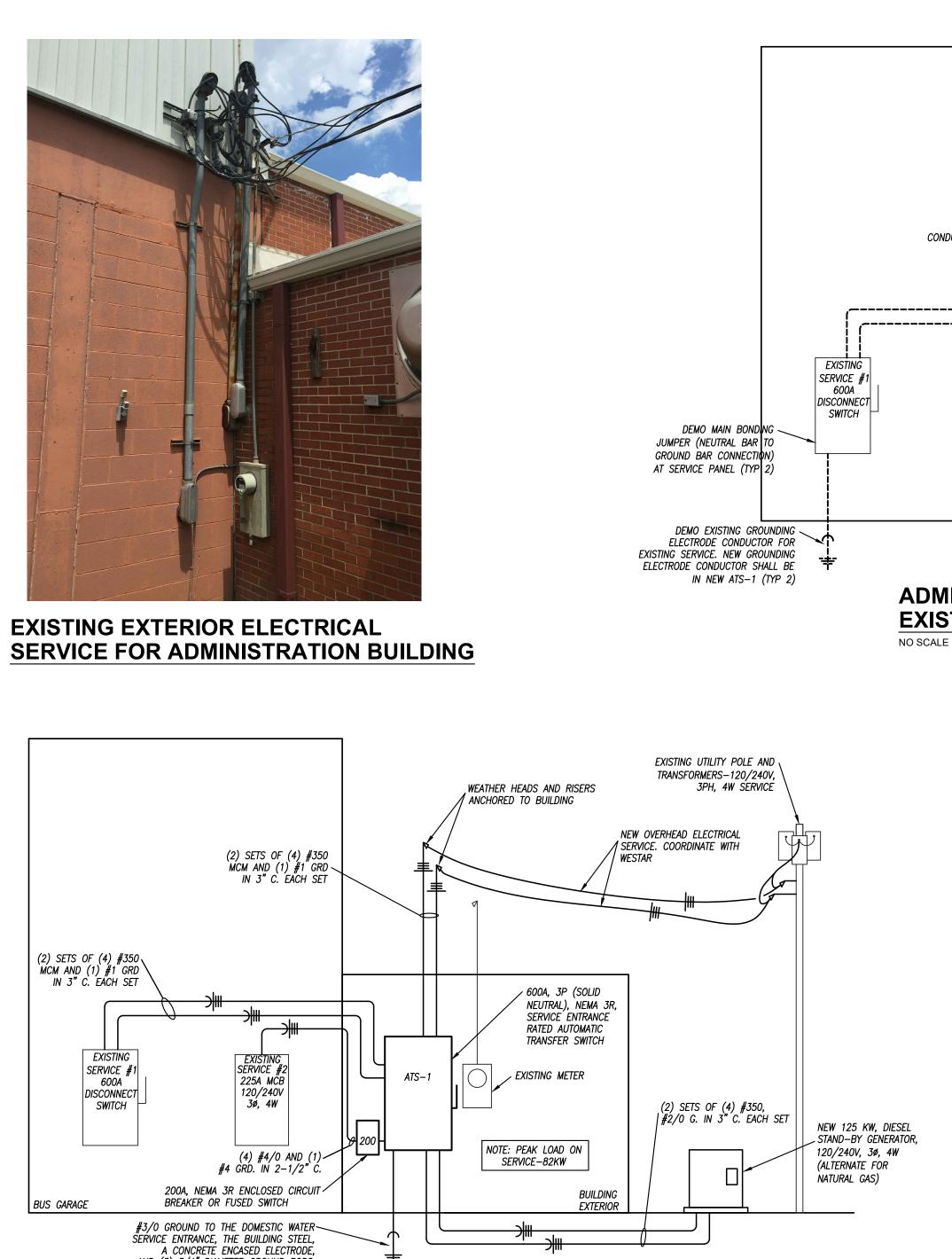


REQUEST FOR BIDS Back-Up Generator Ryan Administration Building TO-21-08

Appendix III Engineering Studies



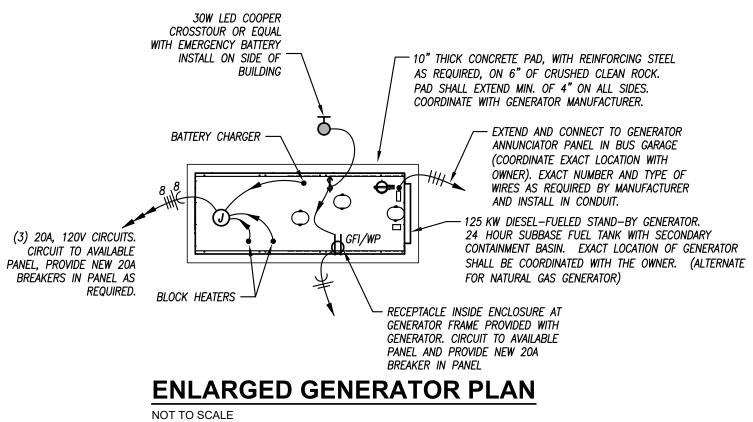
ADMINISTRATION BUILDING **ELECTRICAL SERVICE RISER DIAGRAM** NO SCALE

EQUIPMENT FAULT CURRENT RATING SCHEDULE-ADMIN BLDG				
EQUIPMENT	SCA **	SCCR	NOTES	
MTS-1 (ADMIN. BUILDING)	14,398	35,000	1,2	

<u>NOTES:</u> 1. RATING BASED ON AN ASSUMED FAULT AT UTILITY CO. TRANSFORMER OF 16,255 AIC. 2. EQUIPMENT MAY BE SERIES RATED.

** CALCULATIONS PERFORMED USING BUSSMANN POINT-TO-POINT METHOD.

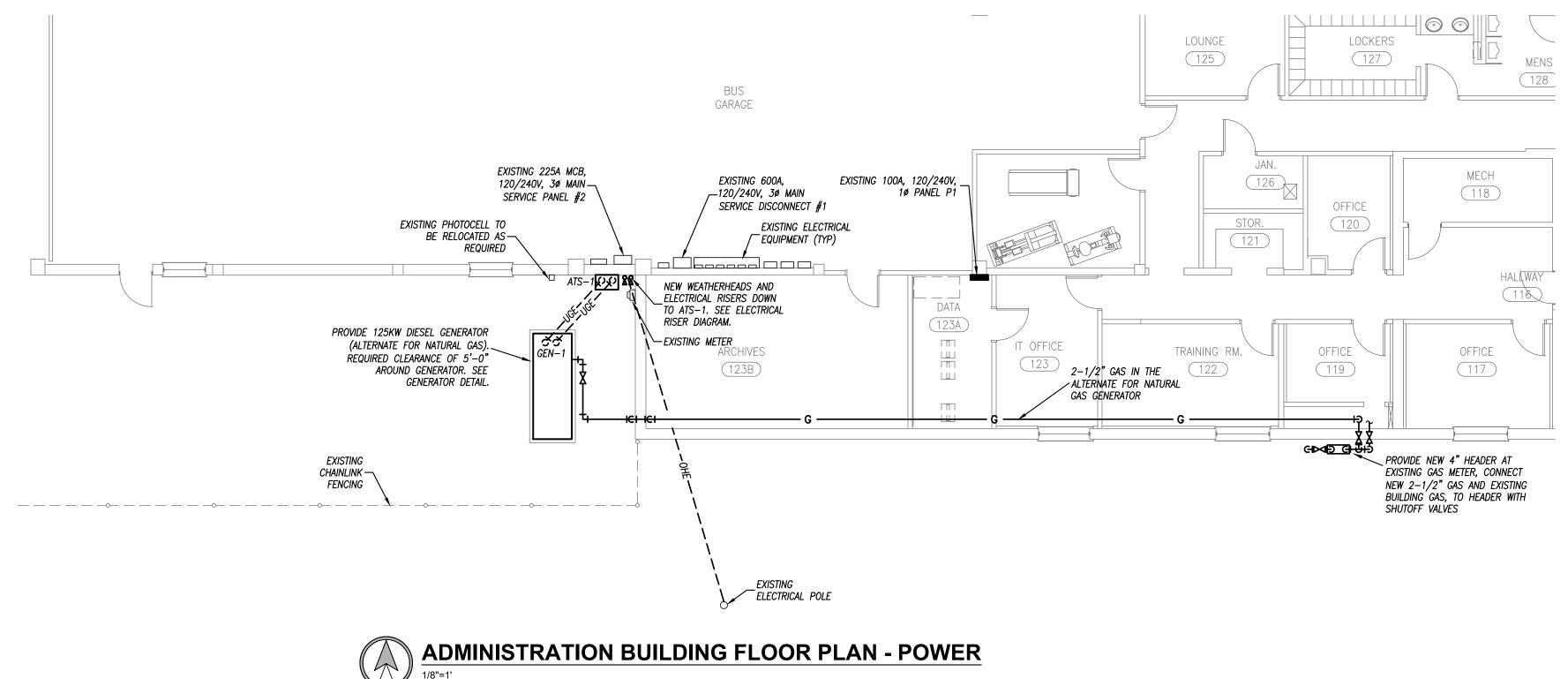
AND (3) 3/4" DIAMETER GROUND RODS.



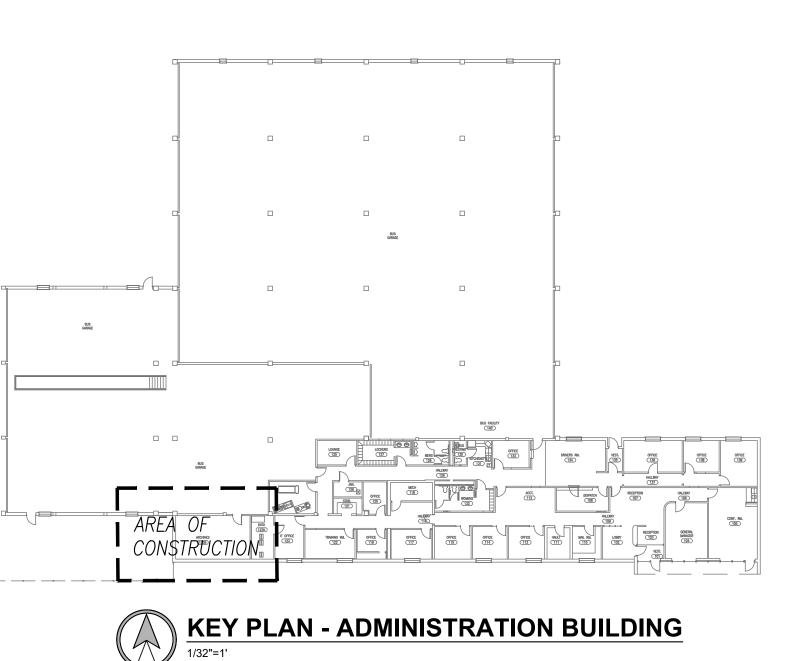
DEMO EXISTING CONDUIT/CONDUCTORS (TYP)	EXISTING UTILITY POLE AND TRANSFORMERS-120/240V, 3PH, 4W SERVICE DEMO EXISTING OVERHEAD ELECTRICAL SERVICE
EXISTING SERVICE #2 225A MCB 120/240V 3ø, 4W BUS GARAGE	EXISTING METER BUILDING EXTERIOR

