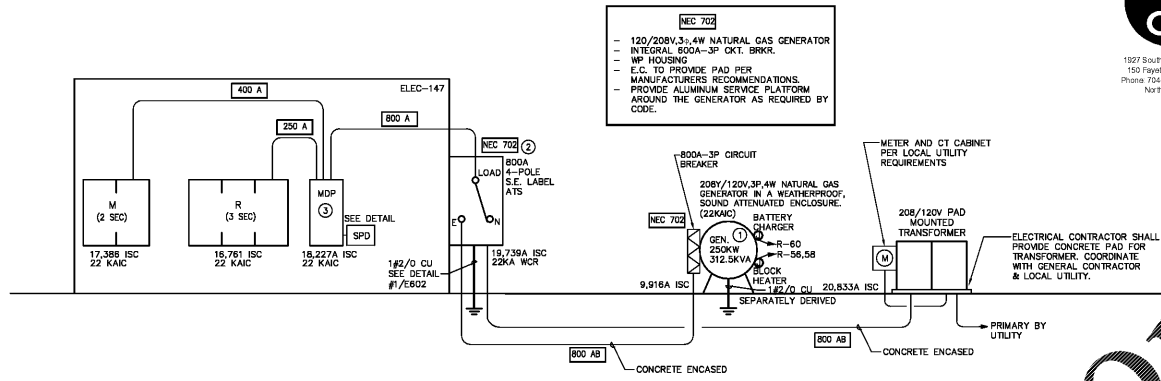


FEEDER SCHEDULE FOR COPPER CONDUCTORS TO SPECIFIC BREAKER SIZE			
BREAKER SIZE	THREE PHASE (COPPER) WIRE/CONDUIT SIZE	BREAKER SIZE	THREE PHASE (COPPER) WIRE/CONDUIT SIZE
20 A	4#12/10 G 3/4"	150 A	4#1/0/1#6 G 2"
25 A	4#10/10 G 3/4"	175 A	4#2/0/1#6 G 2"
30 A	4#10/10 G 3/4"	200 A	4#3/0/1#6 G 2-1/2"
35 A	4#8/10 G 3/4"	225 A	4#4/0/1#6.2-1/2"
40 A	4#8/10 G 3/4"	250 A	4-250KCMIL/1#6.2-1/2"
45 A	4#8/10 G 1"	300 A	4-350KCMIL/1#6.3"
50 A	4#8/10 G 1"	350 A	4-500KCMIL/1#6.3-1/2"
60 A	4#4/10 G 1-1/4"	400 A	(2) 4#3/0/1#6.2"
70 A	4#4/10 G 1-1/4"	450 A	(2) 4#4/0/1#6.2-1/2"
80 A	4#3/1#6 G 1-1/4"	500 A	(2) 4-250KCMIL/1#6.2-1/2"
90 A	4#2/1#6 G 1-1/4"	600 A	(3) 4-300 KCMIL/1#1/0G.3"
100 A	4#1/1#6 G 1-1/2"	800 AB	(3) 4-300 KCMIL/1"
110 A	4#1/1#6 G 1-1/2"		
125 A	4#1/1#6 G 1-1/2"		



**1 POWER RISER DIAGRAM**

- NO SCALE
- NOTES:
- ALL FEES ASSOCIATED WITH UTILITY COMPANY COORDINATION, INCLUDING PURCHASE OF UTILITY TRANSFORMER, TRANSFORMER, PRIMARY FEES, PAD, AND ADMINISTRATIVE FEES SHALL BE INCLUDED AS PART OF THE E.C. CONTRACT. AT MINIMUM \$1000.00 ESTIMATED FOR THE UNBUNDLED TRANSFORMER SERVICE FEE.
  - GENERATOR SHALL BE DEFINED AS SEPARATELY DERIVED AND COMPLY WITH ALL REQUIREMENTS. REFERENCE GENERATOR GROUNDING SHALL BE PROVIDED AND INSTALL REQUIRED FUEL SYSTEM AND ALL REQUIRED ASSOCIATED SUPPORT. GENERATOR SHALL INCLUDE PROVISIONS FOR PORTABLE LOAD BANK. COORDINATE WIRING AND AUXILIARY CONTACT REQUIREMENTS FOR GENERATOR START SIGNAL WITH ATS AND GENERATOR MANUFACTURER PRIOR TO ROUGH IN.
  - PROVIDE SIGNAGE INDICATING TYPE AND LOCATION OF STANDBY GENERATOR AS REQUIRED PER 2017 NEC 702.7.

