D3324L - JACKSONVILLE AR WEST CO -

1096 TEXAS BLVD, LITTLE ROCK AFB, AR 72099

DRAWING INDEX

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GENERATOR REPLACEMENT

100% OWNER REVIEW SET

PROJECT TEAM

CLIENT:	BRIGHTSPEED
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ENGINEERING:	CEC GROUP, LLC 2550 CORPORATE EXCHANGE DRIVE, SUITE 350 COLUMBUS, OHIO 43231
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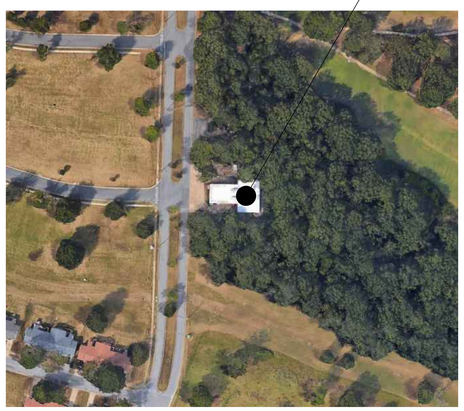
CODE SUMMARY

- 2021 ARKANSAS BUILDING CODE (IBC 2021 AMENDED)
- 2021 ARKANSAS FIRE CODE (IFC 2021 AMENDED)
- 2018 ARKANSAS FUEL GAS CODE (IFGC 2018 AMENDED)
- 2020 ARKANSAS ELECTRICAL CODE (NFPA 70, 2020 AMENDED)
- 2009 ARKANSAS ENERGY CODE ((IECC 2009 AMENDED)

VICINITY MAP

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099



PROJECT SCOPE

1. SEAL EXISTING SUPPLY/EXHAUST LOUVERS IN OLD GENERATOR ROOM & REMOVE EXHAUST FAN.
2. REMOVE AND REPLACE EXISTING GENERATOR
3. REMOVE EXISTING GENERATOR RADIATOR AND ASSOCIATED PIPING
4. REMOVE EXISTING GENERATOR EXHAUST PIPE AND SILENCER ON ROOF
5. REMOVE AND REPLACE EXISTING AUTOMATIC TRANSFER SWITCH
6. PROVIDE NEW LOAD BANK/TEMPORARY GENERATOR QUICK CONNECT PANEL
7. PROVIDE NEW FEEDERS BETWEEN ALL NEW EQUIPMENT

CEC GROUP
CONSULTING ENGINEERS
2550 CORPORATE EXCHANGE DRIVE, SUITE 350
COLUMBUS, OHIO 43231
PHONE: (614) 392-2902

DATE	DRAWINGS ISSUED
04/14/26	100% OWNER REVIEW SET
08/28/26	ISSUED FOR BID

ABBREVIATIONS

ABBREVIATION	TERM
1P	SINGLE POLE
1PH	SINGLE PHASE
3P	THREE POLE
3PH	THREE PHASE
4W	FOUR WIRE
A	AMPERAGE
AF	AMP-FRAME
AS	AMP-SENSOR
AT	AMP-TRIP
ATS	AUTOMATIC TRANSFER SWITCH
ASTS/STS	AUTOMATIC/STATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BIL	BASIC INSULATION LEVEL
CT	CURRENT TRANSFORMER
CU	COPPER
DS	DISCONNECT SWITCH
EO	ELECTRONICALLY OPERATED
EPO	EMERGENCY POWER OFF
FLA	FULL LOAD AMPS
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
GEN	GENERATOR
GFI/GFCI	GROUND FAULT INTERRUPTER
GND	GROUND
HOA	HAND-OFF-AUTO
HP	HORSE POWER
J-BOX	JUNCTION BOX
KAIC	AMPERE INTERRUPTING CAPACITY
LTG	LIGHTING
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MTS	MANUAL TRANSFER SWITCH
NC	NORMALLY CLOSED
NF	NON-FUSED
NL	NIGHT LIGHT
NO	NORMALLY OPEN
OL	OVERLOAD
PB	PUSHBUTTON
PNL	PANEL
RCPT	RECPETACLE
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TP	TWISTED PAIR
TFMR	TRANSFORMER
TPS	TWISTED SHIELDED PAIR
UPS	UNINTERRUPTABLE POWER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE
WP	WEATHER PROOF

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION	HEIGHT (UON)
	DUPLEX RECEPTACLE	+ 18"AFF
	QUADPLEX RECEPTACLE	+ 18"AFF
	SIMPLEX RECEPTACLE	+ 18"AFF
GF	DUPLEX RECEPTACLE W/ GROUND FAULT INTERRUPTER	+ 18"AFF
WP	DUPLEX RECEPTACLE W/ GROUND FAULT INTERRUPTER AND WEATHERPROOF WHILE IN USE ENCLOSURE	+ 18"AFF
	SPECIAL TYPE RECEPTACLE COORDINATE FINAL NEMA CONFIGURATION W/ SUPPLIED EQUIPMENT	+ 18"AFF
	DATA OUTLET PROVIDE 4x4 BACK BOX WITH 1" CONDUIT TO ABOVE ACCESSIBLE CEILING OR JOIST SPACE WITH PULL WIRE AND BUSHING. UON ON NETWORK DRAWINGS	+ 18"AFF
	ELECTRICAL PANELBOARD	6'-6"AFF (TOP)
	CEILING MOUNTED DEVICE	
	FLOOR MOUNTED DEVICE	
J	JUNCTION BOX	
OS	OCCUPANCY SENSOR CEILING MOUNTED	
SD	SMOKE DETECTOR	
S3 S4	LIGHT SWITCH - SINGLE, 3WAY, 4WAY	+42"AFF
SOS	LIGHT SWITCH, OCCUPANCY SENSOR	+42"AFF
SLV	LIGHT SWITCH, LOW VOLTAGE	+42"AFF
	EXIT SIGN CEILING/STEM MOUNTED	SEE LIGHTING FIXTURE SCHEDULE / ARCHITECTURE DRAWINGS
	EXIT SIGN, WALL MOUNTED	
	EXIT SIGN W/ EMERGENCY EGRESS LIGHTS	
	EMERGENCY EGRESS LIGHT	
VFD	VARIABLE FREQUENCY DRIVE (VFD)	+42"AFF
	MOTOR - SINGLE PHASE	
	MOTOR - THREE PHASE	
	CIRCUIT BREAKER AF - FRAME, AS - SENSOR, AT - TRIP L - LONG, S - SHORT, I - INSTANTANEOUS G - GROUND FAULT, A - ARC REDUCTION	
	SHUNT TRIP CIRCUIT BREAKER AF - FRAME, AS - SENSOR, AT - TRIP L - LONG, S - SHORT, I - INSTANTANEOUS G - GROUND FAULT, A - ARC REDUCTION	
	DISCONNECT SWITCH	
	FUSED SWITCH AF - FRAME, AT - TRIP, FUSE CLASS	
	TRANSFORMER	
	TRANSFER SWITCH	
K K	KIRK-KEY INTERLOCK	
SKRU	SOLENOID KEY RELEASE UNIT	
ATC	AUTOMATIC TRANSFER CONTROLLER	
M	METER	
ST	SHUNT TRIP	
CT	CT CABINET	
	GENERATOR	
N G	NEUTRAL TO GROUND BOND	

PROJECT PHASING NOTES

NOTE: THIS FACILITY IS A 24 HOUR, CRITICAL OPERATIONS BUILDING. ALL OUTAGES, POWER TRANSFERS, ETC., SHALL BE SCHEDULED AND COORDINATED AHEAD OF TIME WITH OWNER AND OWNER REPRESENTATIVE. ALL POWER TRANSFERS, OUTAGES, CONNECTIONS/DISCONNECTIONS, HOT WORK AND OTHER INVASIVE PROCEDURES SHALL BE ACCOMPANIED BY A CONTRACTOR PROVIDED METHOD OF PROCEDURE (MOP). MOP DOCUMENT SHALL BE SUBMITTED TO AND APPROVED BY THE OWNER PRIOR TO SCHEDULED OUTAGE/MAINTENANCE PERIOD.

CRITICAL SYSTEMS ARE ON STANDBY BATTERY SYSTEM. MAXIMUM UTILITY OUTAGE IS 4-HOURS, WITH A BATTERY RECHARGE OF AT LEAST (1) WEEK BETWEEN OUTAGES.

PHASE 1: REPLACE GENERATOR & INSTALL DOCKING STATION

1. LOCK EXISTING AUTOMATIC TRANSFER SWITCH INTO UTILITY POSITION.
2. DECOMMISSION AND DEMOLISH EXISTING STANDBY GENERATOR, DIESEL PUMP, DIESEL TANK & RELATED EQUIPMENT.
3. PROVIDE NEW CONCRETE SLAB FOR GENERATOR IN EXTERNAL EQUIPMENT YARD.
4. SET AND INSTALL NEW STANDBY GENERATOR.
5. SET AND INSTALL NEW TEMPORARY GENERATOR AND LOAD BANK DOCKING STATION.
6. PROVIDE PERMANENT FEEDER TO DOCKING STATION AND PERMANENT FEEDER TO EXISTING AUTOMATIC TRANSFER SWITCH.
7. PERFORM ON-SITE GENERATOR MANUFACTURER START UP. PROVIDE REPORT TO OWNER AND ENGINEER OF RECORD.
8. TEST AND COMMISSION DOCKING STATION VIA GENERATOR AND LOAD BANK.
9. TRANSFER AND RETURN BUILDING TO NORMAL OPERATION.

PHASE 2: INSTALL TEMPORARY GENERATOR AND LOAD BANK DOCKING STATION

10. TRANSFER BUILDING LOAD TO NEW GENERATOR. LOCK EXISTING AUTOMATIC TRANSFER SWITCH TO STANDBY POWER.
11. INSTALL NEW TEMPORARY GENERATOR AND LOAD BANK DOCKING STATION. PREPARE CONDUITS & FEEDERS TO INTERCEPT EXISTING NORMAL POWER UTILITY FEED WITH NEW MTS & PROVIDE TEMPORARY FEEDER TO EXISTING AUTOMATIC TRANSFER SWITCH.
12. INTERRUPT UTILITY SERVICE BY OPENING UTILITY DISCONNECT SWITCH.
13. INSTALL NEW SPD AT MAIN UTILITY DISCONNECT.
14. TEST AND COMMISSION DOCKING STATION VIA TEMPORARY GENERATOR AND LOAD BANK.
15. RESTORE UTILITY SERVICE BY CLOSING UTILITY DISCONNECT SWITCH.
16. TRANSFER AND RETURN BUILDING TO NORMAL OPERATION.

PHASE 3: REPLACE AUTOMATIC TRANSFER SWITCH

17. TRANSFER CRITICAL BUILDING LOAD TO BATTERY.
12. INTERRUPT UTILITY SERVICE BY OPENING UTILITY DISCONNECT SWITCH.
13. DECOMMISSION AND DEMOLISH EXISTING AUTOMATIC TRANSFER SWITCH.
14. INSTALL NEW AUTOMATIC TRANSFER SWITCH. RE-USE EXISTING FEEDER FROM MAIN UTILITY DISCONNECT SWITCH OR PROVIDE NEW AND RE-CONNECT FEEDER FROM DOCKING STATION.
13. INSTALL NEW SPD AT NEW AUTOMATIC TRANSFER SWITCH.
14. TRANSFER CRITICAL BUILDING LOAD TO NORMAL POWER.
15. PERFORM GENERATOR COMMISSIONING. REFER TO COMMISSIONING NOTES. PROVIDE REPORT TO ENGINEER OF RECORD AND OWNER.

COMMISSIONING NOTES

GENERATOR COMMISSIONING

1. FOLLOWING THE COMPLETION OF THE INSTALLATION, STARTUP, AND ACCEPTANCE TESTING OF ALL SYSTEMS AND EQUIPMENT, DETAILED POINT-BY-POINT TESTING OF THE SYSTEM IN ALL OPERATIONAL MODES SHALL BE COMPLETED TO CONFIRM PROPER PERFORMANCE AND OPERATION. THIS ACTIVITY IS SEPARATE AND INDEPENDENT FROM THE CONTRACTOR STARTUP ACTIVITY; HOWEVER, THE CONTRACTORS, SUPPLIERS, AND MANUFACTURERS WILL BE PART OF THE COMMISSIONING TEAM AND PARTICIPATE IN THE COMMISSIONING PROCESS.
2. COMMISSIONING SHALL BE SCHEDULED WITH THE OWNER AND COMPLETED DURING AN APPROVED MAINTENANCE PERIOD. COMMISSIONING SHALL BEGIN AFTER THE EQUIPMENT INSTALLATION IS COMPLETE AND THE MANUFACTURER COMPLETES START-UP.
3. THE CONTRACTOR IS RESPONSIBLE FOR SCHEDULING ALL EQUIPMENT, PERSONNEL, MANUFACTURERS TECHNICIANS AND PROVIDING ALL EQUIPMENT AND TOOLS AS REQUIRED FOR THE COMMISSIONING EFFORT.
4. THE CONTRACTOR IS RESPONSIBLE TO COMPLETE THE LEVEL 3 COMMISSIONING CHECKLIST CREATED BY THE COMMISSIONING AGENT AND TURN OVER TO THE COMMISSIONING AGENT PRIOR TO THE COMMISSIONING AGENT ARRIVING ON SITE.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CONNECTION TO DOCKING STATION LOAD BANK CAM LOCK CONNECTIONS FOR COMMISSIONING.

GENERATOR TESTING PROCEDURES

1. FULL LOAD BANK (150KW) BURN IN TEST FOR (4) HOURS IN NORMAL OPERATION.
2. TRANSIENT FUNCTIONALITY (LOAD STEPS)
3. BLOCK LOADS (LOAD STEPS)
4. ALARM TESTING
5. FULL BUILDING TRANSFER AND LOAD TEST FOR (2) HOURS IN NORMAL OPERATION.

TESTING EQUIPMENT

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE FOLLOWING EQUIPMENT AND SERVICES FOR COMMISSIONING:

1. POWER METERS
   - QUANTITY: 2
   - DURATION: 1 WEEK
   - PROVIDE CX PLUS MONITOR
   - POWER MONITOR, VOLTAGE LEADS & POWER SUPPLY
   - VENDOR INFORMATION (SAME AS CT'S)

     Rx MONITORING SERVICES, INC.

     1 SUNDIAL AVE STE 117N

     MANCHESTER, NH 03103
2. CT'S
   - QUANTITY: 8
   - DURATION: 1 WEEK
   - PROVIDE 10,000A 11.5" INNER DIAMETER ROGOWSKI COIL CT
3. RESISTIVE LOAD BANKS
   - SIZE: 150 KW
   - QUANTITY: 1
   - DURATION: 4 DAYS
   - PROVIDE LOAD BANK CABLES. CABLE LENGTH SHALL REACH A SAFE LOCATION TO DISCHARGE HEAT FROM LOAD BANK.
   - CABLE SHALL BE SIZED FOR LOAD BANK FULL LOAD RATING
   - COLOR TOUCHSCREEN HANDHELD CONTROLLER
   - INTERCONNECTION COMMUNICATION CABLE BETWEEN LOAD BANKS
   - POLARIS LUGS
4. THERMAL IMAGER
   - QUANTITY: 1
   - (1) IR TECHNICIAN
   - DURATION: 4 DAYS
   - PROVIDE NORMAL AND IR PICTURES, WITH TEMPERATURES IN DEGREES CELSIUS, IN A REPORT TO THE OWNER AND ENGINEER.

MANPOWER

THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AT A MINIMUM THE FOLLOWING MANPOWER FOR COMMISSIONING.

1. MECHANICAL CONTRACTOR
   - (1) TECHNICIAN
   - DURATION: 4 DAYS
2. ELECTRICAL CONTRACTOR
   - (2) ELECTRICIANS
   - DURATION: 4 DAYS
3. BMS CONTRACTOR
   - (1) TECHNICIAN
   - DURATION: 4 DAYS
4. GENERATOR MANUFACTURER TECHNICIAN
   - (1) TECHNICIAN
   - DURATION: 4 DAYS

DEFINITIONS

1. "INDICATED": REQUIREMENTS EXPRESSED BY GRAPHIC REPRESENTATIONS OR IN WRITTEN FORM ON DRAWINGS, IN SPECIFICATIONS, AND IN OTHER CONTRACT DOCUMENTS. OTHER TERMS INCLUDING "SHOWN," "NOTED," "SCHEDULED," AND "SPECIFIED" HAVE THE SAME MEANING AS INDICATED."
2. "FURNISH": SUPPLY AND DELIVER TO PROJECT SITE, READY FOR UNLOADING, UNPACKING, ASSEMBLY, INSTALLATION, AND SIMILAR OPERATIONS.
3. "INSTALL": OPERATIONS AT PROJECT SITE INCLUDING UNLOADING, TEMPORARILY STORING, UNPACKING, ASSEMBLING, ERECTING, PLACING, ANCHORING, APPLYING, WORKING TO DIMENSION, FINISHING, CURING, PROTECTING, CLEANING, AND SIMILAR OPERATIONS.
4. "PROVIDE": FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE.

LINETYPE LEGEND

- EXISTING
- EXISTING TO BE REMOVED/RELOCATED
- NEW
- FUTURE
- CONTROL WIRING

CIRCUIT BREAKER TESTING

1. CONTRACTOR SHALL HIRE A THIRD PARTY NETA TESTING AGENCY TO COMPLETE PRIMARY CURRENT INJECTION TESTING FOR ALL NEW CIRCUIT BREAKERS 400A AND LARGER. CONTRACTOR SHALL REMOVE CIRCUIT BREAKERS INSTALLED IN PANELBOARDS, SWITCHBOARDS, SWITCHGEAR, GENERATOR, ETC. COMPLETE TESTING, AND RE-INSTALL ALL CIRCUIT BREAKERS BACK IN THE ORIGINAL POSITION AFTER COMPLETION. NETA TESTING REPORTS SHALL BE TURNED OVER TO THE OWNER AND ENGINEER FOR REVIEW. NEMA TESTING AGENCY SHALL PROVIDE A STICKER ON EACH BREAKER TESTED INCLUDING THE DATE TESTED.

GENERAL NOTES

1. THESE GENERAL NOTES ON THIS SHEET APPLY TO ALL SHEETS.
2. THIS BUILDING IS AN ACTIVE CRITICAL OPERATIONS SITE COMPLETE WITH POWER CONDUITS AND CONDUCTORS, FIBER OPTIC CABLING, CABLE TRAYS, SMOKE DETECTORS, WATER AND REFRIGERANT PIPING, WATER DETECTION SENSORS, SECURITY CABLING AND DATA CABLES. THE CONTRACTOR SHALL AT ALL TIMES BE AWARE OF THE WORK ENVIRONMENT.
3. THIS IS A 24 HOUR, 7 DAY A WEEK FACILITY. THERE WILL BE NO SCHEDULED OR UNSCHEDULED SHUTDOWNS OF THE OWNERS SERVICES OR OF THE SERVICES EXTENDED FOR OWNERS CUSTOMERS.
4. ALL WORK SHALL BE SUPERVISED BY A DIRECT EMPLOYEE OF THE CONTRACTOR, AUTHORIZED TO SUPERVISE THE WORK, IMPLEMENT THE NECESSARY PROTECTIVE MEASURES, CURTAIL UNSAFE OR IMPROPER WORK PROCEDURES, AND FULLY INFORMED OF THE NATURE OF THE FACILITY AND THE SPECIAL PRECAUTIONS REQUIRED TO PERFORM WORK IN THE BUILDING.
5. PROVIDE THE OWNER'S REPRESENTATIVE WITH A COMPLETE LIST OF EMPLOYEES WHO WILL BE IN THE FACILITY, AND A LIST OF THE SUBCONTRACTORS (AND THEIR EMPLOYEES) PRIOR TO THE START OF WORK. ALL WORK SHALL BE PERFORMED BY DIRECT EMPLOYEES OF THE CONTRACTOR, OR BY DIRECT EMPLOYEES OF THE APPROVED SUBCONTRACTOR. THE OWNER RESERVES THE RIGHT TO PROHIBIT ANY EMPLOYEE OR SUBCONTRACTOR FROM WORKING ON SITE.
6. THE OWNER HAS THE RIGHT TO REFUSE ACCESS TO THE CRITICAL OPERATIONS SITE IF IN HIS OPINION THE EMPLOYEE OR SUBCONTRACTOR POSES A RISK TO THE OWNERS SERVICES.
7. COORDINATE WORK RULES IN, ON, OR AROUND THE FACILITY WITH THE OWNER PRIOR TO THE START OF CONSTRUCTION.
8. OBSERVE ALL FIRE AND LIFE SAFETY RULES, INCLUDING THE USE OF APPROVED AND CERTIFIED FIRE EXTINGUISHERS, PLACEMENT OF FIRE BLANKETS, THE USE OF INDEPENDENT FIRE WATCH PERSONNEL, CONTAINMENT AND POSTING OF APPROVED HOT WORK PERMITS, THE PROPER NOTIFICATION OF OWNER PERSONNEL PRIOR TO THE START OF WORK, AND THE USE OF WELDING SCREENS.
9. WHEN WORKING IN THE BUILDING THE CONTRACTOR SHALL NOTIFY THE OWNER AND REQUEST THAT THE FIRE ALARM SYSTEM BE PUT INTO THE TEST OR BYPASS MODE. THE CONTRACTOR SHALL CONFIRM WITH THE OWNER THAT THE PROPER FIRE ALARM MONITORING AUTHORITIES HAVE BEEN NOTIFIED. PERFORM NO WORK ON THE RAISED FLOOR UNTIL VERIFICATION OF THIS PROCEDURE IS COMPLETE.
10. ON A DAILY BASIS, PRIOR TO ENTERING THE BUILDING, THE CONTRACTOR SHALL NOTIFY THE OWNER AND INDICATE THE NATURE OF THE WORK AND THE AREA IN WHICH THE WORK WILL BE PERFORMED.
11. THERE ARE EXISTING CABLE TRAYS, FIBER OPTIC CABLES AND POWER CONDUIT/CONDUCTORS WITHIN THE BUILDING. COORDINATE ALL WORK WITH THE OWNER. DO NOT MOVE OR RELOCATE ANY EXISTING CONDUIT, PIPE OR CABLE TRAY WITHOUT THE SPECIFIC AND EXPRESSED APPROVAL OF THE OWNER. AVOID OR MINIMIZE ANY CONFLICTS WITH THE OWNERS CABLE TRAYS, CABLING AND CONDUITS. IN THE COURSE OF THE WORK, PROVIDE SUITABLE PROTECTION OF ALL SERVICES UNDER THE RAISED FLOOR. THIS PROTECTION INCLUDES, BUT IS NOT NECESSARILY LIMITED TO, WELDING BLANKETS, HARD PROTECTION SCREENS, TEMPORARY FIBER OPTIC CABLING PROTECTION, AND SPECIALTY VENTILATION/SMOKE EXTRACTION EQUIPMENT. ALL CONTRACTORS ARE REQUIRED TO MAINTAIN A CONTINUOUS MONITORING PROCESS WHEN WORKING UNDER THE RAISED FLOOR. ALL CONTRACTORS ARE REQUIRED TO PROVIDE PROTECTION OF SERVICES WHEN PERFORMING THEIR WORK.
12. FIELD VERIFY THAT THE FINAL INSTALLATION WILL ALLOW FOR SERVICE AND PREVENTATIVE MAINTENANCE ACCESS, AS RECOMMENDED BY THE MANUFACTURER.
13. COORDINATE THE FINAL ROUTE OF CONDUITS IN ORDER TO AVOID CONFLICTS WITH EXISTING DEVICES & EQUIPMENT.
14. PROVIDE FOR CEILING REMOVAL AND REPAIR AS NECESSARY FOR THE INSTALLATION OF CONDUITS, ETC.
15. PROVIDE FOR CAULKING AND PATCHING OF THE WALL FOR CONDUIT PENETRATIONS. SEAL ALL PENETRATIONS WITH FIRE RATED CAULK.
16. ALL CONDUCTORS SHALL BE CONTINUOUS WITHOUT ANY SPLICES. SPLICES ARE NOT ALLOWED IN ANY WIRING UNLESS A WRITTEN APPROVAL FROM THE ENGINEER IS PROVIDED.
17. UNLESS OTHERWISE INDICATED, ALL MOUNTING ELEVATIONS ARE CENTERLINE ELEVATIONS.
18. CONTRACTOR SHALL NOT BE PERMITTED TO CONSOLIDATE INDIVIDUAL CIRCUIT HOME RUNS.
19. WIRE AND CONDUIT SIZES AND QUANTITIES FOR FEEDERS AND BRANCH CIRCUITS WHICH ARE SHOWN ON ONE LINE POWER DIAGRAMS APPLY TO PLAN SHEETS.
20. PROVIDE AND SIZE ALL SLEEVES, HOLES, CORES, PATCHING, SLOTS, ANCHORS, BRACKETS, SUPPORTS, JUNCTION BOXES, PULL BOXES, AND OTHER APPURTENANCES NECESSARY TO EXECUTE THE CONTRACT DOCUMENTS COMPLETE. SOME OF THESE ITEMS MAY BE SHOWN ON THE DRAWINGS FOR CLARITY OR DESIGN PREFERENCE. HOWEVER, NOT ALL OF THE ITEMS, NECESSARY FOR COMPLETE EXECUTION AND INSTALLATION, ARE SHOWN.
21. PROVIDE TEMPORARY POWER AND LIGHTING DURING CONSTRUCTION. COORDINATE WITH OWNER.
22. ALL WORK SHALL BE PERFORMED ON DE-ENERGIZED EQUIPMENT.
23. PROVIDE PLENUM RATED EQUIPMENT ABOVE CEILING.
24. LABEL ALL JUNCTION BOXES WITH P-TOUCH LABEL THAT IDENTIFIES PANEL DESIGNATION AND CIRCUIT NUMBER.
25. RECEPTACLE LOCATIONS AND DIMENSIONS ARE SHOW FOR REFERENCE ONLY. THE CONTRACTOR SHALL COORDINATE FINAL LOCATION IN FIELD WITH OWNER TO DETERMINE THE EXACT LOCATION OF RECEPTACLES.
26. COORDINATE THE EXACT REQUIREMENTS AND LOCATION OF WORK WITH THE WORK OF OTHER TRADES PRIOR TO START. COORDINATE EXACT ROUTING OF CONDUIT WITH OTHER TRADES AND EXISTING CONDITIONS SO THAT NO CONFLICTS OCCUR WITH DUCTWORK, PIPING, LIGHTS, STRUCTURE, ETC. PROVIDE TO THE APPROPRIATE TRADES ALL PERTINENT DATA CONCERNING THE LOCATION, DIMENSIONS, ETC., OF THE ELECTRICAL EQUIPMENT THAT REQUIRES BASES, CURBS AND SUPPORTS.
27. COORDINATE PHASING OF ALL DEMOLITION WORK WITH OTHER TRADES AS WELL AS PHASING OF RENOVATION WORK. REVIEW RENOVATION DRAWINGS TO VERIFY AND DETERMINE EXTEND OF, AND SCHEDULING FOR, ALL DEMOLITION PRIOR TO PERFORMING DEMOLITION WORK.
28. VISIT THE SITE OF THE WORK TO GAIN AN ACCEPTABLE KNOWLEDGE OF CONDITIONS AFFECTING THE EXECUTION OF THE WORK, AFTER VISITING THE SITE, REQUEST SUCH INFORMATION AND/OR CLARIFICATIONS AS NECESSARY TO FULLY UNDERSTAND THE WORK REQUIRED AND PROPERLY ESTIMATE COSTS. THE RENDERING OF PROPOSAL OR BID TO PERFORM THE WORK SHALL REPRESENT THAT THE SITE HAS BEEN VISITED AND ALL CONDITIONS AFFECTING PERFORMANCE OF THE CONTRACT HAVE BEEN NOTED.
29. SCHEDULE ALL WORK AS TO CAUSE A MINIMUM OF "DOWN TIME" FOR THE OWNER, AS ANY INTERRUPTIONS OF EXISTING SERVICES BECOMES NECESSARY, SCHEDULE SUCH INTERRUPTIONS WITH THE OWNER PRIOR TO THEIR COMMENCEMENT. GIVE THE OWNER NO LESS THAN 30 DAYS NOTICE PRIOR TO SUCH INTERRUPTIONS. WORK SHALL BE PERFORMED AT SUCH TIMES AS DIRECTED BY THE OWNER.
30. ENSURE THAT THE WORK WILL NOT INTERFERE OR INTERRUPT SERVICES TO AREAS OUTSIDE OF THE DESIGNATED CONTRACT AREAS. UNAVOIDABLE INTERRUPTIONS ARE TO BE SCHEDULED IN ADVANCE AND TO OCCUR DURING OFF PEAK PERIODS (NIGHTS AND WEEKENDS).
31. SAWCUT OR CORE DRILL EXISTING FLOOR SLAB AS REQUIRED FOR INSTALLATION OF CONDUIT. DO NOT USE JACK HAMMER AS A MEANS OF CUTTING. CONTRACTOR SHALL LOCATE FLOOR SLAB PRE STRESSED CABLES AND STRUCTURAL RIBS BY MEANS OF GROUND PENETRATING RADAR (GPR) SCANNING OR OTHER RELIABLE METHOD PRIOR TO CUTTING OR CORE DRILLING. ADJUST FLOOR PENETRATIONS, WITH ENGINEER'S APPROVAL, TO AVOID DAMAGING THE PRE STRESSED CABLES OR CUTTING THE STRUCTURAL RIBS. ALL CONDUIT PENETRATIONS MUST OCCUR WITHIN THE SLAB VOID AREAS.
32. ALL FLOOR PENETRATIONS TO BE SEALED WITH UL LISTED FIRE STOPPING ASSEMBLIES.
33. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH THE NECESSARY CUTTING AND PATCHING AS REQUIRED FOR THE INSTALLATION OF THEIR WORK, UNLESS OTHERWISE NOTED.
34. ALL WORK IS TO BE PHASED AS INDICATED ON THE DRAWINGS. CLOSELY COORDINATE PHASING OF WORK WITH THE OWNER. LOADING DOCKS, DRIVE ACCESS AND CORRIDORS CAN NOT BE TOTALLY CLOSED OFF TO PEDESTRIAN TRAFFIC. TO ACCOMMODATE PHASING, CORRIDOR ACCESS WORK MAY NEED TO BE PERFORMED AT NIGHT AND ON WEEKENDS. PRIOR TO MOVING ON TO NEXT PHASE, ALL PREVIOUSLY PHASED AREAS MUST BE OPERATIONAL AND OCCUPIABLE. MAINTAIN SERVICES THROUGHOUT THE CONSTRUCTION.
35. CONTRACTOR IS RESPONSIBLE FOR THE REPLACEMENT OF ANY CEILING & FLOOR TILES DAMAGED AS A RESULT OF CONSTRUCTION.
36. PROVIDE A DETAIL METHODS OF PROCEDURE FOR REVIEW AND APPROVAL FOR ALL CRITICAL CONSTRUCTION ACTIVITIES.
37. PROVIDE A DETAILED CONSTRUCTION SCHEDULE IDENTIFYING EACH DAY'S ACTIVITIES.
38. THE EXISTING WORK SHOWN ON PLANS IS FROM AS-BUILT DOCUMENTATION AND FIELD OBSERVATIONS. ACTUAL CONDITIONS MAY VARY, AND THE CONTRACTOR SHALL FIELD VERIFY EXISTING WORK AND CONDITIONS WHETHER SHOWN OR NOT AND MAKE MINOR ADJUSTMENTS NECESSARY TO COMPLETE WORK. IF EXISTING CONDITIONS ARE FOUND THAT PROHIBIT THE WORK AS DIRECTED, NOTIFY THE ENGINEER IN WRITING FOR REDIRECTION AS REQUIRED.
39. PROVIDE A CONSTRUCTION DUMPSTER FOR THE DURATION OF CONSTRUCTION TO PROPERLY DISPOSE OF ALL CONSTRUCTION DEBRIS. COORDINATE DUMPSTER LOCATION WITH OWNER.
40. PROVIDE A THOROUGH CLEANING OF THE WORK AREA AFTER THE PROJECT IS COMPLETED. CLEAN THE INTERIOR & EXTERIOR OF ALL EQUIPMENT WHERE WORK WAS PERFORMED.
41. PANELBOARD DIRECTORY: A TYPED CIRCUIT DIRECTORY SHALL BE PROVIDED INDICATING LOCAL AREA SERVED AND LOCATION FOR EACH BRANCH CIRCUIT. FINAL PAYMENT SHALL NOT BE MADE UNTIL THIS IS COMPLETED.
42. PERFORM A MEGGER TEST FOR AT LEAST 1-MINUTE PER TEST PER SET OF CONDUCTORS. ALL FEEDERS, SWITCHBOARDS, UPS, ETC. SHALL BE TESTED. THE MEGGER TEST REPORT MUST BE SUBMITTED TO THE OWNER AND ENGINEER PRIOR TO ENERGIZING ANY OF THE NEW EQUIPMENT.
43. ALL BUS BAR CONNECTIONS, WIRE TERMINATIONS SHALL BE TORQUE TO MANUFACTURER RECOMMENDATIONS. TERMINATIONS AND BUS BAR CONNECTIONS SHALL BE MARKED WITH TORQUE MARKS INDICATING THE CONNECTIONS ARE PROPERLY MARKED. TERMINATIONS WITHOUT TORQUE MARKS SHALL BE RE-TORQUE AND WITNESSED BY THE OWNER OR ENGINEER. TORQUE REPORT MUST BE SUBMITTED TO THE OWNER AND ENGINEER PRIOR TO ENERGIZING NEW EQUIPMENT.
44. ALL CONDUCTORS SHALL BE INSTALLED IN CONDUIT, UNLESS NOTED OTHERWISE.
45. PROVIDE 2 HOLE, BURNDY HEAVY DUTY COMPRESSION LUGS WITH INSPECTION WINDOW FOR ALL FEEDER TERMINATIONS TO ALL EQUIPMENT FURNISHED BY OWNER AND BY THE CONTRACTOR. PHASE, NEUTRAL AND GROUND CONDUCTORS SHALL BE TERMINATED ONTO THOSE LUGS.
46. ALL COMPRESSION LUGS SHALL BE CRIMPED WITH BURNDY U CONNECTOR DIE. CONNECTOR DIE SHALL BE USED WITH APPROVED MANUFACTURE HYDRAULIC CRIMP TOOLS.
47. CONSULT ALL CONTRACT DRAWINGS - ARCHITECTURAL, CIVIL, STRUCTURAL, MECHANICAL, PLUMBING, BAS AND ELECTRICAL - WHICH MAY AFFECT THE LOCATION OF EQUIPMENT, PIPING, CONDUIT AND WIRING AND MAKE MINOR ADJUSTMENTS IN LOCATION TO SECURE COORDINATION.
48. FAILURE TO ADEQUATELY COORDINATE THE CONDUIT, PIPING, DUCTWORK AND EQUIPMENT WITH OTHER TRADES AND OWNER SHALL BE CAUSE FOR THE OFFENDING CONTRACTOR TO RELOCATE / RE-INSTALL CONFLICTING SERVICES AT THE CONTRACTOR'S EXPENSE.
49. CONTRACTOR SHALL SUBMIT 1/2" = 1'-0" COORDINATE PLANS PRIOR TO INSTALLATION OF EQUIPMENT. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE DETAILED INPUT, IN THE FORM OF DIMENSIONED FLOOR PLAN (IN ELECTRONIC AUTOCAD FORMAT) AND SECTIONAL REPRESENTATION SUBMITTALS, TO THE OTHER CONTRACTORS FOR THEIR USE IN A SET OF 1/2" SCALE COORDINATION DRAWINGS. IT IS INCUMBENT UPON THE CONTRACTOR TO INITIATE AND MAINTAIN THE COORDINATION COMMUNICATION WITH THE OTHER CONTRACTORS.
50. ALL HOT WORK WILL REQUIRE A UP TO A 30 BUSINESS DAY PRE-NOTIFICATION WITH AN ATTACHED MOP TO BE REVIEWED AND APPROVED BY OWNER. ALL MOP WORK WILL BE CONDUCTED DURING OFF HOURS IN A 6 HOUR WINDOW OF 2300 HOUR - 0500 HOUR. WORK THAT REQUIRES MOP INCLUDES BUT IS NOT LIMITED TO:
    - CIRCUIT BREAKER INSTALLATION
    - WIRING TERMINATION ONTO AN ENERGIZED SECTION OF ELECTRICAL EQUIPMENT
    - WORK REQUIRING THE TRANSFER OF BUILDING LOAD TO GENERATORS
    - PUNCH CONDUIT HOLES IN AN ENERGIZED SWITCHBOARD
    - PULL WIRE INTO ENERGIZED ELECTRICAL EQUIPMENT
    - ALL WORK REQUIRING SHUTTING DOWN ENERGIZED EQUIPMENT
    - ENERGIZING TRANSFORMERS & PDU
57. PROVIDE CONDUCTOR LENGTHS FOR ALL NEW THREE PHASE CIRCUITS TO THE ENGINEER.
58. ALL EQUIPMENT, CONDUIT, WIRE, ETC. REMOVED AS PART OF THIS PROJECT SHALL BE REMOVED FROM THE SITE AT THE CONTRACTORS EXPENSE UNLESS NOTED OTHERWISE.
59. PROVIDE PHENOLIC LABELING FOR ALL SERVICE ENTRANCE EQUIPMENT INDICATING THE AVAILABLE FAULT CURRENT AND DATE THE CALCULATION WAS PERFORMED PER NEC 110.24.

