

PROJECT OVERVIEW

- 1) THE EXISTING TULUKSAK POWER PLANT WAS ORIGINALLY CONSTRUCTED IN 2003. THE POWER PLANT HAS SEVERAL MAJOR MECHANICAL AND ELECTRICAL PROBLEMS THAT HAVE RENDERED IT INOPERABLE. THE COMMUNITY IS CURRENTLY BEING POWERED BY A SELF CONTAINED EMERGENCY GENSET LOCATED OUTSIDE OF THE PLANT. THE POWER PLANT FEEDER BREAKER IS CLOSED AND THE BUS IS ENERGIZED TO PROVIDE POWER PLANT STATION SERVICE POWER.
- 2) THE PURPOSE OF THIS PROJECT IS TO PERFORM AS MANY IMPROVEMENT TASKS AS POSSIBLE WITHIN AVAILABLE FUNDING LIMITATIONS TO RETURN THE POWER PLANT TO OPERABLE CONDITION. THIS PROJECT HAS TWO SEPARATE FUNDING SOURCES: DIESEL EMISSIONS REDUCTION ACT (DERA) AND MAINTENANCE AND IMPROVEMENT (M&I).
- 3) THE MAIN PURPOSE OF THE DERA PROJECT IS TO INSTALL A NEW ENGINE--GENERATOR AND TO PERFORM ALL OF THE ASSOCIATED BASE BID TASKS LISTED HEREIN.
- 4) THE MAIN PURPOSE OF THE M&I PROJECT IS TO INSTALL A NEW ENGINE AND TO PERFORM ALL OF THE ASSOCIATED BASE BID TASKS LISTED HEREIN.
- 5) THE SECONDARY PURPOSE OF BOTH PROJECTS IS TO PERFORM AS MANY OF THE ADDITIVE ALTERNATE TASKS LISTED HEREIN WITHIN THE PROJECT BUDGET IN ORDER TO IMPROVE THE FUNCTIONALITY OF THE POWER PLANT.
- 6) THE BID BREAKDOWN INCLUDES DERA BASE BID, DERA ADDITIVE ALTERNATES, M&I BASE BID, AND M&I ADDITIVE ALTERNATES. ALL WORK IS DESIGNATED BY THOSE FOUR CATEGORIES. THE WORK IS CALLED OUT AS INDIVIDUAL TASKS DESIGNATED WITH UNIQUE LETTERS AND NUMBERS TO MATCH THE ITB BID SCHEDULE. LUMP SUM PRICES MUST BE PROVIDED FOR EACH TASK.

DERA PROJECT SCOPE BASE BID TASKS:

- A** > CLEAN/FLUSH/REPAIR THE ENGINE COOLING SYSTEM
- B** > FURNISH & INSTALL NEW ENGINE & INSTALL OWNER--FURNISHED GENERATOR ON GENSET #1
- C** > INSTALL FIRE EXTINGUISHERS
- D** > RETURN FUNCTION TO RADIATOR VFD CONTROLS (SEE ELECTRICAL)
- E** > OVERHEAD DOOR (INFORMATIONAL NOTE ONLY -- NO WORK)
- F** > SALVAGE PARTS FROM GEN#4 SWITCHGEAR SECTION (SEE ELECTRICAL)
- G** > SALVAGE, SWAP, AND INSTALL NEW PARTS IN GEN#3 SWITCHGEAR SECTION (SEE ELECTRICAL)
- H** > SALVAGE, SWAP, AND INSTALL NEW PARTS IN GEN#2 SWITCHGEAR SECTION (SEE ELECTRICAL)
- H** > INSTALL NEW PARTS IN GEN#1 SWITCHGEAR SECTION (SEE ELECTRICAL)
- J** > REMOVE AND SALVAGE UNSUED CONDUCTORS AND PLUG CONDUIT (SEE ELECTRICAL)

DERA PROJECT SCOPE ADDITIVE ALTERNATE TASKS:

- D1A** > PERFORM DIAGNOSTIC ENGINE TEST ON GENSET #2 AND INSTALL CRANK VENT.
- D2A** > REPLACE ACTUATOR VALVE AT INTERMEDIATE TANK
- D3A** > VENTILATION SERVICE AND REPAIR
- D4A** > PLANT HEATING SYSTEM REPAIR
- D5A** > DISPOSE OF CONTAMINATED COOLANT AND USED CLEANING SOLUTION

M&I PROJECT BASE BID TASKS:

- M-B** > INSTALL OWNER--FURNISHED ENGINE ON GENSET #3

M&I PROJECT SCOPE ADDITIVE ALTERNATE TASKS:

- M1A** > CLEAN/DEGREASE GENERATION ROOM
- M2A** > PREPARE QUOTE FOR REPAIR OF FIRE SUPPRESSION SYSTEM
- M3A** > PREPARE QUOTE FOR REPAIR OF OVERHEAD DOOR

**** GENERAL CONDITIONS ****

PERFORM ALL WORK IN ACCORDANCE WITH THE LATEST ADOPTED EDITIONS OF THE INTERNATIONAL FIRE CODE AND THE INTERNATIONAL BUILDING CODE INCLUDING STATE OF ALASKA AMENDMENTS. COMPLY WITH ALL APPLICABLE STATE AND FEDERAL REGULATIONS.

THE DRAWINGS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW ALL FEATURES OF THE REQUIRED WORK. PROVIDE ALL EQUIPMENT AND MATERIALS REQUIRED FOR A COMPLETE SYSTEM. VERIFY EXISTING FIELD CONDITIONS PRIOR TO STARTING CONSTRUCTION. IMMEDIATELY CONTACT THE ENGINEER FOR CLARIFICATION OF QUESTIONABLE ITEMS OR APPARENT CONFLICTS.

ALL EQUIPMENT AND MATERIALS SHOWN ARE NEW UNLESS SPECIFICALLY INDICATED AS EXISTING. WHERE ADDITIONAL OR REPLACEMENT ITEMS ARE REQUIRED, PROVIDE LIKE ITEMS BY THE SAME MANUFACTURER TO THE MAXIMUM EXTENT PRACTICAL. INSTALL ALL MATERIALS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS, UNLESS INDICATED OTHERWISE.

PROTECT ALL MATERIALS AND EQUIPMENT DURING THE ENTIRE DURATION OF CONSTRUCTION WORK AGAINST CONTAMINATION OR DAMAGE. REPLACE OR REPAIR TO ORIGINAL MANUFACTURED CONDITION ANY ITEMS DAMAGED DURING CONSTRUCTION. IMMEDIATELY REPORT TO THE ENGINEER ANY ITEMS FOUND DAMAGED PRIOR TO COMMENCING CONSTRUCTION.

PERFORM WORK WITH SKILLED CRAFTSMEN SPECIALIZING IN SAID WORK. INSTALL ALL MATERIALS IN A NEAT, ORDERLY, AND SECURE FASHION, AS REQUIRED BY THESE SPECIFICATIONS AND COMMONLY RECOGNIZED STANDARDS OF GOOD WORKMANSHIP.

DO NOT CUT, DRILL, OR NOTCH STRUCTURAL MEMBERS UNLESS SPECIFICALLY APPROVED BY THE ENGINEER. MINIMIZE PENETRATIONS AND DISRUPTION OF BUILDING FEATURES. WHERE PREVIOUSLY COMPLETED BUILDING SURFACES OR OTHER FEATURES MUST BE CUT, PENETRATED, OR OTHERWISE ALTERED, SUCH WORK SHALL BE CAREFULLY LAID OUT AND PATCHED TO ORIGINAL CONDITION. SEAL ALL EXTERIOR FLOOR AND WALL PENETRATIONS AS INDICATED.

CONTACT THE ENGINEER ONE--WEEK PRIOR TO COMPLETION OF ALL WORK TO SCHEDULE A SUBSTANTIAL COMPLETION INSPECTION. THE ENGINEER WILL GENERATE A PUNCH LIST OF CORRECTIVE ACTION ITEMS DURING THE INSPECTION. WORK WILL NOT BE CONSIDERED COMPLETE UNTIL ALL CORRECTIVE ACTION ITEMS IN THE ENGINEERS PUNCH LIST HAVE BEEN SATISFACTORILY COMPLETED AND PHOTOGRAPHIC OR OTHER POSITIVE DOCUMENTATION HAS BEEN PROVIDED TO THE ENGINEER.

PROVIDE ONE SET OF DRAWINGS CLEARLY MARKED UP WITH ALL AS--BUILT INFORMATION TO THE ENGINEER WITHIN TWO WEEKS OF COMPLETION.

**** SPECIAL CONDITIONS ****

ENSURE THAT APPROPRIATE SAFETY MEASURES ARE IMPLEMENTED AND THAT ALL WORKERS ARE AWARE OF THE POTENTIAL HAZARDS FROM ELECTRICAL SHOCK, BURN, ROTATING FANS, PULLEYS, BELTS, HOT MANIFOLDS, NOISE, ETC. ASSOCIATED WITH WORKING NEAR POWER GENERATION AND CONTROL EQUIPMENT.

**** SUPPORTS AND FASTENERS ****

SUPPORT PIPING AND EQUIPMENT AS SHOWN ON PLANS USING SPECIFIED SUPPORTS AND FASTENERS. IF NOT DETAILED ON PLANS, SUPPORT FROM STRUCTURAL MEMBERS WITH PIPE HANGERS, CLAMPS, OR PIPE STRAPS SPECIFICALLY INTENDED FOR THE APPLICATION. DO NOT SUPPORT PIPING FROM CONNECTIONS TO EQUIPMENT. INDEPENDENTLY SUPPORT PUMPS AND EQUIPMENT.

STRUT -- COLD FORMED MILD STEEL CHANNEL STRUT, PRE--GALVANIZED FINISH AND SLOTTED BACK UNLESS SPECIFICALLY INDICATED OTHERWISE. STANDARD STRUT -- 12 GA, 1-5/8" x 1-5/8", B--LINE B22--SH--GALV OR APPROVED EQUAL.

FITTINGS AND ACCESSORIES -- PROVIDE FITTINGS, BRACKETS, CHANNEL NUTS, AND ACCESSORIES DESIGNED SPECIFICALLY FOR USE WITH SPECIFIED CHANNEL STRUT. GALVANIZED OR ZINC--PLATED CARBON STEEL.

PIPE CLAMPS -- TWO--PIECE PIPE CLAMP DESIGNED TO SUPPORT PIPE TIGHT TO STRUT. B--LINE B20## OR APPROVED EQUAL. ZINC--PLATED CARBON STEEL. INSTALL RUBBER ISOLATION STRIP, B--LINE VIBRA CUSHION OR EQUAL, ON COPPER TUBING AND WHERE INDICATED.

FASTENERS -- ALL BOLTS, NUTS, AND WASHERS ZINC--PLATED.

**** PAINTING AND MARKING ****

TOUCH UP -- FINISH ALL CUT ENDS AND DAMAGED SURFACES OF GALVANIZED AND ZINC PLATED SUPPORTS AND FASTENERS WITH SPRAY ON COLD GALVANIZING COMPOUND, ZRC OR APPROVED EQUAL.

**** INSULATION ****

EXHAUST INSULATION -- CUSTOM FIT THERMAL INSULATION PADS, DISTRIBUTION INTERNATIONAL OR APPROVED EQUAL.
HOT FACE LAYER: STAINLESS STEEL MESH.
INNER LAYER: 1" THICK CERAMIC BLANKET, 2000°F MIN. SERVICE RATING, THERMAL CERAMICS KAOWOOL OR EQUAL.
MID LAYER: 2" THICK HIGH TEMP FIBERGLASS BLANKET, 1000°F MIN. SERVICE RATING, JOHNS--MANVILLE HTB SPIN--GLAS OR EQUAL.
OUTER LAYER: PLAIN WEAVE CARMELIZED FIBERGLASS FABRIC, 17OZ WEIGHT, .028" THICKNESS, 1000°F MIN. SERVICE RATING, ALPHA--MARITEX STYLE 2025/9383 OR EQUAL.
PROVIDE ALL STAINLESS STEEL CLOSURE SYSTEM INCLUDING LACING ANCHORS, WASHERS AND WIRE.

**** DIESEL FUEL AND LUBE OIL PIPING, VALVES & HOSES ****

PROVIDE SPIRAL WOUND METALLIC GASKETS AND COAT WITH ANTI SEIZE COMPOUND PRIOR TO ASSEMBLING FLANGED JOINTS.

ELECTRIC ACTUATOR VALVES -- LOW TEMPERATURE ACTUATED BALL VALVE ASSEMBLY RATED TO -50 DEG F. TYPE 304 STAINLESS STEEL FABRICATED COUPLING BRACKET, SHAFT, AND FASTENERS CONFIGURED TO ALLOW WRENCH ACCESS FOR MANUAL OPERATION OF VALVE WITHOUT REMOVING ACTUATOR. DG VALVE, OR EQUAL. LOW TEMP BALL VALVE, 150# RF FLANGED ENDS, NUTRON, NO SUBSTITUTES. ELECTRIC ACTUATOR WITH OPERATING VOLTAGE, NEMA RATING, AND TORQUE AS INDICATED. CONFIGURE WITHOUT MANUAL OVERRIDE SHAFT EXTENSION. FURNISH WITH PTC SELF REGULATING HEATER, AUXILIARY SWITCH SET (AUXILIARY SWITCHES 3 & 4), AND EXXON BEACON 325 SEVERE COLD LUBRICANT.

1" BALL VALVE -- 151 IN--LB OPERATING TORQUE @ -50 DEG F.
NUTRON MODEL T3--R10R01LZ--06, NO SUBSTITUTES.

1" 120VAC NEMA 7 ACTUATOR -- 600 IN--LBS TORQUE, 10 SECOND STROKE TIME, 0.50 LOCKED ROTOR AMPS. RCS MODEL SXR--1023, NO SUBSTITUTES.

SMALL HOSES -- FUEL RATED HOSE, EATON WEATHERHEAD H569 OR APPROVED EQUAL. SIZE AS INDICATED ON DRAWINGS. PROVIDE RE--USABLE PLATED STEEL JIC SWIVEL ENDS, STRAIGHT OR 90° AS REQUIRED, WITH NPT ADAPTERS.

**** CRANKCASE VENTILATION PIPING & HOSE ****

CRANK VENT PIPING -- TYPE "L" HARD DRAWN COPPER TUBE WITH WROUGHT COPPER FITTINGS. ALL JOINTS SOLDERED WITH 95/5 TIN/ANTIMONY SOLDER OR SILVER SOLDER.

CRANK VENT HOSE -- HEAVY DUTY OIL RESISTANT PVC SUCTION HOSE. TIGERFLEX ORV OR APPROVED EQUAL. INSTALL ON BARBED HOSE (KING) NIPPLES AND FASTEN WITH LINED STAINLESS STEEL T--BOLT CLAMPS, NYCO SUPRA W2 OR APPROVED EQUAL.

**** GLYCOL VALVES, AND SPECIALTIES ****

GLYCOL THREADED CONNECTIONS -- COVER MALE THREAD ENDS WITH TEFLON TAPE AND COAT FEMALE THREAD CONNECTIONS WITH TEFLON PASTE PRIOR TO ASSEMBLY.

ENGINE COOLANT HOSES -- SIZE AS INDICATED ON DRAWINGS. WIRE REINFORCED CORRUGATED SILICONE HOSE, PARKER 6621, TUSIL RADFLEX, OR APPROVED EQUAL. INSTALL WITH STAINLESS STEEL T--BOLT CLAMPS.

BUTTERFLY VALVES -- LUG STYLE DUCTILE OR CAST IRON BODY, ANSI 150# FLANGE PATTERN ENDS, STAINLESS STEEL STEM WITH BRONZE BUSHING, BRONZE DISC, EPDM SEATS, LOCKING HANDLE. MILWAUKEE ML--233E, BRAY SERIES 31, OR APPROVED EQUAL.

FLANGED IRON BODY SWING CHECK VALVES -- IRON BODY, ANSI 125# FLANGED ENDS, BRONZE SEATS, SWING CHECK STYLE. MILWAUKEE F--2974A OR APPROVED EQUAL.

GAUGE COCK -- BRASS BODY, MPT BY FPT ENDS, T--HANDLE. LEGEND VALVE ITEM 101--531 (1/4") OR ITEM 101--532 (3/8"), OR APPROVED EQUAL. INSTALL ON ALL AIR VENTS, PRESSURE GAUGES, SMALL HOSE CONNECTIONS, AND WHERE INDICATED.

GLYCOL FILTER: SCREW--ON CANISTER STYLE FILTER ELEMENT WITH 3/8" NPT CONNECTIONS ON HEAD, WIX #24019 (NAPA 4019) HEAD WITH #24069 (NAPA 4069) ELEMENT OR APPROVED EQUAL.

**** INSTRUMENTATION ****

PRESSURE GAUGE -- 2--1/2" DIAL SIZE, DRY TYPE, STAINLESS STEEL CASE, TUBE, AND SOCKET, 1/4" NPT BOTTOM CONNECTION. TRERICE NO. 700SS--25, OR APPROVED EQUAL. 0--15 PSI 700SS--25--02--L--A--080 0--100 PSI 700SS--25--02--L--A--110

DIGITAL THERMOMETER -- SOLAR POWERED, LCD DISPLAY, -50 TO +300 F RANGE OR DUAL F/C RANGE, 1% OF READING ACCURACY, VARIABLE ANGLE DISPLAY, 3--1/2" STEM LENGTH WEISS DVU35 OR APPROVED EQUAL, PROVIDE WITH A 3/4" NPT BRASS THERMOWELL.

