TOPEKA METRO

REQUEST FOR BIDS
Back-Up Generator
Quincy Street Station
TO-24-06

Appendix III
Engineering Studies

16000 - ELECTRICAL SPECIFICATIONS

SECTION 16000 – ELECTRICAL REQUIREMENTS

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 POWER SYSTEM TOGETHER W/ ALL ASSOCIATED EQUIPMENT & APPARATUS AS SHOWN ON PLANS.
E. WHERE 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.

SECTION 16100 – CONDUIT & CONDUCTORS
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.
C. 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.
D. PROVIDE INTERLOCKING SPACERS FOR MULT RUNS OF UG CONDUITS IN SAME TRENCH.
E. RECEPTACLE CIRCUIT CONDUCTORS SHALL BE COPPER THWN/THHN 600 VOLT, 75 DEG C, COLOR CODED AS DESCRIBED UNDER APPLICABLE CODES. NO ROMEX, PLASTIC FLEX TUBING ETC PERMITTED. LIGHT FIXTURE WIRE INSULATION SHALL HAVE TEMP RATING NOT LESS THAN THE MANUFACTURER'S RECOMMENDED INDIVIDUAL FIXTURE RATING.
F. 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.
G. 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.

SECTION 16200 – GROUNDING
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.
E. EQUIPMENT 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 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.

SECTION 16300 – ELECTRICAL EQUIPMENT
A. JUNCTION BOXES & OUTLET BOXES SHALL BE GALVANIZED 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.

SECTION 16350 – ELECTRICAL IDENTIFICATION
A. MANUFACTURED LABELS FOR EACH PANELBOARD. TYPEWRITTEN PANEL SCHEDULES MOUNTED IN PANELS
B. PRINTED TAPE STYLE LABEL FOR EACH RECEPTACLE INDICATING PANEL & CIRCUIT #.
C. MANUFACTURED LABELS FOR ALL DISCONNECT SWITCHES INDICATING EQUIPMENT SERVED.
D. BRANCH CIRCUITS – IDENTIFY EACH CIRCUIT W/ WIRE MARKERS WHEN ENCLOSURE LABEL AND WIRE 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.

SECTION 16400 – WIRING DEVICES
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. PROVIDE GFIC RATED DEVICES WHERE INDICATED AND AS REQ'D PER CODE.
B. PROVIDE GFCI RATED DEVICES WHERE INDICATED AND ANYWHERE REQUIRED PER THE NEC.
C. PROVIDE AFCI PROTECTION ON ALL CIRCUITS REQUIRED PER THE NEC.
D. PROVIDE TAMPER RESISTANT RECEPTACLES ON ALL RECEPTACLES IN PUBLIC AREAS, AREAS ACCESSIBLE TO CHILDREN, AND WHERE OTHERWISE REQUIRED TO BE TAMPER RESISTANT PER THE NEC.
E. EQUIVALENT DEVICES BY LEVITON, BRYANT, HUBBELL, WATTSTOPPER, LITHONIA, SENSOR SWITCH.

EXECUTION
ALL OUTLETS, SHALL BE MOUNTED W/ BOTTOM AT 18" AFF & SWITCHES W/ BOTTOM AT 44" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE ON PLANS.

