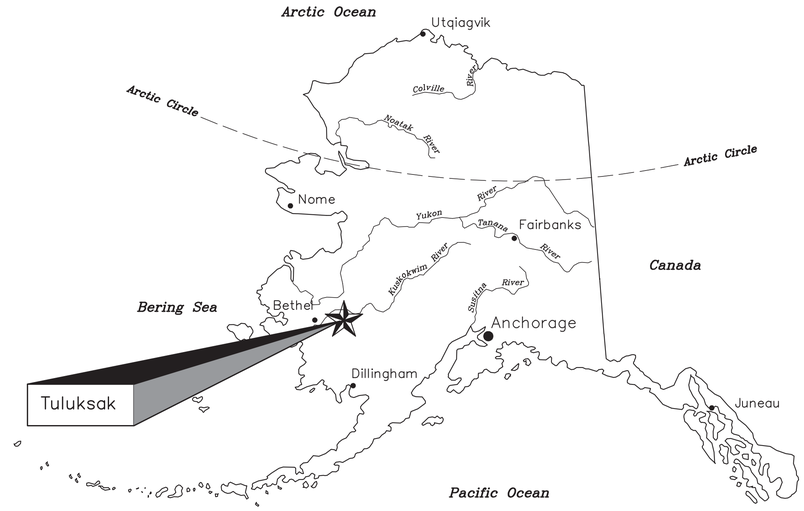
TULUKSAK POWER PLANT UPGRADE PROJECT
ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025



MECHANICAL DRAWINGS

FIRE SUPPRESSION DRAWINGS

ELECTRICAL DRAWINGS

THIS DRAWING SET SHOWS WORK THAT IS UNDER THE BASE BID AND ADDITIVE ALTERNATES. ALL WORK SHOWN IS INCLUDED IN THE BASE BID UNLESS SPECIFICALLY INDICATED AS ADDITIVE ALTERNATE.

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SCHEDULE OF DRAWINGS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: G1
PROJECT NUMBER:	

PIPING LEGEND

- BUTTERFLY VALVE
- BALL VALVE
- CHECK VALVE
- HOSE END DRAIN VALVE
- GAUGE COCK
- Y-STRAINER
- AUTOMATIC AIR VENT
- FLEXIBLE CONNECTOR
- FLANGED JOINT
- UNION
- ELBOW TURNED UP
- ELBOW TURNED DOWN
- PIPING CONNECTION (TEE)
- PIPING REDUCER
- DIRECTION OF FLOW

INSTRUMENT/CONTROL LEGEND

- (P) PRESSURE GAUGE
- (TH) DIGITAL THERMOMETER
- (TTH) THERMOMETER/TRANSMITTER
- (TT) TEMPERATURE TRANSMITTER
- (PTC) COOL. SYS. PRES TRANSMITTER
- (PTH) HT. RECOV. PRES TRANSMITTER
- (DP) DIFFERENTIAL PRES GAUGE
- (FS) FLOAT SWITCH
- (LCA) LOW COOLANT SWITCH
- (GLS) GLYCOL LEVEL SENSOR

ABBREVIATIONS

ø	DIAMETER (PHASE)
A	AMPS
AFF	ABOVE FINISHED FLOOR
BTU	BRITISH THERMAL UNIT
DFR	DIESEL FUEL RETURN
DFS	DIESEL FUEL SUPPLY
ECR	ENGINE COOLANT RETURN
ECS	ENGINE COOLANT SUPPLY
EWT	ENTERING WATER TEMPERATURE
EXIST	EXISTING
FPT	FEMALE PIPE THREAD
GA	GAUGE
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
GRC	GALVANIZED RIGID CONDUIT
HP	HORSEPOWER
HYR	HYDRONIC RETURN
HYS	HYDRONIC SUPPLY
ID	INSIDE DIAMETER
KW	KILOWATT
LT	LIQUID TIGHT
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MIN	MINIMUM
MPT	MALE PIPE THREAD
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OC	ON CENTER
OD	OUTSIDE DIAMETER
PRV	PRESSURE RELIEF VALVE
PSI	POUNDS/PER SQUARE INCH
PSID	PSI DIFFERENTIAL
PSIG	PSI GAUGE
SCH	SCHEDULE
TDH	TOTAL DEVELOPED HEAD
TYP	TYPICAL
UOR	USED OIL RETURN
V	VOLTS
W	WATTS
WG	WATER GAUGE

ENGINE GENERATOR SCHEDULE

GENSET	DESCRIPTION
GEN #1 (EXISTING)	ENGINE – 223 HP, 150 EKW PRIME, JOHN DEERE 6068AFM85, TIER 3 MARINE. 12 VDC STARTING & CONTROL. GENERATOR – 150KW CONTINUOUS AT 105°C RISE, MARATHON 431PSL6254
GEN #2 (EXISTING)	ENGINE – 298 HP, 210 EKW PRIME, JOHN DEERE 6090AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – 260KW CONTINUOUS AT 105°C RISE, MARATHON 432PSL6210.
GEN #3 (NEW)	ENGINE – 298 HP, 210 EKW PRIME, JOHN DEERE 6090AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD S4L1D-D41.
GEN #4 (NEW)	ENGINE – 447 HP, 310 EKW PRIME, JOHN DEERE 6135AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 270 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD S4L1D-F41.

ENGINE COOLING SYSTEM EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
R-1 R-2	GLYCOL RADIATORS	VERTICAL TOP INLET AND HORIZONTAL BOTTOM OUTLET ANSI 3" FLANGED CONNECTIONS. MINIMUM 15,000 BTU/MIN AT 80°F AMBIENT, 125 GPM 50% ETHYLENE GLYCOL AT 200F IN, 2.0 PSI MAX GLYCOL PRESSURE DROP. WITH SPECIAL 208 V, 5 HP, 3 PH, MOTOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAIL.	MESABI PART NO. 123563
TV-1	THERMOSTATIC VALVE	4" ANSI 125# FLAT FACED FLANGES, CAST IRON BODY, FACTORY SET NON-ADJUSTABLE FIELD REPLACEABLE THERMOSTATIC ELEMENTS, 175F ELEMENT	FPE PART NO. A4010-175
ET-1	COOLANT EXPANSION TANK	24 GALLON CAPACITY TANK, 12.75" O.D x 48" LONG FABRICATED STEEL TANK	CUSTOM FABRICATION
HP-EC	ENGINE COOLANT FILL HAND PUMP	DOUBLE ACTION PISTON HAND PUMP, ALUM HOUSING, SS PISTON SHAFT & LINER, BUNA-N SEALS, ANTI-SIPHONING VALVE.	GPI MODEL HP-100
EXP TANK PRESSURE CAP	EXPANSION TANK PRESSURE CAP & ADAPTER	2" MPTxCAP THREAD ADAPTER AND 10 PSI PRESSURE CAP FOR CLOSED SYSTEM	MOTORAD 1004-10 CAP (PURCHASE ON LINE) TRIJET 2NPT-RCA ADAPTER (866) 607-1653

PLANT HEATING EQUIPMENT SCHEDULE:

P-UH1 P-UH2	NEW UNIT HEATER CIRC PUMPS	4 GPM AT 14' TDH, 1/25HP, 115V, 1ø, PROVIDE WITH GASKETS, & BOLTS.	GRUNDFOS UPS 15-58F

HEAT RECOVERY SYSTEM EQUIPMENT SCHEDULE:

HX-1	POWER PLANT HEAT EXCHANGER	316 SS PLATES, BRAZED CONST., 2-1/2" SOLDER CUP PORTS, 500 MBH MIN CAPACITY. PRIMARY: 55 GPM 195F EWT (50% ETHYLENE) 2.5 PSI MAX WPD, SECONDARY: 55 GPM 185F LWT (50% PROPYLENE) 2.5 PSI MAX WPD	SWEP INTERNATIONAL AB B120THx90/1P-SC-4x66.85
P-HR1A	HEAT RECOV. PRIMARY	55 GPM AT 10' TDH, 1/3 HP, 115V, 1ø, WITH 2" NPT FLANGES SET TO FIXED SPEED 2	GRUNDFOS MAGNA1 50-80F
P-HR1B	HEAT RECOV. SECONDARY	55 GPM AT 30' TDH, 3/4 HP, 208-230V, 1ø, WITH CIM 500 MODULE & 2" NPT FLANGES SET TO CONSTANT PRESSURE MODE CP=30'	GRUNDFOS MAGNA3 50-150F WITH CIM 500 PART# 98301408

VENTILATION EQUIPMENT SCHEDULE:

EF-1 EF-2 EF-3 EF-4	NEW GENERATION ROOM EXHAUST FANS	DIRECT DRIVE 14"ø PROPELLER SIDEWALL EXHAUST FAN, 2,100 CFM AT 0.375" SP, 1,750 RPM. FURNISH WITH SPECIAL 1/2 HP, 115 V, 1 PH VARIGREEN MOTOR WITH OPTIONAL 0-10V LEADS AND OPTIONAL 24V TRANSFORMER	GREENHECK SE1-14-436-VG (1/2 HP)
VF-1	HEAT RECOV ROOM VENT FAN	DIRECT DRIVE 8"ø PROPELLER SIDEWALL EXHAUST FAN, 250 CFM AT 0.15" SP, 1,550 RPM. 1/25 HP, 115 V, 1 PH	GREENHECK SE1-8-440
EF & COMB. AIR INTAKE	AIR INTAKE DAMPERS	OPPOSED BLADE LOW-LEAKAGE CONTROL DAMPER, GALVANIZED STEEL CONSTRUCTION, 304 STAINLESS STEEL BEARINGS AND JAMB SEALS, EPDM BLADE SEALS, TWO-PIECE GALVANIZED STEEL WELDED AIRFOIL BLADES	GREENHECK VCD-33
(MD)	MOTORIZED DAMPER ACTUATORS	120V SPRING RETURN ACTUATOR	BELIMO AF-BUP
BACK DRAFT	BACKDRAFT DAMPER	BAROMETRIC DAMPER, GALVANIZED STEEL CONSTRUCTION, FORMED ALUMINUM BLADES, ADJUSTABLE COUNTERWEIGHTS	GREENHECK BR-30

FUEL SYSTEM EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
P-DF1 P-DF2 P-UO1	DAY TANK FILL PUMP DIESEL CIRC. PUMP USED OIL DRAIN PUMP	ROTARY GEAR PUMP, 5 GPM @ 25 PSID, C-FRAME MOUNT, 1" FPT INLET AND OUTLET, IRON CONSTRUCTION, STEEL SHAFT, CARBON GRAPHITE BUSHINGS, BUNA-N LIP SEAL, WITH 75 PSID INTERNAL PRV. DIRECT MOUNT TO FOOT MOUNT 56C FRAME MOTOR, 1,200 RPM, 1/2 HP, 115VAC.	GORMAN RUPP GMC1DC3-B-40C PUMP AND CENTURY #C827 MOTOR FOR FIELD ASSEMBLY
P-UO2	USED OIL INJECTION PUMP	ROTARY GEAR PUMP GEAR PUMP – 1.2 GPH @ 15 PSID, 1/8" FPT INLET AND OUTLET, PEEK GEARS, PTFE SEALS, MAGNETICALLY COUPLED TO FOOT MOUNT 56C FRAME MOTOR, 1,725 RPM, 1/2 HP, 115VAC.	MICROPUMP GA-V21.J8FS.A PUMP WITH #81518 ADAPTER & CENTURY #C826V1 MOTOR
HP-DT	DAY TANK FILL HAND PUMP	DOUBLE ACTION PISTON HAND PUMP, ALUM HOUSING, SS PISTON SHAFT & LINER, BUNA-N SEALS, ANTI-SIPHONING VALVE.	GPI MODEL HP-100
G-DT	DAY TANK LEVEL GAUGE	MAGNETIC OPERATED SPIRAL GAUGE FOR #1 DIESEL, 25 PSIG MAX OPERATING PRESSURE, 35" LIQUID COLUMN PLUS 4" RISER.	ROCHESTER MODEL 8660
M-DT	DAY TANK METER	STEEL BODY, 1" ANSI 150# FLANGED ENDS, 20-800 GPH FLOW RANGE, O-RINGS AND SEALS COMPATIBLE WITH #1 DIESEL, DIRECT READ 6-DIGIT REGISTER TO 0.1 GAL, DRY CONTACT PULSER.	ISTEC CONTOIL 9226-F
F-DT	DAY TANK FILTER BANK	THREE FILTER BANK WITH INDIVIDUAL FILTER ISOLATION VALVES, IMPACT RESISTANT "SEE-THRU" BOWLS, 15 PSIG WORKING PRESSURE. INSTALL 3 EACH 10 MICRON AQUABLOC FILTER ELEMENTS & FURNISH 3 SPARES	RACOR TURBINE SERIES ASSEMBLY # 791000FV10 ELEMENTS 2020V10
F-GEN	GENSET FILTER	SINGLE FILTER, IMPACT RESISTANT "SEE-THRU" BOWL, 15 PSIG WORKING PRESSURE. INSTALL 10 MICRON AQUABLOC FILTER ELEMENTS & FURNISH 1 SPARE.	RACOR TURBINE 1000FV-10 ELEMENT 2020V10

INSTRUMENTATION SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
(TT)	TEMPERATURE TRANSMITTER	RTD, 20-240°F RANGE, 4-20mA OUTPUT, 1/2" NPT PIPING CONNECTION, 6mm DIAMETER BY 2.5" LONG STEM, HIRSCHMANN ELECTRICAL CONNECTION	NOSHOK 800-20/240-1-1-8-8-025-6
(TTH)	THERMOMETER/ TEMP TRANSMITTER	DIGITAL THERMOMETER/TEMP TRANSMITTER, SOLAR POWERED, LCD DISPLAY, 1% OF READING ACCURACY, VARIABLE ANGLE DISPLAY, 3-1/2" STEM LENGTH, DUAL F/C DISPLAY, -52 TO +302 F RANGE 4-20mA OUTPUT, 1/2" ELECTRICAL CONNECTION.	WEISS MODEL DVUT35
(PTC)	COOLING SYSTEM PRESSURE TRANSMITTER	0-20 PSIG RANGE, 4-20mA OUTPUT, 1/4" NPT PIPING CONNECTION, HIRSCHMANN ELECTRICAL CONNECTION	NOSHOK PT40-20-1-1-2-7
(PTH)	HEAT RECOVERY PRESSURE TRANSMITTER	0-60 PSIG RANGE, 4-20mA OUTPUT, 1/4" NPT PIPING CONNECTION, HIRSCHMANN ELECTRICAL CONNECTION	NOSHOK PT40-60-1-1-2-7
(DP)	DIFFERENTIAL PRESSURE GAUGE/SWITCH	DIAPHRAGM TYPE, BRASS BODY, 1/4" FPT IN-LINE CONNECTIONS, 2-1/2" BASIC DIAL, HERMETICALLY SEALED SPDT SWITCH WITH TERMINAL STRIP, PRESSURE RANGES AS INDICATED ON INSTALLATION DETAILS	ORANGE RESEARCH 1516DGS-1E-2.5B-C-0-##PSID
(LCA)	GLYCOL TANK LOW COOLANT ALARM	LOW COOLANT LEVEL ALARM FLOAT SWITCH, SEE MECHANICAL FOR INSTALLATION DETAILS	MURPHY EL-150-K1
(GLS)	GLYCOL TANK LEVEL SENSOR PROBE	12" PROBE, 2" NPT TANK CONNECTION, SS FLOAT, 1/4" RESOLUTION, NEMA 4 ENCLOSURE WITH SIGNAL CONDITIONER AND 1/2" NPT CONDUIT CONNECTION	INNOVATIVE COMPONENTS CLM-2012-SS 5343A 2-WIRE TRANSMITTER
(FS)	DAY TANK/HOPPER FLOAT SWITCH	VERTICAL ACTION FLOAT SWITCH, REVERSIBLE 70VASPST NC/NO SWITCH, 1/8" NPT, 1"MAX ø BUNA-N FLOAT FOR S.G=.47, MINIMUM 60" LONG PVC COATED #20 AWG LEAD WIRES	INNOVATIVE COMPONENTS LS-12-111/2

PIPE/TUBING STRUT CLAMP SCHEDULE

PIPE/TUBE	CLAMP #	PIPE/TUBE	CLAMP #
1/2" COPPER	B2026DCU		
3/4" COPPER	B2028DCU	3/4" STEEL	B2009
1" COPPER	B2030DCU	1" STEEL	B2010
		1-1/4" STEEL	B2011
		1-1/2" STEEL	B2012
		2" STEEL	B2013
		3" STEEL	B2015
		4" STEEL	B2017

NOTES:
1) ALL CLAMP NUMBERS ARE B-LINE. EQUIVALENT EQUALS ACCEPTABLE.
2) ALL COPPER TUBE CLAMPS TO BE COPPER PLATED. WRAP COPPER TUBE WITH VINYL PIPE WRAP TAPE FOR CATHODIC ISOLATION FROM PLATED STEEL STRUT.
3) USE RIGID STEEL PIPE CLAMPS FOR ALL STEEL PIPE AND RIGID CONDUIT.
4) SEE PLANS, ELEVATIONS, ISOMETRICS, AND DETAILS FOR ACTUAL PIPE SIZES.

EQUIPMENT REQUIREMENTS FOR APPROVED EQUALS (APPLIES TO ALL SCHEDULES):
SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

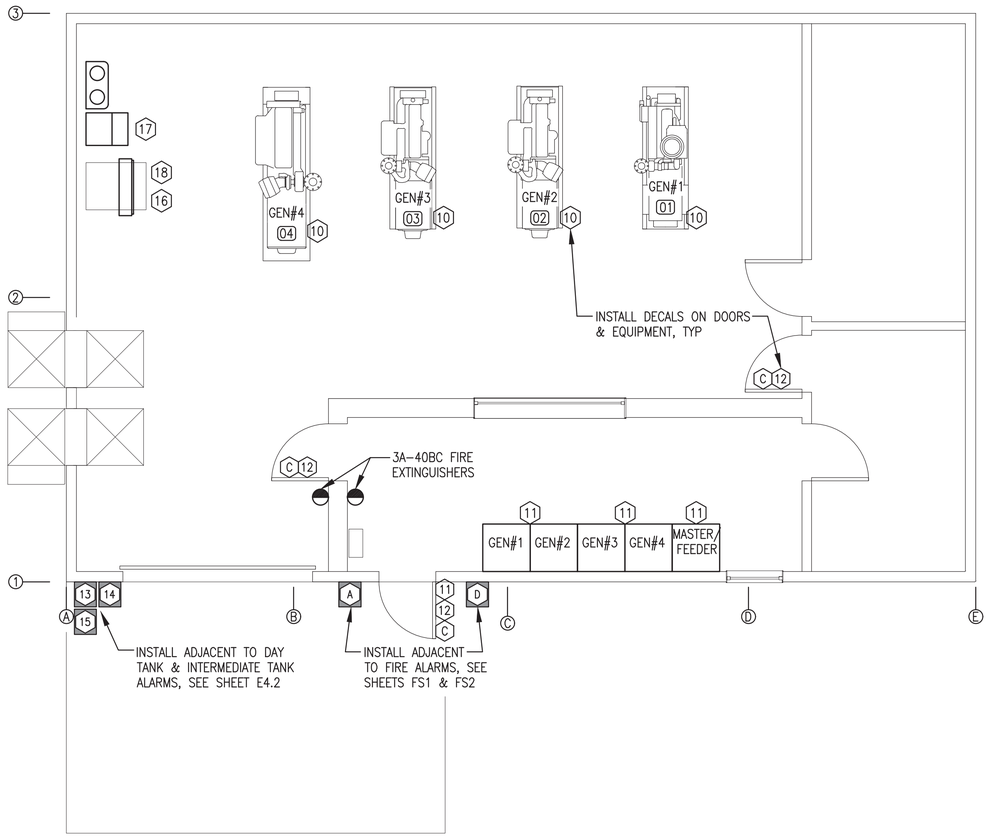
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SCHEDULES & LEGENDS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 11/24/25
FILE NAME: TULU PP M1-M2 | SHEET: M1.1
PROJECT NUMBER:



1 M1.2 POWER PLANT WARNING SIGN & FIRE EXTINGUISHER PLAN
1/4"=1'-0"

VALVE TAG SCHEDULE:

WHITE (EQUIPMENT)

01 "GEN#1 150KW" (DECAL)
02 "GEN#2 210KW" (DECAL)
03 "GEN#3 210KW" (DECAL)
04 "GEN#4 310KW" (DECAL)

GREEN (DIESEL FUEL)

21 "NORMALLY OPEN, CLOSE ONLY FOR EMERGENCIES & TEMPORARY MAINTENANCE OF DAY TANK & DEVICES"
22 "NORMALLY CLOSED, OPEN ONLY FOR HAND PRIMING DAY TANK"
23 "NORMALLY OPEN, CLOSE ONLY FOR TEMPORARY MAINTENANCE OF BLENDER"
24 "NORMALLY OPEN, CLOSE ONLY FOR TEMPORARY MAINTENANCE OF ENGINE"

BROWN (USED OIL)

41 "NORMALLY CLOSED, OPEN ONLY FOR ENGINE OIL CHANGE"
42 "BLENDER FILTER, PRE, 10 MICRON HYDROSORB" (DECAL)
43 "BLENDER FILTER, FINAL, 2 MICRON PARTICULATE" (DECAL)

PINK (COOLING/ETHYLENE GLYCOL)

51 "NORMALLY CLOSED, OPEN ONLY FOR ADDING COOLANT - ETHYLENE GLYCOL ONLY"
52 "NORMALLY CLOSED, OPEN ONLY ON HIGH COOLANT TEMPERATURE ALARM"
53 "NORMALLY OPEN, CLOSE ONLY ON HIGH COOLANT TEMPERATURE ALARM"
54 "NORMALLY OPEN, HEAT RECOVERY SUPPLY"
55 "NORMALLY OPEN, HEAT RECOVERY RETURN"

YELLOW (HEAT RECOVERY/PROPYLENE GLYCOL)

61 NOT USED
62 "NORMALLY OPEN, HEAT RECOVERY SUPPLY"
63 "NORMALLY OPEN, HEAT RECOVERY RETURN"

SPECIFICATIONS:
VALVE TAGS - 3"x5"x.08" ALUMINUM, 3/16" HOLES IN ALL FOUR CORNERS, BLACK GERBER THERMAL TRANSFER FILM PRINTED LETTERS ON GERBER 220 HIGH PERFORMANCE VINYL BACKGROUND, COLOR AS INDICATED, ONE SIDE ONLY. WARNING LITES OR APPROVED EQUAL.

DECALS - WHERE NOTED AS DECALS PROVIDE WITHOUT ALUMINUM BACKING PLATE.

INSTALLATION NOTES:
1) SEE DRAWINGS THAT FOLLOW FOR LOCATIONS OF ALL SPECIFIC FUNCTION TAGS.
2) SECURE EACH METAL TAG TIGHT TO VALVE, PIPE, OR DEVICE WITH STAINLESS STEEL SAFETY WIRE THROUGH ALL FOUR CORNERS OR FASTEN TO ADJACENT WALL OR SECTION OF STRUT WITH SCREWS.
3) APPLY DECALS TO SMOOTH SURFACES OF EQUIPMENT OR ON ADJACENT WALL. ENSURE SURFACE IS CLEAN AND DRY PRIOR TO APPLICATION. USE HEAT GUN AS REQUIRED.
4) FOR ALL VALVES NOT INDICATED WITH A SPECIFIC FUNCTION TAG PROVIDE 1-1/2" ROUND BRASS TAG LABELED "N.O." FOR NORMALLY OPEN VALVES AND 1-1/2" SQUARE BRASS TAG LABELED "N.C." FOR NORMALLY CLOSED VALVES. SECURE TAGS TO VALVE OR ADJACENT PIPE WITH BEADED BRASS CHAIN.

WARNING SIGN & INFORMATIONAL PLACARD SCHEDULE:

PROVIDE DECALS AND SIGN BOARDS AS SPECIFIED BELOW IN ACCORDANCE WITH THE SCHEDULE. INSTALL WHERE SHOWN ON THE WARNING SIGN/PLACARD PLAN THIS SHEET AND OTHER REFERENCED SHEETS.

(#) DECALS — DECALS TO BE WHITE NON-REFLECTIVE VINYL BACKGROUND, 3M 3650-10, WITH 3M SERIES 225 HIGH PERFORMANCE VINYL LETTERS, ONE SIDE ONLY, SELF ADHESIVE BACK. NOMINAL 10"x14" SIZE UNLESS INDICATED OTHERWISE OR REQUIRED TO BE LARGER FOR SPECIFIED LETTER SIZE. WARNING LITES OR EQUAL. APPLY DECALS TO SMOOTH SURFACES OF DOORS, EQUIPMENT, OR ON ADJACENT WALL. ENSURE SURFACE IS THOROUGHLY DEGREASED, CLEANED, AND DRY PRIOR TO APPLICATION. USE HEAT GUN AS REQUIRED.

(#) BOARDS — SIGN BOARDS TO BE EQUAL TO DECALS EXCEPT MOUNTED ON 0.08" ALUMINUM PLATE. PROVIDE 3/16" HOLES IN ALL FOUR CORNERS. ATTACH TO WALLS OR STRUCTURES WITH STAINLESS STEEL SCREWS OR BOLTS.

WARNING SIGNS - RED LETTERING ON WHITE BACKGROUND.

A "FIRE ALARM"
C "CAUTION, ROOM PROTECTED BY WATER MIST FIRE PROTECTION SYSTEM, IN CASE OF FIRE KEEP DOOR CLOSED AND DO NOT ENTER"
D "FLASHING LIGHT MEANS FIRE SUPPRESSION AGENT HAS DISCHARGED"
1 not used
10 "CAUTION: THIS UNIT STARTS AUTOMATICALLY, LOCK & TAG OUT PRIOR TO SERVICE"
11 "DANGER HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY"
12 "CAUTION HEARING & EYE PROTECTION REQUIRED"
13 "FUEL OIL DAY TANK ALARM"
14 "IN CASE OF SPILL CALL DEC 1-800-478-9300"
15 "INTERMEDIATE TANK ALARM"

INFORMATIONAL PLACARDS - BLACK LETTERING ON WHITE BACKGROUND.