SCHEDULE OF DRAWINGS:

M1.1 SCHEDULE OF DRAWINGS & MECHANICAL SPECIFICATIONS

M1.2 MECHANICAL WORK PLAN & NOTES

M2 PIPING DETAILS

M3 GENSETS #1 & #3 UPGRADE DETAILS

M4 TYPICAL ENGINE MODIFICATION DETAILS

M5 DERA BASE BID TASK B GENSET #1 ENGINE SPECIFICATIONS

E1 ELECTRICAL WORK PLAN, NOTES, & SPECIFICATIONS

E2 ELECTRICAL DETAILS

ATTACHED REFERENCE DRAWINGS BY OTHERS (WITH ANNOTATION NOTES)

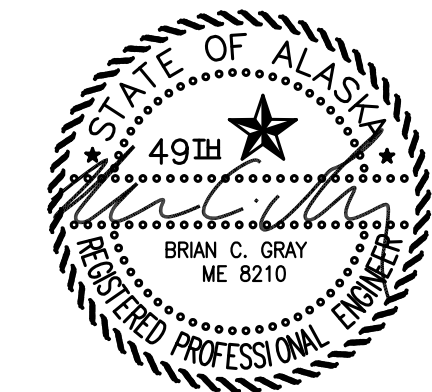
5216--10771 SWITCHGEAR ONE--LINE

5216--10772--1 GENERATOR 1 AC THREE LINE SCHEMATIC DIAGRAM

5216--10774--1 GENERATOR 1 DC CONTROL SCHEMATIC DIAGRAM

5216--10783 INTERCONNECTION DIAGRAM

ISSUED FOR
CONSTRUCTION
AUGUST 2019



PROJECT: TULUKSAK POWER PLANT 2019 DERA--MAINTENANCE & IMPROVEMENT PROJECT		
TITLE: SCHEDULE OF DRAWINGS, SCOPE OF WORK, & MECHANICAL SPECIFICATIONS		
DRAWN BY: JTD	SCALE: NO SCALE	
DESIGNED BY: CWV/BCG	DATE: 8/7/19	
FILE NAME: TULU DR--M&I M	SHEET: M1.1	OF 5
PROJECT NUMBER:		
P.O. 111405, Anchorage, AK 99511 (907)349-0100		

DERA BASE BID TASKS SPECIFIC NOTES:

- A THE COOLING SYSTEM CLEAN/FLUSH/REPAIR TASK INCLUDES:
 - FLUSH & CLEAN ENGINE COOLING SYSTEM
 - PRESSURE WASH/DEGREASE BOTH RADIATOR CORES
 - REPLACE BUTTERFLY VALVES & CHECK VALVES
 - REPAIR THERMOSTATIC VALVE
 - INSTALL NEW THERMOMETERS, PRESSURE GAUGES, AND SITE GAUGE
 - INSTALL NEW SILICONE HOSES
 - FILL SYSTEM WITH NEW COOLANT
 HATCHED AREA INDICATES THE EXTENTS OF THE ENGINE COOLING SYSTEM PIPING. COOLING SYSTEM PIPING AND EQUIPMENT NOT SHOWN THIS VIEW FOR CLARITY. SEE ISOMETRIC 1/M2 FOR ADDITIONAL TASK DETAILS.
- B GENSET #1 UPGRADES: SEE SHEETS M3, M4, M5, E1, AND E2.
- C FIRE EXTINGUISHERS: INSTALL 5 EACH WALL-MOUNT TYPE 3A-40BC FIRE EXTINGUISHERS WHERE INDICATED ON PLANS.
- D TEST AND CALIBRATE RADIATOR VFD'S, SEE ELECTRICAL.
- E THE EXISTING OVERHEAD DOOR IS CURRENTLY INOPERABLE, SEE ADDITIVE ALTERNATE ITEM 8A. MANUALLY OPEN DOOR AS REQUIRED FOR CONSTRUCTION ACTIVITIES. LEAVE DOOR CLOSED AND SECURE UPON COMPLETION.
- F G H I J SEE ELECTRICAL

DERA PROJECT ADDITIVE ALTERNATE TASKS SPECIFIC NOTES:

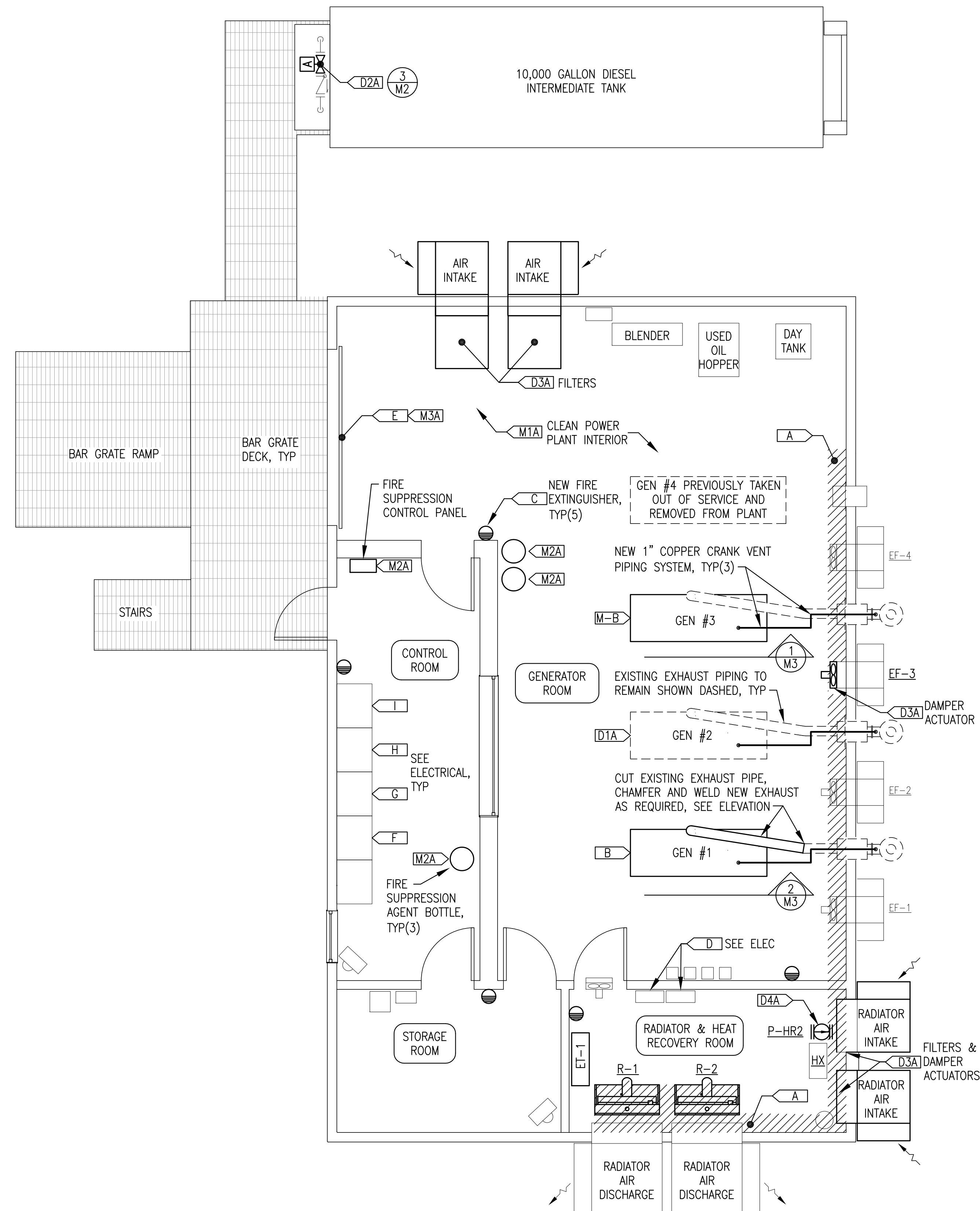
- D1A GENSET #2 DIAGNOSTICS & CRANK VENT INSTALLATION: THE EXISTING ENGINE IS OLD AND IN MARGINAL RUNNING CONDITION. PERFORM A DETAILED INSPECTION AND DIAGNOSTIC CHECK TO DETERMINE EXTENT OF PROBLEMS. PROVIDE A FIELD REPORT WITH ALL IDENTIFIED DEFICIENCIES, AND PROVIDE A QUOTE TO REPAIR ENGINE TO GOOD RUNNING CONDITION. (QUOTE ONLY THIS TASK, ACTUAL REPAIRS TO BE A SEPARATE WORK ORDER). INSTALL CRANKCASE VENTILATION SYSTEM IDENTICAL TO GEN #1 & #3, SEE SHEET M3 FOR DETAILS.
- D2A THE 1" FLANGED ACTUATED BALL VALVE AT THE DAY TANK SUPPLY PIPELINE CONNECTION TO THE INTERMEDIATE TANK HAS FAILED AND IS CURRENTLY HELD OPEN WITH A WRENCH. REPLACE THE COMPLETE ACTUATED BALL VALVE ASSEMBLY. SEE DETAIL 3/M2 FOR REPLACEMENT.
- D3A VENTILATION SERVICE AND REPAIR:
 - FURNISH 32 EACH 18"x18"x1" THICK STANDARD FURNACE FILTERS
 - INSTALL 16 FILTERS (4 FILTERS IN EACH OF 4 INTAKES) AND LEAVE 16 SPARES ON SITE
 - INSTALL NEW BELIMO MODEL AF-BUP ACTUATORS ON RADIATOR R-1 & R-2 AIR INTAKE DAMPERS
 - INSTALL NEW BELIMO MODEL AF-BUP ACTUATOR ON EXHAUST FAN EF-3 DAMPER
 - RECONNECT ALL DAMPER LINKAGES AND WIRING AND TEST TO CONFIRM PROPER OPERATION
- D4A HEAT RECOVERY PUMP P-HR2 PROVIDES HEAT TO THE PARTS ROOM AND CONTROL ROOM. THE EXISTING PUMP HAS FAILED. SEE ISOMETRIC 2/M2 FOR HEATING SYSTEM REPAIR DETAILS.
- D5A REMOVE FROM SITE ALL DRUMS OF USED GLYCOL AND CLEANING SOLUTION DRAINED FROM SYSTEM UNDER BASE BID WORK AND DISPOSE OF IN ACCORDANCE WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

M&I BASE BID TASKS SPECIFIC NOTES:

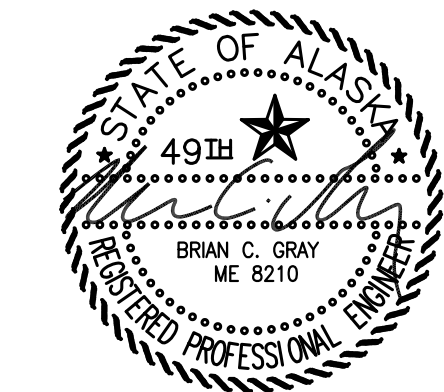
- M-B GENSET #3 UPGRADES: SEE SHEETS M3, M4, E1, AND E2.

M&I PROJECT ADDITIVE ALTERNATE TASKS SPECIFIC NOTES:

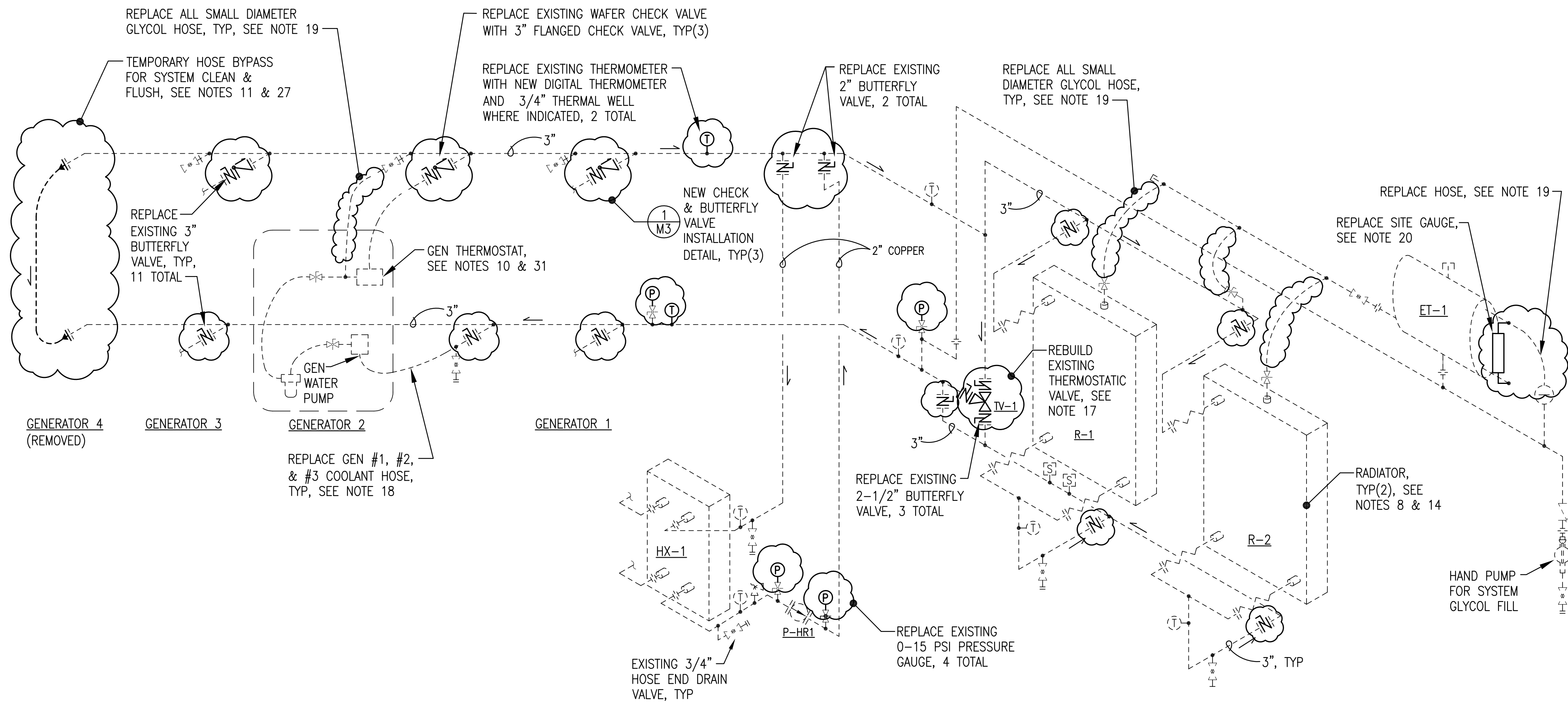
- M1A ALL GENERATION ROOM SURFACES HAVE BEEN COATED WITH AN OIL FILM DUE TO IMPROPER VENTILATION OF CRANKCASE FUMES OVER MANY YEARS. DEGREASE AND CLEAN ALL INTERIOR SURFACES INCLUDING WALLS, CEILING, FLOOR, EQUIPMENT ENCLOSURES, LIGHT FIXTURES, PIPING AND TANKS WITH HEAVY DUTY INDUSTRIAL CLEANER/DEGREASER.
- M2A THE FIRE SUPPRESSION SYSTEM IS EQUIPPED WITH A FIKE CHEETAH MODEL 10-052 CONTROL PANEL AND FM-200 AGENT BOTTLES. IT IS CURRENTLY OUT OF COMMISSION WITH MULTIPLE SENSOR FAULT INDICATIONS, LOW BOTTLE PRESSURES AND MISSING CONTROL PANEL BATTERIES. INSPECT THE FIRE SUPPRESSION SYSTEM WITH A CERTIFIED FIRE SYSTEM INSTALLER, PROVIDE A FIELD REPORT WITH ALL IDENTIFIED DEFICIENCIES, AND PROVIDE A QUOTE TO CORRECT ALL IDENTIFIED DEFICIENCIES. (QUOTE ONLY THIS TASK, ACTUAL REPAIRS AND RECERTIFICATION TO BE A SEPARATE WORK ORDER).
- M3A THE EXISTING 10'-2"Wx10'-0"H OVERHEAD DOOR IS CURRENTLY INOPERABLE. CURRENT DEFICIENCIES INCLUDE: 1) BOTTOM 10'-2"x24"x2" INSULATED METAL PANEL IS DAMAGED BEYOND REPAIR; 2) BOTH CABLES ARE BROKEN; AND 3) BOTH SPRINGS ARE UNWOUND AND IN NEED OF RE-TENSIONING. INSPECT THE OVERHEAD DOOR ASSEMBLY FOR THESE AND ANY OTHER REQUIRED REPAIRS AND PROVIDE A REPAIR QUOTE, INCLUDING LABOR AND DETAILED ITEMIZED PARTS LIST. (QUOTE ONLY THIS TASK, ACTUAL REPAIRS TO BE A SEPARATE WORK ORDER)



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CONSTRUCTION
AUGUST 2019



PROJECT:	TULUKSAK POWER PLANT 2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT	
TITLE:	MECHANICAL WORK PLAN & NOTES	
DRAWN BY:	JTD	SCALE: NO SCALE
DESIGNED BY:	CWV/BCG	DATE: 8/7/19
FILE NAME:	TULU DR-M&I M	SHEET:
PROJECT NUMBER:		M1.2 OF 5



ENGINE COOLING SYSTEM GENERAL NOTES:

1. ALL WORK INDICATED THIS ISOMETRIC IS INCLUDED IN BASE BID TASK A UNLESS SPECIFICALLY INDICATED OTHERWISE.
2. EXISTING ENGINE COOLING SYSTEM PIPING & DEVICES TO REMAIN UNCHANGED SHOWN WITH LIGHT DASHED LINES.
3. EXISTING ENGINE COOLING SYSTEM VALVES AND DEVICES TO BE REPLACED SHOWN WITH DARK SOLID LINES AND CLOUD OUTLINE.
4. ALL PIPING WELDED STEEL EXCEPT WHERE SPECIFICALLY NOTE OTHERWISE. ALL FLANGES ANSI 150# PATTERN.
5. ENGINE COOLANT SYSTEM VOLUME IS APPROXIMATELY 100 GALLONS. PROVIDE A MINIMUM OF 5 EACH NEW EMPTY 55 GALLON DRUMS TO CONTAIN CONTAMINATED COOLANT AND CLEANING SOLUTION.
6. PROVIDE 2 EACH 55 GALLON DRUMS NEW EXTENDED LIFE ETHYLENE GLYCOL SOLUTION, SHELL ROTELLA ELC OR APPROVED EQUAL, PRE-MIXED TO A RATIO OF 60% GLYCOL TO 40% WATER.
7. THE COMMUNITY IS CURRENTLY BEING POWERED BY A SELF CONTAINED EMERGENCY GENSET. THE POWER PLANT FEEDER BREAKER IS CLOSED AND THE BUS IS ENERGIZED TO PROVIDE POWER PLANT STATION SERVICE POWER. GENERATOR #2 WILL BE RUN OFF-LINE TO ALLOW THE ENGINE WATER PUMP TO CIRCULATE THE CLEANING SOLUTION DURING THE FOLLOWING CLEANING & FLUSHING PROCEDURE.

STEP 1: ENGINE COOLING SYSTEM DRAIN/CLEAN

8. CLEAN AND DEGREASE RADIATOR AIR SURFACES. PRESSURE WASH TO REMOVE ALL DEBRIS.
9. DRAIN THE EXISTING COOLANT INTO DRUMS AND TURN OVER TO UTILITY. SEE ADDITIVE ALTERNATE TASK 7A, SHEET M1.2 FOR OPTIONAL DISPOSAL.
10. REMOVE GENERATOR #2 THERMOSTAT TO ENSURE FULL FLOW IN PIPING FROM ENGINE WATER PUMP.
11. PRIOR TO CLEANING THE SYSTEM INSTALL 3/4" TEMPORARY HOSE BYPASS IN MANIFOLD TO ALLOW FLOW THROUGH ALL SECTIONS OF THE MANIFOLD DURING SYSTEM CLEANING. REMOVE EXISTING (ABANDONED) GEN #4 CONNECTION FITTINGS AND INSTALL 3" THREADED FLANGE. INSTALL 3"x1-1/2" BUSHING, 1-1/2"x3/4" BUSHING AND 3/4" KING NIPPLE IN THREADED FLANGE. CONNECT 3/4" RUBBER HOSE BETWEEN KING NIPPLES. SEE ISOMETRIC FOR LOCATION.
12. FILL SYSTEM WITH HEAVY DUTY ALKYLENE-BASED ENGINE CLEANING SOLUTION, CUMMINS FLEETGUARD RESTORE, OR EQUAL, 1 GALLON (OR 4 LITRES) PER 10 GALLONS OF FRESH WATER.
13. START GENERATOR #2 AND OPERATE OFF-LINE AT 1,800 RPM TO CIRCULATE THE CLEANING SOLUTION. TURN ON PUMP P-HR1 TO ENSURE FLOW THROUGH THE HEAT EXCHANGER. OPERATE GEN #2 FOR 24 HOURS MINIMUM.
14. ALLOW CIRCULATION THROUGH ONE RADIATOR AT A TIME TO MAXIMIZE CLEANING SOLUTION FLOW VELOCITY THROUGH THE RADIATOR CORES. ALTERNATE BETWEEN THE TWO RADIATORS FOR APPROXIMATELY EQUAL TIME.
15. SHUT DOWN GENERATOR #2 AND LOCK OUT. TURN OFF PUMP P-HR1.