SECTION 16900 – GENERATOR
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.
THE RESPONSIBILITY FOR PERFORMANCE TO THIS SPECIFICATION SHALL NOT BE DIVIDED AMONG 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. GENERATOR SET MOUNTED SUBASSEMBLIES SUCH AS COOLING SYSTEM, BASE, AIR INTAKE SYSTEM, EXHAUST OUTLET FITTINGS AND GENERATOR SET MOUNTED CONTROLS AND SWITCHGEAR SHALL ALSO BE DESIGNED, BUILT AND ASSEMBLED AS A COMPLETE UNIT BY THE ENGINE – GENERATOR MANUFACTURER.
1.1. APPROVED MANUFACTURERS
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 20 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 AS PERFORMED BY CATERPILLAR, ONAN, CUMMINS, KOHLER, OR DETROIT DIESEL. THE NAMING OF A SPECIFIC MANUFACTURE DOES NOT WAIVE ANY REQUIREMENTS OF THIS SPECIFICATION.
SUBSTITUTIONS TO THIS SPECIFICATION SHALL INCLUDE COMPLETE SUBMITTAL DATA CLEARLY IDENTIFYING ALL DEVIATIONS OR EXCEPTIONS AND SHALL BE SUBMITTED FOR APPROVAL A MINIMUM OF TEN (10) DAYS PRIOR TO THE BID DATE.
2. PART 2 – PRODUCTS
2.1. SYSTEM RATING
THE ELECTRIC POWER GENERATING SYSTEM INCLUDING ENGINE MOUNTED RADIATOR SHALL HAVE A SITE CAPABILITY AS INDICATED ON THE PLANS. 500 ALTITUDE (FEET), 105 MAXIMUM ENGINE ROOM TEMPERATURE (OF), -20 MINIMUM OUTSIDE TEMPERATURE (OF), ENGINE MOUNTED RADIATOR WITH 50% ETHYLENE GLYCOL
2.2. ENGINE
THE ENGINE SHALL BE A STATIONARY, LIQUID COOLED, 1800 RPM, FOUR-CYCLE DESIGN, VERTICAL IN-LINE, WITH DRY EXHAUST MANIFOLDS. IT SHALL HAVE 6 CYLINDERS WITH MINIMUM DISPLACEMENT OF 300 – 400 CUBIC INCHES AND BE MANUFACTURED IN THE UNITED STATES. TWO CYCLE ENGINES ARE NOT ACCEPTABLE.
2.3. ENGINE ACCESSORY EQUIPMENT
THE FOLLOWING ENGINE ACCESSORIES SHALL BE PROVIDED:
THE ENGINE SHALL BE COOLED BY A CLOSE COUPLED, CLOSED LOOP RADIATOR USING A 50% ANTIFREEZE/COOLANT MIXTURE. THE RADIATOR SHALL PROPERLY COOL THE ENGINE WHILE THE ENGINE IS OPERATING AT FULL SITE CAPABILITY AND 0.5 IN H20 EXTERNAL AIR RESTRICTION. ANTIFREEZE SHALL BE SUPPLIED BY THE CONTRACTOR.
ELECTRIC STARTING MOTOR AND CONTROL CIRCUIT CAPABLE OF THREE COMPLETE STARTING CYCLES WITHOUT OVERHEATING.
MECHANICAL, POSITIVE DISPLACEMENT LUBE OIL PUMP WITH REPLACEABLE FULL FLOW FILTER, OIL COOLER, AND DIP STICK.
MECHANICAL, POSITIVE DISPLACEMENT FUEL PUMP WITH REPLACEABLE FULL FLOW FILTER. MANUALLY OPERATED FUEL PRIMING PUMP.
REPLACEABLE DRY ELEMENT AIR FILTER. ELECTRICALLY POWERED, THERMOSTATICALLY CONTROLLED JACKET WATER HEATER SIZED TO ENSURE PROPER STARTING.
THE ENTIRE EXHAUST SYSTEM INCLUDING SHELL, HEADS, ELBOWS, END CAPS, ETC. SHALL BE ALUMINIZED PLATED. THE FLEXIBLE EXHAUST CONNECTOR SHALL BE STAINLESS STEEL.
LUBE OIL SHALL BE FURNISHED BY THE ENGINE GENERATOR MANUFACTURER.
2.4. GENERATOR
THE GENERATOR SHALL BE RECONNECTABLE, CLOSE COUPLED, DRIP PROOF AND GUARDED, CONSTRUCTED TO NEMA 1 AND 1P AND 1P 22 STANDARDS, SINGLE BEARING, SALIENT POLE, REVOLVING FIELD, SYNCHRONOUS TYPE WITH AMORTISSEUR WINDINGS IN THE POLE FACES OF THE ROTATING FIELD AND SKEWED STATOR WINDINGS TO PRODUCE OPTIMUM VOLTAGE WAVEFORM. THE GENERATOR PITCH SHALL BE SELECTED TO OPTIMIZE THE GENERATOR EFFICIENCY AND MINIMIZE THE TOTAL HARMONIC DISTORTION, ESPECIALLY THE 5TH AND 7TH HARMONICS WHICH ARE DETRIMENTAL TO AC MOTORS.
THE GENERATOR SHALL BE CAPABLE OF DELIVERING RATED KVA AT 60 HZ AND 0.8 PF FOR ANY VOLTAGE +/- 5% OF RATED VOLTAGE.
ALL INSULATION SYSTEMS SHALL MEET NEMA MG-1 STANDARDS FOR CLASS H SYSTEMS. THE ACTUAL GENERATOR TEMPERATURE WILL BE LIMITED TO CLASS F LEVELS (130 C RISE BY RESISTANCE OVER 40 C AMBIENT). NO MATERIALS SHALL BE USED WHICH SUPPORT FUNGUS GROWTH.
THE REVOLVING FIELD COILS SHALL BE PRECISION WET LAYER WOUND WITH EPOXY BASED MATERIAL APPLIED TO EACH LAYER OF MAGNET WIRE. THE STATOR SHALL HAVE TWO DIPS AND BAKES USING CLASS H IMPREGNATING VARNISH. THE REVOLVING FIELD ASSEMBLY SHALL BE PROTOTYPE TESTED FOR 2 HOURS AT 2700 RPM (150% OVERSPEED) AND 70 C, AND EACH PRODUCTION UNIT SHALL BE TESTED AT 2250 RPM (125% OVERSPEED) AT ROOM TEMPERATURE. THE REVOLVING FIELD ASSEMBLY SHALL BE BALANCED TO 0.5 MIL PEAK-PEAK.
THE GENERATOR EXCITER SHALL BE BRUSHLESS WITH THE CIRCUIT CONSISTING OF A THREE-PHASE ARMATURE AND A THREE-PHASE FULL WAVE BRIDGE RECTIFIER MOUNTED ON THE ROTOR SHAFT. SURGE SUPPRESSORS SHALL BE INCLUDED TO PROTECT THE ROTATING DIODES FROM VOLTAGE SPIKES.
A PERMANENT MAGNET (PM) GENERATOR SHALL PROVIDE THE SOURCE OF EXCITATION TO THE EXCITER TO INCREASE IMMUNITY TO NON-LINEAR LOADS AND TO MAINTAIN 300% OF RATED CURRENT FOR 10 SECONDS DURING SHORT CIRCUIT CONDITIONS.
(VR3) THE AUTOMATIC VOLTAGE REGULATOR (AVR) SHALL MAINTAIN GENERATOR OUTPUT VOLTAGE WITHIN +/- 0.5% FOR ANY CONSTANT LOAD BETWEEN NO LOAD AND FULL LOAD. THE REGULATOR SHALL BE A TOTALLY SOLID STATE DESIGN WHICH INCLUDES ELECTRONIC VOLTAGE BUILDUP, VOLTS PER HERTZ REGULATION, THREE PHASE SENSING, OVEREXCITATION PROTECTION, LOSS OF SENSING PROTECTION, TEMPERATURE COMPENSATION, SHALL LIMIT VOLTAGE OVERSHOOT ON STARTUP, AND SHALL BE SEALED FROM THE ENVIRONMENT.
2.5. CONTROLS – GENERATOR SET MOUNTED
THE CONTROL PANEL SHALL BE DESIGNED AND BUILT BY THE ENGINE-GENERATOR MANUFACTURER AND INCORPORATE 100% SOLID STATE MICROPROCESSOR BASED CONTROL CIRCUITRY.
AUTOMATIC REMOTE START CAPABILITY WITH MODE OF OPERATION SELECTABLE FROM A PANEL-MOUNTED 4-POSITION SWITCH (STOP, MANUAL, AUTOMATIC, RESET).
CYCLE CRANK WITH ADJUSTABLE "CRANK" AND "RESET" TIMES. ADJUSTABLE COOLDOWN TIMER.
EMERGENCY STOP PUSH BUTTON REQUIRING MANUAL RESET. VOLTAGE ADJUSTMENT POTENTIOMETER TO ADJUST VOLTAGE +10, -25% OF RATED.
A COMMON ALARM HORN (WITH SILENCE SWITCH) AND INDIVIDUAL FLASHING LED'S SHALL BE PROVIDED FOR EACH OF THE FOLLOWING SHUTDOWNS:
OVERSPEED (RED), OVERCRANK (RED), HIGH COOLANT TEMPERATURE (RED), LOW OIL PRESSURE (RED), EMERGENCY STOP (RED)
PANEL ILLUMINATION LIGHTS (2) WITH ON/OFF SWITCH
DIGITAL DISPLAY AND PHASE SELECTOR SWITCH FOR GENERATOR OPERATIONAL PARAMETERS. TRUE RMS SENSING OF THESE PARAMETERS SHALL BE UTILIZED TO MINIMIZE DISTORTION DUE TO NON-LINEAR LOADS AND ENSURE ACCURACY.
AC VOLTS (+/- 0.5% ACCURACY), AC AMPS (+/- 0.5% ACCURACY), HERTZ (+/- 0.3 HZ ACCURACY)
DIGITAL DISPLAY FOR: ENGINE RPM (+/- 0.5% ACCURACY), DC VOLTAGE (+/- 0.5% ACCURACY), OIL PRESSURE (+/- 0.5% ACCURACY), COOLANT TEMPERATURE (+/- 0.5% ACCURACY), OPERATING HOURS
2.6. EXHAUST SILENCER
A CRITICAL EXHAUST SILENCER SHALL BE SIZED AND SUPPLIED BY THE ENGINE SUPPLIER. IT SHALL PROVIDE 15 DBA ATTENUATION WHILE IMPOSING NO MORE THAN 27 IN H20 RESTRICTION. THE SILENCER SHALL BE ALUMINIZED TO PREVENT RUSTING AND MOUNTED (NEAR THE ENGINE TO MINIMIZE NOISE AND CONDENSATION). A PROVISION FOR DRAINING MOISTURE SHALL BE INCLUDED.
2.7. CIRCUIT BREAKER – GENERATOR SET MOUNTED
2.8. BATTERY CHARGER
A DUAL RATE 10 AMPERE BATTERY CHARGER SHALL BE PROVIDED WHICH SHALL ACCEPT 120 VOLT 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.
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.
2.9. BATTERIES
TWENTY-FOUR (24) VOLT STARTING BATTERIES; SIZED AS RECOMMENDED BY THE GENERATOR SET MANUFACTURER; BATTERY CABLES, AND BASE MOUNTED BATTERY RACK SHALL BE PROVIDED.
2.10. ENCLOSURES
STEEL WEATHER PROTECTIVE SOUND ATTENUATED ENCLOSURE WITH REMOVABLE/HINGED DOORS AND REMOVABLE END PANELS. ALL HINGES AND LATCHES SHALL BE STAINLESS STEEL.