16 "TO MANUALLY FILL DAY TANK IN CASE OF EMERGENCY:
1) TURN OFF POWER TO THE DAY TANK CONTROL PANEL
2) MANUALLY OPEN ACTUATOR VALVE AT TANK FARM USING A WRENCH
3) OPEN NORMALLY CLOSED VALVE BY HAND PUMP
4) OPERATE HAND PUMP WHILE MONITORING LEVEL GAUGE"

17 "TO CHANGE ENGINE OIL:
1) VERIFY ENGINE OIL HAS NOT BEEN CONTAMINATED WITH GLYCOL OR OTHER FLUIDS
2) LOCK & TAG GENERATOR OUT OF SERVICE
3) OPEN NORMALLY CLOSED DRAIN VALVE AT GEN
4) TURN ON PUMP TIMER & PUMP OUT ENGINE OIL
5) CHANGE FILTER & PLACE OLD ONE IN HOPPER
6) CLOSE DRAIN VALVE & REFILL ENGINE
7) RUN ENGINE, SHUT OFF, & CHECK DIPSTICK
8) TOP OFF & PLACE ENGINE BACK IN SERVICE"

18 "CHECK INTERMEDIATE TANK LEVEL DAILY, FILL WHEN BELOW 5'-0"

19 "INTERMEDIATE TANK MAX FILL LEVEL 8'-3" (90% TANK CAPACITY)

SEE SHEET M8 FOR LOCATION OF DECALS 18 & 19 AT THE INTERMEDIATE TANKS.

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: WARNING SIGN & FIRE EXTINGUISHER PLAN, SIGN & VALVE TAG SCHEDULES

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 11/24/25
FILE NAME: TULU PP M1-M2 | SHEET: M1.2
PROJECT NUMBER:

POWER PLANT GENERATION SWITCHGEAR OPERATION

THIS POWER PLANT IS DESIGNED TO OPERATE IN AUTOMATIC MODE UNDER CONTROL OF THE PROGRAMMABLE LOGIC CONTROLLER (PLC). MONITORING AND CONTROL IS PRIMARILY DONE THROUGH THE OPERATOR INTERFACE UNIT (OIU). IN AN EMERGENCY SUCH AS A FAILURE OF THE PLC IT CAN ALSO BE OPERATED IN MANUAL MODE. EACH ENGINE IS CONTROLLED BY AN INDIVIDUAL EASYGEN (EZGN) GENSET CONTROLLER LOCATED IN EACH GENERATOR SECTION. FOLLOWING ARE INSTRUCTIONS FOR OPERATING THE SYSTEM. SEE SECTION 3.1 OF THE O&M MANUAL FOR DETAILED SEQUENCES.

AUTOMATIC OPERATION BLACK START PROCEDURE:

1) TEMPORARILY SET THE "SYSTEM MODE" SWITCH ON THE MASTER SECTION TO MAN.
2) CHECK THE MASTER SECTION FOR ANY FAULTS AS INDICATED BY THE ALARM LAMPS OR BANNERS ON THE EZGN. CORRECT THE CAUSE OF THE FAULT (EMERGENCY STOP, LOW COOLANT LEVEL, FEEDER BREAKER TRIPPED, ETC.) PRESS THE ALARM RESET BUTTON ON THE MASTER SECTION AND VERIFY THAT THE ALARMS CLEAR.
3) CHECK EACH GENERATOR SECTION FOR ANY FAULTS. FOR ENGINE-GENERATOR RELATED FAULTS CORRECT THE CAUSE OF THE FAULT (LOW OIL LEVEL, HIGH TEMPERATURE, CIRCUIT BREAKER TRIPPED, ETC.). TO CLEAR ANY ALARMS PRESS "STOP" BUTTON THEN PRESS THE "HOME" BUTTON TO GET TO THE MAIN SCREEN. PRESS THE "ALARM RESET" BUTTON AND HOLD DOWN UNTIL ALL ALARMS CLEAR.
4) PLACE EACH AVAILABLE GENERATOR IN SERVICE BY PRESSING THE "AUTO" BUTTON. IF A GENERATOR IS OUT OF SERVICE FOR REPAIR, VERIFY THE STOP BUTTON IS ILLUMINATED.
5) CHANGE THE "SYSTEM MODE" SWITCH ON THE MASTER SECTION TO AUTO.
6) THE PLC WILL AUTOMATICALLY START ALL AVAILABLE GENERATORS IN AUTO AND PARALLEL THEM TO THE BUS. AS SOON AS THE BUS IS ENERGIZED THE STATION SERVICE POWER WILL TURN ON.
7) AFTER THE AVAILABLE GENERATORS ARE ONLINE, THE PLC WILL WAIT FOR A BRIEF INTERVAL (USUALLY 15 SECONDS) AND CLOSE THE FEEDER BREAKER TO ENERGIZE THE COMMUNITY. THE RED BREAKER CLOSED LAMP WILL ILLUMINATE.

AUTOMATIC DEMAND CONTROL OPERATION:

1) GENERATORS ARE CONSIDERED AVAILABLE FOR DEMAND CONTROL ONLY WHEN THEIR EZGN IS IN THE AUTO MODE AND THERE ARE NO ALARMS. THE DEMAND CONTROL SYSTEM WILL UTILIZE ALL AVAILABLE GENERATORS AS REQUIRED TO MEET THE LOAD ON THE SYSTEM.
2) ON INITIAL STARTUP THE DEMAND CONTROL IS ACTIVATED AFTER THE FEEDER BREAKER HAS BEEN CLOSED FOR APPROXIMATELY ONE MINUTE. THIS ALLOWS THE PLC TIME TO DETERMINE THE POWER DEMAND ON THE SYSTEM. THE PLC MONITORS THE LOAD ON THE SYSTEM AND COMPARES IT TO THE CONNECTED GENERATING CAPACITY.
3) THE DEMAND CONTROL PROVIDES TWO TYPES OF CONTROL FOR INCREASING LOAD – INCREASE AND OVERLOAD. THE OVERLOAD SETPOINT IS TYPICALLY THE PRIME RATING OF THE GENSET AND THE INCREASE SETPOINT IS TYPICALLY 90% OF THE OVERLOAD SETPOINT. WHEN THE LOAD EXCEEDS THE INCREASE SETPOINT FOR A PRE-SET TIME DELAY (USUALLY 20-30 SECONDS) THE DEMAND CONTROL WILL SWITCH TO THE NEXT HIGHER LEVEL OF GENERATING CAPACITY. WHEN THE LOAD EXCEEDS THE OVERLOAD SETPOINT THE DEMAND CONTROL WILL IMMEDIATELY SWITCH TO THE NEXT HIGHER LEVEL OF GENERATING CAPACITY (NO TIME DELAY).
4) THE DEMAND CONTROL PROVIDES ONE TYPE OF CONTROL FOR DECREASING LOAD. THE DECREASE SETPOINT IS TYPICALLY 80% OF THE OVERLOAD SETPOINT. WHEN THE LOAD DROPS BELOW THE DECREASE SETPOINT FOR A PRE-SET TIME DELAY (USUALLY 120 SECONDS) THE DEMAND CONTROL WILL SWITCH TO THE NEXT LOWER LEVEL OF GENERATING CAPACITY.
5) AS THE COMMUNITY ELECTRIC LOAD INCREASES, THE PLC WILL STEP UP TO A LARGER GENERATOR AND AS THE LOAD DECREASES THE PLC WILL STEP DOWN TO A SMALLER GENERATOR. MULTIPLE GENERATORS CAN OPERATE IN PARALLEL TO MEET A PEAK DEMAND.
6) NOTE THAT GENERATORS #2 & #3 ARE EQUAL CAPACITY. ON THE SWITCHGEAR OPERATOR INTERFACE UNIT (OIU) UNDER THE DEMAND TAB SELECT ONE GENERATOR TO OPERATE AS THE LEAD UNIT. THE OTHER GENERATOR WILL OPERATE WHEN THE LEAD UNIT IS NOT AVAILABLE.
7) SEE THE DEMAND CONTROL TABLE THIS SHEET FOR DEMAND LEVEL SETPOINTS AT THE TIME OF COMMISSIONING. ON THE SCADA SYSTEM GO TO THE DEMAND TAB TO VERIFY THE PRESENT SETPOINTS.

MANUAL OPERATION BLACK START PROCEDURE:

1) PLACE THE MASTER CONTROL "SYSTEM MODE" SWITCH IN THE MANUAL POSITION.
2) CHECK THE MASTER AND GENERATOR SECTIONS FOR ANY FAULTS AND CLEAR AS DESCRIBED UNDER AUTOMATIC OPERATION STEPS 2 AND 3.
3) TO PLACE A GENERATOR IN SERVICE, PRESS THE EZGN MAN BUTTON, THEN PRESS THE "I" (START) BUTTON. AFTER THE ENGINE STARTS AND STABILIZES, PRESS THE CONTACTOR CLOSE BUTTON ON THE EZGN. THE RED BREAKER CLOSED LAMP WILL ILLUMINATE.
4) REPEAT THIS PROCESS FOR AT LEAST ONE MORE GENERATOR.
5) with two generators on line rotate the feeder breaker control knob for the main feeder breaker to the close position to energize the community. monitor the load on the system for one minute then select the appropriate generator(s) to match the load.
6) TAKE ANY GENERATOR(S) NOT NEEDED OFF LINE BY PRESSING THE RED EZGN STOP BUTTON. THE ENGINE WILL COOL DOWN FOR THREE MINUTES THEN SHUT OFF. NOTE THAT PRESSING THE RED STOP BUTTON TWICE WILL IMMEDIATELY SHUT DOWN THE GENERATOR.
7) TO MANUALLY SWITCH TO A DIFFERENT GENERATOR AS THE LOAD CHANGES REPEAT STEPS 3 AND 6.

SERVICE DUE / OIL CHANGE PROCEDURE:

THE FOLLOWING TASKS NEED TO BE PERFORMED ON EACH ENGINE AFTER EVERY 250 HOURS OF RUN TIME. IF THE REQUIRED MAINTENANCE CANNOT BE PERFORMED AT THE SCHEDULED TIME, TAKE THE ENGINE OUT OF SERVICE UNTIL ALL WORK HAS BEEN COMPLETED.

NOTE THAT UNDER AUTOMATIC OPERATION, WHENEVER THE SERVICE TIME HAS BEEN EXCEEDED THE GENERATOR WILL AUTOMATICALLY BE TAKEN OFF LINE (AS LONG AS ANOTHER GENERATOR IS AVAILABLE IN AUTO), A SERVICE ENGINE MESSAGE WILL DISPLAY, AND THE RED "ENGINE ALARM" LAMP WILL ILLUMINATE.

1) IF THE SWITCHGEAR IS IN MANUAL MODE, PERFORM MANUAL OPERATION STEP 3 TO PLACE ANOTHER GENERATOR ON LINE IN MAN MODE. PERFORM MANUAL OPERATION STEP 6 ON THE GENERATOR TO BE SERVICED TO TAKE IT OFF LINE THEN CONTINUE AT STEP 3 BELOW (LOCK OUT).
2) IF THE SWITCHGEAR IS IN AUTOMATIC MODE, PRESS THE EZGN MAN BUTTON ON THE GENERATOR TO BE SERVICED. THE PLC WILL START ANOTHER GENERATOR. ONCE THE OTHER GENERATOR IS ON LINE, PRESS THE EZGN STOP BUTTON ON THE GENERATOR TO BE SERVICED. NOTE THAT IF THE STOP BUTTON IS PRESSED BEFORE ANOTHER UNIT IS ONLINE, AN OUTAGE WILL OCCUR.
3) LOCK THE UNIT OUT USING THE KEY SWITCH AND TAG OUT OF SERVICE.
4) SERVICE ENGINE (OIL CHANGE, FUEL FILTER, AIR FILTER, ETC.).
5) REMOVE TAG AND TURN THE GENERATOR LOCKOUT SWITCH TO RUN.
6) PRESS THE SERVICE HOURS RESET BUTTON AND HOLD DOWN UNTIL IT RESETS TO 250 HOURS. PRESS THE "HOME" BUTTON TO RETURN TO THE MAIN SCREEN.
7) PRESS THE ALARM RESET BUTTON AND HOLD DOWN UNTIL ALL ALARMS CLEAR.
8) START THE ENGINE BY PRESSING THE MAN BUTTON AND THEN "I" (START) BUTTON.
   a) AFTER THE ENGINE COMES UP TO SPEED VERIFY THAT THE ENGINE OIL PRESSURE IS IN THE NORMAL RANGE.
   b) CHECK THE OIL FILTER FOR LEAKS.
9) AFTER THE ENGINE RUNS FOR ONE MINUTE PRESS THE STOP BUTTON.
10) CHECK THE OIL LEVEL USING THE DIPSTICK AND ADD OIL AS REQUIRED.
11) PLACE THE GENERATOR BACK IN SERVICE BY PRESSING THE AUTO BUTTON ON THE EZGN.

NOTE: AT EACH OIL CHANGE THE LEAD SELECTION TO THE NEXT UNIT TO DISTRIBUTE THE RUN TIME EQUALLY.

ENGINE-GENERATOR PROTECTION ALARMS:

SEE THE TABLES THIS SHEET FOR ALARM LEVEL SETPOINTS AND BREAKER TRIP SETTINGS AT THE TIME OF COMMISSIONING. SEE SECTION 3.1 OF THE O&M MANUAL FOR DETAILED DESCRIPTIONS OF WARNING ALARM AND PROTECTION SEQUENCES.

FUEL/OIL SYSTEM

AUTOMATIC DAY TANK FILL – THE DAY TANK IS FILLED FROM THE INTERMEDATE TANK. NOTE THAT THE DEDICATED POWER PLANT INTERMEDIATE TANK IS THE PRIMARY SOURCE AND THE WATER PLANT INTERMEDIATE TANK IS CONNECT FOR RESERVE CAPACITY. A SELECTOR SWITCH ON THE FACE OF THE DAY TANK PANEL ALLOWS THE OPERATOR TO SWITCH BETWEEN TANKS.

THE DAY TANK HAS AUTOMATIC FILL CONTROLS WITH REDUNDANT HIGH AND LOW LEVEL ALARMS AND TIMERS. SEE FUEL SYSTEM CONTROL PANEL DRAWING SHEET E7.3 FOR DETAILED SEQUENCE OF OPERATION.

DAY TANK FILTER – THE DAY FILTER HAS WATER DETECTION PROBES. AN ALARM LAMP WILL ILLUMINATE WHEN WATER IS PRESENT IN THE FUEL. SEE WATER INDICATION PANEL DRAWING SHEET E7.4.

MANUAL USED ENGINE OIL DRAIN – USED OIL PUMP P-U01 IS USED TO PUMP USED ENGINE OIL FROM THE ENGINE OIL PANS TO THE USED OIL HOPPER. P-U01 RUNS THROUGH A MANUAL 0-5 MINUTE TIMER SWITCH.

AUTOMATIC USED ENGINE OIL BLENDING SYSTEM – the used engine oil blending system filters used oil and mixes it with diesel fuel in the day tank to be burned by the engines. the pumping rates are set to blend approximately 0.5% used oil to 99.5% diesel fuel. NOTE THAT WHEN THERE IS NO USED OIL IN THE HOPPER THE DIESEL PUMP STILL RUNS TO USE THE BLENDER AS A FUEL "POLISHING" FILTER. sEE FUEL SYSTEM CONTROL PANEL DRAWINGS FOR DETAILED SEQUENCE OF OPERATION.

MANUAL INTERMEDIATE TANK FILL – THE INTERMEDIATE TANK IS LOCATED ADJACENT TO THE POWER PLANT. IT NEEDS TO BE FILLED WHENEVER IT DROPS BELOW THE 50% FULL LEVEL. A PARTIALLY BURIED TRANSFER PIPELINE CONNECTS THE INTERMEDIATE TANK TO THE BULK STORAGE TANKS AND THE FILL PROCESS IS MANUALLY CONTROLLED.

ENGINE COOLING SYSTEM

RADIATORS – RADIATOR FAN MOTORS WILL OPERATE UNDER VARIABLE FREQUENCY DRIVE (VFD) CONTROL. WHEN THE COOLANT RETURN TEMP REACHES THE PID REFERENCE SETPOINT THE MOTOR WILL START AT MINIMUM SPEED AND RAMP UP TO THE REQUIRED SPEED. USING PID CONTROL, THE VFD WILL MODULATE THE FAN SPEED AS REQUIRED TO MAINTAIN COOLANT RETURN TEMP AT THE PID REFERENCE SETPOINT. AS THE COOLANT RETURN TEMP RISES, THE VFD WILL INCREASE THE SPEED OF THE FAN MOTOR UP TO 100%. ONCE THE FAN REACHES THE MINIMUM SPEED, THE VFD WILL MAINTAIN THAT SPEED UNTIL THE LOW SPEED TIME OUT EXPIRES. WHEN THE LOW SPEED TIME OUT EXPIRES THE MOTOR WILL STOP. THE MOTOR WILL REMAIN OFF UNTIL THE COOLANT RETURN TEMP RISES TO THE PID REFERENCE SETPOINT. SEE THE RADIATOR VFD SETTINGS TABLE THIS SHEET FOR SETPOINTS AT THE TIME OF COMMISSIONING.

THERMOSTATIC VALVE TV-1 WILL MIX HOT COOLANT FROM THE ENGINE DISCHARGE PIPE WITH COLD COOLANT FROM THE RADIATOR RETURN PIPE TO MAINTAIN 175°F +/- TEMPERATURE COOLANT RETURN TO THE ENGINES.

ENGINE COOLANT RETURN HIGH TEMPERATURE ALARM- WHEN THE ENGINE COOLANT RETURN TEMPERATURE RISES ABOVE 190°F FOR A MINIMUM OF 2 MINUTES, THE "HIGH COOLANT RETURN TEMPERATURE" LAMP SHALL ILLUMINATE. LAMP SHALL REMAIN ON UNTIL MASTER RESET BUTTON IS PRESSED.

POWER PLANT HEATING AND VENTILATION SYSTEM

GENERATION ROOM – THE OPERATING AND OFF LINE GENERATORS REJECT MORE HEAT TO THE GENERATION ROOM THAN IS REQUIRED SO EXHAUST FANS WITH INTAKE AIR DUCTS ARE INSTALLED TO PROVIDE COOLING.

GENERATION ROOM VENTILATION – THERE ARE TWO AIR INTAKES IN THE GENERATION ROOM. ONE OF THE AIR INTAKES IS USED FOR COMBUSTION AIR AND THE DAMPER IS OPEN ANY TIME THE STATION SERVICE POWER IS ON. THE OTHER AIR INTAKE IS USED FOR COOLING VENTILATION. THE VENTILATION DAMPER IS CONTROLLED BY A LINE VOLTAGE THERMOSTAT AND OPENS WHENEVER THE GENERATION ROOM TEMPERATURE IS ABOVE 70F, ADJUSTABLE.

EXHAUST FANS – THERE ARE FOUR EXHAUST FANS ON THE WALL ABOVE THE FRONT OF THE GENERATORS, EF-1, EF-2, EF-3, AND EF-4. EACH FAN IS EQUIPPED WITH A MOTORIZED DAMPER THAT OPENS WHENEVER THE FAN RUNS ON A CALL FOR COOLING THROUGH A 24VAC DIGITAL MODULATING THERMOSTAT. THE THERMOSTAT WILL PROVIDE A 0-10V SIGNAL TO MODULATE THE FAN SPEED AS REQUIRED TO MAINTAIN GENERATING ROOM TEMP, TYPICALLY SET TO 80F.

MOTOR OPERATED DAMPERS – ALL DAMPER MOTORS ARE NORMALLY CLOSED SPRING RETURN AND WILL CLOSE ON LOSS OF POWER (FIRE ALARM) IN LESS THAN 30 SECONDS.

HEAT RECOVERY ROOM COOLING AND HEATING – VENT FAN VF-1 RUNS CONTINUOUSLY TO CIRCULATE AIR FROM THE GENERATION ROOM THROUGH THE RADIATOR HEAT RECOVERY ROOM.

CONTROL ROOM VENTILATION – COOLING AND VENTILATION FOR THE CONTROL ROOM IS PROVIDED BY AN OPERABLE WINDOW.

CONTROL ROOM HEATING – THE CONTROL ROOM IS HEATED BY A CABINET UNIT HEATER. PUMP P-CUH1 CIRCULATES ENGINE COOLANT FROM THE PIPING MAINS THROUGH THE CABINET UNIT HEATER IN THE CONTROL ROOM. THE TEMPERATURE CONTROLLER ON THE HEATER CYCLES THE PUMP AND THE HEATER FAN ON AND OFF AS REQUIRED TO MAINTAIN TEMPERATURE IN THE CONTROL ROOM, TYPICALLY SET TO 65F.

HEAT RECOVERY SYSTEM

THE POWER PLANT HEAT EXCHANGER (HX-1), THE PRIMARY (HOT SIDE) ENGINE COOLANT CIRCULATING PUMP (P-HR1A), AND THE SECONDARY (COLD SIDE) HEAT RECOVERY FLUID MAIN CIRCULATING PUMP (P-HR1B) ARE LOCATED IN THE POWER PLANT. BOTH PUMPS OPERATE CONTINUOUSLY UNDER MANUAL CONTROL.

HEAT RECOVERY LOSS OF PRESSURE – WHEN THE SYSTEM PRESSURE IN THE HEAT RECOVERY PIPING DROPS BELOW 15 PSIG FOR 15 MINUTES, A RED LAMP "HEAT RECOVERY LOSS OF PRESSURE" LOCATED IN THE SWITCHGEAR MASTER SECTION WILL ILLUMINATE.

NO LOAD ON HEAT RECOVERY SYSTEM – WHEN THE HEAT RECOVERY RETURN TEMP. IS EQUAL TO OR GREATER THAN THE HEAT RECOVERY SUPPLY TEMP. FOR 60 MINUTES, AN AMBER LAMP "NO LOAD ON HEAT RECOVERY" LOCATED IN THE SWITCHGEAR MASTER SECTION WILL ILLUMINATE. WHEN THE HEAT RECOVERY SUPPLY TEMP. IS A MIN. OF 1°F GREATER THAN THE HEAT RECOVERY RETURN TEMP. THE LAMP WILL TURN OFF.

HEAT RECOVERY LOSS OF FLOW – WHEN THE FLOW RATE IN THE HEAT RECOVERY PIPING FALLS BELOW 10 GPM FOR 15 MINUTES, A RED LAMP "HEAT RECOVERY LOSS OF FLOW" LOCATED IN THE SWITCHGEAR MASTER SECTION WILL ILLUMINATE.

THE HEAT RECOVERY SYSTEM PROVIDES INTERRUPTIBLE HEAT TO ADJACENT WATER PLANT. SEE WATER PLANT DESIGN BY OTHERS FOR ARCTIC PIPE INSTALLATION AND INTERCONNECTION TO THE WATER PLANT HEAT.

SYSTEM STARTUP

FUEL OIL PUMPS – PRIOR TO STARTING FUEL AND OIL PUMPS, PRIME CAVITIES WITH LUBE OIL AND RUN MOMENTARILY TO VERIFY CORRECT ROTATION AND TO CONFIRM INLET AND OUTLET CONNECTIONS.

FUEL OIL PIPING – AFTER PRESSURE TESTING, FILL ALL FILTER BODIES, PRIME ALL PIPING, AND BLEED OFF AIR.

VERIFY OPERATION OF ALL FUEL SYSTEM CONTROLS IN ACCORDANCE WITH SEQUENCES OF OPERATION ON THE CONTROL PANEL DRAWINGS.

ENGINE COOLANT PIPING – AFTER PRESSURE TESTING, FLUSHING, AND BLEEDING, FILL SYSTEM WITH ETHYLENE GLYCOL SOLUTION. SEE HYDRONIC PIPING SPECIFICATION 23 21 13.

HEAT RECOVERY PIPING – AFTER PRESSURE TESTING, FLUSHING, AND BLEEDING, FILL SYSTEM WITH PROPYLENE GLYCOL SOLUTION. SEE HYDRONIC PIPING SPECIFICATION 23 21 13.

VERIFY OPERATION OF ENGINE COOLANT SYSTEM THERMOSTATIC VALVE.

VERIFY PROPER OPERATION OF THERMOMETERS, PRESSURE CAUGES, AND ELECTRIAL INSTRUMENTATION DEVICES. SET SWITCHES ON DIFFERENTIAL PRESSURE GAUGES TO SETPOINTS INDICATED. CALIBRATE THERMOMETERS AND ALL ELECTRICAL INSTRUMENTATION DEVICES INCLUDING TEMPERATURE TRANSMITTERS, PRESSURE TRANSMITTERS, DIFFERENTIAL PRESSURE SWITCHES, LEVEL SENSORS, ETC. VERIFY CALIBRATION OF HEAT RECOVERY FLOW RATE READING FROM PUMP. VERIFY HEAT RECOVERY ENERGY CALCULATIONS ON SCADA. SEE INSTRUMENTATION AND CONTROL DEVICES SPECIFICATION 23 09 00.

CLEAN ALL PIPING STRAINERS AFTER FIRST 48 HOURS OR MORE OF OPERATION. MONITOR SYSTEM OPERATION FOR ONE WEEK MINIMUM BEFORE LEAVING SITE. CHANGE GLYCOL FILTER ELEMENTS ON ENGINES AT TIME OF FIRST OIL CHANGE ON EACH ENGINE.

Demand Control Table (PLC)				
Demand Control	Generator(s) On Line	On-line kW (Overload)	Level Increase	Level Decrease
Level 1	#1	150	135	---
Level 2	#2 or #3	210	190	120
Level 3	#4	310	280	170
Level 4	#4 & #1	460	---	250
Note : Gen #2 & #3 are equal capacity. Manually select lead unit.				

