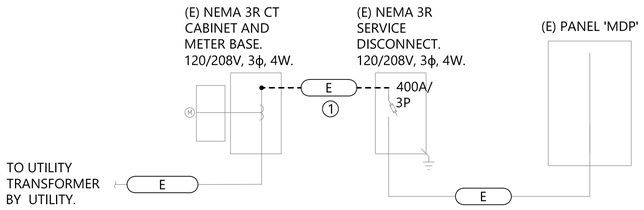
SHORT CIRCUIT CALCULATION SUMMARY

FAULT ANALYSIS WAS PERFORMED USING POINT-TO-POINT METHOD.
THE FOLLOWING ARE THE UTILITY CONTRIBUTION AND EQUIPMENT ASSUMPTIONS:

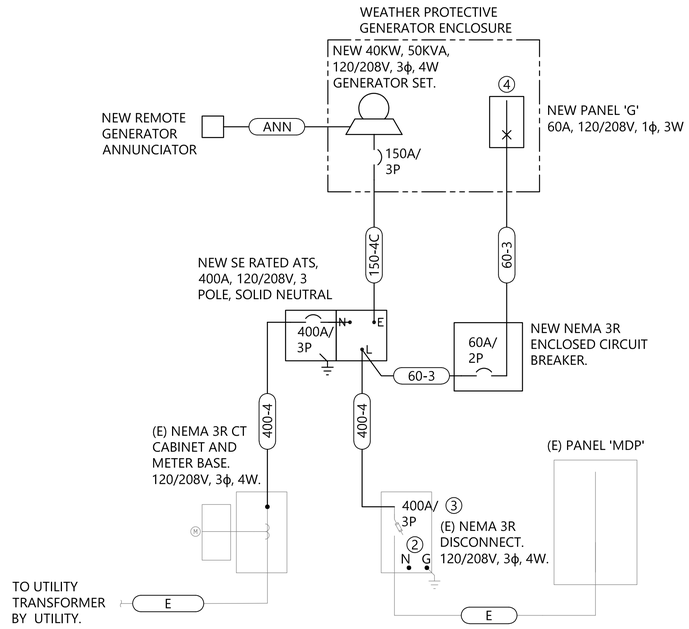
AVAILABLE FAULT CURRENT AT UTILITY TRANSFORMER:	INFINITE BUS
UTILITY TRANSFORMER SIZE:	75KVA
UTILITY TRANSFORMER IMPEDANCE:	2.00%
SERVICE LATERAL # PARALLEL RUNS:	1 EA.
SERVICE LATERAL SIZE:	#500 KCMIL CU
SERVICE LATERAL LENGTH:	70 FEET
SERVICE LATERAL CONDUIT TYPE:	NON-METALLIC
TOTAL MOTOR CONTRIBUTIONS:	72 AMPS

AVAILABLE FAULT CURRENT AT SERVICE DISCONNECT: 8704 A RMS (SYM)

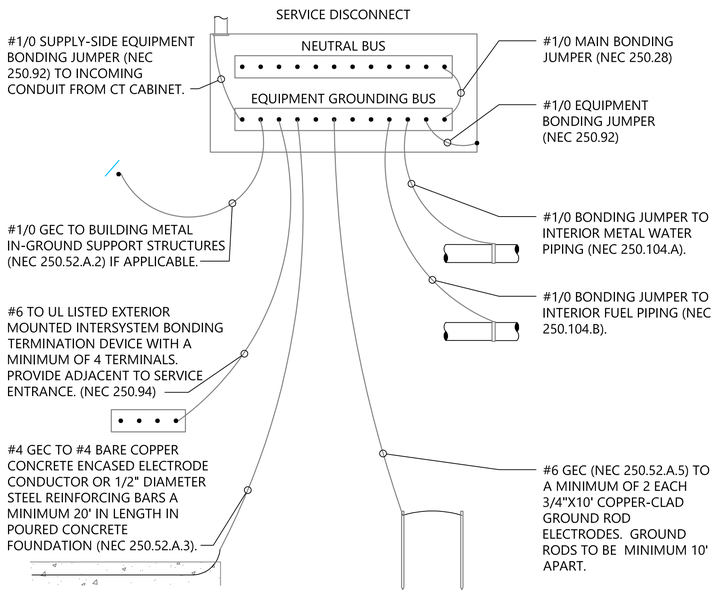
NOTE: VERIFY THE ABOVE TRANSFORMER RATINGS AND SERVICE LATERAL SIZE/TYPE WITH LOCAL UTILITY PRIOR TO ORDERING EQUIPMENT. ADJUST EQUIPMENT SHORT CIRCUIT RATINGS ACCORDINGLY BASED ON ACTUAL EQUIPMENT INSTALLED BY UTILITY. INSTALL LABEL ON SERVICE EQUIPMENT INDICATING DATE AND FINAL CALCULATION RESULTS PER NEC 110.24.



1 DEMOLITION POWER ONE-LINE DIAGRAM
NO SCALE



2 NEW WORK POWER ONE-LINE DIAGRAM
NO SCALE



NOTES:
1. ALL ELECTRODE SIZES ARE BASED ON COPPER CONDUCTORS UON.
2. EXISTING ELECTRODES CAN BE USED IF ACCESSIBLE AND SIZED AS SHOWN HERE.

3 GROUNDING DIAGRAM
NO SCALE

FEEDER SCHEDULE

FEEDER ID	FEEDER AMPACITY	CONDUIT SIZE, PHASE/NEUTRAL CONDUCTORS QUANTITY AND SIZE, GROUND CONDUCTOR QUANTITY AND SIZE.
E	-	EXISTING 1 EACH 4" RIGID METAL CONDUIT WITH CONDUCTORS.
400-4	380	3"C, 4#500KCMIL, 1#3 GND
150-4C	150	2"C, 4#1/0, 1#6 GND AND 1"C WITH LOW VOLTAGE CONTROL WIRING PER MANUFACTURER'S REQUIREMENTS FOR CONTROL BETWEEN ATS AND GENERATOR.
60-3	65	1"C, 3#6, 1#10 GND
ANN	-	1"C, 6#12, 1#12 GND

FEEDER SCHEDULE NOTES:
1. ALL FEEDER CONDUCTORS SHALL BE COPPER WITH XHHW INSULATION.

ABBREVIATIONS

ATS	AUTOMATIC TRANSFER SWITCH
C	CONDUIT
CB	CIRCUIT BREAKER
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
MTD	MOUNTED
NEC	NATIONAL ELECTRICAL CODE
SE	SERVICE ENTRANCE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF

LINETYPES

- DEMOLITION
- EXISTING TO REMAIN
- NEW WORK

GENERAL NOTES

A. INSTALL ELECTRICAL SERVICE PER UTILITY REQUIREMENTS.

B. PEAK UTILITY DEMAND LOAD IS 19.61KW, NEC FACTORS ADJUST LOAD TO 24.5KW.

SHEET NOTES - ①

1. DEMOLISH CIRCUIT AND CONDUIT, MINIMIZE ANY OUTAGE DURATION.
2. NEUTRAL AND GROUND BUS TO BE ISOLATED EXCEPT AT SERVICE DISCONNECT.
3. EXISTING DISCONNECT TO REMAIN TO BE ACCESSIBLE SINGLE POINT OF POWER DISCONNECTING MEANS FOR EMERGENCY BUILDING SHUTDOWN. DISCONNECT WILL INTERRUPT BOTH UTILITY AND GENERATOR POWER.
4. PANEL 'G' TO FEED ALL ELECTRICAL LOADS IN GENERATOR ENCLOSURE SUCH AS BLOCK HEATER, BATTERY CHARGER, FUEL PUMP, ETC. PROVIDE ALL NECESSARY BREAKERS FOR THE GENERATOR ENCLOSURE LOADS.

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AVTEC IT FACILITY NEW GENERATOR ADDITION

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Revisions

No.	Description	Date

Drawn by BJR	Date AUG 6, 2021
Checked BJR	Job No. 21BR-16

Sheet Contents
ELECTRICAL
LEGEND, FEEDER SCHEDULE, CALCULATIONS, AND DIAGRAMS

Sheet No.
E0.1

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ELECTRICAL SPECIFICATIONS

26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

A. SCOPE OF WORK: FURNISH AND INSTALL ALL MATERIAL AND EQUIPMENT FOR A COMPLETE AND WORKABLE ELECTRICAL SYSTEM AS INDICATED ON THE DRAWINGS AND IN THESE SPECIFICATIONS.

B. STANDARDS, CODES AND REGULATIONS: COMPLY WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE, INTERNATIONAL BUILDING CODE, AND INTERNATIONAL FIRE CODE INCLUDING ALL STATE AND LOCAL AMENDMENTS TO THESE CODES. COMPLY WITH THE LATEST PUBLISHED VERSION OF THE NECA STANDARD OF INSTALLATION.

C. DRAWINGS: THE DRAWINGS ARE DIAGRAMMATIC, NOT NECESSARILY SHOWING ALL OFFSETS OR EXACT LOCATIONS OF FIXTURES, EQUIPMENT, ETC. UNLESS SPECIFICALLY DIMENSIONED. REVIEW THE DRAWINGS AND SPECIFICATIONS FOR EQUIPMENT FURNISHED BY OTHER CRAFTS BUT INSTALLED IN ACCORDANCE WITH THIS SECTION. BRING QUESTIONABLE OR OBSCURE ITEMS, APPARENT CONFLICTS BETWEEN PLANS AND SPECIFICATIONS, GOVERNING CODES OR UTILITIES REGULATIONS TO THE ATTENTION OF THE OWNER. CODES, ORDINANCES, REGULATIONS, MANUFACTURER'S INSTRUCTIONS OR STANDARDS TAKE PRECEDENCE WHEN THEY ARE MORE STRINGENT OR CONFLICT WITH THE DRAWINGS AND SPECIFICATIONS.

D. RECORD DRAWINGS: MARK UP A CLEAN SET OF DRAWINGS AS THE WORK PROGRESSES TO SHOW THE DIMENSIONED LOCATION ROUTING AND SIZING OF ANY SIGNIFICANT REVISIONS TO THE SYSTEMS SHOWN.

E. WORKMANSHIP: INSTALLATION OF ALL WORK SHALL BE MADE SO THAT ITS SEVERAL COMPONENT PARTS SHALL FUNCTION AS A WORKABLE SYSTEM COMPLETE WITH ALL ACCESSORIES NECESSARY FOR ITS OPERATION. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, INSTRUCTIONS AND/OR INSTALLATION DRAWINGS AND IN ACCORDANCE WITH NECA STANDARDS. MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL CONFORM WITH APPLICABLE INDUSTRY STANDARDS, NEMA STANDARDS AND UNDERWRITERS LABORATORIES STANDARDS WHERE APPLICABLE.