ADMINISTRATION BUILDING EXISTING ELECTRICAL SERVICE RISER DIAGRAM - DEMO

		ELEC ⁻	TRICAL SYMBOL LIST		
	SO	ME SYMBOLS AN	D ABBREVIATIONS ON THIS LEGEND MAY NOT BE US	ED	
	HOME RUN (2 #12, 1 #12 G UNLESS NOTED OTHERWISE)	¢	DUPLEX RECEPTACLE.	F	MANUAL PULL STATION
	INDICATES 2 PHASE, 1 NEUTRAL, AND 1 GROUND CONDUCTOR	\$	LINE THRU DEVICE INDICATES ABOVE COUNTER	D	CEILING SMOKE DETECTOR
TELE	TELEPHONE CONDUIT	O IG	DUPLEX RECEPTACLE WITH ISOLATED GROUND (SIMPLEX AND QUADPLEX SIMILAR)	D	DUCT SMOKE DETECTOR
—— ОНЕ ——	- OVERHEAD ELECTRICAL	₽	QUADPLEX RECEPTACLE	X	STROBE LIGHT
UGE	- UNDERGROUND ELECTRICAL	0 -	SIMPLEX RECEPTACLE		HORN
↔	BATTERY OPERATED EMERGENCY LIGHT (WALL MTD)	Þ	CEILING MOUNTED RECEPTACLE		COMBINATION HORN/STROBE
	BATTERY OPERATED EMERGENCY LIGHT (CEILING MTD)	€	SPECIAL RECEPTACLE W/NEMA CONFIG AS NOTED	BÓ	FIRE ALARM BELL
© •	SURFACE/RECESSED LIGHT FIXTURE	HG NF	HOSPITAL GRADE NON FUSED	■ TS ■ WF	FIRE ALARM/SPRINKLER TAMPER AND FLOW SWITCHE
•	FLUORESCENT LIGHT FIXTURE	EX IG	EXISTING ISOLATED GROUND	FACP	FIRE ALARM CONTROL PANEL
0	FLUORESCENT STRIP FIXTURE	TS WP	MOUNT RECEPTACLE IN TOE SPACE OF CABINET WEATHER PROOF	DH	ELECTRO/MAGNETIC DOOR HOLD OPEN
H⊗ ⊗	EXIT LIGHT	GFI EM	GROUND FAULT INTERRUPT EMERGENCY		TELEPHONE OUTLET – SINGLE GANG BOX WITH 3/4" C TO ABOVE ACCESSIBLE CEILING, PROVIDE
$\mathbf{\dot{>}}$	FIXTURE EQUIPPED WITH BATTERY	C	DISCONNECT SWITCH. 30A–3P, NON–FUSED EXCEPT AS NOTED		ĆAT 6 CABLING DEVICE PLATE, JACKS, AND TERMINATIONS AT BOTH ENDS
\$	LIGHT SWITCH - SINGLE POLE	NL RL	NIGHT LIGHT RELOCATED EXISTING	4	LINE THRU DEVICE INDICATES ABOVE COUNTER
\$3	LIGHT SWITCH – 3-WAY	Ð	INDICATES CONNECT TO EXISTING		DATA OUTLETS – DOUBLE GANG BOX WITH 3/4" C TO ABOVE ACCESSIBLE CEILING, PROVIDE CAT 6 CABLING DEVICE PLATE, JACKS, AND TERMINATIONS AT BOTH ENDS
\$4	LIGHT SWITCH - 4-WAY	\sim	CONTROL CIRCUIT		
M	CEILING OCCUPANCY SENSOR FOR LIGHTING CONTROL	1G	SINGLE GANG FLOOR BOX (2, 3, 4 GANG SIMILAR)		TELEPHONE/DATA OUTLETS – DOUBLE GANG BOX WITH 3/4" C TO ABOVE ACCESSIBLE CEILING,
\$ _M	WALL OCCUPANCY SENSOR WITH OVERRIDE SWITCH FOR LIGHTING CONTROL		SURFACE PANELBOARD		PROVIDE CAT 6 CABLING, DEVICE PLATE, JACKS, AND TERMINATIONS AT BOTH ENDS
J	JUNCTION BOX		RECESSED PANELBOARD		POWER AND DATA POLE



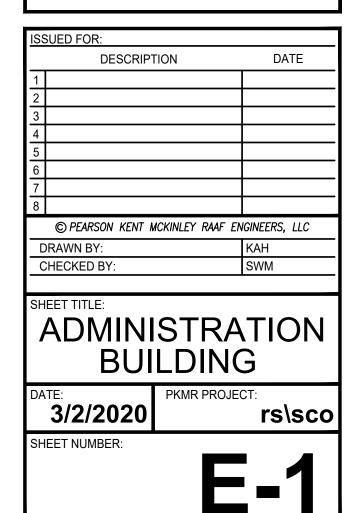
GENERATOR SCHEDULE						
GENERATOR NUMBER	MANUFACTURER	SIZE	VOLTAGE	FUEL	FUEL TANK	NOTES
GEN-1 BASE BID	CATERPILLAR	125 KW	120/240V, 3ø, 4W	DIESEL	24HR SUB-BASE	1,2,3
GEN-1 ALTERNATE	CATERPILLAR	125 KW	120/240V, 3ø, 4W	NATURAL GAS	NONE	1,2,3
REMARKS: 1. LOCKABLE NEMA 3R WEATHERPROOF SOUND ENCLOSURE 2. FACTORY APPROVED START-UP AND BUILDING LOAD TEST						
3. 5 YEAR EXTENDED WARRANTY						