Engine-Generator Alarm Settings (EZGN Genset Controller)			
Function	Normal Range	Pre-Alarm	Shut Down
Overspeed	1795-1805	----	1900 RPM
Oil Pressure	30-50 PSI	14.5 PSI	10 PSI
Coolant Temp.	180-200°F	210°F	215°F
Exhaust Temp.	500-850°F	900°F	-----
Under Frequency	59.5-60.5 Hz	----	58.2 Hz
Over Frequency	59.5-60.5 Hz	----	61.8 Hz
Under Voltage	470-490 V	----	432 V
Over Voltage	470-490 V	----	528 V
Reverse Power	0	----	10%

Generator Breaker Settings (EZGN Genset Controller)	
Function	Setting
Gen #1 Breaker Trip Setpoint (EZGN Rated Current)	250 A
Gen #2 & #3 Breaker Trip Setpoint (EZGN Rated Current)	325 A
Gen #4 Breaker Trip Setpoint (EZGN Rated Current)	500 A
Gen Breaker Level 1 (100%) Time Over Current	60 sec.
Gen Breaker Level 2 (120%) Time Over Current	30 sec.
Gen Breaker Level 3 (250%) Time Over Current	1 sec.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH REGISTERED PROFESSIONAL ENGINEER BRIAN C. GRAY ME 8210

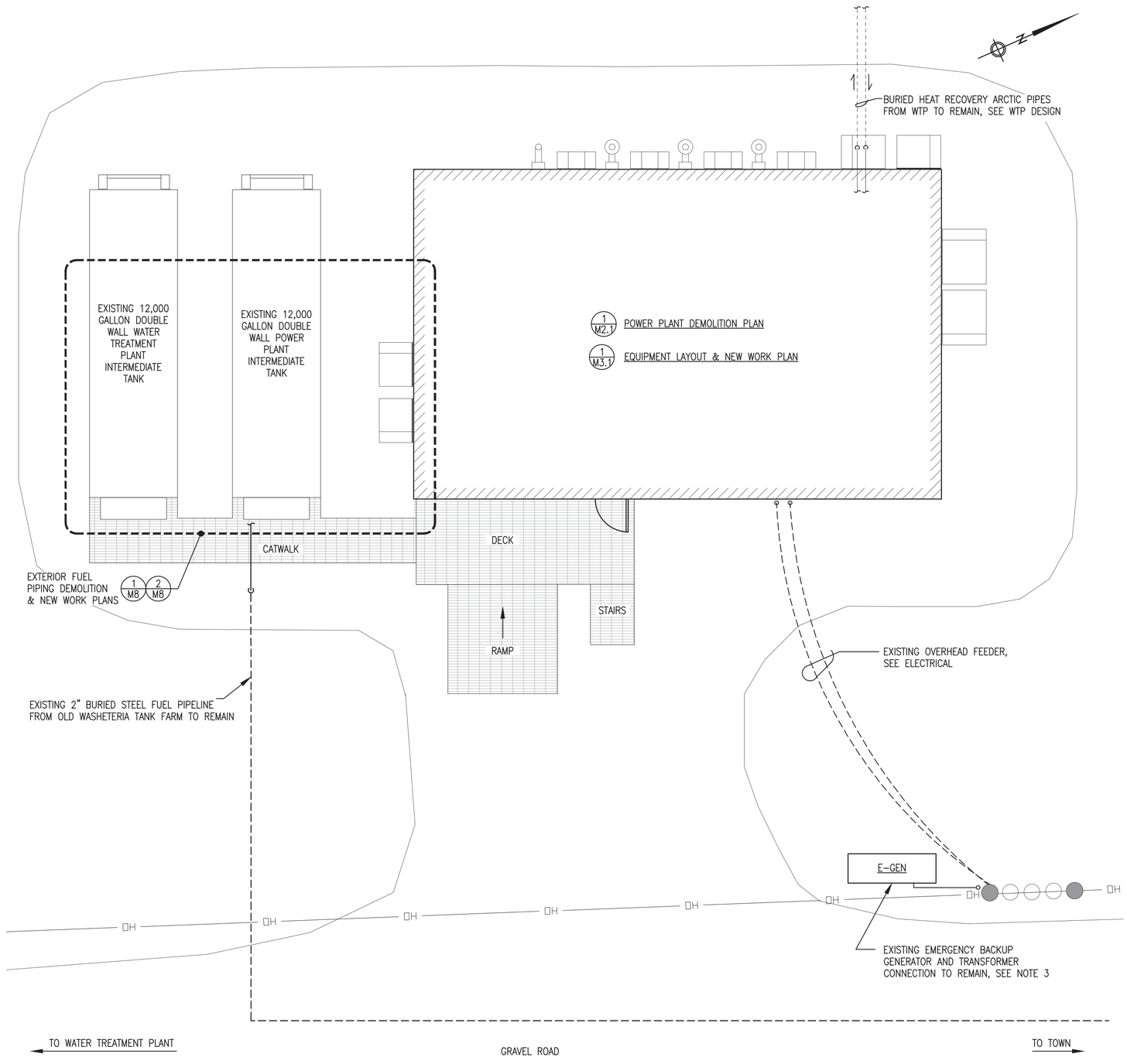
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SYSTEM START UP & SEQUENCE OF OPERATIONS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 11/24/25
FILE NAME: TULU PP M1-M2 | SHEET: M1.3
PROJECT NUMBER:



1 M1.4 MECHANICAL SITE PLAN
3/16"=1'-0"

PROJECT OVERVIEW:

1. THE POWER PLANT PROVIDES PRIME POWER TO THE COMMUNITY OF TULUKSAK BUT DOES NOT CURRENTLY HAVE THE REQUIRED CAPACITY TO MEET THE EXPECTED HIGHER LOADS FROM THE NEW WATER/SEWER UTILITY CURRENTLY UNDER CONSTRUCTION OR TO PROVIDE POWER TO THE EXISTING SCHOOL. THE PURPOSE OF THIS POWER PLANT UPGRADE PROJECT IS TO INCREASE THE CAPACITY AND RELIABILITY OF THE POWER PLANT IN ORDER TO MEET THE PROJECTED NEAR TERM COMMUNITY POWER DEMAND EXCLUDING THE SCHOOL.

2. A PORTION OF THE EXISTING POWER PLANT GENERATION EQUIPMENT HAS EITHER REACHED THE END OF ITS USEFUL LIFE OR HAS INSUFFICIENT CAPACITY TO MEET THE CURRENT COMMUNITY GENERATION DEMAND. THE SCOPE OF WORK INCLUDES REPLACEMENT OF GENERATION EQUIPMENT AND MAJOR RENOVATION OF MECHANICAL AND ELECTRICAL SYSTEMS.

3. THE EXTENT OF THE MODIFICATIONS TO THE POWER PLANT WHICH WILL RENDER IT UNAVAILABLE FOR PROVIDING COMMUNITY POWER DURING A SUBSTANTIAL PORTION OF THE CONSTRUCTION. A GRID-CONNECTED EMERGENCY STANDBY GENERATOR SKID UNIT IS LOCATED AS INDICATED ON THE PLAN AND IS AVAILABLE FOR USE BY THE CONTRACTOR. IF THE CONTRACTOR CHOOSES TO USE THIS GENERATOR TO PROVIDE COMMUNITY POWER DURING CONSTRUCTION, IT WILL BE THEIR RESPONSIBILITY TO INSPECT, TEST, AND MAKE ANY NECESSARY REPAIRS PRIOR TO COMMENCING WORK. A COMMUNITY OUTAGE WILL BE REQUIRED WHEN SWITCHING FROM PRIME POWER TO STANDBY POWER. NOTIFY THE UTILITY WHEN STANDBY POWER IS REQUIRED AND COORDINATE WORK SCHEDULE WITH THE UTILITY.

4. THE EXISTING POWER PLANT BUILDING IS CONSTRUCTED FROM PRE-ENGINEERED STRUCTURAL INSULATED WALL PANELS (SIP's), WOODEN TRUSSES, METAL ROOFING/SIDING, FRP INTERIOR SURFACE, AND A WELDED STEEL FLOOR ON A RAISED FOUNDATION. THE BUILDING HAS BEEN INSPECTED AND HAS BEEN DEEMED TO BE IN GENERALLY SOUND CONDITION.

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

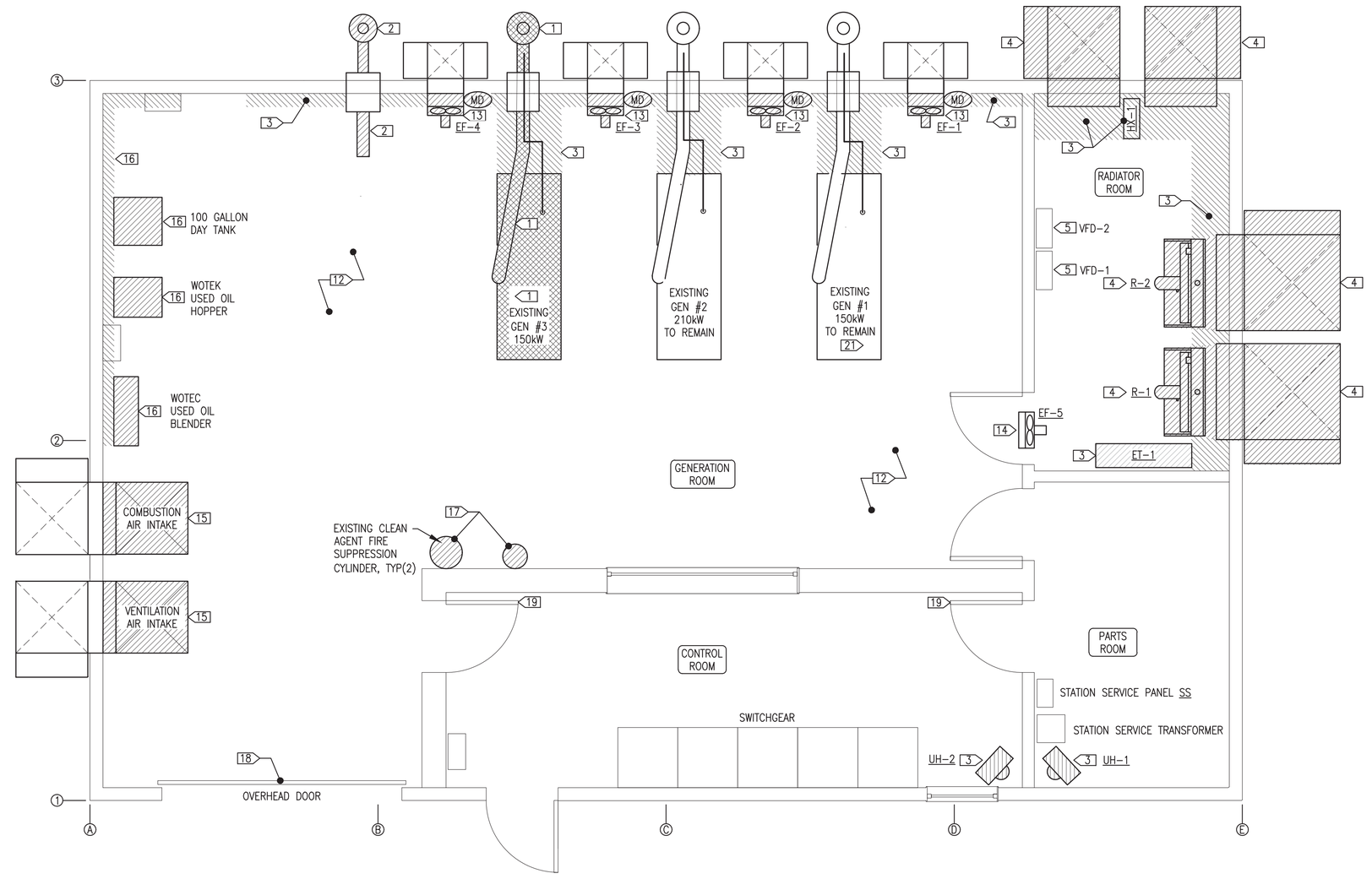
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: MECHANICAL SITE PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD
DESIGNED BY: BCG
FILE NAME: TULU PP M1-M2
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 11/24/25
SHEET: M1.4



1 M2.1 MECHANICAL DEMOLITION PLAN
3/8"=1'-0"

MECHANICAL DEMOLITION PLAN GENERAL NOTES:

1. ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR DEMOLITION OR TEMPORARY REMOVAL. EXISTING EQUIPMENT AND DEVICES TO BE REMOVED INDICATED BY HATCHING.
2. ONLY GENERAL DEMOLITION TASKS AND AREAS SHOWN THIS SHEET. SEE NEW WORK PLANS AND DETAILS FOR ADDITIONAL DETAIL ON LIMITS OF REMOVAL OF EQUIPMENT, COMPONENTS, AND PIPING.
3. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO GENERATION EQUIPMENT BEING REMOVED DURING DEMOLITION. TARP GENERATORS AND SEAL ALL EXPOSED CONNECTIONS PRIOR TO REMOVING FROM PLANT. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.
4. DRAIN ALL PIPING PRIOR TO DEMOLITION. DRAIN ENGINE BLOCKS PRIOR TO REMOVAL. TURN USED OIL AND GLYCOL OVER TO THE UTILITY FOR FINAL DISPOSITION.

MECHANICAL DEMOLITION PLAN SPECIFIC NOTES:

1. DEMOLISH GEN#3 IN ITS ENTIRETY INCLUDING ENGINE, GENERATOR, SKIDS, SUPPORT PEDESTALS, EXHAUST PIPING, EXTERIOR EXHAUST MUFFLER, AND CRANK VENT PIPING. EXISTING 5" WALL THIMBLE AND EXTERIOR MUFFLER SUPPORT STRUT TO REMAIN.
2. DEMOLISH OLD GEN#4 EXHAUST PIPING AND EXTERIOR EXHAUST MUFFLER IN PREPARATION FOR INSTALLATION OF NEW GEN#4. EXISTING 5" WALL THIMBLE AND EXTERIOR MUFFLER SUPPORT STRUT TO REMAIN. NOTE: GEN #4 WAS PREVIOUSLY REMOVED.
3. DEMOLISH EXISTING POWER PLANT ENGINE COOLANT/HEAT RECOVERY SYSTEM IN ITS ENTIRETY INCLUDING PIPING, ENGINE CONNECTIONS, HOSES, VALVES, HEAT EXCHANGERS, HYDRONIC EQUIPMENT, PUMPS, EXPANSION TANKS, AND UNIT HEATERS. EXISTING WALL MOUNTED SUPPORT STRUT TO REMAIN. INFILL AND PATCH OLD PIPING PENETRATIONS IN PARTITION WALL TO MATCH EXISTING WALL FRP.
4. DEMOLISH EXISTING RADIATORS R-1 AND R-2 INCLUDING PIPING, DAMPERS, FLEXES, RADIATOR EXHAUST HOODS, AND RADIATOR SUPPLY AIR HOODS IN THEIR ENTIRETY.
5. SEE ELECTRICAL
6. SEE ELECTRICAL
7. SEE ELECTRICAL
8. SEE ELECTRICAL
9. SEE ELECTRICAL
10. SEE ELECTRICAL
11. SEE ELECTRICAL
12. THE EXISTING POWER PLANT CEILING IS FIBERGLASS REINFORCED PLASTIC (FRP). THE GENERATION ROOM CEILING IS COVERED WITH SOOT AND OILY RESIDUE, CREATING A FIRE HAZARD. THOROUGHLY CLEAN THE GENERATION ROOM CEILING WITH AN INDUSTRIAL DE-GREASER. PROPERLY DISPOSE OF ALL OILY WASTE, RAGS, ETC.
13. DEMOLISH FOUR EACH GENERATOR ROOM EXHAUST FANS, DAMPERS, AND ACTUATORS. EXISTING HOODS INCLUDING DUCT THROUGH WALL TO REMAIN.
14. DEMOLISH EXISTING FAN EF-5 FOR REPLACEMENT WITH NEW. REMOVE ASSOCIATED LINE VOLTAGE COOLING THERMOSTAT FOR RECONFIGURATION TO RUN CONTINUOUS.
15. CAREFULLY REMOVE TWO EACH EXISTING INTERIOR AIR INTAKE DIVERTER HOODS AND SALVAGE FOR REINSTALLATION. DEMOLISH DAMPERS AND ACTUATORS. EXISTING HOODS INCLUDING DUCT THROUGH WALL TO REMAIN.
16. DEMOLISH EXISTING 100 GALLON DAY TANK, USED OIL HOPPER, USED OIL BLENDER, PIPING, HOSES, APPURTENANCES, AND FUEL SYSTEM EQUIPMENT.
17. DEMOLISH EXISTING CLEAN AGENT FIRE SUPPRESSION SYSTEM INCLUDING AGENT CANISTERS, PIPING, AND NOZZLES.
18. DEMOLISH ENTIRE 10'x10' OVERHEAD DOOR INCLUDING DOOR PANELS, SPRINGS, AND CLOSER IN PREPARATION OF INSTALLATION OF NEW MANUAL CHAIN OVERHEAD DOOR. SEE SHEET M2.2.
19. REMOVE, ROTATE, AND REINSTALL EXISTING DOOR TO MEET NEC EGRESS REQUIREMENTS AND ADD PANIC HARDWARE. SEE SHEET M2.2.
20. SEE ELECTRICAL.
21. CONVERT EXISTING 6068TFM85 ENGINE FROM 12VDC TO 24VDC. SEE SPECIFICATIONS.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

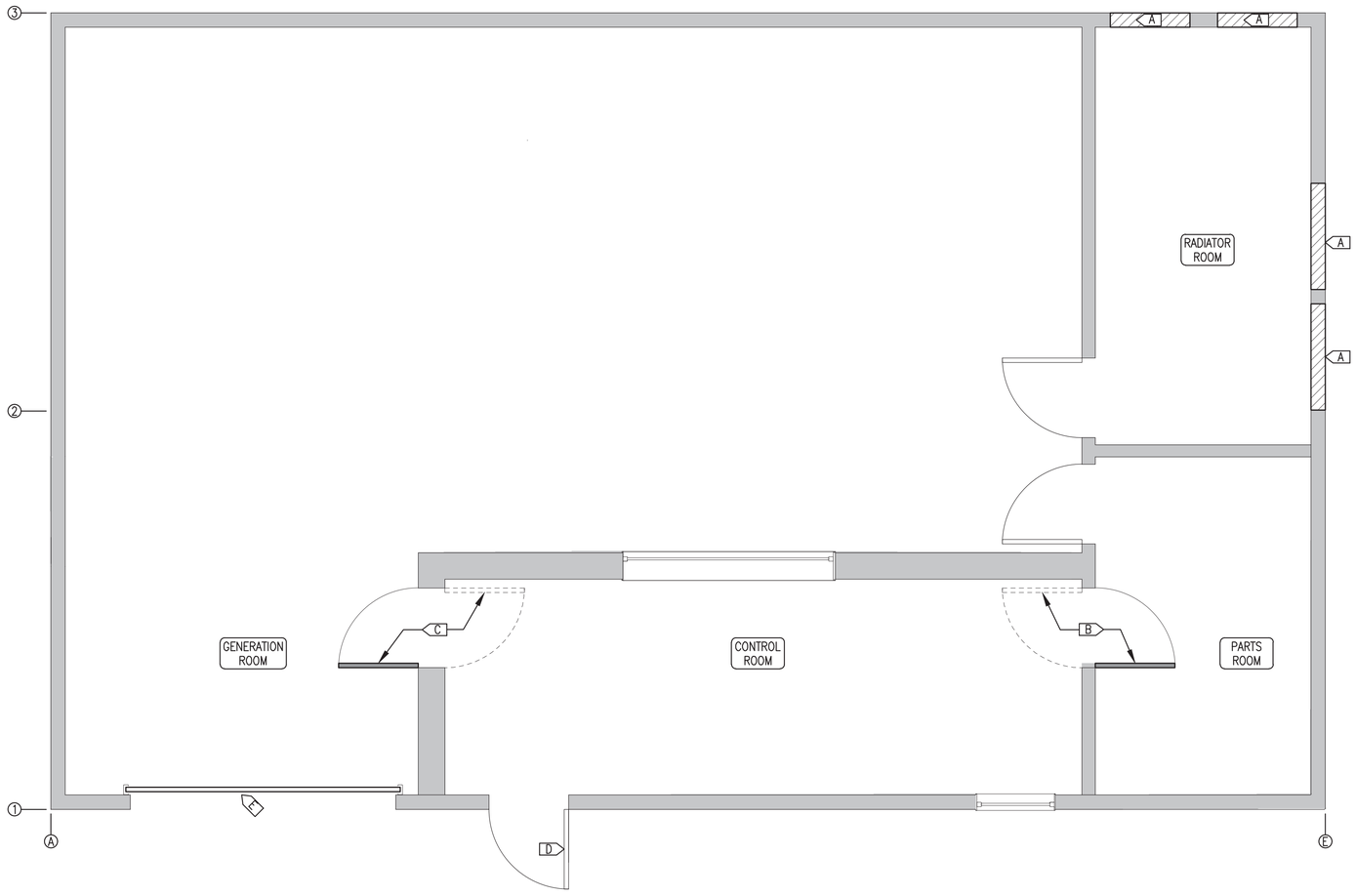
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: MECHANICAL DEMOLITION PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME: TULU PP M1-M2	SHEET: M2.1
PROJECT NUMBER:	



1 M2.2 BUILDING MODIFICATION PLAN FOR MECHANICAL UPGRADES
3/8"=1'

BUILDING MODIFICATIONS FOR MECHANICAL UPGRADES GENERAL NOTES:

1. THE NEW RADIATORS WILL BE INSTALLED ON THE EXTERIOR OF THE PLANT AND THE RADIATOR ROOM WILL BE CONVERTED TO THE HEAT RECOVERY ROOM. SEE SHEETS M2.1, M3.1, M3.3, M3.4 AND SPECIFIC NOTE A.
2. THE NATIONAL ELECTRICAL CODE REQUIRES ALL DOORS WITHIN 25' OF THE SWITCHGEAR TO SWING OUT AND TO BE EQUIPPED WITH PANIC HARDWARE. SEE SPECIFIC NOTES B, C, AND D FOR MODIFICATIONS.

BUILDING MODIFICATIONS FOR MECHANICAL UPGRADES SPECIFIC NOTES:

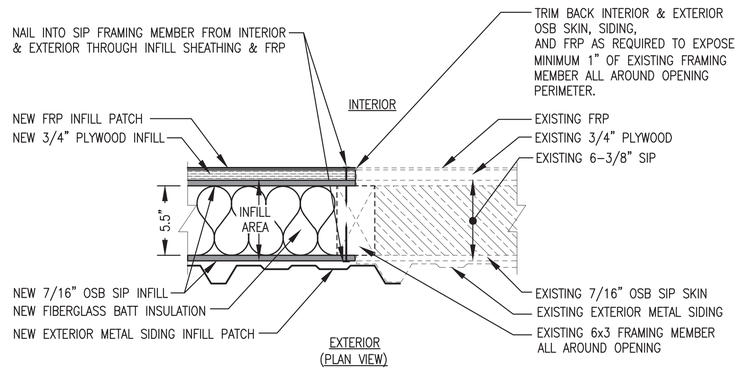
A> INFILL EXISTING RADIATOR ROOM AIR INTAKE AND EXHAUST DUCT OPENINGS AFTER DEMOLISHING DUCTS, RADIATORS, AND HOODS. SEE DETAIL 2/M2.2 FOR INFILL FRAMING AND SHEATHING.
COVER INTERIOR SHEATHING WITH FRP TO MATCH EXISTING WALLS.
COVER EXTERIOR SHEATHING WITH METAL SIDING TO MATCH EXISTING WALLS, 24 GAUGE, 1-1/4" MAJOR RIBS AT 12" O.C. MAGIC METALS HUSKY HIGH RIB OR EQUAL, COLOR WHITE.
SEAL AROUND ALL WALL COVERING PATCHES INSIDE AND OUT WITH WHITE POLYURETHANE CAULK.

B> EXISTING 3'-0" x 6'-8" x 8 3/4" DEEP KNOCK-DOWN FRAME STEEL DOOR. REMOVE, ROTATE, AND REINSTALL TO SWING OUT AS INDICATED FOR NEC REQUIRED EGRESS FROM CONTROL ROOM. INSTALL NEW PRECISION MODEL 2108 x 4908AX3 x 630 EXIT DEVICE ON DOOR INTERIOR.

C> EXISTING 3'-0" x 6'-8" x 11 3/4" DEEP WELDED FRAME STEEL DOOR. CAREFULLY CHAMFER CUT FRAME AT TOP CORNERS, REMOVE, ROTATE, AND REINSTALL TO SWING OUT AS INDICATED FOR NEC REQUIRED EGRESS FROM CONTROL ROOM. SEE DETAIL 3/M2.2 FOR WELDED FRAME MODIFICATIONS. INSTALL NEW PRECISION MODEL 2108 x 4908AX3 x 630 EXIT DEVICE ON DOOR INTERIOR

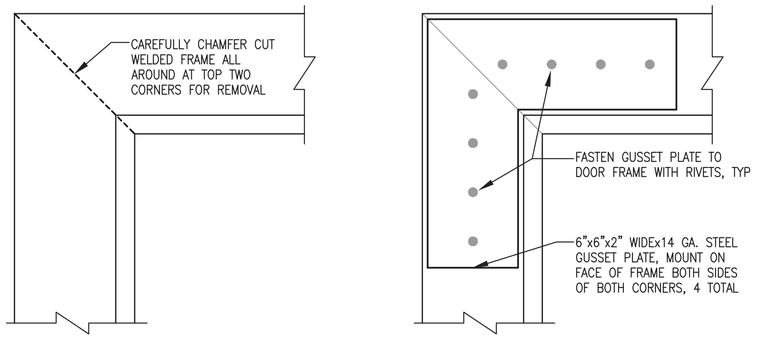
D> INSTALL NEW PRECISION MODEL 2108 x 4908AX3 x 630 EXIT DEVICE ON DOOR INTERIOR.

E> INSTALL NEW MANUAL CHAIN OPERATED 10'-2" WIDE x 10' HIGH INSULATED OVERHEAD DOOR.



2 M2.2 TYPICAL WALL INFILL SECTION
NO SCALE

NOTE: AFTER CORNER MODIFICATION, PRIME CORNERS WITH ALKYD PRIMER, COLOR GRAY, THEN REPAINTING ENTIRE DOOR FRAME WITH ONE COAT OF SEMI-GLOSS ALKYD ENAMEL, COLOR ANSI 61 GRAY.