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D3324L - JACKSONVILLE AR WEST CO
GENERATOR REPLACEMENT

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

MARK	DATE	DESCRIPTION
	08/28	ISSUED FOR BID
	09/14/26	90% OWNER REVIEW

PROJECT NO:	25040-1
COMMISSION DATE:	-
DESIGNED BY:	JRS
DRAWN BY:	JRS
CHECKED BY:	JMM

1" ACTUAL

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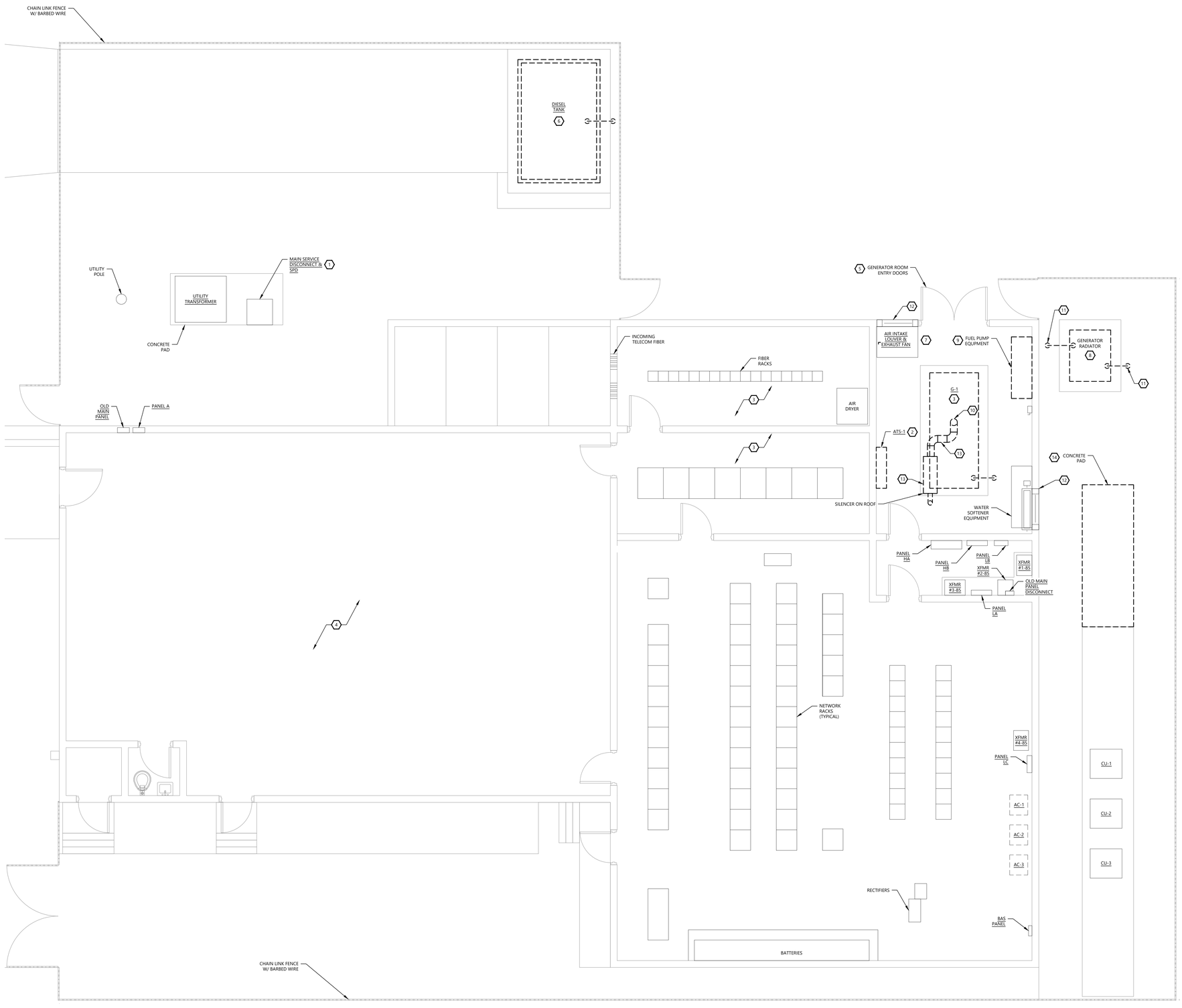
SHEET TITLE

ELECTRICAL GENERAL NOTES

E000



ELECTRICAL ENLARGED PLAN - DEMOLITION

SCALE: 1/4" = 1'-0"

CODED NOTES

1. APPROXIMATE LOCATION OF EXISTING MAIN DISCONNECT SWITCH AND SURGE PROTECTION DEVICE TO REMAIN.
2. APPROXIMATE LOCATION OF EXISTING INTERIOR AUTOMATIC TRANSFER SWITCH (ATS) TO BE REPLACED. EXISTING TRANSFER SWITCH TO BE LOCKED INTO UTILITY POSITION AND REMAIN IN OPERATION WHILE GENERATOR IS DISCONNECTED AND REPLACED. COORDINATE CONSTRUCTION PHASING AND OUTAGES WITH OWNER REPRESENTATIVE.
3. EXISTING GENERATOR TO BE REMOVED. EXISTING GENERATOR AND ASSOCIATED EQUIPMENT TO BE DECOMMISSIONED, DEMOLISHED AND FEEDERS REMOVED BACK TO SOURCE. RETAIN CONDUIT WHERE POSSIBLE FOR RE-USE DURING INSTALLATION OF NEW GENERATOR. DISCONNECT EXISTING EXHAUST, RADIATOR DUCTWORK AND FUEL SYSTEM. COORDINATE RIGGING AND REMOVAL OF EXISTING EQUIPMENT AND DEMOLISH EXISTING GENERATOR ACCESSORIES.
4. EXISTING EQUIPMENT LOCATIONS IN THIS AREA SHOWN FOR REFERENCE ONLY. EXISTING FLOOR PLAN INFORMATION FROM INCOMPLETE SOURCE. CONTRACTOR TO COORDINATE AND VERIFY EXISTING LOCATIONS AND SOURCES PRIOR TO START OF CONSTRUCTION. REFER TO NEW WORK PLAN FOR ADDITIONAL INFORMATION.
5. REMOVE AND REPLACE EXISTING DOOR AS REQUIRED SO GENERATOR CAN BE ACCESSED & REMOVED.
6. EXISTING DIESEL FUEL TANK TO BE REMOVED. DEMOLISH ALL CONDUIT AND WIRE BACK TO SOURCE. CONTRACTOR TO DRAIN, CLEAN AND RECYCLE EXISTING FLUIDS PER ARKANSAS DEPARTMENT OF ENERGY AND ENVIRONMENT STANDARDS, FEDERAL DOT STANDARDS AND API STANDARDS. FILL AND CAP EXISTING FUEL PIPING BELOW GRADE.
7. EXISTING MOTORIZED INTAKE AIR LOUVER AND EXHAUST FAN TO BE REMOVED. DEMOLISH EXISTING CONDUIT AND WIRE BACK TO SOURCE.
8. EXISTING GENERATOR RADIATOR AND STARTER TO BE REMOVED. DEMOLISH EXISTING CONDUIT AND WIRE BACK TO SOURCE.
9. EXISTING FUEL PUMP AND ASSOCIATED EQUIPMENT TO BE REMOVED. DEMOLISH EXISTING CONDUIT AND WIRE BACK TO SOURCE.
10. REMOVE GENERATOR EXHAUST PIPE THROUGH ROOF. CONTRACTOR TO PATCH ROOF AND MAKE WATER/AIR TIGHT. PATCH AND PAINT ROOF PENETRATION IN A FASHION THAT MATCHES EXISTING CONDITIONS.
11. REMOVE EXISTING REMOTE RADIATOR AND ASSOCIATED RADIATOR PIPING AND PIPE HANGERS. DRAIN AND REMOVE RADIATOR PIPING 6" BELOW GRADE AND CAP.
12. EXISTING LOUVER TO BE ABANDONED IN PLACE AND DISCONNECTED FROM CONTROL/POWER WIRING. CAP AND SEAL PENETRATION WITH DOUBLE WALL INSULATED ALUMINUM CAP.
13. EXISTING EXHAUST SILENCER, PIPING, ROOF CURBS, AND BRACING TO BE REMOVED FROM ROOF. CONTRACTOR TO PATCH ROOF TO MAKE AIR / WATER TIGHT AND MATCH EXISTING CONDITIONS.
14. REMOVE EQUIPMENT PAD AND PREPARE AREA FOR NEW GENERATOR PAD AND EQUIPMENT ENCLOSURE.

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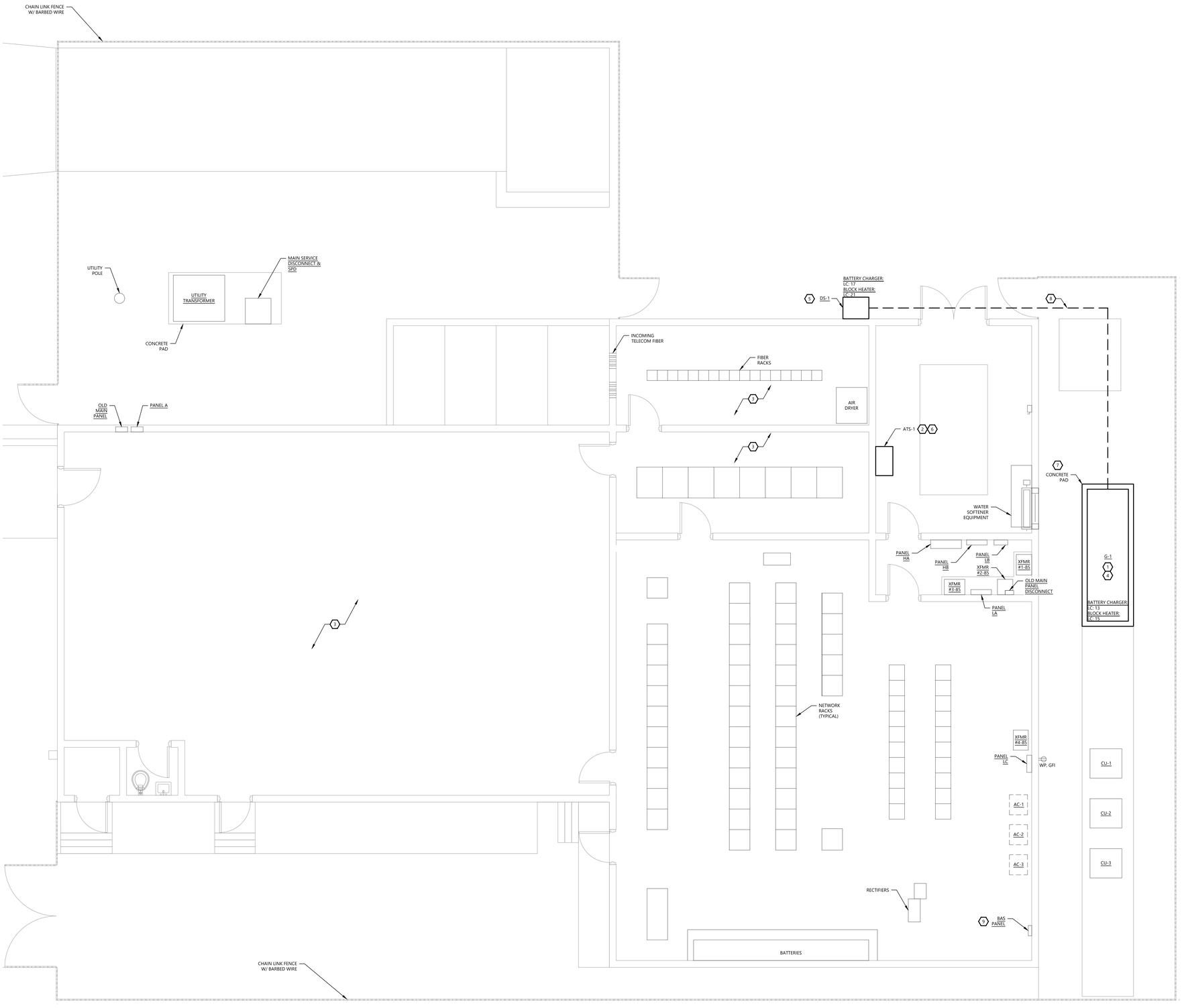
SHEET TITLE

ELECTRICAL FLOOR PLAN - DEMOLITION

E200



ELECTRICAL ENLARGED PLAN
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. LINE VOLTAGE WIRING SHALL BE RUN IN CONDUIT. INTERIOR CIRCUITS SHALL BE CONCEALED IN WALLS OR CEILING SPACES. CIRCUITS IN CEILING SPACES SHALL BE RUN TIGHT TO STRUCTURE ABOVE AND HORIZONTAL TO OR PERPENDICULAR WITH STRUCTURAL MEMBERS. CIRCUITS WITHIN PLENUM CEILINGS SHALL BE PLENUM RATED OR RUN IN METALLIC CONDUIT.
2. LOW VOLTAGE WIRING SHALL BE CONCEALED IN WALLS OR ABOVE CEILING SPACES AND SHALL BE RUN PERPENDICULAR WITH AND HORIZONTAL TO STRUCTURAL MEMBERS. LOW VOLTAGE WIRING SHALL BE RUN IN CONDUIT WHERE NON-ACCESSIBLE, WHERE OUTSIDE OF PROPERTY AND/OR WHERE SUBJECT TO PHYSICAL DAMAGE.
3. VERIFY VOLTAGE DROPS DO NOT EXCEED 3 PERCENT FOR BRANCH CIRCUITS, AND 5 PERCENT TOTAL, OTHERWISE, INCREASE 120 VOLT BRANCH CONDUCTORS BY ONE WIRE SIZE FOR EACH 75' OF CONDUCTOR LENGTH.
4. PROVIDE DISCONNECT SWITCHES AT ALL ELECTRICALLY POWERED EQUIPMENT AND FIXTURES (EVEN IF NOT SHOWN ON PLAN) UNLESS EQUIPMENT IS FURNISHED BY MANUFACTURER WITH INTEGRAL SWITCH, OR UNLESS CIRCUIT BREAKER IS LOCKABLE IN THE OFF POSITION AND APPROVED BY THE AHJ. PROVIDE FINAL CONNECTION FOR ALL ELECTRICALLY POWERED EQUIPMENT.
5. VERIFY VOLTAGE AND AMPACITY OF EXISTING ELECTRICAL EQUIPMENT TO REMAIN. VERIFY ADDITIONAL LOADS DO NOT OVERLOAD EXISTING PANELS, DISTRIBUTION SYSTEMS OR SERVICE. NOTIFY ENGINEER OF ALL CONFLICTS WITH THE PLANS.
6. COORDINATE FINAL LOCATION AND CONNECTION TO ALL OWNER PROVIDED EQUIPMENT PRIOR TO FINAL ELECTRICAL ROUGH IN. COORDINATE EXACT ELECTRICAL AND LOW VOLTAGE REQUIREMENTS PRIOR TO FINAL ROUGH IN.

CODED NOTES

1. PROPOSED LOCATION OF NEW GENERATOR. COORDINATE AND VERIFY FINAL LOCATION WITH OWNERS REPRESENTATIVE. RE-USE/RE-WORK EXISTING 5" CONDUIT TO PROVIDE NEW FEEDER BETWEEN GENERATOR AND AUTOMATIC TRANSFER SWITCH LOCATION. REFER TO GENERATOR SCHEDULE AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION. COORDINATE EXACT REQUIREMENTS IN FIELD.
2. PROPOSED LOCATION OF NEW AUTOMATIC TRANSFER SWITCH (ATS). PROVIDE OPEN TRANSITION SWITCH (ASCO 300 SERIES OR EQUAL). COORDINATE AND VERIFY FINAL LOCATION WITH OWNERS REPRESENTATIVE. RE-WORK/RE-USE EXISTING FEEDER WHERE POSSIBLE. PROVIDE ADDITIONAL CONDUIT AND WIRE AS REQUIRED TO EXTEND NORMAL AND GENERATOR FEEDERS TO NEW ATS LOCATION. REFER TO ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
3. EXISTING EQUIPMENT LOCATIONS IN THIS AREA SHOWN FOR REFERENCE ONLY. CONTRACTOR TO COORDINATE AND VERIFY EXISTING AND NEW EQUIPMENT LOCATIONS PRIOR TO START OF CONSTRUCTION.
4. CONTRACTOR TO PROVIDE ALL CONNECTIONS TO EXISTING BUILDING MONITORING AND ALARM SYSTEMS. COORDINATE EXACT REQUIREMENTS AND LOCATION WITH OWNER REPRESENTATIVE AND BRIGHTSPEED OPS 00690 STANDARD.
5. PROPOSED LOCATION OF NEW TEMPORARY GENERATOR QUICK CONNECT/LOAD BANK DOCKING STATION AND MANUAL TRANSFER SWITCH. ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL AT LOCATION AS SHOWN ON PLAN. DOCKING STATION TO BE 600A, 480V, 3Ø, 4W, 4P WITH GENERATOR AND LOAD BANK QUICK CONNECTS (ASCO 300 3QCDC OR EQUAL). REFER TO ONE LINE DIAGRAM AND SPECIFICATIONS FOR ADDITIONAL INFORMATION. INTERCEPT EXISTING FEED WITH DOCKING STATION AND PROVIDE ADDITIONAL CONDUIT & WIRE AS REQUIRED TO EXTEND EXISTING FEEDER TO NEW ATS LOCATION. COORDINATE EXACT REQUIREMENTS IN FIELD.
6. PROVIDE NEW SIDE MOUNTED SURGE PROTECTIVE DEVICE WITH ISOLATION SWITCH FOR EXISTING MAIN DISTRIBUTION. (EATON #SPD SERIES OR EQUAL). REFER TO ONE-LINE FOR ADDITIONAL INFORMATION.
7. PROVIDE NEW CONCRETE GENERATOR PAD. COORDINATE FINAL LOCATION, SIZE AND PAD REQUIREMENTS WITH OWNER REPRESENTATIVE AND APPROVED SUBMITTALS.
8. APPROXIMATE ROUTE OF UNDERGROUND CONDUITS FROM GENERATOR TO DOCKING STATION. CONTRACTOR TO TRENCH, BACKFILL AND PATCH WHERE NECESSARY.

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CHECKED BY:	JMM

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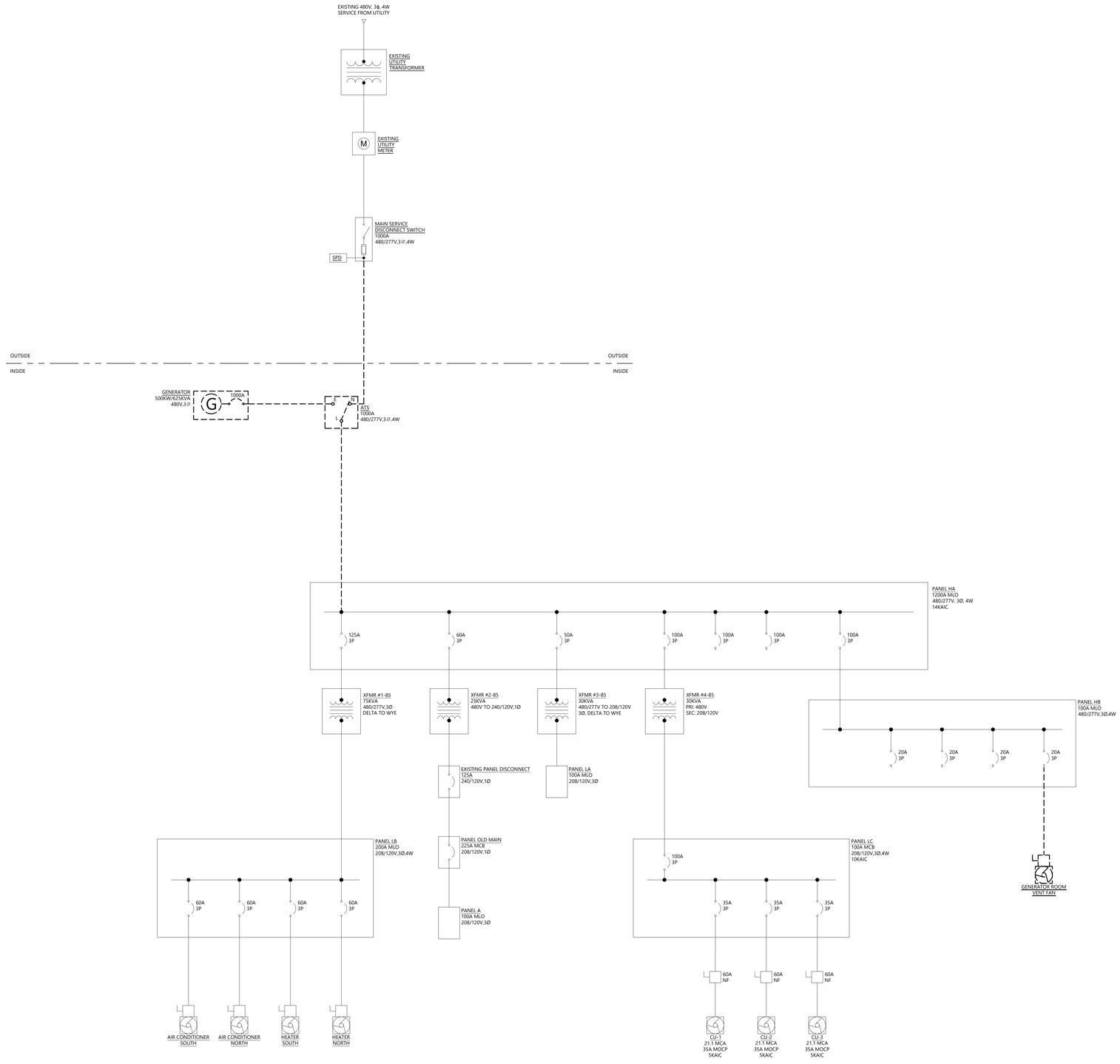
SHEET TITLE

ELECTRICAL FLOOR PLAN

E201



A ONE-LINE DIAGRAM - DEMOLITION

SCALE: NTS

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SHEET TITLE

ELECTRICAL ONE-LINE DIAGRAM - DEMOLITION

E400

GENERATOR SCHEDULE

						ALTERNATOR		ENGINE				ELECTRICAL				
MARK	MFR.	MODEL	DESCRIPTION	RATING	WEIGHT W/O FUEL	MODEL	TEMP RISE	MFR.	MODEL	DISPL. (CU.IN)	BHP	AMP	VOLT	POLE	HZ	POWER (KW/KVA)
G-1	GILLETTE	SPD-1500-3-4	150KW DIESEL GENERATOR SET	STANDBY	6,987 LBS	-	120°C	PERKINS	1106D-E70TAG4	428	281	225	480	4	60	150/188

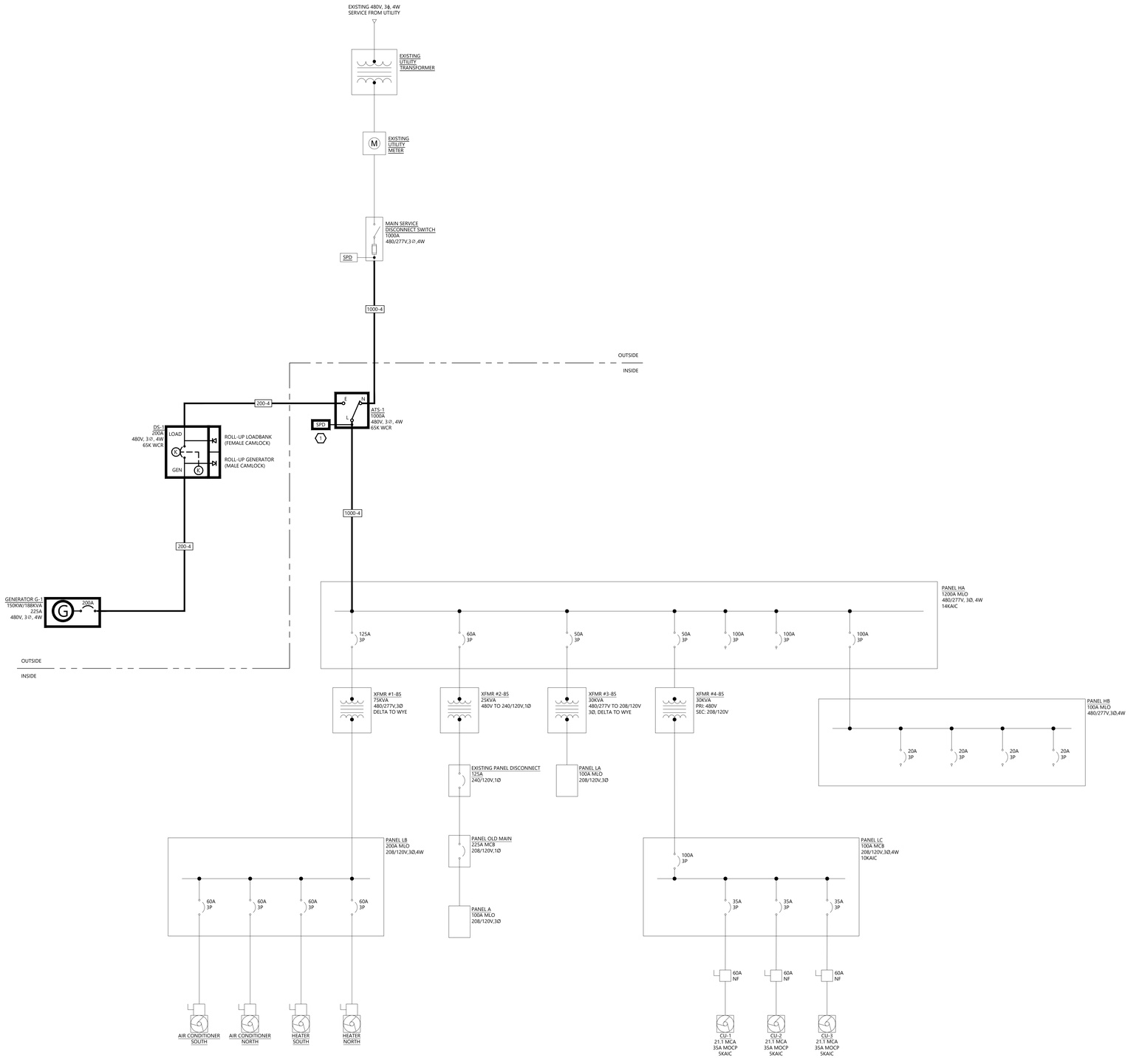
NOTES:
1. BASIS OF DESIGN IS GILLETTE DIESEL STANDBY GENERATOR. EQUAL ALTERNATES BY CATERPILLAR, CUMMINS, REHLKO OR OTHERS ALLOWED UPON APPROVAL
2. PROVIDE WITH DEEP SEA 7420 MKII CONTROLLER.
3. PROVIDE WITH ALUMINUM SOUND ATTENUATED, LOCKABLE ENCLOSURE. WITH EXTERIOR MOUNTED EMERGENCY STOP.
4. PROVIDE WITH FACTORY INSTALLED, GENERATOR MOUNTED OVERCURRENT PROTECTION.
5. PROVIDE WITH JACKET HEATER.
6. PROVIDE WITH BATTERY CHARGER.
7. GENERATOR SET TO BE FACTORY TESTED AND INCLUDE ON-SITE TESTING AND STARTUP FROM QUALIFIED TESTING AGENCY.
8. PROVIDE 24 MONTH MANUFACTURER WARRANTY.
9. PROVIDE (1) 1" CONDUIT FROM GENERATOR TO ATS FOR CONTROL WIRING.
10. PROVIDE CONTROL WIRING & CONDUIT FROM GENERATOR CONTROLLER DRY CONTACT TO FIRE ALARM PANEL.
11. PROVIDE CONDUIT & WIRING FOR MODBUS CONNECTION BETWEEN BUILDING BMS & GENERATOR CONTROLLER.
12. PROVIDE WITH 48-HOUR SUB-BASE FUEL TANK.

PROVIDE THE FOLLOWING ALARMS:
1. LOW OIL PRESSURE
2. ENGINE FAIL TO START
3. HIGH ENGINE TEMPERATURE
4. ENGINE OVER SPEED
5. ENGINE UNDER SPEED
6. OVERVOLTAGE
7. UNDERVOLTAGE
8. BATTERY FAILURE
9. GENERATOR RUNNING
10. GENERATOR FAILURE
11. MAIN TANK LOW FUEL
12. CRANK BATTERY CHARGER FAILURE
13. LOW COOLANT TEMPERATURE

FEEDER SCHEDULE

TAG	# SETS	PHASE		GROUND		CONDUIT	NOTES
		#	SIZE	#	SIZE		
1000-4	3	4	400	1	2/0	3"	
200-4	1	4	4/0	1	6	2-1/2"	

NOTES:
1. ALL INTERIOR FEEDERS TO BE COPPER THHN/THWN CONDUCTORS IN EMT CONDUIT UNLESS OTHERWISE NOTED.
2. ALL EXTERIOR ABOVE GRADE FEEDERS TO BE COPPER XHHW IN RMC CONDUIT UNLESS OTHERWISE NOTED.
3. ALL BELOW GRADE FEEDERS TO BE COPPER XHHW IN SCHEDULE 40 PVC CONDUIT UNLESS OTHERWISE NOTED.
4. ALL CONDUCTOR SIZES SHOWN ARE MINIMUM. CONTRACTOR SHALL ADJUST CONDUCTOR AND CONDUIT SIZE AS REQUIRED FOR VOLTAGE DROP, THERMAL DERATING AND FIELD CONDITIONS.



A ONE-LINE DIAGRAM - NEW
SCALE: NTS

CODED NOTES

1. PROVIDE NEW 22 KA SIDE MOUNTED SURGE PROTECTIVE DEVICE WITH ISOLATION SWITCH AND INTEGRAL COMPONENT LEVEL FUSING. PROVIDE WITH DRY CONTACTS FOR ALARM CONNECTION PER BRIGHTSPEED OPS 00690 ALARM STANDARDS. PROVIDE NEW DISCONNECT SWITCH FOR SPD, AND PROVIDE CONDUIT AND WIRING AS NECESSARY FOR ALL FINAL CONNECTIONS.

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1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

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SHEET TITLE

ELECTRICAL ONE-LINE DIAGRAM

E401

NAME: HA
LOCATION: ELECTRICAL ROOM
MOUNTING: SURFACE
SOURCE: UTILITY

FRAME SIZE: 1200 AMP
MAIN SIZE: 1200 AMP MLO
AIC RATING: 14 KAIC

VOLTAGE: 480Y/277V
PHASE: 3Ø
WIRE: 4

LOAD DESCRIPTION	WIRE	CB	P	N	#	A	B	C	#	N	P	CB	WIRE	DESCRIPTION
					1	0.000	0.000		2					
SPARE		100	3		3		0.000	0.000	4		3	100		SPARE
					5			0.000	0.000	6					
UNUSABLE SPACE					7	0.000	11.118			8				
					9		0.000	11.438		10	R	3	50	ETR	30 KVA XFMR #4-85 PANEL LC
					11			0.000	10.438	12					
SPARE		100	3		13	0.000	0.650			14					
					15		0.000	0.650		16		3	30	ETR	RECTIFIERS 1, 2, 3
					17			0.000	0.650	18					
RECTIFIERS 4, 5, 6	ETR	30	3		19	0.650	0.650			20					
					21		0.650	0.650		22		3	30	ETR	RECTIFIERS 7, 8, 9
					23			0.650	0.650	24					
					25	4.000	6.600			26					
PANEL HB	ETR	100	3		27		4.100	3.220		28		3	60	ETR	25 KVA XFMR #2-85 OLD MAIN PANEL
					29			0.000	0.000	30					
					31	22.000	7.430			32					
75 KVA XFMR #1-85 PANEL LB	ETR	125	3		33		22.000	12.670		34		3	50	ETR	30 KVA XFMR #3-85 PANEL LA
					35			22.000	11.480	36					
					37	0.000	0.650			38					
SPARE		100	3		39		0.000	0.650		40		3	30	ETR	RECTIFIERS 10, 11, 12
					41			0.000	0.650	42					
CONNECTED LOAD PER PHASE:						53.748 KVA	56.028 KVA	46.518 KVA							

ELECTRICAL LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD	CODE REFERENCE
LIGHTING	14.600	125%	18.250	NEC 220.42/NEC 215.2
RECEPTACLE	16.880	FIRST 10 KVA + 50% REMAINING	13.440	NEC 220.44
MOTOR	9.000	125% LARGEST + 100% REMAINING	9.000	NEC 220.50
EQUIPMENT	103.640	100%	103.640	NEC 440.6
EQUIPMENT (CONTINIOUS)	0.000	125%	0.000	NEC 440.6/NEC 215.2
NON-COINCIDENTAL	12.174	0%	0.000	NEC 220.61
TOTAL CONNECTED LOAD:	156.294 KVA	**TOTAL DEMAND LOAD:**	144.330 KVA	
TOTAL CONNECTED AMPS:	188.0 AMPS	**TOTAL DEMAND AMPS:**	173.6 AMPS	

NAME: LC
LOCATION: NETWORK ROOM
MOUNTING: SURFACE
SOURCE: HA

FRAME SIZE: 100 AMP
MAIN SIZE: 100 AMP MCB
AIC RATING: 10 KAIC

VOLTAGE: 208Y/120V
PHASE: 3Ø
WIRE: 4

LOAD DESCRIPTION	WIRE	CB	P	N	#	A	B	C	#	N	P	CB	WIRE	DESCRIPTION
CU-1	ETR	35	3		1	2.522	2.522		2					
					3		2.522	2.522	4		3	35	ETR	CU-2
					5			2.522	2.522	6				
CU-3	ETR	35	3		7	2.522	0.936		8					
					9		2.522	0.936	10		2	15	ETR	AC-1
					11			2.522	0.936	12				
GENERATOR BATTERY CHARGER	(2)#12 & (1)#12G	20	1		13	1.000	0.936		14		2	15	ETR	AC-2
GENERATOR BLOCK HEATER	(2)#12 & (1)#12G	20	1		15		1.000	0.936	16					
TEMP GEN BATTERY CHARGER	(2)#12 & (1)#12G	20	1		17			1.000	0.936	18				
BAS PANEL	ETR	20	1		19	0.500	0.180		20		1	20	ETR	EXTERIOR RECEPTACLE
TEMP GEN BLOCK HEATER	(2)#12 & (1)#12G	20	1		21		1.000	0.000	22			20		SPARE
SPARE		20	1		23			0.000	0.000	24		20		SPARE
SPARE		20	1		25	0.000	0.000		26			20		SPARE
SPARE		20	1		27		0.000	0.000	28			20		SPARE
SPARE		20	1		29			0.000	0.000	30		20		SPARE
SPARE		20	1		31	0.000	0.000		32			20		SPARE
SPACE					33		0.000	0.000	34					SPACE
SPACE					35			0.000	0.000	36				SPACE
SPACE					37	0.000	0.000		38					SPACE
SPACE					39		0.000	0.000	40					SPACE
SPACE					41			0.000	0.000	42				SPACE
CONNECTED LOAD PER PHASE:						11.118 KVA	11.438 KVA	10.438 KVA						

ELECTRICAL LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	DEMAND LOAD	CODE REFERENCE
LIGHTING	0.000	125%	0.000	NEC 220.42/NEC 215.2
RECEPTACLE	0.180	FIRST 10 KVA + 50% REMAINING	0.180	NEC 220.44
MOTOR	0.000	125% LARGEST + 100% REMAINING	0.000	NEC 220.50
EQUIPMENT	22.440	100%	22.440	NEC 440.6
EQUIPMENT (CONTINIOUS)	0.000	125%	0.000	NEC 440.6/NEC 215.2
NON-COINCIDENTAL	10.374	0%	0.000	NEC 220.61
TOTAL CONNECTED LOAD:	32.994 KVA	**TOTAL DEMAND LOAD:**	22.620 KVA	
TOTAL CONNECTED AMPS:	91.6 AMPS	**TOTAL DEMAND AMPS:**	62.8 AMPS	

NOTE:
EXISTING PANEL TO REMAIN. ALL BREAKERS ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED. EXISTING CIRCUIT INFORMATION FROM BEST SOURCE AVAILABLE. ELECTRICAL CONTRACTOR TO COORDINATE AND FIELD VERIFY EXISTING CIRCUITS TO REMAIN AND SPARE CIRCUIT AVAILABILITY PRIOR TO ELECTRICAL ROUGH-IN. REUSE EXISTING CIRCUIT/SPARES TO EXTENT POSSIBLE UNLESS OTHERWISE NOTED. PROVIDE ADDITIONAL BREAKERS IN AVAILABLE SPACES AS REQUIRED FOR NEW CIRCUITS. REVISE PANEL SCHEDULES TO AS-BUILT CONDITIONS AT COMPLETION OF WORK.