**EMERGENCY POWER SYSTEM**

**GENERAL**

- CONTRACTOR SHALL FURNISH AND INSTALL, AS INDICATED ON THE PLANS AND AS HEREIN SPECIFIED, A COMPLETE SYSTEM FOR THE GENERATION, CONTROL, AND DISTRIBUTION OF ELECTRICAL POWER UPON FAILURE OF NORMAL SOURCE.
- SYSTEM SHALL INCLUDE ENGINE-GENERATOR UNIT, AUTOMATIC TRANSFER SWITCHES, AND ALL OTHER WIRING, RACKS/WAYS, EQUIPMENT, HARDWARE, ETC. NECESSARY FOR A COMPLETE AND PROPERLY FUNCTIONING SYSTEM. WHETHER OR NOT EXIST, SUCH ITEM IS SPECIFICALLY SHOWN OR MENTIONED.
- SYSTEM SHALL COMPLY WITH THE REQUIREMENTS OF NFPA 37, NEC ARTICLE 700, UL 2200, STATE BUILDING CODE, AND ALL LOCAL CODES AND REQUIREMENTS.
- UPON FAILURE TO NORMAL POWER SOURCE TO THE AUTOMATIC TRANSFER SWITCH, SYSTEM SHALL FUNCTION AUTOMATICALLY TO RESTORE POWER TO DESIGNATED LOADS FROM THE ENGINE-GENERATOR SET WITHIN 10 SECONDS.
- POWER RATING OF THE ENGINE-GENERATOR SET SHALL BE BASED ON OPERATION AT 1800 RPM WHEN EQUIPPED WITH ALL NECESSARY OPERATION ACCESSORIES SUCH AS AIR CLEANERS, LUBRICATING OIL PUMP, JACKET WATER PUMP, GOVERNOR, ALTERNATING CURRENT GENERATOR, AND EXCITER REGULATOR. RADIATOR FAN SHALL BE INCLUDED AS NECESSARY OPERATING ACCESSORY. RATING SHALL APPLY AT SITE CONDITIONS.
- THE ENGINE SHALL BE WATER-COOLED, IN-LINE VEE TYPE, WITH FOUR-STROKE CYCLE.
- THE ENGINE SHALL BE COMPRESSION IGNITION DIESEL WHICH MEETS SPECIFICATIONS FOR OPERATING ON NO. 2 FUEL OIL.
- THE ENGINE SHALL BE EQUIPPED WITH LUBE OIL INTAKE AIR FILTERS, LUBE OIL COOLER, FUEL TRANSFER PUMP, FUEL PRIMING PUMP, RUNNING TIME METER, CHARGING ALTERNATOR, GEAR-DRIVEN WATER PUMP, AND INSTRUMENTS, INCLUDING A FUEL PRESSURE GAUGE, WATER TEMPERATURE GAUGE, LUBRICATING OIL PRESSURE GAUGE AS HEREIN SPECIFIED.
- AN AUTOMATIC VOLTS PER HERTZ TYPE, SOLID STATE EXCITER/REGULATOR, MANUFACTURED BY THE GENERATOR MANUFACTURER, SHALL BE INCLUDED AND SHOCK MOUNTED INSIDE THE GENERATOR. VOLTAGE REGULATION SHALL BE +1% FROM NO LOAD TO FULL RATED LOAD. READILY ACCESSIBLE VOLTAGE DROOP, VOLTAGE LEVEL, AND VOLTAGE GAIN CONTROLS SHALL BE INCLUDED IN THE MODULE. VOLTAGE LEVEL ADJUSTMENTS SHALL BE MINIMUM OF +10%. THE MODULE SHALL INCLUDE THE FOLLOWING PROTECTIVE FEATURES:
- VOLTAGE REGULATOR SHALL BE THREE PHASE SENSING. SINGLE SENSING SHALL NOT BE ACCEPTABLE.
- AN ENGINE-MOUNTED RADIATOR WITH FLOWER-TYPE FAN SHALL BE PROVIDED TO MAINTAIN SAFE OPERATION AT 110 DEGREE F+ (43 DEGREES C) AMBIENT TEMPERATURE. TOTAL AIR FLOW RESTRICTION TO AND FROM THE RADIATOR SHALL NOT EXCEED 0.5 IN. H<sub>2</sub>O (0.12 KPA).
- THE ENGINE COOLING SYSTEM SHALL BE PRECIPITATED BY THE ENGINE SUPPLIER FOR THE INHIBITION OF INTERNAL CORROSION. IN ADDITION, A SOLUTION OF 50% ETHYLENE GLYCOL SHALL BE ADDED, TO PREVENT FREEZING OF SYSTEM DUE TO EXTREME TEMPERATURES.
- A CRITICAL EXHAUST SILENCER, AND ALL REQUIRED ACCESSORIES AND FITTINGS, SHALL BE PROVIDED. THE EXHAUST SILENCER SHALL BE MOUNTED DIRECTLY ON THE EXHAUST ELBOW OF THE ENGINE AND SUCH THAT ITS WEIGHT IS NOT SUPPORTED BY THE ENGINE NOR WILL EXHAUST SYSTEM GROWTH, DUE TO THERMAL EXPANSION, BE IMPOSED ON THE ENGINE. THE EXHAUST PIPE SIZE SHALL BE SUFFICIENT TO ENSURE THAT EXHAUST BACK-PRESSURE DOES NOT EXCEED THE MAXIMUM LIMITATIONS SPECIFIED BY THE ENGINE MANUFACTURER.
- THE ENGINE SHALL BE EQUIPPED WITH A 24 VOLT ELECTRIC STARTING SYSTEM WITH POSITIVE ENGAGEMENT DRIVE AND OF SUFFICIENT CAPACITY TO CRANK THE ENGINE AT A SPEED WHICH WILL START THE ENGINE UNDER OPERATING CONDITIONS. THE STARTING PRINION WILL DISENGAGE AUTOMATICALLY WHEN THE ENGINE STARTS. THE STARTING SYSTEM SHALL INCORPORATE AN AUTOMATICALLY RESET CIRCUIT BREAKER FOR ANTIJUMP ENGAGEMENT.
- FULLY AUTOMATIC GENERATOR SET START-STOP CONTROLS IN THE GENERATOR CONTROL PANEL SHALL BE PROVIDED. CONTROLS SHALL PROVIDE SHUTDOWN FOR LOW OIL PRESSURE, HIGH WATER TEMPERATURE, OVERSPEED, OVERCRANK, AND ONE AUXILIARY CONTACT FOR ACTIVATING ACCESSORY ITEMS. CONTROLS SHALL INCLUDE ONE 30-SECOND CRACKING CYCLE WITH LOCKOUT AND MANUAL RESET FEATURE.