WELDED DOOR FRAME REMOVAL CORNER DETAIL

WELDED DOOR FRAME REINSTALLATION CORNER DETAIL

3 M2.2 WELDED DOOR FRAME REMOVAL AND REINSTALLATION DETAIL
NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

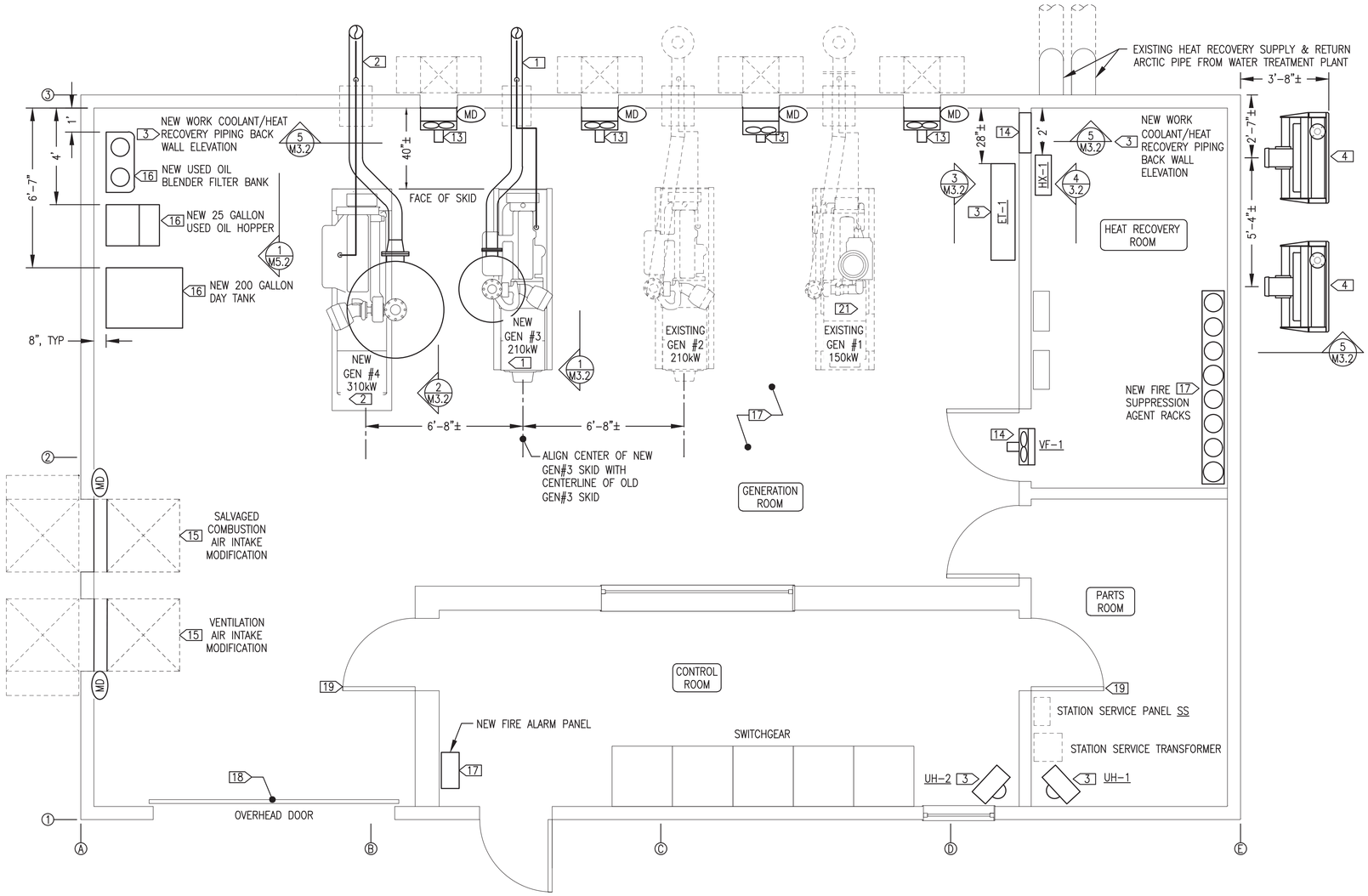
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: POWER PLANT BUILDING MODIFICATION PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME: TULU PP M1-2	SHEET: M2.2
PROJECT NUMBER:	



1 M3.1 MECHANICAL NEW WORK OVERVIEW
3/8"=1'-0"

POWER PLANT MECHANICAL NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT AND PIPING TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT AND PIPING TO BE INSTALLED/RELOCATED SHOWN WITH DARK SOLID LINES.
3. NOT ALL EXISTING EQUIPMENT AND PIPING SHOWN. SEE ATTACHED RECORD DRAWINGS OF ORIGINAL POWER PLANT CONSTRUCTION FOR ADDITIONAL DETAIL ON SYSTEMS NOT BEING MODIFIED.
4. ONLY MAJOR NEW WORK ITEMS SHOWN THIS SHEET. SEE NEW WORK PLANS AND DETAILS FOR ADDITIONAL DETAIL.
5. SEE SHEETS M3.1–M3.5 FOR GENERAL EQUIPMENT LAYOUT, BASE SUPPORT, FABRICATIONS, AND GENERATOR ASSEMBLY PLANS AND DETAILS.
6. SEE SHEETS M4.1–M4.4 FOR ENGINE COOLANT AND HEAT RECOVERY SYSTEM MODIFICATIONS.
7. SEE SHEET M5.1–M5.7 FOR POWER PLANT DIESEL FUEL AND USED OIL SYSTEM MODIFICATIONS.
8. SEE SHEET M6 FOR EXHAUST AND CRANK CASE VENTILATION SYSTEM MODIFICATIONS.
9. SEE SHEET M7.1 FOR VENTILATION SYSTEM MODIFICATIONS.
10. SEE SHEET M8 FOR INTERMEDIATE TANK PIPING MODIFICATIONS
11. SEE SHEETS FS1 AND FS2 FOR FIRE DETECTION, ALARM, AND SUPPRESSION DEMOLITION & NEW WORK

POWER PLANT MECHANICAL NEW WORK PLAN SPECIFIC NOTES:

1. INSTALL NEW GEN#3 INCLUDING SUPPORT PEDESTALS, EXHAUST SYSTEMS, AND CRANK VENT PIPING.
2. INSTALL NEW GEN#4 INCLUDING SUPPORT PEDESTALS, EXHAUST SYSTEM, AND CRANK VENT PIPING..
3. INSTALL NEW ENGINE COOLANT, HEAT RECOVERY, PLANT HEAT SYSTEMS INCLUDING PIPING, ENGINE CONNECTIONS, HOSES, VALVES, HEAT EXCHANGERS, HYDRONIC EQUIPMENT, PUMPS, EXPANSION TANKS, AND UNIT HEATERS.
4. INSTALL NEW RADIATORS R–1 AND R–2.
5. SEE ELECTRICAL.
6. SEE ELECTRICAL
7. SEE ELECTRICAL
8. SEE ELECTRICAL
9. SEE ELECTRICAL
10. SEE ELECTRICAL
11. SEE ELECTRICAL
12. SEE DEMOLITION PLAN
13. INSTALL NEW EF–1, 2, 3, AND 4 FAN/DAMPER ASSEMBLIES.
14. INSTALL NEW VENT FAN VF–1 IN EXISTING OPENING FROM DEMOLISHED EF–5. MODIFY WALL OPENING AS REQUIRED. CUT NEW WALL OPENING AND INSTALL 20"x20" BACKDRAFT DAMPER.
15. INSTALL NEW AIR INTAKE DAMPER ASSEMBLY AND FILTERS IN SALVAGED INTERIOR DIVERTER.
16. INSTALL FUEL SYSTEM UPGRADES INCLUDING NEW 200 GALLON DAY TANK, 25 GALLON USED OIL HOPPER, USED OIL BLENDER, PIPING, HOSES, APPURTENANCES, AND EQUIPMENT AS REQUIRED FOR FUEL SYSTEM UPGRADE.
17. SEE FIRE DETECTION, ALARM, AND SUPPRESSION SYSTEM DRAWINGS FS1 AND FS–2.
18. INSTALL NEW MANUAL CHAIN OVERHEAD DOOR. SEE SHEET M2.2.
19. ROTATE AND REINSTALL EXISTING DOOR TO MEET NEC EGRESS REQUIREMENTS AND ADD PANIC HARDWARE. SEE SHEET M2.2.
20. SEE ELECTRICAL.
21. CONVERT EXISTING 6068TFM85 ENGINE FROM 12VDC TO 24VDC. SEE SPECIFICATIONS.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

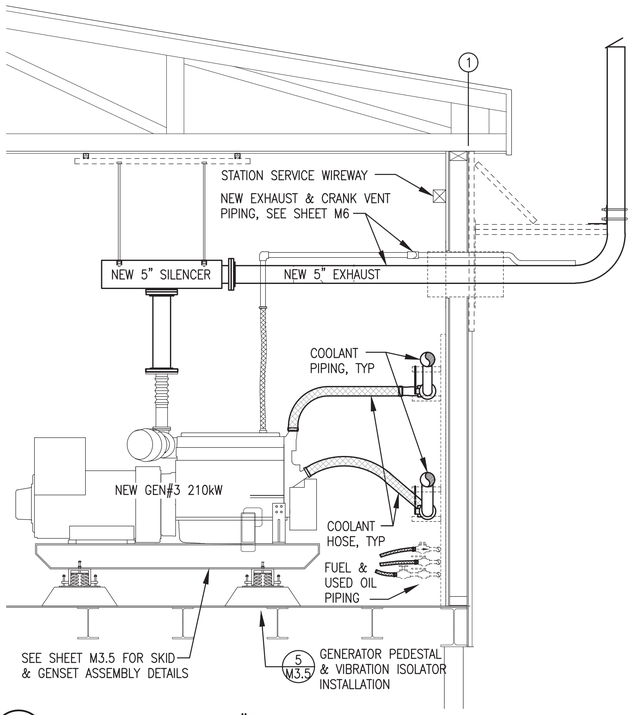
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

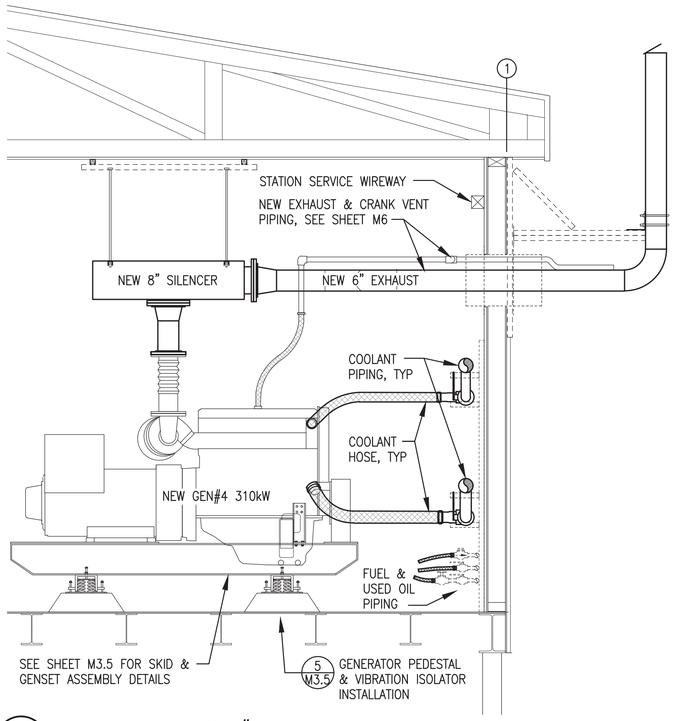
TITLE: MECHANICAL NEW WORK PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

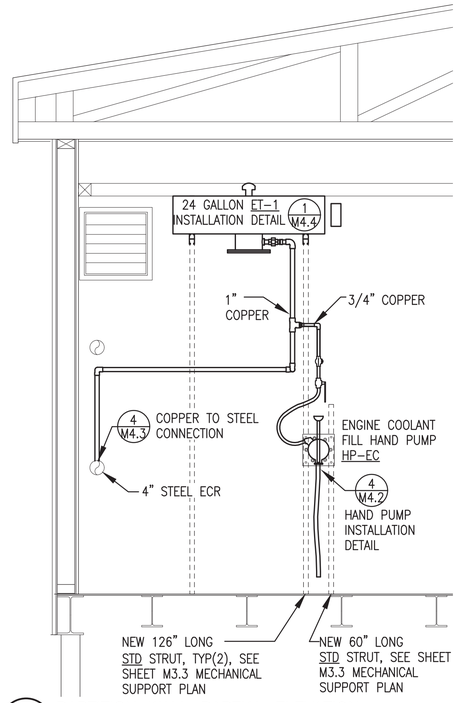
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M3.1
PROJECT NUMBER:	



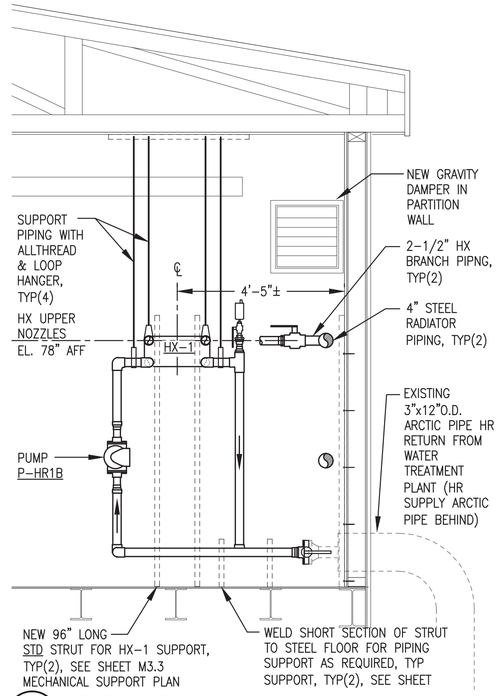
1 M3.2 SECTION AT NEW GEN#3
1/2"=1'



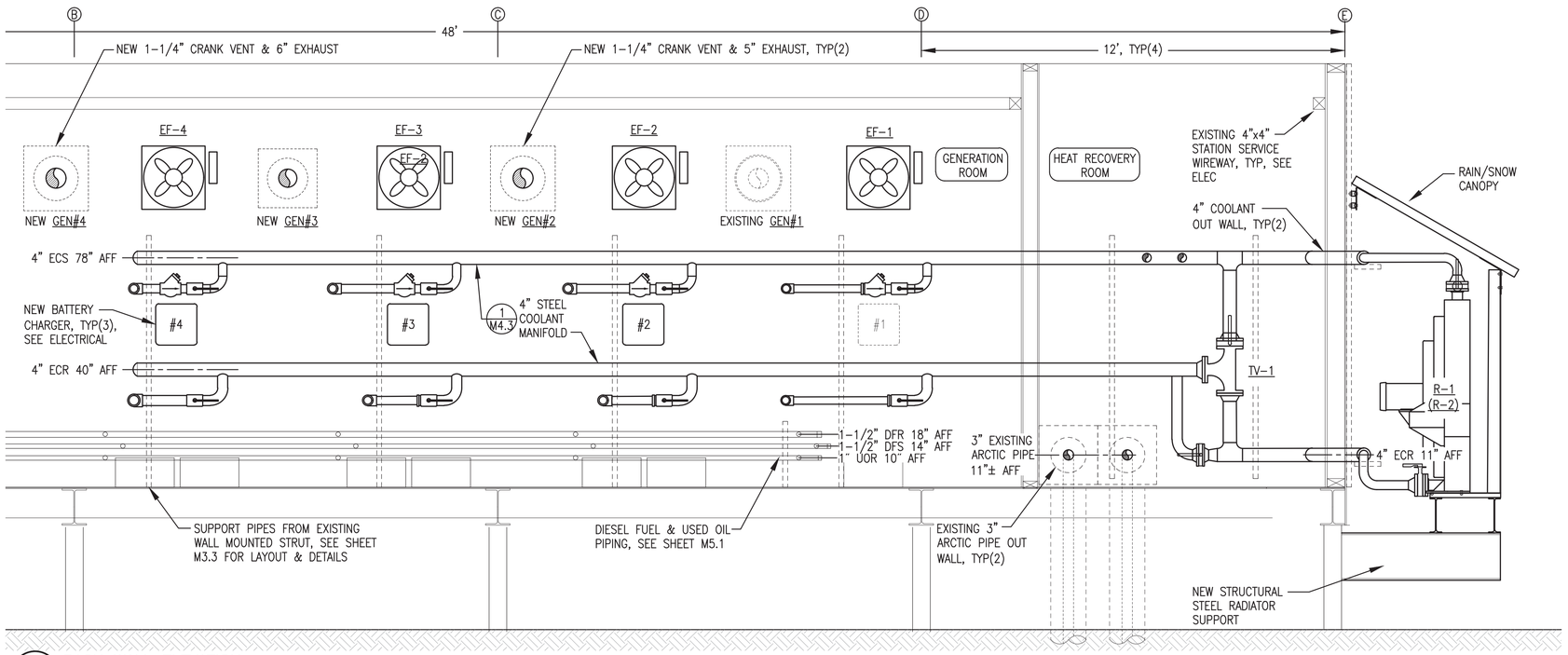
2 M3.2 SECTION AT NEW GEN#4
1/2"=1'



3 M3.2 PARTITION WALL PARTIAL ELEVATION
1/2"=1'



4 M3.2 HR ROOM WALL PARTIAL ELEVATION
1/2"=1'



5 M3.2 BACK WALL ELEVATION
1/2"=1'

GENERAL NOTES:

1. THE SECTIONS AND ELEVATIONS THIS SHEET FOR GENERAL LAYOUT AND SHOW MAJOR WORK ITEMS ONLY. ALL PIPING AND EQUIPMENT NOT SHOWN FOR CLARITY. SEE PIPING ISOMETRICS FOR COMPLETE INSTALLATION.
2. ALL ELEVATIONS ARE ABOVE FINISHED FLOOR (AFF) TO CENTERLINE UNLESS SPECIFICALLY INDICATED OTHERWISE.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

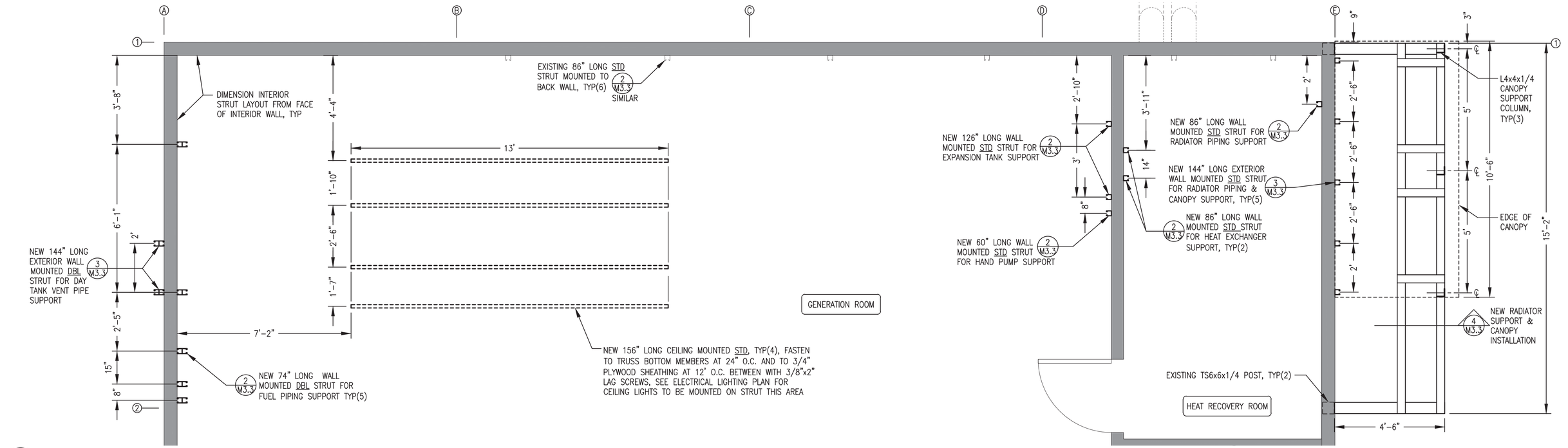
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

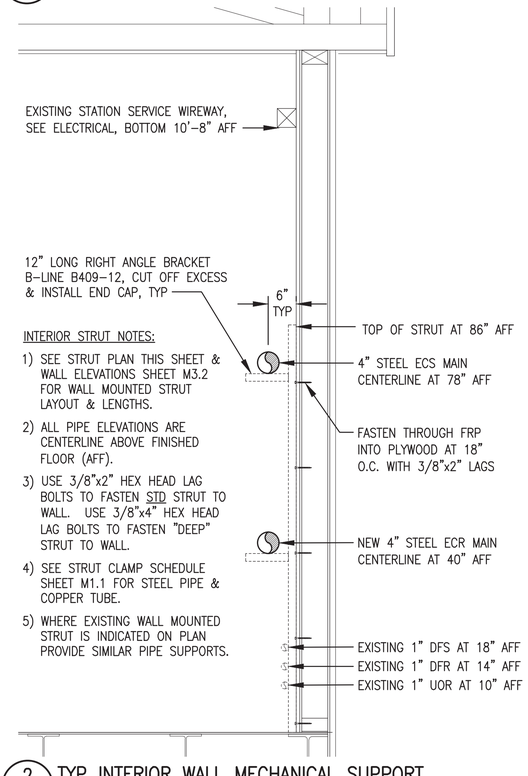
TITLE: NEW WORK SECTIONS, ELEVATIONS, & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M3.2
PROJECT NUMBER:	



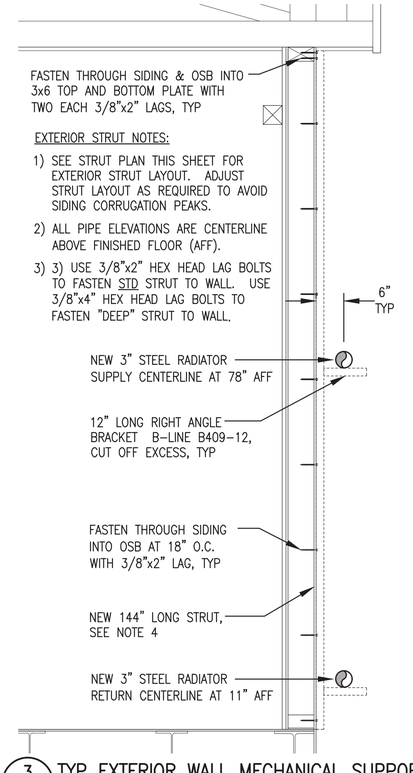
1/M3.3 NEW MECHANICAL SUPPORT PLAN
1/2"=1'



INTERIOR STRUT NOTES:

1) SEE STRUT PLAN THIS SHEET & WALL ELEVATIONS SHEET M3.2 FOR WALL MOUNTED STRUT LAYOUT & LENGTHS.
2) ALL PIPE ELEVATIONS ARE CENTERLINE ABOVE FINISHED FLOOR (AFF).
3) USE 3/8"x2" HEX HEAD LAG BOLTS TO FASTEN STD STRUT TO WALL. USE 3/8"x4" HEX HEAD LAG BOLTS TO FASTEN "DEEP" STRUT TO WALL.
4) SEE STRUT CLAMP SCHEDULE SHEET M1.1 FOR STEEL PIPE & COPPER TUBE.
5) WHERE EXISTING WALL MOUNTED STRUT IS INDICATED ON PLAN PROVIDE SIMILAR PIPE SUPPORTS.

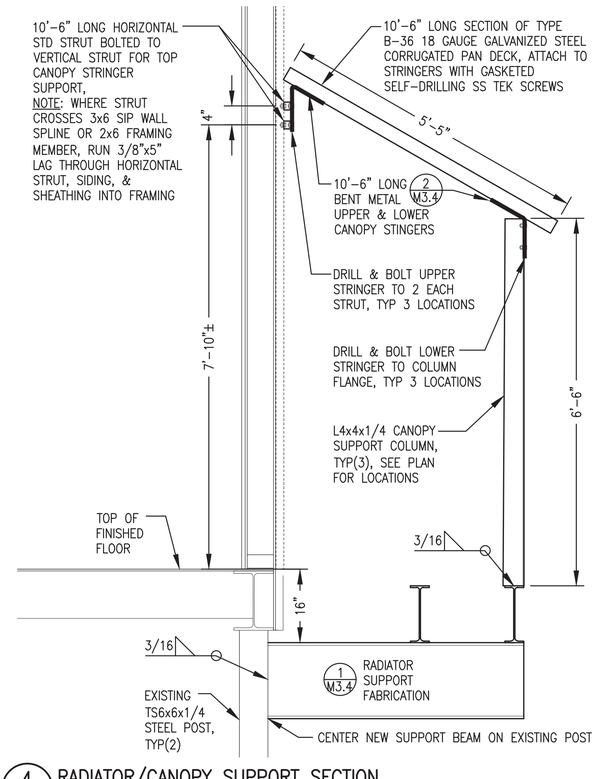
2/M3.3 TYP INTERIOR WALL MECHANICAL SUPPORT
3/4"=1'-0"



EXTERIOR STRUT NOTES:

1) SEE STRUT PLAN THIS SHEET FOR EXTERIOR STRUT LAYOUT. ADJUST STRUT LAYOUT AS REQUIRED TO AVOID SIDING CORRUGATION PEAKS.
2) ALL PIPE ELEVATIONS ARE CENTERLINE ABOVE FINISHED FLOOR (AFF).
3) 3) USE 3/8"x2" HEX HEAD LAG BOLTS TO FASTEN STD STRUT TO WALL. USE 3/8"x4" HEX HEAD LAG BOLTS TO FASTEN "DEEP" STRUT TO WALL.