CEC GROUP
CONSULTING ENGINEERS
2550 CORPORATE EXCHANGE DR, SUITE 350
COLUMBUS, OHIO 43231
PHONE: (614) 392-2902

CONSULTANTS

SEAL

NOT FOR CONSTRUCTION

brightspeed

D3324L - JACKSONVILLE AR WEST CO
GENERATOR REPLACEMENT

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

MARK	DATE	DESCRIPTION
	08/28	ISSUED FOR BID
	~~08~~ 04/26	90% OWNER REVIEW

PROJECT NO: 25040-1
COMMISSION DATE: -
DESIGNED BY: JRS
DRAWN BY: JRW
CHECKED BY: JMM

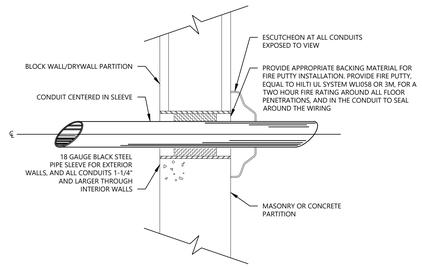
1" ACTUAL

IF THE ABOVE DIMENSION DOES NOT MEASURE ONE INCH (1") EXACTLY, THIS DRAWING WILL HAVE BEEN ENLARGED OR REDUCED, AFFECTING ALL LABELED SCALES.

SHEET TITLE

PANEL SCHEDULES

E500



A TYPICAL WALL PENETRATION CONDUIT DETAIL

SCALE: N.T.S.

NOTE:

- TYPICAL FOR ALL HORIZONTAL CONDUIT PENETRATIONS.

<NAME>
FED FROM <NAME>
<###> AMPS
<###>V, <#>Ø, <#>W

(UNDER LOSS OF NORMAL POWER, THIS EQUIPMENT IS SERVED FROM A STANDBY SOURCE.)

B EQUIPMENT LABEL DETAIL

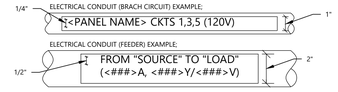
SCALE: N.T.S.

NOTE:

- CONTRACTOR SHALL PROVIDE LABELS AS SPECIFIED HEREIN AND SIMILAR TO THAT SHOWN ABOVE FOR ALL NEW PANELBOARDS, SWITCHBOARDS, SWITCHGEAR, MOTOR CONTROL CENTERS, DISCONNECT SWITCHES, ETC. NEW LABELS SHALL ALSO BE PROVIDED FOR *ANY* EXISTING EQUIPMENT WITHIN THE PROJECT SCOPE (I.E. AT WHICH WORK IS BEING PREFORMED UNDER THIS PROJECT) WHICH DOES NOT ALREADY HAVE LABELING MEETING THESE REQUIREMENTS.
- EQUIPMENT IDENTIFIER LETTERING SHALL BE 1/2" HIGH AND ALL OTHER LETTERING SHALL BE 3/8" HIGH, LETTERING SHALL BE SAN SERIF TYPEFACE.
- LABELING COLORS SHALL BE AS FOLLOWS

POWER SOURCE	LETTERING	FIELD (BACKGROUND)
ALL	WHITE	GRAY

- INDOOR EQUIPMENT LABELS SHALL BE MIN. 1/8" THICK MELAMINE PLASTIC LAMINATE. FOR OUTDOOR EQUIPMENT, THE LABEL SHALL BE MIN. 1/16" STAINLESS STEEL, SIZE AS REQUIRED, AND PUNCHED FOR SCREWS.
- LABEL SHALL BE FASTENED WITH SELF-TAPPING STAINLESS STEEL SCREWS.



C TYPICAL CONDUIT LABELING

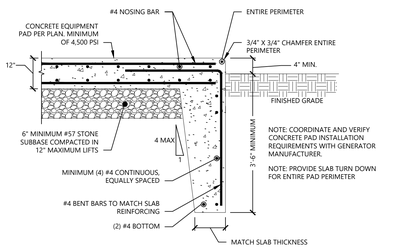
SCALE: N.T.S.

NOTE:

- PROVIDE P-TOUCH LABEL (MINIMUM HEIGHT AS INDICATED ABOVE WITH WIDTH AS REQUIRED) IN A SAN SERIF TYPEFACE. WITH COLORS AS NOTED BELOW. FIELD VERIFY COLORS AGAINST EXISTING SITE STANDARD. LABEL TEXT SHALL BE SIMILAR TO THAT SHOWN ABOVE.
- LABEL COLORS SHALL BE AS FOLLOWS

POWER SOURCE	LETTERING	FIELD (BACKGROUND)
ALL	WHITE	BLACK

- INDOOR EQUIPMENT LABELS SHALL BE MIN. 1/8" THICK MELAMINE PLASTIC LAMINATE. FOR OUTDOOR EQUIPMENT, THE LABEL SHALL BE MIN. 1/16" STAINLESS STEEL. SIZE AS REQUIRED, AND PUNCHED FOR SCREWS.
- LABEL SHALL BE FASTENED WITH SELF-TAPPING STAINLESS STEEL SCREWS.



D GENERATOR CONCRETE SLAB DETAIL

SCALE: N.T.S.

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SHEET TITLE

ELECTRICAL SCHEDULES & DETAILS

E600

SECTION 260100 - GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 GENERAL

1.01 CONFIDENTIALITY

A. ALL MATERIALS AND INFORMATION CONTAINED IN THESE DESIGN DOCUMENTS INCLUDE BUT NOT LIMITED TO DRAWINGS, SPECIFICATIONS, ADDENDUMS, BULLETIN AND CLARIFICATIONS SHALL BE KEPT CONFIDENTIAL.

1.02 CONTRACT DRAWINGS

A. THE DRAWINGS ACCOMPANYING THESE SPECIFICATIONS ARE COMPLEMENTARY EACH TO THE OTHER AND WHAT IS CALLED FOR BY ONE SHALL BE AS IF CALLED FOR BY BOTH.

B. CONSULT ALL CONTRACT DRAWINGS WHICH MAY AFFECT THE LOCATION OF EQUIPMENT, CONDUIT AND WIRING AND MAKE MINOR ADJUSTMENTS IN LOCATION TO SECURE COORDINATION.

C. WIRING LAYOUT IS SCHEMATIC AND EXACT LOCATIONS SHALL BE DETERMINED BY STRUCTURAL AND OTHER CONDITIONS. THIS SHALL NOT BE CONSTRUED TO MEAN THAT THE DESIGN OF THE SYSTEM MAY BE CHANGED; IT REFERS ONLY TO THE EXACT LOCATIONS OF CONDUIT AND EQUIPMENT TO FIT INTO THE BUILDING AS CONSTRUCTED AND WITH THE COORDINATION OF CONDUIT AND OTHER EQUIPMENT WITH PIPING AND EQUIPMENT INCLUDED UNDER OTHER DIVISIONS OF THE SPECIFICATIONS.

D. COORDINATE LAYOUT OF WORK WITH OTHER TRADES. MAKE MINOR ADJUSTMENTS IN LOCATION REQUIRED FOR COORDINATION. LOCATIONS OF STRUCTURAL SYSTEMS, HEATING WORK AND PLUMBING LINES SHALL TAKE PREFERENCE OVER LOCATIONS OF CONDUIT LINES WHERE CONFLICT OCCURS.

E. OTHER THAN MINOR ADJUSTMENTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL BEFORE PROCEEDING WITH THE WORK.

1.03 GENERAL

A. ANY DISCREPANCIES WITHIN DRAWINGS AND SPECIFICATIONS SHALL BE PROMPTLY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION DURING THE BIDDING PERIOD. NO ALLOWANCE SHALL SUBSEQUENTLY BE MADE TO THE CONTRACTOR BY REASON OF HIS FAILURE TO HAVE BROUGHT SAID DISCREPANCIES TO THE ATTENTION OF THE ENGINEER DURING THE BIDDING PERIOD OR OF ANY ERROR ON THE CONTRACTOR'S PART.

B. THE CONTRACTOR SHALL CHECK ALL EXISTING FIELD CONDITIONS (OR CIVIL, STRUCTURAL, ARCHITECTURAL AND MECHANICAL TRADES WORK) FOR POSSIBLE INTERFACE CAUSED BY CONDITIONS IN THE FIELD BEFORE BID IS MADE. NO ALLOWANCE SHALL SUBSEQUENTLY BE MADE TO THE CONTRACTOR BY REASON OF HIS FAILURE TO HAVE MADE SUCH EXAMINATIONS OR OF ANY ERROR ON HIS PART.

C. SHOULD ANY CHANGES IN THE DRAWINGS AND SPECIFICATIONS BE REQUIRED TO CONFORM TO THE ABOVE REGULATIONS, THE CONTRACTOR SHALL NOTIFY THE OWNER OR HIS REPRESENTATIVE AT THE TIME OF SUBMITTING HIS BID. AFTER ENTERING INTO THE OWNER-CONTRACTOR AGREEMENT, THE CONTRACTOR SHALL BE HELD TO COMPLETE ALL WORK NECESSARY TO MEET THESE REQUIREMENTS WITHOUT ADDITIONAL EXPENSE TO THE OWNER.

D. THE CONTRACTOR SHALL NOT ALLOW OR CAUSE ANY OF THE WORK TO BE COVERED UP OR ENCLOSED UNTIL IT HAS BEEN INSPECTED. ANY WORK THAT IS ENCLOSED OR COVERED UP BEFORE SUCH INSPECTION AND TEST SHALL BE UNCOVERED AT THE CONTRACTOR'S EXPENSE; AFTER IT HAS BEEN INSPECTED, THE CONTRACTOR SHALL RESTORE THE WORK TO ITS ORIGINAL CONDITION AT HIS OWN EXPENSE.

E. ALL WORK SHALL BE DONE IN ACCORDANCE WITH CONTRACT DOCUMENTS, IN A NEAT AND WORKMANLIKE MANNER CONSISTENT WITH RECOGNIZED GOOD PRACTICE, AND SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER OR HIS REPRESENTATIVE.

F. IF THE CONTRACTOR FAILS TO DO ANY REQUIRED PATCHING OR REPAIR ANY DAMAGE RESULTING FROM THE INSTALLATION OF THE ELECTRICAL WORK, SUCH PATCHING OR REPAIRING SHALL BE DONE BY THE OWNER AND THE COST SHALL BE PAID BY THE CONTRACTOR.

G. THE CONTRACTOR SHALL AT ALL TIMES KEEP THE PREMISES IN NEAT AND ORDERLY CONDITION AND REMOVE ALL DEBRIS RESULTING FROM THE WORK, AS WELL AS ALL TOOLS, EQUIPMENT, ETC., FROM THE SITE UPON COMPLETION OF THIS CONTRACT. ALL EQUIPMENT INCLUDING LIGHTING FIXTURES AND LENSES SHALL BE CLEAN AND FREE FROM DIRT, GREASE, FINGER MARKS, ETC., BEFORE FINAL ACCEPTANCE.

1.04 JOB-SITE COPY OF DOCUMENTS

A. MAINTAIN AT THE SITE, ONE COPY OF ALL DRAWINGS, SPECIFICATIONS, ADDENDA APPROVED SHOP DRAWINGS, CHANGE ORDERS AND OTHER MODIFICATIONS, IN GOOD ORDER AND MARKED TO RECORD ALL CHANGES MADE DURING CONSTRUCTION. THESE SHALL BE AVAILABLE TO THE OWNER'S REPRESENTATIVE AT ALL TIMES. THE DRAWINGS MARKED TO RECORD ALL CHANGES MADE DURING CONSTRUCTION SHALL BE DELIVERED TO THE OWNER'S REPRESENTATIVE UPON COMPLETION OF THE WORK.

1.05 SUBMITTALS

A. THE CONTRACTOR SHALL TURN OVER ALL CERTIFICATES OF APPROVAL FOR INSPECTIONS OF ELECTRICAL WORK TO THE OWNER PROMPTLY WHEN RECEIVED.THESE CERTIFICATES MUST BE RECEIVED BEFORE PAYMENT WILL BE MADE FOR THE WORK INVOLVED.

B. THE OWNER OR HIS REPRESENTATIVE RESERVES THE RIGHT TO REJECT ANY EQUIPMENT OR MATERIALS WHICH ARE NOT IN COMPLIANCE WITH THESE SPECIFICATIONS, OR THE APPROVED SHOP DRAWINGS, EITHER BEFORE OR AFTER INSTALLATION AT NO EXPENSE TO THE OWNER AND EQUIPMENT SHALL BE REPLACED WITH APPROVED EQUIPMENT BY THE CONTRACTOR AT NO COST TO THE OWNER.

C. PROVIDE SHOP DRAWINGS FOR ALL MATERIALS LISTED IN THIS SPECIFICATION.

D. THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR REVIEW, (1) ELECTRONIC COPY OF MANUFACTURER'S DRAWINGS AND WIRING DIAGRAMS. THE ENGINEER WILL REVIEW CONTRACTOR'S SHOP DRAWINGS AND RELATED SUBMITTALS (AS INDICATED BELOW) WITH RESPECT TO THE ABILITY OF THE DETAILED WORK, WHEN COMPLETE, TO BE A PROPERLY FUNCTIONING INTEGRAL ELEMENT OF THE OVERALL SYSTEM DESIGNED BY THE ENGINEER. BEFORE SUBMITTING A SHOP DRAWING OR ANY RELATED MATERIAL TO THE ENGINEER, CONTRACTOR SHALL: REVIEW EACH SUCH SUBMISSION FOR CONFORMANCE WITH THE MEANS, METHODS, TECHNIQUES, SEQUENCES, AND OPERATIONS OF CONSTRUCTION, AND SAFETY PRECAUTIONS THERETO, ALL OF WHICH ARE THE SOLE RESPONSIBILITY OF CONTRACTOR; APPROVE EACH SUCH SUBMISSION BEFORE SUBMITTING IT; AND SO STAMP EACH SUCH SUBMISSION BEFORE SUBMITTING IT. THE ENGINEER SHALL ASSUME THAT NO SHOP DRAWING OR RELATED SUBMITTAL COMPRISES A VARIATION UNLESS CONTRACTOR ADVISES ENGINEER OTHERWISE VIA A WRITTEN INSTRUMENT WHICH IS ACKNOWLEDGED BY ENGINEER IN WRITING. THE ITEMS, TYPES OF SUBMITTALS AND RELATED MATERIAL (IF ANY) CALLED FOR ARE INDICATED BELOW:

ITEMS	TYPE SUBMITTALS REQUIRED
CONDUIT	CATALOG CUTS
WIRE	CATALOG CUTS
DOCKING STATION	SHOP DRAWINGS
LIGHTING AND POWER PANELS	SHOP DRAWINGS
EMERGENCY GENERATOR	SHOP DRAWINGS
CIRCUIT BREAKERS	CATALOG CUTS
TRANSFER SWITCHES	SHOP DRAWINGS
NETA TEST REPORTS	REPORT
TORQUE REPORTS	REPORT

1.06 GUARANTEES

A. ALL EQUIPMENT FURNISHED AND WORK PERFORMED UNDER THE CONTRACT DOCUMENTS SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS OR WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE. ANY FAILURE OF EQUIPMENT OR WORK DUE TO DEFECTS IN MATERIALS OR WORKMANSHIP SHALL BE CORRECTED BY THE CONTRACTOR AT NO COST TO THE OWNER.

1.07 OPERATION AND MAINTENANCE MANUALS

A. SUBMIT (2) BOUND COPIES AND (1) ELECTRONIC COPY OF OPERATIONS AND MAINTENANCE MANUALS, 8 1/2" BY 11" IN 3-RING HARD BACK BINDERS TO THE OWNER. MANUALS SHALL NOT BE PRINTED UNTIL THE ELECTRONIC COPY IS REVIEWED AND APPROVED BY THE ENGINEER.

B. O&M MANUALS SHALL BE ORGANIZED AND INCLUDE THE FOLLOWING:
COVERSHEET
INDEX OF MANUAL CONTENTS
PROJECT/CONSTRUCTION TEAM CONTACT INFORMATION
PERMITS
INSPECTIONS
WARRANTY LETTERS
APPROVED EQUIPMENT AND MATERIAL SUBMITTALS
NETA TEST REPORTS
TORQUE REPORTS
IR SCAN REPORTS (IF APPLICABLE)
OPERATION AN MAINTENANCE MANUAL FROM EQUIPMENT MANUFACTURERS
COMPLETED PUNCHLIST

1.08 CODES

A. ALL WORK, MATERIAL, AND EQUIPMENT PERFORMED UNDER THIS SPECIFICATION SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION AND INTERM AMENDMENTS OF THE NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE, NATIONAL FIRE PROTECTIONS ASSOCIATION, OHSHA, AMERICAN WITH DISABILITIES ACT (ADA) AND ANY APPLICABLE FEDERAL, STATE, OR LOCAL LAWS AND ORDINANCES. ALL ELECTRICAL EQUIPMENT SHALL BE NEW (UNLESS NOTED OTHERWISE) AND SHALL COMPLY WITH THE REQUIREMENTS OF (UL) AND BEAR THE UL LABEL.

1.09 FEES

A. OBTAIN AND PAY FOR ANY AND ALL PERMITS AND INSPECTIONS REQUIRED BY ALL LAWS, REGULATIONS AND PUBLIC AUTHORITY HAVING SUCH JURISDICTION.

SECTION 260505 - SELECTIVE DEMOLITION FOR ELECTRICAL

PART 1 EXECUTION

1.01 EXAMINATION

A. VERIFY FIELD MEASUREMENTS AND CIRCUITING ARRANGEMENTS ARE AS INDICATED.

B. VERIFY THAT ABANDONED WIRING AND EQUIPMENT SERVE ONLY ABANDONED FACILITIES.

C. DEMOLITION DRAWINGS ARE BASED ON CASUAL FIELD OBSERVATION AND EXISTING RECORD DOCUMENTS.

D. BEGINNING OF DEMOLITION MEANS INSTALLER ACCEPTS EXISTING CONDITIONS.

1.02 PREPARATION

A. DISCONNECT ELECTRICAL SYSTEMS IN WALLS, FLOORS, AND CEILINGS TO BE REMOVED.

B. COORDINATE UTILITY SERVICE OUTAGES WITH UTILITY COMPANY.

C. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. WHEN WORK MUST BE PERFORMED ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.

D. EXISTING ELECTRICAL SERVICE: MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR SERVICE. DISABLE SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. MINIMIZE OUTAGE DURATION.

E. EXISTING FIRE ALARM SYSTEM: MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS ACCEPTED. DISABLE SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. MINIMIZE OUTAGE DURATION.

1.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. REMOVE, RELOCATE, AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION.

B. REMOVE ABANDONED WIRING TO SOURCE OF SUPPLY.

C. REMOVE EXPOSED ABANDONED CONDUIT, INCLUDING ABANDONED CONDUIT ABOVE ACCESSIBLE CEILING FINISHES. CUT CONDUIT FLUSH WITH WALLS AND FLOORS, AND PATCH SURFACES.

D. DISCONNECT ABANDONED OUTLETS AND REMOVE DEVICES. REMOVE ABANDONED OUTLETS IF CONDUIT SERVICING THEM IS ABANDONED AND REMOVED. PROVIDE BLANK COVER FOR ABANDONED OUTLETS THAT ARE NOT REMOVED.

E. DISCONNECT AND REMOVE ABANDONED PANELBOARDS AND DISTRIBUTION EQUIPMENT.

F. DISCONNECT AND REMOVE ELECTRICAL DEVICES AND EQUIPMENT SERVING UTILIZATION EQUIPMENT THAT HAS BEEN REMOVED.

G. DISCONNECT AND REMOVE ABANDONED LUMINAIRES. REMOVE BRACKETS, STEMS, HANGERS, AND OTHER ACCESSORIES.

H. REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION AND EXTENSION WORK.

I. MAINTAIN ACCESS TO EXISTING ELECTRICAL INSTALLATIONS THAT REMAIN ACTIVE. MODIFY INSTALLATION OR PROVIDE ACCESS PANEL AS APPROPRIATE.

J. EXTEND EXISTING INSTALLATIONS USING MATERIALS AND METHODS COMPATIBLE WITH EXISTING ELECTRICAL INSTALLATIONS, OR AS SPECIFIED.

1.04 CLEANING AND REPAIR

A. CLEAN AND REPAIR EXISTING MATERIALS AND EQUIPMENT THAT REMAIN OR THAT ARE TO BE REUSED.

B. PANELBOARDS: CLEAN EXPOSED SURFACES AND CHECK TIGHTNESS OF ELECTRICAL CONNECTIONS. REPLACE DAMAGED CIRCUIT BREAKERS AND PROVIDE CLOSURE PLATES FOR VACANT POSITIONS. PROVIDE TYPED CIRCUIT DIRECTORY SHOWING REVISED CIRCUITING ARRANGEMENT.

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 PRODUCTS

1.01 CONDUCTOR AND CABLE APPLICATIONS

A. DO NOT USE CONDUCTORS AND CABLES FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.

B. PROVIDE SINGLE CONDUCTOR BUILDING WIRE INSTALLED IN SUITABLE RACEWAY UNLESS OTHERWISE INDICATED, PERMITTED, OR REQUIRED.
1. EXCEPTIONS:
a. USE MANUFACTURED WIRING SYSTEMS FOR BRANCH CIRCUITS WHERE CONCEALED UNDER RAISED FLOORS.
b. USE POWER AND CONTROL TRAY CABLE OR METAL-CLAD CABLE FOR INSTALLATION IN CABLE TRAY.
c. USE VARIABLE-FREQUENCY DRIVE CABLE FOR CONNECTION BETWEEN VARIABLE-FREQUENCY MOTOR CONTROLLERS AND ASSOCIATED MOTORS.

C. NONMETALLIC-SHEATHED CABLE IS NOT PERMITTED.

D. METAL-CLAD CABLE IS PERMITTED ONLY AS FOLLOWS:
1. WHERE NOT OTHERWISE RESTRICTED, MAY BE USED:
a. WHERE CONCEALED ABOVE ACCESSIBLE CEILINGS FOR FINAL CONNECTIONS FROM JUNCTION BOXES TO LUMINAIRES.
1) MAXIMUM LENGTH: 6 FEET (1.8 M).
b. IN RENOVATIONS WHERE CONCEALED IN HOLLOW STUD WALLS FOR BRANCH CIRCUITS.
1) EXCEPTION: PROVIDE SINGLE CONDUCTOR BUILDING WIRE IN RACEWAY FOR CIRCUIT HOMERUN FROM FIRST OUTLET TO PANELBOARD.
2. IN ADDITION TO OTHER APPLICABLE RESTRICTIONS, MAY NOT BE USED:
a. UNLESS APPROVED BY OWNER.
b. WHERE NOT APPROVED FOR USE BY THE AUTHORITY HAVING JURISDICTION.
c. WHERE EXPOSED TO DAMAGE.
d. FOR DAMP, WET, OR CORROSIVE LOCATIONS, UNLESS PROVIDED WITH A PVC JACKET LISTED AS SUITABLE FOR THOSE LOCATIONS.

1.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. PROVIDE PRODUCTS THAT COMPLY WITH REQUIREMENTS OF NFPA 70.

B. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.

C. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED CONDUIT, BOXES, WIRING, CONNECTORS, ETC. AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.

D. COMPLY WITH NEMA WC 70.

E. THERMOPLASTIC-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS COMPLYING WITH UL 83.

F. THERMOSET-INSULATED CONDUCTORS AND CABLES: LISTED AND LABELED AS COMPLYING WITH UL 44.

G. CONDUCTORS FOR GROUNDING AND BONDING: ALSO COMPLY WITH SECTION 260526.

H. CONDUCTORS AND CABLES INSTALLED IN CABLE TRAY: LISTED AND LABELED AS SUITABLE FOR CABLE TRAY USE.

I. CONDUCTORS AND CABLES INSTALLED EXPOSED IN SPACES USED FOR ENVIRONMENTAL AIR (ONLY WHERE SPECIFICALLY PERMITTED): PLENUM RATED, LISTED AND LABELED AS SUITABLE FOR USE IN RETURN AIR PLENUMS.

J. CONDUCTOR MATERIAL:
1. PROVIDE COPPER CONDUCTORS EXCEPT WHERE ALUMINUM CONDUCTORS ARE SPECIFICALLY INDICATED OR PERMITTED FOR SUBSTITUTION. CONDUCTOR SIZES INDICATED ARE BASED ON COPPER UNLESS SPECIFICALLY INDICATED AS ALUMINUM. CONDUCTORS DESIGNATED WITH THE ABBREVIATION "AL" INDICATE ALUMINUM.
2. COPPER CONDUCTORS: SOFT DRAWN ANNEALED, 98 PERCENT CONDUCTIVITY, UNCOATED COPPER CONDUCTORS COMPLYING WITH ASTM B3, ASTM B8, OR ASTM B787/B787M UNLESS OTHERWISE INDICATED.
3. TINNED COPPER CONDUCTORS: COMPLY WITH ASTM B33.
4. ALUMINUM CONDUCTORS (ONLY WHERE SPECIFICALLY INDICATED): AA-8000 SERIES ALUMINUM ALLOY CONDUCTORS RECOGNIZED BY ASTM B800 AND COMPACT STRANDED IN ACCORDANCE WITH ASTM B801 UNLESS OTHERWISE INDICATED.

K. MINIMUM CONDUCTOR SIZE:
1. BRANCH CIRCUITS: 12 AWG.
a. EXCEPTIONS:
1) 20 A, 120 V CIRCUITS LONGER THAN 75 FEET (23 M): 10 AWG, FOR VOLTAGE DROP.
2) 20 A, 120 V CIRCUITS LONGER THAN 150 FEET (46 M): 8 AWG, FOR VOLTAGE DROP.
3) 20 A, 277 V CIRCUITS LONGER THAN 150 FEET (46 M): 10 AWG, FOR VOLTAGE DROP.
2. CONTROL CIRCUITS: 14 AWG.

L. CONDUCTOR COLOR CODING:
1. COLOR CODE CONDUCTORS AS INDICATED UNLESS OTHERWISE REQUIRED BY THE AUTHORITY HAVING JURISDICTION. MAINTAIN CONSISTENT COLOR CODING THROUGHOUT PROJECT.
2. COLOR CODING METHOD: INTEGRALLY COLORED INSULATION. COLOR CODING PHASE TAPE IS NOT ACCEPTABLE.
3. COLOR CODE:
a. 480Y/277 V, 3 PHASE, 4 WIRE SYSTEM:
1) PHASE A: BROWN.
2) PHASE B: ORANGE.
3) PHASE C: YELLOW.
4) NEUTRAL/GROUNDED: GRAY.
b. 208Y/120 V, 3 PHASE, 4 WIRE SYSTEM:
1) PHASE A: BLACK.
2) PHASE B: RED.
3) PHASE C: BLUE.
4) NEUTRAL/GROUNDED: WHITE.
c. EQUIPMENT GROUND, ALL SYSTEMS: GREEN.

1.03 SINGLE CONDUCTOR BUILDING WIRE

A. DESCRIPTION: SINGLE CONDUCTOR INSULATED WIRE.

B. CONDUCTOR STRANDING:
1. FEEDERS AND BRANCH CIRCUITS:
a. SIZE 10 AWG AND SMALLER: SOLID.
b. SIZE 8 AWG AND LARGER: STRANDED.

C. INSULATION VOLTAGE RATING: 600 V.

D. INSULATION:
1. COPPER BUILDING WIRE: TYPE THHN/THWN OR THHN/THWN-2, EXCEPT AS INDICATED BELOW.
a. INSTALLED UNDERGROUND: TYPE XHHW-2.
2. ALUMINUM BUILDING WIRE (ONLY WHERE SPECIFICALLY INDICATED): TYPE XHHW-2.

1.04 METAL-CLAD CABLE

A. DESCRIPTION: NFPA 70, TYPE MC CABLE LISTED AND LABELED AS COMPLYING WITH UL 1569, AND LISTED FOR USE IN CLASSIFIED FIRESTOP SYSTEMS TO BE USED.

B. CONDUCTOR STRANDING:
1. SIZE 10 AWG AND SMALLER: SOLID.
2. SIZE 8 AWG AND LARGER: STRANDED.

C. INSULATION VOLTAGE RATING: 600 V.

D. INSULATION: TYPE THHN, THHN/THWN, OR THHN/THWN-2.

E. GROUNDING: FULL-SIZE INTEGRAL EQUIPMENT GROUNDING CONDUCTOR.

F. ARMOR: ALUMINUM OR STEEL, INTERLOCKED TAPE.

G. PROVIDE PVC JACKET APPLIED OVER CABLE ARMOR.

1.05 POWER AND CONTROL TRAY CABLE

A. DESCRIPTION: NFPA 70, TYPE TC CABLE LISTED AND LABELED AS COMPLYING WITH UL 1277.

B. CONDUCTOR STRANDING: STRANDED.

C. INSULATION VOLTAGE RATING: 600 V.

D. INSULATION: TYPE XHHW OR XHHW-2.

E. JACKET: PVC OR CHLORINATED POLYETHYLENE (CPE).

1.06 VARIABLE-FREQUENCY DRIVE CABLE

A. DESCRIPTION: FLEXIBLE MOTOR SUPPLY CABLE LISTED AND LABELED AS COMPLYING WITH UL 2277 IN ACCORDANCE WITH NFPA 79; SPECIFICALLY DESIGNED FOR USE WITH VARIABLE FREQUENCY DRIVES AND ASSOCIATED NONLINEAR POWER DISTORTIONS.

B. CONDUCTOR STRANDING: STRANDED.

C. INSULATION VOLTAGE RATING: 1000 V.

D. INSULATION: USE ONLY THERMOSET INSULATION TYPES; THERMOPLASTIC INSULATION TYPES ARE NOT PERMITTED.

E. GROUNDING: FULL-SIZE INTEGRAL EQUIPMENT GROUNDING CONDUCTOR OR SYMMETRICAL ARRANGEMENT OF MULTIPLE CONDUCTORS OF EQUIVALENT SIZE.

F. PROVIDE METALLIC SHIELDING.

G. JACKET: PVC OR CHLORINATED POLYETHYLENE (CPE).

1.07 MANUFACTURED WIRING SYSTEMS

A. DESCRIPTION: MANUFACTURED WIRING ASSEMBLIES COMPLYING WITH NFPA 70 ARTICLE 604, AND LISTED AND LABELED AS COMPLYING WITH UL 183.

B. PROVIDE COMPONENTS NECESSARY TO TRANSITION BETWEEN MANUFACTURED WIRING SYSTEM AND OTHER WIRING METHODS.

C. BRANCH CIRCUIT CABLES:
1. CONDUCTOR STRANDING (SIZE 10 AWG AND SMALLER): SOLID.
2. INSULATION VOLTAGE RATING: 600 V.
3. INSULATION: TYPE THHN.
4. GROUNDING: FULL-SIZE INTEGRAL EQUIPMENT GROUNDING CONDUCTOR.
5. ARMOR: STEEL, INTERLOCKED TAPE.

D. CONNECTORS: KEYED AND COLOR-CODED TO PREVENT INTERCONNECTION OF DIFFERENT VOLTAGES.

E. FIXTURE LEADS: TYPE TFN INSULATION.

1.08 WIRING CONNECTORS

A. DESCRIPTION: WIRING CONNECTORS APPROPRIATE FOR THE APPLICATION, SUITABLE FOR USE WITH THE CONDUCTORS TO BE CONNECTED, AND LISTED AS COMPLYING WITH UL 486A-486B OR UL 486C AS APPLICABLE.

B. WIRING CONNECTORS FOR SPLICES AND TAPS:
1. COPPER CONDUCTORS SIZE 8 AWG AND SMALLER: USE TWIST-ON INSULATED SPRING CONNECTORS.
2. COPPER CONDUCTORS SIZE 6 AWG AND LARGER: USE MECHANICAL CONNECTORS OR COMPRESSION CONNECTORS.
3. CONNECTORS FOR ALUMINUM CONDUCTORS: USE COMPRESSION CONNECTORS.

C. WIRING CONNECTORS FOR TERMINATIONS:
1. PROVIDE TERMINAL LUGS FOR CONNECTING CONDUCTORS TO EQUIPMENT FURNISHED WITH TERMINATIONS DESIGNED FOR TERMINAL LUGS.
2. PROVIDE COMPRESSION ADAPTERS FOR CONNECTING CONDUCTORS TO EQUIPMENT FURNISHED WITH MECHANICAL LUGS WHEN ONLY COMPRESSION CONNECTORS ARE SPECIFIED.
3. WHERE OVER-SIZED CONDUCTORS ARE LARGER THAN THE EQUIPMENT TERMINATIONS CAN ACCOMMODATE, PROVIDE CONNECTORS SUITABLE FOR REDUCING TO APPROPRIATE SIZE, BUT NOT LESS THAN REQUIRED FOR THE RATING OF THE OVERCURRENT PROTECTIVE DEVICE.
4. PROVIDE MOTOR PIGTAIL CONNECTORS FOR CONNECTING MOTOR LEADS IN ORDER TO FACILITATE DISCONNECTION.

D. TWIST-ON INSULATED SPRING CONNECTORS: RATED 600 V, 221 DEGREES F (105 DEGREES C) FOR STANDARD APPLICATIONS AND 302 DEGREES F (150 DEGREES C) FOR HIGH TEMPERATURE APPLICATIONS; PRE-FILLED WITH SEALANT AND LISTED AS COMPLYING WITH UL 486D FOR DAMP AND WET LOCATIONS.