PEARSON KENT MCKINLEY RAAF ENGINEERS LL 2933 SW WOODSIDE DR., SUITE C TOPEKA, KS 66614 785.273.2447 WWW.PKMRENG.COM





16000 - ELECTRICAL SPECIFICATIONS

<u>SECTION 16000 - ELECTRICAL REQUIREMENTS</u>

GENERAL REQUIREMENTS

- A.ALL WORK SHALL BE IN ACCORDANCE W/ LATEST EDITION OF INTERNATIONAL BUILDING CODE, NATIONAL ELECTRICAL CODE, NFPA, CODES AS ADOPTED BY CITY, COUNTY, STATE & ALL OTHER
- APPLICABLE CODES. B.ALL MATERIALS & EQUIPMENT SHALL BE NEW & SHALL BEAR U.L. LABEL WHERE APPLICABLE. PROVIDE WATERPROOF EQUIPMENT ENCLOSURES WHERE REQUIRED C.OBTAIN & PAY FOR ALL PERMITS REQUIRED FOR EXECUTION OF THIS WORK & SHALL MAKE ARRANGEMENTS FOR MODIFICATIONS TO ELECTRICAL CONNECTIONS TO BUILDING AS REQUIRED. D.CONTRACTOR SHALL PROVIDE ALL LABOR & MATERIALS REQUIRED TO HAVE COMPLETE FUNCTIONING ELECTRICAL LIGHTING & POWER SYSTEMS TOGETHER W/ ALL ASSOCIATED EQUIPMENT & APPARATUS
- AS SHOWN ON PLANS EWHERE AN ELECTRICAL DEVICE IS REQUIRED BY CODE BUT NOT SHOWN, IT SHALL BE PROVIDED AS THOUGH FULLY SHOWN & SPECIFIED. F.CONTRACTOR SHALL VISIT SITE & OBSERVE CONDITIONS UNDER WHICH WORK WILL BE DONE. ANY DISCREPANCIES SHALL BE CALLED TO ARCHITECT'S ATTENTION. NO SUBSEQUENT ALLOWANCE WILL BE MADE IN THIS CONNECTION FOR ANY ERROR OR NEGLIGENCE ON CONTRACTOR'S PART.
- G.FINAL ACCEPTANCE OF WORK SHALL BE SUBJECT TO CONDITION THAT ALL SYSTEMS, EQUIPMENT, APPARATUS & APPLIANCES OPERATE SATISFACTORILY AS DESIGNED & INTENDED. WORK SHALL INCLUDE REQUIRED ADJUSTMENT OF SYSTEMS & CONTROL EQUIPMENT INSTALLED UNDER THESE SPECIFICATIONS. H.WARRANT TO OWNER QUALITY OF MATERIALS, EQUIPMENT, WORKMANSHIP & OPERATION OF EQUIPMENT PROVIDED UNDER THESE SPECIFICATIONS FOR ONE YEAR FROM & AFTER COMPLETION OF BUILDING & ACCEPTANCE OF MECHANICAL SYSTEMS BY OWNER.
- I. ALL MATERIALS INSTALLED IN PLENUMS SHALL BE NONCOMBUSTIBLE OR HAVE FLAME/SMOKE INDEX OF NO MORE THAN 25/50 IN ACCORDANCE W/ ASTM E 84.
- <u>SECTION 16100 CONDUIT & CONDUCTORS</u> A.FOLLOW CIRCUITING SHOWN ON PLANS. USE NO CONDUIT SMALLER THAN 1/2" & NO CONDUCTORS SMALLER THAN #12 GA. UNLESS NOTED OTHERWISE. B.WIRE SHALL BE IN NON-FLEXIBLE METALLIC CONDUIT (EMT, IMC OR RMC) FOR ALL CIRCUITS AND FEEDERS GREATER THAN 30A. LIGHT SWITCH RISERS. KITCHEN CIRCUITS & HOME RUNS. CARLE ARCEPTABLE FOR BRANCH CONVENIENCE CIRCUITS AND LIGHTING CIRCUITS. DO NOT DAISY CHAIN LIGHT FIXTURES. PROVIDE HEALTH CARE RATED MC FOR MEDICAL TREATMENT AREAS WHEN NOT IN CONDUIT.
- D.CONDUIT INSTALLED BELOW GRADE SHALL BE SCHEDULE 80 PVC HEAVY WALL PLASTIC CONDUIT MEETING NEMA STANDARDS & UL LISTED FOR UNDERGROUND & EXPOSED USE. PROVIDE GRS RADIUS BENDS & RISERS AS CONDUITS RISE ABOVE GRADE OR ABOVE FLOOR SLAB. E.PROVIDE INTERLOCKING SPACERS FOR MULT RUNS OF UG CONDUITS IN SAME TRENCH.
- F.LIGHTING & RECEPTACLE CIRCUIT CONDUCTORS SHALL BE COPPER THWN/THHN 600 VOLT, 75 D COLOR CODED AS DESCRIBED UNDER APPLICABLE CODES. NO ROMEX, PLASTIC FLEX TUBING E PERMITTED. LIGHT FIXTURE WIRE INSULATION SHALL HAVE TEMP RATING NOT LESS THAN INDIVIDUAL FIXTURE MANUF RECOMMENDED RATING.
- G.CIRCUITS W/ NO. 8 OR LARGER CONDUCTORS, MOTOR CIRCUITS, POWER & FEEDER CIRCUITS & BUILDING SERVICE FEEDERS SHALL BE COPPER THWN/THHN 600 VOLT, 75 DEG C. H.ALL CONDUIT, JUNCTION BOXES, ETC. ABOVE CEILINGS SHALL BE SUPPORTED FROM STRUCTURE. PIPE SLEEVES, HANGERS & SUPPORTS SHALL BE FURNISHED & SET & CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER & PERMANENT LOCATIONS.
- <u>SECTION 16200 GROUNDING</u> A.SUPPLEMENT GROUNDED NEUTRAL OF SECONDARY DISTRIBUTION SYSTEM W/ EQUIPMENT GROUNDING SYSTEM, INSTALLED SO THAT METALLIC STRUCTURES, ENCLOSURES, RACEWAYS, JUNCTION BOXES, OUTLET BOXES, CABINETS, MACHINE FRAMES, PORTABLE EQUIPMENT & OTHER CONDUCTIVE ITEMS OPERATE CONTINUOUSLY AT GROUND POTENTIAL & PROVIDE LOW IMPEDANCE PATH FOR GROUND FAULT CURRENTS.
- B.SYSTEM SHALL COMPLY W/ NATIONAL ELECTRICAL CODE, DRAWINGS & AS SPECIFIED. C.PROVIDE EQUIPMENT GROUND BUS IN BASE OF LOW VOLTAGE, SWITCHGEAR BRAZED OR OTHERWISE ADEQUATELY CONNECTED BY AN APPROVED METHOD TO GROUND RODS. D.PROVIDE IN CONDUIT GREEN INSULATED COPPER GROUND CONDUCTOR TO MAIN METALLIC WATER
- SERVICE ENTRANCE & CONNECT BY MEANS OF ADEQUATE GROUND CLAMPS. EEQUIPMENT GROUNDING CONDUCTORS FOR BRANCH CIRCUIT HOME RUNS SHOWN ON DRAWINGS SHALL INDICATE AN INDIVIDUAL & SEPARATE GROUND CONDUCTOR FOR THAT BRANCH CIRCUIT WHICH SHALL BE TERMINATED AT BRANCH CIRCUIT PANELBOARD, SWITCHBOARD, OR OTHER DISTRIBUTION EQUIPMENT F.PROVIDE LOW VOLTAGE DISTRIBUTION SYSTEM W/ SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH SINGLE OR THREE-PHASE FEEDER. SINGLE PHASE 120 VOLT BRANCH CIRCUITS FOR LIGHTING & POWER SHALL CONSIST OF PHASE & NEUTRAL CONDUCTORS & GREEN GROUND CONDUCTOR INSTALLED IN COMMON CONDUIT WHICH SHALL SERVE AS GROUNDING
- CONDUCTOR. G.GROUNDING CONDUCTORS SHALL BE AS SHOWN ON PLANS OR IF NOT SPECIFICALLY SHOWN SHALL BE NO SMALLER THAN THAT REQUIRED BY NEC.
- <u>SECTION 16300 ELECTRICAL EQUIPMENT</u> A.JUNCTION BOXES & OUTLET BOXES SHALL BE GALVANIZED KNOCKOUT TYPE. LIGHTING FIXTURE BOXES IN CEILINGS SHALL NOT BE LESS THAN 4" OCTAGONAL KNOCKOUT TYPE. OUTLETS SHALL BE INSTALLED IN LOCATIONS SHOWN ON DRAWINGS EXCEPT OUTLETS MAY BE MOVED 4 FEET IN EITHER DIRECTION IF SO DIRECTED, WITHOUT ADDITIONAL COST. BOXES SHALL BE FLUSH MOUNTED ON WALLS FOR CONCEALED WORK. GANGABLE BOXES SHALL BE USED IN ALL GYPBOARD SURFACES.
- <u>SECTION 163213 DIESEL ENGINE GENERATOR (ALTERNATE FOR NATURAL GAS)</u> A.<u>SYSTEM DESCRIPTION</u> 1. PROVIDE ALL LABOR, MATERIALS AND EQUIPMENT TO FURNISH, INSTALL AND PLACE IN OPERATION THE EMERGENCY/STANDBY POWER GENERATION SYSTEM IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND MANUFACTURER'S DRAWINGS AND INSTALLATION INSTRUCTIONS. ALL EQUIPMENT SHALL BE NEW,
- FACTORY TESTED AND DELIVERED READY FOR FIELD INSTALLATION. INDIVIDUAL COMPONENT MANUFACTURERS, BUT MUST BE ASSUMED SOLELY BY THE PRIMARY MANUFACTURER. THIS INCLUDES GENERATING SYSTEM DESIGN MANUFACTURE, TEST AND HAVING A LOCAL SUPPLIER RESPONSIBLE FOR SERVICE. PARTS AND WARRANTY FOR THE TOTAL SYSTEM. 3. GENERATOR SET MOUNTED SUBASSEMBLIES SUCH AS COOLING SYSTEM, BASE, AIR INTAKE SYSTEM EXHAUST OUTLET FITTINGS AND GENERATOR SET MOUNTED CONTROLS AND SWITCHGEAR SHALL ALSO B DESIGNED. BUILT AND ASSEMBLED AS A COMPLETE UNIT BY THE ENGINE - GENERATOR MANUFACTURER
- B.<u>SUBMITTALS</u> . COMPONENT LIST - A BREAKDOWN OF ALL COMPONENTS AND OPTIONS INCLUDING SWITCHGEAR. P. TECHNICAL DATA – MANUFACTURER PRODUCED GENERATOR SET SPECIFICATION OR DATA SHEET IDENTIFYING MAKE AND MODEL OF ENGINE AND GENERATOR, AND INCLUDING RELEVANT COMPONENT DESIGN AND PERFORMANCE DATE. 3. AUXILIARY EQUIPMENT – SPECIFICATION OR DATA SHEETS, INCLUDING SWITCHGEAR, TRANSFER SWITCH, VIBRATION ISOLATORS. AND DAY TANK.
- 4. DRAWINGS GENERAL DIMENSIONS DRAWINGS SHOWING OVERALL GENERATOR SET MEASUREMENTS, MOUNTING LOCATION AND INTERCONNECT POINTS FOR LOAD LEADS, FUEL, EXHAUST, COOLING AND DRAIN LINES. 5. WIRING DIAGRAMS – WIRING DIAGRAMS, SCHEMATICS AND CONTROL PANEL OUTLINE DRAWINGS PUBLISHED BY THE MANUFACTURER FOR CONTROLS AND SWITCHGEAR SHOWING INTERCONNECTED
- POINTS AND LOGIC DIAGRAMS FOR LISE BY CONTRACTOR AND OWNER 6. WARRANTY STATEMENTS - WARRANTY VERIFICATION PUBLISHED BY THE MANUFACTURER. . SERVICE – LOCATION AND DESCRIPTION OF SUPPLIER'S PARTS AND SERVICE FACILITY INCLUDING PARTS INVENTORY AND NUMBER OF QUALIFIED GENERATOR SET SERVICE PERSONNEL.
- C.QUALITY ASSURANCE . INSTALLER QUALIFICATIONS: MANUFACTURER'S AUTHORIZED REPRESENTATIVE WHO IS TRAINED AND APPROVED FOR INSTALLATION OF UNITS REQUIRED FOR THIS PROJECT. 2. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND MARKED FOR INTENDED USE. 3. COMPLY WITH ASME B15.1.
- 4. COMPLY WITH NFPA 37 5. COMPLY WITH NFPA 70.
- 6. COMPLY WITH NFPA 99
- COMPLY WITH NFPA 110 REQUIREMENTS FOR LEVEL REQUIRED BY OCCUPANCY OF BUILDING FOR EMERGENCY POWER SUPPLY SYSTEM. 8. COMPLY WITH UL 2200. 9. ENGINE EXHAUST EMISSIONS: COMPLY WITH APPLICABLE STATE AND LOCAL GOVERNMENT
- REQUIREMENTS. 10. NOISE EMISSION: COMPLY WITH APPLICABLE STATE AND LOCAL GOVERNMENT REQUIREMENTS FOR MAXIMUM NOISE LEVEL AT ADJACENT PROPERTY BOUNDARIES DUE TO SOUND EMITTED BY GENERATOR SET INCLUDING ENGINE, ENGINE EXHAUST, ENGINE COOLING-AIR INTAKE AND DISCHARGE, AND OTHER COMPONENTS OF INSTALLATION. D.WARRANTY
- I. THE MANUFACTURER'S AUTHORIZED DEALER SHALL BE CAPABLE OF ADMINISTERING THE MANUFACTURER'S AND DEALER'S WARRANTY FOR ALL COMPONENTS SUPPLIED BY THE SELLING DEALER (WHO MAY OR MAY NOT BE THE SAME AS THE SERVICING DEALER). 2. THE MANUFACTURER'S AND DEALER'S EXTENDED WARRANTY SHALL IN NO EVENT BE FOR A PERIOD OF LESS THAN TWO (2) YEARS FROM DATE OF INITIAL START-UP OF THE SYSTEM AND SHALL INCLUDE REPAIR PARTS, LABOR, REASONABLE TRAVEL EXPENSE NECESSARY FOR REPAIRS AT THE JOBSITE, AND
- EXPENDABLE (LUBRICATING OIL, FILTERS, ANTIFREEZE AND OTHER SERVICE ITEMS MADE UNUSABLE BY THE DEFECT) USED DURING THE COURSE OF REPAIR. APPLICABLE DEDUCTIBLE COSTS SHALL BE SPECIFIED IN THE MANUFACTURER'S WARRANTY. RUNNING HOURS SHALL NOT BE A LIMITING FACTOR FOR THE SYSTEM WARRANTY BY EITHER THE MANUFACTURER OR SERVICING DEALER. SUBMITTALS RECEIVED WITHOUT WRITTEN WARRANTIES AS SPECIFIED WILL BE REJECTED IN THEIR ENTIRETY. 3. THE GENERATOR SET SUPPLIER SHALL HAVE FACTORY TRAINED SERVICE REPRESENTATIVES AND TOOLING NECESSARY TO INSTALL, TEST, MAINTAIN AND REPAIR ALL PROVIDED EQUIPMENT. 4. THE GENERATOR SET SUPPLIER SHALL HAVE SUFFICIENT PARTS INVENTORY TO MAINTAIN OVER THE COUNTER AVAILABILITY OF AT LEAST 90% OF ANY REQUIRED PARTS.
- 5. THE GENERATOR SET SUPPLIER SHALL GUARANTEE 100% PARTS AVAILABILITY WITHIN 48 HOURS FROM THE TIME AN ORDER IS ENTERED WITH THE DEALER. PART 2 PRODUCTS A.MANUFACTURERS
- I. THE COMPLETE POWER GENERATION SYSTEM, INCLUDING ENGINE, GENERATOR, SWITCHGEAR AND AUTOMATIC TRANSFER SWITCH, SHALL BE THE PRODUCT OF AN ISO 9001 CERTIFIED MANUFACTURER WHO HAS BEEN REGULARLY ENGAGED IN THE PRODUCTION OF COMPLETE GENERATING SYSTEMS FOR AT LEAST 30 YEARS. ALL COMPONENTS SHALL HAVE BEEN DESIGNED TO ACHIEVE OPTIMUM PHYSICAL AND PERFORMANCE COMPATIBILITY AND PROTOTYPE TESTED TO PROVE INTEGRATED DESIGN CAPABILITY. THE COMPLETE SYSTEM SHALL HAVE BEEN FACTORY FABRICATED, ASSEMBLED AND PRODUCTION TESTED BY MANUFACTURERS LISTED BELOW. THE NAMING OF A SPECIFIC MANUFACTURE DOES NOT WAIVE ANY REQUIREMENTS OF THIS SPECIFICATION.
- 2. THE GENERATOR SET IN THE SPECIFICATIONS IS BY CATERPILLAR. 2.1. EQUIVALENTS BY:
- 2.1.1. CUMMINS/ONAN.
- 2.1.2. DETROIT DIESEL (MTU)
- 2.1.3. KOHLER