3/M3.3 TYP EXTERIOR WALL MECHANICAL SUPPORT
3/4"=1'-0"



4/M3.3 RADIATOR/CANOPY SUPPORT SECTION
3/4"=1'-0"

MECHANICAL SUPPORT STRUT GENERAL NOTES:

1. NEW AND EXISTING MAJOR WALL AND CEILING MOUNTED SUPPORT STRUT SHOWN THIS SHEET IS REQUIRED TO BE IN PLACE PRIOR TO PIPE AND EQUIPMENT INSTALLATION. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL SPECIFIC EQUIPMENT, PIPING, AND WIREWAY STRUT SUPPORTS LOCATIONS AND DETAILS.
2. "STD" DESIGNATES STANDARD 1-5/8"x1-5/8" SINGLE STRUT. "DBL" DESIGNATES 1-5/8"x3-1/4" DOUBLE (BACK-TO-BACK) STRUT. ALL EXTERIOR STRUT, FITTINGS, AND FASTENERS HOT DIP GALVANIZED. ALL INTERIOR STRUT, FITTINGS, AND FASTENERS MAY BE ZINC PLATED.
3. USE 3/8"x2" HEX HEAD LAG BOLTS TO FASTEN STD STRUT TO WALL OR CEILING STRUCTURE.
4. USE 3/8"x4" HEX HEAD LAG BOLTS TO FASTEN "DEEP" STRUT TO WALL STRUCTURE.
5. INTERIOR WALLS & CEILING ARE SHEATHED WITH 3/4" PLYWOOD. EXTERIOR WALLS ARE SHEATHED WITH 7/16" OSB. PROVIDE LAGS INTO FRAMING MEMBERS AND SHEATHING AS INDICATED.
6. GRIND OR WIRE BRUSH OFF ALL EXISTING COATINGS PRIOR TO ALL FIELD WELDING. AFTER WELDING, WIRE BRUSH AFFECTED WELD AREAS AND APPLY 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR EQUAL.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

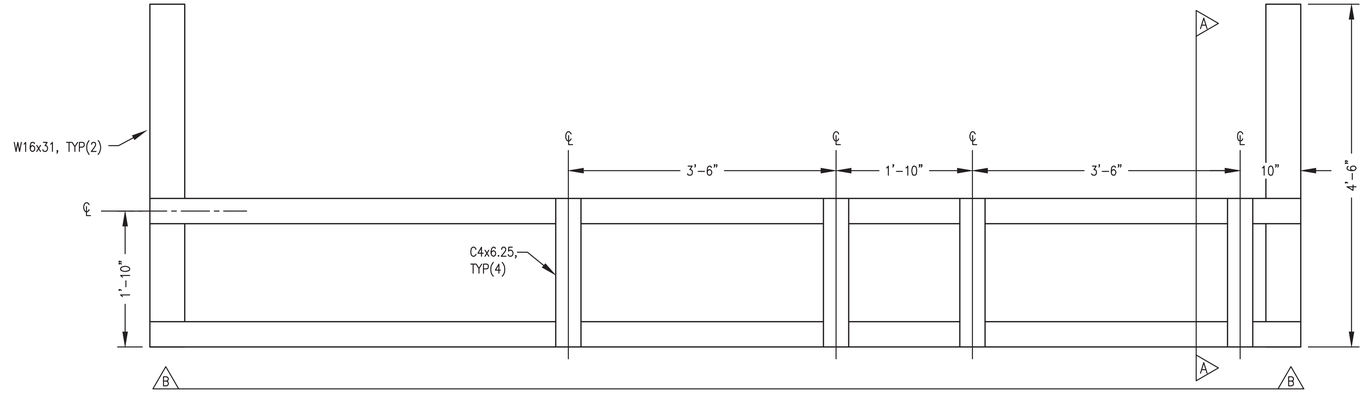
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

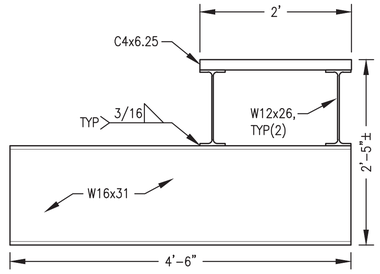
TITLE: MECHANICAL SUPPORT PLAN & SECTIONS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

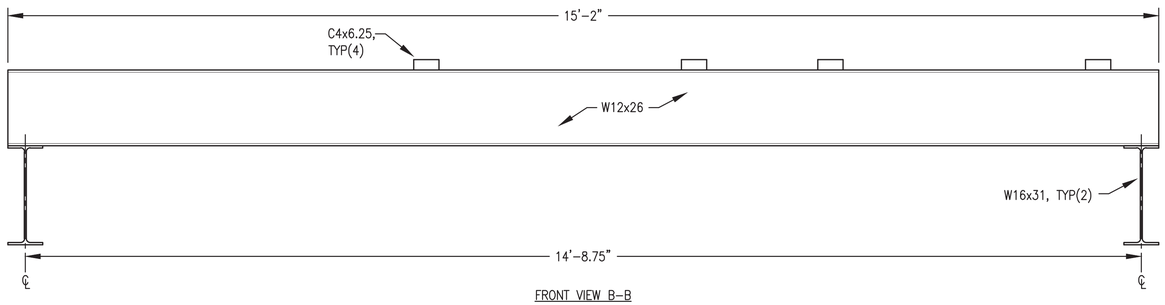
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M3.3
PROJECT NUMBER:	



PLAN VIEW



SECTION A–A



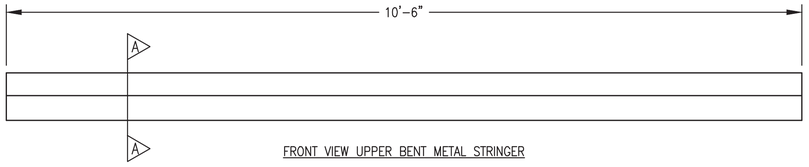
FRONT VIEW B–B

RADIATOR SUPPORT FABRICATION NOTES:

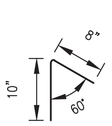
1) SHOP FABRICATE 1 EACH 15'–2" LONG RADIATOR SUPPORT FRAME AS INDICATED.
2) FABRICATE FROM ASTM A–36 STEEL SHAPES.
3) MAKE ALL JOINTS WITH CONTINUOUS GROOVE OR FILLET WELDS.
4) UPON COMPLETION OF WELDING ROUND CORNERS AND GRIND EDGES SMOOTH.
5) WIRE BRUSH OR SANDBLAST ALL FABRICATIONS AND FINISH WITH 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR EQUAL.

1 M3.4 RADIATOR SUPPORT FRAME FABRICATION

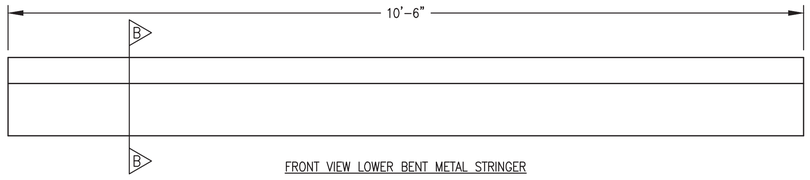
1"=1'–0"



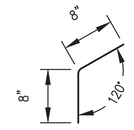
FRONT VIEW UPPER BENT METAL STRINGER



SECTION A–A



FRONT VIEW LOWER BENT METAL STRINGER



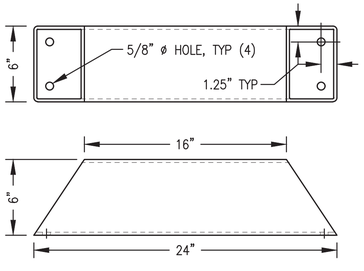
SECTION B–B

BENT METAL STRINGERS FABRICATION NOTES:

1) BEND 1 EACH 10–2" LONG UPPER BENT METAL STRINGER AND 1 EACH 10'–2" LONG LOWER BENT METAL STRINGER.
2) FABRICATE FROM 14GA PLATE.
3) ROUND CORNERS AND GRIND EDGES SMOOTH.
4) WIRE BRUSH OR SANDBLAST AND FINISH WITH 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR EQUAL.

2 M3.4 BENT METAL STINGERS FABRICATION

1"=1'–0"



GENERATOR SUPPORT PEDESTAL FABRICATION NOTES:

1) SHOP FABRICATE 8 EACH GENERATOR SUPPORT PEDESTALS AS SHOWN IN DETAIL 3/M3.4.
2) FABRICATE FROM ASTM–500 TS 6x6x1/4.
3) SHOP DRILL BOTTOM OF PEDESTAL AS INDICATED. FIELD DRILL TOP OF PEDESTAL TO MATCH VIBRATION ISOLATOR BASE.
4) ROUND CORNERS AND GRIND EDGES SMOOTH, WIRE BRUSH OR SANDBLAST, AND FINISH WITH TWO COATS OF EPOXY, SHERWIN WILLIAMS MACROPOXY 646 OR EQUAL, COLOR STRUCTURAL GRAY 4031.

3 M3.4 GENERATOR SUPPORT PEDESTAL FABRICATION

NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

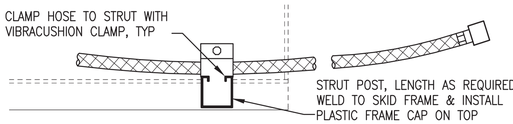
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

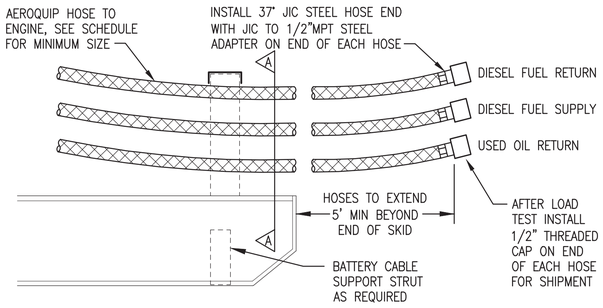
TITLE: MECHANICAL SUPPORT FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

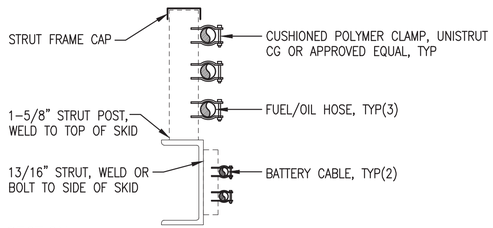
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M3.4
PROJECT NUMBER:	



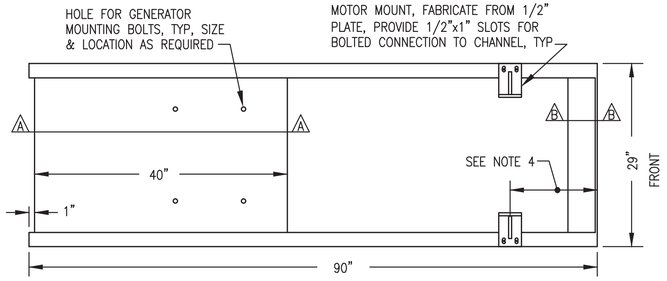
GENSET FRONT RIGHT SKID PLAN VIEW



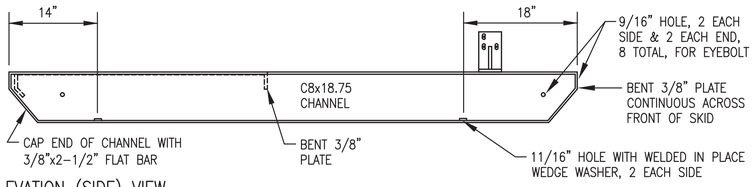
GENSET FRONT RIGHT SKID ELEVATION



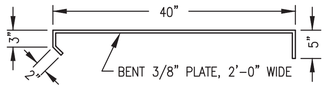
SKID SECTION A–A



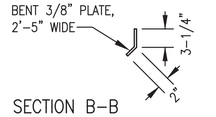
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



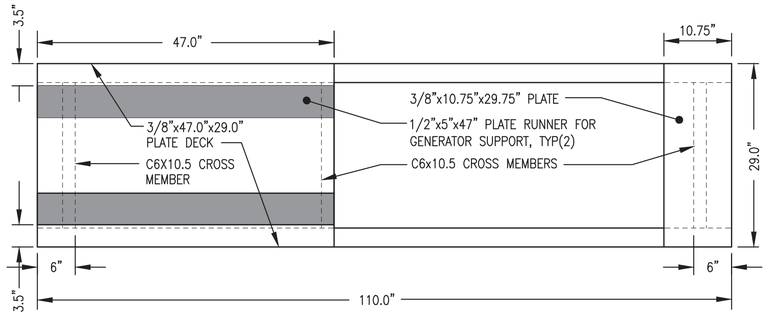
SECTION A–A



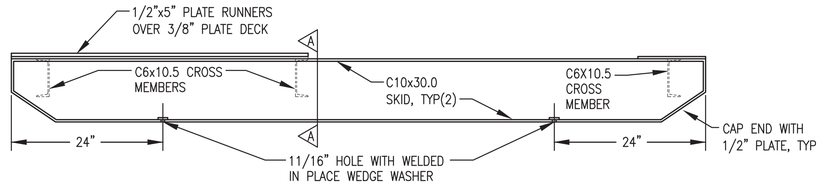
SECTION B–B

NOTES:

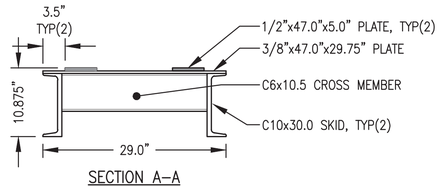
1) FABRICATE FROM ASTM A–36 STEEL. BEND PLATES & CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL–PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE–GENERATOR.
4) PLACE UNITS ON SKIDS SO THAT THE CENTERLINES OF THE EXHAUST RISERS ARE 50" FROM THE FRONT OF THE SKIDS.



PLAN VIEW



ELEVATION VIEW



SECTION A–A

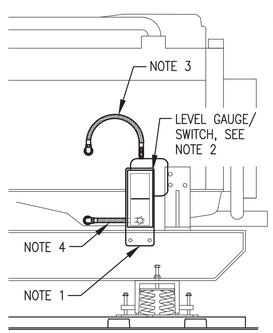
NOTES:

1) FABRICATE FROM ASTM A–36 STEEL. CUT ENDS OF CHANNELS AT 90° & 45° AS SHOWN.
2) EXCEPT WHERE INDICATED AS BOLTED MAKE ALL CONNECTIONS WITH CONTINUOUS WELDS (FILLET OR FULL–PENETRATION GROOVE AS REQUIRED) IN ACCORDANCE WITH CURRENT AWS STANDARD CODE.
3) ROUND ALL CORNERS & GRIND WELDS SMOOTH AFTER FABRICATION. PAINT TO MATCH ENGINE–GENERATOR.
4) PLACE UNIT ON SKID SO THAT THE CENTERLINE OF THE EXHAUST RISER IS 62" FROM THE FRONT OF THE SKID.

1 M3.5 FUEL & OIL HOSE TERMINATIONS
NO SCALE

2 M3.5 GEN#3 (JOHN DEERE 6090) SKID DESIGN
1"=1'–0"

3 M3.5 GEN#4 (JOHN DEERE 6135) SKID DESIGN
NO SCALE



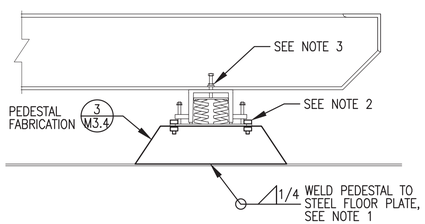
NOTES:

1. 1/4" STEEL SUPPORT PLATE PRE–DRILLED TO MATCH GAUGE/SWITCH MOUNTS AND BOTTOM HOSE ENTRANCE. BOLT TO INSIDE (BACK) OF CHANNEL SKID AT HEIGHT AS REQUIRED TO CENTER GAUGE AT NORMAL FULL OIL LEVEL.
2. MOUNT OIL LEVEL GAUGE/SWITCH TO STEEL SUPPORT PLATE WITH RUBBER SHOCK MOUNTS. LOCATE SO THAT THE OIL LEVEL IS APPROXIMATELY IN THE MIDDLE.
3. CONNECT TOP (VENT) PORT TO ENGINE CRANK CASE WITH #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS. ROUTE UPPER HOSE WITH HIGH POINT 4" MIN ABOVE TOP OF GAUGE.
4. CONNECT BOTTOM PORT TO ENGINE OIL PAN WITH #8 HOSE WITH 1/2" OR 3/8" NPT JIC SWIVEL ENDS. DO NOT TEE INTO OIL DRAIN LINE. ROUTE LOWER HOSE BACK THROUGH PRE–DRILLED HOLE IN STEEL PLATE.
5. DURING STARTUP AND COMMISSIONING ADJUST AND MARK THE OIL LEVEL SITE GAUGE AS FOLLOWS:
   A. WITH ENGINE OFF VERIFY OIL LEVEL IS FULL ON THE DIPSTICK. THIS IS THE STATIC FULL LEVEL. ADJUST THE HIGH LEVEL SWITCH TO 1/2" ABOVE THE STATIC FULL LEVEL.
   B. START THE ENGINE, PLACE ON LINE, AND RUN UNDER LOAD LONG ENOUGH FOR LEVEL TO STABILIZE. THIS IS THE RUNNING FULL LEVEL. MARK THE RUNNING FULL LEVEL WITH A GREEN PAINT PEN.
   C. ADJUST THE LOW LEVEL SWITCH TO 1/2" BELOW THE RUNNING FULL LEVEL.

4 M3.5 TYPICAL OIL LEVEL GAUGE/SWITCH INSTALLATION
NO SCALE

NOTES:

1) LOCATE GENERATOR TO ALIGN WITH EXHAUST ABOVE PRIOR TO WELDING PEDESTALS TO FLOOR PLATE. SEE SHEET M6.1.
2) FIELD DRILL TOP TO MATCH VIBRATION ISOLATOR BASE & FASTEN WITH 2 EA. 1/2" BOLTS WITH LOCK WASHERS.
3) ADJUST SPRING VIBRATION ISOLATOR LEVELING BOLTS TO ACHIEVE A UNIFORM INSTALLATION HEIGHT OF APPROXIMATELY 5–3/4" THEN TIGHTEN LOCKING NUTS. ADJUST NUTS ON STABILIZER BOLTS TO ACHIEVE A UNIFORM CLEARANCE OF APPROXIMATELY 1/8" THEN TIGHTEN LOCKING NUTS. VERIFY UNIT MOVES FREELY ON ISOLATORS.



5 M3.5 GENSET SUPPORT PEDESTAL & ISOLATOR INSTALLATION
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

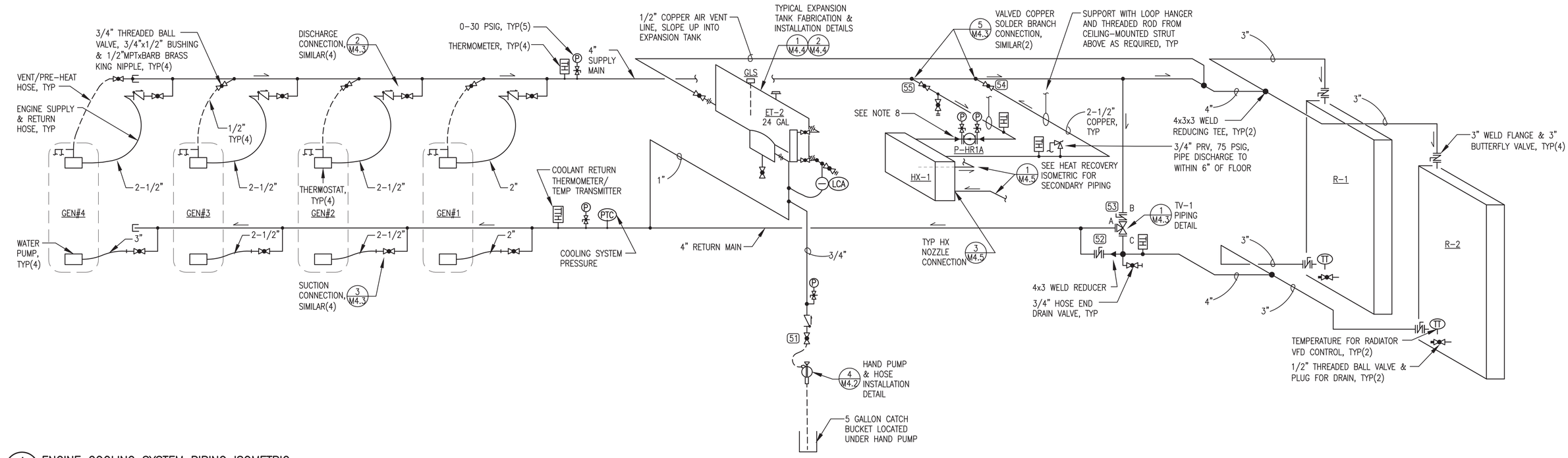
TITLE: GENSET FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

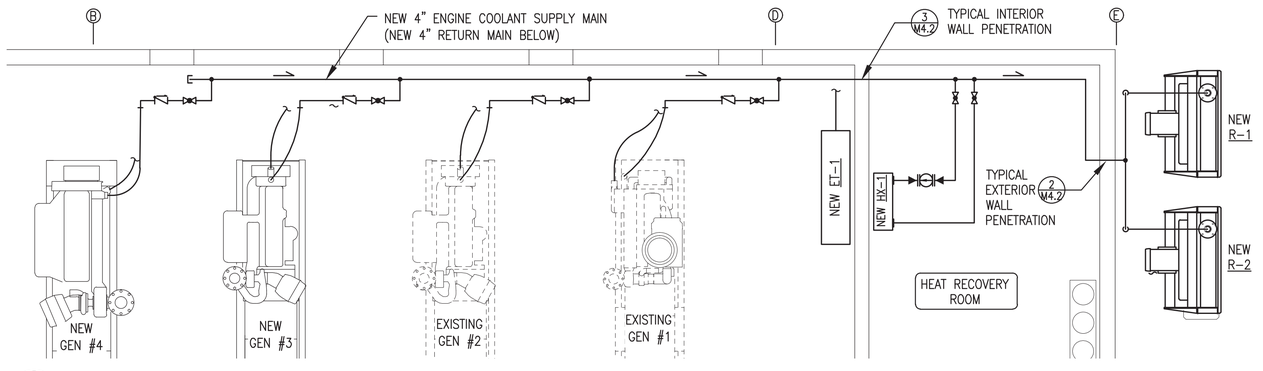
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M3.5
PROJECT NUMBER:	

COOLING SYSTEM ISOMETRIC NOTES:

1. ALL PIPING SHOWN THIS ISOMETRIC 4" SCH 40 STEEL WITH WELDED JOINTS UNLESS SPECIFICALLY INDICATED OTHERWISE. ALL ENGINE BRANCH CONNECTIONS SCH 40 STEEL WITH WELDED AND THREADED JOINTS. ALL OTHER PIPE SHOWN THIS ISOMETRIC TYPE "L" HARD DRAWN COPPER WITH SOLDER JOINTS UNLESS SPECIFICALLY INDICATED OTHERWISE.
2. SEE SHEET M4.3 FOR COOLANT MANIFOLD FABRICATION DETAILS AND BRANCH PIPING/INSTRUMENTATION CONNECTIONS.
3. ALL COOLANT PRESSURE GAUGES 0–30 PSIG.
4. SEE INSTRUMENTATION SCHEDULE FOR TEMPERATURE TRANSMITTERS AND OTHER INSTRUMENTATION.
5. UPON COMPLETION OF FABRICATION VALVE OFF CABINET UNIT HEATER AND FLUSH PIPING TO REMOVE ALL DEBRIS, SEE SPECIFICATIONS.
6. INSULATE COOLANT PIPING MAINS FROM GENERATOR VALVES TO BUTTERFLY VALVES AT EXTERIOR WALL PENETRATIONS AND INSULATE HEAT RECOVERY PIPING. ALL OTHER PIPING NOT INSULATED.
7. 3/4" THREADED BALL VALVE, 3/4"MPTx1/2" BARB BRASS KING NIPPLE, & 1/2" HOSE FOR ENGINE VENT & PRE-HEAT.
8. CONNECT TO P-HR1A WITH 2-1/2"x2" CxC REDUCER, 2" MPTxC ADAPTER, & 2" NPT FLANGE. SET TO OPERATE ON FIXED SPEED 2.



1 M4.1 ENGINE COOLING SYSTEM PIPING ISOMETRIC
NO SCALE



2 M4.1 ENGINE COOLANT SYSTEM PIPING PLAN
3/8"=1'-0"

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

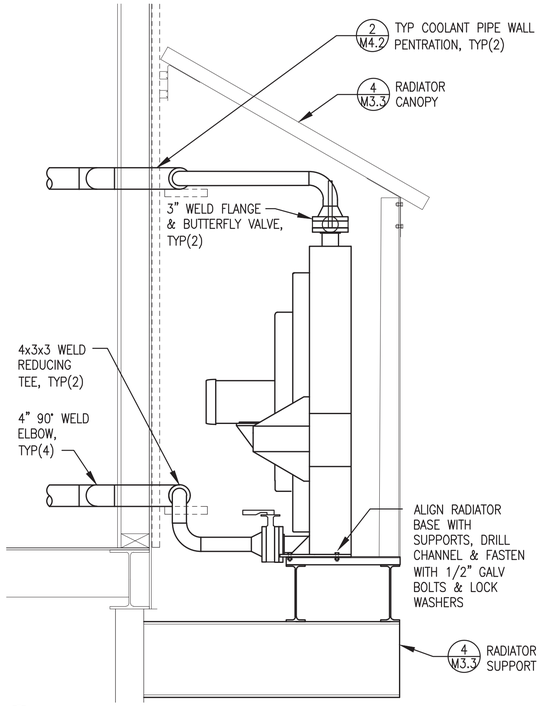
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ENGINE COOLANT SYSTEM PIPING PLAN & ISOMETRIC

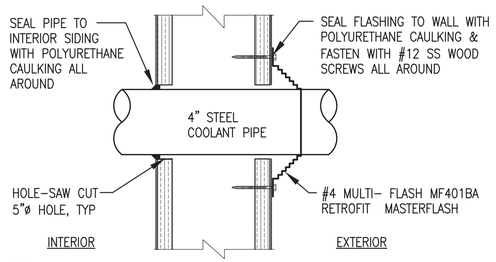
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M4.1
PROJECT NUMBER:	



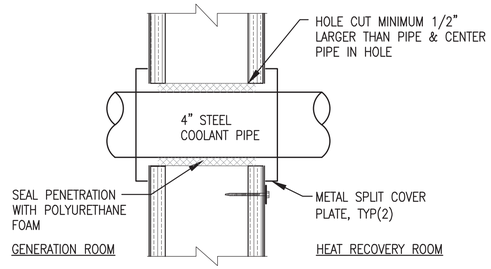
1 M4.2 TYPICAL RADIATOR & PIPING INSTALLATION

3/4"=1'-0"



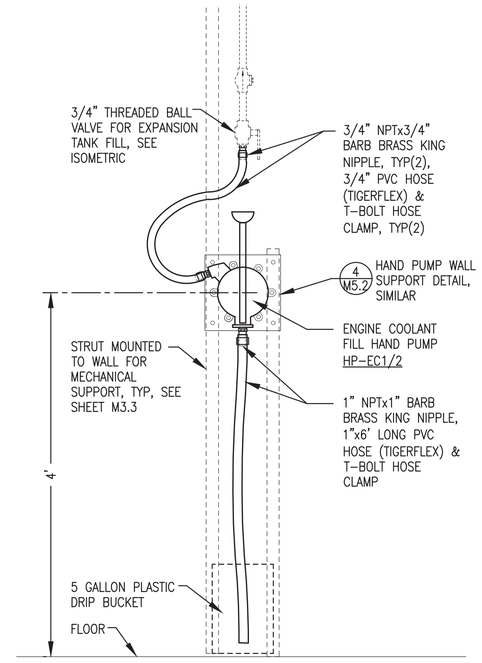
2 M4.2 COOLANT PIPE EXTERIOR WALL PENETRATION

NO SCALE



3 M4.2 COOLANT PIPE INTERIOR WALL PENETRATION

NO SCALE



4 M4.2 GLYCOL HAND PUMP HP-EC INSTALLATION

NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA
49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

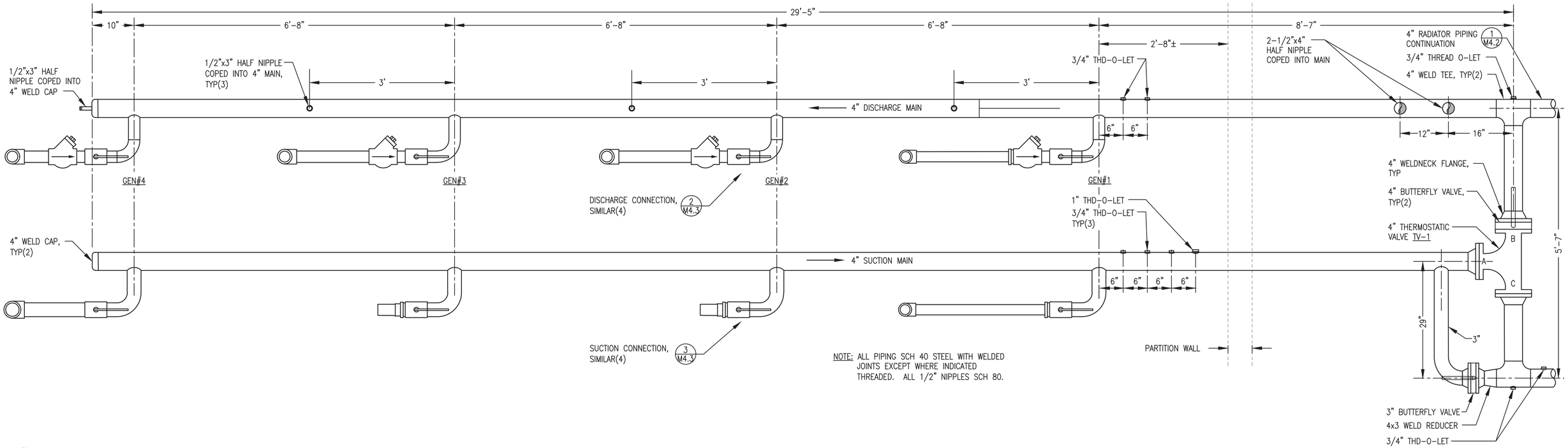
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ENGINE COOLANT SYSTEM PIPING DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

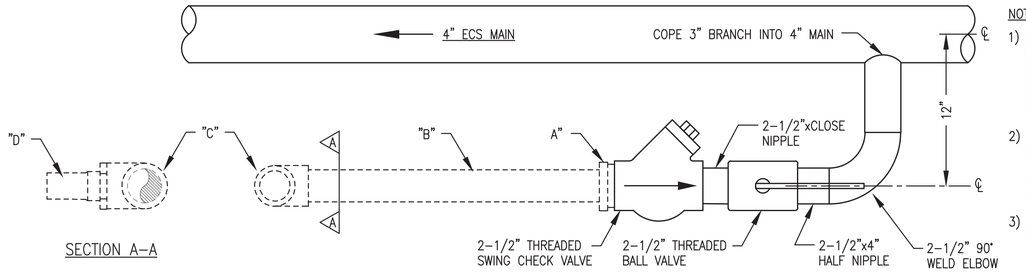
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M4.2
PROJECT NUMBER:	



NOTE: ALL PIPING SCH 40 STEEL WITH WELDED JOINTS EXCEPT WHERE INDICATED THREADED. ALL 1/2" NIPPLES SCH 80.