E. MECHANICAL CONNECTORS: PROVIDE BOLTED TYPE OR SET-SCREW TYPE.

F. COMPRESSION CONNECTORS: PROVIDE CIRCUMFERENTIAL TYPE OR HEX TYPE CRIMP CONFIGURATION.

PART 2 EXECUTION

2.01 INSTALLATION

A. CIRCUITING REQUIREMENTS:
1. UNLESS DIMENSIONED, CIRCUIT ROUTING INDICATED IS DIAGRAMMATIC.
2. WHEN CIRCUIT DESTINATION IS INDICATED WITHOUT SPECIFIC ROUTING, DETERMINE EXACT ROUTING REQUIRED.
3. CIRCUITING ADJUSTMENTS: UNLESS OTHERWISE INDICATED, WHEN BRANCH CIRCUITS ARE INDICATED AS SEPARATE, COMBINING THEM TOGETHER IN A SINGLE RACEWAY IS PERMITTED, UNDER THE FOLLOWING CONDITIONS:
a. PROVIDE NO MORE THAN SIX CURRENT-CARRYING CONDUCTORS IN A SINGLE RACEWAY. DEDICATED NEUTRAL CONDUCTORS ARE CONSIDERED CURRENT-CARRYING CONDUCTORS.
b. INCREASE SIZE OF CONDUCTORS AS REQUIRED TO ACCOUNT FOR AMPACITY DERATING.
c. SIZE RACEWAYS, BOXES, ETC. TO ACCOMMODATE CONDUCTORS.
4. COMMON NEUTRALS: UNLESS OTHERWISE INDICATED, SHARING OF NEUTRAL/GROUNDED CONDUCTORS AMONG UP TO THREE SINGLE PHASE BRANCH CIRCUITS OF DIFFERENT PHASES INSTALLED IN THE SAME RACEWAY IS PERMITTED WHERE NOT OTHERWISE PROHIBITED.
5. PROVIDE OVERSIZED NEUTRAL/GROUNDED CONDUCTORS WHERE INDICATED.

B. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

C. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).

D. INSTALL ALUMINUM CONDUCTORS IN ACCORDANCE WITH NECA 104.

E. INSTALL METAL-CLAD CABLE (TYPE MC) IN ACCORDANCE WITH NECA 120.

F. INSTALLATION IN RACEWAY:
1. TAPE ENDS OF CONDUCTORS AND CABLES TO PREVENT INFILTRATION OF MOISTURE AND OTHER CONTAMINANTS.
2. PULL ALL CONDUCTORS AND CABLES TOGETHER INTO RACEWAY AT SAME TIME.
3. DO NOT DAMAGE CONDUCTORS AND CABLES OR EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSION AND SIDEWALL PRESSURE.
4. USE SUITABLE WIRE PULLING LUBRICANT WHERE NECESSARY, EXCEPT WHEN LUBRICANT IS NOT RECOMMENDED BY THE MANUFACTURER.

G. PARALLELED CONDUCTORS: INSTALL CONDUCTORS OF THE SAME LENGTH AND TERMINATE IN THE SAME MANNER.

H. SECURE AND SUPPORT CONDUCTORS AND CABLES IN ACCORDANCE WITH NFPA 70 USING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTION. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM RACEWAYS, PIPING, DUCTWORK, OR OTHER SYSTEMS.
1. INSTALLATION ABOVE SUSPENDED CEILINGS: DO NOT PROVIDE SUPPORT FROM CEILING SUPPORT SYSTEM. DO NOT PROVIDE SUPPORT FROM CEILING GRID OR ALLOW CONDUCTORS AND CABLES TO LAY ON CEILING TILES.

I. TERMINATE CABLES USING SUITABLE FITTINGS.
1. METAL-CLAD CABLE (TYPE MC):
a. USE LISTED FITTINGS.
b. CUT CABLE ARMOR ONLY USING SPECIALIZED TOOLS TO PREVENT DAMAGING CONDUCTORS OR INSULATION. DO NOT USE HACKSAW OR WIRE CUTTERS TO CUT ARMOR.
c. DO NOT USE DIRECT-BEARING SET-SCREW TYPE FITTINGS FOR CABLES WITH ALUMINUM ARMOR.

J. VARIABLE-FREQUENCY DRIVE CABLE: TERMINATE SHIELDING AT BOTH VARIABLE-FREQUENCY MOTOR CONTROLLER AND ASSOCIATED MOTOR USING GLANDS OR TERMINATION KITS RECOMMENDED BY MANUFACTURER.

K. INSTALL CONDUCTORS WITH A MINIMUM OF 12 INCHES (300 MM) OF SLACK AT EACH OUTLET.

L. WHERE CONDUCTORS ARE INSTALLED IN ENCLOSURES FOR FUTURE TERMINATION BY OTHERS, PROVIDE A MINIMUM OF 5 FEET (1.5 M) OF SLACK.

M. NEATLY TRAIN AND BUNDLE CONDUCTORS INSIDE BOXES, WIREWAYS, PANELBOARDS AND OTHER EQUIPMENT ENCLOSURES.

N. GROUP OR OTHERWISE IDENTIFY NEUTRAL/GROUNDED CONDUCTORS WITH ASSOCIATED UNGROUNDED CONDUCTORS INSIDE ENCLOSURES IN ACCORDANCE WITH NFPA 70.

O. MAKE WIRING CONNECTIONS USING SPECIFIED WIRING CONNECTORS.
1. MAKE SPLICES AND TAPS ONLY IN ACCESSIBLE BOXES. DO NOT PULL SPLICES INTO RACEWAYS OR MAKE SPLICES IN CONDUIT BODIES OR WIRING GUTTERS.
2. REMOVE APPROPRIATE AMOUNT OF CONDUCTOR INSULATION FOR MAKING CONNECTIONS WITHOUT CUTTING, NICKING OR DAMAGING CONDUCTORS.
3. DO NOT REMOVE CONDUCTOR STRANDS TO FACILITATE INSERTION INTO CONNECTOR.
4. CLEAN CONTACT SURFACES ON CONDUCTORS AND CONNECTORS TO SUITABLE REMOVE CORROSION, OXIDES, AND OTHER CONTAMINATES. DO NOT USE WIRE BRUSH ON PLATED CONNECTOR SURFACES.
5. CONNECTIONS FOR ALUMINUM CONDUCTORS: FILL CONNECTORS WITH OXIDE INHIBITING COMPOUND WHERE NOT PRE-FILLED BY MANUFACTURER.
6. MECHANICAL CONNECTORS: SECURE CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
7. COMPRESSION CONNECTORS: SECURE CONNECTIONS USING MANUFACTURER'S RECOMMENDED TOOLS AND DIES.

P. INSULATE SPLICES AND TAPS THAT ARE MADE WITH UNINSULATED CONNECTORS USING METHODS SUITABLE FOR THE APPLICATION, WITH INSULATION AND MECHANICAL STRENGTH AT LEAST EQUIVALENT TO UNSPLICED CONDUCTORS.

Q. INSULATE ENDS OF SPARE CONDUCTORS USING VINYL INSULATING ELECTRICAL TAPE.

R. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS.

S. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE FINAL CONNECTIONS TO ALL EQUIPMENT AND DEVICES, INCLUDING THOSE FURNISHED BY OTHERS, AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 PRODUCTS

1.01 GROUNDING AND BONDING REQUIREMENTS

A. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.

B. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED COMPONENTS, CONDUCTORS, CONNECTORS, CONDUIT, BOXES, FITTINGS, SUPPORTS, ACCESSORIES, ETC. AS NECESSARY FOR A COMPLETE GROUNDING AND BONDING SYSTEM.

C. WHERE CONDUCTOR SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.

D. GROUNDING ELECTRODE SYSTEM:
1. PROVIDE CONNECTION TO REQUIRED AND SUPPLEMENTAL GROUNDING ELECTRODES INDICATED TO FORM GROUNDING ELECTRODE SYSTEM.
a. PROVIDE CONTINUOUS GROUNDING ELECTRODE CONDUCTORS WITHOUT SPLICE OR JOINT.
b. INSTALL GROUNDING ELECTRODE CONDUCTORS IN RACEWAY WHERE EXPOSED TO PHYSICAL DAMAGE. BOND GROUNDING ELECTRODE CONDUCTOR TO METALLIC RACEWAYS AT EACH END WITH BONDING JUMPER.
2. METAL UNDERGROUND WATER PIPE(S):
a. PROVIDE CONNECTION TO UNDERGROUND METAL DOMESTIC AND FIRE PROTECTION (WHERE PRESENT) WATER SERVICE PIPE(S) THAT ARE IN DIRECT CONTACT WITH EARTH FOR AT LEAST 10 FEET (3.0 M) AT AN ACCESSIBLE LOCATION NOT MORE THAN 5 FEET (1.5 M) FROM THE POINT OF ENTRANCE TO THE BUILDING.
b. PROVIDE BONDING JUMPER(S) AROUND INSULATING JOINTS/PIPES AS REQUIRED TO MAKE PIPE ELECTRICALLY CONTINUOUS.
c. PROVIDE BONDING JUMPER AROUND WATER METER OF SUFFICIENT LENGTH TO PERMIT REMOVAL OF METER WITHOUT DISCONNECTING JUMPER.
3. METAL IN-GROUND SUPPORT STRUCTURE:
a. PROVIDE CONNECTION TO METAL IN-GROUND SUPPORT STRUCTURE THAT IS IN DIRECT CONTACT WITH EARTH IN ACCORDANCE WITH NFPA 70.
4. CONCRETE-ENCASED ELECTRODE:
a. PROVIDE CONNECTION TO CONCRETE-ENCASED ELECTRODE CONSISTING OF NOT LESS THAN 20 FEET (6.0 M) OF EITHER STEEL REINFORCING BARS OR BARE COPPER CONDUCTOR NOT SMALLER THAN 4 AWG EMBEDDED WITHIN CONCRETE FOUNDATION OR FOOTING THAT IS IN DIRECT CONTACT WITH EARTH IN ACCORDANCE WITH NFPA 70.
5. GROUND RING:
a. PROVIDE A GROUND RING ENCIRCLING THE BUILDING OR STRUCTURE CONSISTING OF BARE COPPER CONDUCTOR NOT LESS THAN 2 AWG IN DIRECT CONTACT WITH EARTH, INSTALLED AT A DEPTH OF NOT LESS THAN 30 INCHES (750 MM).
6. GROUND ROD ELECTRODE(S):
a. PROVIDE THREE ELECTRODES IN AN EQUILATERAL TRIANGLE CONFIGURATION UNLESS OTHERWISE INDICATED OR REQUIRED.
b. SPACE ELECTRODES NOT LESS THAN 10 FEET (3.0 M) FROM EACH OTHER AND ANY OTHER GROUND ELECTRODE.
7. PROVIDE ADDITIONAL GROUND ELECTRODE(S) AS REQUIRED TO ACHIEVE SPECIFIED GROUNDING ELECTRODE SYSTEM RESISTANCE.
8. GROUND BAR: PROVIDE GROUND BAR, SEPARATE FROM SERVICE EQUIPMENT ENCLOSURE, FOR COMMON CONNECTION POINT OF GROUNDING ELECTRODE SYSTEM BONDING JUMPERS AS PERMITTED IN NFPA 70. CONNECT GROUNDING ELECTRODE CONDUCTOR PROVIDED FOR SERVICE-SUPPLIED SYSTEM GROUNDING TO THIS GROUND BAR.
a. GROUND BAR SIZE: 1/4 BY 2 BY 12 INCHES (6 BY 50 BY 300 MM) UNLESS OTHERWISE INDICATED OR REQUIRED.
9. GROUND RISER: PROVIDE COMMON GROUNDING ELECTRODE CONDUCTOR NOT LESS THAN 3/0 AWG FOR TAP CONNECTIONS TO MULTIPLE SEPARATELY DERIVED SYSTEMS AS PERMITTED IN NFPA 70.

E. SERVICE-SUPPLIED SYSTEM GROUNDING:
1. FOR EACH SERVICE DISCONNECT, PROVIDE GROUNDING ELECTRODE CONDUCTOR TO CONNECT NEUTRAL (GROUNDED) SERVICE CONDUCTOR TO GROUNDING ELECTRODE SYSTEM. UNLESS OTHERWISE INDICATED, MAKE CONNECTION AT NEUTRAL (GROUNDED) BUS IN SERVICE DISCONNECT ENCLOSURE.
2. FOR EACH SERVICE DISCONNECT, PROVIDE MAIN BONDING JUMPER TO CONNECT NEUTRAL (GROUNDED) BUS TO EQUIPMENT GROUND BUS WHERE NOT FACTORY-INSTALLED. DO NOT MAKE ANY OTHER CONNECTIONS BETWEEN NEUTRAL (GROUNDED) CONDUCTORS AND GROUND ON LOAD SIDE OF SERVICE DISCONNECT.

F. GROUNDING FOR SEPARATE BUILDING OR STRUCTURE SUPPLIED BY FEEDER(S) OR BRANCH CIRCUITS:
1. PROVIDE GROUNDING ELECTRODE SYSTEM FOR EACH SEPARATE BUILDING OR STRUCTURE.
2. PROVIDE EQUIPMENT GROUNDING CONDUCTOR ROUTED WITH SUPPLY CONDUCTORS.
3. FOR EACH DISCONNECTING MEANS, PROVIDE GROUNDING ELECTRODE CONDUCTOR TO CONNECT EQUIPMENT GROUND BUS TO GROUNDING ELECTRODE SYSTEM.
4. DO NOT MAKE ANY CONNECTIONS AND REMOVE ANY FACTORY-INSTALLED JUMPERS BETWEEN NEUTRAL (GROUNDED) CONDUCTORS AND GROUND.

G. SEPARATELY DERIVED SYSTEM GROUNDING:
1. SEPARATELY DERIVED SYSTEMS INCLUDE, BUT ARE NOT LIMITED TO:
a. TRANSFORMERS (EXCEPT AUTOTRANSFORMERS SUCH AS BUCK-BOOST TRANSFORMERS).
b. UNINTERRUPTIBLE POWER SUPPLIES (UPS), WHEN CONFIGURED AS SEPARATELY DERIVED SYSTEMS.
c. GENERATORS, WHEN NEUTRAL IS SWITCHED IN THE TRANSFER SWITCH.
2. PROVIDE GROUNDING ELECTRODE CONDUCTOR TO CONNECT DERIVED SYSTEM GROUNDED CONDUCTOR TO NEAREST EFFECTIVELY GROUNDED METAL BUILDING FRAME. UNLESS OTHERWISE INDICATED, MAKE CONNECTION AT NEUTRAL (GROUNDED) BUS IN SOURCE ENCLOSURE.
3. PROVIDE BONDING JUMPER TO CONNECT DERIVED SYSTEM GROUNDED CONDUCTOR TO NEAREST METAL BUILDING FRAME AND NEAREST METAL WATER PIPING IN THE AREA SERVED BY THE DERIVED SYSTEM, WHERE NOT ALREADY USED AS A GROUNDING ELECTRODE FOR THE DERIVED SYSTEM. MAKE CONNECTION AT SAME LOCATION AS GROUNDING ELECTRODE CONDUCTOR CONNECTION.
4. PROVIDE SYSTEM BONDING JUMPER TO CONNECT SYSTEM GROUNDED CONDUCTOR TO EQUIPMENT GROUND BUS. MAKE CONNECTION AT SAME LOCATION AS GROUNDING ELECTRODE CONDUCTOR CONNECTION. DO NOT MAKE ANY OTHER CONNECTIONS BETWEEN NEUTRAL (GROUNDED) CONDUCTORS AND GROUND ON LOAD SIDE OF SEPARATELY DERIVED SYSTEM DISCONNECT.
5. WHERE THE SOURCE AND FIRST DISCONNECTING MEANS ARE IN SEPARATE ENCLOSURES, PROVIDE SUPPLY-SIDE BONDING JUMPER BETWEEN SOURCE AND FIRST DISCONNECTING MEANS.

H. BONDING AND EQUIPMENT GROUNDING:
1. PROVIDE BONDING FOR EQUIPMENT GROUNDING CONDUCTORS, EQUIPMENT GROUND BUSSES, METALLIC EQUIPMENT ENCLOSURES, METALLIC RACEWAYS AND BOXES, DEVICE GROUNDING TERMINALS, AND OTHER NORMALLY NON-CURRENT-CARRYING CONDUCTIVE MATERIALS ENCLOSING ELECTRICAL CONDUCTORS/EQUIPMENT OR LIKELY TO BECOME ENERGIZED AS INDICATED AND IN ACCORDANCE WITH NFPA 70.
2. PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH FEEDER AND BRANCH CIRCUIT RACEWAY. DO NOT USE RACEWAYS AS SOLE EQUIPMENT GROUNDING CONDUCTOR.
3. WHERE CIRCUIT CONDUCTOR SIZES ARE INCREASED FOR VOLTAGE DROP, INCREASE SIZE OF EQUIPMENT GROUNDING CONDUCTOR PROPORTIONALLY IN ACCORDANCE WITH NFPA 70.
4. UNLESS OTHERWISE INDICATED, CONNECT WIRING DEVICE GROUNDING TERMINAL TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR AND TO OUTLET BOX WITH BONDING JUMPER.
5. TERMINATE BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTORS ON SOLIDLY BONDED EQUIPMENT GROUND BUS ONLY. DO NOT TERMINATE ON NEUTRAL (GROUNDED) OR ISOLATED/INSULATED GROUND BUS.
6. PROVIDE BONDING JUMPER ACROSS EXPANSION OR EXPANSION/DEFLECTION FITTINGS PROVIDED TO ACCOMMODATE CONDUIT MOVEMENT.

I. COMMUNICATIONS SYSTEMS GROUNDING AND BONDING:
1. PROVIDE INTERSYSTEM BONDING TERMINATION AT SERVICE EQUIPMENT OR METERING EQUIPMENT ENCLOSURE AND AT DISCONNECTING MEANS FOR ANY ADDITIONAL BUILDINGS OR STRUCTURES IN ACCORDANCE WITH NFPA 70.
2. PROVIDE BONDING JUMPER IN RACEWAY FROM INTERSYSTEM BONDING TERMINATION TO EACH COMMUNICATIONS ROOM OR BACKBOARD AND PROVIDE GROUND BAR FOR TERMINATION.
a. BONDING JUMPER SIZE: 6 AWG, UNLESS OTHERWISE INDICATED OR REQUIRED.
b. RACEWAY SIZE: 3/4 INCH (21 MM) TRADE SIZE UNLESS OTHERWISE INDICATED OR REQUIRED.
c. GROUND BAR SIZE: 1/4 BY 2 BY 12 INCHES (6 BY 50 BY 300 MM) UNLESS OTHERWISE INDICATED OR REQUIRED.

1.02 GROUNDING AND BONDING COMPONENTS

A. GENERAL REQUIREMENTS:
1. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
2. PROVIDE PRODUCTS LISTED AND LABELED AS COMPLYING WITH UL 467 WHERE APPLICABLE.

B. CONDUCTORS FOR GROUNDING AND BONDING, IN ADDITION TO REQUIREMENTS OF SECTION 260526:
1. USE INSULATED COPPER CONDUCTORS UNLESS OTHERWISE INDICATED.
a. EXCEPTIONS:
1) USE BARE COPPER CONDUCTORS WHERE INSTALLED UNDERGROUND IN DIRECT CONTACT WITH EARTH.
2) USE BARE COPPER CONDUCTORS WHERE DIRECTLY ENCASED IN CONCRETE (NOT IN RACEWAY).

C. CONNECTORS FOR GROUNDING AND BONDING:
1. DESCRIPTION: CONNECTORS APPROPRIATE FOR THE APPLICATION AND SUITABLE FOR THE CONDUCTORS AND ITEMS TO BE CONNECTED; LISTED AND LABELED AS COMPLYING WITH UL 467.
2. UNLESS OTHERWISE INDICATED, USE EXOTHERMIC WELDED CONNECTIONS FOR UNDERGROUND, CONCEALED AND OTHER INACCESSIBLE CONNECTIONS.
3. UNLESS OTHERWISE INDICATED, USE MECHANICAL CONNECTORS, COMPRESSION CONNECTORS, OR EXOTHERMIC WELDED CONNECTIONS FOR ACCESSIBLE CONNECTIONS.

D. GROUND BARS:
1. DESCRIPTION: COPPER RECTANGULAR GROUND BARS WITH MOUNTING BRACKETS AND INSULATORS.
2. SIZE: AS INDICATED.
3. HOLES FOR CONNECTIONS: AS INDICATED OR AS REQUIRED FOR CONNECTIONS TO BE MADE.

E. GROUND ROD ELECTRODES:
1. COMPLY WITH NEMA GR 1.
2. MATERIAL: COPPER-BONDED (COPPER-CLAD) STEEL.
3. SIZE: 3/4 INCH (19 MM) DIAMETER BY 10 FEET (3.0 M) LENGTH, UNLESS OTHERWISE INDICATED.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).

C. GROUND ROD ELECTRODES: UNLESS OTHERWISE INDICATED, INSTALL GROUND ROD ELECTRODES VERTICALLY. WHERE ENCOUNTERED ROCK PROHIBITS VERTICAL INSTALLATION, INSTALL AT 45 DEGREE ANGLE OR BURY HORIZONTALLY IN TRENCH AT LEAST 30 INCHES (750 MM) DEEP IN ACCORDANCE WITH NFPA 70 OR PROVIDE GROUND PLATES.

D. MAKE GROUNDING AND BONDING CONNECTIONS USING SPECIFIED CONNECTORS.
1. REMOVE APPROPRIATE AMOUNT OF CONDUCTOR INSULATION FOR MAKING CONNECTIONS WITHOUT CUTTING, NICKING OR DAMAGING CONDUCTORS. DO NOT REMOVE CONDUCTOR STRANDS TO FACILITATE INSERTION INTO CONNECTOR.
2. REMOVE NONCONDUCTIVE PAINT, ENAMEL, OR SIMILAR COATING AT THREADS, CONTACT POINTS, AND CONTACT SURFACES.
3. EXOTHERMIC WELDS: MAKE CONNECTIONS USING MOLDS AND WELD MATERIAL SUITABLE FOR THE ITEMS TO BE CONNECTED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. MECHANICAL CONNECTORS: SECURE CONNECTIONS ACCORDING TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
5. COMPRESSION CONNECTORS: SECURE CONNECTIONS USING MANUFACTURER'S RECOMMENDED TOOLS AND DIES.

E. IDENTIFY GROUNDING AND BONDING SYSTEM COMPONENTS IN ACCORDANCE WITH SECTION 260553.

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 PRODUCTS

1.01 SUPPORT AND ATTACHMENT COMPONENTS

A. GENERAL REQUIREMENTS:
1. COMPLY WITH THE FOLLOWING. WHERE REQUIREMENTS DIFFER, COMPLY WITH MOST STRINGENT.
a. NFPA 70.
b. REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
2. PROVIDE REQUIRED HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES, AND HARDWARE AS NECESSARY FOR COMPLETE INSTALLATION OF ELECTRICAL WORK.
3. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED, WHERE APPLICABLE.
4. WHERE SUPPORT AND ATTACHMENT COMPONENT TYPES AND SIZES ARE NOT INDICATED, SELECT IN ACCORDANCE WITH MANUFACTURER'S APPLICATION CRITERIA AS REQUIRED FOR LOAD TO BE SUPPORTED WITH MINIMUM SAFETY FACTOR OF 1.5 . INCLUDE CONSIDERATION FOR VIBRATION, EQUIPMENT OPERATION, AND SHOCK LOADS WHERE APPLICABLE.
5. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
6. DO NOT USE WIRE, CHAIN, OR PERFORATED PIPE STRAP FOR PERMANENT SUPPORTS UNLESS SPECIFICALLY INDICATED OR PERMITTED.
7. STEEL COMPONENTS: USE CORROSION-RESISTANT MATERIALS SUITABLE FOR ENVIRONMENT WHERE INSTALLED.
a. INDOOR DRY LOCATIONS: USE ZINC-PLATED STEEL OR APPROVED EQUIVALENT UNLESS OTHERWISE INDICATED.
b. OUTDOOR AND DAMP OR WET INDOOR LOCATIONS: USE GALVANIZED STEEL, STAINLESS STEEL, OR APPROVED EQUIVALENT UNLESS OTHERWISE INDICATED.
c. ZINC-PLATED STEEL: ELECTROPLATED IN ACCORDANCE WITH ASTM B633.
d. GALVANIZED STEEL: HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M OR ASTM A153/A153M.

B. CONDUIT AND CABLE SUPPORTS: STRAPS AND CLAMPS SUITABLE FOR CONDUIT OR CABLE TO BE SUPPORTED.
1. CONDUIT STRAPS: ONE-HOLE OR TWO-HOLE TYPE; STEEL OR MALLEABLE IRON.
2. CONDUIT CLAMPS: BOLTED TYPE UNLESS OTHERWISE INDICATED.

C. OUTLET BOX SUPPORTS: HANGERS AND BRACKETS SUITABLE FOR BOXES TO BE SUPPORTED.

D. METAL CHANNEL/STRUT FRAMING SYSTEMS:
1. DESCRIPTION: FACTORY-FABRICATED, CONTINUOUS-SLOT, METAL CHANNEL/STRUT AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE REQUIRED FOR FIELD ASSEMBLY OF SUPPORTS.
2. COMPLY WITH MFMA-4.

E. HANGER RODS: THREADED, ZINC-PLATED STEEL UNLESS OTHERWISE INDICATED.
1. MINIMUM SIZE, UNLESS OTHERWISE INDICATED OR REQUIRED:
a. EQUIPMENT SUPPORTS: 1/2-INCH (13 MM) DIAMETER.
b. SINGLE CONDUIT UP TO 1-INCH (27 MM) TRADE SIZE: 1/4-INCH (6 MM) DIAMETER.
c. SINGLE CONDUIT LARGER THAN 1-INCH (27 MM) TRADE SIZE: 3/8-INCH (10 MM) DIAMETER.
d. TRAPEZE SUPPORT FOR MULTIPLE CONDUITS: 3/8-INCH (10 MM) DIAMETER.
e. OUTLET BOXES: 1/4-INCH (6 MM) DIAMETER.
f. LUMINAIRES: 1/4-INCH (6 MM) DIAMETER.

F. NONPENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS:
1. DESCRIPTION: STEEL PEDESTALS WITH THERMOPLASTIC OR RUBBER BASES THAT REST ON TOP OF ROOFING MEMBRANE, NOT REQUIRING ATTACHMENT TO ROOF STRUCTURE AND NOT PENETRATING ROOFING ASSEMBLY, WITH SUPPORT FIXTURES AS SPECIFIED.
2. BASE SIZES: AS REQUIRED TO DISTRIBUTE LOAD SUFFICIENTLY TO PREVENT INDENTATION OF ROOFING ASSEMBLY.
3. ATTACHMENT/SUPPORT FIXTURES: AS RECOMMENDED BY MANUFACTURER, SAME TYPE AS INDICATED FOR EQUIVALENT INDOOR HANGERS AND SUPPORTS.
4. MOUNTING HEIGHT: PROVIDE MINIMUM CLEARANCE OF 6 INCHES (150 MM) UNDER SUPPORTED COMPONENT TO TOP OF ROOFING.

G. ANCHORS AND FASTENERS:
1. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE ANCHOR AND FASTENER TYPES INDICATED FOR SPECIFIED APPLICATIONS.
2. CONCRETE: USE PRESET CONCRETE INSERTS, EXPANSION ANCHORS, OR SCREW ANCHORS.
3. SOLID OR GROUT-FILLED MASONRY: USE EXPANSION ANCHORS OR SCREW ANCHORS.
4. HOLLOW MASONRY: USE TOGGLE BOLTS.
5. HOLLOW STUD WALLS: USE TOGGLE BOLTS.
6. STEEL: USE BEAM CLAMPS, MACHINE BOLTS, OR WELDED THREADED STUDS.
7. SHEET METAL: USE SHEET METAL SCREWS.
8. WOOD: USE WOOD SCREWS.
9. PRESET CONCRETE INSERTS: CONTINUOUS METAL CHANNEL/STRUT AND SPOT INSERTS SPECIFICALLY DESIGNED TO BE CAST IN CONCRETE CEILINGS, WALLS, AND FLOORS.
a. MANUFACTURER: SAME AS MANUFACTURER OF METAL CHANNEL/STRUT FRAMING SYSTEM.
b. COMPLY WITH MFMA-4.
c. CHANNEL MATERIAL: USE GALVANIZED STEEL.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL HANGERS AND SUPPORTS IN ACCORDANCE WITH NECA 1.

C. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.

D. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM SUSPENDED CEILING SUPPORT SYSTEM OR CEILING GRID.

E. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM ROOF DECK.

F. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS WITHOUT APPROVAL OF STRUCTURAL ENGINEER.

G. EQUIPMENT SUPPORT AND ATTACHMENT:
1. USE METAL, FABRICATED SUPPORTS OR SUPPORTS ASSEMBLED FROM METAL CHANNEL/STRUT TO SUPPORT EQUIPMENT AS REQUIRED.
2. USE METAL CHANNEL/STRUT SECURED TO STUDS TO SUPPORT EQUIPMENT SURFACE MOUNTED ON HOLLOW STUD WALLS WHEN WALL STRENGTH IS NOT SUFFICIENT TO RESIST PULL-OUT.
3. USE METAL CHANNEL/STRUT TO SUPPORT SURFACE-MOUNTED EQUIPMENT IN WET OR DAMP LOCATIONS TO PROVIDE SPACE BETWEEN EQUIPMENT AND MOUNTING SURFACE.
4. UNLESS OTHERWISE INDICATED, MOUNT FLOOR-MOUNTED EQUIPMENT ON PROPERLY SIZED CONCRETE PAD 4 INCHES (100 MM) IN HEIGHT; SEE SECTION 033000.
5. SECURELY FASTEN FLOOR-MOUNTED EQUIPMENT. DO NOT INSTALL EQUIPMENT SUCH THAT IT RELIES ON ITS OWN WEIGHT FOR SUPPORT.

H. PRESET CONCRETE INSERTS: USE MANUFACTURER PROVIDED CLOSURE STRIPS TO INHIBIT CONCRETE SEEPAGE DURING CONCRETE POUR.

I. SECURE FASTENERS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.

J. REMOVE TEMPORARY SUPPORTS.

SECTION 260533.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 PRODUCTS

1.01 CONDUIT APPLICATIONS

A. DO NOT USE CONDUIT AND ASSOCIATED FITTINGS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70, MANUFACTURER'S INSTRUCTIONS, AND PRODUCT LISTING.

B. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE CONDUIT TYPES INDICATED FOR SPECIFIED APPLICATIONS. WHERE MORE THAN ONE LISTED APPLICATION APPLIES, COMPLY WITH MOST RESTRICTIVE REQUIREMENTS. WHERE CONDUIT TYPE FOR PARTICULAR APPLICATION IS NOT SPECIFIED, USE GALVANIZED STEEL RIGID METAL CONDUIT.

C. UNDERGROUND:
1. UNDER SLAB ON GRADE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC) OR PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC).
2. EXTERIOR, DIRECT-BURIED: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT, OR RIGID PVC CONDUIT.
3. EXTERIOR, EMBEDDED WITHIN CONCRETE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC), PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC), GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT), OR RIGID PVC CONDUIT.
4. WHERE RIGID POLYVINYL CHLORIDE (PVC) CONDUIT IS PROVIDED, TRANSITION TO GALVANIZED STEEL RIGID METAL CONDUIT (RMC) WHERE EMERGING FROM UNDERGROUND.
5. WHERE RIGID POLYVINYL (PVC) CONDUIT LARGER THAN 2-INCH (53 MM) TRADE SIZE IS PROVIDED, USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC) ELBOWS, PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) ELBOWS, OR CONCRETE-ENCASED PVC ELBOWS FOR BENDS.

D. CONCEALED WITHIN HOLLOW STUD WALLS: USE ALUMINUM ELECTRICAL METALLIC TUBING (EMT).

E. CONCEALED ABOVE ACCESSIBLE CEILINGS: USE ALUMINUM ELECTRICAL METALLIC TUBING (EMT).

F. EXPOSED, INTERIOR, NOT SUBJECT TO PHYSICAL DAMAGE: USE ALUMINUM ELECTRICAL METALLIC TUBING (EMT) OR RIGID PVC CONDUIT.

G. EXPOSED, INTERIOR, SUBJECT TO PHYSICAL DAMAGE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC) OR GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC).
1. LOCATIONS SUBJECT TO PHYSICAL DAMAGE INCLUDE, BUT ARE NOT LIMITED TO:
a. WHERE EXPOSED BELOW 8 FEET (2.4 M), EXCEPT WITHIN ELECTRICAL AND COMMUNICATION ROOMS OR CLOSETS.

H. EXPOSED, EXTERIOR, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC) OR GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC).

I. EXPOSED, EXTERIOR, SUBJECT TO SEVERE PHYSICAL DAMAGE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC).

J. FLEXIBLE CONNECTIONS TO LUMINAIRES ABOVE ACCESSIBLE CEILINGS: USE FLEXIBLE METAL CONDUIT (FMC).
1. MAXIMUM LENGTH: 6 FEET (1.8 M).

K. FLEXIBLE CONNECTIONS TO VIBRATING EQUIPMENT:
1. DRY LOCATIONS: USE FLEXIBLE METAL CONDUIT (FMC).
2. DAMP, WET, OR CORROSIVE LOCATIONS: USE LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC).
3. MAXIMUM LENGTH: 6 FEET (1.8 M) UNLESS OTHERWISE INDICATED.

L. FISHED IN EXISTING WALLS, WHERE NECESSARY: USE FLEXIBLE METAL CONDUIT (FMC) OR ALUMINUM ELECTRICAL METALLIC TUBING (EMT).

1.02 CONDUIT - GENERAL REQUIREMENTS

A. COMPLY WITH NFPA 70.

B. EXISTING WORK: WHERE EXISTING CONDUITS ARE INDICATED TO BE REUSED, THEY MAY BE REUSED ONLY WHERE THEY COMPLY WITH SPECIFIED REQUIREMENTS, ARE FREE FROM CORROSION, AND INTEGRITY IS VERIFIED BY PULLING MANDREL THROUGH THEM.

C. PROVIDE CONDUIT, FITTINGS, SUPPORTS, AND ACCESSORIES REQUIRED FOR COMPLETE RACEWAY SYSTEM.

D. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED.

E. WHERE CONDUIT SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.

1.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT COMPLYING WITH ANSI C80.1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.

B. FITTINGS:
1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.

1.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. DESCRIPTION: NFPA 70, TYPE IMC GALVANIZED STEEL INTERMEDIATE METAL CONDUIT COMPLYING WITH ANSI C80.6 AND LISTED AND LABELED AS COMPLYING WITH UL 1242.

B. FITTINGS:
1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 1242.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE THREADED TYPE FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.

1.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT WITH EXTERNAL POLYVINYL CHLORIDE (PVC) COATING COMPLYING WITH NEMA RN 1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.

B. EXTERIOR COATING: POLYVINYL CHLORIDE (PVC), NOMINAL THICKNESS OF 40 MIL, 0.040 INCH (1.02 MM).

C. PVC-COATED BOXES AND FITTINGS:
1. MANUFACTURER: SAME AS MANUFACTURER OF PVC-COATED CONDUIT TO BE INSTALLED.
2. NONHAZARDOUS LOCATIONS: USE BOXES AND FITTINGS LISTED AND LABELED AS COMPLYING WITH UL 514A, UL 514B, OR UL 6.
3. MATERIAL: USE STEEL OR MALLEABLE IRON.
4. EXTERIOR COATING: POLYVINYL CHLORIDE (PVC), MINIMUM THICKNESS OF 40 MIL, 0.040 INCH (1.02 MM).

D. PVC-COATED SUPPORTS: FURNISH WITH EXTERIOR COATING OF POLYVINYL CHLORIDE (PVC), MINIMUM THICKNESS OF 15 MIL, 0.015 INCH (0.38 MM).

1.06 FLEXIBLE METAL CONDUIT (FMC)

A. DESCRIPTION: NFPA 70, TYPE FMC STANDARD-WALL STEEL FLEXIBLE METAL CONDUIT LISTED AND LABELED AS COMPLYING WITH UL 1, AND LISTED FOR USE IN CLASSIFIED FIRESTOP SYSTEMS.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.