STEP 2: ENGINE COOLING SYSTEM DRAIN/REFURBISHMENT/FLUSH

16. DRAIN THE SYSTEM WITHIN 1/2 HOUR OF ENGINE SHUT DOWN TO AVOID SETTLING OUT SOLIDS. DRAIN THE USED CLEANING SOLUTION INTO DRUMS AND TURN OVER TO UTILITY. SEE ADDITIVE ALTERNATE TASK 7A, SHEET M2.1 FOR OPTIONAL DISPOSAL.
17. REBUILD EXISTING FPE MODEL A2510-180 THERMOSTATIC VALVE. PROVIDE FPE MODEL 2500 REPAIR KIT INCLUDING NEW COVER GASKET, 2 EACH NEW LIP SEALS, AND 2 EACH 180F THERMOSTATIC ELEMENTS.
18. REPLACE GEN #1, GEN #2, AND GEN #3 SUCTION AND DISCHARGE COOLANT HOSES. PROVIDE NEW 2" SILICONE HOSE AND NEW CLAMPS.
19. REPLACE ALL SMALL DIAMETER GLYCOL HOSE FOR 3 EACH ENGINE VENT/PREHEAT CONNECTIONS, 2 EACH RADIATOR AIR VENTS, 1 PIPING HIGH POINT VENT, AND COOLANT LEVEL SWITCH TOP CONNECTION TO EXPANSION TANK. PROVIDE 1/2" SILICONE HOSE AND NEW CLAMPS AND INSTALL ON 5/8" BARB x 1/4" (3/8") (1/2") NPT KING NIPPLES AS REQUIRED.
20. REMOVE EXISTING SITE GAUGE, INSTALL 1/2" THREADED BRASS OR BRONZE STREET ELBOWS, AND INSTALL NEW SITE GAUGE. BOROSILICATE GLASS TUBE, ALUMINUM BODY, BUNA N SEALS, 1/2" MPT CONNECTIONS, 9" CENTERS. LUBE DEVICES G607-09-A-1-4 OR APPROVED EQUAL.
21. COMPLETE ALL OTHER COOLING SYSTEM REFURBISHMENT WORK SHOWN IN CLOUDED AREAS ON ISOMETRIC INCLUDING VALVE REPLACEMENTS AND INSTRUMENTATION REPLACEMENTS.
22. PROVIDE NEW CAP SCREWS FOR LUG STYLE BUTTERFLY VALVES. PROVIDE NEW BOLT SETS AND NEW FULL FACE GASKETS FOR ALL FLANGE CONNECTIONS AS REQUIRED.
23. FILL SYSTEM WITH FRESH WATER.
24. START GENERATOR #2 AND OPERATE OFF-LINE AT 1,800 RPM TO PROVIDE SYSTEM FLUSH. TURN ON PUMP P-HR1. BRING SYSTEM UP TO OPERATING TEMPERATURE. OPERATE GEN #2 FOR AN ADDITIONAL 2 HOURS MINIMUM. CAREFULLY INSPECT THE ENTIRE SYSTEM FOR ANY LEAKS WHILE FLUSHING. IF ANY LEAKS ARE DETECTED, SHUT OFF GENERATOR, REPAIR AS REQUIRED, AND BEGIN THIS STEP OVER.
25. SHUT DOWN GENERATOR #2 AND LOCK OUT. TURN OFF PUMP P-HR1.

STEP 3: ENGINE COOLING SYSTEM DRAIN/FILL

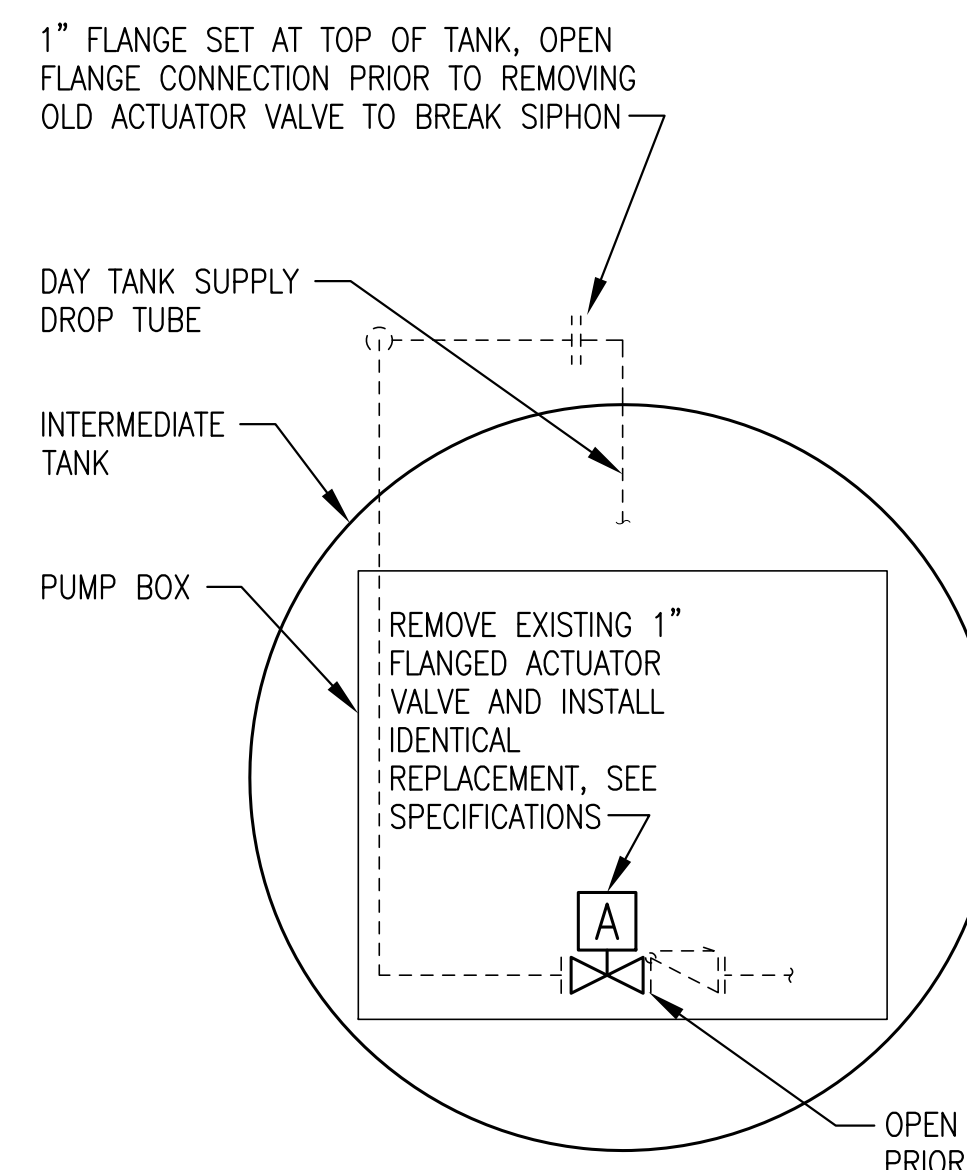
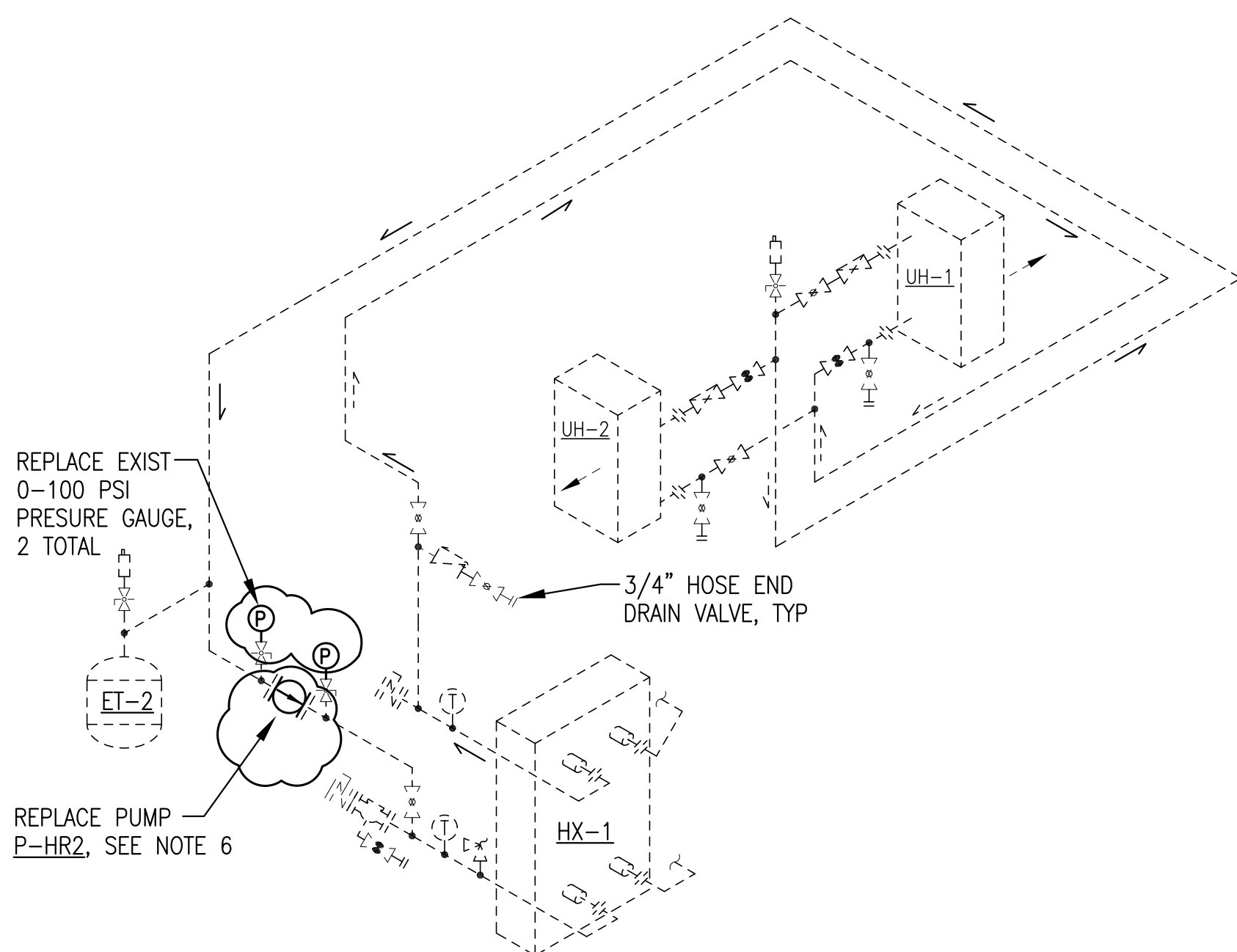
26. DRAIN THE WATER AND USE LOW PRESSURE AIR TO BLOW OUT AS MUCH RESIDUAL FLUSH WATER AS POSSIBLE.
27. REMOVE THE TEMPORARY 3/4" HOSE BYPASS AND INSTALL 3/4" PLUGS IN THREADED FLANGES, SEE ISOMETRIC.
28. FILL SYSTEM WITH A SOLUTION OF EXTENDED LIFE ETHYLENE GLYCOL, SHELL ROTELLA ELC OR APPROVED EQUAL, PRE-MIXED TO A RATIO OF 60% GLYCOL TO 40% WATER.
29. START GENERATOR #2 AND OPERATE OFF-LINE AT 1,800 RPM TO PROVIDE SYSTEM FINAL TEST. TURN ON PUMP P-HR1. BRING SYSTEM UP TO OPERATING TEMPERATURE. OPERATE GEN #2 FOR AN ADDITIONAL 2 HOURS MINIMUM. CAREFULLY PURGE ALL AIR FROM SYSTEM AND INSPECT THE ENTIRE SYSTEM FOR ANY LEAKS. ENSURE THAT COOLANT LEVEL IS MID WAY ON EXPANSION TANK SITE GAUGE AT CONCLUSION OF TEST.
30. SHUT DOWN GENERATOR #2 AND LOCK OUT. TURN OFF PUMP P-HR1.
31. REINSTALL GENERATOR #2 THERMOSTAT WITH NEW GASKETS.

1 DERA BASE BID TASK A ENGINE COOLANT SYSTEM CLEAN/FLUSH/REPAIR ISOMETRIC

M2 NO SCALE

HEATING SYSTEM REPAIRS NOTES:

1. ALL WORK INDICATED THIS ISOMETRIC IS INCLUDED IN DERA ADDITIVE ALTERNATE TASK D4A UNLESS SPECIFICALLY INDICATED OTHERWISE.
2. EXISTING HEATING SYSTEM PIPING & DEVICES TO REMAIN UNCHANGED SHOWN WITH LIGHT DASHED LINES.
3. EXISTING HEATING SYSTEM EQUIPMENT TO BE REPLACED SHOWN WITH DARK SOLID LINES AND CLOUD OUTLINE.
4. HEATING SYSTEM VOLUME IS APPROXIMATELY 10 GALLONS. PROVIDE DRUM STORAGE CAPACITY FOR DRAINING SYSTEM.
5. DRAIN THE EXISTING HEATING SYSTEM FLUID INTO DRUM AND TURN OVER TO UTILITY. SEE ADDITIVE ALTERNATE TASK 7A, SHEET M1.2 FOR OPTIONAL DISPOSAL.
6. REPLACE EXISTING PUMP P-HR2 WITH NEW PUMP. EXISTING 3/4" COMPANION FLANGES TO REMAIN. PROVIDE NEW GRUNDOS UPS15-58FC PUMP WITH NEW GASKETS AND BOLT. SET TO SPEED 1. 2. RECONNECT EXISTING ELECTRICAL TO NEW PUMP IDENTICAL TO ORIGINAL.
7. FILL HEATING SYSTEM WITH WATER, TURN ON PUMP P-HR2 AND RUN FOR 1 HOUR TO FLUSH SYSTEM. CAREFULLY INSPECT THE ENTIRE SYSTEM FOR ANY LEAKS. IF ANY LEAKS ARE DETECTED, SHUT OFF PUMP, REPAIR AS REQUIRED, AND REPEAT.
8. DRAIN THE WATER AND USE LOW PRESSURE AIR TO BLOW OUT AS MUCH RESIDUAL FLUSH WATER AS POSSIBLE.
9. FILL HEATING SYSTEM WITH A SOLUTION OF EXTENDED LIFE ETHYLENE GLYCOL, SHELL ROTELLA ELC OR APPROVED EQUAL, PRE-MIXED TO A RATIO OF 60% GLYCOL TO 40% WATER.
10. TURN ON PUMP P-HR2 FOR 1 HOUR. PURGE ALL AIR FROM SYSTEM. FILL TO A PRESSURE OF 20 PSIG MINIMUM WITH SYSTEM COLD OR 30 PSIG WITH SYSTEM HOT AND INSPECT THE ENTIRE SYSTEM FOR ANY LEAKS.



NOTES:

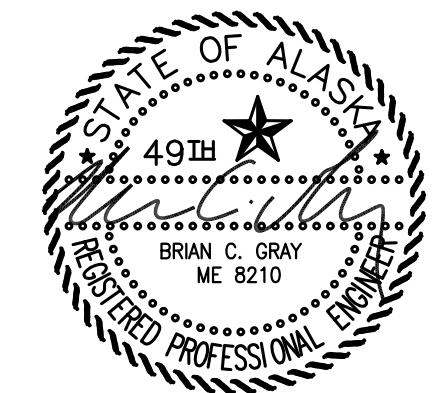
1. INSTALL NEW FLANGE GASKETS AND BOLTS ON ALL REASSEMBLED FLANGED CONNECTIONS. COAT GASKETS AND BOLTS WITH ANTI-SIEZE COMPOUND.
2. RECONNECT EXISTING ELECTRICAL TO NEW ACTUATOR VALVE IDENTICAL TO ORIGINAL.