- 3. THE NAMING OF A SPECIFIC MANUFACTURER DOES NOT SPECIFICATION I. SUBSTITUTIONS TO THIS SPECIFICATION SHALL INCLUDE IDENTIFYING ALL DEVIATIONS OR EXCEPTIONS AND SHALL BE SUB TEN (10) DAYS PRIOR TO THE BID DATE. B.<u>SYSTEM_RATING</u>
- 1. THE ELECTRIC POWER GENERATING SYSTEM INCLUDING ENGIN SITE CAPABILITY OF:
- 1.1. 125 KW. 157 KVA @ .8 PF. STANDBY RATING 1.2. 240 VOLTS AC, WYE CONNECTED, SINGLE PHASE, 60 HERTZ 1.3. 500 ALTITUDE (FEET). 105 MAXIMUM ENGINE ROOM T OUTSIDE TEMPERATURE (DEG F), ENGINE MOUNTED RADIATOR W
- .ENGINE 1. THE ENGINE SHALL BE A STATIONARY, LIQUID COOLED, 1800 IN-LINE, WITH DRY EXHAUST MANIFOLDS. IT SHALL HAVE 6 C OF 300 - 400 LITERS AND BE MANUFACTURED IN THE UNITE NOT ACCEPTABLE. D.ENGINE ACCESSORY EQUIPMENT
- THE FOLLOWING ENGINE ACCESSORIES SHALL BE PROVIDED: 1.1. THE ENGINE SHALL BE COOLED BY A CLOSE COUPLED, ANTIFREEZE/COOLANT MIXTURE. THE RADIATOR SHALL PRO ENGINE IS OPERATING AT FULL SITE CAPABILITY AND 0.5 ANTIFREEZE SHALL BE SUPPLIED BY THE CONTRACTOR. .2. ELECTRIC STARTING MOTOR AND CONTROL CIRCUIT CAP
- CYCLES WITHOUT OVERHEATING. 1.3. ELECTRONIC GOVERNOR.
- 1.4. MECHANICAL, POSITIVE DISPLACEMENT LUBE OIL PUMP WITH COOLER. AND DIP STICK. 1.5. MECHANICAL, POSITIVE DISPLACEMENT FUEL PUMP WITH REP 1.6. MANUALLY OPERATED FUEL PRIMING PUMP. 1.7. REPLACEABLE DRY ELEMENT AIR FILTER.
- 1.8. ELECTRICALLY POWERED, THERMOSTATICALLY CONTROLLEL ENSURE PROPER STARTING. THE HEATERS FOR THE GENER WHEN THE ENGINE STARTS IN ACCORDANCE WITH SECTION 3-1.9. LOCKING FUEL FILL CAP
- 2. THE ENTIRE EXHAUST SYSTEM INCLUDING SHELL, HEADS, ALUMINIZED PLATED. THE FLEXIBLE EXHAUST CONNECTOR SHALL 3. THE USE OF CHARGING ALTERNATORS FOR CHARGING THE UNIT 4. LUGS SHALL BE FURNISHED BY ENGINE GENERATOR MANUFACTU 5. LUBE OIL SHALL BE FURNISHED BY THE ENGINE GENERATOR MA E.GENERATOR
- THE GENERATOR SHALL BE RECONNECTABLE, CLOSE CO CONSTRUCTED TO NEMA 1 AND 1P AND 1P 22 STANDARD REVOLVING FIELD, SYNCHRONOUS TYPE WITH AMORTISSEUR WI ROTATING FIELD AND SKEWED STATOR WINDINGS TO PRODUCE OF 2. THE GENERATOR PITCH SHALL BE SELECTED TO OPTIMIZE TH THE TOTAL HARMONIC DISTORTION, ESPECIALLY THE 5TH AND 7 TO AC MOTORS.
- 3. THE GENERATOR SHALL BE CAPABLE OF DELIVERING RATED VOLTAGE +/- 5% OF RATED VOLTAGE. 4. ALL INSULATION SYSTEMS SHALL MEET NEMA MG-1 STANDA ACTUAL GENERATOR TEMPERATURE WILL BE LIMITED TO CLASS F OVER 400 C AMBIENT). NO MATERIALS SHALL BE USED WHICH
- 5. THE REVOLVING FIELD COILS SHALL BE PRECISION WET LAYER APPLIED TO EACH LAYER OF MAGNET WIRE. THE STATOR SHA CLASS H IMPREGNATING VARNISH. THE REVOLVING FIELD ASSEMI 2 HOURS AT 2700 RPM (150% OVERSPEED) AND 700 C, A TESTED AT 2250 RPM (125% OVERSPEED) AT ROOM TEMPERAT SHALL BE BALANCED TO 0.5 MIL PEAK-PÉAK.
- 6. THE GENERATOR EXCITER SHALL BE BRUSHLESS WITH THE CI ARMATURE AND A THREE-PHASE FULL WAVE BRIDGE RECTIFI SURGE SUPPRESSORS SHALL BE INCLUDED TO PROTECT THE ROT 7. A PERMANENT MAGNET (PM) GENERATOR SHALL PROVIDE EXCITER TO INCREASE IMMUNITY TO NON-LINEAR LOADS AND T
- FOR 10 SECONDS DURING SHORT CIRCUIT CONDITIONS. 8. (VR3) THE AUTOMATIC VOLTAGE REGULATOR (AVR) SHALL WITHIN +/- 0.5% FOR ANY CONSTANT LOAD BETWEEN NO L SHALL BÉ A TOTALLY SOLID STATE DESIGN WHICH INCLUDES EL HERTZ REGULATION, THREE PHASE SENSING, OVEREXCITATIO PROTECTION, TEMPERATURE COMPENSATION, SHALL LIMIT VOLTAGE BE SEALED FROM THE ENVIRONMENT.
- F.<u>CONTROLS GENERATOR SET MOUNTED</u> 1. THE CONTROL PANEL SHALL BE DESIGNED AND BUILT BY THE SHALL BE MOUNTED ON THE GENERATOR SET AND INCORPORATE BASED CONTROL CIRCUITRY, SEALED DUST TIGHT, WATERTIGHT HOUSINGS, AND DIGITAL INSTRUMENTATION. THE PANEL SHALL COMPLY WITH IEC 144, IP 22, AND NEMA 12 FOR EXTERNAL EN AND NEMA 12 FOR RESISTANCE OF THE INTERNAL SEALED MODU CAPABLE OF FACING THE RIGHT, LEFT OR REAR AND SHALL BE VI 2. THE PANEL SHALL INCLUDE THE FOLLOWING EQUIPMENT/FUNCTI
- 2.1. AUTOMATIC REMOTE START CAPABILITY WITH MODE PANEL-MOUNTED 4-POSITION SWITCH (STOP, MANUAL, AUTOMA 2.2. CYCLE CRANK WITH ADJUSTABLE "CRANK" AND "RESET" TIME 2.3. ADJUSTABLE COOLDOWN TIMER.
- 2.4. EMERGENCY STOP PUSH BUTTON REQUIRING MANUAL RESET. 2.5. VOLTAGE ADJUSTMENT POTENTIOMETER TO ADJUST VOLTAGE
- 2.6. (1) 16 LIGHT REMOTE ANNUNCIATOR LOCATED WHERE INDICA 2.6.1. ANNUNCIATOR PANEL SHALL INCLUDE ALL ALARM/S GENERATOR-MOUNTED CONTROLLER. PROVIDE ADDITIONAL REMOTE ANNUNCIATOR PANEL AS FOLLOWS: a. LOW ENGINE TEMPERATURE
- b. HIGH ENGINE TEMPERATURE c. LOW COOLANT LEVEL
- d. BATTERY CHARGER AC FAIL e. TANK RUPTURE
- f.LOW FUEL LEVEL 3.1. A COMMON ALARM HORN (WITH SILENCE SWITCH) AND
- PROVIDED FOR EACH OF THE FOLLOWING SHUTDOWNS: 3.1.1. OVERSPEED (RED), OVERCRANK (RED), HIGH COOLA PRESSURE (RED), EMERGENCY STOP (RED)
- A. PANEL ILLUMINATION LIGHTS (2) WITH ON/OFF SWITCH 5. DIGITAL DISPLAY AND PHASE SELECTOR SWITCH FOR GENERAT RMS SENSING OF THESE PARAMETERS SHALL BE UTILIZED NON-LINEAR LOADS AND ENSURE ACCURACY. 5.1. AC VOLTS (+/- 0.5%) ACCURACY), AC AMPS (+/- 0.5%)ACCURACY)
- 6. DIGITAL DISPLAY FOR: 6.1. ENGINE RPM (+/- 0.5% ACCURACY), DC VOLTAGE (+/-
- 0.5% ACCURACY), COOLANT TEMPERATURE (+/- 0.5% ACCURAC 7. UL-LISTED ALTERNATOR PROTECTIVE DEVICE. G.<u>GFCI_RECEPTACLE</u>
- 1. 20A/120V GFCI RECEPTACLE SHALL BE PROVIDED WITH GENER H<u>.WIRING CONDUIT</u> . ENGINE AND GENERATOR CONTROL WIRING SHALL BE MULTI-S
- ENCASED BY CROSS-LINKED POLYETHYLENE INSULATION RESIS ANTIFREEZE AND DIESEL FUEL. WIRING SHALL BE SUITABLE WITH INSULATION NOT BRITTLE AT -50C (-60F). EACH CABLE THE ENTIRE LENGTH TO IDENTIFY THE CABLE'S ORIGIN AND TERM IN NYLON FLEXIBLE CONDUIT WHICH IS SLOTTED TO ALLOW EA:
- REUSABLE BULKHEAD FITTINGS WILL ATTACH THE CONDUIT BOXES I. EXHAUST SILENCER
- . A CRITICAL EXHAUST SILENCER SHALL BE SIZED AND SUPPLIED PROVIDE 15 DBA ATTENUATION WHILE IMPOSING NO MORE THAN 2. THE SILENCER SHALL BE ALUMINIZED TO PREVENT RUSTING MINIMIZE NOISE AND CONDENSATION). A PROVISION FOR DRAININ 3. THE SILENCER SHALL BE INSTALLED IN THE WEATHERPROOF of the enclosure.
- . THE ENGINE AND GENERATOR SHALL BE ASSEMBLED TO A COM MANUFACTURER. THE GENERATOR SET BASE SHALL E ENGINE-GENERATOR MANUFACTURER TO RESIST DEFLECTION,
- RESONANT LINEAR VIBRATION. K.<u>FUEL TANK AND FUEL</u> 1. A UL LISTED DUAL WALL BASE MOUNTED FUEL TANK (SIZED 75% OF RATED LOAD) WITH ELECTRIC STUB-UP AND CONTAINME COMPLIES WITH LOCÁL CODES AND ORDINANCES. THE TANK CONNECTIONS, FUEL GAUGE, LOW FUEL LEVEL ALARM CONTACT CONTACT) WIRED TO INDICATING LIGHT ON THE GENERATOR SET
- EMERGENCY PRESSURE RELIEF VENT. CONTRACTOR SHALL SUP PROJECT COMPLETION. 2. NORMAL TANK VENT SHALL EXTEND 12'-0" ABOVE GRADE. L.<u>CIRCUIT BREAKER – GENERATOR SET MOUNTED</u> 1. THE THREE-POLE MAIN LINE CIRCUIT BREAKER(S) SHALL BE
- AGAINST EXTERNAL FAULTS AND PROVIDE A POSITIVE DISCONNED TERMINALS. THE BREAKER(S) SHALL BE UL-LISTED, AN FUNCTIONS/FEATURES:
- 1.1. SOLID STATE (ELECTRONIC) TRIP UNIT.