1.07 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. DESCRIPTION: NFPA 70, TYPE LFMC POLYVINYL CHLORIDE (PVC) JACKETED STEEL FLEXIBLE METAL CONDUIT LISTED AND LABELED AS COMPLYING WITH UL 360.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.

1.08 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. DESCRIPTION: NFPA 70, TYPE EMT GALVANIZED STEEL ELECTRICAL METALLIC TUBING COMPLYING WITH ANSI C80.3 AND LISTED AND LABELED AS COMPLYING WITH UL 797.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE COMPRESSION/GLAND TYPE.
a. DO NOT USE INDENTER TYPE CONNECTORS AND COUPLINGS.
b. DO NOT USE SET-SCREW TYPE CONNECTORS AND COUPLINGS.
4. DAMP OR WET LOCATIONS, WHERE PERMITTED: USE FITTINGS LISTED FOR USE IN WET LOCATIONS.

1.09 ALUMINUM ELECTRICAL METALLIC TUBING (EMT)

A. DESCRIPTION: NFPA 70, TYPE EMT ALUMINUM ELECTRICAL METALLIC TUBING LISTED AND LABELED AS COMPLYING WITH UL 797A.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B; LISTED FOR USE WITH ALUMINUM EMT.
2. MATERIAL: USE ALUMINUM.
3. CONNECTORS AND COUPLINGS: USE COMPRESSION/GLAND TYPE.
a. DO NOT USE INDENTER TYPE CONNECTORS AND COUPLINGS.
b. DO NOT USE SET-SCREW TYPE CONNECTORS AND COUPLINGS.
4. DAMP OR WET LOCATIONS, WHERE PERMITTED: USE FITTINGS LISTED FOR USE IN WET LOCATIONS.

1.10 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. DESCRIPTION: NFPA 70, TYPE PVC RIGID POLYVINYL CHLORIDE CONDUIT COMPLYING WITH NEMA TC 2 AND LISTED AND LABELED AS COMPLYING WITH UL 651; SCHEDULE 40 UNLESS OTHERWISE INDICATED, SCHEDULE 80 WHERE SUBJECT TO PHYSICAL DAMAGE; RATED FOR USE WITH CONDUCTORS RATED 90 DEGREES C.

B. FITTINGS:
1. MANUFACTURER: SAME AS MANUFACTURER OF CONDUIT TO BE CONNECTED.
2. DESCRIPTION: FITTINGS COMPLYING WITH NEMA TC 3 AND LISTED AND LABELED AS COMPLYING WITH UL 651; MATERIAL TO MATCH CONDUIT.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL CONDUIT IN ACCORDANCE WITH NECA 1.

C. GALVANIZED STEEL RIGID METAL CONDUIT (RMC): INSTALL IN ACCORDANCE WITH NECA 101.

D. INTERMEDIATE METAL CONDUIT (IMC): INSTALL IN ACCORDANCE WITH NECA 101.

E. PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC): INSTALL USING ONLY TOOLS APPROVED BY MANUFACTURER.

F. RIGID POLYVINYL CHLORIDE (PVC) CONDUIT: INSTALL IN ACCORDANCE WITH NECA 111.

G. CONDUIT ROUTING:
1. UNLESS DIMENSIONED, CONDUIT ROUTING INDICATED IS DIAGRAMMATIC.
2. WHEN CONDUIT DESTINATION IS INDICATED WITHOUT SPECIFIC ROUTING, DETERMINE EXACT ROUTING REQUIRED.
3. CONCEAL CONDUITS UNLESS SPECIFICALLY INDICATED TO BE EXPOSED.
4. CONDUITS IN THE FOLLOWING AREAS MAY BE EXPOSED, UNLESS OTHERWISE INDICATED:
a. ELECTRICAL ROOMS.
b. MECHANICAL EQUIPMENT ROOMS.
c. WITHIN JOISTS IN AREAS WITH NO CEILING.
5. CONDUITS INSTALLED UNDERGROUND OR EMBEDDED IN CONCRETE MAY BE ROUTED IN SHORTEST POSSIBLE MANNER UNLESS OTHERWISE INDICATED. ROUTE OTHER CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING STRUCTURE AND SURFACES, FOLLOWING SURFACE CONTOURS WHERE PRACTICAL.
6. ARRANGE CONDUIT TO MAINTAIN ADEQUATE HEADROOM, CLEARANCES, AND ACCESS.
7. ARRANGE CONDUIT TO PROVIDE NO MORE THAN EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN PULL POINTS.
8. ARRANGE CONDUIT TO PROVIDE NO MORE THAN 150 FEET (46 M) BETWEEN PULL POINTS.
9. ROUTE CONDUITS ABOVE WATER AND DRAIN PIPING WHERE POSSIBLE.
10. GROUP PARALLEL CONDUITS IN SAME AREA ON COMMON RACK.

H. CONDUIT SUPPORT:
1. SECURE AND SUPPORT CONDUITS IN ACCORDANCE WITH NFPA 70 USING SUITABLE SUPPORTS AND METHODS APPROVED BY AUTHORITIES HAVING JURISDICTION; SEE SECTION 260529.
2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.
3. INSTALLATION ABOVE SUSPENDED CEILINGS: DO NOT PROVIDE SUPPORT FROM CEILING SUPPORT SYSTEM. DO NOT PROVIDE SUPPORT FROM CEILING GRID OR ALLOW CONDUITS TO LAY ON CEILING TILES.
4. USE METAL CHANNEL/STRUT WITH ACCESSORY CONDUIT CLAMPS TO SUPPORT MULTIPLE PARALLEL SURFACE-MOUNTED CONDUITS.
5. USE TRAPEZE HANGERS ASSEMBLED FROM THREADED RODS AND METAL CHANNEL/STRUT WITH ACCESSORY CONDUIT CLAMPS TO SUPPORT MULTIPLE PARALLEL SUSPENDED CONDUITS.

I. CONNECTIONS AND TERMINATIONS:
1. USE APPROVED ZINC-RICH PAINT OR CONDUIT JOINT COMPOUND ON FIELD-CUT THREADS OF GALVANIZED STEEL CONDUITS PRIOR TO MAKING CONNECTIONS.
2. WHERE TWO THREADED CONDUITS MUST BE JOINED AND NEITHER CAN BE ROTATED, USE THREE-PIECE COUPLINGS OR SPLIT COUPLINGS. DO NOT USE RUNNING THREADS.
3. USE SUITABLE ADAPTERS WHERE REQUIRED TO TRANSITION FROM ONE TYPE OF CONDUIT TO ANOTHER.
4. PROVIDE DRIP LOOPS FOR LIQUIDTIGHT FLEXIBLE CONDUIT CONNECTIONS TO PREVENT DRAINAGE OF LIQUID INTO CONNECTORS.
5. TERMINATE THREADED CONDUITS IN BOXES AND ENCLOSURES USING THREADED HUBS OR DOUBLE LOCK NUTS FOR DRY LOCATIONS AND RAINTIGHT HUBS FOR WET LOCATIONS.
6. PROVIDE INSULATING BUSHINGS, INSULATED THROATS, OR LISTED METAL FITTINGS WITH SMOOTH, ROUNDED EDGES AT CONDUIT TERMINATIONS TO PROTECT CONDUCTORS.
7. SECURE JOINTS AND CONNECTIONS TO PROVIDE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY.

J. PENETRATIONS:
1. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS, INCLUDING FOOTINGS AND GRADE BEAMS, WITHOUT APPROVAL OF STRUCTURAL ENGINEER.
2. MAKE PENETRATIONS PERPENDICULAR TO SURFACES UNLESS OTHERWISE INDICATED.
3. PROVIDE SLEEVES FOR PENETRATIONS AS INDICATED OR AS REQUIRED TO FACILITATE INSTALLATION. SET SLEEVES FLUSH WITH EXPOSED SURFACES UNLESS OTHERWISE INDICATED OR REQUIRED.
4. CONCEAL BENDS FOR CONDUIT RISERS EMERGING ABOVE GROUND.
5. WHERE CONDUITS PENETRATE WATERPROOF MEMBRANE, SEAL AS REQUIRED TO MAINTAIN INTEGRITY OF MEMBRANE.
6. MAKE PENETRATIONS FOR ROOF-MOUNTED EQUIPMENT WITHIN ASSOCIATED EQUIPMENT OPENINGS AND CURBS WHERE POSSIBLE TO MINIMIZE ROOFING SYSTEM PENETRATIONS. WHERE PENETRATIONS ARE NECESSARY, SEAL AS INDICATED OR AS REQUIRED TO PRESERVE INTEGRITY OF ROOFING SYSTEM AND MAINTAIN ROOF WARRANTY.
7. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS; SEE SECTION 078400.

K. UNDERGROUND INSTALLATION:
1. MINIMUM COVER, UNLESS OTHERWISE INDICATED OR REQUIRED:
a. UNDERGROUND, EXTERIOR: 24 INCHES (610 MM).
b. UNDER SLAB ON GRADE: 4 INCHES (100 MM) TO BOTTOM OF SLAB.
2. PROVIDE UNDERGROUND WARNING TAPE ALONG ENTIRE CONDUIT LENGTH; SEE SECTION 260553.

L. CONCRETE ENCASEMENT: WHERE CONDUITS NOT OTHERWISE EMBEDDED WITHIN CONCRETE ARE INDICATED TO BE CONCRETE-ENCASED, PROVIDE MINIMUM CONCRETE COVER OF 3 INCHES (76 MM) ON ALL SIDES UNLESS OTHERWISE INDICATED.

M. CONDUIT MOVEMENT PROVISIONS: WHERE CONDUITS ARE SUBJECT TO MOVEMENT, PROVIDE EXPANSION AND EXPANSION/DEFLECTION FITTINGS TO PREVENT DAMAGE TO ENCLOSED CONDUCTORS OR CONNECTED EQUIPMENT. THIS INCLUDES, BUT IS NOT LIMITED TO:
1. WHERE CONDUITS CROSS STRUCTURAL JOINTS INTENDED FOR EXPANSION, CONTRACTION, OR DEFLECTION.
2. WHERE CALCULATED IN ACCORDANCE WITH NFPA 70 FOR RIGID POLYVINYL CHLORIDE (PVC) CONDUIT INSTALLED ABOVE GROUND TO COMPENSATE FOR THERMAL EXPANSION AND CONTRACTION.
3. WHERE CONDUITS ARE SUBJECT TO EARTH MOVEMENT BY SETTLEMENT OR FROST.

N. CONDUIT SEALING:
1. USE FOAM CONDUIT SEALANT TO PREVENT ENTRY OF MOISTURE AND GASES. THIS INCLUDES, BUT IS NOT LIMITED TO:
a. WHERE CONDUITS ENTER BUILDING FROM OUTSIDE.
b. WHERE SERVICE CONDUITS ENTER BUILDING FROM UNDERGROUND DISTRIBUTION SYSTEM.
c. WHERE CONDUITS ENTER BUILDING FROM UNDERGROUND.
d. WHERE CONDUITS MAY TRANSPORT MOISTURE TO CONTACT LIVE PARTS.
2. WHERE CONDUITS CROSS BARRIERS BETWEEN AREAS OF POTENTIAL SUBSTANTIAL TEMPERATURE DIFFERENTIAL, USE FOAM CONDUIT SEALANT AT ACCESSIBLE POINT NEAR PENETRATION TO PREVENT CONDENSATION. THIS INCLUDES, BUT IS NOT LIMITED TO:
a. WHERE CONDUITS PASS FROM OUTDOORS INTO CONDITIONED INTERIOR SPACES.
b. WHERE CONDUITS PASS FROM UNCONDITIONED INTERIOR SPACES INTO CONDITIONED INTERIOR SPACES.

O. PROVIDE PULL STRING IN EACH EMPTY CONDUIT AND IN CONDUITS WHERE CONDUCTORS AND CABLES ARE TO BE INSTALLED BY OTHERS. LEAVE MINIMUM SLACK OF 12 INCHES (300 MM) AT EACH END.

P. PROVIDE GROUNDING AND BONDING; SEE SECTION 260526.

SECTION 260533.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 PRODUCTS

1.01 BOXES

A. GENERAL REQUIREMENTS:
1. DO NOT USE BOXES AND ASSOCIATED ACCESSORIES FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
2. PROVIDE ALL BOXES, FITTINGS, SUPPORTS, AND ACCESSORIES REQUIRED FOR A COMPLETE RACEWAY SYSTEM AND TO ACCOMMODATE DEVICES AND EQUIPMENT TO BE INSTALLED.
3. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
4. WHERE BOX SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70 BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED.
5. PROVIDE GROUNDING TERMINALS WITHIN BOXES WHERE EQUIPMENT GROUNDING CONDUCTORS TERMINATE.

B. OUTLET AND DEVICE BOXES UP TO 100 CUBIC INCHES (1,650 CU CM), INCLUDING THOSE USED AS JUNCTION AND PULL BOXES:
1. USE SHEET-STEEL BOXES FOR DRY LOCATIONS UNLESS OTHERWISE INDICATED OR REQUIRED.
2. USE CAST IRON BOXES OR CAST ALUMINUM BOXES FOR DAMP OR WET LOCATIONS UNLESS OTHERWISE INDICATED OR REQUIRED; FURNISH WITH COMPATIBLE WEATHERPROOF GASKETED COVERS.
3. USE SUITABLE CONCRETE TYPE BOXES WHERE FLUSH-MOUNTED IN CONCRETE.
4. USE SUITABLE MASONRY TYPE BOXES WHERE FLUSH-MOUNTED IN MASONRY WALLS.
5. USE RAISED COVERS SUITABLE FOR THE TYPE OF WALL CONSTRUCTION AND DEVICE CONFIGURATION WHERE REQUIRED.
6. USE SHALLOW BOXES WHERE REQUIRED BY THE TYPE OF WALL CONSTRUCTION.
7. DO NOT USE "THROUGH-WALL" BOXES DESIGNED FOR ACCESS FROM BOTH SIDES OF WALL.
8. SHEET-STEEL BOXES: COMPLY WITH NEMA OS 1, AND LIST AND LABEL AS COMPLYING WITH UL 514A.
9. CAST METAL BOXES: COMPLY WITH NEMA FB 1, AND LIST AND LABEL AS COMPLYING WITH UL 514A; FURNISH WITH THREADED HUBS.
10. BOXES FOR SUPPORTING LUMINAIRES AND CEILING FANS: LISTED AS SUITABLE FOR THE TYPE AND WEIGHT OF LOAD TO BE SUPPORTED; FURNISHED WITH FIXTURE STUD TO ACCOMMODATE MOUNTING OF LUMINAIRE WHERE REQUIRED.
11. BOXES FOR GANGED DEVICES: USE MULTIGANG BOXES OF SINGLE-PIECE CONSTRUCTION. DO NOT USE FIELD-CONNECTED GANGABLE BOXES UNLESS SPECIFICALLY INDICATED OR PERMITTED.
12. WALL PLATES: COMPLY WITH SECTION 262726.

C. CABINETS AND ENCLOSURES, INCLUDING JUNCTION AND PULL BOXES LARGER THAN 100 CUBIC INCHES (1,650 CU CM):
1. COMPLY WITH NEMA 250, AND LIST AND LABEL AS COMPLYING WITH UL 50 AND UL 50E, OR UL 508A.
2. NEMA 250 ENVIRONMENT TYPE, UNLESS OTHERWISE INDICATED:
3. JUNCTION AND PULL BOXES LARGER THAN 100 CUBIC INCHES (1,650 CU CM):
a. PROVIDE SCREW-COVER OR HINGED-COVER ENCLOSURES UNLESS OTHERWISE INDICATED.

D. BOXES AND ENCLOSURES FOR INTEGRATED POWER, DATA, AND AUDIO/VIDEO: SIZE AND CONFIGURATION AS INDICATED OR AS REQUIRED WITH PARTITIONS TO SEPARATE SERVICES; FIELD-CONNECTED GANGABLE BOXES MAY BE USED.

E. FLOOR BOXES:
1. DESCRIPTION: FLOOR BOXES COMPATIBLE WITH FLOOR BOX SERVICE FITTINGS PROVIDED IN ACCORDANCE WITH SECTION 262726; WITH PARTITIONS TO SEPARATE MULTIPLE SERVICES; FURNISHED WITH ALL COMPONENTS, ADAPTERS, AND TRIMS REQUIRED FOR COMPLETE INSTALLATION.
2. METALLIC FLOOR BOXES: FULLY ADJUSTABLE (WITH INTEGRAL MEANS FOR LEVELING ADJUSTMENT PRIOR TO AND AFTER CONCRETE POUR).
3. MANUFACTURER: SAME AS MANUFACTURER OF FLOOR BOX SERVICE FITTINGS.

F. UNDERGROUND BOXES/ENCLOSURES:
1. DESCRIPTION: IN-GROUND, OPEN BOTTOM BOXES FURNISHED WITH FLUSH, NON-SKID COVERS WITH LEGEND INDICATING TYPE OF SERVICE AND STAINLESS STEEL TAMPER RESISTANT COVER BOLTS.
2. SIZE: AS INDICATED ON DRAWINGS.
3. DEPTH: AS REQUIRED TO EXTEND BELOW FROST LINE TO PREVENT FROST UPHEAVAL, BUT NOT LESS THAN 12 INCHES (300 MM).
4. APPLICATIONS:
a. DO NOT USE POLYMER CONCRETE ENCLOSURES IN AREAS SUBJECT TO DELIBERATE VEHICULAR TRAFFIC.
5. POLYMER CONCRETE UNDERGROUND BOXES/ENCLOSURES: COMPLY WITH SCTE 77.
a. COMBINATION FIBERGLASS/POLYMER CONCRETE BOXES/ENCLOSURES ARE ACCEPTABLE.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL BOXES IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP) AND, WHERE APPLICABLE, NECA 130, INCLUDING MOUNTING HEIGHTS SPECIFIED IN THOSE STANDARDS WHERE MOUNTING HEIGHTS ARE NOT INDICATED.

C. ARRANGE EQUIPMENT TO PROVIDE MINIMUM CLEARANCES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NFPA 70.

D. PROVIDE SEPARATE BOXES FOR EMERGENCY POWER AND NORMAL POWER SYSTEMS.

E. UNLESS OTHERWISE INDICATED, PROVIDE SEPARATE BOXES FOR LINE VOLTAGE AND LOW VOLTAGE SYSTEMS.

F. FLUSH-MOUNT BOXES IN FINISHED AREAS UNLESS SPECIFICALLY INDICATED TO BE SURFACE-MOUNTED.

G. UNLESS OTHERWISE INDICATED, BOXES MAY BE SURFACE-MOUNTED WHERE EXPOSED CONDUITS ARE INDICATED OR PERMITTED.

H. BOX LOCATIONS:
1. LOCATE BOXES TO BE ACCESSIBLE. PROVIDE ACCESS PANELS IN ACCORDANCE WITH SECTION 083100 AS REQUIRED WHERE APPROVED BY THE ARCHITECT.
2. UNLESS DIMENSIONED, BOX LOCATIONS INDICATED ARE APPROXIMATE.
3. LOCATE BOXES AS REQUIRED FOR DEVICES INSTALLED UNDER OTHER SECTIONS OR BY OTHERS.
4. UNLESS OTHERWISE INDICATED, WHERE MULTIPLE OUTLET BOXES ARE INSTALLED AT THE SAME LOCATION AT DIFFERENT MOUNTING HEIGHTS, INSTALL ALONG A COMMON VERTICAL CENTER LINE.
5. DO NOT INSTALL FLUSH-MOUNTED BOXES ON OPPOSITE SIDES OF WALLS BACK-TO-BACK. PROVIDE MINIMUM 6 INCHES (150 MM) HORIZONTAL SEPARATION UNLESS OTHERWISE INDICATED.
6. FIRE RESISTANCE RATED WALLS: INSTALL FLUSH-MOUNTED BOXES SUCH THAT THE REQUIRED FIRE RESISTANCE WILL NOT BE REDUCED.
a. DO NOT INSTALL FLUSH-MOUNTED BOXES ON OPPOSITE SIDES OF WALLS BACK-TO-BACK; PROVIDE MINIMUM 24 INCHES (610 MM) SEPARATION WHERE WALL IS CONSTRUCTED WITH INDIVIDUAL NONCOMMUNICATING STUD CAVITIES OR PROTECT BOTH BOXES WITH LISTED PUTTY PADS.
7. LOCATE JUNCTION AND PULL BOXES IN THE FOLLOWING AREAS, UNLESS OTHERWISE INDICATED:
a. CONCEALED ABOVE ACCESSIBLE SUSPENDED CEILINGS.
b. WITHIN JOISTS IN AREAS WITH NO CEILING.
c. ELECTRICAL ROOMS.
d. MECHANICAL EQUIPMENT ROOMS.

I. BOX SUPPORTS:
1. SECURE AND SUPPORT BOXES IN ACCORDANCE WITH NFPA 70 AND SECTION 260529 USING SUITABLE SUPPORTS AND METHODS APPROVED BY THE AUTHORITY HAVING JURISDICTION.
2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE EXCEPT FOR CAST METAL BOXES (OTHER THAN BOXES USED FOR FIXTURE SUPPORT) SUPPORTED BY THREADED CONDUIT CONNECTIONS IN ACCORDANCE WITH NFPA 70. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.

J. INSTALL BOXES PLUMB AND LEVEL.

K. FLUSH-MOUNTED BOXES:
1. INSTALL BOXES IN NONCOMBUSTIBLE MATERIALS SUCH AS CONCRETE, TILE, GYPSUM, PLASTER, ETC. SO THAT FRONT EDGE OF BOX OR ASSOCIATED RAISED COVER IS NOT SET BACK FROM FINISHED SURFACE MORE THAN 1/4 INCH (6 MM) OR DOES NOT PROJECT BEYOND FINISHED SURFACE.
2. INSTALL BOXES IN COMBUSTIBLE MATERIALS SUCH AS WOOD SO THAT FRONT EDGE OF BOX OR ASSOCIATED RAISED COVER IS FLUSH WITH FINISHED SURFACE.
3. REPAIR ROUGH OPENINGS AROUND BOXES IN NONCOMBUSTIBLE MATERIALS SUCH AS CONCRETE, TILE, GYPSUM, PLASTER, ETC. SO THAT THERE ARE NO GAPS OR OPEN SPACES GREATER THAN 1/8 INCH (3 MM) AT THE EDGE OF THE BOX.

L. INSTALL BOXES AS REQUIRED TO PRESERVE INSULATION INTEGRITY.

M. UNDERGROUND BOXES/ENCLOSURES:
1. INSTALL ENCLOSURE ON GRAVEL BASE, MINIMUM 6 INCHES (150 MM) DEEP.
2. INSTALL ADDITIONAL BRACING INSIDE ENCLOSURES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS TO MINIMIZE BOX SIDEWALL DEFLECTIONS DURING BACKFILLING. BACKFILL WITH COVER BOLTED IN PLACE.

N. INSTALL PERMANENT BARRIER BETWEEN GANGED WIRING DEVICES WHEN VOLTAGE BETWEEN ADJACENT DEVICES EXCEEDS 300 V.

CEC GROUP
CONSULTING ENGINEERS
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CONSULTANTS

SEAL

NOT FOR CONSTRUCTION

brightspeed

D3324L - JACKSONVILLE AR WEST CO GENERATOR REPLACEMENT

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

MARK	DATE	DESCRIPTION
	08/28	ISSUED FOR BID
	04/14/26	90% OWNER REVIEW

PROJECT NO:	25040-1
COMMISSION DATE:	-
DESIGNED BY:	JRS
DRAWN BY:	JRS
CHECKED BY:	JMM

1" ACTUAL

IF THE ABOVE DIMENSION DOES NOT MEASURE ONE INCH (1") EXACTLY, THIS DRAWING WILL HAVE BEEN ENLARGED OR REDUCED, AFFECTING ALL LABELED SCALES.

SHEET TITLE

ELECTRICAL SPECIFICATIONS

E700

ELECTRICAL SPECIFICATIONS

O. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS, USING MATERIALS AND METHODS SPECIFIED IN SECTION 078400.
P. CLOSE UNUSED BOX OPENINGS.
Q. INSTALL BLANK WALL PLATES ON JUNCTION BOXES AND ON OUTLET BOXES WITH NO DEVICES OR EQUIPMENT INSTALLED OR DESIGNATED FOR FUTURE USE.
R. PROVIDE GROUNDING AND BONDING IN ACCORDANCE WITH SECTION 260526.

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 PRODUCTS

1.01 IDENTIFICATION REQUIREMENTS

A. EXISTING WORK: UNLESS SPECIFICALLY EXCLUDED, IDENTIFY EXISTING ELEMENTS TO REMAIN THAT ARE NOT ALREADY IDENTIFIED IN ACCORDANCE WITH SPECIFIED REQUIREMENTS.
B. IDENTIFICATION FOR EQUIPMENT:
1. USE IDENTIFICATION NAMEPLATE TO IDENTIFY EACH PIECE OF ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT AND ASSOCIATED SECTIONS, COMPARTMENTS, AND COMPONENTS.
a. SWITCHGEAR:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) USE IDENTIFICATION NAMEPLATE TO IDENTIFY MAIN AND TIE DEVICES.
3) USE IDENTIFICATION NAMEPLATE TO IDENTIFY LOAD(S) SERVED FOR EACH BRANCH DEVICE. DO NOT IDENTIFY SPARES AND SPACES.
b. SWITCHBOARDS:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) USE IDENTIFICATION NAMEPLATE TO IDENTIFY MAIN OVERCURRENT PROTECTIVE DEVICE.
3) USE IDENTIFICATION NAMEPLATE TO IDENTIFY LOAD(S) SERVED FOR EACH BRANCH DEVICE. DO NOT IDENTIFY SPARES AND SPACES.
c. PANELBOARDS:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) IDENTIFY MAIN OVERCURRENT PROTECTIVE DEVICE. USE IDENTIFICATION LABEL FOR PANELBOARDS WITH A DOOR. FOR POWER DISTRIBUTION PANELBOARDS WITHOUT A DOOR, USE IDENTIFICATION NAMEPLATE.
3) USE TYPEWRITTEN CIRCUIT DIRECTORY TO IDENTIFY LOAD(S) SERVED FOR PANELBOARDS WITH A DOOR. IDENTIFY SPARES AND SPACES USING PENCIL.
4) FOR POWER PANELBOARDS WITHOUT A DOOR, USE IDENTIFICATION NAMEPLATE TO IDENTIFY LOAD(S) SERVED FOR EACH BRANCH DEVICE. DO NOT IDENTIFY SPARES AND SPACES.
d. TRANSFORMERS:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) IDENTIFY LOAD(S) SERVED. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
e. ENCLOSED SWITCHES, CIRCUIT BREAKERS, AND MOTOR CONTROLLERS:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) IDENTIFY LOAD(S) SERVED. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
f. TRANSFER SWITCHES:
1) IDENTIFY POWER SOURCE AND CIRCUIT NUMBER FOR BOTH NORMAL POWER SOURCE AND STANDBY POWER SOURCE. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
2) IDENTIFY LOAD(S) SERVED. INCLUDE LOCATION WHEN NOT WITHIN SIGHT OF EQUIPMENT.
3) IDENTIFY SHORT CIRCUIT CURRENT RATING BASED ON THE SPECIFIC OVERCURRENT PROTECTIVE DEVICE TYPE AND SETTINGS PROTECTING THE TRANSFER SWITCH.
2. SERVICE EQUIPMENT:
a. USE IDENTIFICATION NAMEPLATE TO IDENTIFY EACH SERVICE DISCONNECTING MEANS.
b. FOR BUILDINGS OR STRUCTURES SUPPLIED BY MORE THAN ONE SERVICE, OR ANY COMBINATION OF BRANCH CIRCUITS, FEEDERS, AND SERVICES, USE IDENTIFICATION NAMEPLATE OR MEANS OF IDENTIFICATION ACCEPTABLE TO AUTHORITY HAVING JURISDICTION AT EACH SERVICE DISCONNECTING MEANS TO IDENTIFY ALL OTHER SERVICES, FEEDERS, AND BRANCH CIRCUITS SUPPLYING THAT BUILDING OR STRUCTURE. VERIFY FORMAT AND DESCRIPTIONS WITH AUTHORITY HAVING JURISDICTION.
3. USE IDENTIFICATION NAMEPLATE TO IDENTIFY DISCONNECT LOCATION FOR EQUIPMENT WITH REMOTE DISCONNECTING MEANS.
4. AVAILABLE FAULT CURRENT DOCUMENTATION: USE IDENTIFICATION LABEL TO IDENTIFY THE AVAILABLE FAULT CURRENT AND DATE CALCULATIONS WERE PERFORMED AT LOCATIONS REQUIRING DOCUMENTATION BY NFPA 70 INCLUDING BUT NOT LIMITED TO THE FOLLOWING.
a. SERVICE EQUIPMENT.
b. INDUSTRIAL CONTROL PANELS.
c. MOTOR CONTROL CENTERS.
d. ELEVATOR CONTROL PANELS.
e. INDUSTRIAL MACHINERY.
5. ARC FLASH HAZARD WARNING LABELS: COMPLY WITH SECTION 260573.
C. IDENTIFICATION FOR CONDUCTORS AND CABLES:
1. COLOR CODING FOR POWER CONDUCTORS 600 V AND LESS: COMPLY WITH SECTION 260519.
2. USE IDENTIFICATION NAMEPLATE OR IDENTIFICATION LABEL TO IDENTIFY COLOR CODE FOR UNGROUNDED AND GROUNDED POWER CONDUCTORS INSIDE DOOR OR ENCLOSURE AT EACH PIECE OF FEEDER OR BRANCH-CIRCUIT DISTRIBUTION EQUIPMENT.
3. USE WIRE AND CABLE MARKERS TO IDENTIFY CIRCUIT NUMBER OR OTHER DESIGNATION INDICATED FOR POWER, CONTROL, AND INSTRUMENTATION CONDUCTORS AND CABLES AT THE FOLLOWING LOCATIONS:
a. AT EACH SOURCE AND LOAD CONNECTION.
b. WITHIN BOXES WHEN MORE THAN ONE CIRCUIT IS PRESENT.
4. USE UNDERGROUND WARNING TAPE TO IDENTIFY DIRECT BURIED CABLES.
D. IDENTIFICATION FOR RACEWAYS:
1. USE VOLTAGE MARKERS OR IDENTIFICATION LABELS TO IDENTIFY HIGHEST VOLTAGE PRESENT FOR ACCESSIBLE CONDUITS AT MAXIMUM INTERVALS OF 20 FEET (6.1 M).
2. USE UNDERGROUND WARNING TAPE TO IDENTIFY UNDERGROUND RACEWAYS.
3. PROVIDE CONDUIT LABELS AS INDICATED.
E. IDENTIFICATION FOR DEVICES:
1. USE IDENTIFICATION LABEL OR ENGRAVED WALLPLATE TO IDENTIFY SERVING BRANCH CIRCUIT FOR ALL RECEPTACLES.
2. USE IDENTIFICATION LABEL TO IDENTIFY RECEPTACLES PROTECTED BY UPSTREAM GFI PROTECTION, WHERE PERMITTED.

1.02 IDENTIFICATION NAMEPLATES AND LABELS

A. IDENTIFICATION NAMEPLATES:
1. MATERIALS:
a. INDOOR CLEAN, DRY LOCATIONS: USE PLASTIC NAMEPLATES.
b. OUTDOOR LOCATIONS: USE PLASTIC OR STAINLESS STEEL NAMEPLATES SUITABLE FOR EXTERIOR USE.
2. PLASTIC NAMEPLATES: TWO-LAYER OR THREE-LAYER LAMINATED ACRYLIC OR ELECTRICALLY NON-CONDUCTIVE PHENOLIC WITH BEVELED EDGES; MINIMUM THICKNESS OF 1/16 INCH (1.6 MM); ENGRAVED TEXT.
3. STAINLESS STEEL NAMEPLATES: MINIMUM THICKNESS OF 1/32 INCH (0.8 MM); ENGRAVED OR LASER-ETCHED TEXT.
4. MOUNTING HOLES FOR MECHANICAL FASTENERS: TWO, CENTERED ON SIDES FOR SIZES UP TO 1 INCH (25 MM) HIGH; FOUR, LOCATED AT CORNERS FOR LARGER SIZES.
B. IDENTIFICATION LABELS:
1. MATERIALS: USE SELF-ADHESIVE LAMINATED PLASTIC LABELS; UV, CHEMICAL, WATER, HEAT, AND ABRASION RESISTANT.
2. TEXT: USE FACTORY PRE-PRINTED OR MACHINE-PRINTED TEXT. DO NOT USE HANDWRITTEN TEXT UNLESS OTHERWISE INDICATED.
C. FORMAT FOR EQUIPMENT IDENTIFICATION:
1. MINIMUM SIZE: 1 INCH (25 MM) BY 2.5 INCHES (64 MM).
2. LEGEND:
a. EQUIPMENT DESIGNATION OR OTHER APPROVED DESCRIPTION.
b. OTHER INFORMATION AS INDICATED.
3. TEXT: ALL CAPITALIZED UNLESS OTHERWISE INDICATED.
4. MINIMUM TEXT HEIGHT:
a. EQUIPMENT DESIGNATION: 1/2 INCH (13 MM).
b. OTHER INFORMATION: 1/4 INCH (6 MM).
5. COLOR:
a. WHITE TEXT ON BLACK BACKGROUND UNLESS OTHERWISE INDICATED.
D. FORMAT FOR RECEPTACLE IDENTIFICATION:
1. MINIMUM SIZE: 3/8 INCH (10 MM) BY 1.5 INCHES (38 MM).
2. LEGEND: POWER SOURCE AND CIRCUIT NUMBER OR OTHER DESIGNATION INDICATED.
3. TEXT: ALL CAPITALIZED UNLESS OTHERWISE INDICATED.
4. MINIMUM TEXT HEIGHT: 3/16 INCH (5 MM).
5. COLOR: BLACK TEXT ON CLEAR BACKGROUND.

1.03 WIRE AND CABLE MARKERS

A. MARKERS FOR CONDUCTORS AND CABLES: USE WRAP-AROUND SELF-ADHESIVE VINYL CLOTH, WRAP-AROUND SELF-ADHESIVE VINYL SELF-LAMINATING, HEAT-SHRINK SLEEVE, PLASTIC SLEEVE, PLASTIC CLIP-ON, OR VINYL SPLIT SLEEVE TYPE MARKERS SUITABLE FOR THE CONDUCTOR OR CABLE TO BE IDENTIFIED.
B. MARKERS FOR CONDUCTOR AND CABLE BUNDLES: USE PLASTIC MARKER TAGS SECURED BY NYLON CABLE TIES.
C. LEGEND: POWER SOURCE AND CIRCUIT NUMBER OR OTHER DESIGNATION INDICATED.
D. TEXT: USE FACTORY PRE-PRINTED OR MACHINE-PRINTED TEXT, ALL CAPITALIZED UNLESS OTHERWISE INDICATED.
E. MINIMUM TEXT HEIGHT: 1/8 INCH (3 MM).
F. COLOR: BLACK TEXT ON WHITE BACKGROUND UNLESS OTHERWISE INDICATED.

1.04 VOLTAGE MARKERS

A. MARKERS FOR CONDUITS: USE FACTORY PRE-PRINTED SELF-ADHESIVE VINYL, SELF-ADHESIVE VINYL CLOTH, OR VINYL SNAP-AROUND TYPE MARKERS.
B. MINIMUM SIZE:
1. MARKERS FOR CONDUITS: AS RECOMMENDED BY MANUFACTURER FOR CONDUIT SIZE TO BE IDENTIFIED.
C. LEGEND:
1. MARKERS FOR VOLTAGE IDENTIFICATION: HIGHEST VOLTAGE PRESENT.
D. COLOR: BLACK TEXT ON ORANGE BACKGROUND UNLESS OTHERWISE INDICATED.