2 DERA ADDITIVE ALTERNATE TASK D4A HEATING SYSTEM REPAIRS ISOMETRIC

M2 NO SCALE

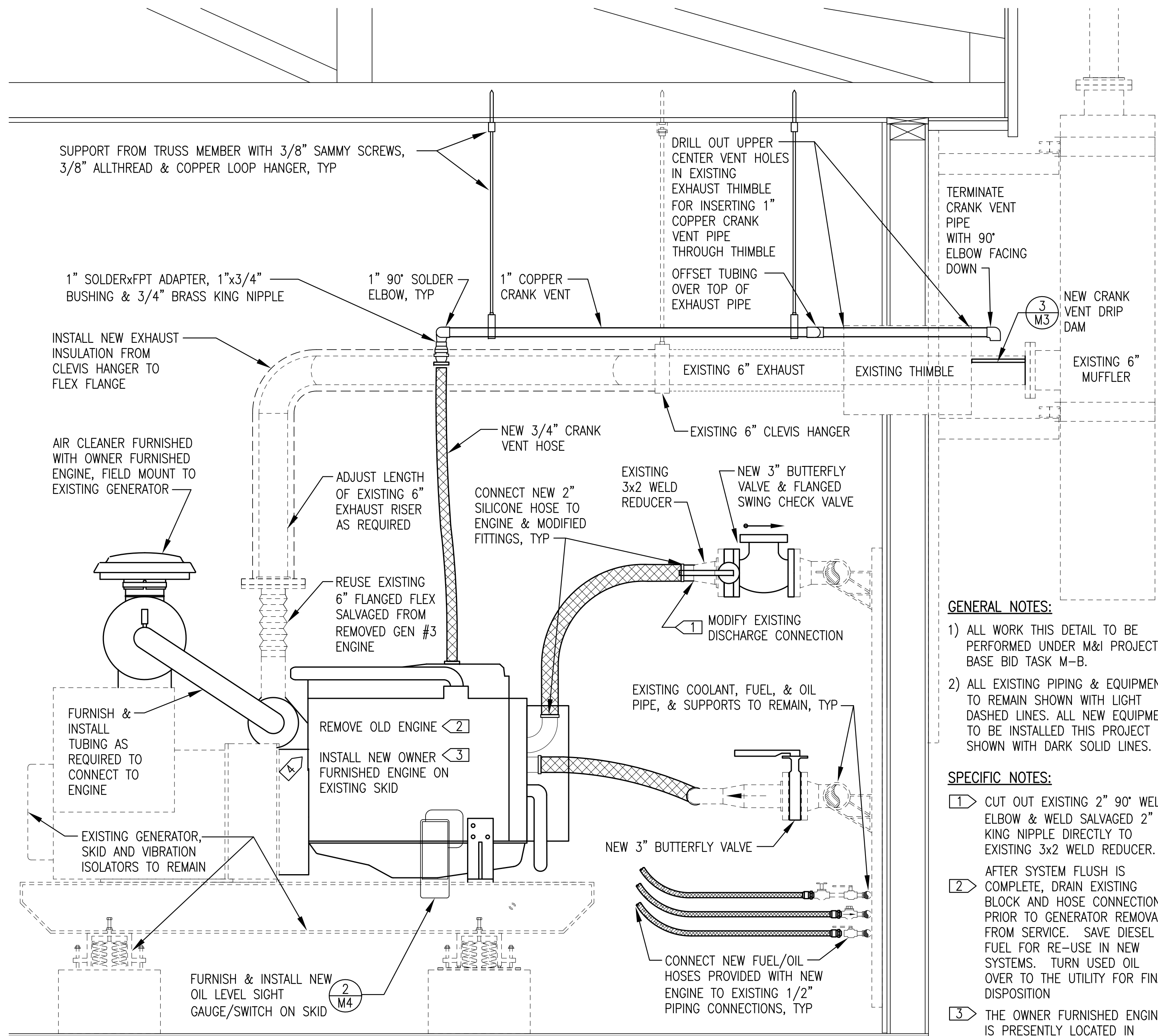
3 DERA ADDITIVE ALTERNATE TASK D2A ACTUATOR VALVE REPLACEMENT

M2 1/4"=1'-0"



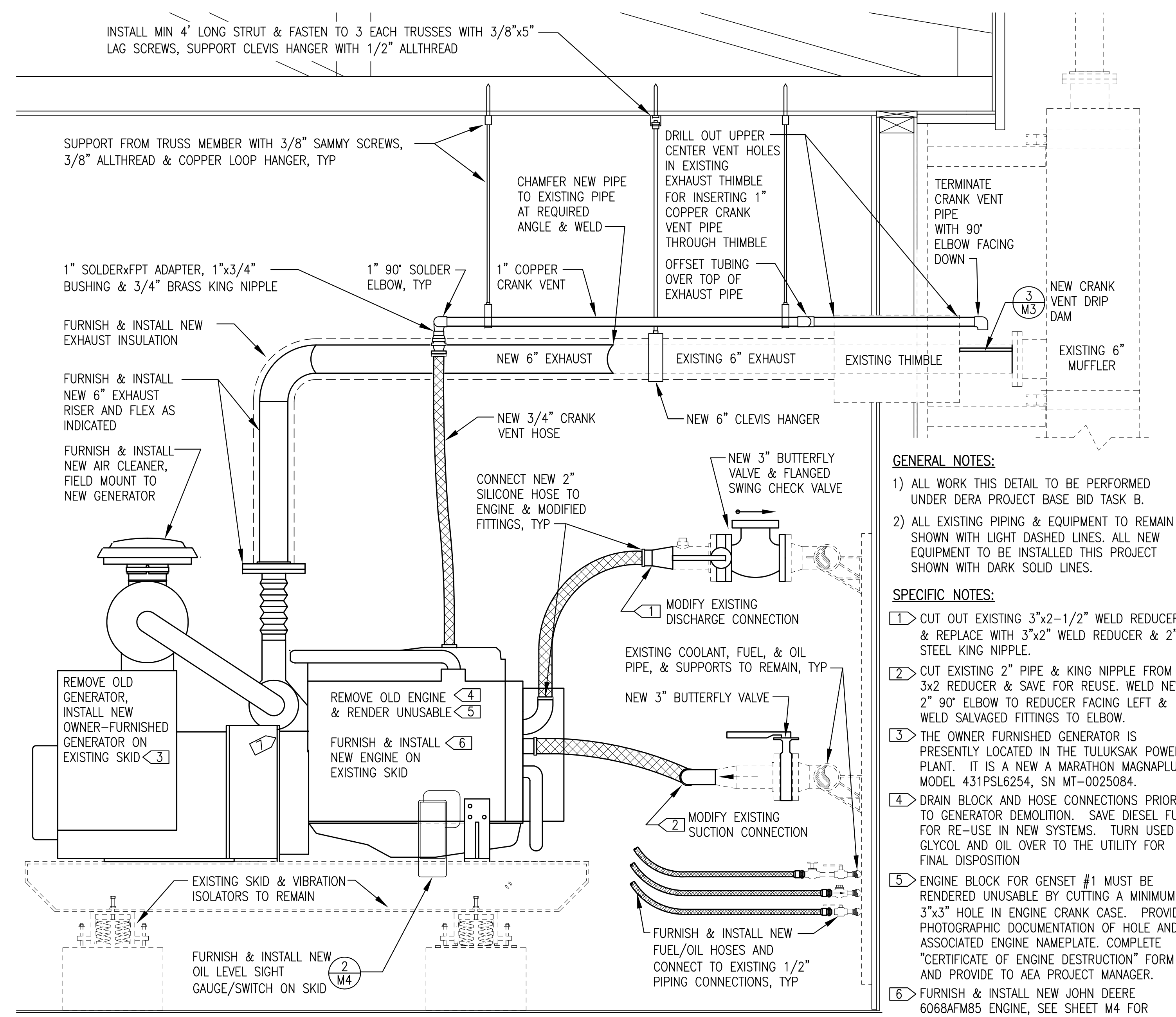
ISSUED FOR CONSTRUCTION
AUGUST 2019

PROJECT: TULUKSAK POWER PLANT		
2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT		
TITLE: PIPING DETAILS		
	DRAWN BY: JTD	SCALE: NO SCALE
	DESIGNED BY: CWV/BCG	DATE: 8/7/19
FILE NAME: TULU DR-M&I M	SHEET: M2	OF 5
PROJECT NUMBER:		



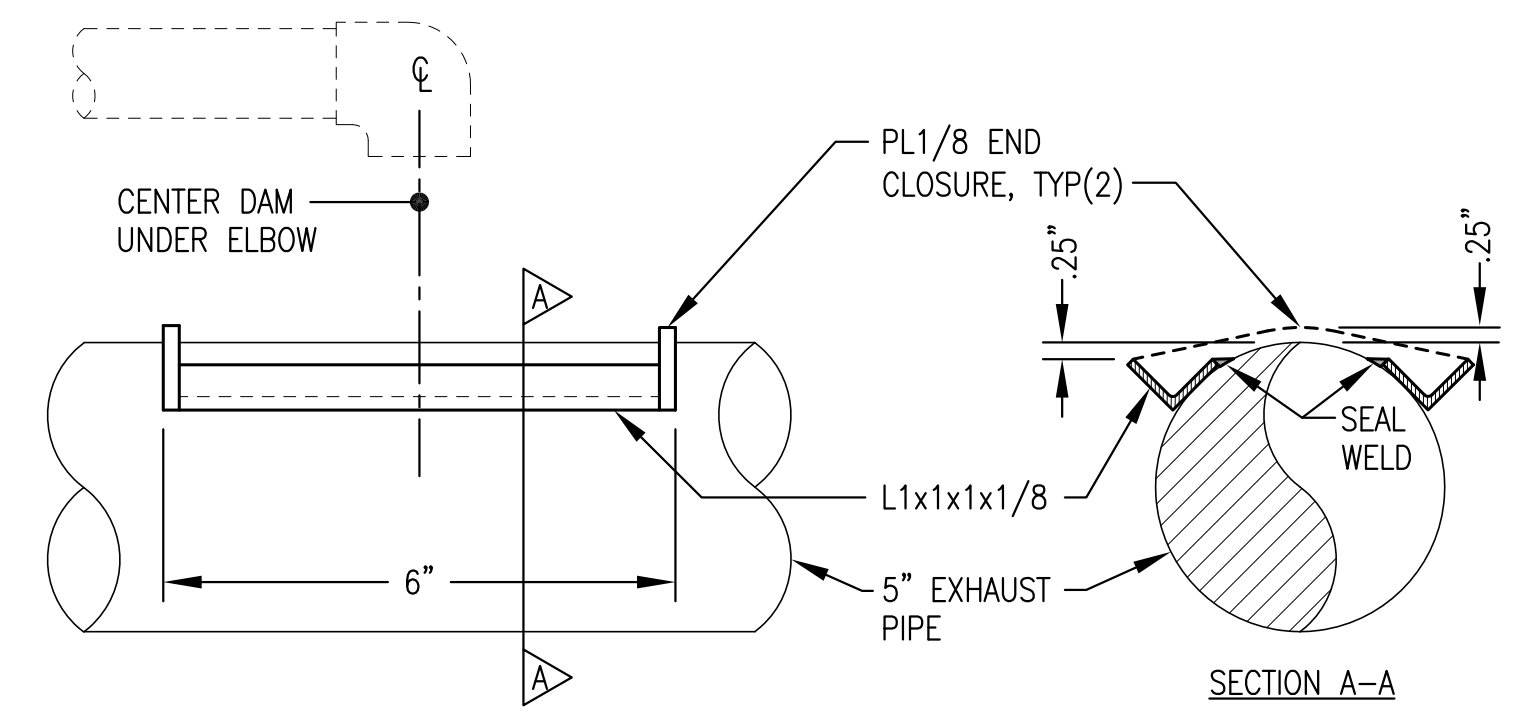
- GENERAL NOTES:**
- 1) ALL WORK THIS DETAIL TO BE PERFORMED UNDER M&I PROJECT BASE BID TASK M-B.
 - 2) ALL EXISTING PIPING & EQUIPMENT TO REMAIN SHOWN WITH LIGHT DASHED LINES. ALL NEW EQUIPMENT TO BE INSTALLED THIS PROJECT SHOWN WITH DARK SOLID LINES.
- SPECIFIC NOTES:**
- 1) CUT OUT EXISTING 2" 90° WELD ELBOW & WELD SALVAGED 2" KING NIPPLE DIRECTLY TO EXISTING 3x2 WELD REDUCER.
 - 2) AFTER SYSTEM FLUSH IS COMPLETE, DRAIN EXISTING BLOCK AND HOSE CONNECTIONS PRIOR TO GENERATOR REMOVAL FROM SERVICE. SAVE DIESEL FUEL FOR RE-USE IN NEW SYSTEMS. TURN USED OIL OVER TO THE UTILITY FOR FINAL DISPOSITION.
 - 3) THE OWNER FURNISHED ENGINE IS PRESENTLY LOCATED IN ANCHORAGE. IT IS A NEW JOHN DEERE 6068AFM85 ENGINE, SEE SHEET M4 FOR MODIFICATIONS.
 - 4) REINSTALL EXISTING MAGNETIC PICKUP AS REQUIRED.

1 M&I PROJECT BASE BID TASK M-B GEN #3 ENGINE REPLACEMENT & MISC. UPGRADES ELEVATION
1"=1'-0"



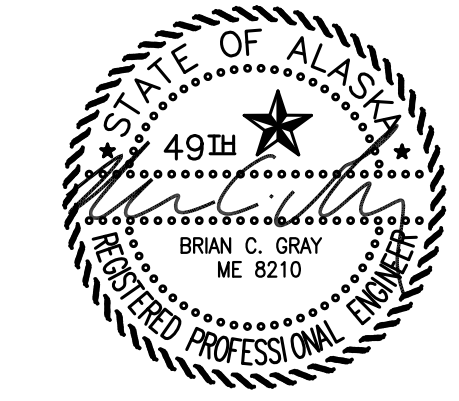
- GENERAL NOTES:**
- 1) ALL WORK THIS DETAIL TO BE PERFORMED UNDER DERA PROJECT BASE BID TASK B.
 - 2) ALL EXISTING PIPING & EQUIPMENT TO REMAIN SHOWN WITH LIGHT DASHED LINES. ALL NEW EQUIPMENT TO BE INSTALLED THIS PROJECT SHOWN WITH DARK SOLID LINES.
- SPECIFIC NOTES:**
- 1) CUT OUT EXISTING 3"x2-1/2" WELD REDUCER & REPLACE WITH 3"x2" WELD REDUCER & 2" STEEL KING NIPPLE.
 - 2) CUT EXISTING 2" PIPE & KING NIPPLE FROM 3x2 REDUCER & SAVE FOR REUSE. WELD NEW 2" 90° ELBOW TO REDUCER FACING LEFT & WELD SALVAGED FITTINGS TO ELBOW.
 - 3) THE OWNER FURNISHED GENERATOR IS PRESENTLY LOCATED IN THE TULUKSAK POWER PLANT. IT IS A NEW A MARATHON MAGNAPLUS MODEL 431PSL6254, SN MT-0025084.
 - 4) DRAIN BLOCK AND HOSE CONNECTIONS PRIOR TO GENERATOR DEMOLITION. SAVE DIESEL FUEL FOR RE-USE IN NEW SYSTEMS. TURN USED GLYCOL AND OIL OVER TO THE UTILITY FOR FINAL DISPOSITION.
 - 5) ENGINE BLOCK FOR GENSET #1 MUST BE RENDERED UNUSABLE BY CUTTING A MINIMUM 3"x3" HOLE IN ENGINE CRANK CASE. PROVIDE PHOTOGRAPHIC DOCUMENTATION OF HOLE AND ASSOCIATED ENGINE NAMEPLATE. COMPLETE "CERTIFICATE OF ENGINE DESTRUCTION" FORM AND PROVIDE TO AEA PROJECT MANAGER.
 - 6) FURNISH & INSTALL NEW JOHN DEERE 6068AFM85 ENGINE, SEE SHEET M4 FOR MODIFICATIONS & SHEET M5 FOR SPECIFICATIONS.
 - 7) FURNISH & INSTALL NEW MAGNETIC PICKUP.

2 DERA PROJECT BASE BID TASK B GEN #1 REPLACEMENT ELEVATION
1"=1'-0"



3 TYPICAL CRANKCASE DRIP DAM FABRICATION DETAIL
NO SCALE

ISSUED FOR CONSTRUCTION
AUGUST 2019

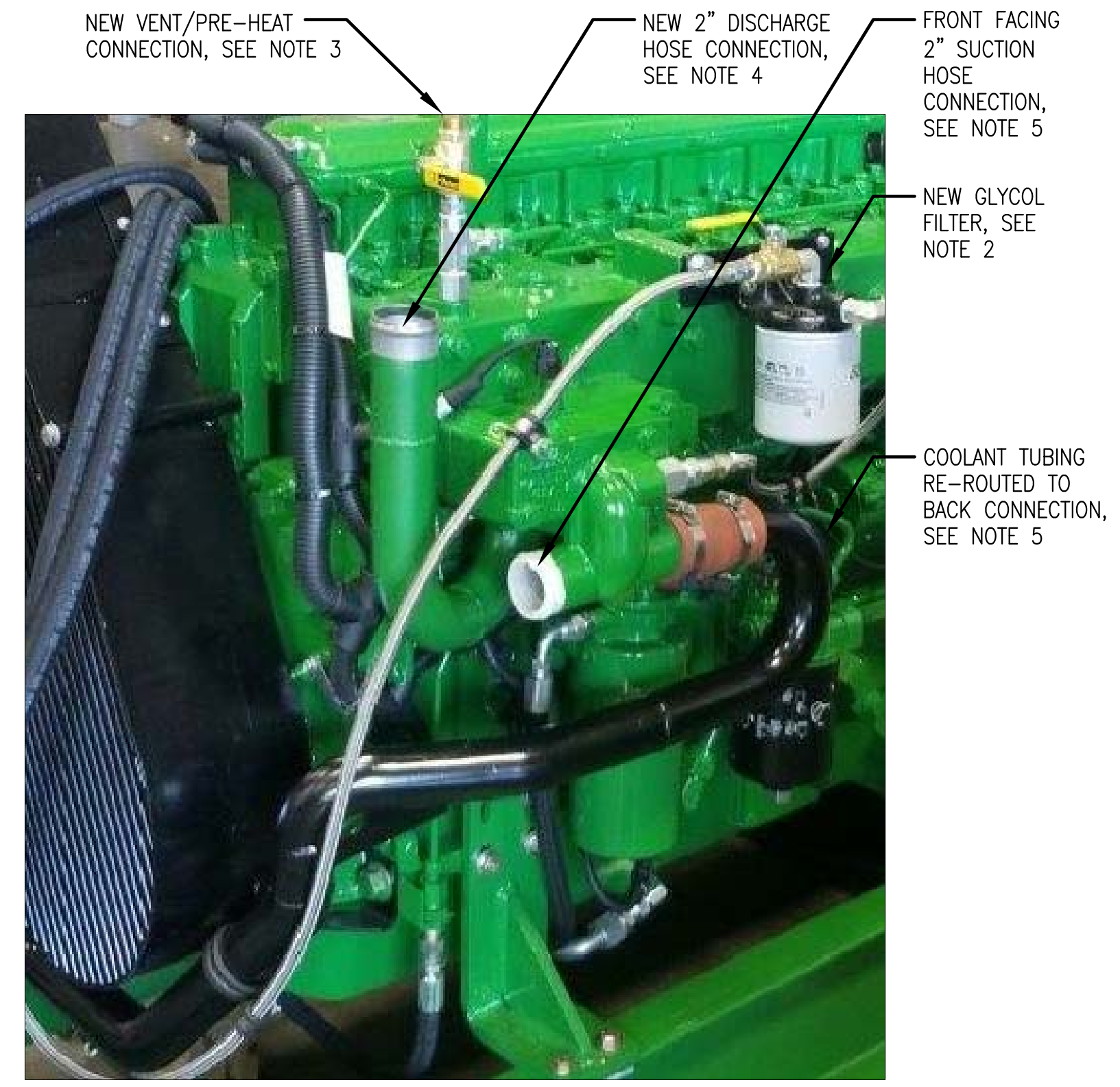


PROJECT: TULUKSAK POWER PLANT 2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT	
TITLE: GENSETS #1 & #3 UPGRADE DETAILS	
DRAWN BY: JTD	SCALE: NO SCALE
DESIGNED BY: CWV/BCG	DATE: 8/12/19
FILE NAME: TULU DR-M&I M	SHEET: M3 OF 5
PROJECT NUMBER:	
P.O. 111405, Anchorage, AK 99511 (907)349-0100	



MODIFY ENGINE COOLANT SUCTION CONNECTION & DISCHARGE CONNECTION (BEHIND - NOT VISIBLE)