WAIVE ANY REQUIREMENTS OF THIS	1.2. SHUNT TRIP DEVICE/ACCESSORY CONNECTED TO ENGINE/GENERATOR SAFETY SHUTDOWNS. 1.3. MOUNTED ON THE GENERATOR IN A GUARDED DRIP–PROOF ENCLOSURE.
COMPLETE SUBMITTAL DATA CLEARLY BMITTED FOR APPROVAL A MINIMUM OF	M. <u>BATTERY CHARGER</u> 1. A DUAL RATE 10 AMPERE BATTERY CHARGER SHALL BE PROVIDED WHICH SHALL ACCEPT 120 VOLT
IE MOUNTED RADIATOR SHALL HAVE A	AC SINGLE PHASE INPUT TO PROVIDE 24 VOLT DC OUTPUT. IT SHALL BE FUSED ON THE AC INPUT AND DC OUTPUT, AND INCORPORATE CURRENT LIMITING CIRCUITRY TO AVOID THE NEED FOR A CRANK DISCONNECT RELAY. THE CHARGER SHALL INCLUDE A DC AMMETER AND VOLTMETER, AND BE HOUSED IN A NEMA 1 ENCLOSURE SUITABLE FOR WALL MOUNTING.
? EMPERATURE (DEG F), —20 MINIMUM VITH 50% ETHYLENE GLYCOL	2. THE CHARGER SHALL INCLUDE LED ANNUNCIATION FOR LOW BATTERY VOLTAGE, HIGH BATTERY VOLTAGE, BATTERY CHARGER MALFUNCTION, AND AC FAILURE; AND DRY CONTACTS FOR BATTERY CHARGER MALFUNCTION AND LOW BATTERY VOLTAGE; AS REQUIRED BY NFPA-110. N. <u>BATTERIES</u>
RPM, FOUR-CYCLE DESIGN, VERTICAL YLINDERS WITH MINIMUM DISPLACEMENT D STATES. TWO CYCLE ENGINES ARE	 TWENTY-FOUR (24) VOLT STARTING BATTERIES; SIZED AS RECOMMENDED BY THE GENERATOR SET MANUFACTURER; BATTERY CABLES, AND BASE MOUNTED BATTERY RACK SHALL BE PROVIDED. THE GENERATOR BATTERY (OR BATTERIES) SHALL BE PROVIDED WITH A BATTERY HEATER. O.ENCLOSURES
	1. WEATHER PROTECTIVE ENCLOSURE WITH REMOVABLE/HINGED DOORS AND REMOVABLE END PANELS. ALL HINGES AND LATCHES SHALL BE STAINLESS STEEL. <u>PART 3 EXECUTION</u>
CLOSED LOOP RADIATOR USING A 50% PPERLY COOL THE ENGINE WHILE THE	A. <u>SUBMITTALS</u> 1. SUBMITTALS FOR APPROVAL SHALL INCLUDE BUT NOT BE LIMITED TO:
5 IN H20 EXTERNAL AIR RESTRICTION. ABLE OF THREE COMPLETE STARTING	2. COMPONENT LIST – A BREAKDOWN OF ALL COMPONENTS AND OPTIONS INCLUDING SWITCHGEAR. 3. TECHNICAL DATA – MANUFACTURER PRODUCED GENERATOR SET SPECIFICATION OR DATA SHEET IDENTIFYING MAKE AND MODEL OF ENGINE AND GENERATOR, AND INCLUDING RELEVANT COMPONENT DESIGN AND PERFORMANCE DATE.
H REPLACEABLE FULL FLOW FILTER, OIL	4. AUXILIARY EQUIPMENT – SPECIFICATION OR DATA SHEETS, INCLUDING SWITCHGEAR, TRANSFER SWITCH, VIBRATION ISOLATORS, AND DAY TANK. 5. DRAWINGS – GENERAL DIMENSIONS DRAWINGS SHOWING OVERALL GENERATOR SET MEASUREMENTS,
PLACEABLE FULL FLOW FILTER.	MOUNTING LOCATION AND INTERCONNECT POINTS FOR LOAD LEADS, FUEL, EXHAUST, COOLING AND DRAIN LINES. 6. WIRING DIAGRAMS – WIRING DIAGRAMS, SCHEMATICS AND CONTROL PANEL OUTLINE DRAWINGS
JACKET WATER HEATERS SIZED TO ATOR SHALL AUTOMATICALLY DEACTIVATE 3.1 OF NFPA 110.	PUBLISHED BY THE MANUFACTURER FOR CONTROLS AND SWITCHGEAR SHOWING INTERCONNECTED POINTS AND LOGIC DIAGRAMS FOR USE BY CONTRACTOR AND OWNER. 7. WARRANTY STATEMENTS — WARRANTY VERIFICATION PUBLISHED BY THE MANUFACTURER. B. <u>PROTOTYPE TESTS</u> 1. THE SYSTEM MANUFACTURER MUST CERTIEN THAT ENGINE CENERATOR CONTROLS AND SWITCHCEAR
ELBOWS, END CAPS, ETC. SHALL BE BE STAINLESS STEEL. BATTERIES IS NOT ACCEPTABLE.	1. THE SYSTEM MANUFACTURER MUST CERTIFY THAT ENGINE, GENERATOR, CONTROLS AND SWITCHGEAR HAVE BEEN TESTED AS COMPLETE SYSTEM OF REPRESENTATIVE ENGINEERING MODELS (NOT ON EQUIPMENT SOLD). PROTOTYPE TESTING SHALL INCLUDE:
JRER. ANUFACTURER.	1.1. FUEL CONSUMPTION AT 1/4, 1/2, 3/4 AND FULL LOAD, EXHAUST EMISSIONS, MECHANICAL AND EXHAUST NOISE, GOVERNOR SPEED REGULATION AT 1/4, 1/2, 3/4 AND FULL LOAD; AND DURING TRANSIENTS, MOTOR STARTING KVA, GENERATOR TEMPERATURE RISE IN ACCORDANCE WITH NEMA
UPLED, DRIP PROOF AND GUARDED, DS, SINGLE BEARING, SALIENT POLE, NDINGS IN THE POLE FACES OF THE TIMUM VOLTAGE WAVEFORM.	MG1–22.40, VOLTAGE REGULATION AT 1/4, 1/2, 3/4 AND FULL LOAD; AND DURING TRANSIENTS, HARMONIC ANALYSIS, VOLTAGE WAVEFORM DEVIATION AND TELEPHONE INFLUENCE FACTOR, GENERATOR SHORT CIRCUIT CAPABILITY, COOLING SYSTEM PERFORMANCE, TORSIONAL ANALYSIS, LINEAR VIBRATION ANALYSIS
E GENERATOR EFFICIENCY AND MINIMIZE TH HARMONICS WHICH ARE DETRIMENTAL	C. <u>System Performance</u> 1. The Power generating system shall conform to the following performance criteria at
KVA AT 60 HZ AND 0.8 PF FOR ANY	THE SITE CONDITIONS. 2. RATING – ENGINE BRAKE HORSEPOWER SHALL BE SUFFICIENT TO DELIVER FULL RATED GENERATOR SET KW/KVA WHEN OPERATED AT RATED RPM AND EQUIPPED WITH ALL ENGINE-MOUNTED PARASITIC
ARDS FOR CLASS H SYSTEMS. THE LEVELS (1300 C RISE BY RESISTANCE	AND EXTERNAL LOADS SUCH AS RADIATOR FANS AND POWER GENERATORS. 3. START TIME AND LOAD ACCEPTANCE – ENGINES SHALL START, ACHIEVE RATED VOLTAGE AND FREQUENCY, AND BE CAPABLE OF ACCEPTING LOAD WITHIN 10 SECONDS WHEN PROPERLY EQUIPPED
SUPPORT FUNGUS GROWTH. R WOUND WITH EPOXY BASED MATERIAL ALL HAVE TWO DIPS AND BAKES USING	AND MAINTAINED. 4. WITH THE POWER GENERATING SYSTEM AT NORMAL OPERATING TEMPERATURE, IT SHALL ACCEPT A
BLY SHALL BE PROTOTYPE TESTED FOR ID EACH PRODUCTION UNIT SHALL BE URE. THE REVOLVING FIELD ASSEMBLY	100% BLOCK LOAD, LESS APPLICABLE DERATING FACTORS, IN ACCORDANCE WITH NFPA 110. 5. STEADY STATE FREQUENCY REGULATION SHALL BE +/- 0.33% WITH NO LOAD TO FULL LOAD SPEED DROOP LESS THAN 3%.
RCUIT CONSISTING OF A THREE-PHASE IER MOUNTED ON THE ROTOR SHAFT.	6. VOLTAGE REGULATION SHALL BE +/— 0.5% FOR ANY STEADY STATE LOAD BETWEEN NO LOAD AND FULL LOAD. D.PRODUCTION TESTS
TATING DIODES FROM VOLTAGE SPIKES. THE SOURCE OF EXCITATION TO THE TO MAINTAIN 300% OF RATED CURRENT	1. THE SYSTEM MANUFACTURER SHALL PERFORM PRODUCTION TESTS ON THE COMPLETE GENERATOR SET SUPPLIED. A CERTIFIED REPORT OF THESE TESTS SHALL BE AVAILABLE WHEN REQUESTED AT THE TIME OF THE GENERATOR SET ORDER. THESE TESTS AND CONTROLS SHALL INCLUDE BUT NOT BE LIMITED TO:
IAINTAIN GENERATOR OUTPUT VOLTAGE AD AND FULL LOAD. THE REGULATOR	1.1. OPERATION AT RATED KW, TRANSIENT AND STEADY STATE GOVERNING, TRANSIENT AND STEADY STATE VOLTAGE REGULATION, OPERATION OF ALL ALARM AND SHUTDOWN DEVICES, SINGLE STEP LOAD PICKUP OF RATED KW