1 M4.3 ENGINE COOLANT MANIFOLD FABRICATION DETAIL

1"=1'-0"

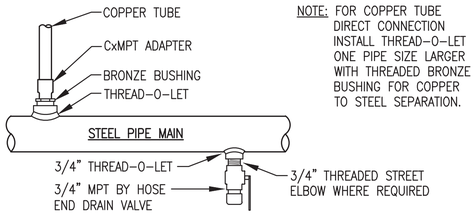


NOTES:
1) SEE TABLE THIS DETAIL FOR FITTINGS & DIMENSIONS SPECIFIC TO EACH GENERATOR SUCTION CONNECTION.
2) MAIN PIPING 4" STEEL WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
3) ALL PIPING SCHEDULE 40 STEEL.

LOCATION	"A"	B"	"C"	"D"
GEN#1	2-1/2"x2" HEX BUSHING	2"x26" THREADED NIPPLE	2" THREADED ELBOW	2" MPTxBARB BRASS KING NIPPLE
GEN#2	NO BUSHING	2-1/2"x20" THREADED NIPPLE	2-1/2" THREADED ELBOW	2-1/2" MPTxBARB BRASS KING NIPPLE
GEN#3	NO BUSHING	2-1/2"x20" THREADED NIPPLE	2-1/2" THREADED ELBOW	2-1/2" MPTxBARB BRASS KING NIPPLE
GEN#4	NO BUSHING	2-1/2"x8" THREADED NIPPLE	2-1/2" THREADED ELBOW	2-1/2" MPTxBARB BRASS KING NIPPLE

2 M4.3 TYPICAL DISCHARGE CONNECTION

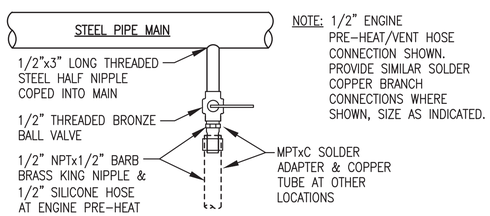
NO SCALE



NOTE: FOR COPPER TUBE DIRECT CONNECTION INSTALL THREAD-O-LET ONE PIPE SIZE LARGER WITH THREADED BRONZE BUSHING FOR COPPER TO STEEL SEPARATION.

4 M4.3 TYP DIRECT CONNECTION TO STEEL MAIN

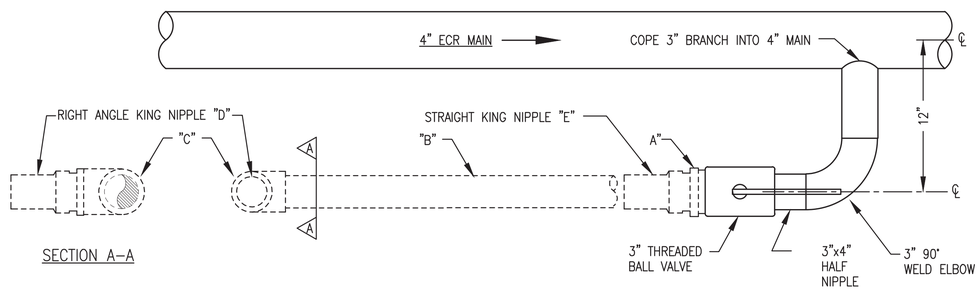
NO SCALE



NOTE: 1/2" ENGINE PRE-HEAT/VENT HOSE CONNECTION SHOWN. PROVIDE SIMILAR SOLDER COPPER BRANCH CONNECTIONS WHERE SHOWN, SIZE AS INDICATED.

5 M4.2 TYP VALVED BRANCH CONNECTION TO STEEL MAIN

NO SCALE



NOTES:
1) SEE TABLE THIS DETAIL FOR FITTINGS & DIMENSIONS SPECIFIC TO EACH GENERATOR SUCTION CONNECTION.
2) MAIN PIPING 4" STEEL WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
3) ALL PIPING SCHEDULE 40 STEEL.

LOCATION	"A"	B"	"C"	"D"	"E"
GEN#1	3"x2" HEX BUSHING	2"x34" THREADED NIPPLE	2" THREADED ELBOW	2" MPTxBARB BRASS KING NIPPLE	NO STRAIGHT KING NIPPLE
GEN#2	3"x2-1/2" HEX BUSHING	NO THREADED NIPPLE	NO" THREADED ELBOW	NO RIGHT ANGLE KING NIPPLE	2-1/2" MPTxBARB BRASS KING NIPPLE
GEN#3	3"x2-1/2" HEX BUSHING	NO THREADED NIPPLE	NO THREADED ELBOW	NO RIGHT ANGLE KING NIPPLE	2-1/2" MPTxBARB BRASS KING NIPPLE
GEN#4	NO REDUCING BUSHING	3"x18" THREADED NIPPLE	3" THREADED ELBOW	3" MPTxBARB BRASS KING NIPPLE	NO STRAIGHT KING NIPPLE

3 M4.3 TYPICAL SUCTION CONNECTION

NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

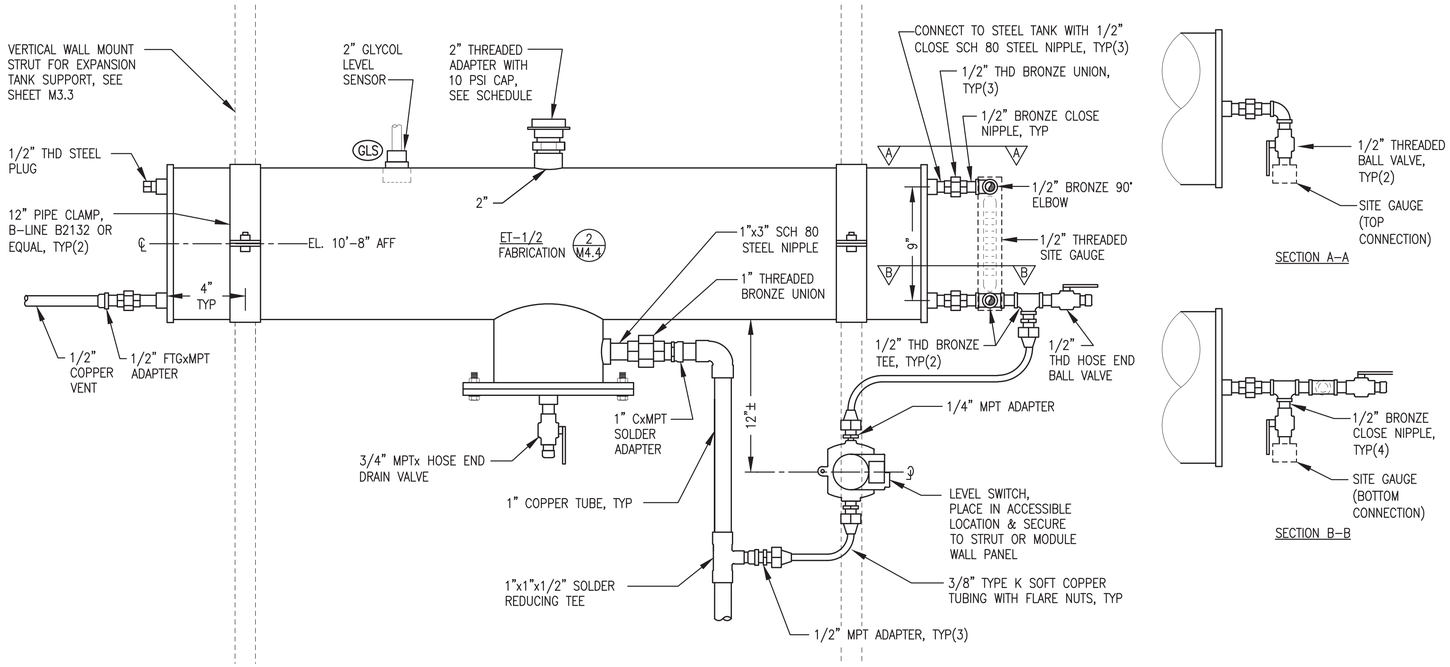
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ENGINE COOLANT SYSTEM FABRICATIONS & PIPING DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M4.3
PROJECT NUMBER:	

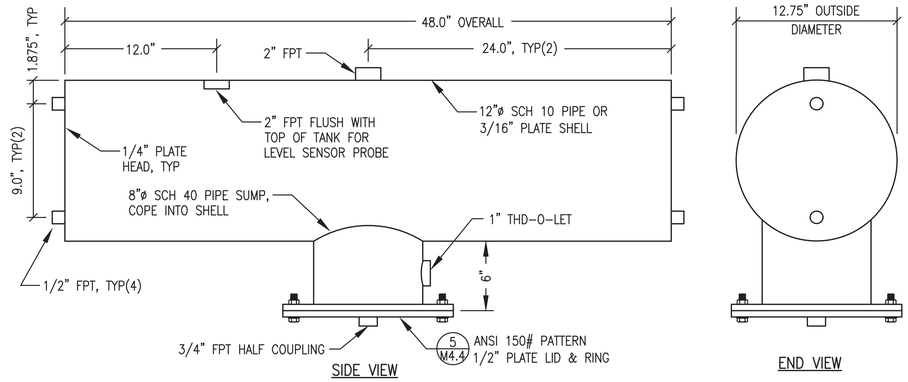


1 M4.4 24 GAL EXPANSION TANK ET-1 INSTALLATION

NO SCALE

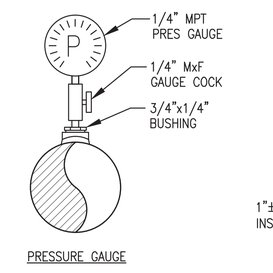
EXPANSION TANK GENERAL NOTES:

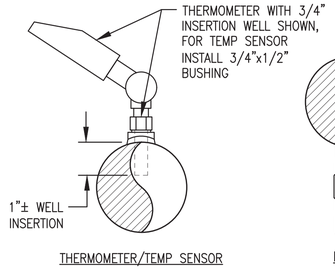
1) FABRICATE SINGLE WALL 24 GALLON NOMINAL CAPACITY GLYCOL EXPANSION TANK.
2) FABRICATE SHELL FROM MINIMUM 3/16" ASTM A-36 PLATE STEEL ROLLED AND WELDED OR 12"ø SCHEDULE 10 LIGHTWALL ASTM A53 STEEL PIPE. FABRICATE HEADS FROM 1/4" THICK ASTM A-36 PLATE STEEL. FABRICATE SUMP FROM 8"ø SCHEDULE 40 ASTM A53 STEEL PIPE. FABRICATE SUMP PLATE LID FROM 1/2" THICK ASTM A-36 PLATE STEEL. MAKE ALL JOINTS WITH CONTINUOUS FULL-PENETRATION WELDS.
3) PROVIDE WITH ALL OPENINGS INDICATED USING MINIMUM 3000# FORGED STEEL PIPE HALF COUPLINGS IN ACCORDANCE WITH U.L 142 FIGURE 7.1 #2.
4) PRESSURE TEST COMPLETED ASSEMBLY TO 15 PSIG MINIMUM.
5) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PAINT WITH TWO COATS EPOXY, SHERWIN WILLIAMS MACROPOXY 646, COLOR STRUCTURAL GRAY 4031
6) UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS, AIR DRY INTERIOR, AND SEAL ALL TANK OPENINGS WITH PLASTIC PLUGS.

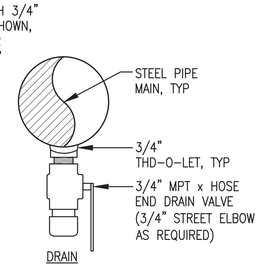


2 M4.4 EXPANSION TANK ET-1 FABRICATION

NO SCALE

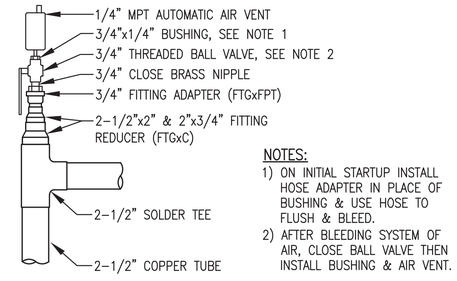






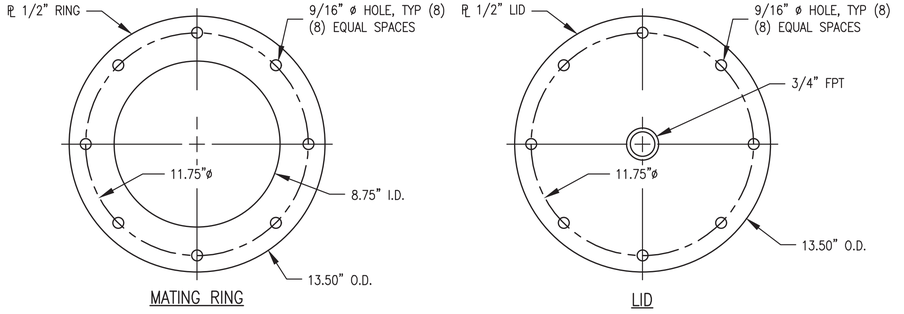
3 M4.4 TYP INSTRUMENT/DRAIN INSTALLATION IN STEEL PIPE

NO SCALE



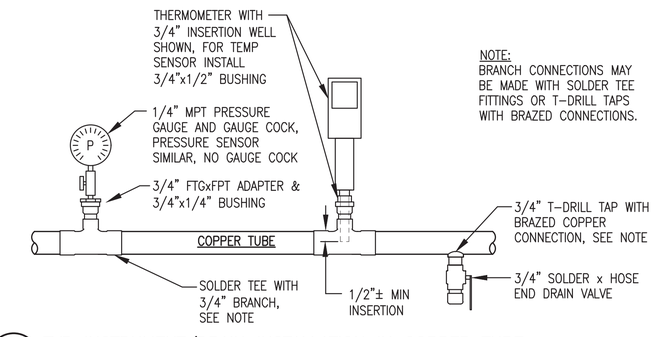
4 M4.4 TYPICAL AIR VENT INSTALLATION IN COPPER

NO SCALE



5 M4.4 LID & MATING RING - PLAN VIEW

NO SCALE



6 M4.4 TYP INSTRUMENT/DRAIN INSTALLATION IN COPPER TUBE

NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

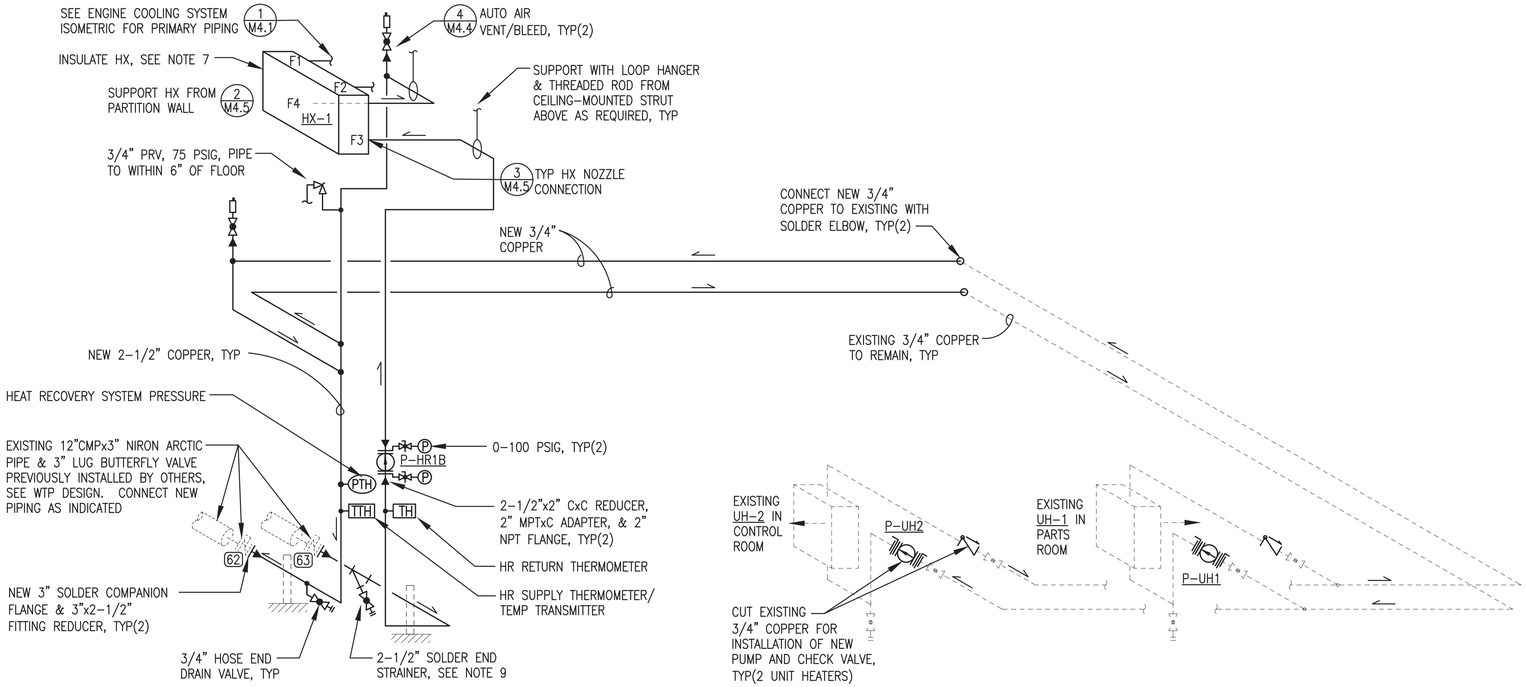
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ENGINE COOLANT SYSTEM FABRICATIONS & PIPING DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M4.4
PROJECT NUMBER:	

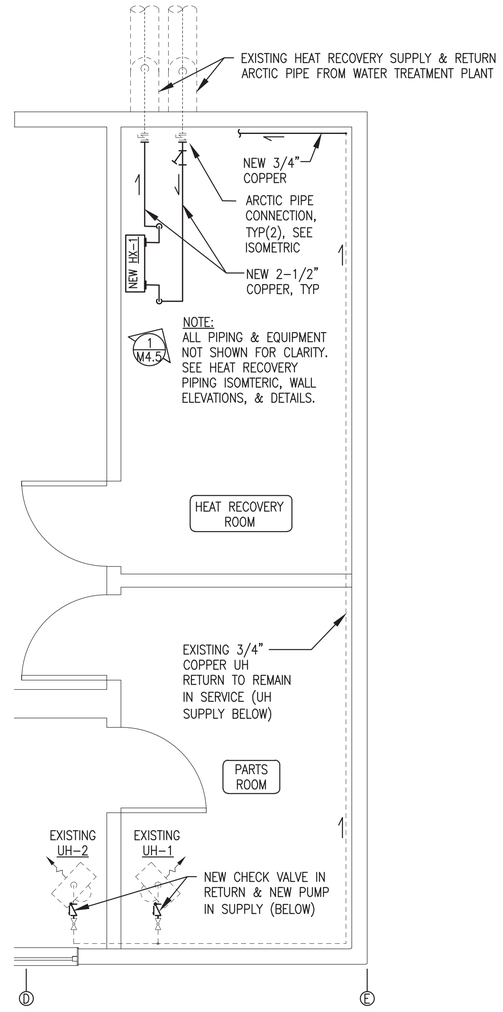


1 M4.5 HEAT RECOVERY AND PLANT HEATING SYSTEM PIPING ISOMETRIC

NO SCALE

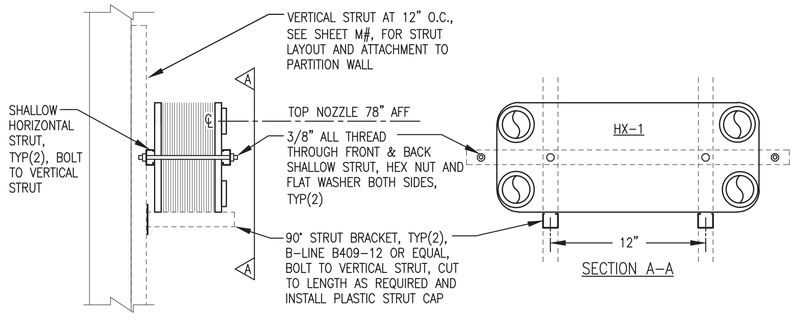
HEAT RECOVERY ISOMETRIC NOTES:

1) NEW PIPING SHOWN WITH DARK-SOLID LINES. EXISTING PIPING TO BE REUSED SHOWN WITH LIGHT-DASHED LINES.
2) ALL NEW PIPING SHOWN THIS ISOMETRIC TYPE "L" COPPER WITH SOLDER JOINTS, 2-1/2"ø EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. ALL FLANGES ANSI 150# PATTERN TWO-PIECE WITH POWDER COATED STEEL FLANGE AND SOLDER COPPER TUBE ADAPTER. FOR ALL JOINTS EXCEPT BUTTERFLY VALVES INSTALL SPIRAL WOUND METALLIC GASKETS AND COAT GASKETS WITH ANTI-SEIZE COMPOUND PRIOR TO ASSEMBLING.
3) MAKE ALL CONNECTIONS FOR INSTRUMENTATION WITH T-DRILL TAP OR REDUCING TEE AS SHOWN ON DETAIL 6/M4.4.
4) ALL HEAT RECOVERY PRESSURE GAUGES 0-100 PSIG.
5) SEE INSTRUMENTATION SCHEDULE FOR TEMPERATURE AND PRESSURE TRANSMITTERS.
6) UPON COMPLETION OF FABRICATION FLUSH PIPING TO REMOVE ALL DEBRIS, SEE SPECIFICATIONS.
7) INSULATE ALL HEAT RECOVERY PIPING MAINS. WRAP HEAT EXCHANGER WITH 1" RIGID FOIL-BACK FIBERGLASS INSULATION ALL AROUND AND TAPE ALL SEAMS.
8) SET P-HR1B TO OPERATE IN CONSTANT PRESSURE MODE CP=30'. SET P-UH1 AND P-UH2 ON FIXED SPEED 1.
9) PRIOR TO INSTALLING SOLDER STRAINER IN PIPING, REMOVE THE THREADED SCREEN ACCESS PLUG, COAT THE PLUG THREADS WITH ANTI-SEIZE, AND REINSTALL PLUG IN STRAINER. INSTALL HOSE END DRAIN VALVE.