PRIOR TO MODIFICATION



AFTER MODIFICATION

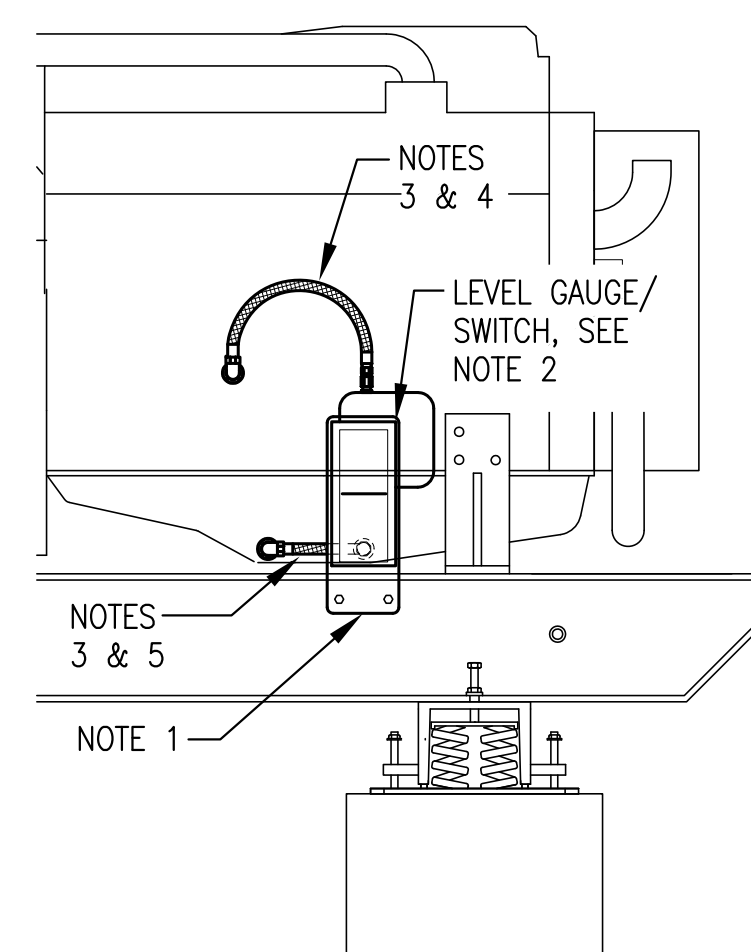
ENGINE MODIFICATION NOTES:

1. REMOVE FACTORY-INSTALLED ACCESSORIES: REMOVE COOLANT TANK, ALTERNATOR, CRANKCASE FILTER AND ANY OTHER ACCESSORIES THAT ARE NOT REQUIRED.
2. INSTALL GLYCOL FILTER: PROVIDE SCREW-ON CANISTER STYLE FILTER ELEMENT WITH 3/8" NPT CONNECTIONS ON HEAD, WIX #24019 HEAD WITH #24069 ELEMENT OR APPROVED EQUAL. MOUNT HEAD ON STEEL BRACKET FIXED TO FRONT OR SIDE OF ENGINE. CONNECT TO ENGINE WITH GLYCOL HOSES WITH 3/8" NPT QUARTER TURN GAUGE COCK ISOLATION VALVES. CONNECT INLET TO THERMOSTAT HOUSING AND CONNECT OUTLET TO WATER PUMP INLET.
3. INSTALL VENT/PRE-HEAT CONNECTION: ON THERMOSTAT HOUSING PROVIDE 3/8" NPT TEE FITTING FOR ENGINE VENT/PRE-HEAT. PROVIDE PLUG IN BRANCH TEE FOR FIELD ENGINE PRE-HEAT CONNECTION. PROVIDE 3/8" NPT QUARTER TURN GAUGE COCK ISOLATION VALVE WITH 5/8" BARB x 3/8" NPT BRASS KING NIPPLE FOR FIELD CONNECTION OF 1/2" SILICONE HOSE.
4. MODIFY COOLANT DISCHARGE CONNECTION: MODIFY FOR 2" HOSE CONNECTION TO FACE VERTICALLY AT THE FRONT OF THE ENGINE. SEE PHOTO FOR ARRANGEMENT.
5. MODIFY COOLANT SUCTION CONNECTION: REROUTE ENGINE COOLANT TUBING TO BACK OF SUCTION CONNECTION HOUSING AS REQUIRED AND MODIFY FOR 2" HOSE CONNECTION TO FACE HORIZONTALLY AT THE FRONT OF THE ENGINE. SEE PHOTO FOR ARRANGEMENT.

NOTE: THIS PICTURE SHOWS THE OWNER FURNISHED ENGINE, SERIAL # PE6068L920596, IN PRESENT CONFIGURATION.

NOTE: THIS PICTURE SHOWS A COMPARABLE ENGINE FROM A PRIOR PROJECT IN FINAL CONFIGURATION.

1 M&I TASK M-B GENSET #3 ENGINE MODIFICATIONS (DERA BASE BID TASK B GENSET #1 ENGINE MODIFICATIONS SIMILAR)
M4 NO SCALE



- NOTES:**
- 1) 1/4" STEEL SUPPORT PLATE PRE-DRILLED TO MATCH GAUGE/SWITCH MOUNTS, CHANNEL SKID HOLES AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL. ADJUST SWITCH CONTACTS 1/2" ABOVE & BELOW.
 - 2) MURPHY EL-150-K1 OIL LEVEL GAUGE/SWITCH OR EQUAL. MOUNT TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS.
 - 3) #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS AS REQUIRED.
 - 4) CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH HOSE. ROUTE UPPER HOSE TO AVOID LOW POINT TRAPS.
 - 5) CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH HOSE. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE-DRILLED HOLE IN STEEL PLATE.

2 TYPICAL OIL LEVEL GAUGE/SWITCH FIELD INSTALLATION
M4 NO SCALE

ISSUED FOR CONSTRUCTION
AUGUST 2019



PROJECT:	TULUKSAK POWER PLANT 2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT	
TITLE:	TYPICAL ENGINE MODIFICATION DETAILS	
DRAWN BY: JTD	SCALE: NO SCALE	
DESIGNED BY: CWV/BCG	DATE: 8/7/19	
FILE NAME: TULU DR-M&I M	SHEET: M4	OF 5
PROJECT NUMBER:		



PART 1 – GENERAL

1.1 SCOPE

- A. The Work included herein shall consist of providing, modifying, and factory testing one pre-model year 2014 John Deere 6068AFM75 or 6068AFM85 engine with accessories as specified herein.
- B. The engine may be like new (500 hours maximum run time) or it may be rebuilt in accordance with these specifications.

1.2 SUBMITTALS

- A. Provide Data Sheet, Serial Number, and Manufacturer's Build Code for the engine to be furnished.
- B. Provide manufacturer's catalog literature for all accessories and equipment. Note that if materials are going to be furnished exactly as specified, provide written notice confirming material compliance.

1.3 REGULATORY COMPLIANCE

The Environmental Protection Agency (EPA) has issued New Source Performance Standards (NSPS) regulations governing use of stationary diesel engines in remote areas of Alaska. The following provisions of 40 CFR Subpart IIII apply to this solicitation:

- A. 40 CFR 60.4201(f) permits manufacturers to produce stationary, non-emergency engines certified to 40 CFR 94 and 40 CFR 1042 (Tier 2 and Tier 3 Marine) if used solely in remote areas of Alaska.
- B. 40 CFR 60.4208(e) prohibits owners and operators from installing a new engine greater than or equal to 175 HP after December 31, 2012 unless it meets applicable 2011 model year emissions requirements. A new/unused Tier 2 Marine certified engine in this horsepower category complies with this requirement because the Tier 2 Marine emissions standard was in effect through model year 2012 for engines with displacements from 0.9 to less than 1.2 liters/cylinder.
- C. 40 CFR 60.4216(b) permits manufacturers, owners and operators to install engines in remote areas of Alaska certified to 40 CFR 94 and 40 CFR 1042 (Tier 2 and Tier 3 Marine).

In order to comply with EPA emissions requirements and also be compatible with the intended service applications, the diesel engine furnished under this solicitation shall be a Tier 2 or Tier 3 Marine certified engine, with a manufacture date in accordance with the requirements listed herein. If the engine is rebuilt it shall be rebuilt as specified herein and shall meet the requirements of 40 CFR 1068 and applicable NSPS standards.

1.4 QUALITY ASSURANCE FOR REBUILT ENGINE OPTION

- A. Engines shall not have been in service at any time after rebuilding and prior to delivery except as required to comply with requirements for Factory Tests.
- B. All new and refurbished parts, castings, assemblies and components furnished shall meet original OEM specifications.
- C. All work shall be performed by certified and experienced technicians trained and authorized to work on the engines being rebuilt and furnished.
- D. All nondestructive testing (NDT) of castings and parts to be performed to ASTM standards. All NDT inspections shall be performed by a Level II or Level III certified NDT inspector using a certified Quality System.
- E. Where items are described as factory rebuilt or remanufactured, the term factory shall mean a machine shop that is regularly engaged in the practice of remanufacturing the type of items required.

1.5 REBUILDER QUALIFICATIONS

The engine shall be rebuilt by a qualified rebuilder (Rebuilder) who is regularly engaged in the business of rebuilding diesel engines.

- A. The Rebuilder must have staff with extensive experience in rebuilding diesel engines.
- B. The Rebuilder must have a fabrication facility with adequate space and appropriate equipment as required to perform the work.

1.6 CONTRACTOR WARRANTIES

- A. A warranty is not required for this project.

PART 2 – PRODUCTS

2.1 ENGINE

- A. Engine shall have a manufacture date prior to Model Year 2014. The engines shall be new or shall be rebuilt in accordance with these specifications.
- B. In order to comply with the DERA program requirements and be compatible with the existing power plant, the engine shall be a John Deere 6068AFM75, Tier 2 Marine or 6068AFM85, Tier 3 Marine rated 223 hp, 150 ekW prime. Approved equal substitution will be allowed only by Engineer's approval. To obtain approval, the Contractor must provide submittals clearly demonstrating the following:
 1. The substitute engine must meet all of the requirements of these specifications.
 2. The substitute engine manufacturer must have at least one factory authorized service representative with a permanent shop in Southcentral Alaska.
 3. The size and weight of the substitute engine must not exceed that of the specified engine by more than 10%.
 4. The physical layout, piping connections, and service access area of the substitute engine must be sufficiently similar to that of the specified engine so that no major changes will be required to the power plant design.
 5. The substitute engine must meet or exceed the fuel efficiency rate of the specified engine. Provide fuel curve showing fuel consumption (kWh/gallon) at 25%, 50%, 75% and 100% of prime rated capacity.
 6. The substitute engine must be provided with a single jacket water cooling circuit without a separate aftercooler circuit.
 7. The engine must not be equipped, or require to be equipped, with any exhaust emissions equipment including Exhaust Gas Recirculation, Diesel Oxidation Catalyst, Diesel Particulate Filter, or Selective Catalytic Reduction.
- C. In order to integrate with the paralleling switchgear, the engine ECU shall be programmed for paralleling prime power (G-Drive) operation at 1800 RPM using a 0-5 VDC analog throttle input for speed bias.
- D. The Starting and Control Voltage shall be 12 VDC (convert as required).
- E. The engine shall have manufacturer's engine mounted fuel filters with replaceable elements. Fuel supply and return lines shall be routed to the front of generator skid for field connection to the plant piping.
- F. The engine shall have a gear type lubricating oil pump for supplying oil under pressure to the main bearings, crankshaft bearings, pistons, piston pins, timing gears, camshaft bearings and valve rocker mechanism. Threaded spin-on type, full flow lubricating oil filters shall be provided. The oil drain line shall be connected to the front of generator skid for field connection to the plant piping.
- G. The engine shall be furnished without a charging alternator, heat exchanger, coolant expansion tank, or accessory reduction gear drive. Factory installed components shall be removed as required.
- H. The engine coolant connections shall be modified as indicated on Sheet M4.

D. The Starting and Control Voltage shall be 12 VDC (convert as required).

- E. The engine shall have manufacturer's engine mounted fuel filters with replaceable elements. Fuel supply and return lines shall be routed to the front of generator skid for field connection to the plant piping.
- F. The engine shall have a gear type lubricating oil pump for supplying oil under pressure to the main bearings, crankshaft bearings, pistons, piston pins, timing gears, camshaft bearings and valve rocker mechanism. Threaded spin-on type, full flow lubricating oil filters shall be provided. The oil drain line shall be connected to the front of generator skid for field connection to the plant piping.
- G. The engine shall be furnished without a charging alternator, heat exchanger, coolant expansion tank, or accessory reduction gear drive. Factory installed components shall be removed as required.
- H. The engine coolant connections shall be modified as indicated on Sheet M4.

2.2 ACCESSORIES

- A. Oil Level: The engine shall have a combination visual oil level site gauge with adjustable high and low level switches, Murphy L129CK1 or approved equal. Mount on rubber isolators and connect to engine with minimum #8 hoses. Carefully route upper vent hose to avoid any low point traps and connect directly into crankcase. Route lower hose to a connection directly on the oil pan. Do not tee lower hose into oil drain line. See Drawings for installation detail.
- B. Fuel and Oil Hoses: All hoses for fuel, lube oil, vents, mechanical gauges, etc., shall be Aeroquip type FC300, Eaton Weatherhead H569 or approved equal. Minimum hose size shall be 5/16" (#6). Provide with re-useable JIC swivel type fittings. Push-on or barb type hose connections will not be allowed. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.

- C. Glycol Hoses: All hoses for glycol shall be Teflon hose with stainless steel outer braid, Eaton Weatherhead H243 or approved equal. Provide with re-useable plated steel straight JIC swivel ends with NPT adapters. Route hoses to avoid wear points and to ensure access to normal service points on the engine. Securely support hoses from engine and skid.
- D. Wire Loom: All wiring for control and instrumentation shall be routed in plastic loom. Provide tee fittings for all branch connections. Route loom to avoid wear points and to ensure access to normal service points on the engine. Securely support loom from engine and skid.
- E. Protective Guards: All moving parts and hot surfaces shall be provided with protective guards in accordance with U.L. Standard 2200.
- F. Air Cleaners: The engine shall be provided with a dry-type, replaceable element air cleaner with a metal canister, Donaldson or approved equal. Open disposable type air filters or plastic canisters will not be accepted. Provide visual air restriction indicator, 20" water column limit, manual reset, Donaldson X002251 or approved equal.
- G. Provide a flexible, continuous, 18 inch long stainless steel exhaust flex connector with welded connections, Alaska Rubber or approved equal. Provide an appropriate engine mating connection at one end and an ASA 125 lb. flange at the opposite end, sized as indicated on the Drawings.
- H. Starting: The engine shall be equipped with a 12 VDC electric starting system. A starter auxiliary relay shall be included.
- I. Provide two each minimum 800 cold crank amp 12-volt starting batteries, one for engine and one spare. Batteries shall be sealed maintenance free, Optima Red Top NAPA Part Number BAT N993478RED or approved equal.
- J. Provided with two each #2/0 AWG arctic flex battery cables, length as required. All cables shall include compression type terminal ends. One battery cable shall be red for the positive lead and the other shall be black for the negative lead.
- K. Control Power: To provide 12VDC power to the switchgear, a 30A circuit breaker with switch shall be mounted on the engine in the vicinity of the starter, Cooper 187-030-F-00 or approved equal.
- L. Provide a J1939 multi-function monitoring panel, Murphy PV101-C or approved equal. The panel shall be mounted on the side of the generator enclosure. Provide with wiring harness as required for connection to ECU and battery power.

2.3 SPARE FILTERS

In addition to the filters installed on the engine, provide the following quantities of replacement filters for the engine.

- A. Twelve (12) oil filters.
- B. Six (6) fuel filters.
- C. Three (3) air filters

PART 3 – EXECUTION

3.1 FACTORY TESTS

- A. Prior to shipment, the Contractor shall perform factory tests on the engine. Supply sufficient notice to the Authority prior to performing tests. The Authority reserves the right to witness all tests. Test procedures shall conform to ASME, IEEE, and ANSI standards, and NEMA standard practices section on testing, as appropriate and applicable.
- B. The Contractor shall provide all required mechanical and electrical equipment including but not limited to fuel supply, radiator, instrumentation, dynamometer or generator and load bank as required.
- C. The Contractor shall provide all required measuring and indicating devices. All devices shall be certified correct or correction data furnished for the device.

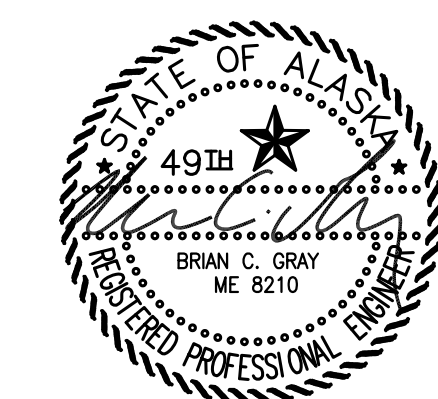
- D. Prior to running, the Contractor shall verify that engine is filled with break in oil. The break in oil shall be approved by the engine manufacturer for 100 to 500 hour run time, John Deere Break-In Plus or approved equal. Note that if the engine is used the existing oil shall be drained and replaced with specified oil. Pull a sample of the clean lube oil installed in the engine.
- E. Perform a hydrostatic test on water jackets to assure that water seals and water jackets are watertight. Test report shall indicate pressure at which test was made and the results.
- F. Prior to performing the load test, connect the ECU to an analog throttle input and verify that it is correctly responding including idle operation at input less than 0.5 VDC and 1800 RPM at 2.5 VDC.
- G. Perform a load test on the engine using a dynamometer or at Contractor's option using a generator and an electric load bank. Place engine in continuous operation without stoppage for a period of not less than eight hours. Operate not less than one hour at each load point (1/2, 3/4, and full load) and 1 hour at 110 percent of rated load. If stoppage becomes necessary during this period, repeat the 8-hour run. Also record the following data at the start, at 15-minute intervals, and at the end of each load run: RPM (or Hz), kW load (shaft or ekW), fuel consumption, exhaust temperature, intake air temperature, jacket water temperature, lube oil temperature, lube oil pressure, manifold (boost) pressure, and crankcase vacuum.
- H. Pull a sample of the lube oil after performing test.
- I. Tests shall indicate satisfactory operation and attainment of guarantees and specified performance. Provide test reports including certified copies of all Contractor's test data and results. Include laboratory analysis for the clean lube oil sample and the sample pulled after the test. Contractor shall not install equipment without approval by the Authority of the shop test reports.

3.2 SHIPPING

After testing, and prior to shipping perform the following steps:

- A. Remove any dirt from the air cleaner; check all seals and gaskets. Put lubricant on all points given in the lubrication chart of the engine operation guide.
- B. Turn the engine at cranking speed with governor control in full off position and use a sprayer to add a mixture of 50% VCI (volatile corrosion inhibitor) oil and 50% 30 weight oil into the air intake or turbocharger inlet.
- C. Continue spraying the mixture of 50% VCI oil and 50% 30-weight engine oil into the air intake or turbocharger inlet to ensure the cylinders and exhaust ports are coated with the oily mixture.
- D. Clean the outside of the engine and inspect and ensure that the engine and generator are covered by good quality paint. Correct any deficiencies.
- E. Spray a thin amount of 50% VCI oil and 50% 30-weight engine oil on the flywheel, ring gear teeth, and starter pinion. Install the covers to keep the vapors in.
- F. Flush the cooling system with extended life 50/50 ethylene glycol mix, Shell Rotella ELC or approved equal. Install covers over the connections. Note that if testing was performed with extended life ethylene glycol solution the engine does not need to be flushed.
- G. Install covers on all openings including air intake, exhaust, flywheel housing, etc. Ensure all covers are air tight and weatherproof. Use waterproof, weather resistant type tape. Do not install tape in such a manner as will damage paint when the tape is removed. Install a mechanical protective device over any protruding items, which may be vulnerable to damage during transportation.
- H. Fasten the engine to a shipping skid or pallet. Put a waterproof cover over the entire engine.
- I. Package all spare filters and other loose ship items in boxes or crates. Wrap each box/crate with waterproof cover and secure to pallet(s).