F. SUBMITTALS: PROVIDE MATERIAL AND EQUIPMENT SUBMITTALS CONTAINING A COMPLETE LISTING OF MATERIAL AND EQUIPMENT SHOWN ON THE DRAWINGS. INCLUDE CATALOG NUMBERS, WIRING DIAGRAMS, ROUGH-IN DIMENSIONS AND PERFORMANCE DATA FOR ALL MATERIAL AND EQUIPMENT. SUBMITTALS SHALL BE IN ELECTRONIC .PDF FORMAT, SEPARATE FROM WORK FURNISHED UNDER OTHER DIVISIONS. INDEX AND CLEARLY IDENTIFY ALL MATERIAL AND EQUIPMENT BY ITEM, NAME OR DESIGNATION USED ON THE DRAWINGS. SUBMITTAL REVIEW IS FOR GENERAL DESIGN AND ARRANGEMENT ONLY AND DOES NOT RELIEVE THE CONTRACTOR FROM ANY REQUIREMENTS OF THE CONTRACT DOCUMENTS. THE SUBMITTALS ARE NOT CHECKED FOR QUANTITY, DIMENSION, OR FOR PROPER OPERATION. WHERE DEVIATIONS OF A SUBSTITUTE PRODUCT OR SYSTEM PERFORMANCE HAVE NOT BEEN SPECIFICALLY NOTED IN THE SUBMITTAL BY THE CONTRACTOR, PROVISIONS OF A COMPLETE AND SATISFACTORY WORKING INSTALLATION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

G. OPERATION AND MAINTENANCE MANUALS: PROVIDE OPERATION AND MAINTENANCE MANUALS FOR TRAINING OF THE OWNER'S PERSONNEL. DESCRIBE THE PROCEDURES NECESSARY TO OPERATE THE SYSTEM INCLUDING START-UP, OPERATION, EMERGENCY OPERATION AND SHUTDOWN. PROVIDE INSTRUCTIONS AND A SCHEDULE OF PREVENTIVE MAINTENANCE IN TABULAR FROM FOR ALL ROUTINE CLEANING, INSPECTION AND LUBRICATION WITH RECOMMENDED LUBRICANTS. PROVIDE INSTRUCTIONS FOR MINOR REPAIR OR ADJUSTMENTS REQUIRED FOR PREVENTIVE MAINTENANCE ROUTINES. PROVIDE MANUFACTURER'S DESCRIPTIVE LITERATURE INCLUDING APPROVED SHOP DRAWINGS COVERING DEVICES USED IN ANY CONTRACTOR-PROVIDED EQUIPMENT OR SYSTEMS WITH ILLUSTRATION, EXPLODED VIEWS, ETC.

H. WARRANTY: THE CONTRACTOR SHALL GUARANTEE ALL WORK EXECUTED UNDER THIS CONTRACT TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM BENEFICIAL OCCUPANCY. ANY FAULTY MATERIALS OR WORKMANSHIP SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER DURING THE GUARANTEE PERIOD.

I. PERMITS: SECURE AND PAY FOR ALL FEES, PERMITS, ETC. REQUIRED BY LOCAL AND STATE AGENCIES AND ALL LOCAL UTILITY COMPANIES.

J. REFERENCE SYMBOLS: THE ELECTRICAL "LEGEND" ON THE DRAWINGS IS A STANDARDIZED VERSION, AND ALL SYMBOLS SHOWN MAY NOT BE USED. USE THE "LEGEND" AS A REFERENCE FOR THE SYMBOLS USED ON THE DRAWINGS.

K. PENETRATION OF FIRE BARRIERS: ALL ELECTRICAL PENETRATIONS THROUGH FIRE RATED BARRIERS SHALL BE SEALED IN ACCORDANCE WITH NEC ARTICLE 300.21 AND THE FOLLOWING:

1. ALL HOLES OR VOIDS CREATED TO EXTEND ELECTRICAL SYSTEMS THROUGH FIRE RATED FLOORS, WALLS OR CEILING SHALL BE SEALED WITH AN ASBESTOS-FREE INTUMESCENT FIRE STOPPING MATERIAL CAPABLE OF EXPANDING 8 TO 10 TIMES WHEN EXPOSED TO TEMPERATURES 250 DEGREES F OR HIGHER.
2. MATERIALS SHALL BE SUITABLE FOR THE FIRE STOPPING OF PENETRATIONS MADE BY STEEL, GLASS, PLASTIC AND SHALL BE CAPABLE OF MAINTAINING AN EFFECTIVE BARRIER AGAINST FLAME, SMOKE AND GASES IN COMPLIANCE WITH THE REQUIREMENTS OF ASTM E814, UL 1479 AND THE UL FIRE RESISTANCE DIRECTORY REQUIREMENTS FOR THROUGH-PENETRATION FIRESTOP DEVICES (XHCR).
3. THE RATING OF THE FIRE STOPS SHALL BE THE SAME AS THE TIME-RATED FLOOR, WALL OR CEILING ASSEMBLY.
4. INSTALL FIRE STOPPING MATERIALS IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

26 05 05 - SELECTIVE DEMOLITION FOR ELECTRICAL

A. DEMOLITION DRAWINGS ARE BASED ON A NON-DESTRUCTIVE FIELD OBSERVATION. REPORT DISCREPANCIES TO OWNER BEFORE DISTURBING THE EXISTING INSTALLATION. BEGINNING OF DEMOLITION MEANS INSTALLER ACCEPTS EXISTING CONDITIONS. DISABLE SYSTEMS ONLY TO MAKE SWITCHOVERS AND CONNECTIONS.

B. OBTAIN PERMISSION FROM OWNER AT LEAST 7 DAYS BEFORE PARTIALLY OR COMPLETELY DISABLING SYSTEM. MINIMIZE OUTAGE DURATION AND MAKE TEMPORARY CONNECTIONS TO MAINTAIN SERVICE IN AREAS ADJACENT TO WORK AREA. WHEN WORK MUST BE PERFORMED ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.

C. REMOVE, RELOCATE AND EXTEND EXISTING INSTALLATIONS TO ACCOMMODATE NEW CONSTRUCTION. REMOVE ABANDONED WIRING TO SOURCE OF SUPPLY. REMOVE EXPOSED ABANDONED CONDUIT.

D. MAINTAIN ACCESS TO EXISTING ELECTRICAL INSTALLATIONS WHICH REMAIN ACTIVE.

26 05 19 - WIRE AND CABLE

A. SUBMITTALS: NONE REQUIRED FOR THIS SECTION.

B. MATERIALS:

1. ALL CONDUCTORS SHALL BE COPPER WITH TYPE XHHW INSULATION. MINIMUM BRANCH CIRCUIT CONDUCTOR SIZE SHALL BE #12 AWG. MINIMUM CONTROL CIRCUIT CONDUCTOR SIZE SHALL BE #18 AWG.

C. INSTALLATION:

1. COLOR CODE WIRES BY LINE OR PHASE. COLOR CODE THE 120/208V CONDUCTORS BLACK, RED, BLUE, AND WHITE.
2. DO NOT SHARE NEUTRAL CONDUCTORS. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH BRANCH CIRCUIT THAT REQUIRES A NEUTRAL.
3. USE PROPERLY SIZED INSULATED SPRING WIRE CONNECTORS WITH PLASTIC CAPS FOR ALL CONDUCTORS #8 AWG AND SMALLER. TERMINATE #6 AWG AND LARGER CONDUCTORS WITH CRIMP OR COMPRESSION TYPE CONNECTORS INSTALLED WITH TOOL RECOMMENDED BY CONNECTION MANUFACTURER AND INSULATE WITH PROPERLY SIZED 600 VOLT RATED HEAT SHRINK TUBING.
4. INSTALLATION SCHEDULE: BUILDING WIRE IN RACEWAYS AT ALL LOCATIONS UNLESS OTHERWISE NOTED. PROVIDE XHHW-2 FOR FEEDERS AND IN EXTERIOR LOCATIONS.
5. COLD TEMPERATURE INSTALLATIONS: THERMOPLASTIC TYPE INSULATED WIRES OR CABLES SHALL NOT BE INSTALLED WHEN AMBIENT TEMPERATURES ARE LESS THAN 20 DEGREES F.

26 05 26 - GROUNDING AND BONDING

A. SUBMITTALS: NONE REQUIRED FOR THIS SECTION.

B. MATERIAL: SOLID GROUND RODS: COPPER-ENCASED STEEL, 3/4 INCH DIAMETER, MINIMUM LENGTH 10 FEET.

C. INSTALLATION:

1. PROVIDE A SEPARATE, INSULATED EQUIPMENT GROUNDING CONDUCTOR IN ALL NEW BRANCH CIRCUITS AND FEEDERS. TERMINATE EACH END ON A GROUNDING LUG, BUS, OR BUSHING.
2. MECHANICAL CONNECTORS: NON-REVERSIBLE CRIMP TYPE LUGS ONLY. USE FACTORY MADE COMPRESSION LUG FOR ALL TERMINATIONS. CRIMP TYPE ONE HOLE FOR CONDUCTORS SMALLER THAN #6 AWG.
3. BOND TOGETHER SYSTEM NEUTRALS, SERVICE EQUIPMENT ENCLOSURES, EXPOSED NON-CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT, METAL RACEWAY SYSTEMS, GROUNDING CONDUCTOR IN RACEWAYS AND CABLES, AND PLUMBING AND FUEL SYSTEMS.

26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

A. SUBMITTALS: NONE REQUIRED FOR THIS SECTION.

B. MATERIAL: SUPPORT CHANNEL SHALL BE GALVANIZED OR PAINTED STEEL. HARDWARE SHALL BE CORROSION RESISTANT.

C. INSTALLATION: EQUIPMENT WEIGHING MORE THAN 50 POUNDS SHALL BE ADEQUATELY ANCHORED TO THE BUILDING STRUCTURE TO RESIST LATERAL EARTHQUAKE FORCES.

26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

A. SUBMITTALS: NONE REQUIRED FOR THIS SECTION.

B. MATERIALS:

1. RIGID STEEL CONDUIT: ANSI C80.1. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB 1; THREADED TYPE WITH INSULATED THROAT BUSHINGS, MATERIAL TO MATCH CONDUIT.
2. INTERMEDIATE METAL CONDUIT (IMC): GALVANIZED STEEL. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB 1; USE FITTINGS AND CONDUIT BODIES SPECIFIED ABOVE FOR RIGID STEEL CONDUIT.
3. ELECTRICAL METALLIC TUBING CONDUIT (EMT): ANSI C80.3. GALVANIZED TUBING. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB 1; STEEL OR MALLEABLE IRON, COMPRESSION TYPE OR SET SCREW FITTINGS WITH INSULATED THROAT BUSHINGS. DIE-CAST FITTINGS ARE NOT ACCEPTABLE. PROVIDE FACTORY ELBOWS ON SIZES 1-1/2" AND LARGER.
4. LIQUIDTIGHT FLEXIBLE CONDUIT: FLEXIBLE METAL CONDUIT WITH PVC JACKET. FITTINGS AND CONDUIT BODIES: ANSI/NEMA FB 1; STEEL OR MALLEABLE IRON WITH INSULATED THROAT BUSHINGS. DIE CAST FITTINGS ARE NOT ACCEPTABLE.
5. PROVIDE GALVANIZED OR CADMIUM PLATED, ONE PIECE PRESSED STEEL OUTLET BOXES 4 INCH SQUARE OR OCTAGONAL, 1-1/2 INCHES DEEP MINIMUM SIZE FOR USE IN INTERIOR AREAS.
6. PROVIDE CAST ALUMINUM OR FERALLOY TYPE BOXES WITH GASKETED COVER, THREADED HUBS AND NEMA 3R RATING FOR USE IN EXTERIOR OR WET LOCATIONS.