SECTION 16950 – AUTOMATIC TRANSFER SWITCH
THE TRANSFER/BYPASS-ISOLATION SWITCHES SHALL BE RATED FOR VOLTAGE AND AMPACITY AS SHOWN ON THE PLANS AND SHALL HAVE 600 VOLT INSULATION ON ALL PARTS IN ACCORDANCE WITH NEMA STANDARDS.
THE CURRENT RATING SHALL BE A CONTINUOUS RATING WHEN THE SWITCH IS INSTALLED IN AN UNVENTILATED ENCLOSURE, AND SHALL CONFORM TO NEMA TEMPERATURE RISE STANDARDS.
AS A PRECONDITION FOR APPROVAL, ALL TRANSFER SWITCHES COMPLETE WITH ACCESSORIES SHALL BE LISTED BY UNDERWRITERS LABORATORIES, UNDER STANDARD UL-1008 (AUTOMATIC TRANSFER SWITCHES) AND APPROVED FOR USE ON EMERGENCY SYSTEMS.
THE WITHSTAND CURRENT CAPACITY OF THE MAIN CONTACTS SHALL NOT BE LESS THAN 20 TIMES THE CONTINUOUS DUTY RATING FOR A MINIMUM OF 3 ELECTRICAL CYCLES AS ESTABLISHED BY CERTIFIED TEST DATA.
TEMPERATURE RISE TESTS IN ACCORDANCE WITH UL-1008 SHALL HAVE BEEN CONDUCTED AFTER THE OVERLOAD AND ENDURANCE TESTES TO CONFIRM THE ABILITY OF THE UNITS TO CARRY THEIR RATED CURRENTS WITHIN THE ALLOWABLE TEMPERATURE LIMITS.
THE AUTOMATIC TRANSFER SWITCHES SHALL BE ZENITH ZTG SERIES OR EQUL BY ASCO OR RUSSEL ELECTRIC.
1.2. SEQUENCE OF OPERATION
WHEN THE VOLTAGE ON ANY PHASE OF THE NORMAL SOURCE IS REDUCED TO 80% OF RATED VOLTAGE OR INCREASES TO 120% OF RATED VOLTAGE FOR .5-6 SECONDS (ADJUSTABLE), A PILOT CONTACT SHALL CLOSE TO INITIATE STARTING OF THE STANDBY PLANT.
WHEN THE STANDBY PLANT IS DELIVERING NOT LESS THAN 90% OF RATED VOLTAGE AND 95% OF RATED FREQUENCY, THE LOAD SHALL BE TRANSFERRED TO THE EMERGENCY SOURCE.
WHEN THE NORMAL SOURCE HAS BEEN RESTORED TO NOT LESS THEN 90% OF RATED VOLTAGE OR DROPS BELOW 110% OF RATED VOLTAGE ON ALL PHASES, THE LOAD SHALL BE RE-TRANSFERRED TO THE NORMAL SOURCE AFTER A TIME DELAY OF 0 TO 30 MINUTES (ADJUSTABLE). THE STANDBY PLANT SHALL RUN UNLOADED FOR 5 MINUTES (ADJUSTABLE) AND THEN AUTOMATICALLY SHUT DOWN. THE GENSET SHALL BE READY FOR AUTOMATIC OPERATION UPON THE NEXT FAILURE OF THE NORMAL SOURCE.
IF THE STANDBY PLANT SHOULD FAIL WHILE CARRYING THE LOAD, RETRANSFER TO THE NORMAL SOURCE SHALL BE MADE INSTANTANEOUSLY UPON RESTORATION OF PROPER VOLTAGE (90%) OF THE NORMAL SOURCE.

ABBREVIATIONS

A/E	ARCHITECT / ENGINEER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AG	ABOVE GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
C	CONDUIT
DIA	DIAMETER
E/C	ELECTRICAL CONTRACTOR
EX	EXISTING ITEM
G	GROUND / GANG
G/C	GENERAL CONTRACTOR
GFCI	GROUND FAULT CIRCUIT INTERUPTER
JB	JUNCTION BOX
MCB	MAIN CIRCUIT BREAKER
MH	MANHOLE
MLO	MAIN LUGS ONLY
RL	RELOCATED ITEM
ST	SHUNT TRIP
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
WP	WEATHERPROOF

COORDINATION NOTES

1. COORDINATE REQUIREMENTS FOR INSTALLATION OF SYSTEMS AND EQUIPMENT WITH ALL OTHER TRADES.
2. THE CONTRACTOR SHALL COORDINATE THE ROUTING AND PATH OF ALL SYSTEMS, CONDUITS, PIPES, DUCTS, ETC WITH THE POSITION AND LAYOUT OF THE STRUCTURE. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING NECESSARY OFFSETS, TURNS, RISES AND DROPS FOR SYSTEMS AND COMPONENTS AS NEEDED TO INSTALL THE MEP SYSTEMS TO CLEAR STRUCTURE, CEILINGS, ETC AND OTHER SYSTEMS IN POTENTIAL CONFLICT WITH ROUTING.
3. CHECK SPACE REQUIREMENTS WITH OTHER TRADES AND STRUCTURE/CONSTRUCTION TO INSURE THAT ALL MATERIALS AND EQUIPMENT CAN BE INSTALLED IN THE SPACE ALLOTTED INCLUDING FINISHED SUSPENDED CEILINGS AND OTHER SPACES, CHASES, ETC WITHIN THE BUILDING. MAKE MODIFICATIONS THERETO AS REQUIRED AND APPROVED.
4. COORDINATE, PROJECT AND SCHEDULE WORK WITH OTHER TRADES IN ACCORDANCE WITH THE CONSTRUCTION SEQUENCE.
5. DRAWINGS SHOW THE GENERAL RUNS OF CONDUITS AND APPROXIMATE LOCATION OF OUTLETS. ANY SIGNIFICANT CHANGES IN LOCATION OF ITEMS NECESSARY IN ORDER TO MEET FIELD CONDITIONS SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER AND RECEIVE HIS APPROVAL BEFORE SUCH ALTERATIONS ARE MADE. ALL SUCH MODIFICATIONS SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION AND REPAIR OF SURFACES, AREAS AND PROPERTY THAT MAY BE DAMAGED AS A RESULT OF CONSTRUCTION ACTIVITIES.