- AN ENGINE-MOUNTED THERMAL CIRCULATION TANK-TYPE IMMERSION WATER HEATER INCORPORATING AN ADJUSTABLE THERMOSTATIC SWITCH SHALL BE FURNISHED TO MAINTAIN ENGINE JACKET WATER TO 90 DEGREES F (32.2 DEGREES C) IN A STILL AIR, AMBIENT TEMPERATURE OF 30 DEGREES F (+1.1 DEGREES C). THE HEATER SHALL BE 208 VOLT, SINGLE PHASE, 9KW, 60HZ, VEE-TYPE ENGINES OF 12 CYLINDERS OR MORE SHALL HAVE ONE HEATER PER EACH BANK OF CYLINDERS.
- A LEAD-ACID STORAGE BATTERY SET OF THE HEAVY-DUTY DIESEL STARTING TYPE SHALL BE PROVIDED. BATTERY VOLTAGE SHALL BE COMPATIBLE WITH THE STARTING SYSTEM. THE BATTERY SET SHALL BE RATED NO LESS THAN 200 AMPERE HOURS. A BATTERY RACK CONSTRUCTED IN CONFORMANCE WITH NEC REQUIREMENTS AND NECESSARY CABLES AND CLAMPS SHALL BE PROVIDED. BATTERIES SHALL BE CAPABLE OF CRANKING ENGINE AT RATED AMBIENT FOR A MINIMUM OF FIVE MINUTES.
- A CURRENT LIMITING, FLOAT-EQUALIZE CHARGER SHALL BE FURNISHED TO AUTOMATICALLY RECHARGE BATTERIES. THE CHARGER SHALL FLOAT AT 2.17 VOLTS PER CELL AND EQUALIZE AT 2.33 VOLTS PER CELL. IT SHOULD INCLUDE OVERLOAD PROTECTION, SILICON DIODE FULL WAVE RECTIFIERS, VOLTAGE SURGE SUPPRESSORS, DC AMMETER, AND FUSED C OUTPUT. AC INPUT VOLTAGE SHALL BE 120 VOLTS, SINGLE PHASE. AMPERAGE OUTPUT SHALL BE NO LESS THAN 5 AMPERES. CHARGER SHALL BE WALL-MOUNTING TYPE IN NEMA 1 ENCLOSURE.
- MAIN LINE MOLDED CASE, THREE-POLE, SINGLE THROW CIRCUIT BREAKERS RATED AS INDICATED ON THE DRAWINGS, AT 104 DEGREES F (40 DEGREES C) AMBIENT TEMPERATURE SHALL BE INSTALLED FOR THREE PHASE OVERLOADS AND FOR SHORT CIRCUIT PROTECTION. THESE RATINGS SHALL INCLUDE AT LEAST 10% ADDITIONAL CAPACITY FOR OVERLOAD AND OPERATING TEMPERATURE RISE OVER 104 DEGREES F (40 DEGREES C). IT SHALL OPERATE BOTH MANUALLY FOR NORMAL STARTING FUNCTIONS AND AUTOMATICALLY DURING OVERLOAD AND SHORT CIRCUIT CONDITIONS.
- GENERATOR SHALL BE PROVIDED WITH THE FOLLOWING NON-STANDARD OPTIONS: EXTENDED WARRANTY, CRITICAL EXHAUST SILENCER, FLEXIBLE BATTERY HEATER, MAIN LINE CIRCUIT BREAKERS AND 21-LIGHT PORTABLE GENERATOR.