C. INSTALLATION:

1. INSTALL CONDUIT FOR ALL SYSTEMS UNLESS OTHERWISE NOTED, 1/2 INCH MINIMUM SIZE. IN SLAB ABOVE GRADE, EXPOSED OUTDOOR LOCATIONS, AND FEEDERS SHALL BE RIGID STEEL CONDUIT OR INTERMEDIATE METAL CONDUIT.
2. EXPOSED DRY INTERIOR LOCATIONS SHALL BE RIGID STEEL CONDUIT OR INTERMEDIATE METAL CONDUIT. ELECTRICAL METALLIC TUBING MAY BE USED EXPOSED WHEN INSTALLED ON THE CEILING, A MINIMUM OF TEN FEET ABOVE THE FLOOR OR WHERE NOT SUBJECT TO PHYSICAL DAMAGE. EMT MAY ALSO BE USED FOR CONCEALED, DRY, INTERIOR LOCATIONS.
3. EQUIPMENT CONNECTIONS SHALL BE SHORT EXTENSIONS OF FLEXIBLE METAL CONDUIT TO ALLOW FOR VIBRATION. LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS SHALL BE USED FOR THESE CONNECTIONS IN DAMP OR WET LOCATIONS.
4. PAINT ALL EXPOSED CONDUIT TO MATCH SURFACE TO WHICH IT IS ATTACHED OR CROSSES. CLEAN GREASY OR DIRTY CONDUIT PRIOR TO PAINTING IN ACCORDANCE WITH PAINT MANUFACTURER'S INSTRUCTIONS.
5. RACEWAYS AND BOXES PENETRATING VAPOR BARRIERS OR PENETRATING AREAS FROM COLD TO WARM SHALL BE TAPED AND SEALED WITH A NON-HARDENING DUCT SEALING COMPOUND TO PREVENT THE ACCUMULATION OF MOISTURE.
6. INSTALL FITTINGS AND FLEXIBLE METAL CONDUIT TO ACCOMMODATE 3-AXIS MOVEMENTS WHERE RACEWAY CROSSES SEISMIC JOINTS. INSTALL FITTINGS DESIGNED AND LISTED TO ACCOMMODATE EXPANSION AND CONTRACTION WHERE RACEWAY CROSSES CONTROL AND EXPANSION JOINTS.
7. USE MULTIPLE-GANG BOXES WHERE MORE THAN ONE DEVICE ARE MOUNTED TOGETHER; DO NOT USE SECTIONAL BOXES.
8. SUPPORT BOXES INDEPENDENTLY OF CONDUIT.

26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

A. SUBMITTALS: NONE REQUIRED FOR THIS SECTION.

B. MATERIALS:

1. NAMEPLATES: ENGRAVED THREE-LAYER LAMINATED PLASTIC, BLACK LETTERS ON A WHITE BACKGROUND. NAMEPLATES SHALL BE PROVIDED TO IDENTIFY ALL ELECTRICAL DISTRIBUTION AND CONTROL EQUIPMENT AND LOADS SERVED. NAMEPLATE TO BE WHITE LETTERS ON A RED BACKGROUND FOR THE SERVICE DISCONNECT.
2. TAPE LABELS: ADHESIVE TAPE LABELS, WITH 3/16 INCH BOLD BLACK LETTERS ON CLEAR BACKGROUND MADE USING DYMO RHINO SERIES OR EQUAL LABEL PRINTER.
3. WIRE AND CABLE MARKERS: CLOTH MARKERS, SPLIT SLEEVE OR TUBING TYPE.

C. INSTALLATION:

1. GEAR: PROVIDE NAMEPLATES TO IDENTIFY ALL ELECTRICAL DISTRIBUTION, CONTROL EQUIPMENT, LOADS SERVED, AND LOW-VOLTAGE SYSTEM PANELS. INDICATE DEVICE NAME AND WHERE THE POWER ORIGINATES.
2. SERVICE DISCONNECT: PROVIDE NAMEPLATE THAT STATES "SERVICE DISCONNECT" AND INDICATES THE MAXIMUM AVAILABLE FAULT CURRENT PER NEC 110.24.
3. WIRE IDENTIFICATION: PROVIDE WIRE MARKERS ON EACH CONDUCTOR IN PANELBOARD GUTTERS, PULL BOXES, OUTLET AND JUNCTION BOXES, AND AT LOAD CONNECTION. MARKERS SHALL BE LOCATED WITHIN ONE INCH OF EACH CABLE END, EXCEPT AT PANELBOARDS, WHERE MARKERS FOR BRANCH CIRCUIT CONDUCTORS SHALL BE VISIBLE WITHOUT REMOVING PANEL DEADFRONT.

26 24 16 - PANELBOARDS

A. SUBMITTALS: SUBMIT PRODUCT DATA FOR APPROVAL.

B. MATERIAL:

1. MANUFACTURERS: SIEMENS, SQUARE D, GE, EATON, OR EQUAL.
2. PROVIDE DEAD-FRONT CIRCUIT BREAKER PANELBOARDS WITH BUS SIZE, SHORT CIRCUIT RATING AS SHOWN ON THE DRAWINGS. BUSSING SHALL BE COPPER. PROVIDE WITH SURFACE FRONTS WITH CONCEALED TRIM CLAMPS, CONCEALED HINGE AND FLUSHLOCK. MOLDED CASE CIRCUIT BREAKERS SHALL BE BOLT-ON THERMAL MAGNETIC TRIP TYPE WITH COMMON TRIP HANDLE FOR ALL POLES. PROVIDE UL CLASS A GROUND FAULT INTERRUPTER CIRCUIT BREAKERS FOR GFCI CIRCUITS AS INDICATED ON THE DRAWINGS. PROVIDE NUMBER AND SIZE OF BRANCH CIRCUITS AS NEEDED FOR THE ELECTRICAL LOADS IN THE GENERATOR ENCLOSURE.

C. INSTALLATION:

1. INSTALL PANELBOARDS PLUMB WITH TOP OF CABINET 6'-6" ABOVE FINISHED GRADE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
2. PROVIDE TYPED CIRCUIT DIRECTORIES FOR EACH PANELBOARD, SHOWING DETAILED CONNECTED LOAD DESCRIPTION OF EACH CIRCUIT. IDENTIFY ALL CIRCUIT BREAKERS; UNUSED CIRCUIT BREAKERS IDENTIFY AS "SPARE".
3. ALL PANELBOARDS SHALL HAVE SIGNAGE FOR ARC HAZARD INSTALLED. THE MARKING SHALL BE LOCATED TO BE CLEARLY VISIBLE TO QUALIFIED PERSONNEL BEFORE EXAMINATION, ADJUSTMENT, SERVICING OR MAINTENANCE OF THE EQUIPMENT. AT A MINIMUM THE 3-LINE SIGNAGE SHALL STATE THE FOLLOWING: WARNING - ARC FLASH AND SHOCK HAZARD - APPROPRIATE PPE REQUIRED.

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Sheet Contents
ELECTRICAL SPECIFICATIONS

Sheet No.
E0.2

Plot Date Time: 8/6/2021 5:05 AM

ELECTRICAL SPECIFICATIONS

26 36 00 - TRANSFER SWITCHES

1.1 SUBMITTALS

A. PRODUCT DATA: PROVIDE CATALOG SHEETS SHOWING VOLTAGE, SWITCH SIZE, RATINGS AND SIZE OF SWITCHING DEVICES, OPERATING LOGIC, SHORT CIRCUIT RATINGS, DIMENSIONS, ENCLOSURE DETAILS AND ALL OPTIONS PROVIDED.

B. FACTORY TEST REPORT: PROVIDE COPY OF FACTORY OPERATIONAL TEST ON THE TRANSFER SWITCH PRIOR TO SHIPPING FROM THE FACTORY. A CERTIFIED TEST REPORT SHALL BE INCLUDED IN THE PACKING LIST WITH THE TRANSFER SWITCH. THE TEST PROCESS SHALL INCLUDE CALIBRATION OF VOLTAGE SENSORS.

1.2 QUALIFICATIONS

A. MANUFACTURER: COMPANY SPECIALIZING IN MANUFACTURING THE PRODUCTS SPECIFIED IN THIS SECTION WITH MINIMUM THREE YEARS DOCUMENTED EXPERIENCE. MANUFACTURER SHALL BE CERTIFIED TO ISO 9001 INTERNATIONAL QUALITY STANDARD AND SHALL HAVE THIRD PARTY CERTIFICATION VERIFYING QUALITY ASSURANCE IN DESIGN/DEVELOPMENT, PRODUCTION, INSTALLATION AND SERVICE IN ACCORDANCE WITH ISO 9001.

B. SUPPLIER: AUTHORIZED DISTRIBUTOR OF SPECIFIED MANUFACTURER WITH MINIMUM THREE YEARS DOCUMENTED EXPERIENCE.

1.3 DELIVERY, STORAGE, AND HANDLING

A. STORE IN A CLEAN, DRY SPACE. MAINTAIN FACTORY WRAPPING OR PROVIDE AN ADDITIONAL HEAVY CANVAS OR HEAVY PLASTIC COVER TO PROTECT UNITS FROM DIRT, WATER, CONSTRUCTION DEBRIS, AND TRAFFIC.

B. HANDLE IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS. LIFT ONLY WITH LUGS PROVIDED FOR THE PURPOSE. HANDLE CAREFULLY TO AVOID DAMAGE TO INTERNAL COMPONENTS, ENCLOSURE AND FINISH.

1.4 MAINTENANCE SERVICE

A. FURNISH SERVICE AND MAINTENANCE OF TRANSFER SWITCH FOR ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION.

1.5 WARRANTY

A. PROVIDE THREE-YEAR MANUFACTURER WARRANTY OF ALL COMPONENTS, PARTS, AND ASSEMBLIES AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP, WITH NO DEDUCTIBLE FOR ALL COMPONENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. CATERPILLAR OR APPROVED EQUAL.

2.2 AUTOMATIC TRANSFER SWITCH

A. DESCRIPTION: NEMA ICS 2, UL 1008 LISTED AUTOMATIC TRANSFER SWITCH.

B. CONFIGURATION: DOUBLE THROW, ELECTRICALLY OPERATED, ELECTRICALLY AND MECHANICALLY INTERLOCKED AND MECHANICALLY HELD TRANSFER SWITCH. THE TRANSFER SWITCH SHALL BE SPECIFICALLY DESIGNED SO THAT IT CAN STOP IN A NEUTRAL POSITION.

C. OPEN TRANSITION TYPE.

2.3 SERVICE CONDITIONS

A. SERVICE CONDITIONS: NEMA ICS 1.

B. OPERATING TEMPERATURE: MINUS 20ºF TO PLUS 140F.

C. ALTITUDE: 500 FEET.

2.4 RATINGS

A. VOLTAGE: 208 VOLTS, THREE PHASE, FOUR WIRE, 60 HZ.

B. SWITCHED POLES: 3 PLUS A NEUTRAL BUS WITH LUGS.

C. LOAD INRUSH RATING: COMBINATION LOAD.

D. CONTINUOUS RATING: AS NOTED ON THE DRAWINGS.

E. INTERRUPTING CAPACITY: 250 PERCENT OF CONTINUOUS RATING.

F. WITHSTAND CURRENT RATING: THE SWITCH SHALL BE RATED TO WITHSTAND 22,000 AMPS RMS SYMMETRICAL SHORT CIRCUIT CURRENT FOR 3 CYCLES.