GENERAL ELECTRICAL NOTES

1. COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED VERSION OF THE NATIONAL ELECTRICAL CODE, LOCAL AND STATE CODES, AND REQUIREMENTS OF THE AHJ.
2. PROVIDE ALL EMPTY CONDUITS WITH PULL STRINGS AND BUSHED ENDS.
3. CONTRACTOR SHALL CONCEAL ALL CONDUIT, FITTINGS, AND DEVICES FROM VIEW WHERE REASONABLY POSSIBLE.

GENERAL PLUMBING NOTES

1. COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST ADOPTED VERISION OF THE INTERNATIONAL PLUMBING CODE, LOCAL AND STATE CODES, AND REQUIREMENTS OF THE AHJ.

GENERAL NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN AND KEEP AT THE JOB SITE, AN UP TO DATE SET OF "RECORD DRAWINGS" SHOWING ALL CHANGES FROM THE ORIGINAL PLANS. THE CONTRACTOR SHALL DELIVER THE "RECORD DRAWINGS" TO THE ENGINEER AT THE CONCLUSION OF THE PROJECT ELECTRONICALLY.
2. THESE DRAWINGS ARE DIAGRAMMATIC. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS (NEW AND EXISTING), DIMENSIONS, AND CLEARANCES PRIOR TO THE COMMENCEMENT OF WORK AND SHALL INCLUDE ALL COSTS, EQUIPMENT, MATERIAL, ACCESSORIES, ETC. REQUIRED FOR A FULLY COMPLETE, FUNCTIONAL AND CODE COMPLIANT INSTALLATION.
3. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS, APPROVALS, LICENSES, ETC. AS NEEDED FOR THE COMPLETE INSTALLATION AND PROJECT. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER FOR ALL FEES AND DATA NEEDED FOR THIS.

GEN. RENOVATION NOTES

1. DISCONNECT AND REMOVE ANY EQUIPMENT, PIPING OR DUCTWORK THAT WAS INSTALLED AS PART OF THE BUILDING SHELL THAT IS NOT NEEDED OR CONFLICTS WITH THIS BUILD OUT.
2. EXISTING UNDERGROUND PIPING LOCATIONS ARE ESTIMATED BASED UPON ANTICIPATED ROUTINGS. FIELD VERIFY EXACT LOCATIONS DURING CONSTRUCTION AND PROVIDE ALL NECESSARY MODIFICATIONS.
3. SAWCUT GRADE FLOOR SLABS TO INSTALL NEW PIPING, MECHANICAL SYSTEMS, ELECTRICAL FLOOR BOXES AND ALL ASSOCIATED CONDUIT, ETC. PATCH FLOOR TO MAKE LIKE NEW AFTER INSTALLATION. TAKE CARE TO LOCATE EXISTING CONDUIT, ETC AND AVOID CUTTING EXISTING CONDUITS BY NOT OVERCUTTING SLAB DEPTH.
4. HOMERUN CIRCUITS TO 20 AMP, SINGLE POLE BREAKERS IN PANELBOARDS INDICATED. UTILIIZE SPARE BREAKERS MADE AVAILABLE BY DEMOLITION, IF NO SPARE BREAKER IS AVAILABLE, PROVIDE NEW BREAKER.
5. EXISTING CIRCUITING MAY BE RE-USED WHERE POSSIBLE.

MECHANICAL AND ELECTRICAL SYMBOL LEGEND

SOME SYMBOLS AND ABBREVIATIONS ON THIS LEGEND MAY NOT BE USED

CIRCUITING
- HOME RUN (2#12 1#12G UNO)
- INDICATES 2 PHASE, 1 N, & 1 GRD CONDUCTOR
- HOME RUN: INDICATES SHARED CIRCUIT
- HOME RUN: INDICATES #10 CONDUCTORS ENTIRELY
- CONTROL WIRING

UTILITIES
- ---- UGE --- UNDERGROUND ELECTRICAL
- —— OHE —— OVERHEAD ELECTRICAL
- —— TELE —— TELECOMMUNICATIONS CONDUIT
- ---- UGT --- UNDERGROUND TELECOMMUNICATIONS CONDUIT

EQUIPMENT
- DISCONNECT SWITCH. RE: PLANS FOR INFORMATION.
- MAGNETIC MOTOR STARTER
- COMBINATION DISCONNECT SWITCH / MOTOR STARTER
- $ TOGGLE-TYPE DISCONNECT. FURNISH WITH THERMAL MOTOR PROTECTION WHERE SERVING FANS/PUMPS.
- SURFACE PANELBOARD
- RECESSED PANELBOARD
- DISTRIBUTION PANELBOARD
- SWITCHBOARD. FEEDER/MAIN CIRCUIT BREAKER SECTION AND DISTRIBUTION SECTION.

GENERAL SYMBOLS
- INDICATES CONNECT TO EXISTING
- INDICATES ELEVATION

POWER DEVICES
- DUPLEX RECEPTACLE.
- LINE THRU DEVICE INDICATES ABOVE COUNTER
- GFI SPECIAL DUPLEX RECEPTACLE (GFCI, ISOLATED GROUND, ETC.)
- QUADPLEX RECEPTACLE
- 5-50R SIMPLEX RECEPTACLE W/NEMA CONFIG AS NOTED
- 5-50R MULTI-POLE RECEPTACLE W/NEMA CONFIG AS NOTED
- J JUNCTION BOX

PIPING SYMBOLS
- SHUTOFF VALVE
- SHUTOFF VALVE IN RISER
- PIPING ELBOW UP
- PIPING ELBOW DOWN
- PIPING TEE
- PIPING ELBOW
- PIPING TEE UP
- PIPING TEE DOWN
- INCREASER / REDUCER
- UNION
- CAP

PLUMBING PIPING
- —— G —— GAS (NATURAL)