1.05 UNDERGROUND WARNING TAPE

A. MATERIALS: USE FOIL-BACKED DETECTABLE TYPE POLYETHYLENE TAPE SUITABLE FOR DIRECT BURIAL, UNLESS OTHERWISE INDICATED.
B. NON-DETECTABLE TYPE TAPE: 6 INCHES (152 MM) WIDE, WITH MINIMUM THICKNESS OF 4 MIL (0.1 MM).
C. FOIL-BACKED DETECTABLE TYPE TAPE: 3 INCHES (76 MM) WIDE, WITH MINIMUM THICKNESS OF 5 MIL (0.1 MM), UNLESS OTHERWISE REQUIRED FOR PROPER DETECTION.
D. LEGEND: TYPE OF SERVICE, CONTINUOUSLY REPEATED OVER FULL LENGTH OF TAPE.
E. COLOR:
1. TAPE FOR BURIED POWER LINES: BLACK TEXT ON RED BACKGROUND.
2. TAPE FOR BURIED COMMUNICATION, ALARM, AND SIGNAL LINES: BLACK TEXT ON ORANGE BACKGROUND.

1.06 WARNING SIGNS AND LABELS

A. COMPLY WITH ANSI Z535.2 OR ANSI Z535.4 AS APPLICABLE.
B. WARNING SIGNS:
1. MATERIALS:
a. INDOOR DRY, CLEAN LOCATIONS: USE FACTORY PRE-PRINTED RIGID PLASTIC OR SELF-ADHESIVE VINYL SIGNS.
b. OUTDOOR LOCATIONS: USE FACTORY PRE-PRINTED RIGID ALUMINUM OR SELF-ADHESIVE VINYL SIGNS.
2. RIGID SIGNS: PROVIDE FOUR MOUNTING HOLES AT CORNERS FOR MECHANICAL FASTENERS.
3. MINIMUM SIZE: 7 BY 10 INCHES (178 BY 254 MM) UNLESS OTHERWISE INDICATED.
C. WARNING LABELS:
1. MATERIALS: USE FACTORY PRE-PRINTED OR MACHINE-PRINTED SELF-ADHESIVE POLYESTER OR SELF-ADHESIVE VINYL LABELS; UV, CHEMICAL, WATER, HEAT, AND ABRASION RESISTANT; PRODUCED USING MATERIALS RECOGNIZED TO UL 969.
2. MACHINE-PRINTED LABELS: USE THERMAL TRANSFER PROCESS PRINTING MACHINES AND ACCESSORIES RECOMMENDED BY LABEL MANUFACTURER.
3. MINIMUM SIZE: 2 BY 4 INCHES (51 MM BY 102 MM) UNLESS OTHERWISE INDICATED.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. INSTALL IDENTIFICATION PRODUCTS TO BE PLAINLY VISIBLE FOR EXAMINATION, ADJUSTMENT, SERVICING, AND MAINTENANCE. UNLESS OTHERWISE INDICATED, LOCATE PRODUCTS AS FOLLOWS:
1. SURFACE-MOUNTED EQUIPMENT: ENCLOSURE FRONT.
2. FLUSH-MOUNTED EQUIPMENT: INSIDE OF EQUIPMENT DOOR.
3. FREE-STANDING EQUIPMENT: ENCLOSURE FRONT; ALSO ENCLOSURE REAR FOR EQUIPMENT WITH REAR ACCESS.
4. ELEVATED EQUIPMENT: LEGIBLE FROM THE FLOOR OR WORKING PLATFORM.
5. BRANCH DEVICES: ADJACENT TO DEVICE.
6. INTERIOR COMPONENTS: LEGIBLE FROM THE POINT OF ACCESS.
7. CONDUITS: LEGIBLE FROM THE FLOOR.
8. CONDUCTORS AND CABLES: LEGIBLE FROM THE POINT OF ACCESS.
9. DEVICES: OUTSIDE FACE OF COVER.
C. INSTALL IDENTIFICATION PRODUCTS CENTERED, LEVEL, AND PARALLEL WITH LINES OF ITEM BEING IDENTIFIED.
D. SECURE NAMEPLATES TO EXTERIOR SURFACES OF ENCLOSURES USING STAINLESS STEEL SCREWS AND TO INTERIOR SURFACES USING SELF-ADHESIVE BACKING OR EPOXY CEMENT.
E. INSTALL SELF-ADHESIVE LABELS AND MARKERS TO ACHIEVE MAXIMUM ADHESION, WITH NO BUBBLES OR WRINKLES AND EDGES PROPERLY SEALED.
F. INSTALL UNDERGROUND WARNING TAPE ABOVE BURIED LINES WITH ONE TAPE PER TRENCH AT 3 INCHES (75 MM) BELOW FINISHED GRADE.
G. SECURE RIGID SIGNS USING STAINLESS STEEL SCREWS.
H. MARK ALL HANDWRITTEN TEXT, WHERE PERMITTED, TO BE NEAT AND LEGIBLE.

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 EXECUTION

1.01 INSTALLATION

A. INSTALL LIGHTING CONTROL DEVICES IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP) AND, WHERE APPLICABLE, NECA 130, INCLUDING MOUNTING HEIGHTS SPECIFIED IN THOSE STANDARDS UNLESS OTHERWISE INDICATED.
B. COORDINATE LOCATIONS OF OUTLET BOXES AS REQUIRED FOR INSTALLATION OF LIGHTING CONTROL DEVICES; SEE SECTION 260533.16.
1. MOUNTING HEIGHTS: AS INDICATED ON THE DRAWINGS.
2. ORIENT OUTLET BOXES FOR VERTICAL INSTALLATION OF LIGHTING CONTROL DEVICES UNLESS OTHERWISE INDICATED.
C. MAINTAIN SEPARATION OF REMOTE-CONTROL, SIGNALING, AND POWER-LIMITED CIRCUITS.
1. SEE MANUFACTURER INSTRUCTIONS AND SECTION 260519 FOR CONTROL WIRING CONDUCTORS, WIRING METHODS, AND IDENTIFICATION REQUIREMENTS.
D. INSTALL LIGHTING CONTROL DEVICES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
E. UNLESS OTHERWISE INDICATED, CONNECT LIGHTING CONTROL DEVICE GROUNDING TERMINAL OR CONDUCTOR TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR AND TO OUTLET BOX WITH BONDING JUMPER.
F. INSTALL LIGHTING CONTROL DEVICES PLUMB AND LEVEL, AND HELD SECURELY IN PLACE.
G. WHERE REQUIRED AND NOT FURNISHED WITH LIGHTING CONTROL DEVICE, PROVIDE WALL PLATE; SEE SECTION 262726.
H. PROVIDE REQUIRED SUPPORTS; SEE SECTION 260529.
I. WHERE APPLICABLE, INSTALL LIGHTING CONTROL DEVICES AND ASSOCIATED WALL PLATES TO FIT COMPLETELY FLUSH TO MOUNTING SURFACE WITH NO GAPS AND ROUGH OPENING COMPLETELY COVERED WITHOUT STRAIN ON WALL PLATE. REPAIR OR REINSTALL IMPROPERLY INSTALLED OUTLET BOXES OR IMPROPERLY SIZED ROUGH OPENINGS. DO NOT USE OVERSIZED WALL PLATES IN LIEU OF MEETING THIS REQUIREMENT.
J. OCCUPANCY SENSOR LOCATIONS:
1. LOCATION ADJUSTMENTS: LOCATIONS INDICATED ARE DIAGRAMMATIC AND ONLY INTENDED TO INDICATE WHICH ROOMS OR AREAS REQUIRE DEVICES. PROVIDE QUANTITY AND LOCATIONS AS REQUIRED FOR COMPLETE COVERAGE OF RESPECTIVE ROOM OR AREA BASED ON MANUFACTURER'S RECOMMENDATIONS FOR INSTALLED DEVICES.
2. LOCATE ULTRASONIC AND DUAL TECHNOLOGY PASSIVE INFRARED/ULTRASONIC OCCUPANCY SENSORS MINIMUM OF 4 FEET (1.2 M) FROM AIR SUPPLY DUCTS OR OTHER SOURCES OF HEAVY AIR FLOW AND AS PER MANUFACTURER'S RECOMMENDATIONS, IN ORDER TO MINIMIZE FALSE TRIGGERS.
K. OUTDOOR PHOTO CONTROL LOCATIONS:
1. WHERE POSSIBLE, LOCATE OUTDOOR PHOTO CONTROLS WITH PHOTO SENSOR FACING NORTH. IF NORTH FACING PHOTO SENSOR IS NOT POSSIBLE, INSTALL WITH PHOTO SENSOR FACING EAST, WEST, OR DOWN.
2. LOCATE OUTDOOR PHOTO CONTROLS SO THAT PHOTO SENSORS DO NOT FACE ARTIFICIAL LIGHT SOURCES, INCLUDING LIGHT SOURCES CONTROLLED BY PHOTO CONTROL ITSELF.
L. INSTALL OUTDOOR PHOTO CONTROLS SO THAT CONNECTIONS ARE WEATHERPROOF. DO NOT INSTALL PHOTO CONTROLS WITH CONDUIT STEM FACING UP IN ORDER TO PREVENT INFILTRATION OF WATER INTO PHOTO CONTROL.
M. DAYLIGHTING CONTROL PHOTO SENSOR LOCATIONS:
1. LOCATION ADJUSTMENTS: LOCATIONS INDICATED ARE DIAGRAMMATIC AND ONLY INTENDED TO INDICATE WHICH ROOMS OR AREAS REQUIRE DEVICES. PROVIDE QUANTITY AND LOCATIONS AS REQUIRED FOR PROPER CONTROL OF RESPECTIVE ROOM OR AREA BASED ON MANUFACTURER'S RECOMMENDATIONS FOR INSTALLED DEVICES.
2. UNLESS OTHERWISE INDICATED, LOCATE PHOTO SENSORS FOR CLOSED LOOP SYSTEMS TO ACCURATELY MEASURE LIGHT LEVEL CONTROLLED AT DESIGNATED TASK LOCATION, WHILE MINIMIZING MEASURED AMOUNT OF DIRECT LIGHT FROM NATURAL OR ARTIFICIAL SOURCES SUCH AS WINDOWS OR PENDANT LUMINAIRES.
3. UNLESS OTHERWISE INDICATED, LOCATE PHOTO SENSORS FOR OPEN LOOP SYSTEMS TO ACCURATELY MEASURE THE LEVEL OF DAYLIGHT COMING INTO SPACE, WHILE MINIMIZING MEASURED AMOUNT OF LIGHTING FROM ARTIFICIAL SOURCES.
N. LAMP BURN-IN: OPERATE LAMPS AT FULL OUTPUT FOR MINIMUM OF 100 HOURS OR PRESCRIBED PERIOD PER MANUFACTURER'S RECOMMENDATIONS PRIOR TO USE WITH DIMMING CONTROLS. REPLACE LAMPS THAT FAIL PREMATURELY DUE TO IMPROPER LAMP BURN-IN.
O. UNLESS OTHERWISE INDICATED, INSTALL POWER PACKS FOR LIGHTING CONTROL DEVICES ABOVE ACCESSIBLE CEILING NEAR SENSOR LOCATION.
P. UNLESS OTHERWISE INDICATED, INSTALL SWITCHES ON LOAD SIDE OF POWER PACKS SO THAT SWITCH DOES NOT TURN OFF POWER PACK.

2.02 ADJUSTING

A. ADJUST DEVICES AND WALL PLATES TO BE FLUSH AND LEVEL.
B. ADJUST OCCUPANCY SENSOR SETTINGS TO MINIMIZE UNDESIRED ACTIVATIONS WHILE OPTIMIZING ENERGY SAVINGS, AND TO ACHIEVE DESIRED FUNCTION AS INDICATED OR AS DIRECTED BY ARCHITECT.
C. WHERE INDICATED OR AS DIRECTED BY ARCHITECT, INSTALL FACTORY MASKING MATERIAL OR ADJUST INTEGRAL BLINDERS ON PASSIVE INFRARED (PIR) AND DUAL TECHNOLOGY OCCUPANCY SENSOR LENSES TO BLOCK UNDESIRED MOTION DETECTION.
D. ADJUST TIME SWITCH SETTINGS TO ACHIEVE DESIRED OPERATION SCHEDULE AS INDICATED OR AS DIRECTED BY OWNER/ENGINEER. RECORD SETTINGS IN WRITTEN REPORT TO BE INCLUDED WITH SUBMITTALS.

SECTION 262416 - PANELBOARDS

PART 2 PRODUCTS

1.01 MANUFACTURERS

A. ABB
B. EATON
C. SCHNEIDER ELECTRIC

1.02 PANELBOARDS - GENERAL REQUIREMENTS

A. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
B. UNLESS OTHERWISE INDICATED, PROVIDE PRODUCTS SUITABLE FOR CONTINUOUS OPERATION FOR THE SPECIFIC SITE LOCATION. UNDER THE FOLLOWING SERVICE CONDITIONS:
1. ALTITUDE: LESS THAN 6,600 FEET (2,000 M).
2. AMBIENT TEMPERATURE:
a. PANELBOARDS CONTAINING CIRCUIT BREAKERS: BETWEEN 23 DEGREES F (-5 DEGREES C) AND 104 DEGREES F (40 DEGREES C).
C. SHORT CIRCUIT CURRENT RATING:
1. PROVIDE PANELBOARDS WITH LISTED SHORT CIRCUIT CURRENT RATING NOT LESS THAN THE AVAILABLE FAULT CURRENT AT THE INSTALLED LOCATION AS INDICATED ON THE DRAWINGS.
D. PANELBOARDS USED FOR SERVICE ENTRANCE: LISTED AND LABELED AS SUITABLE FOR USE AS SERVICE EQUIPMENT ACCORDING TO UL 869A.
E. MAINS: CONFIGURE FOR TOP OR BOTTOM INCOMING FEED AS INDICATED OR AS REQUIRED FOR THE INSTALLATION.
F. BRANCH OVERCURRENT PROTECTIVE DEVICES: REPLACEABLE WITHOUT DISTURBING ADJACENT DEVICES.
G. BUSSING: SIZED IN ACCORDANCE WITH UL 67 TEMPERATURE RISE REQUIREMENTS.
1. PROVIDE FULLY RATED NEUTRAL BUS UNLESS OTHERWISE INDICATED, WITH A SUITABLE LUG FOR EACH FEEDER OR BRANCH CIRCUIT REQUIRING A NEUTRAL CONNECTION.
2. PROVIDE SOLIDLY BONDED EQUIPMENT GROUND BUS IN EACH PANELBOARD, WITH A SUITABLE LUG FOR EACH FEEDER AND BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR.
H. CONDUCTOR TERMINATIONS: SUITABLE FOR USE WITH THE CONDUCTORS TO BE INSTALLED.
I. ENCLOSURES: COMPLY WITH NEMA 250, AND LIST AND LABEL AS COMPLYING WITH UL 50 AND UL 50E.
1. ENVIRONMENT TYPE PER NEMA 250: AS INDICATED ON THE DRAWINGS.
2. BOXES: GALVANIZED STEEL UNLESS OTHERWISE INDICATED.
a. PROVIDE WIRING GUTTERS SIZED TO ACCOMMODATE THE CONDUCTORS TO BE INSTALLED.
b. INCREASE GUTTER SPACE AS REQUIRED WHERE SUB-FEED LUGS, FEED-THROUGH LUGS, GUTTER TAPS, OR OVERSIZED LUGS ARE PROVIDED.
c. PROVIDE PAINTED STEEL BOXES FOR SURFACE-MOUNTED PANELBOARDS WHERE INDICATED, FINISH TO MATCH FRONTS.
3. FRONTS:
a. FRONTS FOR SURFACE-MOUNTED ENCLOSURES: SAME DIMENSIONS AS BOXES.
b. FRONTS FOR FLUSH-MOUNTED ENCLOSURES: OVERLAP BOXES ON ALL SIDES TO CONCEAL ROUGH OPENING.
c. FINISH FOR PAINTED STEEL FRONTS: MANUFACTURER'S STANDARD GREY UNLESS OTHERWISE INDICATED.
4. LOCKABLE DOORS: ALL LOCKS KEYED ALIKE UNLESS OTHERWISE INDICATED.
J. FUTURE PROVISIONS: PREPARE ALL UNUSED SPACES FOR FUTURE INSTALLATION OF DEVICES INCLUDING BUSSING, CONNECTORS, MOUNTING HARDWARE AND ALL OTHER REQUIRED PROVISIONS.
K. SURGE PROTECTIVE DEVICES: WHERE FACTORY-INSTALLED, INTERNALLY MOUNTED SURGE PROTECTIVE DEVICES ARE PROVIDED IN ACCORDANCE WITH SECTION 264300, LIST AND LABEL PANELBOARDS AS A COMPLETE ASSEMBLY INCLUDING SURGE PROTECTIVE DEVICE.
L. GROUND FAULT PROTECTION: WHERE GROUND-FAULT PROTECTION IS INDICATED, PROVIDE SYSTEM LISTED AND LABELED AS COMPLYING WITH UL 1053.
1. WHERE ELECTRONIC CIRCUIT BREAKERS EQUIPPED WITH INTEGRAL GROUND FAULT PROTECTION ARE USED, PROVIDE SEPARATE NEUTRAL CURRENT SENSOR WHERE APPLICABLE.
M. SELECTIVITY: WHERE THE REQUIREMENT FOR SELECTIVITY IS INDICATED, FURNISH PRODUCTS AS REQUIRED TO ACHIEVE SELECTIVE COORDINATION.
N. MULTI-SECTION PANELBOARDS: PROVIDE ENCLOSURES OF THE SAME HEIGHT, WITH FEED-THROUGH LUGS OR SUB-FEED LUGS AND FEEDERS AS INDICATED OR AS REQUIRED TO INTERCONNECT SECTIONS.
O. PROVIDE THE FOLLOWING FEATURES AND ACCESSORIES WHERE INDICATED OR WHERE REQUIRED TO COMPLETE INSTALLATION:
1. FEED-THROUGH LUGS.
2. SUB-FEED LUGS.

1.03 POWER DISTRIBUTION PANELBOARDS

A. DESCRIPTION: PANELBOARDS COMPLYING WITH NEMA PB 1, POWER AND FEEDER DISTRIBUTION TYPE, CIRCUIT BREAKER TYPE, AND LISTED AND LABELED AS COMPLYING WITH UL 67; RATINGS, CONFIGURATIONS AND FEATURES AS INDICATED ON THE DRAWINGS.
B. CONDUCTOR TERMINATIONS:
1. MAIN AND NEUTRAL LUG MATERIAL: ALUMINUM, SUITABLE FOR TERMINATING ALUMINUM OR COPPER CONDUCTORS.
2. MAIN AND NEUTRAL LUG TYPE: MECHANICAL.
C. BUSSING:
1. PHASE AND NEUTRAL BUS MATERIAL: COPPER.
2. GROUND BUS MATERIAL: COPPER.
D. CIRCUIT BREAKERS:
1. PROVIDE BOLT-ON TYPE.
2. PROVIDE THERMAL MAGNETIC CIRCUIT BREAKERS UNLESS OTHERWISE INDICATED.
3. PROVIDE ELECTRONIC TRIP CIRCUIT BREAKERS WHERE INDICATED.
E. ENCLOSURES:
1. PROVIDE SURFACE-MOUNTED ENCLOSURES UNLESS OTHERWISE INDICATED.
2. FRONTS: PROVIDE TRIMS TO COVER ACCESS TO LOAD TERMINALS, WIRING GUTTERS, AND OTHER LIVE PARTS, WITH EXPOSED ACCESS TO OVERCURRENT PROTECTIVE DEVICE HANDLES.

1.04 LIGHTING AND APPLIANCE PANELBOARDS

A. DESCRIPTION: PANELBOARDS COMPLYING WITH NEMA PB 1, LIGHTING AND APPLIANCE BRANCH CIRCUIT TYPE, CIRCUIT BREAKER TYPE, AND LISTED AND LABELED AS COMPLYING WITH UL 67; RATINGS, CONFIGURATIONS AND FEATURES AS INDICATED ON THE DRAWINGS.
B. CONDUCTOR TERMINATIONS:
1. MAIN AND NEUTRAL LUG MATERIAL: COPPER, SUITABLE FOR TERMINATING COPPER CONDUCTORS ONLY.
2. MAIN AND NEUTRAL LUG TYPE: MECHANICAL.
C. BUSSING:
1. PHASE BUS CONNECTIONS: ARRANGED FOR SEQUENTIAL PHASING OF OVERCURRENT PROTECTIVE DEVICES.
2. PHASE AND NEUTRAL BUS MATERIAL: COPPER.
3. GROUND BUS MATERIAL: COPPER.
D. CIRCUIT BREAKERS: THERMAL MAGNETIC BOLT-ON TYPE UNLESS OTHERWISE INDICATED.
E. ENCLOSURES:
1. PROVIDE SURFACE-MOUNTED OR FLUSH-MOUNTED ENCLOSURES AS INDICATED.
2. FRONTS: PROVIDE LOCKABLE HINGED DOOR WITH CONCEALED HINGES FOR ACCESS TO OVERCURRENT PROTECTIVE DEVICE HANDLES WITHOUT EXPOSING LIVE PARTS.
3. PROVIDE CLEAR PLASTIC CIRCUIT DIRECTORY HOLDER MOUNTED ON INSIDE OF DOOR.

1.05 OVERCURRENT PROTECTIVE DEVICES

A. MOLDED CASE CIRCUIT BREAKERS:
1. DESCRIPTION: QUICK-MAKE, QUICK-BREAK, OVER CENTER TOGGLE, TRIP-FREE, TRIP-INDICATING CIRCUIT BREAKERS LISTED AND LABELED AS COMPLYING WITH UL 489, AND COMPLYING WITH FS W-C-375 WHERE APPLICABLE; RATINGS, CONFIGURATIONS, AND FEATURES AS INDICATED ON THE DRAWINGS.
2. INTERRUPTING CAPACITY:
a. PROVIDE CIRCUIT BREAKERS WITH INTERRUPTING CAPACITY AS REQUIRED TO PROVIDE THE SHORT CIRCUIT CURRENT RATING INDICATED, BUT NOT LESS THAN:
1) 10,000 RMS SYMMETRICAL AMPERES AT 240 VAC OR 208 VAC.
2) 14,000 RMS SYMMETRICAL AMPERES AT 480 VAC.
b. FULLY RATED SYSTEMS: PROVIDE CIRCUIT BREAKERS WITH INTERRUPTING CAPACITY NOT LESS THAN THE SHORT CIRCUIT CURRENT RATING INDICATED.
3. CONDUCTOR TERMINATIONS:
a. PROVIDE MECHANICAL LUGS UNLESS OTHERWISE INDICATED.
b. LUG MATERIAL: ALUMINUM, SUITABLE FOR TERMINATING ALUMINUM OR COPPER CONDUCTORS.
4. THERMAL MAGNETIC CIRCUIT BREAKERS: FOR EACH POLE, FURNISH THERMAL INVERSE TIME TRIPPING ELEMENT FOR OVERLOAD PROTECTION AND MAGNETIC INSTANTANEOUS TRIPPING ELEMENT FOR SHORT CIRCUIT PROTECTION.
a. PROVIDE FIELD-ADJUSTABLE MAGNETIC INSTANTANEOUS TRIP SETTING FOR CIRCUIT BREAKER FRAME SIZES 225 AMPERES AND LARGER.
b. PROVIDE INTERCHANGEABLE TRIP UNITS WHERE INDICATED.
5. ELECTRONIC TRIP CIRCUIT BREAKERS: FURNISH SOLID STATE, MICROPROCESSOR-BASED, TRUE RMS SENSING TRIP UNITS. PROVIDE ELECTRONIC TRIP CIRCUIT BREAKERS FOR CIRCUIT BREAKER FRAME SIZES 400 AMPERES AND LARGER.
a. PROVIDE THE FOLLOWING FIELD-ADJUSTABLE TRIP RESPONSE SETTINGS:
1) LONG TIME PICKUP, ADJUSTABLE BY REPLACING INTERCHANGEABLE TRIP UNIT OR BY SETTING DIAL.
2) LONG TIME DELAY.
3) SHORT TIME PICKUP AND DELAY.
4) INSTANTANEOUS PICKUP.
5) GROUND FAULT PICKUP AND DELAY WHERE GROUND FAULT PROTECTION IS INDICATED.
6. MULTI-POLE CIRCUIT BREAKERS: FURNISH WITH COMMON TRIP FOR ALL POLES.
7. PROVIDE THE FOLLOWING CIRCUIT BREAKER TYPES WHERE INDICATED:
a. GROUND FAULT CIRCUIT INTERRUPTER (GFCI) CIRCUIT BREAKERS: LISTED AS COMPLYING WITH UL 943, CLASS A FOR PROTECTION OF PERSONNEL.
b. ARC-FAULT CIRCUIT INTERRUPTER (AFCI) CIRCUIT BREAKERS: COMBINATION TYPE LISTED AS COMPLYING WITH UL 1699.
c. 100 PERCENT RATED CIRCUIT BREAKERS: LISTED FOR APPLICATION WITHIN THE PANELBOARD WHERE INSTALLED AT 100 PERCENT OF THE CONTINUOUS CURRENT RATING.
8. DO NOT USE TANDEM CIRCUIT BREAKERS.
9. DO NOT USE HANDLE TIES IN LIEU OF MULTI-POLE CIRCUIT BREAKERS.
10. PROVIDE MULTI-POLE CIRCUIT BREAKERS FOR MULTI-WIRE BRANCH CIRCUITS AS REQUIRED BY NFPA 70.
11. PROVIDE THE FOLLOWING FEATURES AND ACCESSORIES WHERE INDICATED OR WHERE REQUIRED TO COMPLETE INSTALLATION:
a. SHUNT TRIP: PROVIDE COIL VOLTAGE AS REQUIRED FOR CONNECTION TO INDICATED TRIP ACTUATOR.
b. HANDLE PAD-LOCK PROVISION: FOR LOCKING CIRCUIT BREAKER HANDLE IN OFF POSITION.

PART 3 EXECUTION

2.01 INSTALLATION

A. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).
B. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
C. INSTALL PANELBOARDS IN ACCORDANCE WITH NECA 407 AND NEMA PB 1.1.
D. ARRANGE EQUIPMENT TO PROVIDE MINIMUM CLEARANCES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NFPA 70.
E. PROVIDE REQUIRED SUPPORT AND ATTACHMENT IN ACCORDANCE WITH SECTION 260529.
F. INSTALL PANELBOARDS PLUMB.
G. INSTALL FLUSH-MOUNTED PANELBOARDS SO THAT TRIMS FIT COMPLETELY FLUSH TO WALL WITH NO GAPS AND ROUGH OPENING COMPLETELY COVERED.
H. MOUNT PANELBOARDS SUCH THAT THE HIGHEST POSITION OF ANY OPERATING HANDLE FOR CIRCUIT BREAKERS OR SWITCHES DOES NOT EXCEED 79 INCHES (2000 MM) ABOVE THE FLOOR OR WORKING PLATFORM.
I. PROVIDE MINIMUM OF SIX SPARE 1 INCH (27 MM) TRADE SIZE CONDUITS OUT OF EACH FLUSH-MOUNTED PANELBOARD STUBBED INTO ACCESSIBLE SPACE ABOVE CEILING AND BELOW FLOOR.
J. PROVIDE GROUNDING AND BONDING IN ACCORDANCE WITH SECTION 260526.
K. INSTALL ALL FIELD-INSTALLED BRANCH DEVICES, COMPONENTS, AND ACCESSORIES.
L. MULTI-WIRE BRANCH CIRCUITS: GROUP GROUNDED AND UNGROUNDED CONDUCTORS TOGETHER IN THE PANELBOARD AS REQUIRED BY NFPA 70.
M. SET FIELD-ADJUSTABLE CIRCUIT BREAKER TRIPPING FUNCTION SETTINGS AS DIRECTED.
N. SET FIELD-ADJUSTABLE GROUND FAULT PROTECTION PICKUP AND TIME DELAY SETTINGS AS INDICATED.
O. PROVIDE FILLER PLATES TO COVER UNUSED SPACES IN PANELBOARDS.
P. PROVIDE CIRCUIT BREAKER LOCK-ON DEVICES TO PREVENT UNAUTHORIZED PERSONNEL FROM DE-ENERGIZING ESSENTIAL LOADS WHERE INDICATED. ALSO PROVIDE FOR THE FOLLOWING:
1. EMERGENCY LIGHTING CIRCUITS.
2. FIRE DETECTION AND ALARM CIRCUITS.

2.02 ADJUSTING

A. ADJUST TIGHTNESS OF MECHANICAL AND ELECTRICAL CONNECTIONS TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
B. ADJUST ALIGNMENT OF PANELBOARD FRONTS.

2.03 CLEANING

A. CLEAN DIRT AND DEBRIS FROM PANELBOARD ENCLOSURES AND COMPONENTS ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
B. REPAIR SCRATCHED OR MARRED EXTERIOR SURFACES TO MATCH ORIGINAL FACTORY FINISH.

SECTION 262726 - WIRING DEVICES

PART 1 PRODUCTS

1.01 WIRING DEVICES - GENERAL REQUIREMENTS

A. PROVIDE WIRING DEVICES SUITABLE FOR INTENDED USE WITH RATINGS ADEQUATE FOR LOAD SERVED.
B. WIRING DEVICE APPLICATIONS:
1. RECEPTACLES INSTALLED OUTDOORS OR IN DAMP OR WET LOCATIONS: USE WEATHER-RESISTANT GFCI RECEPTACLES WITH WEATHERPROOF COVERS.
2. PROVIDE GFCI PROTECTION FOR:
a. RECEPTACLES INSTALLED WITHIN 6 FEET (1.8 M) OF SINKS.
b. RECEPTACLES INSTALLED IN FOOD PREPERATION AREAS.
C. WIRING DEVICE FINISHES:
1. PROVIDE WIRING DEVICE FINISHES AS DESCRIBED BELOW, UNLESS OTHERWISE INDICATED.
2. WIRING DEVICES, UNLESS OTHERWISE INDICATED: WHITE WITH WHITE NYLON WALL PLATE.
3. WIRING DEVICES INSTALLED IN UNFINISHED SPACES: GRAY WITH GALVANIZED STEEL WALL PLATE.
4. WIRING DEVICES INSTALLED IN WET OR DAMP LOCATIONS: WHITE WITH WEATHERPROOF COVER.
5. FLUSH FLOOR BOX SERVICE FITTINGS: BLACK WIRING DEVICES WITH BLACK NONMETALLIC COVER AND RING/FLANGE.
6. FLUSH POKE-THROUGH SERVICE FITTINGS: BLACK WIRING DEVICES WITH BLACK NONMETALLIC COVER AND BLACK NONMETALLIC FLANGE.
7. ACCESS FLOOR BOXES: BLACK WIRING DEVICES WITH BLACK NONMETALLIC COVER WITH INSERT TO MATCH FLOOR COVERING.

1.02 WALL SWITCHES

A. WALL SWITCHES - GENERAL REQUIREMENTS: AC ONLY, QUIET OPERATING, GENERAL-USE SNAP SWITCHES WITH SILVER ALLOY CONTACTS, COMPLYING WITH NEMA WD 1 AND NEMA WD 6, AND LISTED AS COMPLYING WITH UL 20 AND WHERE APPLICABLE, FS W-S-896; TYPES AS INDICATED ON THE DRAWINGS.
1. WIRING PROVISIONS: TERMINAL SCREWS FOR SIDE WIRING AND SCREW ACTUATED BINDING CLAMP FOR BACK WIRING WITH SEPARATE GROUND TERMINAL SCREW.
B. STANDARD WALL SWITCHES: COMMERCIAL SPECIFICATION GRADE, 20 A, 120/277 V WITH STANDARD TOGGLE TYPE SWITCH ACTUATOR AND MAINTAINED CONTACTS; SINGLE POLE SINGLE THROW, DOUBLE POLE SINGLE THROW, THREE WAY, OR FOUR WAY AS INDICATED ON THE DRAWINGS.

1.03 WALL DIMMERS

A. WALL DIMMERS - GENERAL REQUIREMENTS: SOLID-STATE WITH CONTINUOUS FULL-RANGE EVEN CONTROL FOLLOWING SQUARE LAW DIMMING CURVE, INTEGRAL RADIO FREQUENCY INTERFERENCE FILTERING, POWER FAILURE PRESET MEMORY, AIR GAP SWITCH ACCESSIBLE WITHOUT REMOVING WALL PLATE, COMPLYING WITH NEMA WD 1 AND NEMA WD 6, AND LISTED AS COMPLYING WITH UL 1472; TYPES AND RATINGS SUITABLE FOR LOAD CONTROLLED AS INDICATED ON THE DRAWINGS.
B. CONTROL: SLIDE CONTROL TYPE WITH SEPARATE ON/OFF SWITCH.

1.04 RECEPTACLES

A. RECEPTACLES - GENERAL REQUIREMENTS: SELF-GROUNDING, COMPLYING WITH NEMA WD 1 AND NEMA WD 6, AND LISTED AS COMPLYING WITH UL 498, AND WHERE APPLICABLE, FS W-C-596; TYPES AS INDICATED ON THE DRAWINGS.
1. WIRING PROVISIONS: TERMINAL SCREWS FOR SIDE WIRING OR SCREW ACTUATED BINDING CLAMP FOR BACK WIRING WITH SEPARATE GROUND TERMINAL SCREW.
2. NEMA CONFIGURATIONS SPECIFIED ARE ACCORDING TO NEMA WD 6.
B. CONVENIENCE RECEPTACLES:
1. STANDARD CONVENIENCE RECEPTACLES: COMMERCIAL SPECIFICATION GRADE, 20A, 125V, NEMA 5-20R; SINGLE OR DUPLEX AS INDICATED ON THE DRAWINGS.
2. AUTOMATICALLY CONTROLLED CONVENIENCE RECEPTACLES: COMMERCIAL SPECIFICATION GRADE, 20A, 125V, NEMA 5-20R; CONTROLLED RECEPTACLE MARKING ON DEVICE FACE PER NFPA 70; SINGLE OR DUPLEX AS INDICATED ON THE DRAWINGS.
3. TAMPER RESISTANT CONVENIENCE RECEPTACLES: INDUSTRIAL SPECIFICATION GRADE, 20A, 125V, NEMA 5-20R, LISTED AND LABELED AS TAMPER RESISTANT TYPE; SINGLE OR DUPLEX AS INDICATED ON THE DRAWINGS.
C. GFCI RECEPTACLES:
1. GFCI RECEPTACLES - GENERAL REQUIREMENTS: SELF-TESTING, WITH FEED-THROUGH PROTECTION AND LIGHT TO INDICATE GROUND FAULT TRIPPED CONDITION AND LOSS OF PROTECTION; LISTED AS COMPLYING WITH UL 943, CLASS A.
2. WEATHER RESISTANT GFCI RECEPTACLES: COMMERCIAL SPECIFICATION GRADE, DUPLEX, 20A, 125V, NEMA 5-20R, RECTANGULAR DECORATOR STYLE, LISTED AND LABELED AS WEATHER RESISTANT TYPE COMPLYING WITH UL 498 SUPPLEMENT SD SUITABLE FOR INSTALLATION IN DAMP OR WET LOCATIONS.
D. USB CHARGING DEVICES:
1. USB CHARGING DEVICES - GENERAL REQUIREMENTS: LISTED AS COMPLYING WITH UL 1310.
2. USB CHARGING/TAMPER RESISTANT RECEPTACLE COMBINATION DEVICES: TWO-PORT (TYPE A) USB CHARGING DEVICE AND RECEPTACLE, COMMERCIAL SPECIFICATION GRADE, DUPLEX, 20A, 125V, NEMA 5-20R, LISTED AND LABELED AS TAMPER RESISTANT TYPE; RECTANGULAR DECORATOR STYLE.