G. SERVICE ENTRANCE RATED.

2.5 PRODUCT OPTIONS AND FEATURES

A. ATS CONTROLS: MICROPROCESSOR CONTROLS WITH DIGITAL DISPLAY FOR STATUS INFORMATION.

B. MAIN SWITCH CONTACTS SHALL BE HIGH-PRESSURE SILVER ALLOY. CONTACT ASSEMBLIES SHALL HAVE ARC CHUTES FOR POSITIVE ARC EXTINGUISHING. ARC CHUTES SHALL HAVE INSULATING COVERS TO PREVENT INTER-PHASE FLASHOVER.

C. TRANSFER SWITCH INTERNAL WIRING SHALL BE COMPOSED OF PRE-MANUFACTURED HARNESSES THAT ARE PERMANENTLY MARKED FOR SOURCE AND DESTINATION. HARNESSES SHALL BE CONNECTED TO THE CONTROL SYSTEM BY MEANS OF LOCKING DISCONNECT PLUG(S) TO ALLOW THE CONTROL SYSTEM TO BE DISCONNECTED AND SERVICE WITHOUT DISCONNECTING POWER FROM THE TRANSFER SWITCH MECHANISM.

D. TRANSFER SWITCH SHALL BE PROVIDE WITH AL/CU MECHANICAL LUGS SIZED TO ACCEPT THE FULL OUTPUT RATING OF THE SWITCH OR THE NUMBER AND SIZE OF CONDUCTORS SHOWN ON THE DRAWINGS, WHICHEVER IS LARGER.

E. OPERATOR PANEL: PROVIDE WITH A CONTROL PANEL TO ALLOW THE OPERATOR TO VIEW THE STATUS AND CONTROL THE OPERATION OF THE TRANSFER SWITCH. THE OPERATOR PANEL SHALL BE A SEALED MEMBRANE PANEL RATED NEMA 3R THAT IS PERMANENTLY LABELED FOR SWITCH AND CONTROL FUNCTIONS. THE OPERATOR PANEL SHALL BE PROVIDED WITH THE FOLLOWING FEATURES AND CAPABILITIES:

1. HIGH INTENSITY LED LAMPS TO INDICATE THE SOURCE THAT THE LOAD IS CONNECTED TO AND WHICH SOURCES ARE AVAILABLE. SOURCE AVAILABLE LED INDICATORS SHALL OPERATE FROM THE CONTROL MICROPROCESSOR TO INDICATE THE TRUE CONDITION OF THE SOURCES AS SENSED BY THE CONTROL.
2. INDICATE THAT THE TRANSFER SWITCH IN "NOT IN AUTO" AND "TEST/EXERCISE ACTIVE" TO INDICATE THAT THE CONTROL SYSTEM IS TESTING OR EXERCISING THE GENERATOR SET.
3. "OVERIDE" PUSHBUTTON TO CAUSE THE TRANSFER SWITCH TO BYPASS ANY ACTIVE TIME DELAYS FOR START, TRANSFER, AND RETRANSFER AND IMMEDIATELY PROCEED WITH ITS NEXT LOGICAL OPERATION.
4. "TEST" PUSHBUTTON TO INITIATE A PREPROGRAMMED TEST SEQUENCE FOR THE GENERATOR SET AND TRANSFER SWITCH. THE TRANSFER SWITCH SHALL BE PROGRAMMABLE FOR TEST WITH LOAD OR TEST WITHOUT LOAD.
5. "REST/LAMP TEST" PUSHBUTTON THAT WILL CLEAR ANY FAULTS PRESENT IN THE CONTROL OR SIMULTANEOUSLY TEST ALL LAMPS ON THE PANEL BY LIGHTING THEM.
6. THE CONTROL SYSTEM SHALL CONTINUOUSLY LOG INFORMATION ON THE NUMBER OF HOURS EACH SOURCE HAS BEEN CONNECTED TO THE LOAD, THE NUMBER OF TIMES TRANSFERRED, AND THE TOTAL NUMBER OF TIMES EACH SOURCE HAS FAILED. THIS INFORMATION SHALL BE AVAILABLE VIA THE OPERATOR DISPLAY PANEL.
7. ALPHANUMERIC DISPLAY PANEL WITH PUSHBUTTON NAVIGATION SWITCHES OR LCD BACKLIGHT PANEL WITH PUSHBUTTON NAVIGATION SWITCHES. THE DISPLAY SHALL BE CLEARLY VISIBLE IN BOTH BRIGHT (SUNLIGHT) AND NO LIGHT CONDITIONS. IT SHALL BE VISIBLE OVER AN ANGLE OF AT LEAST 120 DEGREES. THE ALPHANUMERIC DISPLAY PANEL SHALL BE CAPABLE OF PROVIDING THE FOLLOWING FUNCTIONS AND CAPABILITIES:
   a. DISPLAY SOURCE CONDITION INFORMATION, INCLUDING AC VOLTAGE FOR EACH PHASE OF NORMAL AND EMERGENCY SOURCE, FREQUENCY OF EACH SOURCE. VOLTAGE FOR ALL THREE PHASES SHALL BE DISPLAYED ON A SINGLE SCREEN.
   b. DISPLAY SOURCE STATUS TO INDICATE SOURCE IS CONNECTED OR NOT CONNECTED.
   c. DISPLAY LOAD DATA INCLUDING 3-PHASE AC VOLTAGE, 3-PHASE AC CURRENT, FREQUENCY, KW, KVA, AND POWER FACTOR. VOLTAGE AND CURRENT DATA FOR ALL PHASES SHALL BE DISPLAYED ON A SINGLE SCREEN.
   d. THE DISPLAY PANEL SHALL ALLOW THE OPERATOR TO VIEW AND MAKE THE FOLLOWING ADJUSTMENTS IN THE CONTROL SYSTEM AFTER ENTERING AN ACCESS CODE:
      1) SET NOMINAL VOLTAGE AND FREQUENCY FOR THE TRANSFER SWITCH.
      2) ADJUST VOLTAGE AND FREQUENCY SENSOR OPERATION SET POINTS.
      3) SET UP TIME CLOCK FUNCTIONS.
      4) SET UP LOAD SEQUENCE FUNCTIONS.
      5) ENABLE OR DISABLE CONTROL FUNCTIONS IN THE TRANSFER SWITCH, INCLUDING PROGRAM TRANSITION.
      6) SET UP EXERCISE AND LOAD TEST OPERATION CONDITIONS, NORMAL SYSTEM TIME DELAYS FOR TRANSFER TIME, TIME DELAY FOR START, STOP TRANSFER AND RETRANSFER.
   e. DISPLAY REAL TIME CLOCK DATA, INCLUDING DATE, AND TIME IN HOURS, MINUTES AND SECONDS. THE REAL TIME CLOCK SHALL INCORPORATE PROVISIONS FOR AUTOMATIC DAYLIGHT SAVINGS TIME AND LEAP YEAR ADJUSTMENTS. THE CONTROL SHALL ALSO LOG TOTAL OPERATING HOURS FOR THE CONTROL SYSTEM.
   f. DISPLAY SERVICE HISTORY FOR THE TRANSFER SWITCH. DISPLAY SOURCE CONNECTED HOURS TO INDICATE THE TOTAL NUMBER OF HOURS CONNECTED TO EACH SOURCE. DISPLAY NUMBER OF TIMES TRANSFERRED AND TOTAL NUMBER OF TIMES EACH SOURCE HAS FAILED.

F. THE TRANSFER SWITCH CONTROL SYSTEM SHALL BE CONFIGURABLE IN THE FIELD FOR ANY OPERATING VOLTAGE LEVEL UP TO 600 VAC. PROVIDE RMS VOLTAGE SENSING AND METERING THAT IS ACCURATE TO WITHIN PLUS OR MINIMUM 1% OF NOMINAL VOLTAGE LEVEL. FREQUENCY SENSING SHALL BE ACCURATE TO WITHIN PLUS OR MINUS 0.2%. VOLTAGE SENSING SHALL BE MONITORED BASED ON THE NORMAL VOLTAGE AT THE SITE.

G. TRANSFER SWITCH VOLTAGE SENSORS SHALL BE CLOSE DIFFERENTIAL TYPE PROVIDING SOURCE AVAILABILITY INFORMATION TO THE CONTROL SYSTEM BASED ON THE FOLLOWING FUNCTIONS:

1. MONITORING ALL PHASES OF THE NORMAL SOURCE FOR UNDER VOLTAGE CONDITIONS (ADJUSTABLE FOR PICKUP IN A RANGE OF 85 TO 98% OF THE NORMAL VOLTAGE LEAVE AND DROPOUT IN A RANGE OF 75 TO 98% OF NORMAL VOLTAGE LEVEL).
2. MONITORING ALL PHASES OF THE STANDBY SOURCE FOR UNDER VOLTAGE CONDITIONS (ADJUSTABLE FOR PICKUP IN A RANGE OF 85 TO 98% OF THE NORMAL VOLTAGE LEAVE AND DROPOUT IN A RANGE OF 75 TO 98% OF PICKUP VOLTAGE LEVEL).
3. MONITORING ALL PHASES OF THE NORMAL AND STANDBY SOURCES FOR VOLTAGE IMBALANCE.
4. MONITORING ALL PHASES OF THE NORMAL AND STANDBY SOURCES FOR LOSS OF A SINGLE PHASE.
5. MONITORING ALL PHASES OF THE NORMAL AND STANDBY SOURCES FOR PHASE ROTATION.
6. MONITORING ALL PHASES OF THE NORMAL AND STANDBY SOURCES FOR OVER VOLTAGE CONDITIONS (ADJUSTABLE FOR DROPOUT OVER A RANGE OF 105 TO 135% OR NORMAL VOLTAGE AND PICKUP AT 95 - 99% OF DROPOUT VOLTAGE LEVEL).
7. MONITORING OF ALL PHASES OF THE NORMAL AND STANDBY SOURCES FOR OVER OR UNDER FREQUENCY CONDITIONS.
8. MONITORING THE NEUTRAL CURRENT FLOW IN THE LOAD SIDE OF THE TRANSFER SWITCH. THE CONTROL SHALL INITIATE AN ALARM WHEN THE NEUTRAL CURRENT EXCEEDS A PRESET ADJUSTABLE VALUE IN THE RANGE OF 100 - 150% (SET AT 125%) OF RATED PHASE CURRENT FOR MORE THAN AN ADJUSTABLE TIME PERIOD OF 10 TO 60 SECONDS (SET AT 45 SECONDS).