SECTION 220000 - PLUMBING SPECIFICATIONS

22-I. GENERAL REQUIREMENTS

22-I-A. PLUMBING REQUIREMENTS
1. ALL WORK SHALL BE IN ACCORDANCE W/ LATEST EDITION OF INTERNATIONAL BUILDING, MECHANICAL & PLUMBING CODES, CODES AS ADOPTED BY CITY, COUNTY, STATE & ALL OTHER APPLICABLE CODES.
2. FURNISH & INSTALL ALL LABOR & MATERIALS REQUIRED FOR COMPLETE, FUNCTIONING PLUMBING SYSTEMS W/ ALL ASSOCIATED EQUIPMENT & APPARATUS AS SHOWN ON PLANS.
3. OBTAIN & PAY FOR ALL PERMITS REQUIRED FOR EXECUTION OF THIS WORK & SHALL MAKE ARRANGEMENTS FOR MODIFICATIONS TO WATER, GAS & SEWER CONNECTIONS TO BUILDING AS REQUIRED.
4. ALL MATERIALS SHALL BE NEW & SHALL BARE UL LABEL WHERE APPLICABLE.
5. 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 CONTRACT FOR ANY ERROR OR NEGLIGENCE ON CONTRACTOR'S PART.
6. 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.
7. 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 PLUMBING SYSTEMS BY OWNER.
8. 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.
9. REQUIREMENTS UNDER DIVISION ONE & GENERAL & SUPPLEMENTARY CONDITIONS OF THESE SPECIFICATIONS SHALL BE PART OF THIS SECTION. CONTRACTOR SHALL BECOME THOROUGHLY ACQUAINTED W/ ITS CONTENTS AS TO REQUIREMENTS THAT AFFECT THIS DIVISION OF WORK REQUIRED UNDER THIS SECTION INCLUDES MATERIAL. EQUIPMENT, APPLIANCES. TRANSPORTATION. SERVICES. & LABOR REQUIRED TO COMPLETE ENTIRE SYSTEM AS REQUIRED BY DRAWINGS & SPECIFICATIONS.
10. THE SPECIFICATIONS & DRAWINGS FOR PROJECT ARE COMPLEMENTARY, & PORTIONS OF WORK DESCRIBED IN ONE, SHALL BE PROVIDED AS IF DESCRIBED IN BOTH. IN EVENT OF DISCREPANCIES, NOTIFY ENGINEER & REQUEST CLARIFICATION PRIOR TO PROCEEDING W/ WORK INVOLVED.

22-I-B. DEFINITIONS
1. WHENEVER USED IN THESE SPECIFICATIONS OR DRAWINGS, FOLLOWING TERMS SHALL HAVE INDICATED MEANINGS:
1.1. FURNISH: TERM "FURNISH" IS USED TO MEAN "SUPPLY & DELIVER TO PROJECT SITE. READY FOR UNLOADING, UNPACKING, ASSEMBLY. INSTALLATION & SIMILAR OPERATIONS.
1.2. INSTALL: TERM "INSTALL" IS USED TO DESCRIBE OPERATIONS AT PROJECT SITE INCLUDING ACTUAL "UNLOADING, UNPACKING. ASSEMBLY. ERECTION. PLACING. ANCHORING. APPLYING, WORKING TO DIMENSION. FINISHING, CURING, PROTECTING, CLEANING. & SIMILAR OPERATIONS."
1.3. PROVIDE: TERM "PROVIDE" MEANS "TO FURNISH & INSTALL. COMPLETE & READY FOR INTENDED USE." FURNISHED BY OWNER OR FURNISHED BY OTHERS: ITEM WILL BE FURNISHED BY OWNER OR OTHERS. IT IS TO BE INSTALLED & CONNECTED UNDER REQUIREMENTS OF THIS DIVISION, COMPLETE & READY FOR OPERATION, INCLUDING ITEMS INCIDENTAL TO WORK, INCLUDING SERVICES NECESSARY FOR PROPER INSTALLATION & OPERATION. INSTALLATION SHALL BE INCLUDED UNDER GUARANTEE REQUIRED BY THIS DIVISION.
1.4. ENGINEER: WHERE REFERENCED IN THIS DIVISION, "ENGINEER" IS ENGINEER OF RECORD & DESIGN PROFESSIONAL FOR WORK UNDER THIS DIVISION, & IS CONSULTANT TO, & AN AUTHORIZED REPRESENTATIVE OF, ARCHITECT. AS DEFINED IN GENERAL &/OR SUPPLEMENTARY CONDITIONS. WHEN USED IN THIS DIVISION. IT MEANS INCREASED INVOLVEMENT BY. & OBLIGATIONS TO, ENGINEER, IN ADDITION TO INVOLVEMENT BY. & OBLIGATIONS TO, "ARCHITECT".
1.5. AHJ: LOCAL CODE &/OR INSPECTION AGENCY (AUTHORITY) HAVING JURISDICTION OVER WORK.
1.6. THE TERMS "APPROVED EQUAL", "EQUIVALENT". OR "EQUAL" ARE USED SYNONYMOUSLY & SHALL MEAN "ACCEPTED BY OR ACCEPTABLE TO ENGINEER AS EQUIVALENT TO ITEM OR MANUFACTURER SPECIFIED".
1.7. THE TERM "APPROVED" SHALL MEAN LABELED, LISTED. OR BOTH. BY NATIONALLY RECOGNIZED TESTING LABORATORY (E.G. UL. ETL. CSA). & ACCEPTABLE TO AHJ OVER THIS PROJECT.

22-I-D. MATERIAL & WORKMANSHIP
1. PROVIDE NEW MATERIAL, EQUIPMENT. & APPARATUS UNDER THIS CONTRACT UNLESS OTHERWISE STATED HEREIN. OF BEST QUALITY NORMALLY USED FOR PURPOSE IN GOOD COMMERCIAL PRACTICE & FREE FROM DEFECTS. MODEL NUMBERS LISTED IN SPECIFICATIONS OR SHOWN ON DRAWINGS ARE NOT NECESSARILY INTENDED TO DESIGNATE REQUIRED TRIM, WRITTEN DESCRIPTIONS OF TRIM GOVERN MODEL NUMBERS.
2. PIPE, FITTINGS, SPECIALTIES & VALVES SHALL BE MANUFACTURED IN USA. WORK PERFORMED UNDER THIS CONTRACT SHALL PROVIDE NEAT & "WORKMANLIKE" APPEARANCE WHEN COMPLETED TO SATISFACTION OF ARCHITECT & ENGINEER. WORKMANSHIP SHALL BE FINEST POSSIBLE BY EXPERIENCED MECHANICS. INSTALLATIONS SHALL COMPLY W/ APPLICABLE CODES & LAWS. COMPLETE INSTALLATION SHALL FUNCTION AS DESIGNED & INTENDED W/ RESPECT TO EFFICIENCY, CAPACITY, NOISE LEVEL. ETC. ABNORMAL NOISE CAUSED BY RATTLING EQUIPMENT, PIPING, DUCTS. AIR DEVICES. & SQUEAKS IN ROTATING COMPONENTS WILL NOT BE ACCEPTABLE. IN GENERAL MATERIALS & EQUIPMENT SHALL BE OF COMMERCIAL SPECIFICATION GRADE IN QUALITY. LIGHT DUTY & RESIDENTIAL EQUIPMENT IS NOT ACCEPTABLE.
3. REMOVE FROM PREMISES WASTE MATERIAL PRESENT FROM WORK, INCLUDING CARTONS, CRATING, PAPER, STICKERS, &/OR EXCAVATION MATERIAL NOT USED.
4. CLEAN EQUIPMENT INSTALLED UNDER THIS CONTRACT TO PRESENT NEAT & CLEAN INSTALLATION AT COMPLETION.
5. REPAIR OR REPLACE PUBLIC & PRIVATE PROPERTY DAMAGED AS RESULT OF WORK PERFORMED UNDER THIS CONTRACT TO SATISFACTION OF AUTHORITIES & REGULATIONS HAVING JURISDICTION.