ISSUED FOR
CONSTRUCTION
AUGUST 2019



PROJECT: TULUKSAK POWER PLANT 2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT	
TITLE: DERA BASE BID TASK B GENSET #1 ENGINE SPECIFICATIONS	
 P.O. 111405, Anchorage, AK 99511 (907)349-0100	DRAWN BY: JTD DESIGNED BY: CWV/BCG FILE NAME: TULU DR-M&I M PROJECT NUMBER:
SCALE: NO SCALE DATE: 8/7/19	SHEET: M5 OF 5

GENERAL NOTES:

- 1) THE COMMUNITY IS CURRENTLY BEING POWERED BY A SELF CONTAINED EMERGENCY GENSET LOCATED OUTSIDE OF THE PLANT. THE POWER PLANT FEEDER BREAKER IS CLOSED AND THE BUS IS ENERGIZED TO PROVIDE POWER PLANT STATION SERVICE POWER.
- 2) ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL.
- 3) ENSURE ALL EQUIPMENT AND CIRCUITS TO BE REMOVED ARE DE-ENERGIZED PRIOR TO BEGINNING DEMOLITION. LOCK AND TAG OUT ALL AFFECTED CIRCUIT BREAKERS AND DISCONNECTS.
- 4) TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO ELECTRICAL EQUIPMENT AND CONDUCTORS BEING SALVAGED FOR REUSE. TURN ALL REMOVED MATERIALS AND EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION IF NOT REUSED.
- 5) SEE ATTACHED MARK UP OF EXISTING SWITCHGEAR ONE-LINE DIAGRAM FOR POWER CONDUCTOR AND SWITCHGEAR CHANGES.
- 6) SEE MECHANICAL FOR OVERALL SCOPE DESCRIPTION AND ADDITIONAL TASKS.

DERA BASE BID TASKS SPECIFIC NOTES:

A FLUSH AND REPAIR COOLING SYSTEM, SEE MECHANICAL

B GENSET #1 UPGRADES:

- DISCONNECT ALL POWER & CONTROL CONDUCTORS INSIDE GENERATOR ENCLOSURE IN PREPARATION FOR GENERATOR REPLACEMENT AND DISCONNECT STARTER CABLES IN PREPARATION FOR ENGINE REPLACEMENT.
- REMOVE EXISTING ENGINE AND GENERATOR FROM SKID AND RENDER ENGINE BLOCK UNUSABLE (SEE MECHANICAL).
- FURNISH AND INSTALL NEW ENGINE AND OWNER FURNISHED GENERATOR ON EXISTING SKID (SEE MECHANICAL).
- INSTALL ALL ENGINE ACCESSORIES AND PIPING (SEE MECHANICAL).
- CAREFULLY REMOVE 4#1/0, #2G, CABLE FROM 2-1/2" UNDER FLOOR CONDUIT, LEAVE CONDUIT IN PLACE.
- RECONNECT EXISTING CONDUIT RISERS TO NEW GENERATOR ENCLOSURE.
- INSTALL 4#3/0, #2G SALVAGED FROM GEN #4, SEE TASK J, AND TERMINATE TO NEW GENERATOR.
- RECONNECT ALL ENGINE CONTROL CONDUCTORS INCLUDING 12VDC POWER, STARTER SIGNAL, RUN SIGNAL, SPEED BIAS, AND LOW OIL LEVEL ALARM. SEE DETAIL 3/E2.

C FIRE EXTINGUISHERS, SEE MECHANICAL

D RADIATOR R-1 AND R-2 VFD CONTROLS:

- THE VFD'S ARE FUNCTIONAL BUT HAVE RECENTLY BEEN OPERATED IN BYPASS MODE.
- TEST AND CALIBRATE BOTH RADIATOR VFD CONTROLS AND CONFIRM PROPER RADIATOR FUNCTION. VFD CONTROL FOR EACH RADIATOR IS PROVIDED BY AN ALTIVAR DRIVE MODEL ATV58HU72M2ZU WITH REMOTE DISPLAY MOUNTED IN FACE OF DEDICATED CONTROL PANEL.

E OVERHEAD DOOR, SEE MECHANICAL

F GEN #4 SWITCHGEAR SECTION PARTS SALVAGE:

- CAREFULLY SALVAGE EXISTING 400A BREAKER FROM GEN #4 SECTION FOR INSTALLATION IN GEN #3 SECTION.
- REMOVE EXISTING 400A TRIP PLUG FROM BREAKER AND TURN OVER TO UTILITY.

G GEN #3 SWITCHGEAR SECTION UPGRADES:

- SALVAGE 3 EACH 200:5 CT'S FROM GENERATOR #3 SECTION AND SAVE FOR INSTALLATION IN GEN #2 SECTION.
- INSTALL 3 EACH 300:5 CT'S SALVAGED FROM GENERATOR #2 SECTION (SEE TASK H).
- INSTALL 400A BREAKER SALVAGED FROM GEN #4 SECTION (SEE TASK F).
- INSTALL NEW GE PART# SRPG400A250 250A TRIP PLUG IN SALVAGED 400A BREAKER.
- INPUT NEW 300:5 CT SETTINGS IN GEN #3 LOAD SHARE MODULE AND POWER METER.

H GEN #2 SWITCHGEAR SECTION UPGRADES:

- SALVAGE 3 EACH 300:5 CT'S FROM GENERATOR #2 SECTION AND SAVE FOR INSTALLATION IN GEN #3 SECTION.
- INSTALL 3 EACH 200:5 CT'S SALVAGED FROM GENERATOR #3 SECTION (SEE TASK G).
- INSTALL NEW GE PART# SRPF250A200 200A TRIP PLUG IN EXISTING 250A BREAKER.
- INPUT NEW 200:5 CT SETTINGS IN GEN #2 LOAD SHARE MODULE AND POWER METER.

I GEN #1 SWITCHGEAR SECTION UPGRADES:

- INSTALL NEW 250A FRAME MOLDED CASE CIRCUIT BREAKER IN OPEN SPACE WHERE ORIGINAL BREAKER WAS REMOVED. GE SPECTRA RMS BREAKER PART# SFHA36ATO250 WITH 250A TRIP PLUG PART# SRPF250A250, AUX CONTACTS 2A/2B PART# SAUXPAB2, BELL ALARM PART# SABAP1, AND LUGS PART# TCAL29.
- RECONNECT EXISTING POWER AND CONTROL CONDUCTORS TO NEW BREAKER.
- REPLACE EXISTING LOAD SHARE MODULE WITH NEW WOODWARD 9907-252 LOAD SHARE MODULE.
- CONNECT EXISTING CONTROL WIRING TO NEW LOAD SHARE MODULE AND REVISE AS REQUIRED.
- INPUT CORRECT FLYWHEEL TOOTH COUNT FOR NEW ENGINE INTO EXISTING ECU-57 AUTOSTART.

J NOTE THAT WHEN GEN #4 WAS REMOVED THE POWER AND CONTROL CONDUCTORS WERE LEFT EXPOSED ON THE FLOOR. SALVAGE EXISTING CONDUCTOR FOR REUSE AND PLUG ABANDONED CONDUIT:

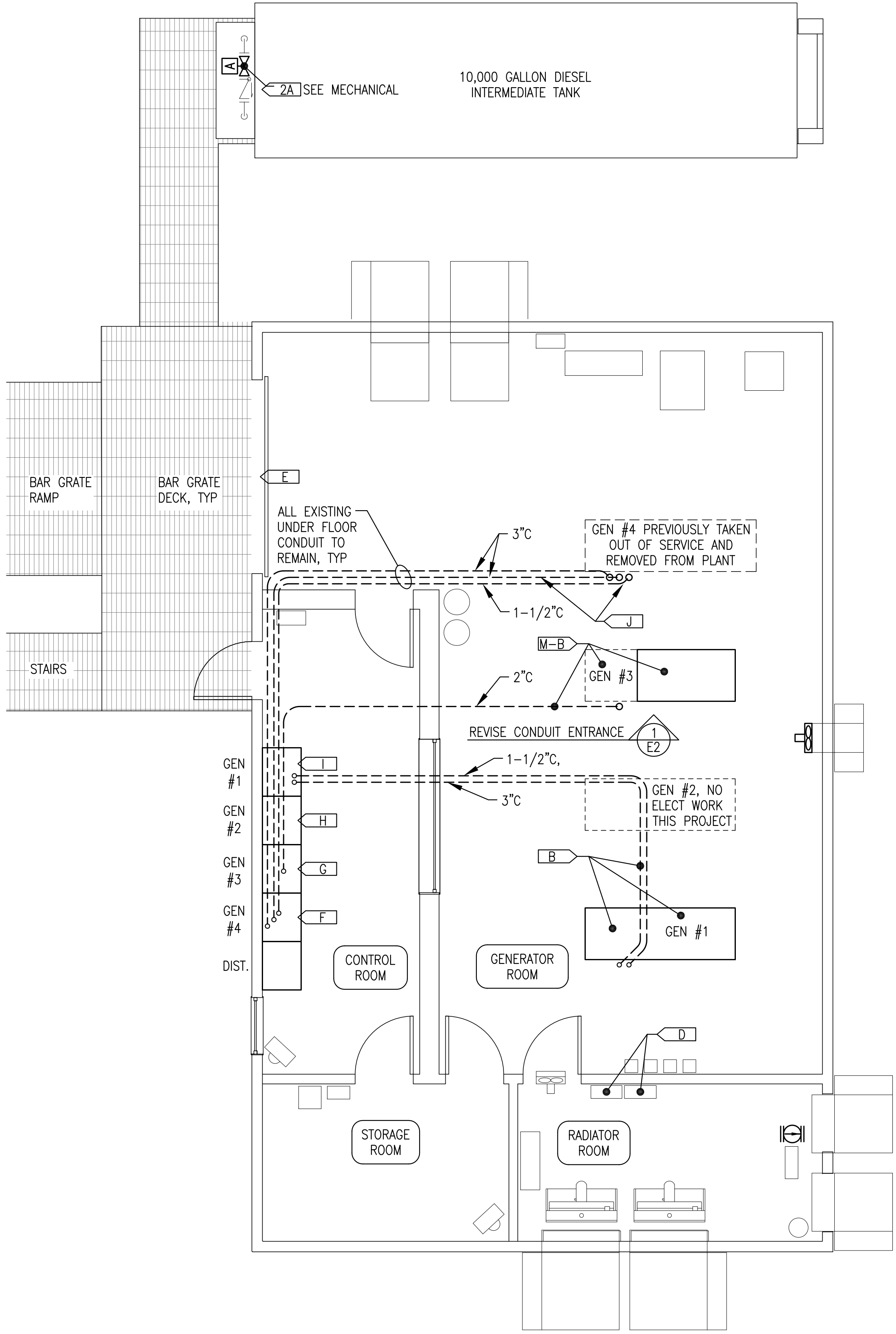
- CAREFULLY REMOVE TWO RUNS OF 4#3/0, #2G, 150C COBRA CABLE (EACH IN SEPARATE 3" CONDUIT UNDER FLOOR) AND SAVE FOR RE-USE. LEAVE UNDER FLOOR CONDUIT IN PLACE.
- CAREFULLY REMOVE ALL CONTROL CONDUCTORS FROM 1-1/2" CONDUIT UNDER FLOOR AND SAVE FOR RE-USE. LEAVE UNDER FLOOR CONDUIT IN PLACE.
- NOTE THAT CONDUIT COUPLINGS ARE WELDED THROUGH THE FLOOR. AFTER REMOVING ALL CONDUCTORS, REMOVE ALL CONDUIT ABOVE FLOOR AND INSTALL THREADED PLUGS IN CONDUIT COUPLINGS.

M&I PROJECT BASE BID TASKS SPECIFIC NOTES:

M-B GENSET #3 UPGRADES:

- CAREFULLY REMOVE 4#2, #2G, 150C COBRA CABLE FROM 2" UNDER FLOOR CONDUIT. LEAVE UNDER FLOOR CONDUIT IN PLACE.
- DISCONNECT ENGINE CONTROL CONDUCTORS INSIDE GENERATOR ENCLOSURE AND DISCONNECT STARTER CABLES IN PREPARATION FOR ENGINE REPLACEMENT (SEE MECHANICAL).
- REMOVE EXISTING 2" CONDUIT RISER ABOVE FLOOR TO GENERATOR ENCLOSURE.
- INSTALL NEW 2-1/2" LT FLEX RISER ABOVE FLOOR TO GENERATOR ENCLOSURE, SEE DETAIL 1/E2.
- INSTALL NEW 3#2/0, #4N, #4G 150°C EXTRA FLEXIBLE CABLE FROM SWITCHGEAR TO GENERATOR #2. TERMINATE WITH LUGS RATED FOR 150°C EXTRA FLEXIBLE CABLE AND CONNECT TO GENERATOR AND SWITCHGEAR.
- AFTER ENGINE REPLACEMENT CONNECT EXISTING BATTERY CABLES TO STARTER AND CONNECT NEW ENGINE CONTROL CONDUCTORS TO EXISTING TERMINALS IN GENERATOR ENCLOSURE INCLUDING 12VDC POWER, STARTER SIGNAL, RUN SIGNAL, SPEED BIAS, LOW OIL LEVEL ALARM, AND POWERVIEW CANBUS.
- VERIFY FLYWHEEL TOOTH COUNT IN EXISTING ECU-57 AUTOSTART IS CORRECT FOR NEW ENGINE.

ADDITIVE ALTERNATE TASKS: SEE MECHANICAL FOR ALL ADDITIVE ALTERNATE TASKS.



1 ELECTRICAL WORK PLAN
1/4"=1'-0"

ELECTRICAL SPECIFICATIONS:

**** GENERAL CONDITIONS ****

PERFORM ALL WORK IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE NATIONAL ELECTRICAL CODE INCLUDING STATE OF ALASKA AMENDMENTS.

THE DRAWINGS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW ALL FEATURES OF THE REQUIRED WORK. PROVIDE ALL EQUIPMENT AND MATERIALS REQUIRED FOR A COMPLETE SYSTEM. VERIFY EXISTING FIELD CONDITIONS PRIOR TO STARTING CONSTRUCTION. IMMEDIATELY CONTACT THE ENGINEER FOR CLARIFICATION OF QUESTIONABLE ITEMS OR APPARENT CONFLICTS.

ALL EQUIPMENT AND MATERIALS SHOWN ARE NEW UNLESS SPECIFICALLY INDICATED AS EXISTING. INSTALL ALL MATERIALS IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND INSTRUCTIONS, UNLESS INDICATED OTHERWISE.

PERFORM WORK WITH SKILLED CRAFTSMEN SPECIALIZING IN SAID WORK. INSTALL ALL MATERIALS IN A NEAT, ORDERLY, AND SECURE FASHION, AS REQUIRED BY THESE SPECIFICATIONS AND COMMONLY RECOGNIZED STANDARDS OF GOOD WORKMANSHIP.

DO NOT CUT, DRILL, OR NOTCH STRUCTURAL MEMBERS UNLESS SPECIFICALLY APPROVED BY THE ENGINEER. MINIMIZE PENETRATIONS AND DISRUPTION OF BUILDING FEATURES.

**** SPECIAL CONDITIONS ****

ENSURE THAT APPROPRIATE SAFETY MEASURES ARE IMPLEMENTED AND THAT ALL WORKERS ARE AWARE OF THE POTENTIAL HAZARDS FROM ELECTRICAL SHOCK, BURN, ROTATING FANS, PULLEYS, BELTS, HOT MANIFOLDS, NOISE, ETC. ASSOCIATED WITH WORKING NEAR POWER GENERATION AND CONTROL EQUIPMENT.

**** DEVICES AND EQUIPMENT ****

DEVICES - LISTED FOR INTENDED SERVICE. INSTALL ALL DEVICES SUCH THAT MINIMUM REQUIRED ACCESS CLEARANCE IS MAINTAINED.

EQUIPMENT - CIRCUIT BREAKERS AND CONTROL DEVICES ARE LISTED BY MANUFACTURER AND MODEL TO ENSURE COMPATIBILITY WITH EXISTING EQUIPMENT. ANY SUBSTITUTIONS MUST BE FULLY COMPATIBLE WITH ALL OTHER SYSTEMS AND EQUIPMENT AND MUST PROVIDE EQUIVALENT FUNCTION.

**** SUPPORT ****

INDEPENDENTLY SUPPORT EACH DEVICE FROM BUILDING STRUCTURAL MEMBERS WITH CHANNEL STRUT OR FABRICATED BRACKETS. ALL STRUT, BRACKETS, AND FASTENERS SHALL BE GALVANIZED OR ZINC PLATED.

**** CONDUCTORS ****

COLOR CODING - UNLESS SPECIFICALLY INDICATED OTHERWISE CONDUCTORS SHALL BE COLOR CODED AS FOLLOWS:

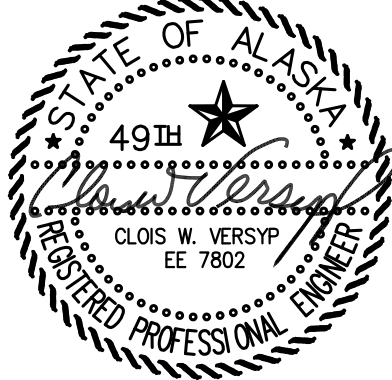
480-VOLT POWER CONDUCTORS
 PHASE A - BROWN
 PHASE B - ORANGE
 PHASE C - YELLOW
 NEUTRAL - WHITE WITH YELLOW STRIPE

120/208-VOLT POWER CONDUCTORS
 PHASE A - BLACK
 PHASE B - RED
 PHASE C - BLUE
 NEUTRAL - WHITE

FOR NO. 6 AWG AND SMALLER CONDUCTORS COLOR CODING SHALL BE PROVIDED BY USING CONDUCTORS WITH CONTINUOUS COLOR EMBEDDED IN THE INSULATION. FOR ALL CONDUCTORS LARGER THAN NO. 6 SCOTCH 35 MARKING TAPE OR EQUIVALENT MAY BE USED TO COLOR CODE THE CABLE. WHERE MARKING TAPE IS USED THE CABLE SHALL BE IDENTIFIED AT EVERY ACCESSIBLE LOCATION. PROVIDE A MINIMUM OF 2 INCHES OF TAPE AT EACH LOCATION.