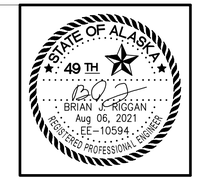
H. ALL TRANSFER SWITCH SENSING SHALL BE CONFIGURABLE FROM A WINDOW XP PC-BASED SERVICE TOOL TO ALLOW SETTING OF LEVELS, AND ENABLING OR DISABLING OF FEATURES AND FUNCTIONS. SELECTED FUNCTIONS INCLUDING VOLTAGE SENSING LEVELS AND TIME DELAYS SHALL BE CONFIGURABLE USING THE OPERATOR PANEL.

I. THE TRANSFER SWITCH SHALL INCORPORATE ADJUSTABLE TIME DELAYS FOR GENERATOR SET START (ADJUSTABLE IN A RANGE FROM 0 - 15 SECONDS, SET AT 5 SECONDS); TRANSFER (ADJUSTABLE IN A RANGE FROM 0 - 120 SECONDS, SET AT 2 SECONDS); RETRANSFER (ADJUSTABLE IN A RANGE FROM 0 - 30 MINUTES, SET AT 5 MINUTES); AND GENERATOR STOP (COOL DOWN)(ADJUSTABLE IN A RANGE OF 0 - 30 MINUTES, SET AT 5 MINUTES).

J. THE CONTROL SHALL HAVE OPTICALLY ISOLATED LOGIC INPUTS, HIGH ISOLATION TRANSFORMERS FOR AC INPUTS, AND RELAYS ON ALL OUTPUTS TO PROVIDE OPTIMUM PROTECTION FORM LINE VOLTAGE SURGES, RFI AND EMI.

K. THE TRANSFER SWITCH SHALL PROVIDE AN ISOLATED RELAY CONTACT FOR STARTING OF THE GENERATOR SET. THE RELAY SHALL BE NORMALLY HELD OPEN, AND CLOSE TO START THE GENERATOR SET. OUTPUT CONTACTS SHALL BE FORM C.

L. PROVIDE ONE SET OF FORM C AUXILIARY CONTACTS ON BOTH SIDES OPERATED BY TRANSFER SWITCH POSITION, RATED 10 AMPS, 250 VAC.



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Revisions

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Sheet Contents
ELECTRICAL SPECIFICATIONS

Sheet No.
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ELECTRICAL SPECIFICATIONS

A. GENERATOR SET EXERCISE (TEST) WITH LOAD MODE: THE CONTROL SYSTEM SHALL BE CONFIGURABLE TO TEST THE GENERATOR SET UNDER LOAD. IN THIS MODE THE TRANSFER SWITCH SHALL CONTROL THE GENERATOR SET IN THE FOLLOWING SEQUENCE:

1. TRANSFER SWITCH SHALL INITIATE THE EXERCISE SEQUENCE AT A TIME INDICATED IN THE EXERCISE TIMER PROGRAM OR WHEN MANUALLY INITIATED BY THE OPERATOR.
2. WHEN THE CONTROL SYSTEM SENSES THE GENERATOR SET AT RATED VOLTAGE AND FREQUENCY IT SHALL OPERATE TO CONNECT THE LOAD TO THE GENERATOR SET.
3. THE GENERATOR SET SHALL OPERATE CONNECTED TO THE LOAD FOR THE DURATION OF THE EXERCISE PERIOD. IF THE GENERATOR SET FAILS DURING THIS PERIOD THE TRANSFER SWITCH SHALL AUTOMATICALLY RECONNECT THE LOAD TO THE NORMAL SOURCE.
4. AT THE COMPLETION OF THE EXERCISE PERIOD THE TRANSFER SWITCH SHALL OPERATE TO CONNECT THE LOAD TO THE NORMAL SOURCE.
5. THE TRANSFER SWITCH SHALL OPERATE THE GENERATOR SET UNLOADED FOR THE PROGRAMMED COOL DOWN PERIOD AND THEN REMOVE THE START SIGNAL FROM THE GENERATOR SET. IF THE NORMAL SOURCE FAILS AT ANY TIME WHEN THE GENERATOR SET IS RUNNING THE TRANSFER SWITCH SHALL IMMEDIATELY CONNECT THE LOAD TO THE GENERATOR SET.

N. GENERATOR SET EXERCISE (TEST) WITHOUT LOAD MODE: THE CONTROL SYSTEM SHALL BE CONFIGURABLE TO TEST THE GENERATOR SET WITHOUT TRANSFER SWITCH LOAD CONNECTED. IN THIS MODE THE TRANSFER SWITCH SHALL CONTROL THE GENERATOR SET IN THE FOLLOWING SEQUENCE:

1. TRANSFER SWITCH SHALL INITIATE THE EXERCISE SEQUENCE AT A TIME INDICATED IN THE EXERCISE TIMER PROGRAM OR WHEN MANUALLY INITIATED BY THE OPERATOR.
2. WHEN THE CONTROL SYSTEM SENSES THE GENERATOR SET AT RATED VOLTAGE AND FREQUENCY IT SHALL OPERATE THE GENERATOR SET UNLOADED FOR THE DURATION OF THE EXERCISE PERIOD.
3. AT THE COMPLETION OF THE EXERCISE PERIOD THE TRANSFER SWITCH SHALL REMOVE THE START SIGNAL FROM THE GENERATOR SET AND SHUT THE GENERATOR DOWN. IF THE NORMAL SOURCE FAILS AT ANY TIME WHEN THE GENERATOR SET IS RUNNING THE TRANSFER SWITCH SHALL IMMEDIATELY CONNECT THE LOAD TO THE GENERATOR SET.

O. SERVICE ENTRANCE RATED TRANSFER SWITCH SHALL BE ABLE TO BE SWITCHED TO A NEUTRAL POSITION DISCONNECTING ALL SOURCES OF POWER FROM BUILDING AT THE TRANSFER SWITCH OR WITH A REMOTE ROTARY SWITCH.

2.6 ENCLOSURE

A. ENCLOSURE SHALL BE ICS 10 AND UL LISTED NEMA 3R. THE ENCLOSURE SHALL PROVIDE WIRE BEND SPACE IN COMPLIANCE TO THE LATEST VERSION OF NFPA 70. THE CABINET DOOR SHALL INCLUDE PERMANENTLY MOUNTED KEY TYPE LATCHES.

B. PROVIDE TRANSFER SWITCH WITH 125W STRIP HEATER PROPERLY DESIGNED AND SIZED TO PREVENT CONDENSATION.

PART 3 - EXECUTION

3.1 EXAMINATION

A. VERIFY THAT SURFACE IS SUITABLE FOR TRANSFER SWITCH INSTALLATION.

3.2 INSTALLATION

A. INSTALL TRANSFER SWITCHES IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

B. PROVIDE START-UP CONTROL SIGNAL WIRING BETWEEN TRANSFER SWITCH AND STANDBY DIESEL GENERATOR SYSTEM TO START GENERATOR UPON LOCAL LOSS OF POWER.

C. ALL TRANSFER SWITCHES SHALL HAVE SIGNAGE FOR ARC HAZARD INSTALLED. THE MARKING SHALL BE LOCATED TO BE CLEARLY VISIBLE TO QUALIFIED PERSONNEL BEFORE EXAMINATION, ADJUSTMENT, SERVICING OR MAINTENANCE OF THE EQUIPMENT. AT A MINIMUM THE SIGNAGE SHALL STATE THE FOLLOWING:

WARNING

ARC FLASH AND SHOCK HAZARD

APPROPRIATE PPE REQUIRED

3.3 MANUFACTURER'S SERVICES

A. THE TRANSFER SWITCH MANUFACTURER SHALL PERFORM A COMPLETE OPERATIONAL TEST ON THE TRANSFER SWITCH PRIOR TO SHIPPING FROM THE FACTORY. A CERTIFIED TEST REPORT SHALL BE INCLUDED IN THE PACKING LIST WITH THE TRANSFER SWITCH. THE TEST PROCESS SHALL INCLUDE CALIBRATION OF VOLTAGE SENSORS.

3.4 DEMONSTRATION

A. VISUAL AND MECHANICAL INSPECTION:

1. COMPARE EQUIPMENT NAMEPLATE DATA WITH DRAWINGS AND SPECIFICATIONS.
2. INSPECT PHYSICAL AND MECHANICAL CONDITION.
3. VERIFY MANUAL TRANSFER WARNINGS ARE ATTACHED AND VISIBLE.
4. VERIFY TIGHTNESS OF CONTROL CONNECTIONS.
5. VERIFY TIGHTNESS OF ACCESSIBLE BOLTED ELECTRICAL CONNECTIONS BY CALIBRATED TORQUE-WRENCH METHOD IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED DATA.
6. PERFORM MANUAL TRANSFER OPERATION.
7. VERIFY POSITIVE MECHANICAL INTERLOCKING BETWEEN NORMAL AND ALTERNATIVE SOURCES.
8. INSPECT ANCHORAGE, ALIGNMENT, GROUNDING AND REQUIRED CLEARANCES.

B. ELECTRICAL TESTS:

1. MEASURE CONTACT-RESISTANCE.
2. PERFORM INSULATION-RESISTANCE TESTS, PHASE-TO-PHASE AND PHASE-TO-GROUND, WITH SWITCH IN BOTH SOURCE POSITIONS. TEST DURATION SHALL BE ONE MINUTE. USE A TEST VOLTAGE IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED DATA. FOR CONTROL DEVICES THAT CANNOT TOLERATE TEST VOLTAGE FOLLOW MANUFACTURER'S RECOMMENDATION.
3. VERIFY SETTINGS AND OPERATION OF CONTROL DEVICES.
4. CALIBRATE AND SET RELAYS AND TIMERS IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED DATA.
5. VERIFY PHASE ROTATION, PHASING AND SYNCHRONIZED OPERATION AS REQUIRED BY THE APPLICATION.
6. PERFORM AUTOMATIC TRANSFER TESTS:
   a. SIMULATE LOSS OF NORMAL POWER.
   b. RETURN TO NORMAL POWER.
   c. SIMULATE LOSS OF EMERGENCY POWER.
   d. SIMULATE ALL FORMS OF SINGLE-PHASE CONDITIONS.
   e. TIME DELAY AND RETRANSFER UPON NORMAL POWER RESTORATION.
   f. ENGINE COOL DOWN AND SHUTDOWN FEATURE.

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Revisions

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Sheet Contents
ELECTRICAL SPECIFICATIONS

Sheet No.
E0.4

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ELECTRICAL SPECIFICATIONS

26 32 00 - PACKAGED GENERATOR ASSEMBLIES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. PACKAGED ENGINE GENERATOR SYSTEM.

B. EXHAUST SILENCER AND FITTINGS.

C. BATTERY AND CHARGER.

D. WEATHERPROOF ENCLOSURE

1.2 SYSTEM DESCRIPTION

A. ENGINE GENERATOR SYSTEM TO PROVIDE SOURCE OF STANDBY POWER FOR ENTIRE FACILITY.

B. SYSTEM CAPACITY: 40KW, 50 KVA, PRIME RATING AT ELEVATION OF 500 FEET ABOVE SEA LEVEL, AND AMBIENT TEMPERATURE BETWEEN -40 AND 104° F; USING ENGINE MOUNTED RADIATOR AND LOAD BANK.