**WP ENCLOSURE (SOUND-ATTENUATED)**

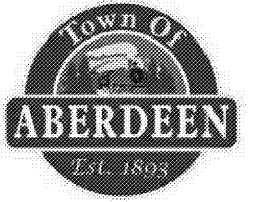
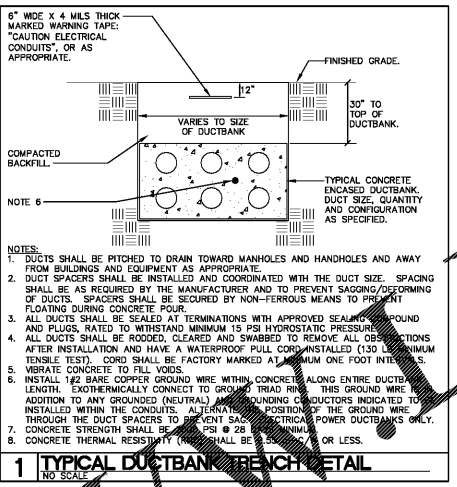
- THE WEATHERPROOF, SOUND-ATTENUATED (LEVEL II) ENCLOSURE FOR THE GENERATOR AND ALL OTHER ITEMS SHALL BE DESIGNED AND BUILT BY THE ENGINE MANUFACTURER AS AN INTEGRAL PART OF THE ENTIRE GENERATOR SET AND BE DESIGNED TO PERFORM WITHOUT OVERHEATING IN THE AMBIENT TEMPERATURE SPECIFIED.
- THE EXHAUST SILENCER SHALL BE MOUNTED IN THE WEATHERPROOF, SOUND-ATTENUATED ENCLOSURE ENCLOSURE AND PROTECTED THROUGH THE ENCLOSURE. A RAIN CAP SHALL BE PROVIDED.
- UNIT SHALL HAVE BRANDED CORROSION RESISTANT SHEET METAL, SUITABLY REINFORCED TO BE VIBRATION FREE IN THE OPERATING MODE. THE ROOF SHALL BE PITCHED TO ALLOW DRAINAGE OF RAIN WATER.
- THE UNIT SHALL HAVE BRANDED ENAMEL FINISH WITH PRIMER AND FINISH COAT TO BE PAINTED BEFORE ASSEMBLY. ALL FASTENERS SHALL BE RUST RESISTANT.
- UNIT SHALL HAVE SUFFICIENT GUARDS TO PREVENT ENTRANCE BY SMALL ANIMALS.
- THE BATTERIES SHALL FIT INSIDE ENCLOSURE AND ALONG SIDE THE ENGINE.
- THE UNIT SHALL HAVE COOLANT AND OIL DRAINS OUTSIDE THE UNIT TO FACILITATE MAINTENANCE. EACH DRAIN LINE SHALL HAVE A HIGH QUALITY VALVE LOCATED NEAR THE FLUID SOURCE.

**AUTOMATIC TRANSFER SWITCH (ATS)**

- PROVIDE AND INSTALL AUTOMATIC TRANSFER SWITCHES) TO OPERATE ON A 3-PHASE, 4-WIRE, 60HZ SYSTEM VOLTAGE. VOLTAGE AND AMPERAGE AND OTHER REQUIREMENTS SHALL BE AS NOTED ON THE DRAWINGS. THE TRANSFER SWITCH SHALL BE 3-POLE WITH SOLID NEUTRAL UNLESS INDICATED AS 4-POLE ON THE POWER RISER DIAGRAM. THE ENTIRE ASSEMBLY SHALL BE UL LISTED UNDER UL-1008 AND COMPLY WITH NATIONAL ELECTRICAL CODE REQUIREMENTS.
- THE TRANSFER SWITCH SHALL BE DOUBLE THROW, ACTUATED BY A SINGLE ELECTRICAL OPERATOR, MOMENTARILY ENERGIZE, AND CONNECTED TO THE TRANSFER MECHANISM BY A SINGLE OVER-CENTER-TYPE LINKAGE WITH A TOTAL TRANSFER TIME NOT TO EXCEED ONE-HALF SECOND. THE TRANSFER SWITCH SHALL BE CAPABLE OF TRANSFERRING SUCCESSFULLY WITHOUT THE USE OF HOOKS, LATCHES, MAGNETS OR SPRINGS AND SHALL BE SILVER-TUNGSTEN ALLOY. SEPARATE ARROW CONTACTS, WITH MAGNETIC BLOWERS, SHALL BE PROVIDED ON ALL TRANSFER SWITCHES. INTERLOCKED MOLDED CASE CIRCUIT BREAKERS OR CONTACTORS ARE NOT ACCEPTABLE. THE TRANSFER SWITCH SHALL BE EQUIPPED WITH A PERMANENTLY ATTACHED SAFE MANUAL OPERATOR DESIGNED TO PREVENT INJURY TO OPERATING PERSONNEL.
- THE MANUAL OPERATOR SHALL PROVIDE A SAME CONTACT-TO-CONTACT TRANSFER SPEED AS THE ELECTRICAL OPERATOR TO PREVENT A FLASH-OVER FROM SWITCHING THE MAIN CONTACTS SLOWLY.
- PROVIDE INTEGRAL MODULE OPTION FOR INTERFACES TO GAS CONTROLS. CONTRACTOR SHALL COORDINATE WITH GAS CONTRACTOR FOR EXACT REQUIREMENTS, PROTOCOL LANGUAGE, APPURTENANCES, ETC. PRIOR TO SUBMITTING SUBMITTALS FOR REVIEW.