ECTRONIC VOLTAGE BUILDUP, VOLTS PER ON PROTECTION, LOSS OF SENSING E OVERSHOOT ON STARTUP, AND SHALL	E <u>INSTALLATION/ON SITE TESTING</u> 1. THE INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH SHOP DRAWINGS, SPECIFICATIONS AND THE MANUFACTURER'S INSTRUCTIONS; AND SHALL COMPLY WITH APPLICABLE STATE AND LOCAL CODES.
ENGINE-GENERATOR MANUFACTURER, IT E 100% SOLID STATE MICROPROCESSOR	2. THE GENERATOR SET SHALL BE TESTED AS DEFINED BELOW BY THE MANUFACTURERS AUTHORIZED DEALER TO SHOW IT IS FREE OF ANY DEFECTS AND WILL START AUTOMATICALLY AND CARRY FULL
MODULAR COMPONENTS WITH METAL BE LABELED WITH ISO SYMBOLS AND NVIRONMENTAL RESISTANCE, AND IP 44	LOAD. THIS TESTING MAY BE PERFORMED AT THE FACILITY OF THE SYSTEM MANUFACTURER'S AUTHORIZED LOCAL DEALER OR AT THE JOBSITE. TESTING SHALL BE COMPLETED IN THE PRESENCE OF THE OWNER'S ENGINEER OR HIS APPOINTED REPRESENTATIVE.
ules. The control panel shall be /Ibration isolated. ons:	3. ALL CONSUMABLES NECESSARY FOR TESTING SHALL BE FURNISHED BY THE BIDDER. ANY DEFECTS WHICH BECOME EVIDENT DURING THE TEST SHALL BE CORRECTED BY THE BIDDER AT HIS OWN EXPENSE.
DF OPERATION SELECTABLE FROM A TIC, RESET). ES.	 GENERATOR MANUFACTURER SHALL PROVIDE CUSTOMER TRAINING OF GENERATOR SYSTEM. PROPER OPERATION OF THE FOLLOWING SHALL BE DEMONSTRATED: ALL AUXILIARY EQUIPMENT SUPPLIED TO THIS SPECIFICATION, STARTING AND CHARGING SYSTEM COMPONENTS, ALL CONTROLS, ENGINE SHUTDOWNS AND SAFETY DEVICES
: +10, –25% OF RATED.	F. <u>SERVICE MANUALS AND PARTS BOOKS</u> 1. THE SYSTEM MANUFACTURER'S AUTHORIZED LOCAL DEALER SHALL FURNISH THREE COPIES OF EACH OF THE MANUALS AND BOOKS LISTED BELOW FOR EACH UNIT UNDER THIS CONTRACT:
ATED ON PLANS. SHUTDOWN FUNCTIONS PROVIDED ON L ALARM/SHUTDOWN FUNCTIONS ON	G. <u>OPERATING INSTRUCTIONS</u> 1. WITH DESCRIPTION AND ILLUSTRATION OF ALL SWITCHGEAR CONTROLS AND INDICATORS AND ENGINE AND GENERATOR CONTROLS.
	H. <u>PARTS BOOKS</u> 1. THAT ILLUSTRATE AND LIST ALL ASSEMBLIES, SUBASSEMBLIES AND COMPONENTS, EXCEPT STANDARD FASTENING HARDWARE (NUTS, BOLTS, WASHERS, ETC.).
	I. <u>PREVENTATIVE MAINTENANCE INSTRUCTIONS</u> 1. ON THE COMPLETE SYSTEM THAT COVER DAILY, WEEKLY, MONTHLY, BIANNUAL AND ANNUAL MAINTENANCE REQUIREMENTS AND INCLUDE A COMPLETE LUBRICATION CHART. J.ROUTINE TEST PROCEDURES
INDIVIDUAL FLASHING LED'S SHALL BE	1. FOR ALL ELECTRONIC CIRCUITS AND FOR THE MAIN AC GENERATOR. K. <u>TROUBLESHOOTING CHART</u>
ANT TEMPERATURE (RED), LOW OIL	1. COVERING THE COMPLETE GENERATOR SET SHOWING DESCRIPTION OF TROUBLE, PROBABLE CAUSE AND SUGGESTED REMEDY. L. <u>RECOMMENDED SPARE PARTS LIST</u>
TOR OPERATIONAL PARAMETERS. TRUE D TO MINIMIZE DISTORTION DUE TO	 SHOWING ALL CONSUMABLES ANTICIPATED TO BE REQUIRED DURING ROUTINE MAINTENANCE AND TEST. M<u>WIRING DIAGRAMS AND SCHEMATICS</u> SHOWING FUNCTION OF ALL ELECTRICAL COMPONENTS.
5% ACCURACY), HERTZ (+/– 0.3 HZ	8. GENERATOR MANUFACTURER SHALL PROVIDE FREIGHT TO JOB SITE, UNLOADING OF EQUIPMENT BY CONTRACTOR.
0.5% ACCURACY), OIL PRESSURE (+/– CY), OPERATING HOURS	<u>SECTION 16350 – ELECTRICAL IDENTIFICATION</u> A.MANUFACTURED LABELS FOR EACH PANELBOARD & TRANSFORMER. TYPEWRITTEN PANEL SCHEDULES MOUNTED IN PANELS B.PRINTED TAPE STYLE LABEL FOR EACH RECEPTACLE INDICATING PANEL & CIRCUIT #.
RATOR SET.	C.MANUFACTURED LABELS FOR ALL DISCONNECT SWITCHES INDICATING EQUIPMENT SERVED. D.BRANCH CIRCUITS — IDENTIFY EACH CIRCUIT W/ WIRE MARKERS WHEN ENCLOSURE LABEL AND WIRE
TRAND ANNEALED COPPER CONDUCTORS TANT TO HEAT, ABRASION, OIL, WATER,	COLORS DO NOT PROVIDE ENOUGH INFORMATION TO IDENTIFY EACH CIRCUIT WITHOUT TRACING. FEEDERS & BRANCH CIRCUIT HOME RUNS W/ WIRE MARKER W/ PANEL & CKT #. BOX COVERS ABOVE LAY—IN CEILINGS NEATLY MARKED W/ INDELIBLE MARKER.
FOR CONTINUOUS USE AT 120C (250F) WILL BE HEAT STAMPED THROUGHOUT MINATION. CABLES SHALL BE ENCLOSED SY ACCESS AND MOISTURE TO ESCAPE.	E.FIRE ALARM – NAMEPLATE ON EACH FIRE ALARM TERMINAL CABINET. LABEL ALL WIRING. <u>SECTION 163600 – TRANSFER SWITCHES</u>
GENERATOR SET MOUNTED JUNCTION	<u>PART 1 GENERAL</u> A. <u>RELATED DOCUMENTS</u> 1. REFERENCE SECTION 260500.
D BY THE ENGINE SUPPLIER. IT SHALL 27 IN H20 RESTRICTION. AND MOUNTED (NEAR THE ENGINE TO	2. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION. B.SUMMARY
ig Moisture Shàll be included. Enclosure and not on the outside	1. THIS SECTION INCLUDES TRANSFER SWITCHES RATED 600 V AND LESS, INCLUDING THE FOLLOWING: 1.1. AUTOMATIC TRANSFER SWITCHES. 1.2. NONAUTOMATIC TRANSFER SWITCHES.
IMON BASE BY THE ENGINE-GENERATOR IE DESIGNED AND BUILT BY THE MAINTAIN ALIGNMENT, AND MINIMIZE	 1.3. REMOTE ANNUNCIATION SYSTEMS. C.<u>SUBMITTALS</u> PRODUCT DATA: INCLUDE RATED CAPACITIES, WEIGHTS, OPERATING CHARACTERISTICS, FURNISHED SPECIALTIES, AND ACCESSORIES. SUGD DRAWINGC, DIMENSIONED DI ANG ELEVATIONS SECTIONS AND DETAILS SUGWING MINIMUM.
FOR MINIMUM 24 HOURS SUPPLY AT ENT COVER SHALL BE PROVIDED WHICH	 SHOP DRAWINGS: DIMENSIONED PLANS, ELEVATIONS, SECTIONS, AND DETAILS SHOWING MINIMUM CLEARANCES, CONDUCTOR ENTRY PROVISIONS, GUTTER SPACE, INSTALLED FEATURES AND DEVICES, AND MATERIAL LISTS FOR EACH SWITCH SPECIFIED. FIELD QUALITY-CONTROL TEST REPORTS.
SHALL INCORPORATE THREADED PIPE T (DUAL WALL – AND FUEL LEAKAGE CONTROL PANEL, VENT WITH CAP AND	4. OPERATION AND MAINTENANCE DATA: FOR EACH TYPE OF PRODUCT TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 01 SECTION
PPLY A FULL SUPPLY OF FUEL AT THE	"OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING: 4.1. FEATURES AND OPERATING SEQUENCES, BOTH AUTOMATIC AND MANUAL. 4.2. LIST OF ALL FACTORY SETTINGS OF RELAYS; PROVIDE RELAY—SETTING AND CALIBRATION INSTRUCTIONS, INCLUDING SOFTWARE, WHERE APPLICABLE.
PROVIDED TO PROTECT THE GENERATOR CT DEVICE AT THE GENERATOR OUTPUT	D. <u>QUALITY ASSURANCE</u> 1. MANUFACTURER QUALIFICATIONS: MAINTAIN A SERVICE CENTER CAPABLE OF PROVIDING TRAINING, PARTS, AND EMERGENCY MAINTENANCE REPAIRS WITHIN A RESPONSE PERIOD OF LESS THAN EIGHT
ND ALSO INCLUDE THE FOLLOWING	HOURS FROM TIME OF NOTIFICATION. 2. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, ARTICLE 100, BY A TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, AND