C. OPERATION: IN ACCORDANCE WITH ANSI/NFPA 110.

D. THE PACKAGED GENERATOR SYSTEM, MODULE AND ALL DIMENSIONS, AND PERFORMANCE DATA ARE BASED ON CATERPILLAR MODEL: D40 GC SOUND ATTENUATED LEVEL 2 ENCLOSURE ON UL LISTED INTEGRAL FUEL TANK BASE. THE CONTRACTOR SHALL MAKE ALL NECESSARY MODIFICATIONS REQUIRED FOR OTHER MANUFACTURES, AT NO ADDITIONAL COST TO THE OWNER, IF CATERPILLAR GENERATION'S EQUIPMENT IS NOT SUPPLIED.

1.3 SUBMITTALS

A. SUBMIT PRODUCT DATA SHOWING DIMENSIONS, WEIGHTS, RATINGS, INTERCONNECTION POINTS, AND INTERNAL WIRING DIAGRAMS FOR ENGINE, GENERATOR, CONTROL PANEL, BATTERY, BATTERY RACK, BATTERY CHARGER, EXHAUST SILENCER, VIBRATION ISOLATORS, SUB-BASE FUEL DAY TANK, REMOTE RADIATOR, AND REMOTE ANNUNCIATOR.

B. PROVIDE STRUCTURALLY ENGINEERED SHOP DRAWINGS FOR SEISMIC RESTRAINT OF ALL EQUIPMENT REQUIRED BY THE 2012 IBC, CHAPTER 16 (1621). EQUIPMENT REQUIRING STRUCTURAL SHOP DRAWINGS INCLUDES, BUT IS NOT LIMITED TO THE FOLLOWING: GENERATOR PAD, GENERATOR MODULE, SKID-MOUNTED ENGINE/GENERATOR, SUB-BASE FUEL TANK, RADIATOR, AND VIBRATION ISOLATORS.

1.4 OPERATION AND MAINTENANCE DATA

A. SUBMIT OPERATION AND MAINTENANCE DATA UNDER PROVISIONS OF DIVISION 01.

B. INCLUDE INSTRUCTIONS FOR THE FOLLOWING:

1. NORMAL OPERATION.
2. ROUTINE MAINTENANCE REQUIREMENTS, INCLUDING REPLACEMENT OF FILTERS.
3. STARTING BATTERY INSPECTION/MAINTENANCE.
4. SYSTEM COOLANT AND OTHER FLUID INSPECTION AND REPLACEMENT.
5. OIL SAMPLING AND ANALYSIS FOR ENGINE WEAR.
6. EMERGENCY MAINTENANCE PROCEDURES.

C. PROVIDE MANUFACTURER'S SERVICE MANUALS FOR ALL EQUIPMENT, INCLUDING BUT NOT LIMITED TO THE FOLLOWING: ENGINE, GENERATOR, RADIATOR, AND FUEL TANK.

1.5 QUALIFICATIONS

A. MANUFACTURER: COMPANY SPECIALIZING IN PACKAGED ENGINE GENERATOR SYSTEM WITH MINIMUM THREE YEARS DOCUMENTED EXPERIENCE.

B. SUPPLIER: AUTHORIZED DISTRIBUTOR OF ENGINE GENERATOR MANUFACTURER WITH SERVICE FACILITIES WITHIN THE STATE OF ALASKA MILES OF PROJECT SITE.

1.6 DELIVERY, STORAGE, AND HANDLING

A. ACCEPT PACKAGED ENGINE GENERATOR SET AND ACCESSORIES ON SITE IN CRATES AND VERIFY DAMAGE.

B. PROTECT EQUIPMENT FROM DIRT AND MOISTURE BY SECURELY WRAPPING IN HEAVY PLASTIC.

1.7 WARRANTY

A. PROVIDE TWO YEAR, 6000 HOUR WARRANTY. THE COMPLETE ELECTRICAL POWER SYSTEM (GENERATOR SETS, CONTROLS, AUTOMATIC TRANSFER SWITCHES AND ASSOCIATED SWITCHES AND ACCESSORIES, GENERATOR MODULE) SHALL BE WARRANTED BY THE MANUFACTURER AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF TWO YEARS OR 6000 HOURS, WHICHEVER OCCURS FIRST FROM THE DATE OF BENEFICIAL OCCUPANCY. WARRANTY SHALL INCLUDE PARTS, LABOR, TRAVEL EXPENSES AND LABOR TO REMOVE/REINSTALL EQUIPMENT. THERE SHALL BE NO DEDUCTIBLES APPLIED TO THE WARRANTY.

1.8 MAINTENANCE SERVICE

A. FURNISH SERVICE AND MAINTENANCE OF PACKAGED ENGINE GENERATOR SYSTEM FOR THREE YEARS FROM DATE OF SUBSTANTIAL COMPLETION. THE MAINTENANCE SERVICE SHALL INCLUDE TWO SEMI-ANNUAL INSPECTIONS AND TEST RUN THE ENGINE TO PERFORM MANUFACTURERS RECOMMENDED PREVENTATIVE MAINTENANCE SERVICE ON THE EQUIPMENT FURNISHED.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. CATERPILLAR (BASIS OF DESIGN) OR APPROVED EQUAL.

2.2 ENGINE

A. TYPE: WATER-COOLED INLINE, FOUR STROKE CYCLE, COMPRESSION IGNITION DIESEL INTERNAL COMBUSTION ENGINE.

B. RATING: SUFFICIENT TO OPERATE RATED LOAD AT 10 PERCENT OVERLOAD FOR ONE HOUR AT SPECIFIED ELEVATION AND AMBIENT LIMITS.

C. FUEL SYSTEM: APPROPRIATE FOR USE OF NO. 1 (ARCTIC GRADE) FUEL OIL.

D. GOVERNOR: ISOCHRONOUS TYPE TO MAINTAIN ENGINE SPEED WITHIN 0.5 PERCENT, STEADY STATE, AND 5 PERCENT, NO LOAD TO FULL LOAD, WITH RECOVERY TO STEADY STATE WITHIN 2 SECONDS FOLLOWING SUDDEN LOAD CHANGES.

E. SAFETY DEVICES: ENGINE SHUTDOWN ON HIGH WATER TEMPERATURE, HIGH LUBE OIL TEMPERATURE, LOW OIL PRESSURE, OVERSPEED, AND ENGINE OVERCRANK. LIMITS AS SELECTED BY MANUFACTURER.

F. ENGINE STARTING: ELECTRIC DC STARTING SYSTEM CAPABLE OF THREE COMPLETE CRANKING CYCLES WITHOUT OVERHEATING. STARTERS SHALL HAVE POSITIVE ENGAGEMENT, NUMBER AND VOLTAGE OF STARTER MOTORS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. INCLUDE REMOTE STARTING CONTROL CIRCUIT, WITH MANUAL-OFF-REMOTE SELECTOR SWITCH ON ENGINE-GENERATOR CONTROL PANEL.

G. ENGINE JACKET HEATER: UL499 LISTED AND LABELED THERMAL CIRCULATION TYPE WATER HEATER WITH INTEGRAL THERMOSTATIC CONTROL, SIZED TO MAINTAIN ENGINE JACKET WATER AT 90° F, AND SUITABLE FOR OPERATION ON 120 VOLTS AC.

H. RADIATOR: ENGINE MOUNTED RADIATOR USING 50/50 GLYCOL COOLANT, WITH BLOWER TYPE FAN, SIZED TO MAINTAIN SAFE ENGINE TEMPERATURE IN AMBIENT TEMPERATURE OF 104° F AND FREEZE PROTECTION TO -50 °F. RADIATOR AIR FLOW RESTRICTION: 0.5 INCHES OF WATER, MAXIMUM. ROTATING PARTS SHALL BE GUARDED AGAINST ACCIDENTAL CONTACT.

I. ENGINE ACCESSORIES:

1. OIL PUMP: POSITIVE DISPLACEMENT, MECHANICAL, FULL PRESSURE, LUBRICATION OIL PUMP.
2. FUEL PUMP: AN ENGINE DRIVEN, MECHANICAL, POSITIVE DISPLACEMENT FUEL PUMP. INCLUDE FUEL PRIMING PUMP.
3. FUEL FILTER WITH A REPLACEABLE SPIN_ON CANISTER ELEMENT. PROVIDE RACOR #500FG OR APPROVED EQUAL PRE-FILTER, WITH WATER SHUTDOWN SENSOR TIED TO CONTROL PANEL.
4. REPLACEABLE DRY ELEMENT AIR CLEANER WITH RESTRICTION INDICATOR.
5. WATER PUMP.
6. LUBE OIL COOLER.
7. LUBE OIL DRAIN: EXTEND THE LUBE OIL DRAIN TO THE OUTSIDE OF THE GENERATOR SKID USING AREOEQUIP FITTINGS. INSTALL A NIBCO T - 113 SHUT OFF VALVE ON THE HOSE AT AN ACCESSIBLE LOCATION OF THE UNIT AND CAP THE END OF THE HOSE WITH A ¾" NPT CAP.

J. MOUNTING: PROVIDE UNIT WITH SUITABLE SPRING-TYPE VIBRATION ISOLATORS AND MOUNT ON STRUCTURAL STEEL BASE.

2.3 GENERATOR

A. GENERATOR: ANSI/NEMA MG 1; THREE PHASE, FOUR POLE, RECONNECTIBLE BRUSHLESS SYNCHRONOUS GENERATOR WITH BRUSHLESS EXCITER.

B. RATING: 40 KW, 50 KVA, AT 0.8 POWER FACTOR, 208Y/120 VOLTS, 60HZ AT 1800 RPM.

C. INSULATION: ANSI/NEMA MG 1, CLASS F.

D. TEMPERATURE RISE: 130° C CONTINUOUS.

E. ENCLOSURE: ANSI/NEMA MG 1; OPEN DRIP PROOF.

F. VOLTAGE REGULATION: INCLUDE GENERATOR-MOUNTED VOLTS PER HERTZ EXCITER-REGULATOR TO MATCH ENGINE AND GENERATOR CHARACTERISTICS, WITH VOLTAGE REGULATION +/- ONE PERCENT FROM NO LOAD TO FULL LOAD. INCLUDE MANUAL CONTROLS TO ADJUST VOLTAGE DROP +/- 5 PERCENT VOLTAGE LEVEL, AND VOLTAGE GAIN.

G. FREQUENCY REGULATION: ISOCHRONOUS FROM STEADY STATE NO LOAD TO STEADY STATE RATED LOAD. RANDOM FREQUENCY VARIATION WITH ANY STEADY LOAD FROM NO LOAD TO FULL LOAD SHALL NOT EXCEED PLUS OR MINUS 0.25%.

H. THE DIESEL ENGINE_GENERATOR SET SHALL BE CAPABLE OF SINGLE STEP LOAD PICK UP OF 100% NAMEPLATE KW AND POWER FACTOR, LESS APPLICABLE DERATING FACTORS, WITH THE ENGINE_GENERATOR SET AT OPERATING TEMPERATURE.

I. THE ALTERNATOR SHALL PRODUCE A CLEAN AC VOLTAGE WAVEFORM, WITH NOT MORE THAN 5% TOTAL HARMONIC DISTORTION AT FULL LINEAR LOAD, WHEN MEASURED FROM LINE TO NEUTRAL, AND WITH NOT MORE THAN 3% IN ANY SINGLE HARMONIC.

