYPE OF FLOOR, WALL AND CEILING PENETRATION.

3.17 WIREWAYS

- A. UL 870, MATERIALS SHALL BE STEEL EPOXY PAINTED, 16 GAUGE FOR SIZES 2 1/2 X 2, 4 BY 6 X 6 INCHES, 14 GAUGE FOR SIZES 8 X 8, 12 X 12 INCHES. PROVIDE IN LENGTH REQUIRED FOR THE APPLICATION WITH SCREW-ON COVER NEMA 1 ENCLOSURE FOR NEMA ICS 6.

3.18 FIRE DETECTION AND ALARM (DISREGARD THIS SECTION IF NOT REQUIRED)

- A. THE GENERAL CONDITIONS, SUPPLEMENTARY GENERAL CONDITIONS, OWNER'S REQUIRED SUPPLEMENTAL GENERAL CONDITIONS AND DIVISION 1 OF THESE SPECIFICATIONS ARE HEREBY INCLUDED AS PART OF THIS SECTION.

B. DESCRIPTION

- 1. THIS SECTION OF THE SPECIFICATION INCLUDES THE FURNISHING, INSTALLATION AND CONNECTION OF THE MICROPROCESSOR-CONTROLLED FIRE ALARM EQUIPMENT REQUIRED TO FORM A COMPLETE COORDINATED SYSTEM. IT SHALL INCLUDE, BUT NOT BE LIMITED TO, ALARM INITIATING DEVICES, ALARM NOTIFICATION APPLIANCES, CONTROL PANEL, AUXILIARY CONTROL DEVICES, ANNUNCIATORS, POWER SUPPLIES, AND WIRING AS SHOWN ON THE DRAWINGS AND SPECIFIED HEREIN.
2. THE FIRE ALARM SYSTEM SHALL COMPLY WITH REQUIREMENTS OF UL, NEC 70, LIFE SAFETY CODE 101 AND NFPA STANDARD NO.72 FOR PROTECTED PREMISES SIGNALING SYSTEMS EXCEPT AS MODIFIED AND SUPPLEMENTED BY THIS SPECIFICATION. THE SYSTEM FIELD WIRING SHALL BE SUPERVISED EITHER ELECTRICALLY OR BY SOFTWARE DIRECTED POLLING OF FIELD DEVICES.
3. THE FIRE ALARM SYSTEM SHALL BE MANUFACTURED BY AN ISO 9001 CERTIFIED COMPANY AND MEET THE REQUIREMENTS OF BS EN9001: ANSI/ASQC 09001-1994.
4. THE FACP AND PERIPHERAL DEVICES SHALL BE UNDERWRITTEN 100% BY A SINGLE U.S. MANUFACTURER (OR DIVISION THEREOF).
5. THE SYSTEM AND ITS COMPONENTS SHALL BE UNWRITTEN LABORATORIES, INC. LISTED UNDER THE APPROPRIATE UL TESTING STANDARD AS LISTED HEREIN FOR FIRE ALARM APPLICATIONS AND SHALL BE INSTALLED IN COMPLIANCE WITH THE UL LISTING.

C. SCOPE

- 1. BASIC PERFORMANCE:
a. INITIATION DEVICE CIRCUITS (IDC) SHALL BE WIRED CLASS A (NFPA STYLE D).
b. NOTIFICATION APPLIANCE CIRCUITS (NAC) SHALL BE WIRED CLASS A (NFPA STYLE Z).

D. SUBMITTALS

- 1. GENERAL: ALL REFERENCES TO MANUFACTURER'S MODEL NUMBERS AND OTHER PERTINENT INFORMATION HEREIN IS INTENDED TO ESTABLISH MINIMUM STANDARDS OF PERFORMANCE, FUNCTION AND QUALITY. EQUIVALENT EQUIPMENT (COMPATIBLE UL LISTED) FROM OTHER MANUFACTURERS MAY BE SUBSTITUTED FOR THE SPECIFIED EQUIPMENT.
2. SHOP DRAWINGS: INCLUDE MANUFACTURER'S NAME(S), MODEL NUMBERS, RATINGS, POWER REQUIREMENTS, EQUIPMENT LAYOUT DEVICE ARRANGEMENT AND COMPLETE WIRING POINT-TO-POINT DIAGRAMS.

E. GUARANTEE

- 1. ALL WORK PERFORMED AND ALL MATERIAL AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE FREE FROM DEFECTS AND SHALL REMAIN SO FOR A PERIOD OF AT LEAST ONE (1) YEAR FROM THE DATE OF ACCEPTANCE.