3. COMPLY WITH NEMA ICS 1. 4. COMPLY WITH NFPA 70.

MARKED FOR INTENDED USE.

5. COMPLY WITH NFPA 110.

6. COMPLY WITH UL 1008 UNLESS REQUIREMENTS OF THESE SPECIFICATIONS ARE STRICTER. <u>PART_2_PRODUCTS</u>

A.MANUFACTURERS MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS THE FOLLOWING

1.1. CATERPILLAR 1.2. ASCO

1.3. CUMMINS/ONAN 1.4. KOHLER

1.5. RUSSELECTRIC, INC.

1.6. ZENITH B.GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

1. INDICATED CURRENT RATINGS: APPLY AS DEFINED IN UL 1008 FOR CONTINUOUS LOADIN SYSTEM TRANSFER, INCLUDING TUNGSTEN FILAMENT LAMP LOADS NOT EXCEEDING 30 SWITCH AMPERE RATING, UNLESS OTHERWISE INDICATED.

2. WITHSTAND AND CLOSING RATINGS 2.1. THE ATS SHALL BE RATED TO CLOSE ON AND WITHSTAND THE AVAILABLE RMS SHORT CIRCUIT CURRENT AT THE ATS TERMINALS AS SHOWN AND SCHEDULED ON THE F 2.2. UNLESS NOTED OTHERWISE, THE ATS SCCR SHALL BE INDEPENDENT OF USE WITH

CIRCUIT BREAKERS AND/OR FUSES. 2.3. WHERE THE ATS IS NOTED ON THE PLANS AS "MAY BE SERIES-RATED", THE TRANSFER SWITCH MAY BE RATED BASED ON USE WITH SPECIFIC CIRCUIT BREAKERS. 2.3.1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COORDINATING THE BE FURNISHED WITH THE ELECTRICAL GEAR, AND VERIFYING THAT THE SUPPLIED BREAK

SWITCH COMBINATION MEETS OR EXCEEDS THE AVAILABLE FAULT CURRENT AS INDICA 3. SOLID-STATE CONTROLS: REPETITIVE ACCURACY OF ALL SETTINGS SHALL BE PLUS PERCENT OR BETTER OVER AN OPERATING TEMPERATURE RANGE OF MINUS 20 TO PLUS 70 4. RESISTANCE TO DAMAGE BY VOLTAGE TRANSIENTS: COMPONENTS SHALL MEET VOLTAGE-SURGE WITHSTAND CAPABILITY REQUIREMENTS WHEN TESTED ACCORDING TO Components shall meet or exceed voltage—impulse withstand test of nema ics i ELECTRICAL OPERATION: ACCOMPLISH BY A NONFUSED, MOMENTARILY ENERGIZED

LECTRIC-MOTOR-OPERATED MECHANISM, MECHANICALLY AND ELECTRICALLY INTERLOCK 6. SWITCH CHARACTERISTICS: DESIGNED FOR CONTINUOUS-DUTY REPETITIVE TRANSFER OF CURRENT BETWEEN ACTIVE POWER SOURCES.

6.1. LIMITATION: SWITCHES USING MOLDED-CASE SWITCHES OR CIRCUIT BE INSULATED-CASE CIRCUIT-BREAKER COMPONENTS ARE NOT ACCEPTABLE 6.2. SWITCH ACTION: DOUBLE THROW; MECHANICALLY HELD IN BOTH DIRECTIONS.

6.3. CONTACTS: SILVER COMPOSITION OR SILVER ALLOY FOR LOAD-CURRENT CONVENTIONAL AUTOMATIC TRANSFER-SWITCH UNITS, RATED 225 A AND HIGHER, S SEPARATE ARCING CONTACTS. 7. NEUTRAL SWITCHING. WHERE FOUR-POLE SWITCHES ARE INDICATED, PROVIDE N SWITCHED SIMULTANEOUSLY WITH PHASE POLES.

8. NEUTRAL TERMINAL: SOLID AND FULLY RATED, UNLESS OTHERWISE INDICATED. 9. HEATER: EQUIP SWITCHES EXPOSED TO OUTDOOR TEMPERATURES AND HUMIDITY, AND INDICATED. WITH AN INTERNAL HEATER. PROVIDE THERMOSTAT WITHIN ENCLOSURE TO CONT 10. ANNUNCIATION, CONTROL, AND PROGRAMMING INTERFACE COMPONENTS: DEVICES / SWITCHES FOR COMMUNICATING WITH REMOTE PROGRAMMING DEVICES, ANNUNCIATORS, AND CONTROL PANELS SHALL HAVE COMMUNICATION CAPABILITY MATCHED WITH REMOTE DE 11.FACTORY WIRING: TRAIN AND BUNDLE FACTORY WIRING AND LABEL, CONSISTENT DRAWINGS, EITHER BY COLOR-CODE OR BY NUMBERED OR LETTERED WIRE AND CABLE AT TERMINATIONS.

11.1. DESIGNATED TERMINALS: PRESSURE TYPE, SUITABLE FOR TYPES AND SIZES OF 11.2. POWER-TERMINAL ARRANGEMENT AND FIELD-WIRING SPACE: SUITABLE FOR TOP BOTTOM ENTRANCE OF FEEDER CONDUCTORS AS INDICATED. 11.3. CONTROL WIRING: EQUIPPED WITH LUGS SUITABLE FOR CONNECTION TO TERMINAL STI

2. ENCLOSURES: GENERAL-PURPOSE NEMA 250, TYPE 3R COMPLYING WITH NEMA UL 508, UNLESS OTHERWISE INDICATED ON THE PLANS. C. AUTOMATIC TRANSFER SWITCHES SWITCHING ARRANGEMENT: DOUBLE-THROW TYPE, INCAPABLE OF PAUSES OR INTERMEDI

STOPS DURING NORMAL FUNCTIONING, UNLESS OTHERWISE INDICATED. 1.1. SWITCH SHALL BE OF THE OPEN-TRANSITION TYPE (BREAK BEFORE MAKE). 2. MANUAL SWITCH OPERATION: UNDER LOAD, WITH DOOR CLOSED AND WITH EITHEN SOURCES ENERGIZED. TRANSFER TIME IS SAME AS FOR ELECTRICAL OPERATION. CONT

AUTOMATICALLY DISCONNECTS FROM ELECTRICAL OPERATOR DURING MANUAL OPERATION. 3. SIGNAL—BEFORE—TRANSFER CONTACTS: A SET OF NORMALLY OPEN/NORMALLY CONTACTS OPERATES IN ADVANCE OF RETRANSFER TO NORMAL SOURCE. INTERVAL IS

FROM 1 TO 30 SECONDS. 4. DIGITAL COMMUNICATION INTERFACE: MATCHED TO CAPABILITY OF REMOTE ANNU ANNUNCIATOR AND CONTROL PANEL

5. AUTOMATIC TRANSFER-SWITCH FEATURES: 5.1. UNDERVOLTAGE SENSING FOR EACH PHASE OF NORMAL SOURCE: PHASE—TO—GROUND VOLTAGE ON EACH PHASE. PICKUP VOLTAGE SHALL BE AD. TO 100 PERCENT OF NOMINAL, AND DROPOUT VOLTAGE IS ADJUSTABLE FROM 75 TO OF PICKUP VALUE. FACTORY SET FOR PICKUP AT 90 PERCENT AND DROPOUT AT 85 P

5.2. ADJUSTABLE TIME DELAY: FOR OVERRIDE OF NORMAL-SOURCE VOLTAGE SENSIN TRANSFER AND ENGINE START SIGNALS. ADJUSTABLE FROM ZERO TO SIX SECONDS, SET FOR ONE SECOND.

5.3. VOLTAGE/FREQUENCY LOCKOUT RELAY: PREVENT PREMATURE TRANSFER TO GENERATI VOLTAGE SHALL BE ADJUSTABLE FROM 85 TO 100 PERCENT OF NOMINAL. FACTOR PICKUP AT 90 PERCENT. PICKUP FREQUENCY SHALL BE ADJUSTABLE FROM 90 TO 1 OF NOMINAL. FACTORY SET FOR PICKUP AT 95 PERCEN

5.4. TIME DELAY FOR RETRANSFER TO NORMAL SOURCE: ADJUSTABLE FROM 0 TO 30 FACTORY SET FOR 10 MINUTES TO AUTOMATICALLY DEFEAT DELAY ON LOSS OF SUSTAINED UNDERVOLTAGE OF EMERGENCY SOURCE, PROVIDED NORMAL SUPPLY

5.5. TEST SWITCH: SIMULATE NORMAL-SOURCE FAILURE. 5.6. SWITCH-POSITION PILOT LIGHTS: INDICATE SOURCE TO WHICH LOAD IS CONNECTED. 5.7. SOURCE-AVAILABLE INDICATING LIGHTS: SUPERVISE SOURCES VIA TRANSFER-SWITC AND ALTERNATE-SOURCE SENSING CIRCUITS.

5.7.1. NORMAL POWER SUPERVISION: GREEN LIGHT WITH NAMEPLATE ENGRAVED "NORM AVAILABLE 5.7.2. EMERGENCY POWER SUPERVISION: RED LIGHT WITH NAMEPLATE ENGRAVED

SOURCE AVAILABLE." 5.8. UNASSIGNED AUXILIARY CONTACTS: TWO NORMALLY OPEN, SINGLE-POLE, DO CONTACTS FOR EACH SWITCH POSITION, RATED 10 A AT 240-V AC.

5.9. TRANSFER OVERRIDE SWITCH: OVERRIDES AUTOMATIC RETRANSFER CONTROL TRANSFER SWITCH WILL REMAIN CONNECTED TO EMERGENCY POWER SOURCE REG. CONDITION OF NORMAL SOURCE. PILOT LIGHT INDICATES OVERRIDE STATUS. 5.10. ENGINE STARTING CONTACTS: ONE ISOLATED AND NORMALLY CLOSED, AND ONE

NORMALLY OPEN; RATED 10 A AT 32-V DC MINIMUM. 5.11. ENGINE SHUTDOWN CONTACTS: TIME DELAY ADJUSTABLE FROM ZERO TO FIVE FACTORY SET FOR FIVE MINUTES. CONTACTS SHALL INITIATE SHUTDOWN ENGINE-GENERATOR CONTROLS AFTER RETRANSFER OF LOAD TO NORMAL SOURCE.

D.<u>REMOTE ANNUNCIATOR SYSTEM</u> FUNCTIONAL DESCRIPTION: REMOTE ANNUNCIATOR PANEL SHALL ANNUNCIATE CON INDICATED TRANSFER SWITCHES. ANNUNCIATION SHALL INCLUDE THE FOLLOWING: 1.1. SOURCES AVAILABLE, AS DEFINED BY ACTUAL PICKUP AND DROPOUT S

TRANSFER-SWITCH CONTROLS. 1.2. SWITCH POSITION.