J. GENERATOR LEADS: THE GENERATOR LEADS SHALL BE BROUGHT OUT AND TERMINATED ON A UNIT-MOUNTED GENERATOR CIRCUIT BREAKER. THE GENERATOR LEADS SHALL HAVE SUFFICIENT LENGTH TO ALLOW FOR ANY CONNECTION CONFIGURATION.

2.4 WEATHER-PROTECTIVE ENCLOSURE

A. THE GENERATOR SET SHALL BE PROVIDED WITH A SOUND-ATTENUATED HOUSING WHICH ALLOWS THE GENERATOR SET TO OPERATE AT FULL RATED LOAD IN THE AMBIENT CONDITIONS PREVIOUSLY SPECIFIED. THE ENCLOSURE SHALL REDUCE THE SOUND LEVEL OF THE GENERATOR SET WHILE OPERATING AT FULL RATED LOAD TO A MAXIMUM OF 68 DBA AT ANY LOCATION 7 METERS FROM THE GENERATOR SET IN A FREE FIELD ENVIRONMENT. HOUSING CONFIGURATION AND MATERIALS USED MAY BE OF ANY SUITABLE DESIGN WHICH MEETS APPLICATION NEEDS, EXCEPT THAT ACOUSTICAL MATERIALS USED SHALL BE OIL AND WATER RESISTANT. NO FOAM MATERIALS SHALL BE USED UNLESS THEY CAN BE DEMONSTRATED TO HAVE THE SAME DURABILITY AND LIFE AS FIBERGLASS.

B. THE ENCLOSURE SHALL INCLUDE HINGED DOORS FOR ACCESS TO BOTH SIDES OF THE ENGINE AND ALTERNATOR, AND THE CONTROL EQUIPMENT. KEY-LOCKING AND PADLOCKABLE DOOR LATCHES SHALL BE PROVIDED FOR ALL DOORS. DOOR HINGES SHALL BE STAINLESS STEEL.

C. THE ENCLOSURE SHALL BE PROVIDED WITH AN EXHAUST SILENCER, WHICH IS MOUNTED INSIDE OF THE ENCLOSURE, AND ALLOWS THE GENERATOR SET PACKAGE TO MEET SPECIFIED SOUND LEVEL REQUIREMENTS. SILENCER AND EXHAUST SHALL INCLUDE A RAINCAP AND RAINSHIELD.

D. THE ENCLOSURE SHALL HAVE A THERMOSTATICALLY-CONTROLLED MODULATING DAMPER SYSTEM TO MAINTAIN THE TEMPERATURE IN THE GENERATOR ENCLOSURE AT A MINIMUM OF +40 DEGREES FAHRENHEIT WHILE THE GENERATOR IS RUNNING.

E. ALL SHEETMETAL SHALL BE PRIMED FOR CORROSION PROTECTION AND FINISH PAINTED WITH THE MANUFACTURERS STANDARD COLOR. ALL SURFACES OF ALL METAL PARTS SHALL BE PRIMED AND PAINTED.

F. PAINTING OF HOSES, CLAMPS, WIRING HARNESSES, AND OTHER NON-METALLIC SERVICE PARTS SHALL NOT BE ACCEPTABLE. FASTENERS USED SHALL BE CORROSION RESISTANT, AND DESIGNED TO MINIMIZE MARRING OF THE PAINTED SURFACE WHEN REMOVED FOR NORMAL INSTALLATION OR SERVICE WORK.

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AVTEC IT FACILITY
NEW GENERATOR ADDITION
703 2ND AVE, SEWARD, AK 99664

Revisions

No.	Description	Date

Drawn by BJR	Date AUG 6, 2021
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Sheet Contents
ELECTRICAL SPECIFICATIONS

Sheet No.
E0.5

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ELECTRICAL SPECIFICATIONS

2.5 ACCESSORIES

A. SUB-BASE TANKS: DOUBLE-WALL, ALL-WELDED CONSTRUCTION, BASE-MOUNTED FUEL TANK WITH A MINIMUM CAPACITY FOR 24 HOUR RUNTIME. THE TANK OUTSIDE DIMENSIONS SHALL NOT EXCEED THE DIMENSIONS OF THE GENERATOR FRAMEWORK. THE TANK SHALL HAVE FOUNDATION TO GROUND CLEARANCE FOR VISUAL SECONDARY LEAK DETECTION, SHALL HAVE THE STRUCTURAL INTEGRITY TO SUPPORT THE ENGINE-GENERATOR SET, SHALL BE SUPPLIED BY THE ENGINE-GENERATOR SET MANUFACTURER, AND SHALL BE INSTALLED BEFORE SHIPMENT. THE TANK SHALL BE UL 142 LISTED FOR BOTH PRIMARY AND SECONDARY CONTAINMENT AND SHALL MEET ALL OF THE REQUIREMENTS OF NFPA FOR THE INTENDED USE. THE TANK SHALL HAVE THE FOLLOWING FEATURES; VENT CONNECTIONS, TANK-MOUNTED FUEL GAUGE, FLEXIBLE FUEL LINE CONNECTIONS, CHECK VALVE, INLET SOLENOID VALVE, HIGH AND LOW FUEL LEVEL ALARM CONTACTS AND INDICATING LIGHTS, COMPLETE FUEL TANK PUMP PACKAGE FOR AUTOMATIC SELF-REFILLING SYSTEM. THE FUEL PUMP PACKAGE SHALL INCLUDE MANUAL FUEL PUMP, AUTOMATIC DUPLEX FILL PUMP AND RETURN PUMPS, INLET SOLENOID VALVE, FUEL OIL STRAINER AND CONTROLS. THE CONTROLS SHALL CONSIST OF A UL LISTED, INTEGRATED DESIGN, DIGITAL LEVEL CONTROLLER WHICH PROVIDES DIFFERENTIAL LEVEL CONTROL FOR ACTIVATION OF PUMPS, DUPLEX PUMP ALTERNATOR, TANK LEVEL INDICATION, SYSTEM ALARMS AND MANUAL OPERATING CONTROLS. LEVEL CONTROLLER SHALL BE SELF-CONTAINED AS A UNIT WITHIN A NEMA4 ENCLOSURE INTEGRAL WITH THE DAY TANK ASSEMBLY. THE SUPPLY PUMPS SHALL BE SIZED AT GPM 150% GREATER THAN THE GENERATOR PEAK FUEL CONSUMPTION. THE RETURN PUMPS SHALL BE SIZED AT GPM 150% GREATER THAN THE SUPPLY PUMPS. THE PUMPS SHALL BE SIZED TO TRANSFER FUEL FROM THE FUEL STORAGE TANK TO THE SUB-BASE TANK THROUGH PIPING AS INDICATED ON THE PLANS. ALL APPURTENANCES SHALL MEET ALL STATE AND LOCAL CODES.

B. BATTERIES: HEAVY DUTY, DIESEL STARTING TYPE LEAD-ACID STORAGE BATTERIES, SIZED AS RECOMMENDED BY THE ENGINE/GENERATOR SET MANUFACTURER FOR STARTING THE SET AT 0F AMBIENT. MATCH BATTERY VOLTAGE TO STARTING SYSTEM. INCLUDE NECESSARY CABLES AND CLAMPS.

C. BATTERY TRAYS: NON-METALLIC BATTERY BOXES WITH COVERS AND HOLD-DOWNS, TREATED FOR ELECTROLYTE RESISTANCE AND CONSTRUCTED TO CONTAIN SPILLAGE OF ELECTROLYTE. PROVIDE WITH SEISMIC RESTRAINTS TO SECURE BATTERIES DURING EARTHQUAKES. THE BATTERY HOUSING SHALL BE MOUNTED OUTSIDE THE ENGINE/GENERATOR SKID BASE

D. BATTERY CHARGERS: DUAL-RATE, 12-AMP, CURRENT LIMITING TYPE DESIGNED TO FLOAT AT 2.17 VOLTS PER CELL AND EQUALIZE AT 2.33 VOLTS PER CELL. PROVIDE OVERLOAD PROTECTION, FULL WAVE RECTIFIER, DC VOLTMETER AND AMMETER, AND 120 VOLTS AC FUSED INPUT. PROVIDE WALL-MOUNTED ENCLOSURE TO MEET ANSI/NEMA 250, TYPE 1 REQUIREMENTS. OPERATIONAL MONITORS SHALL PROVIDE VISUAL OUTPUT ALONG WITH INDIVIDUAL FORM C CONTACTS RATED AT 4 AMP, 120 VAC, 30 VDC FOR REMOTE INDICATION OF:

1. LOSS OF AC POWER: RED LIGHT.
2. LOW BATTERY VOLTAGE: RED LIGHT.
3. HIGH BATTERY VOLTAGE: RED LIGHT.
4. POWER ON: GREEN LIGHT, NO RELAY CONTACT.

E. LINE CIRCUIT BREAKER: NEMA AB 1 MOLDED CASE CIRCUIT BREAKER ON GENERATOR OUTPUT WITH INTEGRAL THERMAL AND INSTANTANEOUS MAGNETIC TRIP IN EACH POLE; SIZED IN ACCORDANCE WITH ANSI/NFPA 70. INCLUDE BATTERY-VOLTAGE OPERATED SHUNT TRIP, CONNECTION TO OPEN CIRCUIT BREAKER ON ENGINE FAILURE. MOUNT UNIT IN ENCLOSURE TO MEET ANSI/NEMA 250, TYPE 1 REQUIREMENTS.

F. ENGINE-GENERATOR CONTROL PANEL: NEMA 250, TYPE 1 GENERATOR-MOUNTED CONTROL PANEL ENCLOSURE WITH UL508 LISTED AND LABELED MICROPROCESSOR BASED CONTROL, DESIGNED TO PROVIDE AUTOMATIC STARTING, MONITORING AND CONTROL FUNCTIONS. INCLUDE PROVISION FOR PADLOCK AND PROVIDE THE FOLLOWING EQUIPMENT AND FEATURES:

1. DIGITAL FREQUENCY METER: 45-65 HZ RANGE, LED DISPLAY.
2. AC OUTPUT DIGITAL VOLTMETER: LED DISPLAY, 2 PERCENT ACCURACY, WITH PHASE SELECTOR SWITCH.
3. AC OUTPUT DIGITAL AMMETER: LED DISPLAY, 2 PERCENT ACCURACY, WITH PHASE SELECTOR SWITCH.
4. AC OUTPUT DIGITAL KILOWATT METER: LED DISPLAY, 2% ACCURACY.
5. OUTPUT VOLTAGE ADJUSTMENT: VIA TOUCHPAD ON CONTROL PANEL.
6. PUSH-TO-TEST INDICATOR LAMPS, ONE EACH FOR LOW OIL PRESSURE SHUTDOWN, HIGH WATER TEMPERATURE SHUTDOWN, HIGH OIL TEMPERATURE SHUTDOWN OVERSPEED SHUTDOWN, OVERCRANK SHUTDOWN, LOW WATER SHUTDOWN, LOW OIL PRESSURE PRE-ALARM AND HIGH WATER TEMPERATURE PRE-ALARM, BATTERY CHARGER MALFUNCTION, LOW WATER TEMPERATURE, AND LOW FUEL LEVEL.
7. ENGINE MANUAL-OFF-REMOTE SELECTOR SWITCH.
8. ENGINE RUNNING TIME METER.
9. OIL PRESSURE GAUGE.
10. WATER TEMPERATURE GAUGE.
11. FUEL PRESSURE GAUGE.
12. AUXILIARY RELAY: 3PDT, OPERATES WHEN ENGINE RUNS, WITH CONTACT TERMINALS PREWIRED TO TERMINAL STRIP.
13. REMOTE ALARM CONTACTS: PRE-WIRE SPDT CONTACTS TO TERMINAL STRIP FOR REMOTE ALARM FUNCTIONS.
14. OVERCRANK PROTECTION WITH MANUAL RESET.
15. TROUBLE HORN WITH SILENCING SWITCH, RED INDICATING LIGHT AND RESET SWITCH.
16. AUXILIARY RELAY FOR BUILDING AUTOMATION SYSTEM MONITORING: PROVIDE DRY CONTACT RELAYS FOR MONITORING OF GENERATOR STATUS AND GENERAL ALARM BY BAS. COORDINATION WITH SPECIFICATION SECTION 23 09 23.