**TESTING AND COMMISSIONING**

- THE GENERATOR SET SHALL BE TESTED AT THE EQUIPMENT MANUFACTURER'S FACILITY PRIOR TO SHIPMENT. ALL TESTS SHALL BE RECORDED AND SUBMITTED TO THE ARCHITECT/ENGINEER. MINIMUM TESTING SHALL INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING:
  - TRANSIENT RESPONSE
  - VOLTAGE DIP AT 50, 75, AND 100% LOAD
  - FREQUENCY DIP
  - RECOVERY TIME
- CAREFULLY "OHM" OUT CONTROL WIRING BETWEEN THE ENGINE AND GENERATOR SET PRIOR TO CONNECTING, CHECKING FOR OPEN, SHORTS AND/OR GROUNDING. TEST THE ATS FUNCTIONS PRIOR TO CONNECTING LOAD. PRIOR TO CONNECTION, CHECK THE NORMAL AND EMERGENCY INPUT FEEDERS FOR QUALITY, OVERVOLTAGE, OVERCURRENT, AND/OR GROUNDING.
- UPON COMPLETION OF THE INSTALLATION, PART-5 SHALL BE PERFORMED BY THE GENERATOR SET MANUFACTURER, OR A TRULY REPRESENTATIVE. REPRESENTATIVE PARTS BOOKS COVERING THE ENGINE, GENERATOR, AND MAIN AUXILIARY EQUIPMENT SHALL BE PROVIDED TO THE OWNER AT THE TIME OF COMPLETION. OPERATING AND MAINTENANCE MANUALS SHALL BE PROVIDED TO THE OWNER AT THE TIME OF COMPLETION.
- SELECTED PARTS AND WORKMANSHIP UNDER THE TERMS OF THE MANUFACTURER'S WARRANTY SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP, BUT IN NO EVENT, SHALL IT BE FOR A PERIOD LESS THAN 90 DAYS FROM DATE OF INITIAL START-UP OF THE SYSTEM AND SHALL INCLUDE LABOR AND TRAVEL TIME FOR NECESSARY REPAIRS AT THE JOB SITE. REPAIRS SHALL NOT BE A LIMITING FACTOR FOR THE SYSTEM WARRANTY.
- SYSTEM TESTING SHALL INCLUDE AN 8-HOUR, 100% LOAD BANK AND TRANSIENT TESTING. CALIBRATING POWER QUALITY ANALYZERS FOR WAVEFORM CAPTURE AS WELL AS VERIFICATION OF ALL ATS TRANSFER AND OPERATION FUNCTIONS AND SEQUENCE.
- THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR EQUIPMENT/SYSTEM COMMISSIONING AS DIRECTED BY THE COMMISSIONING AUTHORITY (C/A). THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH THE COMMISSIONING AUTHORITY AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT.



RENOVATION AND ADDITION FOR ABERDEEN POLICE DEPARTMENT



POWER RISER DIAGRAM

DATE: 10/25/2019  
PROJECT NO: 18062

REVISIONS

NO.	DATE	DESCRIPTION

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