1.3. SWITCH IN TEST MODE

1.4. FAILURE OF COMMUNICATION LINK. 2. REFER TO GENERATOR SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS OF REMOTE

E.NONAUTOMATIC TRANSFER SWITCHES . OPERATION: ELECTRICALLY ACTUATED BY PUSH BUTTONS DESIGNATED "NORMAL SOURCE "ALTERNATE SOURCE." SWITCH SHALL BE CAPABLE OF TRANSFERRING LOAD IN EITHER DIRECTION WITH EITHER OR BOTH SOURCES ENERGIZED. 2. DOUBLE-THROW SWITCHING ARRANGEMENT: INCAPABLE OF PAUSES OR INTERMEDIATE POSITION STOPS

DURING SWITCHING SEQUENCE. 3. NONAUTOMATIC TRANSFER-SWITCH ACCESSORIES: 3.1. PILOT LIGHTS: INDICATE SOURCE TO WHICH LOAD IS CONNECTED. 3.2. SOURCE-AVAILABLE INDICATING LIGHTS: SUPERVISE SOURCES VIA TRANSFER-SWITCH NORMAL-

AND ALTERNATE-SOURCE SENSING CIRCUITS. 3.2.1. NORMAL POWER SUPERVISION: GREEN LIGHT WITH NAMEPLATE ENGRAVED "NORMAL SOURCE AVAII ARI F 3.2.2. EMERGENCY POWER SUPERVISION: RED LIGHT WITH NAMEPLATE ENGRAVED "ALTERNATE

SOURCE AVAILABLE." 3.3. UNASSIGNED AUXILIARY CONTACTS: ONE SET OF NORMALLY CLOSED CONTACTS FOR EACH SWITCH POSITION, RATED 10 A AT 240-V AC.

F.<u>SOURCE_QUALITY_CONTROL</u> 1. FACTORY TEST AND INSPECT COMPONENTS, ASSEMBLED SWITCHES, AND ASSOCIATED EQUIPMENT. ENSURE PROPER OPERATION. CHECK TRANSFER TIME AND VOLTAGE, FREQUENCY, AND TIME-DELAY SETTINGS FOR COMPLIANCE WITH SPECIFIED REQUIREMENTS. PERFORM DIELECTRIC STRENGTH TEST COMPLYING WITH NEMA ICS 1.

PART 3 EXECUTION A.INSTALLATION

FLOOR-MOUNTING SWITCH: ANCHOR TO FLOOR BY BOLTING.

1.1. CONCRETE BASES: 3-1/2 INCHES HIGH, REINFORCED, WITH CHAMFERED EDGES. EXTEND BASE NO MORE THAN 4 INCHES IN ALL DIRECTIONS BEYOND THE MAXIMUM DIMENSIONS OF SWITCH, UNLESS OTHERWISE INDICATED OR UNLESS REQUIRED FOR SEISMIC SUPPORT.

2. IDENTIFY COMPONENTS ACCORDING TO DIVISION 16 SECTION "IDENTIFICATION FOR ELECTRICAL

	SYSTEMS."
	 SET FIELD-ADJUSTABLE INTERVALS AND DELAYS, RELAYS, AND ENGINE EXERCISER CLOCK. B.<u>CONNECTIONS</u>
	1. GROUND EQUIPMENT ACCORDING TO DIVISION 16. 2. CONNECT WIRING ACCORDING TO DIVISION16.
	3. WIRING TO REMOTE COMPONENTS: MATCH TYPE AND NUMBER OF CABLES AND CONDUCTORS TO CONTROL AND COMMUNICATION REQUIREMENTS OF TRANSFER SWITCHES AS RECOMMENDED BY
BY ONE OF	MANUFACTURER. INCREASE RACEWAY SIZES AT NO ADDITIONAL COST TO OWNER IF NECESSARY TO ACCOMMODATE REQUIRED WIRING.
	C. <u>WARRANTY</u> 1. DURATION OF WARRANTY:
	1.1. 2 YEARS INCLUSIVE OF LABOR/WORKMANSHIP
	1.2. 5 YEARS ON PARTS 1.3. 10 YEARS ON THE MAIN CONTACTS
	D. <u>FIELD QUALITY CONTROL</u> 1. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.
IG AND TOTAL	1.1. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATION, INCLUDING CONNECTIONS, AND
PERCENT OF	to assist in testing.
SYMMETRICAL	1.2. AFTER INSTALLING EQUIPMENT AND AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, TEST FOR COMPLIANCE WITH REQUIREMENTS.
LANS. ANY SPECIFIC	1.3. PERFORM EACH VISUAL AND MECHANICAL INSPECTION AND ELECTRICAL TEST STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
SCCR OF THE	1.4. MEASURE INSULATION RESISTANCE PHASE—TO—PHASE AND PHASE—TO—GROUND WITH INSULATION—RESISTANCE TESTER, INCLUDE EXTERNAL ANNUCIATION AND CONTROL CIRCUITS, USE
REAKER TYPES	TEST VOLTAGES AND PROCEDURE RECOMMENDED BY MANUFACTURER. COMPLY WITH MANUFACTURER'S SPECIFIED MINIMUM RESISTANCE.
ER/TRANSFER ATED ON THE	1.4.1. CHECK FOR ELECTRICAL CONTINUITY OF CIRCUITS AND FOR SHORT CIRCUITS. 1.4.2. INSPECT FOR PHYSICAL DAMAGE, PROPER INSTALLATION AND CONNECTION, AND INTEGRITY OF
OR MINUS 2	BARRIERS, COVERS, AND SAFETY FEATURES. 1.4.3. VERIFY THAT MANUAL TRANSFER WARNINGS ARE PROPERLY PLACED.
DEG C. OR EXCEED	1.4.4. PERFORM MANUAL TRANSFER OPERATION. 1.5. AFTER ENERGIZING CIRCUITS, DEMONSTRATE INTERLOCKING SEQUENCE AND OPERATIONAL FUNCTION
IEEE C62.41.	FOR EACH SWITCH AT LEAST THREE TIMES. 1.5.1. SIMULATE POWER FAILURES OF NORMAL SOURCE TO AUTOMATIC TRANSFER SWITCHES AND OF
SOLENOID OR	EMERGENCY SOURCE WITH NORMAL SOURCE AVAILABLE. 1.5.2. SIMULATE LOSS OF PHASE-TO-GROUND VOLTAGE FOR EACH PHASE OF NORMAL SOURCE.
ED IN BOTH	1.5.3. VERIFY TIME-DELAY SETTINGS.
FULL-RATED	1.5.4. VERIFY PICKUP AND DROPOUT VOLTAGES BY DATA READOUT OR INSPECTION OF CONTROL SETTINGS.
REAKERS OR	1.5.5. VERIFY PROPER SEQUENCE AND CORRECT TIMING OF AUTOMATIC ENGINE STARTING, TRANSFER TIME DELAY, RETRANSFER TIME DELAY ON RESTORATION OF NORMAL POWER, AND ENGINE
SWITCHING.	COOL-DOWN AND SHUTDOWN. 2. COORDINATE TESTS WITH TESTS OF GENERATOR AND RUN THEM CONCURRENTLY.
SHALL HAVE	3. REPORT RESULTS OF TESTS AND INSPECTIONS IN WRITING. RECORD ADJUSTABLE RELAY SETTINGS AND MEASURED INSULATION AND CONTACT RESISTANCES AND TIME DELAYS. ATTACH A LABEL OR TAG
EUTRAL POLE	TO EACH TESTED COMPONENT INDICATING SATISFACTORY COMPLETION OF TESTS. 4. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.
other units	E <u>DEMONSTRATION</u>
ROL HEATER.	1. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN TRANSFER SWITCHES AND RELATED EQUIPMENT AS
NT TRANSFER ANNUNCIATOR	SPECIFIED BELOW. 2. COORDINATE THIS TRAINING WITH THAT FOR GENERATOR EQUIPMENT.
/ICE. WITH SHOP	END OF SECTION 163600
APE MARKERS	
FIELD WIRING	<u>SECTION 16400 – WIRING DEVICES</u>
P, SIDE, OR	A.CONVENIENCE OUTLETS – SPEC GRADE 20 AMP DUPLEX W/ GROUND & SS WALL PLATES. OTHER OUTLETS SHALL BE VERIFIED W/ EQUIPMENT SUPPLIERS FOR PROPER NEMA CONFIGURATIONS.
RIPS. ICS 6 AND	PROVIDE GFIC RATED DEVICES WHERE INDICATED AND AS REQ'D PER CODE. B.LIGHT SWITCHES – SPEC GRADE 20 AMP TOGGLE SWITCHES W/ SS WALL PLATES.
	C.WALL MOTION SWITCHES - SPEC GRADE, PIR, OVERRIDE.
IATE POSITION	D.CEILING MOTION SWITCHES – SPEC GRADE, DUAL TECHNOLOGY, MODEL AS REQ'D BY ROOM CONFIGURATION, ALL NECESSARY POWER PACKS AND RELAYS.
R OR BOTH	EWALL MOTION SWITCHES (BATHROOM) – DUAL RELAY, SPEC GRADE, PIR, 2ND RELAY FOR OPERATION OF EXHAUST FAN DELAY.
TROL CIRCUIT	F.COLOR OF DEVICES AS DIRECTED BY ARCHITECT. G.EQUIVALENT DEVICES BY LEVITON, BRYANT, HUBBEL, WATTSTOPPER, LITHONIA, SENSOR SWITCH.
CLOSED DRY	EXECUTION
ADJUSTABLE	A.ALL OUTLETS, SHALL BE MOUNTED W/ BOTTOM AT 18" AFF & SWITCHES W/ BOTTOM AT 44" ABOVE
INCIATOR OR	FINISHED FLOOR UNLESS NOTED OTHÉRWISE ON PLANS. REFER TO ARCH FOR OTHER REQUIRED ELEVATIONS AND CABINETRY COORDINATION.
SENSE LOW	EXECUTION
BLE FROM 85 98 PERCENT	A.CABLING SHALL BE INSTALLED CONCEALED IN NEW & EXISTING CONSTRUCTION. B.CABLING SHALL BE UL LISTED FOR INTENDED USE & INSTALLED IN ACCORDANCE W/ APPROPRIATE
ERCENT. NG TO DELAY	ARTICLES FROM LATEST NEC.
AND FACTORY	
TOR. PICKUP DRY SET FOR	
100 PERCENT	
MINUTES, AND VOLTAGE OR	
HAS BEEN	
CH NORMAL-	
RMAL SOURCE	
"ALTERNATE	
UBLE-THROW	
O AUTOMATIC	
ARDLESS OF	
SOLATED AND	
MINUTES, AND AT REMOTE	
DITIONS FOR	
ETTINGS OF	
ANNUNCIATOR	
OURCE" AND	

THE COLOR THE PROF	W. M. Kutay
HIMMINI PROVIDENT	15159



PEARSON KENT MCKINLEY RAAF ENGINEERS LL 2933 SW WOODSIDE DR., SUITE C TOPEKA, KS 66614 785.273.2447 WWW.PKMRENG.COM

O Δω **D A** S D ΣÜ OS A S <u>- O</u> ЦU Ζò O N B Ш

X

0

ШЮ

ISSUED FOR:							
DESCRIPTION			DATE				
1							
2							
3							
4							
5							
6							
7 8							
0	© PEARSON KENT I	ACKINI FY RAAF FN	I IGINEERS II C				
	DRAWN BY:		KAH				
	CHECKED BY:		SWM				
<u> </u>							
	ELECTRICAL						
SPECIFICATIONS							
DA	TE: 3/2/2020	PKMR PROJE	ст: 20.103				
			20.103				
SH	EET NUMBER:						