G. REMOTE ANNUNCIATOR PANEL: PROVIDE FLUSH MOUNTED 20-LIGHT LED TYPE REMOTE ALARM ANNUNCIATOR PANELS WITH BRUSHED STAINLESS STEEL FINISH AND ALARM HORN, LOCATED AS SHOWN ON THE DRAWINGS. THE REMOTE ANNUNCIATOR SHALL PROVIDE ALL THE AUDIBLE AND VISUAL ALARMS CALLED FOR BY NFPA STANDARD 110 FOR LEVEL 2 SYSTEMS FOR THE LOCAL GENERATOR CONTROL PANEL. ANNUNCIATOR SHALL BE LABELED WITH THE SPECIFIED FUNCTIONS. ALARM SILENCE AND LAMP TEST SWITCHES SHALL BE PROVIDED. LED LAMPS SHALL BE REPLACEABLE, AND INDICATING LAMP COLOR SHALL BE CAPABLE OF CHANGES NEEDED FOR SPECIFIC APPLICATION REQUIREMENTS. SPARE LAMPS SHALL BE PROVIDED TO ALLOW FUTURE ADDITION OF OTHER ALARM AND STATUS FUNCTIONS TO THE ANNUNCIATOR. ALARM HORN SHALL BE SWITCHABLE FOR ALL ANNUNCIATION POINTS. ALARM HORN (WHEN SWITCHED ON) SHALL SOUND FOR FIRST FAULT, AND ALL SUBSEQUENT FAULTS, REGARDLESS OF WHETHER FIRST FAULT HAS BEEN CLEARED, IN COMPLIANCE WITH NFPA110 3-5.6.2. THE INTERCONNECTING WIRING BETWEEN THE ANNUNCIATOR AND OTHER SYSTEM COMPONENTS SHALL BE MONITORED AND FAILURE OF THE INTERCONNECTION BETWEEN COMPONENTS SHALL BE DISPLAYED ON THE ANNUNCIATOR PANEL.

H. HEATERS: PROVIDE MANUFACTURER'S RECOMMENDED HEATERS WITH THERMOSTATIC CONTROLS TO KEEP ENGINE OIL PAN, ENGINE BLOCK, GENERATOR CONTROLS, AND GENERATOR WINDINGS WITHIN MANUFACTURER'S RECOMMENDED TEMPERATURE AT 30^{O}F. PROVIDE IMMERSION TYPE COOLANT HEATER IN REMOTE RADIATOR TO KEEP RADIATOR WITHIN MANUFACTURER'S RECOMMENDED TEMPERATURE AT -20^{O}F.

I. MOUNTING: THE COMPLETE ENGINE/GENERATOR PACKAGE SHALL BE MOUNTED ON A COMMON, SELF-SUPPORTING, LOW PROFILE, STRUCTURAL STEEL SKID BASE WITH RUBBER IN SHEAR VIBRATION ISOLATORS BETWEEN THE ENGINE AND BASE AND SPRING TYPE VIBRATION ISOLATORS WITH SEISMIC SNUBBERS BETWEEN THE BASE AND THE MODULE. THE BASE SHALL EXTEND FROM THE REAR END OF THE GENERATOR TO THE MOST FORWARD POINT OF THE ENGINE AND SHALL BE PREDRILLED TO ACCEPT A 250 KCMIL COPPER GROUNDING CONDUCTOR.

PART 3 - EXECUTION

3.1 EXAMINATION

A. BEGINNING OF INSTALLATION MEANS INSTALLER ACCEPTS EXISTING CONDITIONS.

3.2 INSTALLATION

A. GROUND AND BOND GENERATOR AND OTHER ELECTRICAL SYSTEM COMPONENTS IN ACCORDANCE WITH NEC REQUIREMENTS.

3.3 FIELD QUALITY CONTROL

A. SIMULATE POWER FAILURE INCLUDING OPERATION OF EACH TRANSFER SWITCH, AUTOMATIC STARTING CYCLE, AND AUTOMATIC SHUTDOWN, AND RETURN TO NORMAL. DEMONSTRATE ALL AUTOMATIC FEATURES AS DIRECTED BY THE OWNER'S REPRESENTATIVE.

B. DURING TEST, RECORD THE FOLLOWING AT 20 MINUTE INTERVALS:

1. KILOWATTS.
2. AMPERES.
3. VOLTAGE.
4. COOLANT TEMPERATURE.
5. ROOM TEMPERATURE.
6. FREQUENCY.
7. OIL PRESSURE.

C. TEST ALARM AND SHUTDOWN CIRCUITS BY SIMULATING CONDITIONS.

D. UPON COMPLETION OF THE TEST, PROVIDE A TEST UNDER FULL AVAILABLE (BUILDING) LOAD FOR 2 HOURS FOR WITNESS BY THE AUTHORITY HAVING JURISDICTION AND THE OWNER'S REPRESENTATIVE. SIMULATE POWER FAILURES FROM ATS WITH LOAD TRANSFER AND NORMAL COOL-DOWN CYCLE. RECORD VOLTAGE, CURRENT, AND FREQUENCY DURING BUILDING LOAD TEST. NOTE ANY REQUIRED ADJUSTMENTS. FURNISH RECORD OF TESTS TO THE OWNER.

3.4 MANUFACTURER'S FIELD SERVICES

A. PREPARE, START, TEST, AND ADJUST SYSTEMS.

B. ADJUST GENERATOR OUTPUT VOLTAGE AND ENGINE SPEED.

C. CLEAN ENGINE AND GENERATOR SURFACES. REPLACE OIL AND FUEL FILTERS.

3.5 DEMONSTRATION

A. DESCRIBE LOADS CONNECTED TO STANDBY SYSTEM AND RESTRICTIONS FOR FUTURE LOAD ADDITIONS.

B. SIMULATE POWER OUTAGE BY INTERRUPTING NORMAL SOURCE, AND DEMONSTRATE THAT SYSTEM OPERATES TO PROVIDE STANDBY POWER.

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Aug 06, 2021
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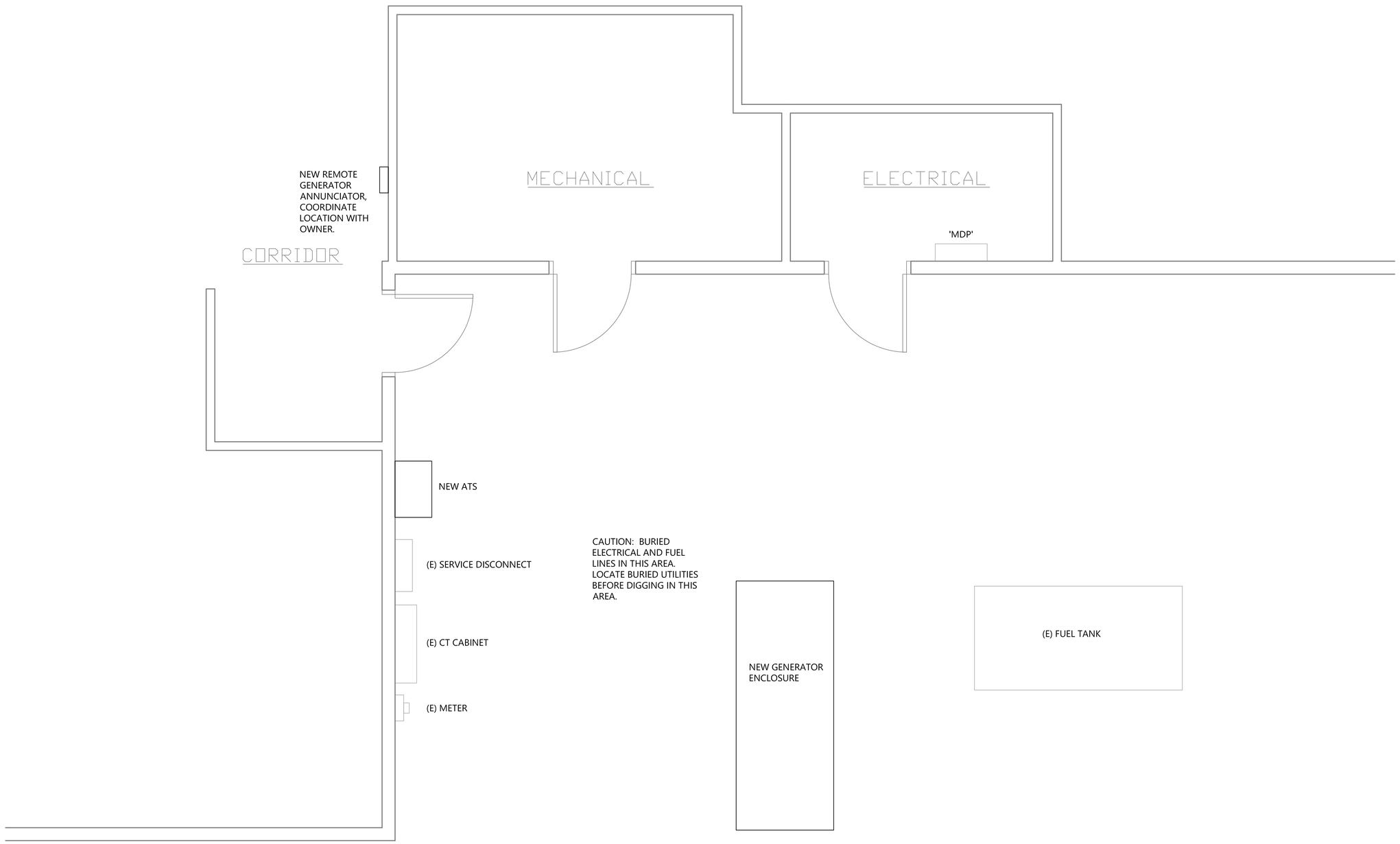

1 ELECTRICAL PLAN
1/2" = 1'-0"

STATE OF ALASKA
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BRIAN J. RIGGAN
Aug 06, 2021
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