F. EQUIPMENT AND MATERIAL, GENERAL

- 1. ALL EQUIPMENT AND COMPONENTS SHALL BE NEW AND THE MANUFACTURER'S CURRENT MODEL.
2. ALL EQUIPMENT AND COMPONENTS SHALL BE INSTALLED IN STRICT COMPLIANCE WITH MANUFACTURER'S RECOMMENDATIONS.
3. ALL EQUIPMENT SHALL BE ATTACHED TO WALL AND CEILING/FLOOR ASSEMBLIES AND SHALL BE HELD FIRM IN PLACE. (E.G., DETECTORS SHALL NOT BE SUPPORTED SOLELY BY SUSPENDED CEILINGS). FASTENERS AND SUPPORTS SHALL BE ADEQUATE TO SUPPORT THE REQUIRED LOAD.
G. CONDUIT AND WIRE
1. CONDUIT
a. CONDUIT SHALL BE 3/4 INCH MINIMUM. COUPLING AND CONNECTORS SHALL BE SET SCREW STEEL IN DRY LOCATIONS. COMPRESSION TYPE IN WET LOCATIONS.
2. WIRES
a. NUMBER AND SIZE OF CONDUCTORS SHALL BE AS RECOMMENDED BY THE FIRE ALARM SYSTEM MANUFACTURER, BUT NOT LESS THAN 18 AWG FOR LIGHTING DEVICE CIRCUITS AND SIGNALING LINE CIRCUITS, AND 14 AWG FOR NOTIFICATION DEVICE CIRCUITS.
b. WIRE AND CABLE NOT INSTALLED IN CONDUIT SHALL HAVE A FIRE RESISTANCE RATING SUITABLE FOR THE INSULATION AS INDICATED IN NFPA 70 (FPLR).
3. THE MAIN FIRE ALARM CONTROL PANEL SHALL BE CONNECTED TO A SEPARATE DEDICATED BRANCH CIRCUIT, MAXIMUM 20 AMPERES. THIS CIRCUIT SHALL BE LABELED AT THE MAIN POWER DISTRIBUTION PANEL AS FIRE ALARM. FIRE ALARM CONTROL PANEL PRIMARY POWER WIRING SHALL BE 12 AWG. THE CONTROL PANEL CABINET SHALL BE GROUNDING SECURELY TO EITHER A COLD WATER PIPE OR GROUNDING ROD.

H. MAIN FIRE ALARM CONTROL PANEL

- 1. THE MAIN FACP SHALL BE BY SILENT NIGHT AND SHALL CONTAIN A MICROPROCESSOR BASED CENTRAL PROCESSING UNIT (CPU). THE CPU SHALL COMMUNICATE WITH AND CONTROL SLAVE MICROPROCESSOR CONTROLLED MODULES WHICH PROVIDE THE INTERFACE TO INITIATING DEVICE CIRCUITS; NOTIFICATION APPLIANCE CIRCUITS; BUILDING CONTROLS.
2. SYSTEM CAPACITY AND GENERAL OPERATION
a. THE CONTROL PANEL SHALL INCLUDE THE FOLLOWING STANDARD CIRCUITS:
1) FORM C ALARM AND TROUBLE RELAYS.
2) TWO STYLE Y OR Z NOTIFICATION CIRCUITS.
3) MUNICIPAL BOX CONNECTION. (DELETE IF NOT APPLICABLE)
4) REVERSE POLARITY CONNECTION.
b. THE CONTROL PANEL SHALL HAVE THE ABILITY FOR EIGHT OPTIONAL CONTROL POINTS FOR A MAXIMUM SYSTEM CAPACITY OF 16 INITIATING AND 12 OUTPUT CIRCUITS.
c. THE CPU SHALL PROVIDE THE FOLLOWING OPERATOR CONTROLS AND INDICATORS:
1) AC POWER (GREEN LED)
2) SYSTEMS ALARM (RED LED)
3) SUPERVISORY (YELLOW LED)
4) SYSTEM TROUBLE (YELLOW LED)
5) SIGNALS SILENCED (YELLOW LED)
6) ANNUNCIATOR/MODULE TROUBLE (YELLOW LED)
7) POWER TROUBLE (YELLOW LED)
d. ACKNOWLEDGE (MOMENTARY SWITCH)
e. SIGNAL SILENCE (MOMENTARY SWITCH)
f. SYSTEM RESET (MOMENTARY SWITCH)
g. LAMP TEST (MOMENTARY SWITCH)
h. NOTIFICATION CKT 1 ALARM (GREEN LED)
i. NOTIFICATION CKT 1 TROUBLE (YELLOW LED)
j. NOTIFICATION CKT 2 ALARM - (GREEN LED)
k. NOTIFICATION CKT 2 TROUBLE (YELLOW LED)
l. ALARM RELAY ON (GREEN LED)
m. ALARM RELAY/TROUBLE (YELLOW LED)
n. REMOTE SIG/CITY TIE ON (GREEN LED)
o. REMOTE SIG/CITY TIE TRBL (YELLOW LED)
p. NOTIFICATION AND RELAY CIRCUITS SHALL BE PROGRAMMABLE TO ACTIVATE ON ALARM FROM A SINGLE INITIATING ZONE OR COMBINATION OF INITIATING ZONES. SYSTEMS WHICH ARE LIMITED IN PROGRAMMING, SUCH AS GENERAL ALARM, ARE NOT ACCEPTABLE SUBSTITUTES.
q. THE FACP SHALL HAVE THE FOLLOWING PROGRAMMABLE FUNCTIONS:
1) SIGNAL SILENCE INHIBIT, 30 SECONDS TO 5 MINUTES.
2) AUTOMATIC SILENCE SELECT, 5 TO 20 MINUTES.
3) PRE-SIGNAL DELAY - SELECT 1 TO 3 MINUTES.
4) POSITIVE ALARM SEQUENCES, PER NFPA 72 3-8.3.
5) TROUBLE REMINDER.