1.05 WALL PLATES AND COVERS

A. WALL PLATES: COMPLY WITH UL 514D.
1. CONFIGURATION: ONE PIECE COVER AS REQUIRED FOR QUANTITY AND TYPES OF CORRESPONDING WIRING DEVICES.
2. SIZE: STANDARD.
3. SCREWS: METAL WITH SLOTTED HEADS FINISHED TO MATCH WALL PLATE FINISH.
4. PROVIDE SCREWLESS WALLPLATES WITH CONCEALED MOUNTING HARDWARE WHERE INDICATED.
B. NYLON WALL PLATES: SMOOTH FINISH, HIGH-IMPACT THERMOPLASTIC.
C. STAINLESS STEEL WALL PLATES: BRUSHED SATIN FINISH, TYPE 302 STAINLESS STEEL.
D. WEATHERPROOF RECEPTACLE COVERS FOR DAMP LOCATIONS: GASKETED, CAST ALUMINUM, WITH SELF-CLOSING HINGED COVER AND CORROSION-RESISTANT SCREWS; LISTED AS SUITABLE FOR USE IN WET LOCATIONS WITH COVER CLOSED.
E. WEATHERPROOF RECEPTACLE COVERS FOR WET LOCATIONS: GASKETED, CAST ALUMINUM, WITH HINGED LOCKABLE COVER AND CORROSION-RESISTANT SCREWS; LISTED AS SUITABLE FOR USE IN WET LOCATIONS WHILE IN USE WITH ATTACHMENT PLUGS CONNECTED AND IDENTIFIED AS EXTRA-DUTY TYPE.
F. WEATHERPROOF SWITCH COVERS FOR WET OR DAMP LOCATIONS: GASKETED, METALLIC, WITH EXTERNALLY OPERABLE ACTUATING MEANS AND CORROSION-RESISTANT SCREWS; LISTED AS SUITABLE FOR USE IN WET LOCATIONS.

1.06 FLOOR BOX SERVICE FITTINGS

A. DESCRIPTION: SERVICE FITTINGS COMPATIBLE WITH FLOOR BOXES PROVIDED UNDER SECTION 260533.16 WITH COMPONENTS, ADAPTERS, AND TRIMS REQUIRED FOR COMPLETE INSTALLATION.
B. FLUSH FLOOR SERVICE FITTINGS:
1. DUAL SERVICE FLUSH COMBINATION OUTLETS:
a. COVER: ROUND.
b. CONFIGURATION:
1) POWER: ONE STANDARD CONVENIENCE DUPLEX RECEPTACLE(S) WITH DUPLEX FLAP OPENING(S).
2) COMMUNICATIONS: _________.
3) VOICE AND DATA JACKS: PROVIDED BY OTHERS.
2. DUAL SERVICE FLUSH FURNITURE FEED:
a. COVER: ROUND.
b. CONFIGURATION:
1) POWER: ONE 2-1/8 INCH BY 3/4 INCH COMBINATION THREADED OPENING(S).
2) COMMUNICATIONS: ONE 2-1/8 INCH BY 1 INCH COMBINATION THREADED OPENING(S).

1.07 POKE-THROUGH ASSEMBLIES

A. DESCRIPTION: ASSEMBLY COMPRISING FLOOR SERVICE FITTING, POKE-THROUGH COMPONENT, FIRE STOPS AND SMOKE BARRIERS, AND JUNCTION BOX FOR CONDUIT TERMINATION; FIRE RATING LISTED TO MATCH FIRE RATING OF FLOOR AND SUITABLE FOR FLOOR THICKNESS WHERE INSTALLED.
B. FLUSH FLOOR SERVICE FITTINGS:
1. DUAL SERVICE FLUSH COMBINATION OUTLETS:
a. COVER: HINGED DOOR(S).
b. CONFIGURATION:
1) POWER: TWO STANDARD CONVENIENCE DUPLEX RECEPTACLE(S).
2) COMMUNICATIONS: _________.
3) VOICE AND DATA JACKS: PROVIDED BY OTHERS.
2. DUAL SERVICE FLUSH FURNITURE FEED:
a. CONFIGURATION:
1) POWER: ONE 3/4 INCH THREADED OPENING(S).
2) COMMUNICATIONS: TWO 1/2 INCH THREADED OPENING(S).
3. ACCESSORIES:
a. CLOSURE PLUGS: SIZE AND FIRE RATING AS REQUIRED TO SEAL UNUSED CORE HOLE AND MAINTAIN FIRE RATING OF FLOOR.

1.08 ACCESS FLOOR BOXES

A. DESCRIPTION: METALLIC MULTI-SERVICE BOX SUITABLE FOR MOUNTING IN ACCESS FLOOR SYSTEM SPECIFIED IN SECTION 096900.
B. CONFIGURATION:
1. POWER: TWO STANDARD CONVENIENCE DUPLEX RECEPTACLE(S).
2. COMMUNICATIONS: _________.
3. VOICE AND DATA JACKS: PROVIDED BY OTHERS.

PART 2 EXECUTION

2.01 INSTALLATION

A. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP) AND, WHERE APPLICABLE, NECA 130, INCLUDING MOUNTING HEIGHTS SPECIFIED IN THOSE STANDARDS UNLESS OTHERWISE INDICATED.
B. COORDINATE LOCATIONS OF OUTLET BOXES PROVIDED UNDER SECTION 260533.16 AS REQUIRED FOR INSTALLATION OF WIRING DEVICES PROVIDED UNDER THIS SECTION.
1. MOUNTING HEIGHTS: AS INDICATED ON THE DRAWINGS.
2. ORIENT OUTLET BOXES FOR VERTICAL INSTALLATION OF WIRING DEVICES UNLESS OTHERWISE INDICATED.
3. WHERE MULTIPLE RECEPTACLES, WALL SWITCHES, OR WALL DIMMERS ARE INSTALLED AT THE SAME LOCATION AND AT THE SAME MOUNTING HEIGHT, GANG DEVICES TOGETHER UNDER A COMMON WALL PLATE.
4. LOCATE RECEPTACLES FOR ELECTRIC DRINKING FOUNTAINS CONCEALED BEHIND DRINKING FOUNTAIN ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
C. INSTALL WIRING DEVICES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
D. INSTALL PERMANENT BARRIER BETWEEN GANGED WIRING DEVICES WHEN VOLTAGE BETWEEN ADJACENT DEVICES EXCEEDS 300 V.
E. WHERE REQUIRED, CONNECT WIRING DEVICES USING PIGTAILS NOT LESS THAN 6 INCHES (150 MM) LONG. DO NOT CONNECT MORE THAN ONE CONDUCTOR TO WIRING DEVICE TERMINALS.
F. CONNECT WIRING DEVICES BY WRAPPING CONDUCTOR CLOCKWISE 3/4 TURN AROUND SCREW TERMINAL AND TIGHTENING TO PROPER TORQUE SPECIFIED BY THE MANUFACTURER. WHERE PRESENT, DO NOT USE PUSH-IN PRESSURE TERMINALS THAT DO NOT RELY ON SCREW-ACTUATED BINDING.
G. UNLESS OTHERWISE INDICATED, CONNECT WIRING DEVICE GROUNDING TERMINAL TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR AND TO OUTLET BOX WITH BONDING JUMPER.
H. UNLESS OTHERWISE INDICATED, GFCI RECEPTACLES MAY BE CONNECTED TO PROVIDE FEED-THROUGH PROTECTION TO DOWNSTREAM DEVICES. LABEL SUCH DEVICES TO INDICATE THEY ARE PROTECTED BY UPSTREAM GFCI PROTECTION.
I. INSTALL WIRING DEVICES PLUMB AND LEVEL WITH MOUNTING YOKE HELD RIGIDLY IN PLACE.
J. INSTALL WALL SWITCHES WITH OFF POSITION DOWN.
K. INSTALL WALL DIMMERS TO ACHIEVE FULL RATING SPECIFIED AND INDICATED AFTER DERATING FOR GANGING AS INSTRUCTED BY MANUFACTURER.
L. DO NOT SHARE NEUTRAL CONDUCTOR ON BRANCH CIRCUITS UTILIZING WALL DIMMERS.
M. INSTALL VERTICALLY MOUNTED RECEPTACLES WITH GROUNDING POLE ON TOP AND HORIZONTALLY MOUNTED RECEPTACLES WITH GROUNDING POLE ON LEFT.
N. INSTALL WALL PLATES TO FIT COMPLETELY FLUSH TO WALL WITH NO GAPS AND ROUGH OPENING COMPLETELY COVERED WITHOUT STRAIN ON WALL PLATE. REPAIR OR REINSTALL IMPROPERLY INSTALLED OUTLET BOXES OR IMPROPERLY SIZED ROUGH OPENINGS. DO NOT USE OVERSIZED WALL PLATES IN LIEU OF MEETING THIS REQUIREMENT.
O. INSTALL BLANK WALL PLATES ON JUNCTION BOXES AND ON OUTLET BOXES WITH NO WIRING DEVICES INSTALLED OR DESIGNATED FOR FUTURE USE.
P. INSTALL POKE-THROUGH CLOSURE PLUGS IN EACH UNUSED CORE HOLES TO MAINTAIN FIRE RATING OF FLOOR.

2.02 ADJUSTING

A. ADJUST DEVICES AND WALL PLATES TO BE FLUSH AND LEVEL.

SECTION 262816.16 - ENCLOSED SWITCHES

PART 1 PRODUCTS

1.01 ENCLOSED SAFETY SWITCHES

A. DESCRIPTION: QUICK-MAKE, QUICK-BREAK ENCLOSED SAFETY SWITCHES LISTED AND LABELED AS COMPLYING WITH UL 98; HEAVY OR GENERAL DUTY AS INDICATED; RATINGS, CONFIGURATIONS, AND FEATURES AS INDICATED ON THE DRAWINGS.
B. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
C. UNLESS OTHERWISE INDICATED, PROVIDE PRODUCTS SUITABLE FOR CONTINUOUS OPERATION FOR THE SPECIFIC SITE LOCATION. UNDER THE FOLLOWING SERVICE CONDITIONS:
1. ALTITUDE: LESS THAN 6,600 FEET (2,000 M).
2. AMBIENT TEMPERATURE: BETWEEN -22 DEGREES F (-30 DEGREES C) AND 104 DEGREES F (40 DEGREES C).
D. HORSEPOWER RATING: SUITABLE FOR CONNECTED LOAD.
E. VOLTAGE RATING: SUITABLE FOR CIRCUIT VOLTAGE.
F. SHORT CIRCUIT CURRENT RATING:
1. PROVIDE ENCLOSED SAFETY SWITCHES, WHEN PROTECTED BY THE FUSES OR SUPPLY SIDE OVERCURRENT PROTECTIVE DEVICES TO BE INSTALLED, WITH LISTED SHORT CIRCUIT CURRENT RATING NOT LESS THAN THE AVAILABLE FAULT CURRENT AT THE INSTALLED LOCATION AS INDICATED ON THE DRAWINGS.
2. MINIMUM RATINGS:
a. SWITCHES PROTECTED BY CLASS H FUSES: 10,000 RMS SYMMETRICAL AMPERES.
b. GENERAL DUTY SINGLE THROW SWITCHES PROTECTED BY CLASS R, CLASS J, OR CLASS T FUSES: 100,000 RMS SYMMETRICAL AMPERES.
G. ENCLOSED SAFETY SWITCHES USED FOR SERVICE ENTRANCE: LISTED AND LABELED AS SUITABLE FOR USE AS SERVICE EQUIPMENT ACCORDING TO UL 869A.
H. PROVIDE WITH SWITCH BLADE CONTACT POSITION THAT IS VISIBLE WHEN THE COVER IS OPEN.
I. FUSE CLIPS FOR FUSIBLE SWITCHES: AS REQUIRED TO ACCEPT FUSES INDICATED.
J. CONDUCTOR TERMINATIONS: SUITABLE FOR USE WITH THE CONDUCTORS TO BE INSTALLED.
K. PROVIDE INSULATED, GROUNDABLE FULLY RATED SOLID NEUTRAL ASSEMBLY WHERE A NEUTRAL CONNECTION IS REQUIRED, WITH A SUITABLE LUG FOR TERMINATING EACH NEUTRAL CONDUCTOR.
L. PROVIDE SOLIDLY BONDED EQUIPMENT GROUND BUS IN EACH ENCLOSED SAFETY SWITCH, WITH A SUITABLE LUG FOR TERMINATING EACH EQUIPMENT GROUNDING CONDUCTOR.
M. ENCLOSURES: COMPLY WITH NEMA 250, AND LIST AND LABEL AS COMPLYING WITH UL 50 AND UL 50E.
1. ENVIRONMENT TYPE PER NEMA 250: AS INDICATED ON THE DRAWINGS.
N. PROVIDE SAFETY INTERLOCK TO PREVENT OPENING THE COVER WITH THE SWITCH IN THE ON POSITION WITH CAPABILITY OF OVERRIDING INTERLOCK FOR TESTING PURPOSES.
O. HEAVY DUTY SWITCHES:
1. COMPLY WITH NEMA KS 1.
2. CONDUCTOR TERMINATIONS:
a. LUG MATERIAL: ALUMINUM, SUITABLE FOR TERMINATING ALUMINUM OR COPPER CONDUCTORS.
3. PROVIDE EXTERNALLY OPERABLE HANDLE WITH MEANS FOR LOCKING IN THE OFF POSITION, CAPABLE OF ACCEPTING THREE PADLOCKS.
P. GENERAL DUTY SWITCHES:
1. CONDUCTOR TERMINATIONS:
a. PROVIDE MECHANICAL LUGS.
b. LUG MATERIAL: ALUMINUM, SUITABLE FOR TERMINATING ALUMINUM OR COPPER CONDUCTORS.
2. PROVIDE EXTERNALLY OPERABLE HANDLE WITH MEANS FOR LOCKING IN THE OFF POSITION, CAPABLE OF ACCEPTING TWO PADLOCKS.

PART 3 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
B. PERFORM WORK IN ACCORDANCE WITH NECA 1 (GENERAL WORKMANSHIP).
C. ARRANGE EQUIPMENT TO PROVIDE MINIMUM CLEARANCES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND NFPA 70.
D. PROVIDE REQUIRED SUPPORT AND ATTACHMENT IN ACCORDANCE WITH SECTION 260529.
E. INSTALL ENCLOSED SWITCHES PLUMB.
F. EXCEPT WHERE INDICATED TO BE MOUNTED ADJACENT TO THE EQUIPMENT THEY SUPPLY, MOUNT ENCLOSED SWITCHES SUCH THAT THE HIGHEST POSITION OF THE OPERATING HANDLE DOES NOT EXCEED 79 INCHES (2000 MM) ABOVE THE FLOOR OR WORKING PLATFORM.
G. PROVIDE GROUNDING AND BONDING IN ACCORDANCE WITH SECTION 260526.
H. PROVIDE FUSES COMPLYING WITH SECTION 262813 FOR FUSIBLE SWITCHES AS INDICATED OR AS REQUIRED BY EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.

SECTION 265100 - INTERIOR LIGHTING

PART 1 PRODUCTS

1.01 LUMINAIRE TYPES

A. FURNISH PRODUCTS AS INDICATED IN LUMINAIRE SCHEDULE INCLUDED ON THE DRAWINGS.

1.02 LUMINAIRES

A. PROVIDE PRODUCTS THAT COMPLY WITH REQUIREMENTS OF NFPA 70.
B. PROVIDE PRODUCTS THAT ARE LISTED AND LABELED AS COMPLYING WITH UL 1598, WHERE APPLICABLE.
C. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR THE PURPOSE INTENDED.
D. UNLESS OTHERWISE INDICATED, PROVIDE COMPLETE LUMINAIRES INCLUDING LAMP(S) AND ALL SOCKETS, BALLASTS, REFLECTORS, LENSES, HOUSINGS AND OTHER COMPONENTS REQUIRED TO POSITION, ENERGIZE AND PROTECT THE LAMP AND DISTRIBUTE THE LIGHT.
E. UNLESS SPECIFICALLY INDICATED TO BE EXCLUDED, PROVIDE ALL REQUIRED CONDUIT, BOXES, WIRING, CONNECTORS, HARDWARE, SUPPORTS, TRIMS, ACCESSORIES, ETC. AS NECESSARY FOR A COMPLETE OPERATING SYSTEM.
F. PROVIDE PRODUCTS SUITABLE TO WITHSTAND NORMAL HANDLING, INSTALLATION, AND SERVICE WITHOUT ANY DAMAGE, DISTORTION, CORROSION, FADING, DISCOLORING, ETC.
G. RECESSED LUMINAIRES:
1. CEILING COMPATIBILITY: COMPLY WITH NEMA LE 4.
2. LUMINAIRES RECESSED IN INSULATED CEILINGS: LISTED AND LABELED AS IC-RATED, SUITABLE FOR DIRECT CONTACT WITH INSULATION AND COMBUSTIBLE MATERIALS.
H. LED LUMINAIRES:
1. COMPONENTS: UL 8750 RECOGNIZED OR LISTED AS APPLICABLE.
2. TESTED IN ACCORDANCE WITH IES LM-79 AND IES LM-80.
3. LED ESTIMATED USEFUL LIFE: MINIMUM OF 50,000 HOURS AT 70 PERCENT LUMEN MAINTENANCE, CALCULATED BASED ON IES LM-80 TEST DATA.
I. LED TAPE LIGHTING SYSTEMS: PROVIDE ALL POWER SUPPLIES, DRIVERS, CABLES, CONNECTORS, CHANNELS, COVERS, MOUNTING ACCESSORIES, AND INTERFACES AS NECESSARY TO COMPLETE INSTALLATION.
1. LED TAPE - GENERAL REQUIREMENTS:
a. LISTED.
b. DESIGNED FOR FIELD CUTTING IN ACCORDANCE WITH LISTING.
J. TRACK LIGHTING SYSTEMS: PROVIDE TRACK COMPATIBLE WITH SPECIFIED TRACK HEADS, WITH ALL CONNECTORS, POWER FEED FITTINGS, DEAD ENDS, HANGERS AND CANOPIES AS NECESSARY TO COMPLETE INSTALLATION.
K. LUMINAIRES MOUNTED IN CONTINUOUS ROWS: PROVIDE QUANTITY OF UNITS REQUIRED FOR LENGTH INDICATED, WITH ALL ACCESSORIES REQUIRED FOR JOINING AND ALIGNING.

1.03 EMERGENCY LIGHTING UNITS

A. DESCRIPTION: EMERGENCY LIGHTING UNITS COMPLYING WITH NFPA 101 AND ALL APPLICABLE STATE AND LOCAL CODES, AND LISTED AND LABELED AS COMPLYING WITH UL 924.
B. OPERATION: UPON INTERRUPTION OF NORMAL POWER SOURCE OR BROWNOUT CONDITION EXCEEDING 20 PERCENT VOLTAGE DROP FROM NOMINAL, SOLID-STATE CONTROL AUTOMATICALLY SWITCHES CONNECTED LAMPS TO INTEGRAL BATTERY POWER FOR MINIMUM OF 90 MINUTES OF RATED EMERGENCY ILLUMINATION, AND AUTOMATICALLY RECHARGES BATTERY UPON RESTORATION OF NORMAL POWER SOURCE.
C. BATTERY:
1. SEALED MAINTENANCE-FREE NICKEL CADMIUM UNLESS OTHERWISE INDICATED.
2. SIZE BATTERY TO SUPPLY ALL CONNECTED LAMPS, INCLUDING EMERGENCY REMOTE HEADS WHERE INDICATED.
D. DIAGNOSTICS: PROVIDE POWER STATUS INDICATOR LIGHT AND ACCESSIBLE INTEGRAL TEST SWITCH TO MANUALLY ACTIVATE EMERGENCY OPERATION.
E. PROVIDE LOW-VOLTAGE DISCONNECT TO PREVENT BATTERY DAMAGE FROM DEEP DISCHARGE.
F. SELF-DIAGNOSTICS: PROVIDE UNITS THAT SELF-MONITOR FUNCTIONALITY AND AUTOMATICALLY PERFORM TESTING REQUIRED BY NFPA 101 WHERE INDICATED; PROVIDE INDICATOR LIGHT(S) TO REPORT TEST AND DIAGNOSTIC STATUS.
G. ACCESSORIES:
1. PROVIDE COMPATIBLE ACCESSORY MOUNTING BRACKETS WHERE INDICATED OR REQUIRED TO COMPLETE INSTALLATION.
2. WHERE INDICATED, PROVIDE EMERGENCY REMOTE HEADS THAT ARE COMPATIBLE WITH THE EMERGENCY LIGHTING UNIT THEY ARE CONNECTED TO AND SUITABLE FOR THE INSTALLED LOCATION.

1.04 EXIT SIGNS

A. DESCRIPTION: EXIT SIGNS COMPLYING WITH NFPA 101 AND APPLICABLE STATE AND LOCAL CODES, AND LISTED AND LABELED AS COMPLYING WITH UL 924.
1. NUMBER OF FACES: SINGLE- OR DOUBLE-FACE AS INDICATED OR AS REQUIRED FOR INSTALLED LOCATION.
2. DIRECTIONAL ARROWS: AS INDICATED OR AS REQUIRED FOR INSTALLED LOCATION.
B. POWERED EXIT SIGNS: INTERNALLY ILLUMINATED WITH LEDS UNLESS OTHERWISE INDICATED.
1. SELF-POWERED EXIT SIGNS:
a. OPERATION: UPON INTERRUPTION OF NORMAL POWER SOURCE OR BROWNOUT CONDITION EXCEEDING 20 PERCENT VOLTAGE DROP FROM NOMINAL, SOLID-STATE CONTROL AUTOMATICALLY SWITCHES CONNECTED LAMPS TO INTEGRAL BATTERY POWER FOR MINIMUM OF 90 MINUTES OF RATED EMERGENCY ILLUMINATION, AND AUTOMATICALLY RECHARGES BATTERY UPON RESTORATION OF NORMAL POWER SOURCE.
b. BATTERY: SEALED, MAINTENANCE-FREE, NICKEL CADMIUM UNLESS OTHERWISE INDICATED.
c. DIAGNOSTICS: PROVIDE POWER STATUS INDICATOR LIGHT AND ACCESSIBLE INTEGRAL TEST SWITCH TO MANUALLY ACTIVATE EMERGENCY OPERATION.
d. PROVIDE LOW-VOLTAGE DISCONNECT TO PREVENT BATTERY DAMAGE FROM DEEP DISCHARGE.
e. SELF-DIAGNOSTICS: PROVIDE UNITS THAT SELF-MONITOR FUNCTIONALITY AND AUTOMATICALLY PERFORM TESTING REQUIRED BY NFPA 101 WHERE INDICATED; PROVIDE INDICATOR LIGHT(S) TO REPORT TEST AND DIAGNOSTIC STATUS.

1.05 BALLASTS AND DRIVERS

A. BALLASTS/DRIVERS - GENERAL REQUIREMENTS:
1. PROVIDE BALLASTS CONTAINING NO POLYCHLORINATED BIPHENYLS (PCBS).
2. MINIMUM EFFICIENCY/EFFICACY: PROVIDE BALLASTS COMPLYING WITH ALL CURRENT APPLICABLE FEDERAL AND STATE BALLAST EFFICIENCY/EFFICACY STANDARDS.
3. ELECTRONIC BALLASTS/DRIVERS: INRUSH CURRENTS NOT EXCEEDING PEAK CURRENTS SPECIFIED IN NEMA 410.
B. DIMMABLE LED DRIVERS:
1. DIMMING RANGE: CONTINUOUS DIMMING FROM 100 PERCENT TO FIVE PERCENT RELATIVE LIGHT OUTPUT UNLESS DIMMING CAPABILITY TO LOWER LEVEL IS INDICATED, WITHOUT FLICKER.
2. CONTROL COMPATIBILITY: FULLY COMPATIBLE WITH THE DIMMING CONTROLS TO BE INSTALLED.

1.06 ACCESSORIES

A. STEMS FOR SUSPENDED LUMINAIRES: STEEL TUBING, MINIMUM 1/2" SIZE, FACTORY FINISHED TO MATCH LUMINAIRE OR FIELD-PAINTED AS DIRECTED.
B. THREADED RODS FOR SUSPENDED LUMINAIRES: ZINC-PLATED STEEL, MINIMUM 1/4" SIZE, FIELD-PAINTED AS DIRECTED.
C. PROVIDE ACCESSORY PLASTER FRAMES FOR LUMINAIRES RECESSED IN PLASTER CEILINGS.
D. ARCHITECTURAL TRIMS FOR LED LIGHTING:
1. DESCRIPTION: TRIMS DESIGNED FOR INTEGRATION INTO ARCHITECTURAL ELEMENTS, WITH CHANNELS TO ACCOMMODATE LED TAPE LIGHTING SYSTEM.

PART 2 EXECUTION

2.01 INSTALLATION

A. COORDINATE LOCATIONS OF OUTLET BOXES PROVIDED UNDER SECTION 260533.16 AS REQUIRED FOR INSTALLATION OF LUMINAIRES PROVIDED UNDER THIS SECTION.
B. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
C. INSTALL LUMINAIRES SECURELY, IN A NEAT AND WORKMANLIKE MANNER, AS SPECIFIED IN NECA 500 (COMMERCIAL LIGHTING) AND NECA 502 (INDUSTRIAL LIGHTING).
D. PROVIDE REQUIRED SUPPORT AND ATTACHMENT IN ACCORDANCE WITH SECTION 260529.
E. INSTALL LUMINAIRES PLUMB AND SQUARE AND ALIGNED WITH BUILDING LINES AND WITH ADJACENT LUMINAIRES.
F. SUSPENDED CEILING MOUNTED LUMINAIRES:
1. DO NOT USE CEILING TILES TO BEAR WEIGHT OF LUMINAIRES.
2. DO NOT USE CEILING SUPPORT SYSTEM TO BEAR WEIGHT OF LUMINAIRES UNLESS CEILING SUPPORT SYSTEM IS CERTIFIED AS SUITABLE TO DO SO.
3. SECURE SURFACE-MOUNTED AND RECESSED LUMINAIRES TO CEILING SUPPORT CHANNELS OR FRAMING MEMBERS OR TO BUILDING STRUCTURE.
4. SECURE LAY-IN LUMINAIRES TO CEILING SUPPORT CHANNELS USING LISTED SAFETY CLIPS AT FOUR CORNERS.
5. IN ADDITION TO CEILING SUPPORT WIRES, PROVIDE TWO GALVANIZED STEEL SAFETY WIRE(S), MINIMUM 12 GAUGE, CONNECTED FROM OPPOSING CORNERS OF EACH RECESSED LUMINAIRE TO BUILDING STRUCTURE.
6. SEE APPROPRIATE DIVISION 9 SECTION WHERE SUSPENDED GRID CEILING IS SPECIFIED FOR ADDITIONAL REQUIREMENTS.
G. RECESSED LUMINAIRES:
1. INSTALL TRIMS TIGHT TO MOUNTING SURFACE WITH NO VISIBLE LIGHT LEAKAGE.
H. SUSPENDED LUMINAIRES:
1. INSTALL USING THE SUSPENSION METHOD INDICATED, WITH SUPPORT LENGTHS AND ACCESSORIES AS REQUIRED FOR SPECIFIED MOUNTING HEIGHT.
2. INSTALL CANOPIES TIGHT TO MOUNTING SURFACE.
I. INSTALL ACCESSORIES FURNISHED WITH EACH LUMINAIRE.
J. BOND PRODUCTS AND METAL ACCESSORIES TO BRANCH CIRCUIT EQUIPMENT GROUNDING CONDUCTOR.
K. EMERGENCY LIGHTING UNITS:
1. UNLESS OTHERWISE INDICATED, CONNECT UNIT TO UNSWITCHED POWER FROM SAME CIRCUIT FEEDING NORMAL LIGHTING IN SAME ROOM OR AREA. BYPASS LOCAL SWITCHES, CONTACTORS, OR OTHER LIGHTING CONTROLS.
L. EXIT SIGNS:
1. UNLESS OTHERWISE INDICATED, CONNECT UNIT TO UNSWITCHED POWER FROM SAME CIRCUIT FEEDING NORMAL LIGHTING IN SAME ROOM OR AREA. BYPASS LOCAL SWITCHES, CONTACTORS, OR OTHER LIGHTING CONTROLS.
M. INSTALL LAMPS IN EACH LUMINAIRE.
N. LAMP BURN-IN: OPERATE LAMPS AT FULL OUTPUT FOR PRESCRIBED PERIOD PER MANUFACTURER'S RECOMMENDATIONS PRIOR TO USE WITH ANY DIMMING CONTROLS. REPLACE LAMPS THAT FAIL PREMATURELY DUE TO IMPROPER LAMP BURN-IN.

2.02 ADJUSTING

A. AIM AND POSITION ADJUSTABLE LUMINAIRES TO ACHIEVE DESIRED ILLUMINATION AS INDICATED OR AS DIRECTED BY ARCHITECT. SECURE LOCKING FITTINGS IN PLACE.
B. AIM AND POSITION ADJUSTABLE EMERGENCY LIGHTING UNIT LAMPS TO ACHIEVE OPTIMUM ILLUMINATION OF EGRESS PATH AS REQUIRED OR AS DIRECTED BY ARCHITECT OR AUTHORITY HAVING JURISDICTION.
C. EXIT SIGNS WITH FIELD-SELECTABLE DIRECTIONAL ARROWS: SET AS INDICATED OR AS REQUIRED TO PROPERLY DESIGNATE EGRESS PATH AS DIRECTED BY ARCHITECT OR AUTHORITY HAVING JURISDICTION.

SECTION 270529 - HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS

PART 1 PRODUCTS

1.01 SUPPORT AND ATTACHMENT COMPONENTS

A. GENERAL REQUIREMENTS:
1. COMPLY WITH THE FOLLOWING. WHERE REQUIREMENTS DIFFER, COMPLY WITH MOST STRINGENT.
a. TIA-569.
b. NFPA 70.
c. REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.
2. PROVIDE REQUIRED HANGERS, SUPPORTS, ANCHORS, FASTENERS, FITTINGS, ACCESSORIES, AND HARDWARE AS NECESSARY FOR COMPLETE INSTALLATION OF COMMUNICATIONS WORK.
3. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED, WHERE APPLICABLE.
4. WHERE SUPPORT AND ATTACHMENT COMPONENT TYPES AND SIZES ARE NOT INDICATED, SELECT IN ACCORDANCE WITH MANUFACTURER'S APPLICATION CRITERIA AS REQUIRED FOR LOAD TO BE SUPPORTED WITH MINIMUM SAFETY FACTOR OF1.5. INCLUDE CONSIDERATION FOR VIBRATION, EQUIPMENT OPERATION, AND SHOCK LOADS WHERE APPLICABLE.
5. DO NOT USE PRODUCTS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING.
6. STEEL COMPONENTS: USE CORROSION-RESISTANT MATERIALS SUITABLE FOR ENVIRONMENT WHERE INSTALLED.
a. ZINC-PLATED STEEL: ELECTROPLATED IN ACCORDANCE WITH ASTM B633.
b. GALVANIZED STEEL: HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123/A123M OR ASTM A153/A153M.
B. CONDUIT SUPPORTS: STRAPS AND CLAMPS SUITABLE FOR CONDUIT TO BE SUPPORTED.
1. CONDUIT STRAPS: ONE-HOLE OR TWO-HOLE TYPE; STEEL OR MALLEABLE IRON.
2. CONDUIT CLAMPS: BOLTED TYPE UNLESS OTHERWISE INDICATED.
C. NONCONTINUOUS CABLE SUPPORTS: SUITABLE FOR CABLES TO BE SUPPORTED, INCLUDING BUT NOT LIMITED TO J-HOOKS, BRIDLE RINGS, DRIVE RINGS, AND FLEXIBLE HARNESSES/SLINGS.
1. APPLICATIONS:
a. DO NOT EXCEED 5 FEET (1.5 M) BETWEEN CABLE SUPPORTS.
b. MAXIMUM NUMBER OF CABLES PER CABLE SUPPORT:
2. CABLE SUPPORTS INSTALLED IN SPACES USED FOR ENVIRONMENTAL AIR: PLENUM RATED; LISTED AND LABELED AS COMPLYING WITH UL 2043, SUITABLE FOR USE IN AIR-HANDLING SPACES.
3. J-HOOKS: NONCONTINUOUS CABLING SUPPORT WITH REMOVABLE TOP RETAINER CLIP.
a. MATERIAL: USE GALVANIZED STEEL, FACTORY-PAINTED STEEL, OR STAINLESS STEEL.
b. PROVIDE SUPPORT SURFACES WITH SMOOTH, BEVELED EDGES AND RADIUS NOT LESS THAN MINIMUM ALLOWABLE BEND RADIUS OF CABLES SUPPORTED.
c. PROVIDE MULTITIERED J-HOOKS WHERE REQUIRED TO SUPPORT MULTIPLE CABLING SYSTEMS.
D. CABLE ROUTING ASSEMBLIES:
1. APPLICATIONS:
a. HORIZONTAL SUPPORTS: DO NOT EXCEED 3 FEET (0.9 M) AND AT EACH END OR JOINT.
b. VERTICAL SUPPORTS: DO NOT EXCEED 4 FEET (1.2 M), UNLESS LISTED OTHERWISE - MAXIMUM ONE JOINT BETWEEN SUPPORTS.
c. COMPLY WITH NFPA 70 FOR CABLE ROUTING ASSEMBLIES.
d. PROVIDE NFPA 70 REQUIRED BONDING OF METAL COMPONENTS IN ACCORDANCE WITH MANUFACTURER WRITTEN INSTRUCTIONS.
e. ALLOWABLE CABLE TYPES: CATEGORY 5E, CATEGORY 6, SINGLE-MODE FIBER OPTIC, AND MULTI-MODE FIBER OPTIC.
E. OUTLET BOX SUPPORTS: HANGERS AND BRACKETS SUITABLE FOR BOXES TO BE SUPPORTED.
F. METAL CHANNEL/STRUT FRAMING SYSTEMS:
1. DESCRIPTION: FACTORY-FABRICATED, CONTINUOUS-SLOT, METAL CHANNEL/STRUT AND ASSOCIATED FITTINGS, ACCESSORIES, AND HARDWARE REQUIRED FOR FIELD ASSEMBLY OF SUPPORTS.
2. COMPLY WITH MFMA-4.
G. HANGER RODS: THREADED, ZINC-PLATED STEEL UNLESS OTHERWISE INDICATED.
H. NONPENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS:
1. DESCRIPTION: STEEL PEDESTALS WITH THERMOPLASTIC OR RUBBER BASES THAT REST ON TOP OF ROOFING MEMBRANE, NOT REQUIRING ATTACHMENT TO ROOF STRUCTURE AND NOT PENETRATING ROOFING ASSEMBLY, WITH SUPPORT FIXTURES AS SPECIFIED.
2. BASE SIZES: AS REQUIRED TO DISTRIBUTE LOAD SUFFICIENTLY TO PREVENT INDENTATION OF ROOFING ASSEMBLY.
3. ATTACHMENT/SUPPORT FIXTURES: AS RECOMMENDED BY MANUFACTURER, SAME TYPE AS INDICATED FOR EQUIVALENT INDOOR HANGERS AND SUPPORTS.
4. MOUNTING HEIGHT: PROVIDE MINIMUM CLEARANCE OF 6 INCHES (150 MM) UNDER SUPPORTED COMPONENT TO TOP OF ROOFING.
I. ANCHORS AND FASTENERS:
1. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE ANCHOR AND FASTENER TYPES INDICATED FOR SPECIFIED APPLICATIONS.

PART 2 EXECUTION

2.01 INSTALLATION

I. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
J. INSTALL HANGERS AND SUPPORTS IN ACCORDANCE WITH NECA 1, BICSI ITSIMM, AND BICSI N1.
K. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.
L. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM SUSPENDED CEILING SUPPORT SYSTEM OR CEILING GRID.
M. UNLESS SPECIFICALLY INDICATED OR APPROVED BY ARCHITECT, DO NOT PROVIDE SUPPORT FROM ROOF DECK.
N. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS WITHOUT APPROVAL OF STRUCTURAL ENGINEER.
O. EQUIPMENT SUPPORT AND ATTACHMENT:
1. USE METAL, FABRICATED SUPPORTS OR SUPPORTS ASSEMBLED FROM METAL CHANNEL/STRUT TO SUPPORT EQUIPMENT AS REQUIRED.
2. USE METAL CHANNEL/STRUT SECURED TO STUDS TO SUPPORT EQUIPMENT SURFACE MOUNTED ON HOLLOW STUD WALLS WHEN WALL STRENGTH IS NOT SUFFICIENT TO RESIST PULL-OUT.
3. USE METAL CHANNEL/STRUT TO SUPPORT SURFACE-MOUNTED EQUIPMENT IN WET OR DAMP LOCATIONS TO PROVIDE SPACE BETWEEN EQUIPMENT AND MOUNTING SURFACE.
4. SECURELY FASTEN FLOOR-MOUNTED EQUIPMENT. DO NOT INSTALL EQUIPMENT SUCH THAT IT RELIES ON ITS OWN WEIGHT FOR SUPPORT.
H. SECURE FASTENERS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.
I. REMOVE TEMPORARY SUPPORTS.