22-I-E. COORDINATION
1. COORDINATE WORK W/ OTHER TRADES SO VARIOUS COMPONENTS OF SYSTEMS WILL BE INSTALLED AT PROPER TIME WILL FIT AVAILABLE SPACE & WILL ALLOW PROPER SERVICE ACCESS FOR MAINTENANCE. COMPONENTS WHICH ARE INSTALLED WITHOUT REGARD TO ABOVE SHALL BE RELOCATED AT NO ADDITIONAL COST TO OWNER.
2. UNLESS OTHERWISE INDICATED, GENERAL CONTRACTOR WILL PROVIDE CHASES & OPENINGS IN BUILDING CONSTRUCTION REQUIRED FOR INSTALLATION OF SYSTEMS SPECIFIED HEREIN. CONTRACTOR SHALL FURNISH GENERAL CONTRACTOR W/ INFORMATION WHERE CHASES & OPENINGS ARE REQUIRED.
3. KEEP INFORMED AS TO WORK OF OTHER TRADES ENGAGED IN CONSTRUCTION OF PROJECT & EXECUTE WORK IN MANNER AS TO NOT INTERFERE W/ OR DELAY WORK OF OTHER TRADES. FIGURED DIMENSIONS SHALL BE TAKEN IN PREFERENCE TO SCALE DIMENSIONS.
4. CONTRACTOR SHALL TAKE HIS OWN MEASUREMENTS AT BUILDING, AS VARIATIONS MAY OCCUR. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ERRORS THAT COULD HAVE BEEN AVOIDED BY PROPER CHECKING & INSPECTION.
5. PROVIDE MATERIALS W/ TRIM THAT WILL PROPERLY FIT TYPES OF CEILING, WALL. OR FLOOR FINISHES ACTUALLY INSTALLED. MODEL NUMBERS LISTED IN SPECIFICATIONS OR SHOWN ON DRAWINGS ARE NOT INTENDED TO DESIGNATE REQUIRED TRIM.

22-I-F. ORDINANCES & CODES
1. WORK PERFORMED UNDER THIS CONTRACT SHALL. AT MINIMUM, BE IN CONFORMANCE W/ APPLICABLE NATIONAL, STATE & LOCAL CODES HAVING JURISDICTION. EQUIPMENT FURNISHED & ASSOCIATED
2. INSTALLATION WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN STRICT COMPLIANCE W/ CURRENT APPLICABLE CODES ADOPTED BY LOCAL AHJ INCLUDING ANY AMENDMENTS & STANDARDS AS SET FORTH BY NATIONAL FIRE PROTECTION ASSOCIATION (NFPA). UNDERWRITERS LABORATORIES (UL), OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA). AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME), AMERICAN SOCIETY OF HEATING, REFRIGERATION, & AIR CONDITIONING ENGINEERS (ASHRAE). AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI), AMERICAN SOCIETY OF TESTING MATERIALS (ASTM) & OTHER NATIONAL STANDARDS & CODES WHERE APPLICABLE.
3. WHERE CONTRACT DOCUMENTS EXCEED REQUIREMENTS OF REFERENCED CODES. STANDARDS, ETC., CONTRACT DOCUMENTS SHALL TAKE PRECEDENCE.
4. PROCURE & PAY FOR PERMITS & LICENSES REQUIRED FOR ACCOMPLISHMENT OF WORK HEREIN DESCRIBED. WHERE REQUIRED, OBTAIN. PAY FOR & FURNISH CERTIFICATES OF INSPECTION TO OWNER. CONTRACTOR WILL BE HELD RESPONSIBLE FOR VIOLATIONS OF LAW.

22-I-G. PROTECTION OF EQUIPMENT & MATERIALS
1. STORE & PROTECT FROM DAMAGE EQUIPMENT & MATERIALS DELIVERED TO JOB SITE. COVER AS REQUIRED TO PROTECT FROM DIRT & DAMAGE. PLUG OR CAP OPEN ENDS OF DUCTWORK & PIPING SYSTEMS WHILE STORED & INSTALLED DURING CONSTRUCTION WHEN NOT IN USE TO PREVENT ENTRANCE OF DEBRIS INTO SYSTEMS. EQUIPMENT & MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, & CONTRACTOR IS OBLIGATED TO FURNISH NEW EQUIPMENT & MATERIAL OF LIKE KIND. KEEP PREMISES BROOM CLEAN FROM FOREIGN MATERIAL CREATED DURING WORK PERFORMED UNDER THIS CONTRACT. PIPING, EQUIPMENT, ETC. SHALL HAVE NEAT & CLEAN APPEARANCE AT COMPLETION.

22-I-M. WARRANTIES
1. WARRANT EACH SYSTEM & EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP DESIGN OR MATERIAL FOR PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY LONGER WARRANTY IN CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN WARRANTY PERIOD(S) STATED IN GENERAL CONDITIONS & DIVISION 1. WARRANTIES SHALL INCLUDE LABOR & MATERIAL. MAKE REPAIRS OR REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO OWNER. PERFORM REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM ENGINEER OR OWNER.
2. AT TIME OF SUBSTANTIAL COMPLETION, DELIVER TO OWNER ALL WARRANTIES IN WRITING & PROPERLY EXECUTED INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND ONE YEAR PERIOD. EACH WARRANTY INSTRUMENT BEING ADDRESSED TO OWNER & STATING COMMENCEMENT DATE & TERM.

22-I-N. CUTTING & PATCHING
1. PERFORM CUTTING OF WALLS, FLOORS, CEILINGS, ETC. AS REQUIRED TO INSTALL WORK UNDER THIS SECTION. OBTAIN PERMISSION FROM ARCHITECT PRIOR TO CUTTING. DO NOT CUT OR DISTURB STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL FROM ARCHITECT. CUT HOLES AS SMALL AS POSSIBLE. GENERAL CONTRACTOR SHALL PATCH WALLS, FLOORS, ETC. AS REQUIRED BY WORK UNDER THIS SECTION. PATCHING SHALL MATCH ORIGINAL MATERIAL & CONSTRUCTION. REPAIR & REFINISH AREAS DISTURBED BY WORK TO CONDITION OF ADJOINING SURFACES IN MANNER SATISFACTORY TO ARCHITECT.

22-I-O. ROUGH-IN
1. COORDINATE ROUGH-IN W/ GENERAL CONSTRUCTION & OTHER TRADES. CONCEAL PIPING & CONDUIT ROUGH-IN EXCEPT IN UNFINISHED AREAS & WHERE OTHERWISE SHOWN.

22-I-P. STRUCTURAL STEEL
1. STRUCTURAL STEEL USED FOR SUPPORT OF EQUIPMENT & PIPING SHALL BE NEW, CLEAN, & CONFORM TO ASTM A-36. SUPPORT PLUMBING COMPONENTS FROM BUILDING STRUCTURE. DO NOT SUPPORT PLUMBING COMPONENTS FROM CEILINGS, OTHER PLUMBING OR ELECTRICAL COMPONENTS, & OTHER NON-STRUCTURAL ELEMENTS.