GENERATOR POWER CONDUCTORS - HIGH TEMPERATURE, EXTRA FLEXIBLE CABLE. 600V, 150°C THERMOSET EPDM INSULATION WITH TIN COATED COPPER CONDUCTOR. BELDEN, COBRA CABLE, OMNI, OR APPROVED EQUAL. TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT 150°C.

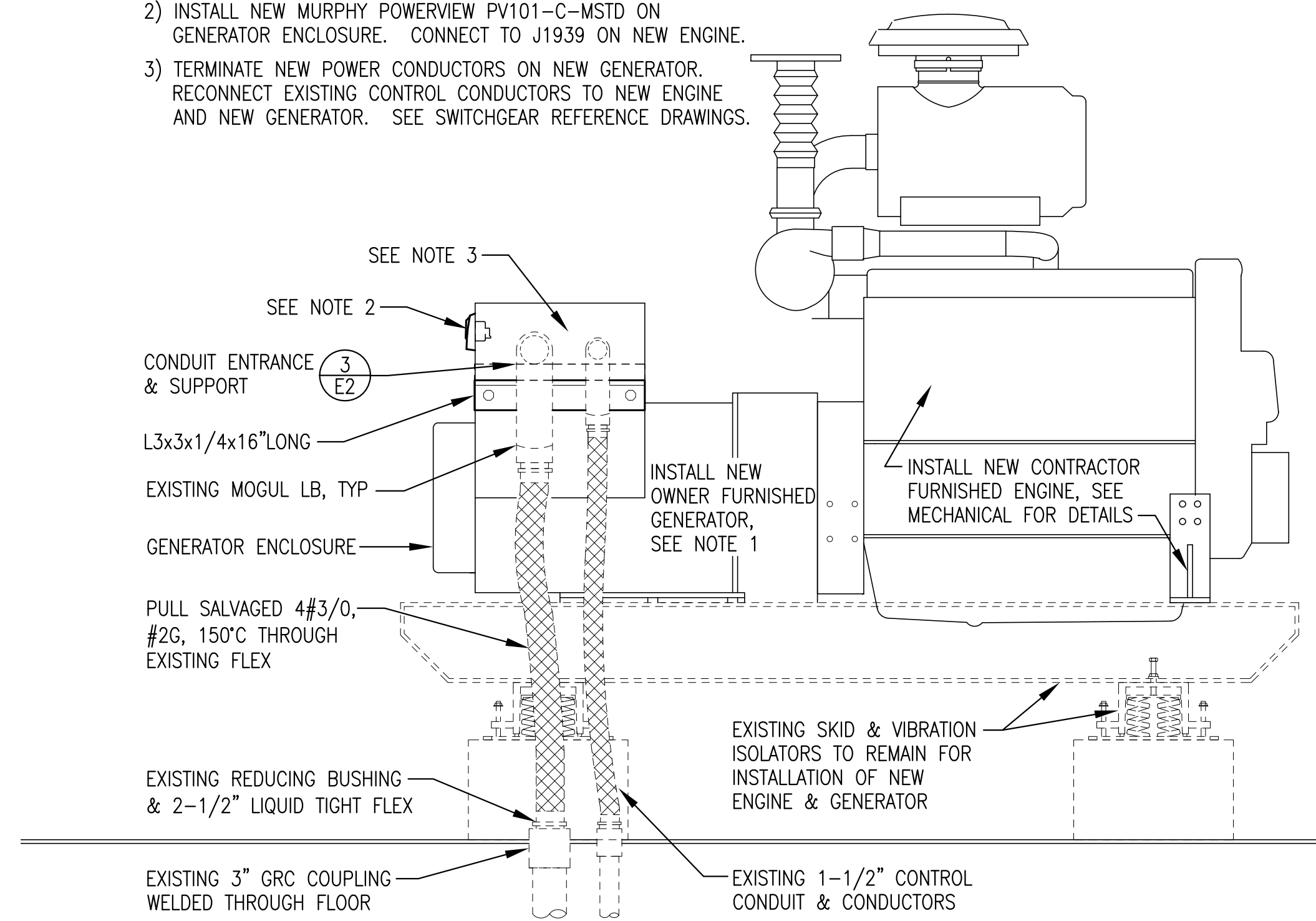
ISSUED FOR
CONSTRUCTION
AUGUST 2019



PROJECT:	TULUKSAK POWER PLANT		
	2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT		
TITLE:	ELECTRICAL WORK PLAN, NOTES, & SPECIFICATIONS		
DRAWN BY:	JTD	SCALE:	NO SCALE
DESIGNED BY:	CWV/BCG	DATE:	8/7/19
FILE NAME:	TULU DR-M&I E	SHEET:	E1 OF 2
PROJECT NUMBER:			

NOTES:

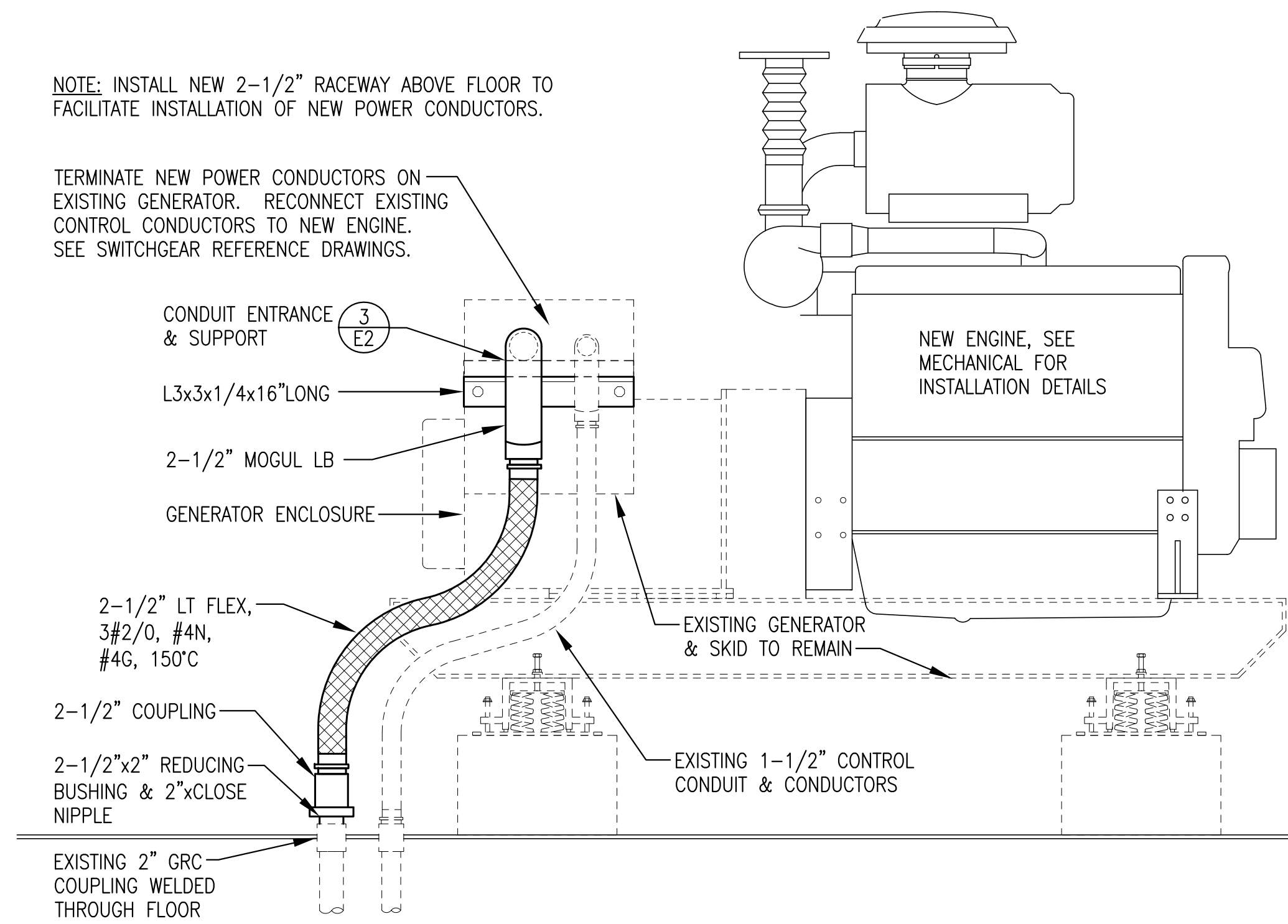
- 1) INSTALL NEW OWNER-FURNISHED GENERATOR ON EXISTING SKID, MARATHON MAGNAPLUS MODEL 431PSL6254, SN MT-0025084.
- 2) INSTALL NEW MURPHY POWERVIEW PV101-C-MSTD ON GENERATOR ENCLOSURE. CONNECT TO J1939 ON NEW ENGINE.
- 3) TERMINATE NEW POWER CONDUCTORS ON NEW GENERATOR. RECONNECT EXISTING CONTROL CONDUCTORS TO NEW ENGINE AND NEW GENERATOR. SEE SWITCHGEAR REFERENCE DRAWINGS.



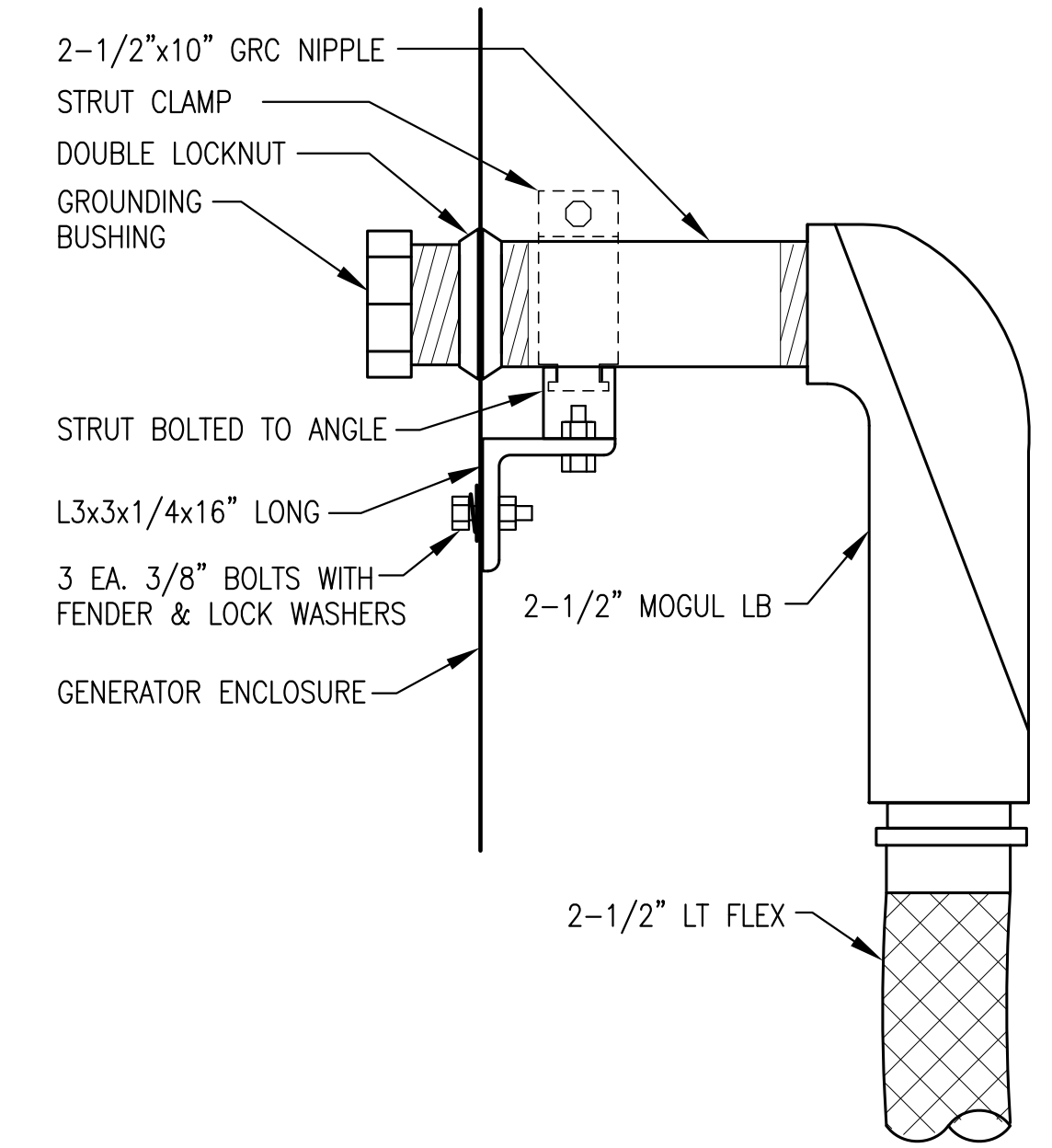
1 DERA BASE BID TASK B GEN #1 REPLACEMENT
E2 1"=1'-0"

NOTE: INSTALL NEW 2-1/2" RACEWAY ABOVE FLOOR TO FACILITATE INSTALLATION OF NEW POWER CONDUCTORS.

TERMINATE NEW POWER CONDUCTORS ON EXISTING GENERATOR. RECONNECT EXISTING CONTROL CONDUCTORS TO NEW ENGINE. SEE SWITCHGEAR REFERENCE DRAWINGS.

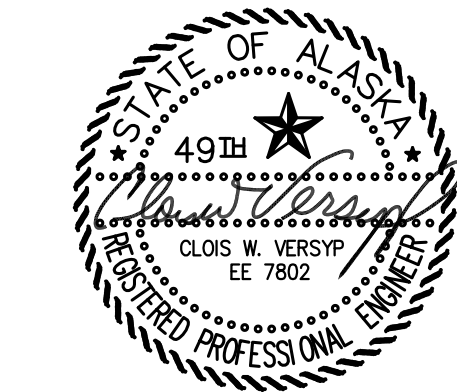


2 M&I BASE BID TASK M1 GEN #3 UPGRADES - CONDUIT ENTRANCE REVISION
E2 1"=1'-0"

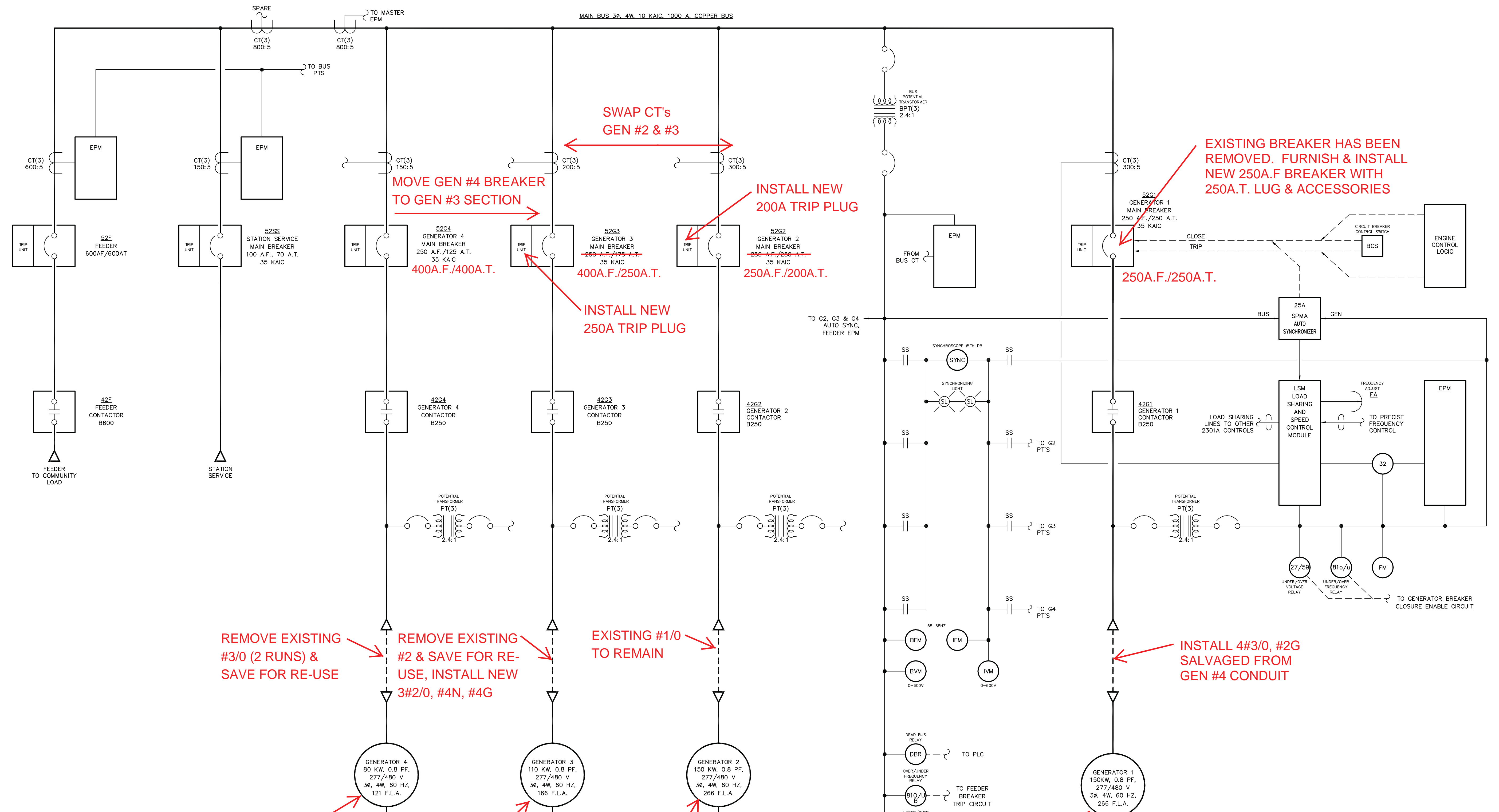


3 2-1/2" POWER CONDUIT ENTRANCE & SUPPORT
E2 NO SCALE

ISSUED FOR
CONSTRUCTION
AUGUST 2019



PROJECT:	TULUKSAK POWER PLANT 2019 DERA-MAINTENANCE & IMPROVEMENT PROJECT		
TITLE:	ELECTRICAL DETAILS		
 P.O. 111405, Anchorage, AK 99511 (907)349-0100	DRAWN BY: JTD	SCALE: NO SCALE	
	DESIGNED BY: CWV/BCG	DATE: 8/7/19	
	FILE NAME: TULU DR-M&I E	SHEET: E2	OF 2
PROJECT NUMBER:			