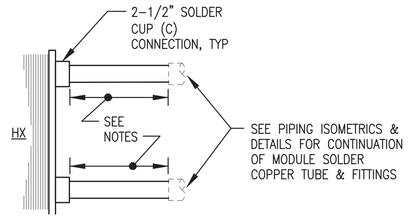
3 M4.5 HEAT RECOVERY SYSTEM PIPING PLAN

3/8"=1'-0"



2 M4.5 HEAT EXCHANGER HX-1 SUPPORT FROM WALL

NO SCALE



3 M4.5 TYPICAL HX PIPING CONNECTION

NO SCALE

NOTES:
1) PRIOR TO SHIPPING THE HEAT EXCHANGER TO THE JOB SITE, SHOP BRAZE 12" LONG STRAIGHT COPPER TUBE SECTIONS INTO ALL 4 HEAT EXCHANGER SOLDER CUP NOZZLES UNDER CONTROLLED SHOP CONDITIONS WITH CRAFTSMAN THAT IS HIGHLY EXPERIENCED WITH STAINLESS/COPPER BRAZE CONNECTIONS. USE ONLY SILVER ALLOY BRAZE ROD SPECIFICALLY FORMULATED FOR STAINLESS STEEL TO COPPER CONNECTIONS. INSTALL TEMPORARY CAPS & TAP AS REQUIRED TO SHOP PRESSURE TEST THE ASSEMBLY PRIOR TO INSTALLATION.
2) DURING INSTALLATION MAINTAIN A MINIMUM 9" LONG STRAIGHT COPPER TUBE SECTION BETWEEN ALL HEAT EXCHANGER NOZZLES AND FIRST SOLDER FITTING TO ALLOW FUTURE INSTALLATION OF NON-DIMPLED REPAIR COUPLING FOR HEAT EXCHANGER TEMPORARY REMOVAL AND/OR REPLACEMENT.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

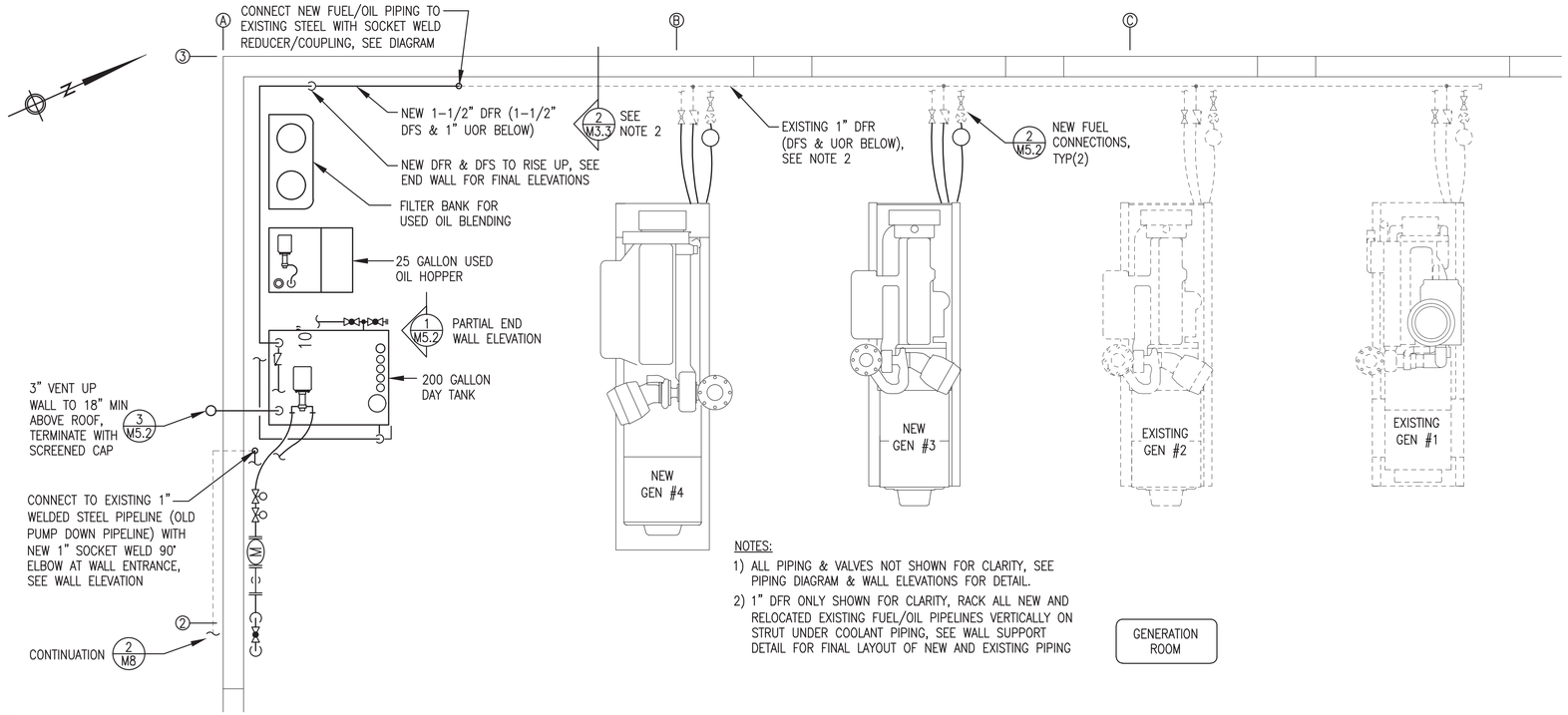
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

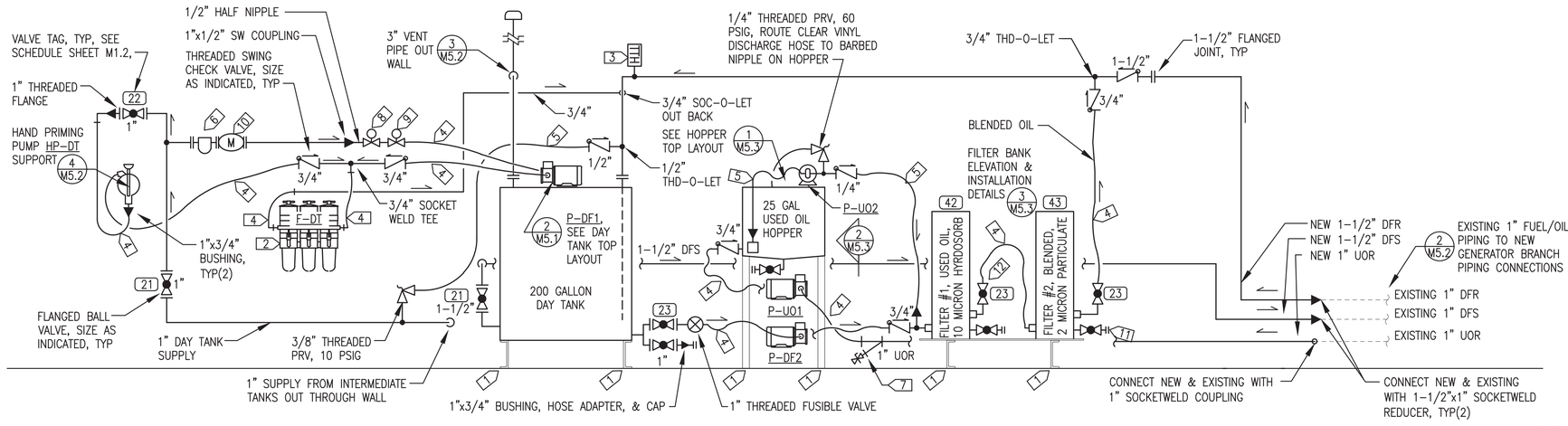
TITLE: HEAT RECOVERY PIPING PLAN, ISOMETRIC, & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M4.5
PROJECT NUMBER:	



1 M5.1 FUEL/OIL SYSTEM MODIFICATION PLAN
3/8"=1'-0"



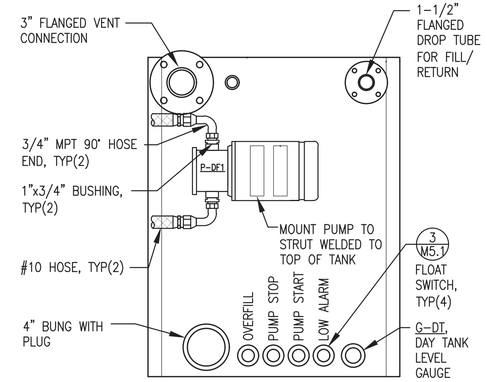
PIPING DIAGRAM SPECIFIC NOTES:

1. FASTEN DEVICE TO FLOOR WITH MIN 1"x3/16" FILLET WELD ALL 4 CORNERS, WIRE BRUSH AND RE-PAINT WELD AREA TO MATCH EXISTING.
2. 3/4" THREADED TRIPLE FILTER BANK F-DT.
3. THERMOMETER/TEMP TRANSMITTER, INSTALL WELL IN 3/4" THREAD-O-LET.
4. #10 HOSE WITH 1/2" OR 3/4" NPT ENDS TO MATCH EQUIPMENT.
5. #6 HOSE WITH 1/8", 1/4", OR 3/8" NPT ENDS.
6. 1" FLANGED BASKET STRAINER IN 1" DAY TANK SUPPLY WITH GAUGE COCK BLOW DOWN.
7. 1" THREADED "Y" STRAINER IN 1" UOR WITH BALL VALVE BLOW DOWN.
8. 1/2" NO SOLENOID VALVE.
9. 1/2" NC SOLENOID VALVE.
10. METER M-DT EQUIPPED WITH 1" ANSI 150# FLANGED ENDS.
11. 3/4" THREADED BALL VALVE WITH HOSE ADAPTER & CAP, TYP(3).
12. 3/4" THREADED BALL VALVE, TYP(2).

PIPING DIAGRAM GENERAL NOTES:

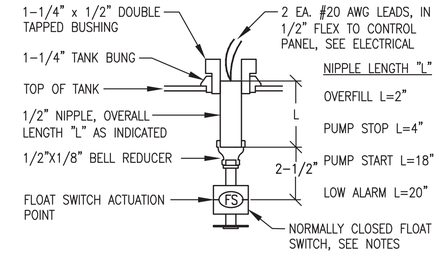
1) FABRICATE DAY TANK, FILTER BANK, & HOPPER IN ACCORDANCE WITH FABRICATION DETAILS.
2) ALL DFS, DFR & UOR PIPING SCH 80. ALL UOR 1". ALL DFS & DFR 1-1/2" EXCEPT WHERE INDICATED AS 3/4". ALL VENT PIPING 3" SCH 40.
3) ALL DFS, DFR & UOR PIPING JOINTS SOCKET OR BUTT WELD EXCEPT FOR THREADED CONNECTIONS TO EQUIPMENT & VALVES. ALL VENT PIPING JOINTS THREADED.
4) ON ALL HOSES FIELD INSTALL JICxNPT SWIVEL ENDS, SIZE REQUIRED TO MATCH PIPING, PUMPS, OR EQUIPMENT.

4 M5.1 DIESEL FUEL & USED OIL PIPING DIAGRAM
NO SCALE



2 M5.1 TOP OF DAY TANK – PLAN VIEW
NO SCALE

NOTES:
1) FLOAT SWITCH SPECIFIED ON INSTRUMENTATION SCHEDULE SHEET M1.1.
2) PRIOR TO INSTALLATION IN TANK, VERIFY THAT ALL DAY TANK FLOAT SWITCHES ARE ORIENTED N.C. (OPEN ON RISE). VERIFY THAT USED OIL HOPPER FLOAT SWITCH IS ORIENTED N.O. (CLOSE ON RISE).
3) IF THREADS ON FLOAT SWITCH HAVE EXCESS EPOXY, CHASE WITH 1/8" PIPE DIE BEING CAREFUL TO AVOID DAMAGING WIRES.



3 M5.1 DAY TANK FLOAT SWITCH INSTALLATION
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

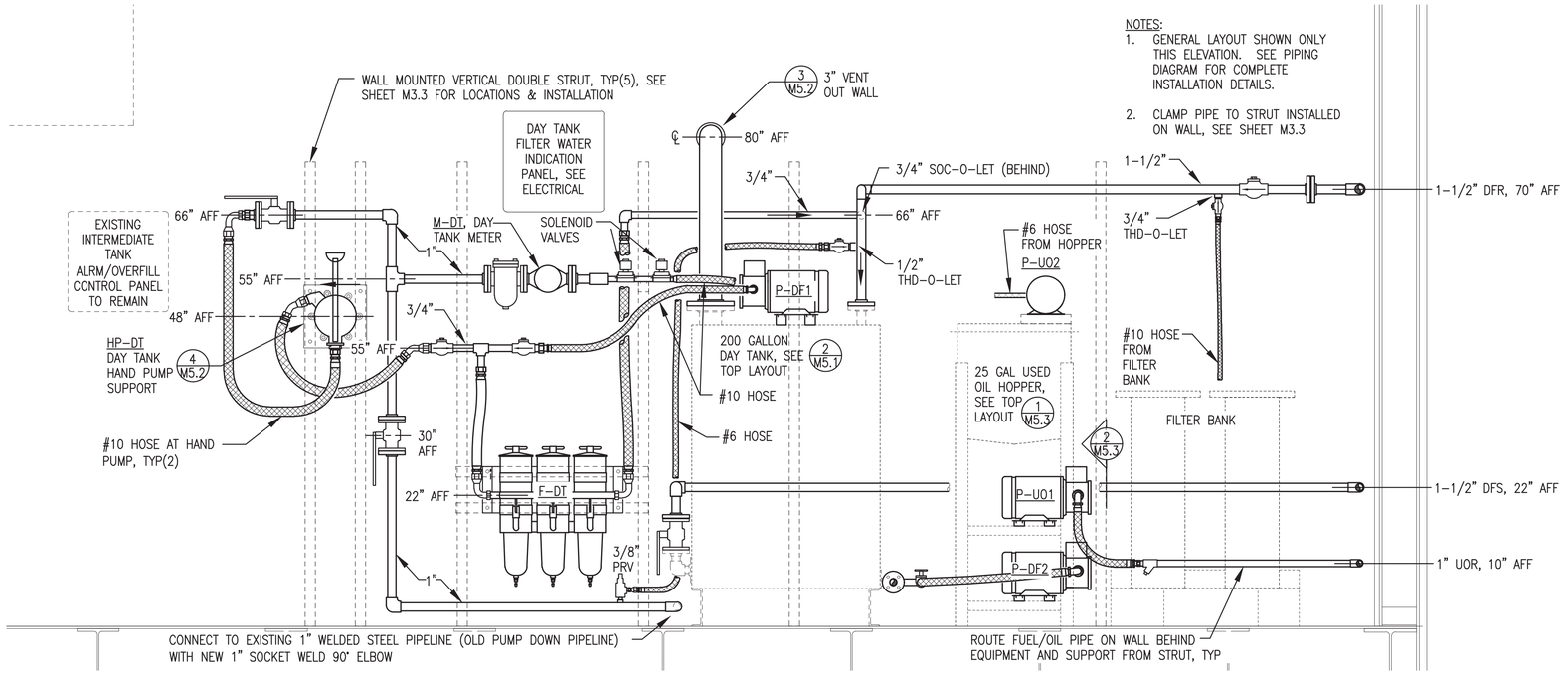
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: FUEL/OIL SYSTEM MODIFICATION PLAN & PIPING DIAGRAM

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.1
PROJECT NUMBER:	



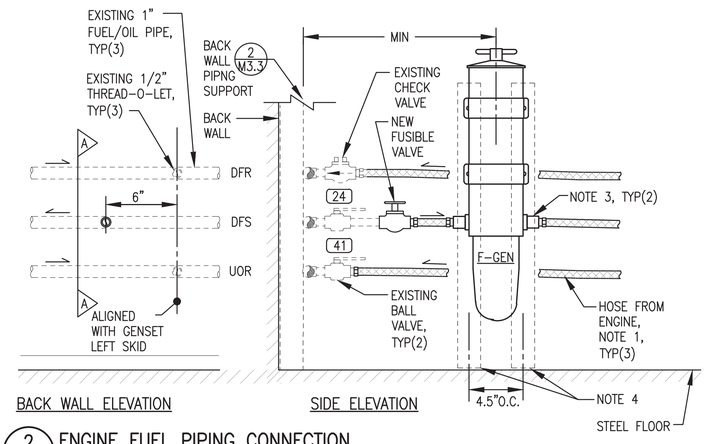
1 M5.2 DIESEL FUEL & USED OIL END WALL ELEVATION
1"=1'

NOTES:
1) HOSES PROVIDED WITH ENGINE, SIZE VARIES PER ENGINE & PRODUCT. CUT TO LENGTH & INSTALL JIC SWIVELS & 1/2" MPT ADAPTERS.

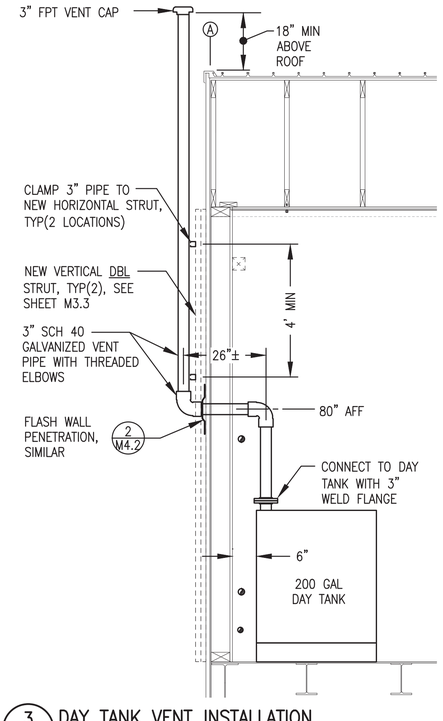
2) ALL PIPING & NIPPLES SCH 80. ALL VALVES 1/2" SIZE, THREADED BODY.

3) VERIFY PORTS TO USE FOR FLOW IN DIRECTION SHOWN. INSTALL RACOR FURNISHED 3/4" FPT ADAPTERS IN THESE PORTS & RACOR FURNISHED PLUGS IN UNUSED PORTS. CONNECT TO FILTER WITH JIC TO 3/4" MPT HOSE ENDS.

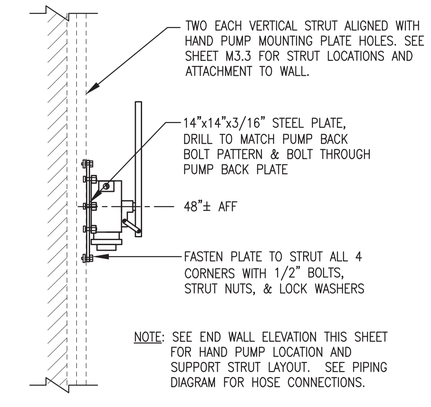
4) WELD STRUT TO FLOOR FOR FILTER SUPPORT AS INDICATED, WIRE BRUSH AND RE-PAINT WELD AREA TO MATCH EXISTING



2 M5.2 ENGINE FUEL PIPING CONNECTION
NO SCALE



3 M5.2 DAY TANK VENT INSTALLATION
1/2"=1'-0"



4 M5.2 DAY TANK HAND PUMP HP-DT WALL SUPPORT
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

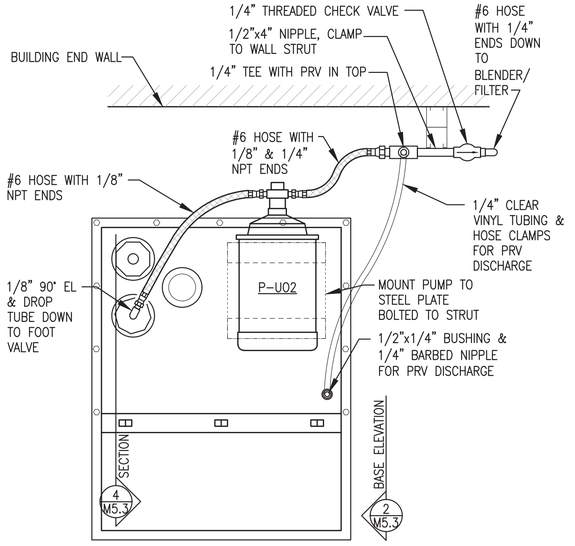
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

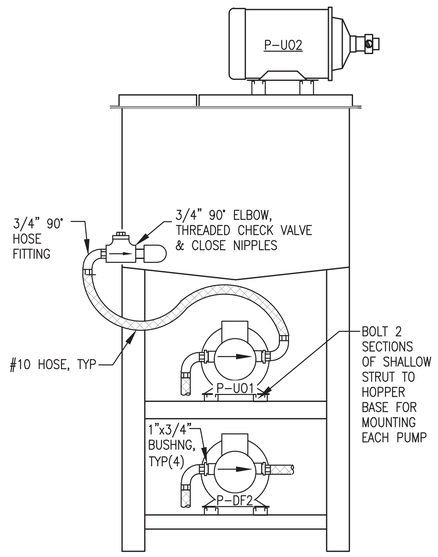
TITLE: DIESEL FUEL & USED OIL PIPING ELEVATIONS & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

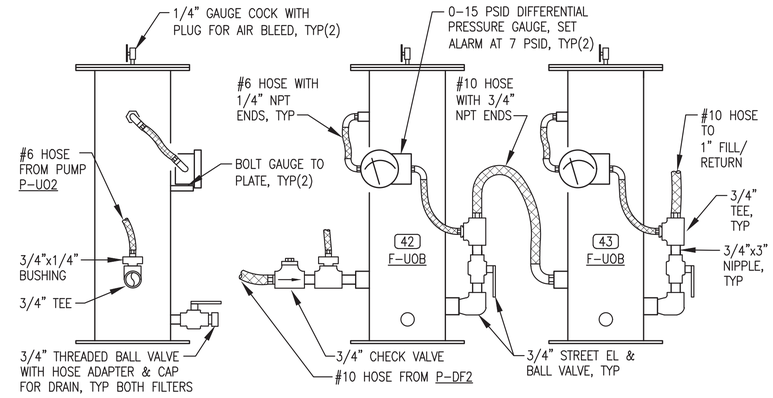
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.2
PROJECT NUMBER:	



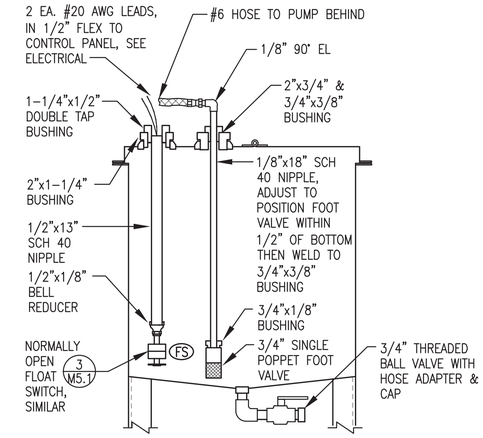
1 M5.3 TOP OF HOPPER – PLAN VIEW
NO SCALE



2 M5.3 HOPPER BASE ELEVATION
NO SCALE



3 M5.3 FILTER BANK ELEVATIONS
NO SCALE



4 M5.3 SECTION THROUGH HOPPER
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA
49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

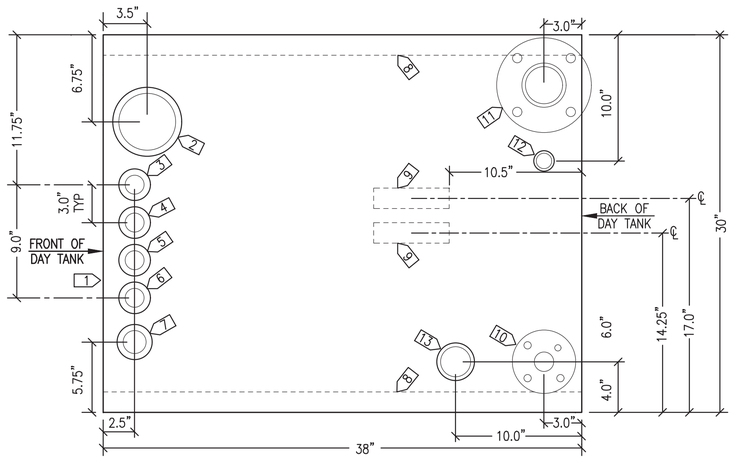
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

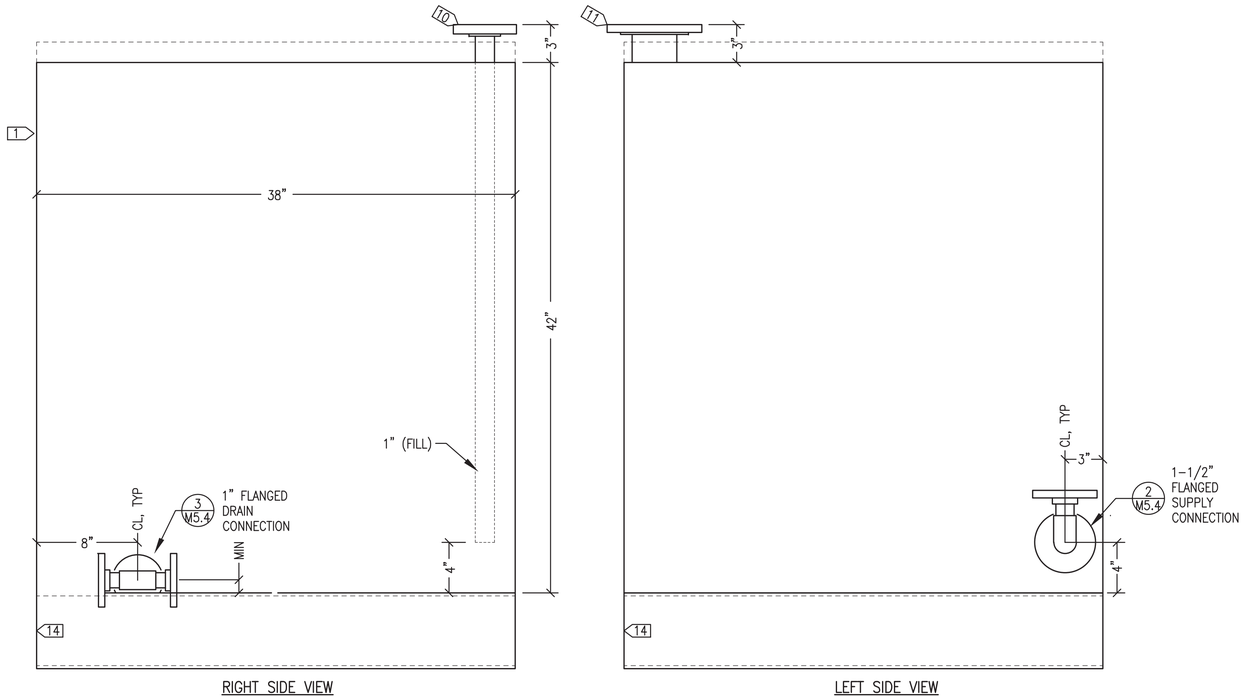
TITLE: USED OIL HOPPER & BLENDER INSTALLATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.3
PROJECT NUMBER:	



TOP VIEW



RIGHT SIDE VIEW

LEFT SIDE VIEW

1 M5.4 200 GALLON SINGLE WALL DAY TANK
1"=6"

DAY TANK SPECIFICATIONS:

1) FABRICATE SINGLE WALL 200 GALLON NOMINAL CAPACITY DAY TANK. FABRICATE IN ACCORDANCE WITH UL 142.

2) FABRICATE FROM ASTM A-36 STEEL PLATE, 10 GAUGE MINIMUM EXCEPT FOR TOP 3/16" MINIMUM. ALL TANK SEAM JOINTS TO BE FULL CONTINUOUS WELDS IN ACCORDANCE WITH UL 142 FIGURE 6.5 - #1, #6, #7, OR #8.