22-I-R. PENETRATIONS
1. SEAL PLUMBING FLOOR, EXTERIOR WALL & ROOF PENETRATIONS WATERTIGHT & WEATHERTIGHT. SEAL AROUND PLUMBING PENETRATIONS W/ 3M CP-25 FIRE BARRIER CAULK (THICKNESS AS REQUIRED & RECOMMENDED BY MANUFACTURER) TO MAINTAIN RESISTANCE RATING OF FIRE-RATED ASSEMBLIES. PROVIDE PREFABRICATED ROOF CURBS MANUFACTURED BY CUSTOM CURB, INC., PATE COMPANY, THYCURB OR APPROVED EQUAL. PROVIDE ROOF CURB W/ FACTORY INSTALLED WOOD NAILER; WELDED, 18 GAUGE GALVANIZED STEEL SHELL, BASE PLATE & FLASHING; 1-1/2" THICK, 3 POUND RIGID INSULATION; FULLY MITERED 3-INCH RAISED CANT; COVER OF WEATHER-RESISTANT, WEATHER-PROOF MATERIAL & PIPE COLLAR OF WEATHER-RESISTANT MATERIAL W/ STAINLESS STEEL PIPE CLAMPS. MAKE ROOF PENETRATIONS BY AUTHORIZED ROOFING CONTRACTOR WHEN REQUIRED.

22-I-Y. BUILDING OPERATION
1. ACCOMPLISH WORK REQUIRING INTERRUPTION OF BUILDING OPERATION AT TIME WHEN BUILDING IS NOT IN OPERATION, & ONLY W/ WRITTEN APPROVAL OF BUILDING OWNER &/OR TENANT. COORDINATE INTERRUPTION OF BUILDING OPERATION W/ OWNER &/OR TENANT MINIMUM OF SEVEN DAYS IN ADVANCE OF WORK.

22-II. PLUMBING

22-II-A. PIPING & INSULATION
1. GAS PIPING – PROVIDE SCHED 40 CONT. WELD CARBON STEEL W/ CORRESPONDING FITTINGS. PROVIDE THREADED FITTINGS. PROVIDE IRON BODY-BRASS PLUG GAS STOPS.

22-II-B. VALVES
1. EQUIVALENT VALVES LISTED ON CURRENT COMPARISON CHARTS OF SPECIFIED VALVE MANUFACTURERS BY MILWAUKEE, STOCKHAM, POWELL, RED-WHITE, CRANE, APOLLO, MUELLER, MUESSCO, WATTS, HAYS, ROCKWELL-NORDSTROM.
2. BALL VALVES – 2" & UNDER – BRONZE FULL PORT W/ TEFLON SEATS, BRONZE BALL & INSULATED HANDLE.
3. BUTTERFLY VALVES – 3" & LARGER LEVER ASTM A126 CI DRILLED & TAPPED FULL LUG BODY, 200 PSI-WOG, EXTENDED NECK, BRONZE DISC, STAINLESS STEEL STEM, FIELD-REPLACEABLE EPDM SLEEVE & STEM SEALS.

22-II-E. PLUMBING EXECUTION
1. PROVIDE UNIONS OR FLANGED JOINTS IN EACH PIPE LINE PRECEDING CONNECTIONS TO EQUIPMENT TO ALLOW REMOVAL FOR REPAIR OR REPLACEMENT. PROVIDE ALL SCREWED & CONTROL VALVES W/ UNIONS ADJACENT TO EACH CONNECTION. PROVIDE SCREWED END VALVES W/ UNION ADJACENT TO VALVE UNLESS VALVE CAN BE OTHERWISE EASILY REMOVED FROM LINE.
2. ALL PIPING SHALL BE PROPERLY SUPPORTED WITH HANGERS AND SUPPORTS SPECIFICALLY INTENDED FOR THAT PURPOSE. PROVIDE CLEVIS HANGERS, UNISTRUT BRACKETS AND PIPE CLAMPS AND SIMILAR SYSTEMS. PROTECT INETGRITY OF INSULATION AND PROVIDE RIGID INSULATION INSERTS OR PIPE SADDLES AS NECESSARY.
3. AFTER PIPING IS IN PLACE TEST LINES TO INSURE NO LEAKS.
4. ALL PIPING & EQUIPMENT SHALL BE SUPPORTED PROPERLY.
5. ESCUTCHEONS – PROVIDE NICKEL-BRASS OR CHROME PLATED ON ALL EXPOSED PIPES WHEN PASSING THRU WALL OR CEILING OF FINISHED ROOMS.

SHEET INDEX

811 KANSAS ONE-CALL CENTER: ALWAYS CALL BEFORE YOU DIG

PROTECT YOURSELVES AND YOUR PROPERTY AGAINST UNDERGROUND UTILITY DAMAGE AND LIABILITY.

FIND OUT WHERE THE UNDERGROUND UTILITY LINES MIGHT BE BURIED BEFORE YOU DIG.

ANYONE DIGGING IN KANSAS MUST CALL BEFORE DIGGING. THE PERSON WHO IS DOING THE WORK IS RESPONSIBLE FOR CALLING. IF THE OWNER CONTRACTS WITH A PROFESSIONAL EXCAVATOR TO DO THE EXCAVATION THEN THE PROFESSIONAL EXCAVATOR IS RESPONSIBLE FOR CALLING.

YOU (THE DIGGER) WILL NEED TO PROVIDE INFORMATION ABOUT THE WORK SITE WHEN YOU CALL. THIS IS A FREE SERVICE.

CALL BEFORE YOU DIG, IT'S THE LAW.

PRELIMINARY NOT FOR CONSTRUCTION

pkmr ENGINEERS
24.121
PEARSON KENT MCKINLEY RAAF ENGINEERS LLC
2933 SW WOODSIDE DR., SUITE C TOPEKA, KS 66614
785.273.2447 WWW.PKMRENG.COM

TOPEKA METROPOLITAN TRANSIT AUTHORITY GENERATOR ADDITION

820 SE QUINCY STREET TOPEKA, KS

ISSUED FOR:

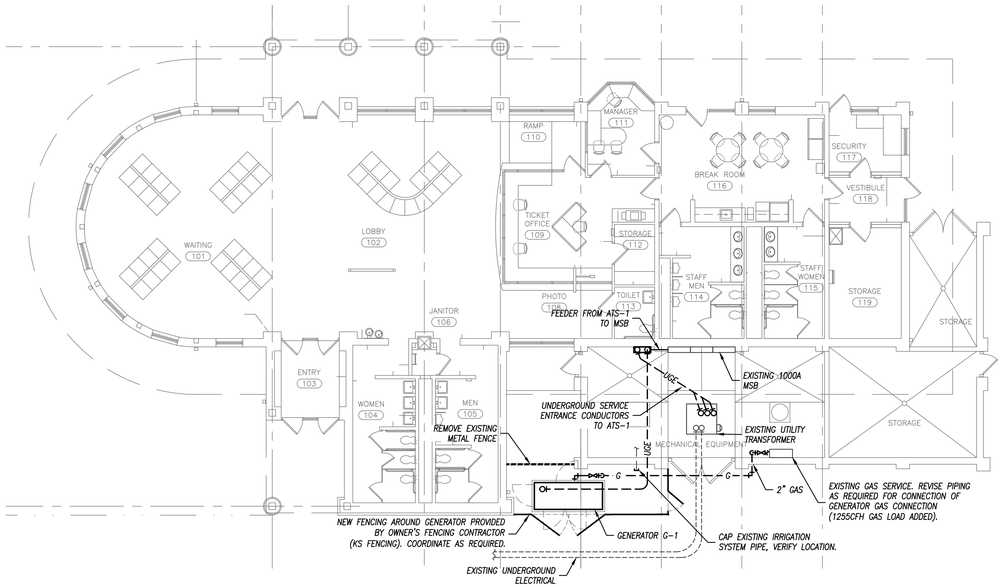
	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		