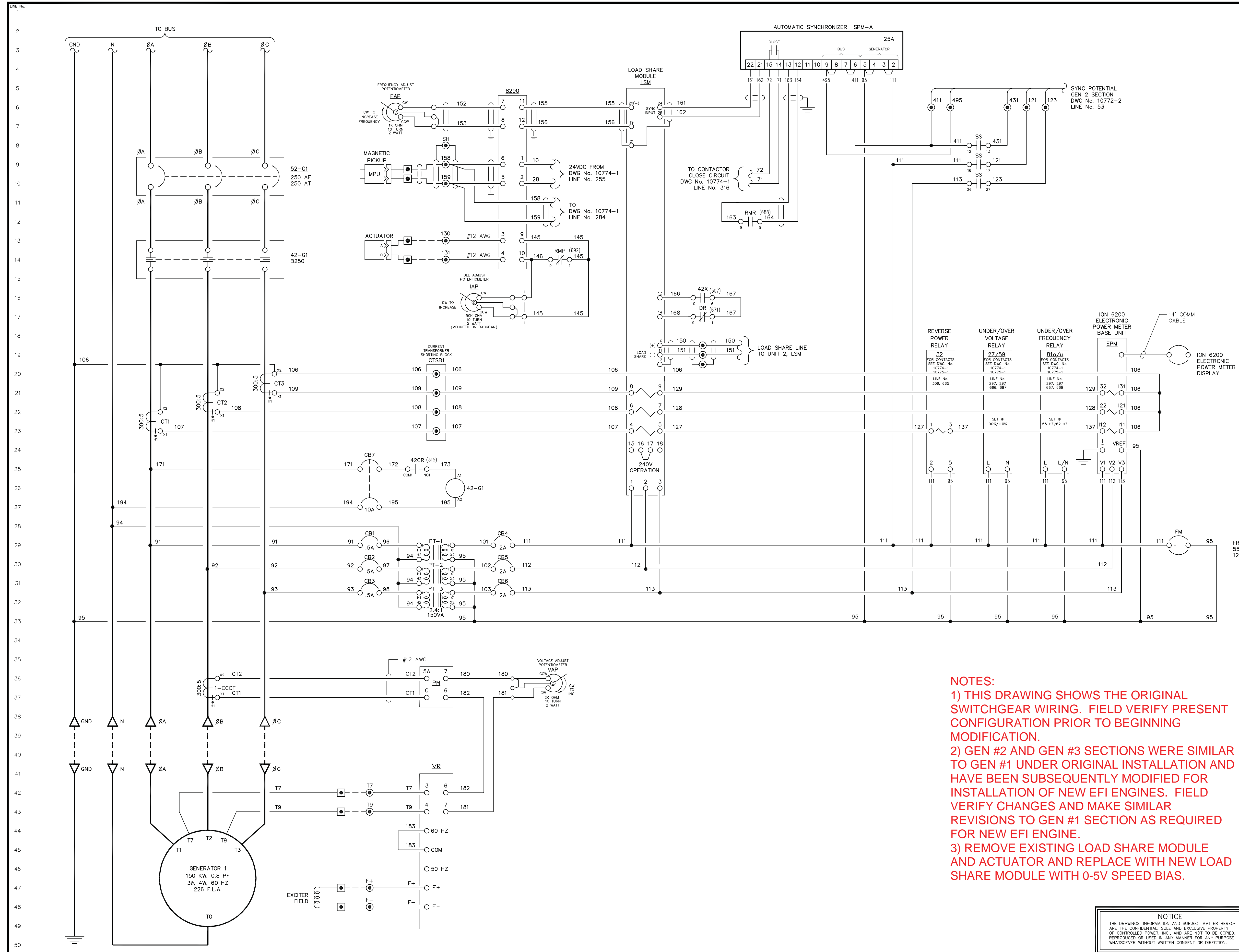


- NOTES:**
- ALL BREAKERS ARE MANUALLY OPERATED NON-DRAWOUT TYPE
 - ALL BREAKERS ARE G.E. SPECTRA TYPE, LOW VOLTAGE MOLDED CASE CIRCUIT BREAKERS.
 - GENERATORS 2, 3 & 4 SIMILAR TO GENERATOR 1

NOTICE
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B	10-07-02	SHOP AS BUILT	CMD
A	07-30-02	SUBMITTAL	GPN
REV.	DATE	DESCRIPTION	BY
CASCADE PURCHASE ORDER No. R12673		CONTROLLED POWER JOB No. 5216	
TITLE: SINGLE LINE, SCHEMATIC DIAGRAM			
CPI DWG No. 10771			
SCALE: NONE	DATE: 07-30-02	DWN. BY: GPN	
DWG. No: 10771	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: TULUKSAK			

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 9800 40th Ave. So. • Seattle, Wa. 98118
 e-mail: info@cascode-diesel.com
 Authorized Engine Distributor Since 1961



NOTES:

- 1) THIS DRAWING SHOWS THE ORIGINAL SWITCHGEAR WIRING. FIELD VERIFY PRESENT CONFIGURATION PRIOR TO BEGINNING MODIFICATION.
- 2) GEN #2 AND GEN #3 SECTIONS WERE SIMILAR TO GEN #1 UNDER ORIGINAL INSTALLATION AND HAVE BEEN SUBSEQUENTLY MODIFIED FOR INSTALLATION OF NEW EFI ENGINES. FIELD VERIFY CHANGES AND MAKE SIMILAR REVISIONS TO GEN #1 SECTION AS REQUIRED FOR NEW EFI ENGINE.
- 3) REMOVE EXISTING LOAD SHARE MODULE AND ACTUATOR AND REPLACE WITH NEW LOAD SHARE MODULE WITH 0-5V SPEED BIAS.

NOTE:
1. FOR GENERAL WRING & CONSTRUCTION NOTES, SEE DRAWING No. 10770L

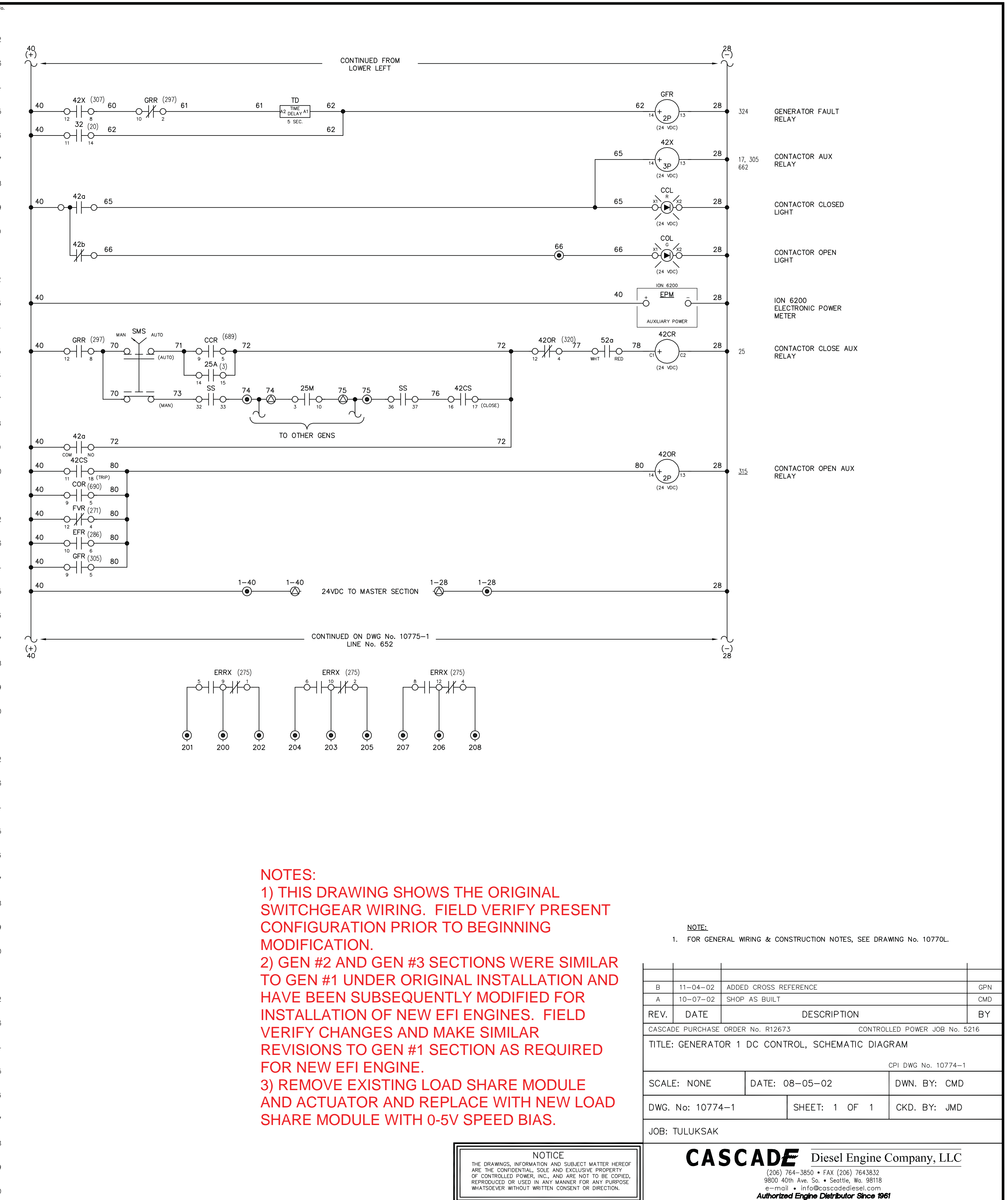
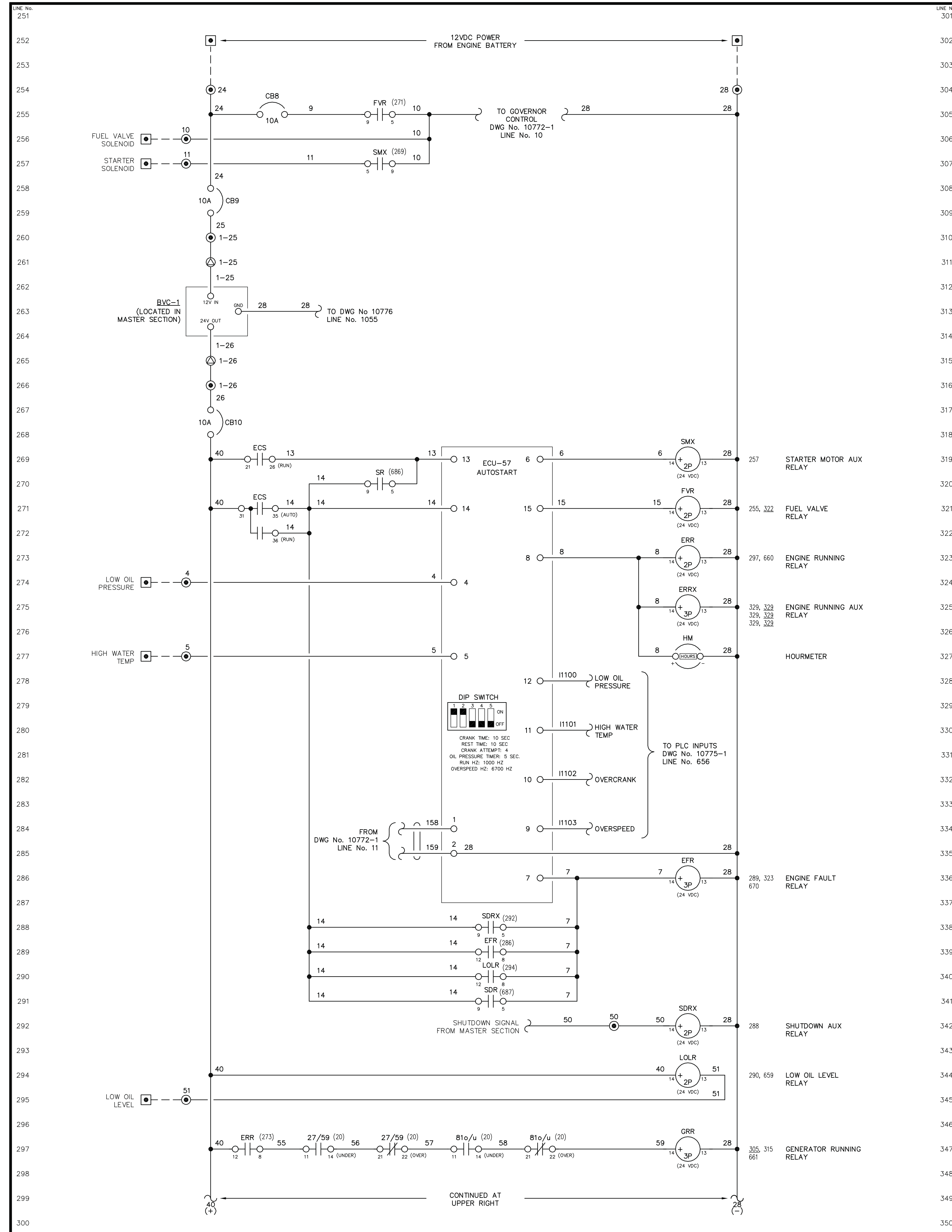
REV.	DATE	DESCRIPTION	BY
D	11-01-02	ADDED CROSS REFERENCE	GPN
C	10-28-02	REVISED CCCT	GPN
B	10-07-02	SHOP AS BUILT	CMD
A	07-30-02	SUBMITTAL	GPN

SCALE:	DATE:	DWN. BY:
NONE	07-30-02	GPN

DWG. No.:	SHEET:	CKD. BY:
10772-1	1 OF 1	JMD

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NOTES:

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- 2) GEN #2 AND GEN #3 SECTIONS WERE SIMILAR TO GEN #1 UNDER ORIGINAL INSTALLATION AND HAVE BEEN SUBSEQUENTLY MODIFIED FOR INSTALLATION OF NEW EFI ENGINES. FIELD VERIFY CHANGES AND MAKE SIMILAR REVISIONS TO GEN #1 SECTION AS REQUIRED FOR NEW EFI ENGINE.
- 3) REMOVE EXISTING LOAD SHARE MODULE AND ACTUATOR AND REPLACE WITH NEW LOAD SHARE MODULE WITH 0-5V SPEED BIAS.

NOTE:

1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 10770L.

B	11-04-02	ADDED CROSS REFERENCE	GFN
A	10-07-02	SHOP AS BUILT	CMD
REV.	DATE	DESCRIPTION	BY
CASCADE PURCHASE ORDER No. R12673 CONTROLLED POWER JOB No. 5216			
TITLE: GENERATOR 1 DC CONTROL, SCHEMATIC DIAGRAM			
CPI DWG No. 10774-1			
SCALE: NONE	DATE: 08-05-02	DWN. BY: CMD	
DWG. No: 10774-1	SHEET: 1 OF 1	CKD. BY: JMD	
JOB: TULUKSAK			

CASCADE Diesel Engine Company, LLC

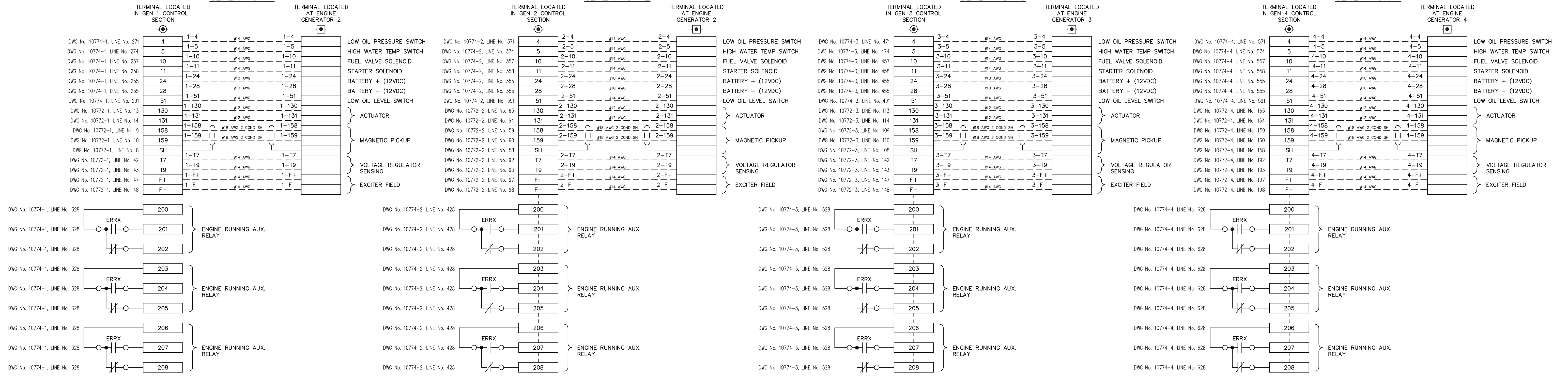
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GENERATOR 1

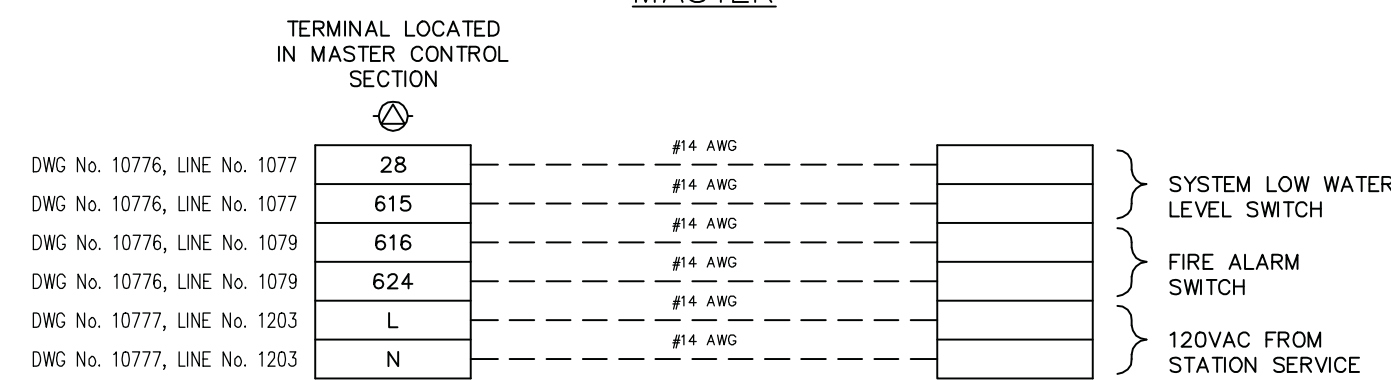
GENERATOR 2

GENERATOR 3

GENERATOR 4



MASTER



NOTE:
1. FOR GENERAL WIRING & CONSTRUCTION NOTES, SEE DRAWING No. 10770L.

- NOTES:**
- 1) THIS DRAWING SHOWS THE ORIGINAL SWITCHGEAR WIRING AND IS PROVIDED FOR REFERENCE ONLY.
 - 2) MAKE REVISIONS TO GEN #1 SECTION AS REQUIRED FOR NEW EFI ENGINE.
 - 3) MARK UP DRAWING TO SHOW FINAL AS BUILT CONNECTIONS FOR GEN #1.

REV.	DATE	DESCRIPTION	BY
A	10-01-02	SHOP AS BUILT	CMD
CASCADE PURCHASE ORDER No. R12673 CONTROLLED POWER JOB No. 5216			
TITLE: INTERCONNECTION DIAGRAM			
SCALE: NONE		DATE: 09-03-02	DWN. BY: GPN
DWG. No: 10783		SHEET: 1 OF 1	CKD. BY: JMD
JOB: TULUKSAK			

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