2.02 FIELD QUALITY CONTROL

A. SEE SECTION 014000 - QUALITY REQUIREMENTS FOR ADDITIONAL REQUIREMENTS.
B. INSPECT SUPPORT AND ATTACHMENT COMPONENTS FOR DAMAGE AND DEFECTS.
C. REPAIR CUTS AND ABRASIONS IN GALVANIZED FINISHES USING ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER. REPLACE COMPONENTS THAT EXHIBIT SIGNS OF CORROSION.
5. D. CORRECT DEFICIENCIES AND REPLACE DAMAGED OR DEFECTIVE SUPPORT AND ATTACHMENT COMPONENTS.

CEC GROUP
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CONSULTANTS

SEAL

NOT FOR CONSTRUCTION

brightspeed

D3324L - JACKSONVILLE AR WEST CO GENERATOR REPLACEMENT

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

MARK	DATE	DESCRIPTION
	08/28	ISSUED FOR BID
	04/14/26	90% OWNER REVIEW

PROJECT NO: 25040-1
COMMISSION DATE: -
DESIGNED BY: JRS
DRAWN BY: JRS
CHECKED BY: JMM

1" ACTUAL

IF THE ABOVE DIMENSION DOES NOT MEASURE ONE INCH (1") EXACTLY, THIS DRAWING WILL HAVE BEEN ENLARGED OR REDUCED, AFFECTING ALL LABELED SCALES.

SHEET TITLE

ELECTRICAL SPECIFICATIONS

E701

ELECTRICAL SPECIFICATIONS

SECTION 270533 - CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 1 PRODUCTS

1.01 CONDUIT APPLICATIONS

A. DO NOT USE CONDUIT AND ASSOCIATED FITTINGS FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, MANUFACTURERS' INSTRUCTIONS, AND PRODUCT LISTING.

B. UNLESS OTHERWISE INDICATED AND WHERE NOT OTHERWISE RESTRICTED, USE CONDUIT TYPES INDICATED FOR SPECIFIED APPLICATIONS, WHERE MORE THAN ONE LISTED APPLICATION APPLIES, COMPLY WITH MOST RESTRICTIVE REQUIREMENTS. WHERE CONDUIT TYPE FOR PARTICULAR APPLICATION IS NOT SPECIFIED, USE GALVANIZED STEEL RIGID METAL CONDUIT.

C. UNDERGROUND:
1. UNDER SLAB ON GRADE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC), OR RIGID PVC CONDUIT.
2. EXTERIOR, DIRECT-BURIED: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC), OR RIGID PVC CONDUIT.
3. EXTERIOR, EMBEDDED WITHIN CONCRETE: USE GALVANIZED STEEL RIGID METAL CONDUIT (RMC), GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC), PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC), GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT), OR RIGID PVC CONDUIT.

D. CONCEALED WITHIN HOLLOW STUD WALLS: USE GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT).

E. CONCEALED ABOVE ACCESSIBLE CEILINGS: WHERE IN CONDUIT, USE STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT).

1.02 CONDUIT - GENERAL REQUIREMENTS

A. COMPLY WITH NFPA 70 AND TIA-569.

B. EXISTING WORK: WHERE EXISTING CONDUITS ARE INDICATED TO BE REUSED, THEY MAY BE REUSED ONLY WHERE THEY COMPLY WITH SPECIFIED REQUIREMENTS, ARE FREE FROM CORROSION, AND INTEGRITY IS VERIFIED BY PULLING MANDREL THROUGH THEM.

C. PROVIDE CONDUIT, FITTINGS, SUPPORTS, AND ACCESSORIES REQUIRED FOR COMPLETE COMMUNICATIONS PATHWAY.

D. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED.

E. MINIMUM CONDUIT SIZE, UNLESS OTHERWISE INDICATED:
1. COMMUNICATIONS OUTLET BOX: 3/4-INCH (21 MM) TRADE SIZE.

F. WHERE CONDUIT SIZE IS NOT INDICATED, SIZE TO COMPLY WITH NFPA 70, TIA-569, AND BICSI TDMM, BUT NOT LESS THAN APPLICABLE MINIMUM SIZE REQUIREMENTS SPECIFIED. WHERE SPECIFIED STANDARDS DIFFER, COMPLY WITH MOST STRINGENT.

1.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT COMPLYING WITH ANSI C80.1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.

B. FITTINGS:
1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 6.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE THREADED FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
4. CONDUIT BODIES: USE ONLY CONDUIT BODIES SPECIFICALLY DESIGNED FOR COMMUNICATIONS CABLING. STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.
   a. COMPLY WITH TIA-568.0 MINIMUM BEND RADIUS REQUIREMENTS FOR FIBER OPTIC CABLES.

1.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. DESCRIPTION: NFPA 70, TYPE IMC GALVANIZED STEEL INTERMEDIATE METAL CONDUIT COMPLYING WITH ANSI C80.6 AND LISTED AND LABELED AS COMPLYING WITH UL 1242.

B. FITTINGS:
1. NONHAZARDOUS LOCATIONS: USE FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B OR UL 1242.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE THREADED FITTINGS ONLY. THREADLESS FITTINGS, INCLUDING SET SCREW AND COMPRESSION/GLAND TYPES, ARE NOT PERMITTED.
4. CONDUIT BODIES: USE ONLY CONDUIT BODIES SPECIFICALLY DESIGNED FOR COMMUNICATIONS CABLING. STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.
   a. COMPLY WITH TIA-568.0 MINIMUM BEND RADIUS REQUIREMENTS FOR FIBER OPTIC CABLES.

1.05 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. DESCRIPTION: NFPA 70, TYPE RMC GALVANIZED STEEL RIGID METAL CONDUIT WITH EXTERNAL POLYVINYL CHLORIDE (PVC) COATING COMPLYING WITH NEMA RN 1 AND LISTED AND LABELED AS COMPLYING WITH UL 6.

B. EXTERIOR COATING: POLYVINYL CHLORIDE (PVC), NOMINAL THICKNESS OF 40 MIL, 0.040 INCH (1.02 MM).

C. PVC-COATED BOXES AND FITTINGS:
1. MANUFACTURER: SAME AS MANUFACTURER OF PVC-COATED CONDUIT TO BE INSTALLED.
2. NONHAZARDOUS LOCATIONS: USE BOXES AND FITTINGS LISTED AND LABELED AS COMPLYING WITH UL 514A, UL 514B, OR UL 6.
3. MATERIAL: USE STEEL OR MALLEABLE IRON.
4. EXTERIOR COATING: POLYVINYL CHLORIDE (PVC), MINIMUM THICKNESS OF 40 MIL, 0.040 INCH (1.02 MM).
5. CONDUIT BODIES: STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.

D. PVC-COATED SUPPORTS: FURNISH WITH EXTERIOR COATING OF POLYVINYL CHLORIDE (PVC), MINIMUM THICKNESS OF 15 MIL, 0.015 INCH (0.38 MM).

1.06 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. DESCRIPTION: NFPA 70, TYPE EMT GALVANIZED STEEL ELECTRICAL METALLIC TUBING COMPLYING WITH ANSI C80.3 AND LISTED AND LABELED AS COMPLYING WITH UL 797.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.
2. MATERIAL: USE STEEL OR MALLEABLE IRON.
3. CONNECTORS AND COUPLINGS: USE COMPRESSION/GLAND TYPE.
   a. DO NOT USE INDENTER TYPE CONNECTORS AND COUPLINGS.
   b. DO NOT USE SET-SCREW TYPE CONNECTORS AND COUPLINGS.
4. CONDUIT BODIES: USE ONLY CONDUIT BODIES SPECIFICALLY DESIGNED FOR COMMUNICATIONS CABLING. STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.
   a. COMPLY WITH TIA-568.0 MINIMUM BEND RADIUS REQUIREMENTS FOR FIBER OPTIC CABLES.

1.07 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

A. DESCRIPTION: NFPA 70, TYPE EMT STAINLESS STEEL ELECTRICAL METALLIC TUBING COMPLYING WITH ANSI C80.3 AND LISTED AND LABELED AS COMPLYING WITH UL 797A.

B. FITTINGS:
1. DESCRIPTION: FITTINGS COMPLYING WITH NEMA FB 1 AND LISTED AND LABELED AS COMPLYING WITH UL 514B.
2. MATERIAL: USE STAINLESS STEEL WITH CORROSION RESISTANCE EQUIVALENT TO CONDUIT.
3. CONNECTORS AND COUPLINGS: USE COMPRESSION/GLAND TYPE.
   a. DO NOT USE SET-SCREW TYPE CONNECTORS AND COUPLINGS.
4. CONDUIT BODIES: STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.

1.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. DESCRIPTION: NFPA 70, TYPE PVC RIGID POLYVINYL CHLORIDE CONDUIT COMPLYING WITH NEMA TC 2 AND LISTED AND LABELED AS COMPLYING WITH UL 651; SCHEDULE 40 UNLESS OTHERWISE INDICATED, SCHEDULE 80 WHERE SUBJECT TO PHYSICAL DAMAGE.

B. FITTINGS:
1. MANUFACTURER: SAME AS MANUFACTURER OF CONDUIT TO BE CONNECTED.
2. DESCRIPTION: FITTINGS COMPLYING WITH NEMA TC 3 AND LISTED AND LABELED AS COMPLYING WITH UL 651; MATERIAL TO MATCH CONDUIT.
3. CONDUIT BODIES: USE ONLY CONDUIT BODIES SPECIFICALLY DESIGNED FOR COMMUNICATIONS CABLING. STANDARD CONDUIT BODIES DESIGNED FOR ELECTRICAL RACEWAYS ARE NOT PERMITTED.
   a. COMPLY WITH TIA-568.0 MINIMUM BEND RADIUS REQUIREMENTS FOR FIBER OPTIC CABLES.

PART 2 EXECUTION

2.01 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL CONDUIT IN ACCORDANCE WITH NECA 1, BICSI ITSIMM, AND BICSI N1.

C. GALVANIZED STEEL RIGID METAL CONDUIT (RMC): INSTALL IN ACCORDANCE WITH NECA 101.

D. GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC): INSTALL IN ACCORDANCE WITH NECA 101.

E. PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC): INSTALL USING ONLY TOOLS APPROVED BY MANUFACTURER.

F. GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT): INSTALL IN ACCORDANCE WITH NECA 101.

G. RIGID POLYVINYL CHLORIDE (PVC) CONDUIT: INSTALL IN ACCORDANCE WITH NECA 111.

H. CONDUIT ROUTING:
1. UNLESS DIMENSIONED, CONDUIT ROUTING INDICATED IS DIAGRAMMATIC.
2. WHEN CONDUIT DESTINATION IS INDICATED WITHOUT SPECIFIC ROUTING, DETERMINE EXACT ROUTING REQUIRED.
3. CONCEAL CONDUITS UNLESS SPECIFICALLY INDICATED TO BE EXPOSED.
4. CONDUITS IN THE FOLLOWING AREAS MAY BE EXPOSED, UNLESS OTHERWISE INDICATED:
   a. ELECTRICAL ROOMS.
   b. COMMUNICATIONS ROOMS.
   c. MECHANICAL EQUIPMENT ROOMS.
   d. WITHIN JOISTS IN AREAS WITH NO CEILING.
5. CONDUITS INSTALLED UNDERGROUND OR EMBEDDED IN CONCRETE MAY BE ROUTED IN SHORTEST POSSIBLE MANNER UNLESS OTHERWISE INDICATED. ROUTE OTHER CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING STRUCTURE AND SURFACES, FOLLOWING SURFACE CONTOURS WHERE PRACTICAL.
6. ARRANGE CONDUIT TO MAINTAIN ADEQUATE HEADROOM, CLEARANCES, AND ACCESS.
7. ARRANGE CONDUIT TO PROVIDE NO MORE THAN EQUIVALENT OF TWO 90-DEGREE BEND(S) BETWEEN PULL POINTS.
8. ARRANGE CONDUIT TO PROVIDE NO MORE THAN 100 FEET (33 M) BETWEEN PULL POINTS.

I. CONDUIT SUPPORT:
1. SECURE AND SUPPORT CONDUITS IN ACCORDANCE WITH NFPA 70 USING SUITABLE SUPPORTS AND METHODS APPROVED BY AUTHORITIES HAVING JURISDICTION.
2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.
3. INSTALLATION ABOVE SUSPENDED CEILINGS: DO NOT PROVIDE SUPPORT FROM CEILING SUPPORT SYSTEM. DO NOT PROVIDE SUPPORT FROM CEILING GRID OR ALLOW CONDUITS TO LAY ON CEILING TILES.
4. USE CONDUIT STRAP TO SUPPORT SINGLE SURFACE-MOUNTED CONDUIT.
   a. USE CLAMP BACK SPACER WITH CONDUIT STRAP FOR DAMP AND WET LOCATIONS TO PROVIDE SPACE BETWEEN CONDUIT AND MOUNTING SURFACE.
5. USE METAL CHANNEL/STRUT WITH ACCESSORY CONDUIT CLAMPS TO SUPPORT MULTIPLE, PARALLEL, SURFACE-MOUNTED CONDUITS.
6. USE TRAPEZE HANGERS ASSEMBLED FROM THREADED RODS AND METAL CHANNEL/STRUT WITH ACCESSORY CONDUIT CLAMPS TO SUPPORT MULTIPLE, PARALLEL, SUSPENDED CONDUITS.

J. CONNECTIONS AND TERMINATIONS:
1. USE APPROVED ZINC-RICH PAINT OR CONDUIT JOINT COMPOUND ON FIELD-CUT THREADS OF GALVANIZED STEEL CONDUITS PRIOR TO MAKING CONNECTIONS.
2. WHERE TWO THREADED CONDUITS MUST BE JOINED AND NEITHER CAN BE ROTATED, USE THREE-PIECE COUPLINGS OR SPLIT COUPLINGS. DO NOT USE RUNNING THREADS.
3. USE SUITABLE ADAPTERS WHERE REQUIRED TO TRANSITION FROM ONE TYPE OF CONDUIT TO ANOTHER.
4. TERMINATE THREADED CONDUITS IN BOXES AND ENCLOSURES USING THREADED HUBS OR DOUBLE LOCK NUTS FOR DRY LOCATIONS AND RAINTIGHT HUBS FOR WET LOCATIONS.
5. PROVIDE INSULATING BUSHINGS, INSULATED THROATS, OR LISTED METAL FITTINGS WITH SMOOTH, ROUNDED EDGES AT CONDUIT TERMINATIONS TO PROTECT CABLES.
6. SECURE JOINTS AND CONNECTIONS TO PROVIDE MECHANICAL STRENGTH AND ELECTRICAL CONTINUITY.

K. PENETRATIONS:
1. DO NOT PENETRATE OR OTHERWISE NOTCH OR CUT STRUCTURAL MEMBERS, INCLUDING FOOTINGS AND GRADE BEAMS, WITHOUT APPROVAL OF STRUCTURAL ENGINEER.
2. MAKE PENETRATIONS PERPENDICULAR TO SURFACES UNLESS OTHERWISE INDICATED.
3. PROVIDE SLEEVES AND/OR SLOTS FOR PENETRATIONS AS INDICATED OR AS REQUIRED TO FACILITATE INSTALLATION.
4. CONCEAL BENDS FOR CONDUIT RISERS EMERGING ABOVE GROUND.
5. WHERE CONDUITS PENETRATE WATERPROOF MEMBRANE, SEAL AS REQUIRED TO MAINTAIN INTEGRITY OF MEMBRANE.
6. MAKE PENETRATIONS FOR ROOF-MOUNTED EQUIPMENT WITHIN ASSOCIATED EQUIPMENT OPENINGS AND CURBS WHERE POSSIBLE TO MINIMIZE ROOFING SYSTEM PENETRATIONS. WHERE PENETRATIONS ARE NECESSARY, SEAL AS INDICATED OR AS REQUIRED TO PRESERVE INTEGRITY OF ROOFING SYSTEM AND MAINTAIN ROOF WARRANTY.
7. INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF PARTITIONS AND OTHER ELEMENTS; SEE SECTION 078400.

L. UNDERGROUND INSTALLATION:
1. MINIMUM COVER, UNLESS OTHERWISE INDICATED OR REQUIRED:
   a. UNDERGROUND, EXTERIOR: 18 INCHES (460 MM).
   b. UNDER SLAB ON GRADE: 12 INCHES (300 MM) TO BOTTOM OF SLAB.
2. PROVIDE UNDERGROUND WARNING TAPE ALONG ENTIRE CONDUIT LENGTH.
3. PROVIDE COPPER CONDUCTOR FOR USE WITH TONING LOCATION IN CONDUIT SYSTEMS WHERE ONLY NONMETALLIC FIBER OPTIC CABLES ARE INSTALLED.

M. CONCRETE ENCASEMENT: WHERE CONDUITS NOT OTHERWISE EMBEDDED WITHIN CONCRETE ARE INDICATED TO BE CONCRETE ENCASED, PROVIDE MINIMUM CONCRETE COVER OF 3 INCHES (76 MM) ON ALL SIDES UNLESS OTHERWISE INDICATED; SEE SECTION 033000.

N. CONDUIT MOVEMENT PROVISIONS: WHERE CONDUITS ARE SUBJECT TO MOVEMENT, PROVIDE EXPANSION AND EXPANSION/DEFLECTION FITTINGS TO PREVENT DAMAGE TO ENCLOSED CABLES OR CONNECTED EQUIPMENT. THIS INCLUDES, BUT IS NOT LIMITED TO:
1. WHERE CONDUITS CROSS STRUCTURAL JOINTS INTENDED FOR EXPANSION, CONTRACTION, OR DEFLECTION.
2. WHERE CALCULATED IN ACCORDANCE WITH NFPA 70 FOR RIGID POLYVINYL CHLORIDE (PVC) CONDUIT INSTALLED ABOVE GROUND TO COMPENSATE FOR THERMAL EXPANSION AND CONTRACTION.
3. WHERE CONDUITS ARE SUBJECT TO EARTH MOVEMENT BY SETTLEMENT OR FROST.

O. CONDUIT SEALING:
1. USE FOAM CONDUIT SEALANT TO PREVENT ENTRY OF MOISTURE AND GASES. THIS INCLUDES, BUT IS NOT LIMITED TO:
   a. WHERE CONDUITS ENTER BUILDING FROM OUTSIDE.
   b. WHERE SERVICE CONDUITS ENTER BUILDING FROM UNDERGROUND DISTRIBUTION SYSTEM.
   c. WHERE CONDUITS ENTER BUILDING FROM UNDERGROUND.
   d. WHERE CONDUITS MAY TRANSPORT MOISTURE TO CONTACT LIVE PARTS.
2. WHERE CONDUITS CROSS BARRIERS BETWEEN AREAS OF POTENTIAL SUBSTANTIAL TEMPERATURE DIFFERENTIAL, USE FOAM CONDUIT SEALANT AT ACCESSIBLE POINT NEAR PENETRATION TO PREVENT CONDENSATION. THIS INCLUDES, BUT IS NOT LIMITED TO:
   a. WHERE CONDUITS PASS FROM OUTDOORS INTO CONDITIONED INTERIOR SPACES.
   b. WHERE CONDUITS PASS FROM UNCONDITIONED INTERIOR SPACES INTO CONDITIONED INTERIOR SPACES.

P. PROVIDE PULL STRING IN EACH EMPTY CONDUIT AND INNERDUCT/CELL, AND IN EACH CONDUIT WHERE CABLES ARE TO BE INSTALLED BY OTHERS. LEAVE MINIMUM SLACK OF 12 INCHES (300 MM) AT EACH END.

Q. PROVIDE GROUNDING AND BONDING.

2.02 FIELD QUALITY CONTROL

A. SEE SECTION 014000 - QUALITY REQUIREMENTS FOR ADDITIONAL REQUIREMENTS.

B. REPAIR CUTS AND ABRASIONS IN GALVANIZED FINISHES USING ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER. REPLACE COMPONENTS THAT EXHIBIT SIGNS OF CORROSION.

C. WHERE COATING OF PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC) CONTAINS CUTS OR ABRASIONS, REPAIR IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

D. CORRECT DEFICIENCIES AND REPLACE DAMAGED OR DEFECTIVE CONDUITS.

2.03 CLEANING

A. CLEAN INTERIOR OF CONDUITS TO REMOVE MOISTURE AND FOREIGN MATTER.

2.04 PROTECTION

A. IMMEDIATELY AFTER INSTALLATION OF CONDUIT, USE SUITABLE MANUFACTURED PLUGS TO PROVIDE PROTECTION FROM ENTRY OF MOISTURE AND FOREIGN MATERIAL AND DO NOT REMOVE UNTIL READY FOR INSTALLATION OF CABLES.

SECTION 270536 - CABLE TRAYS FOR COMMUNICATIONS SYSTEMS

PART 2 PRODUCTS

1.01 CABLE TRAY SYSTEM - GENERAL REQUIREMENTS

A. PROVIDE NEW CABLE TRAY SYSTEM CONSISTING OF REQUIRED COMPONENTS, FITTINGS, SUPPORTS, AND ACCESSORIES, AS NECESSARY FOR COMPLETE SYSTEM.

B. PROVIDE PRODUCTS LISTED, CLASSIFIED, AND LABELED AS SUITABLE FOR PURPOSE INTENDED.

C. DO NOT USE CABLE TRAY FOR APPLICATIONS OTHER THAN AS PERMITTED BY NFPA 70 AND PRODUCT LISTING/CLASSIFICATION.

D. PROVIDE CABLE TRAY SYSTEM AND ASSOCIATED COMPONENTS SUITABLE FOR USE AT INDICATED SPAN/LOAD RATINGS UNDER SERVICE CONDITIONS AT INSTALLED LOCATION.

E. UNLESS OTHERWISE INDICATED, SPECIFIED SPAN/LOAD RATINGS ARE BASED ON SAFETY FACTOR OF 1.5 AND WORKING LOAD ONLY (I.E., NO ADDITIONAL CONCENTRATED STATIC LOAD), WITH RATINGS FOR METAL CABLE TRAY SYSTEMS IN ACCORDANCE WITH NEMA BI 50015.

F. UNLESS OTHERWISE INDICATED, SPECIFIED LOAD/FILL DEPTHS AND INSIDE WIDTHS ARE NOMINAL VALUES, WITH VALUES FOR METAL CABLE TRAY SYSTEMS IN ACCORDANCE WITH NEMA BI 50015 INCLUDING APPLICABLE ALLOWABLE TOLERANCES.

1.02 METAL CABLE TRAY SYSTEMS

A. COMPLY WITH NEMA BI 50015.

B. MATERIAL/FINISHES:
1. ZINC ELECTROPLATED STEEL: COMPLY WITH ASTM B633.
2. MILL-GALVANIZED BEFORE FABRICATION (PRE-GALVANIZED) STEEL: COMPLY WITH ASTM A653/A653M, G90 COATING.

C. METAL LADDER CABLE TRAY:
1. MATERIAL: ALUMINUM.
2. SIDE RAIL CONSTRUCTION: I-BEAM, C-CHANNEL FLANGE OUT, OR C-CHANNEL FLANGE IN.
3. LOAD/FILL DEPTH: AS INDICATED ON DRAWINGS.
4. SPAN/LOAD RATING: 100 LB/FT AT SPAN OF 10 FT (_____ KG/M AT SPAN OF _____ M).
5. RUNG SPACING: 9 INCHES (229 MM) ON CENTER FOR STRAIGHT LENGTHS.
6. INSIDE WIDTH: AS INDICATED ON DRAWINGS.
7. INSIDE RADIUS OF FITTINGS: 12 INCHES (305 MM).

D. METAL WIRE MESH/BASKET CABLE TRAY:
1. MATERIAL: ZINC-ELECTROPLATED STEEL OR MILL-GALVANIZED BEFORE FABRICATION (PRE-GALVANIZED) STEEL.
2. TRAY DEPTH: 4 INCHES (102 MM).
3. SPAN/LOAD RATING: AS INDICATED ON DRAWINGS.
4. MESH SPACING: 2 BY 4 INCHES (51 BY 102 MM).
5. TRAY WIDTH: AS INDICATED ON DRAWINGS.

1.03 ACCESSORIES

A. CABLE TRAY COVER EXPANSION CLAMPS:
1. PROVIDE HEAVY-DUTY WRAP AROUND STYLE CLAMPS.

1.04 SOURCE QUALITY CONTROL

A. SEE SECTION 014000 - QUALITY REQUIREMENTS FOR ADDITIONAL REQUIREMENTS.

B. METAL CABLE TRAY: PERFORM FACTORY DESIGN TESTS IN ACCORDANCE WITH NEMA BI 50015, INCLUDING ELECTRICAL CONTINUITY AND LOAD TESTING.

PART 3 EXECUTION

2.01 EXAMINATION

A. VERIFY THAT WORK LIKELY TO DAMAGE CABLE TRAY SYSTEM HAS BEEN COMPLETED.

B. VERIFY FIELD MEASUREMENTS.

C. VERIFY DIMENSIONS AND SPAN/LOAD RATINGS OF CABLE TRAY SYSTEM COMPONENTS.

D. VERIFY THAT MOUNTING SURFACES ARE READY TO RECEIVE CABLE TRAY AND ASSOCIATED SUPPORTS.

E. VERIFY THAT CONDITIONS ARE SATISFACTORY FOR INSTALLATION PRIOR TO STARTING WORK.

2.02 INSTALLATION

A. INSTALL PRODUCTS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. INSTALL CABLE TRAY SYSTEM IN ACCORDANCE WITH THE FOLLOWING. WHERE REQUIREMENTS DIFFER, COMPLY WITH MOST STRINGENT.
1. NECA 1 (GENERAL WORKMANSHIP).
2. NEMA BI-50016 (CABLE TRAY).

C. UNLESS OTHERWISE INDICATED, ARRANGE CABLE TRAY TO BE PARALLEL OR PERPENDICULAR TO BUILDING LINES.

D. ARRANGE CABLE TRAY TO PROVIDE REQUIRED CLEARANCES AND MAINTAIN CABLE ACCESS.
1. MAINTAIN MINIMUM CLEARANCE OF 3 INCHES (75 MM) BETWEEN BOTTOM OF CABLE TRAY AND TOP OF SUSPENDED CEILINGS, UNLESS OTHERWISE INDICATED OR REQUIRED BY AUTHORITIES HAVING JURISDICTION.
2. MINIMUM CLEARANCE ABOVE AND ADJACENT TO CABLE TRAY: 12 INCHES (300 MM).
   a. MINIMUM CLEARANCE UNDER ACCESS FLOORS: 2 INCHES (50 MM) BETWEEN TOP OF CABLE TRAY AND BOTTOM OF ACCESS FLOOR PANELS.

E. INSTALL CABLE TRAY PLUMB AND LEVEL, WITH SECTIONS ALIGNED AND WITH HORIZONTAL RUNS AT SPECIFIED ELEVATION.

F. METAL WIRE MESH/BASKET CABLE TRAY: FIELD FABRICATE FITTINGS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, USING ONLY MANUFACTURER-APPROVED CONNECTORS CLASSIFIED FOR BONDING.
1. INSIDE RADIUS OF FITTINGS: 12 INCHES (305 MM).

G. HOT-DIP GALVANIZED AFTER FABRICATION (H.D.G.A.F.) STEEL CABLE TRAY: AFTER CUTTING, DRILLING, OR DEBURRING, USE APPROVED ZINC-RICH PAINT TO REPAIR FINISH IN ACCORDANCE WITH ASTM A780/A780M.

H. CABLE TRAY MOVEMENT PROVISIONS:
1. PROVIDE EXPANSION FITTINGS WHERE CABLE TRAY IS SUBJECT TO MOVEMENT, INCLUDING BUT NOT LIMITED TO:
   a. WHERE CABLE TRAY CROSSES STRUCTURAL JOINTS INTENDED FOR EXPANSION.
   b. LONG STRAIGHT CABLE TRAY RUNS IN ACCORDANCE WITH NEMA BI-50016.
2. USE EXPANSION GUIDES IN LIEU OF HOLD-DOWN CLAMPS WHERE PRESCRIBED IN NEMA BI-50016.
3. SET GAPS FOR EXPANSION FITTINGS IN ACCORDANCE WITH NEMA BI-50016.

I. CABLE PROVISIONS:
1. USE FIXED BARRIER STRIPS TO MAINTAIN SEPARATION OF CABLES AS INDICATED AND AS REQUIRED BY NFPA 70.
2. USE DROP-OUT FITTINGS OR BUSHINGS WHERE CABLES EXIT CABLE TRAY AS REQUIRED TO MAINTAIN MINIMUM CABLE BENDING RADIUS.
3. USE CABLE SUPPORT FITTINGS FOR LONG VERTICAL CABLE TRAY RUNS WITH HEAVY CABLES.

J. PROVIDE END CLOSURES AT UNCONNECTED ENDS OF CABLE TRAY RUNS.

K. CABLE TRAY SUPPORT:
1. USE MANUFACTURER'S RECOMMENDED HANGERS AND SUPPORTS, LOCATED IN ACCORDANCE WITH NEMA BI-50016, BICSI ITSIMM, AND MANUFACTURER'S REQUIREMENTS, BUT NOT EXCEEDING SPECIFIED SPAN UNLESS OTHERWISE APPROVED BY ENGINEER. PROVIDE REQUIRED SUPPORT AND ATTACHMENT WHERE NOT FURNISHED BY CABLE TRAY MANUFACTURER.
2. PROVIDE INDEPENDENT SUPPORT FROM BUILDING STRUCTURE. DO NOT PROVIDE SUPPORT FROM PIPING, DUCTWORK, OR OTHER SYSTEMS.

L. GROUNDING AND BONDING REQUIREMENTS:
1. INSTALL CABLE TRAY GROUNDING IN ACCORDANCE WITH THE FOLLOWING. WHERE REQUIREMENTS DIFFER, COMPLY WITH THE MOST STRINGENT.
   a. BICSI TDMM (TELECOMMUNICATIONS DISTRIBUTION METHODS).
   b. NECA/BICSI 607 (TELECOMMUNICATIONS BONDING AND GROUNDING).
   c. NEMA BI-50016 (CABLE TRAY).
   d. TIA-607 (GENERIC TELECOMMUNICATIONS BONDING AND GROUNDING).
2. METAL CABLE TRAY SYSTEMS: USE SUITABLE BONDING JUMPERS OR CLASSIFIED CABLE TRAY CONNECTORS TO PROVIDE ELECTRICAL CONTINUITY. DO NOT USE CLASSIFIED CABLE TRAY CONNECTORS WHERE CABLE TRAY SECTIONS HAVE BEEN MODIFIED, SUCH AS BEING BENT, CUT, OR RESHAPED.
3. METAL CABLE TRAY SYSTEM MAY BE USED AS SOLE BONDING CONDUCTOR ONLY WHERE ALL CONDITIONAL REQUIREMENTS OF NFPA 70 ARE MET, INCLUDING BUT NOT LIMITED TO:
   a. INSTALLATION MUST BE IN QUALIFYING FACILITY WITH SUITABLE MAINTENANCE AND SUPERVISION AS DETERMINED BY AUTHORITIES HAVING JURISDICTION.
   b. CABLE TRAY SYSTEM MUST BE GALVANIZED STEEL OR ALUMINUM (AS SPECIFIED) AND CLASSIFIED AS EQUIPMENT BONDING CONDUCTOR (STAINLESS STEEL CABLE TRAY IS NOT PERMITTED FOR USE AS BONDING CONDUCTOR).
   c. CABLE TRAY MUST MEET MINIMUM CROSS-SECTIONAL AREA REQUIREMENTS.

M. CABLE INSTALLATION:
1. INSTALL CABLES IN ACCORDANCE WITH THE FOLLOWING. WHERE REQUIREMENTS DIFFER, COMPLY WITH MOST STRINGENT.
   a. BICSI ITSIMM (TECHNOLOGY SYSTEMS).
   b. NEMA BI-50016 (CABLE TRAY).
2. USE APPROPRIATE CABLE PULLING TOOLS, APPLIED TO PREVENT EXCESSIVE FORCE ON CABLE TRAY SYSTEM AND MAINTAIN MINIMUM CABLE BENDING RADIUS.
3. USE CABLE LACING BARS OR CABLE TIES TO FASTEN CONDUCTORS/CABLES TO VERTICAL AND HORIZONTAL RUNS OF CABLE TRAY.
   a. DISTANCE BETWEEN FASTENING POINTS FOR VERTICAL RUNS: 18 INCHES (450 MM).
   b. DISTANCE BETWEEN FASTENING POINTS FOR HORIZONTAL RUNS: AS REQUIRED TO MAINTAIN SPACING AND CONFINE CONDUCTOR/CABLE WITHIN CABLE FILL AREA.

N. PENETRATIONS: INSTALL FIRESTOPPING TO PRESERVE FIRE RESISTANCE RATING OF BUILDING ELEMENTS.

O. IDENTIFICATION REQUIREMENTS:

P. INSTALL CABLE TRAY COVERS WHERE INDICATED AND AS FOLLOWS:

2.03 FIELD QUALITY CONTROL

A. SEE SECTION 014000 - QUALITY REQUIREMENTS FOR ADDITIONAL REQUIREMENTS.

B. INSPECT CABLE TRAY SYSTEM FOR DAMAGE AND DEFECTS.

C. REPAIR CUTS AND ABRASIONS IN GALVANIZED FINISHES USING ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER. REPLACE COMPONENTS THAT EXHIBIT SIGNS OF CORROSION.

D. CORRECT DEFICIENCIES AND REPLACE DAMAGED OR DEFECTIVE CABLE TRAY SYSTEM COMPONENTS.

2.04 ADJUSTING

A. ADJUST TIGHTNESS OF MECHANICAL CONNECTIONS TO MANUFACTURER'S RECOMMENDED TORQUE SETTINGS.

2.05 CLEANING

A. REMOVE DIRT AND DEBRIS FROM CABLE TRAY.

B. CLEAN EXPOSED SURFACES TO REMOVE DIRT, PAINT, OR OTHER FOREIGN MATERIAL AND RESTORE TO MATCH ORIGINAL FACTORY FINISH.

2.06 PROTECTION

A. PROTECT CABLE TRAY SYSTEM FROM SUBSEQUENT CONSTRUCTION OPERATIONS.

CEC GROUP
CONSULTING ENGINEERS
2550 CORPORATE EXCHANGE DR, SUITE 350
COLUMBUS, OHIO 43231
PHONE: (614) 392-2902

CONSULTANTS

SEAL

NOT FOR CONSTRUCTION

brightspeed

D3324L - JACKSONVILLE AR WEST CO GENERATOR REPLACEMENT

1096 TEXAS BLVD
LITTLE ROCK AFB, AR 72099

MARK	DATE	DESCRIPTION
		-
	08/28	ISSUED FOR BID
1	11/14/26	90% OWNER REVIEW

PROJECT NO:	25040-1
COMMISSION DATE:	-
DESIGNED BY:	JRS
DRAWN BY:	JRS
CHECKED BY:	JMM

1" ACTUAL

IF THE ABOVE DIMENSION DOES NOT MEASURE ONE INCH (1") EXACTLY, THIS DRAWING WILL HAVE BEEN ENLARGED OR REDUCED, AFFECTING ALL LABELED SCALES.

SHEET TITLE

ELECTRICAL SPECIFICATIONS

E702