DRAWN BY:	KAH
CHECKED BY:	SWM

SHEET TITLE: SYMBOLS, NOTES, & SPECIFICATIONS

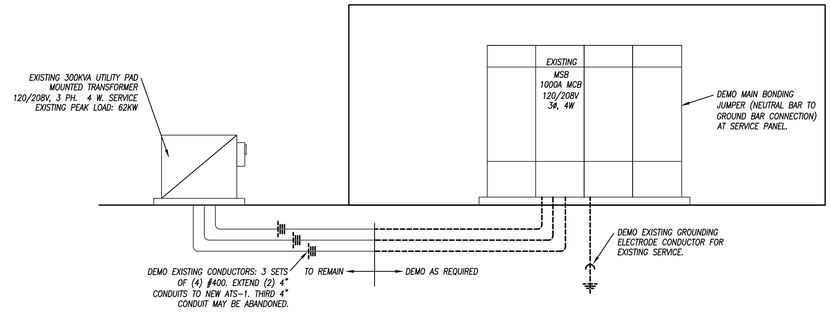
DATE: 3/12/24 PKMR PROJECT: 24.121

SHEET NUMBER: MEP1



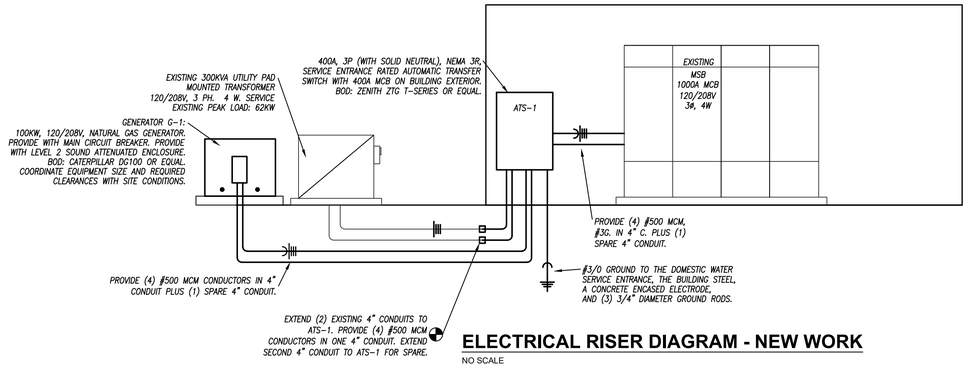
QUINCY STATION BUILDING MEP PLAN

3/32" = 1'



ELECTRICAL RISER DIAGRAM - DEMO

NO SCALE

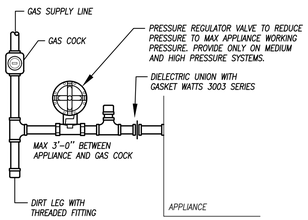


ELECTRICAL RISER DIAGRAM - NEW WORK

NO SCALE

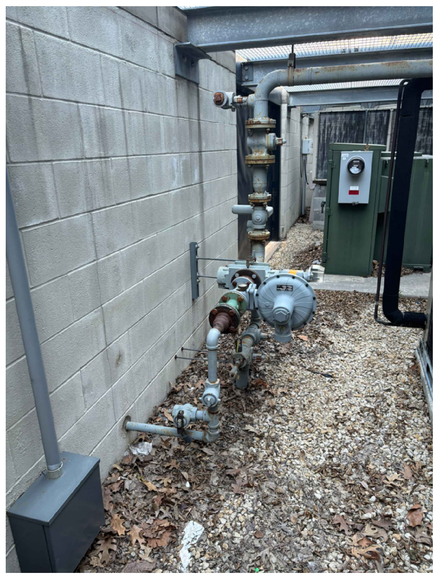
PIPING MATERIAL & INSULATION SCHEDULE

PIPING SYSTEM	SIZE	TYPE/SCHED	MATERIAL	ACCEPTABLE FITTINGS	FIELD TEST PRESSURE/TIME	ALLOWABLE IN PLENUMS	INSULATION TYPE	INSULATION THICKNESS
NATURAL GAS – ABOVE GRADE	2-1/2 & Up	SCH. 40	STEEL– SEEMED	WELDED	75 PSI – 1HR	YES	----	----
NATURAL GAS – ABOVE GRADE	1/2"-2"	SCH. 40	STEEL– SEEMLESS	THREADED IRON	75 PSI – 1HR	YES	----	----
NATURAL GAS BELOW GRADE	ALL	SDR-11	POLYETHYLENE	FUSION JOINTS	100 PSI – 1HR	NO	----	----



TYPICAL GAS CONNECTION

NOT TO SCALE



EXISTING GAS SERVICE AND TRANSFORMER

NOT TO SCALE

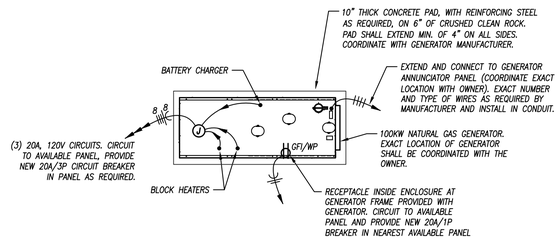
EQUIPMENT FAULT CURRENT RATING SCHEDULE

EQUIPMENT	SCA **	SCCR	% OF RATING	NOTES
AUTOMATIC TRANSFER SWITCH ATS-1	51,110	65,000	79%	-

NOTES:

1. RATING BASED ON AN ASSUMED FAULT AT UTILITY CO. TRANSFORMER OF 75,022A.

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



ENLARGED GENERATOR PLAN

NOT TO SCALE

PRELIMINARY
NOT FOR CONSTRUCTION

pkmr ENGINEERS
24.121
PEARSON KENT MCKINLEY RAAF ENGINEERS LLC
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TOPEKA METROPOLITAN TRANSIT AUTHORITY GENERATOR ADDITION

820 SE QUINCY STREET
TOPEKA, KS

ISSUED FOR:

	DESCRIPTION	DATE
1		
2		
3		
4		
5		
6		
7		
8		

DRAWN BY:	KAH
CHECKED BY:	SWM

SHEET TITLE:
MEP PLAN & DETAILS

DATE: 3/12/24
PKMR PROJECT: 24.121

SHEET NUMBER:
MEP2