3) PROVIDE WITH ALL OPENINGS AND ATTACHMENTS INDICATED. ALL STRUT TO BE 1-5/8"x1-5/8"x12 GA SOLID BACK PLAIN (BLACK), B-LINE B22 PLN OR EQUAL. SEAL WELD ALL TANK ATTACHMENTS.

4) INSTALL ALL FPT OPENINGS IN ACCORDANCE WITH UL 142 FIGURE 7.1 - #4 UNLESS INDICATED OTHERWISE. ALL DROP TUBES SCH 40 ASTM A53 STEEL PIPE WITH MPT OR FLANGED END AS INDICATED.

5) PRESSURE TEST COMPLETED ASSEMBLY TO 5 PSIG MAXIMUM USING SOAPY WATER SOLUTION ON ALL WELD JOINTS.

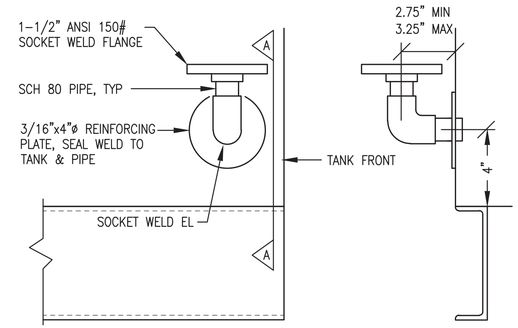
6) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PAINT WITH TWO COATS EPOXY, SHERWIN WILLIAMS MACROPOXY 646, COLOR STRUCTURAL GRAY 4031.

7) LABEL ALL OPENINGS WITH 1/4" BLACK LETTERS INDICATING FUNCTION AS LISTED IN PARENTHESES IN SPECIFIC NOTES.

8) UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS AND AIR DRY INTERIOR. SEAL ALL MPT OPENINGS WITH THREADED STEEL CAPS. SEAL FPT TANK OPENINGS WITH THREADED STEEL PIPE PLUGS WHERE INDICATED. INSTALL 1-1/4" VENT CAP WHERE INDICATED. SEAL ALL OTHER FPT OPENINGS WITH PLASTIC OR STEEL PLUGS.

DAY TANK SPECIFIC NOTES:

1. PROVIDE 2" HIGH LETTERING: "DIESEL FUEL 200 GALLONS"
2. 4" FPT (MANUAL FILL) - INSTALL THREADED STEEL PLUG
3. 1-1/4" FPT (OVERFILL) - INSTALL VENT CAP FOR SHIPPING
4. 1-1/4" FPT (PUMP STOP)
5. 1-1/4" FPT (PUMP START)
6. 1-1/4" FPT (LOW ALARM)
7. 1-1/2" FPT (TANK GAUGE)
8. 38"L STRUT, ENDS FLUSH WITH TANK
9. 6"L STRUT
10. 1-1/2" SCH 40 DROP TUBE (FILL) WITH 1" 150# FLANGE
11. 3" 150# FLANGED VENT CONNECTION
12. 1" FPT (SPARE) - INSTALL THREADED STEEL PLUG
13. 2" FPT (SPARE) - INSTALL THREADED STEEL PLUG
14. C6x8.2, 38" LONG



LEFT SIDE ELEVATION

SECTION A-A

2 M5.4 1-1/2" FLANGED SUPPLY CONNECTION
NO SCALE

RIGHT SIDE ELEVATION

SECTION A-A

3 M5.4 1" FLANGED DRAIN CONNECTION
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

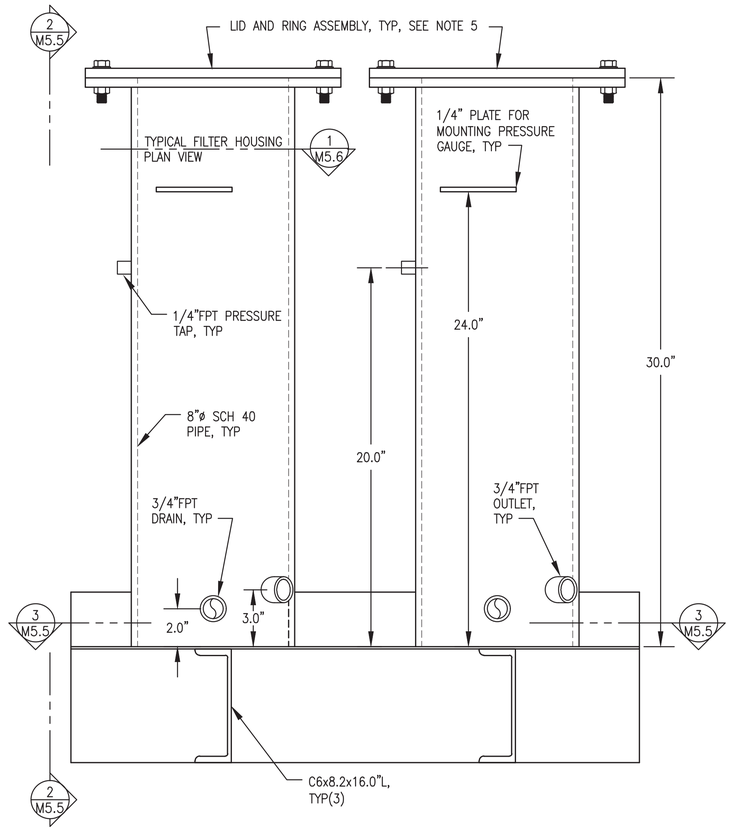
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

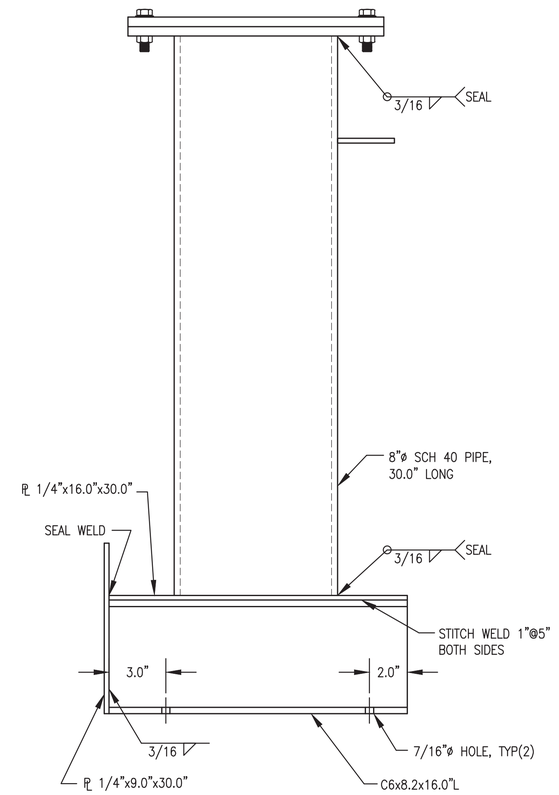
TITLE: 200 GALLON DAY TANK FABRICATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

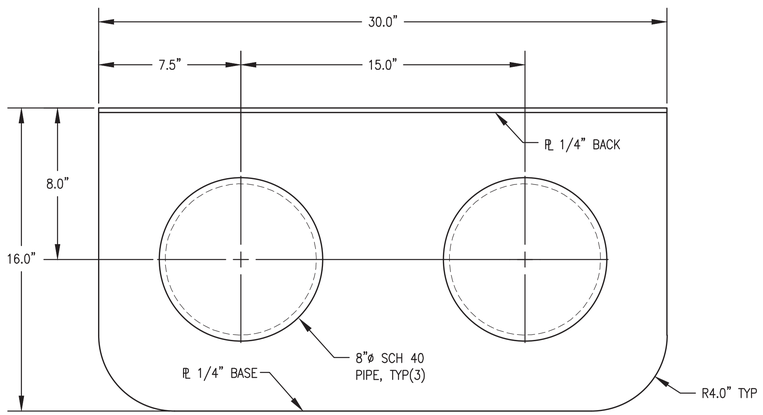
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.4
PROJECT NUMBER:	



1 M5.5 OIL FILTER BANK FRONT ELEVATION
1/4" = 1"



2 M5.5 SECTION THROUGH FILTER & BASE
1/4" = 1"



3 M5.5 OIL FILTER BANK BASE PLAN
1/4" = 1"

FILTER BANK GENERAL NOTES:

1. FABRICATE TWO CHAMBER FILTER BANK AS INDICATED. SEE SHEET M5.5 FOR INTERNAL DETAILS.
2. FABRICATE FROM ASTM A–36 STEEL PLATE AND SHAPES AND ASTM A–53 PIPE. ALL JOINTS TO BE FULL CONTINUOUS SEAL WELDS EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE.
3. PROVIDE WITH ALL OPENINGS AND ATTACHMENTS INDICATED. INSTALL MINIMUM 3,000# FORGED STEEL HALF COUPLINGS FOR ALL FPT OPENINGS IN ACCORDANCE WITH UL 142 FIGURE 7.1 – #2.
4. PRESSURE TEST COMPLETED ASSEMBLY TO MINIMUM 50 PSIG USING SOAPY WATER SOLUTION ON ALL WELD JOINTS.
5. UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC–SP–6. PAINT WITH TWO COATS EPOXY, SHERWIN WILLIAMS MACROPOXY 646, COLOR STRUCTURAL GRAY 4031.
6. AFTER PAINTING REMOVE LID, WIRE BRUSH MATING SURFACES OF LID AND RING TO REMOVE ALL PAINT AND POLISH SURFACES SMOOTH. APPLY A LIGHT COAT OF GREASE OR ANTI–SIEZE PASTE TO BOTH FACES PRIOR TO INSTALLING GASKET. INSTALL 13.5" O.D. FULL–FACED 1/4" BUNA–N RUBBER GASKET (ALASKA RUBBER OR EQUAL) ON FILTER LIDS.
7. FURNISH FASTENERS AS INDICATED AND COAT WITH ANTI–SIEZE.
8. PRESSURE TEST EACH FILTER HOUSING ASSEMBLY TO 50 PSIG MINIMUM.
9. UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS, AIR DRY INTERIOR, AND SEAL ALL TANK OPENINGS WITH PLASTIC PLUGS.

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA
49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

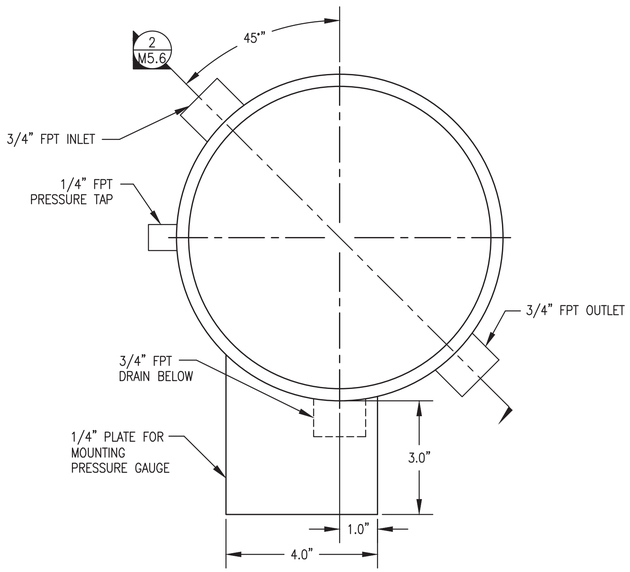
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

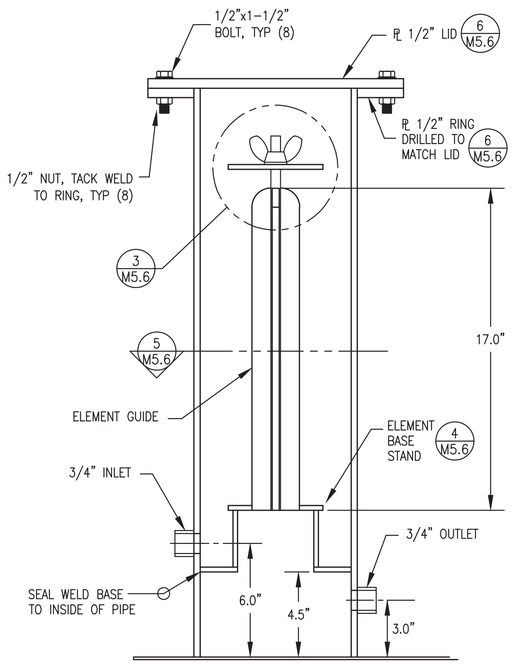
TITLE: USED OIL BLENDER
FILTER BANK LAYOUT & CONFIGURATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

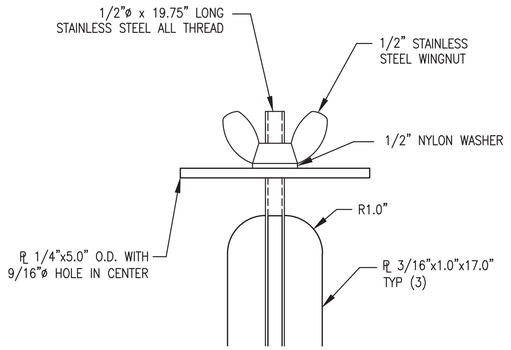
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.5
PROJECT NUMBER:	



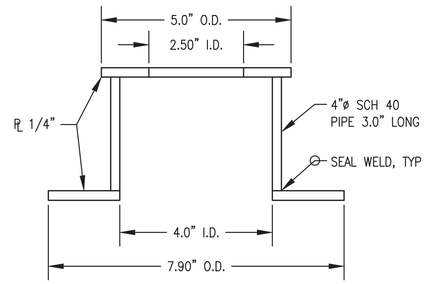
1 M5.6 TYPICAL FILTER HOUSING – PLAN VIEW
1/2" = 1"



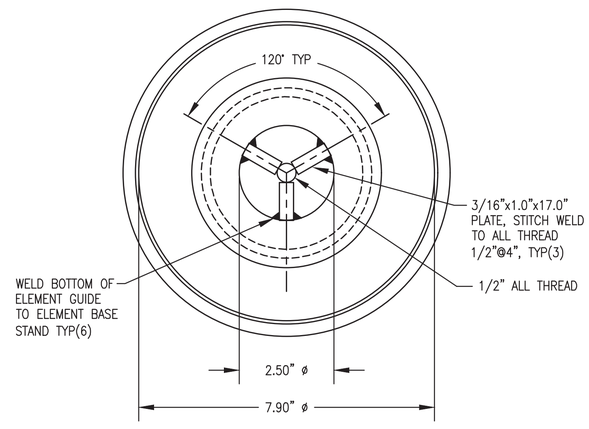
2 M5.6 TYPICAL SECTION THROUGH FILTER HOUSING
1/4" = 1"



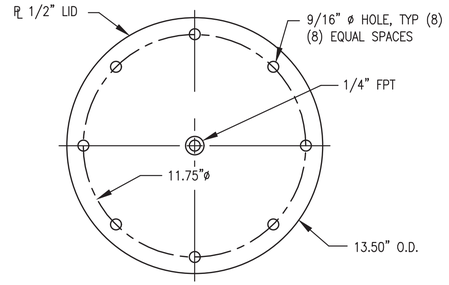
3 M5.6 ELEMENT RETAINER CAP
1/2" = 1"



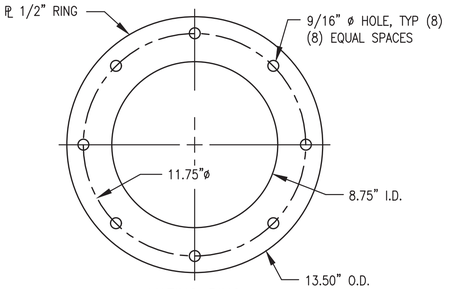
4 M5.6 ELEMENT BASE STAND
1/2" = 1"



5 M5.6 SECTION THROUGH ELEMENT GUIDE
1/2" = 1"



LID



MATING RING

6 M5.6 LID & MATING RING – PLAN VIEW
1/4" = 1"

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER

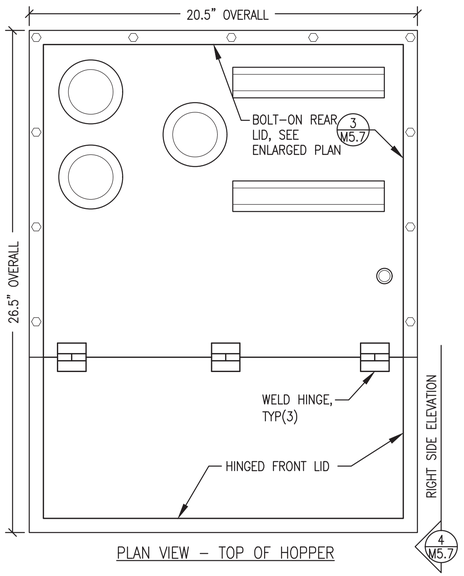
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

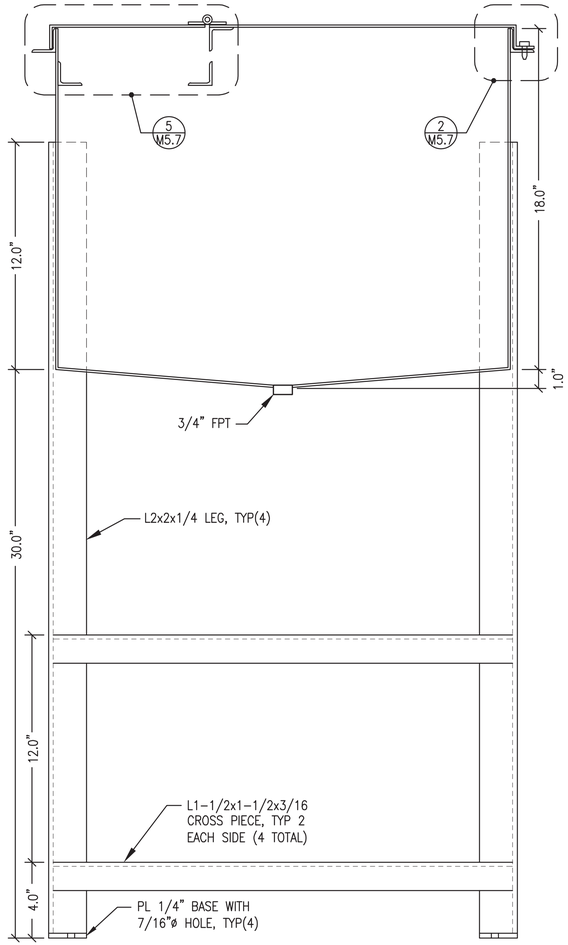
TITLE: USED OIL BLENDER
TYPICAL FILTER HOUSING DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

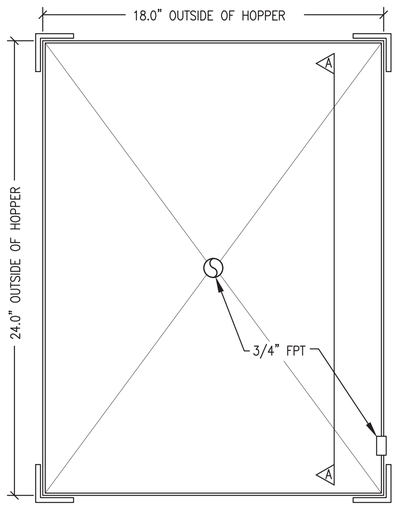
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.6
PROJECT NUMBER:	



PLAN VIEW – TOP OF HOPPER



SECTION A–A



PLAN VIEW – BOTTOM OF HOPPER

1 M5.7 HOPPER PLAN & SECTION
3"=1'-0"

FABRICATION NOTES:

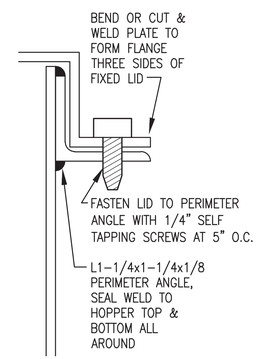
1) FABRICATE SINGLE WALL 25 GALLON USABLE CAPACITY HOPPER.

2) FABRICATE FROM MINIMUM 10 GAUGE ASTM A-36 STEEL PLATE. ALL TANK SEAM JOINTS TO BE FULL CONTINUOUS WELDS. SEAL WELD ALL TANK ATTACHMENTS.

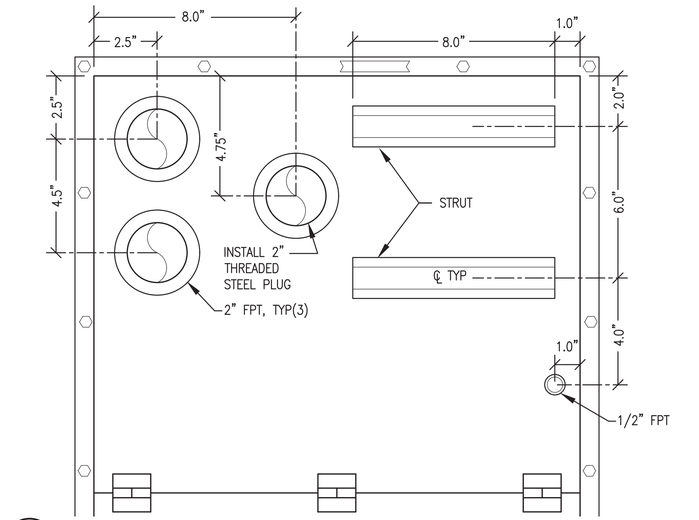
3) PROVIDE WITH ALL OPENINGS AND ATTACHMENTS INDICATED. INSTALL ALL FPT OPENINGS IN ACCORDANCE WITH UL 142 FIGURE 7.1 – #1, #2, #4, OR #6. ALL STRUT TO BE 1-5/8"x1-5/8"x12 GA SOLID BACK PLAIN (BLACK), B-LINE B22 PLN OR EQUAL. FURNISH ALL FASTENERS AS INDICATED.

4) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PAINT WITH TWO COATS EPOXY, SHERWIN WILLIAMS MACROPOXY 646, COLOR STRUCTURAL GRAY 4031.

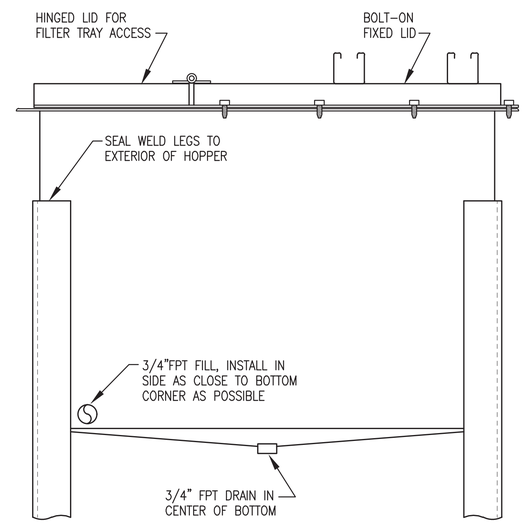
5) PRIOR TO SHIPPING, SEAL ALL FPT OPENINGS WITH PLASTIC OR STEEL PLUGS.



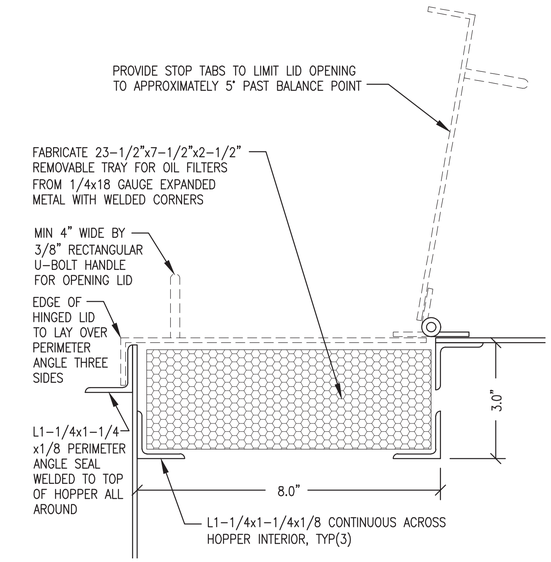
2 M5.7 FIXED LID PERIMETER ATTACHMENT
12"=1'-0"



3 M5.7 FIXED LID ENLARGED PLAN VIEW
4"=1'-0"



4 M5.7 HOPPER RIGHT SIDE ELEVATION
3"=1'-0"



5 M5.7 HINGED LID & FILTER TRAY DETAIL
6"=1'-0"

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

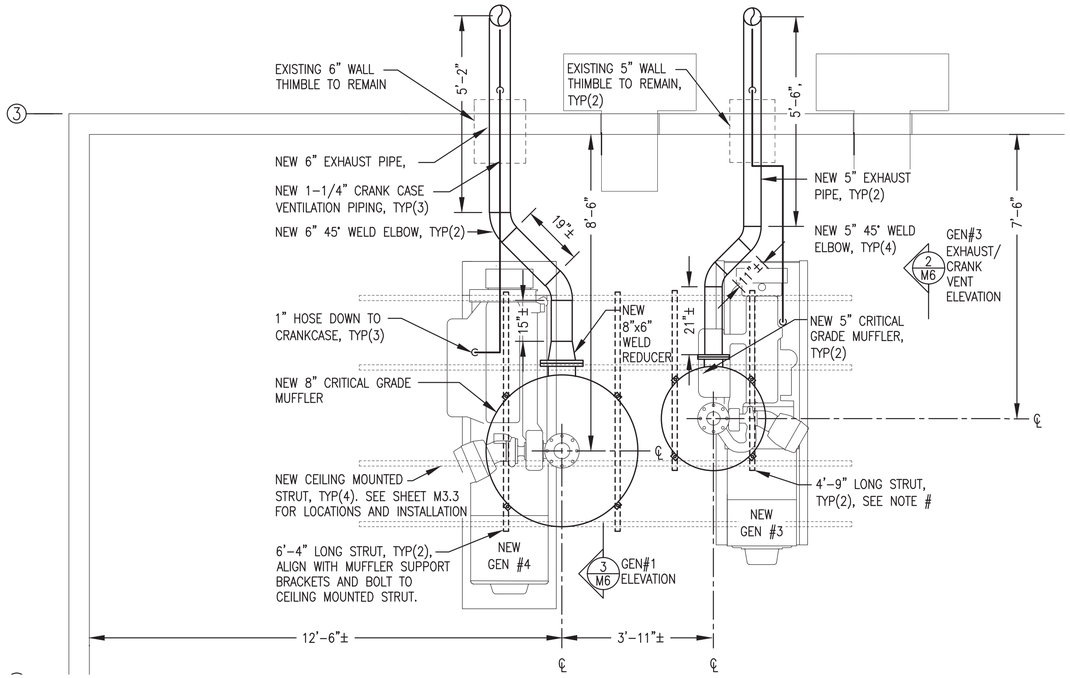
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

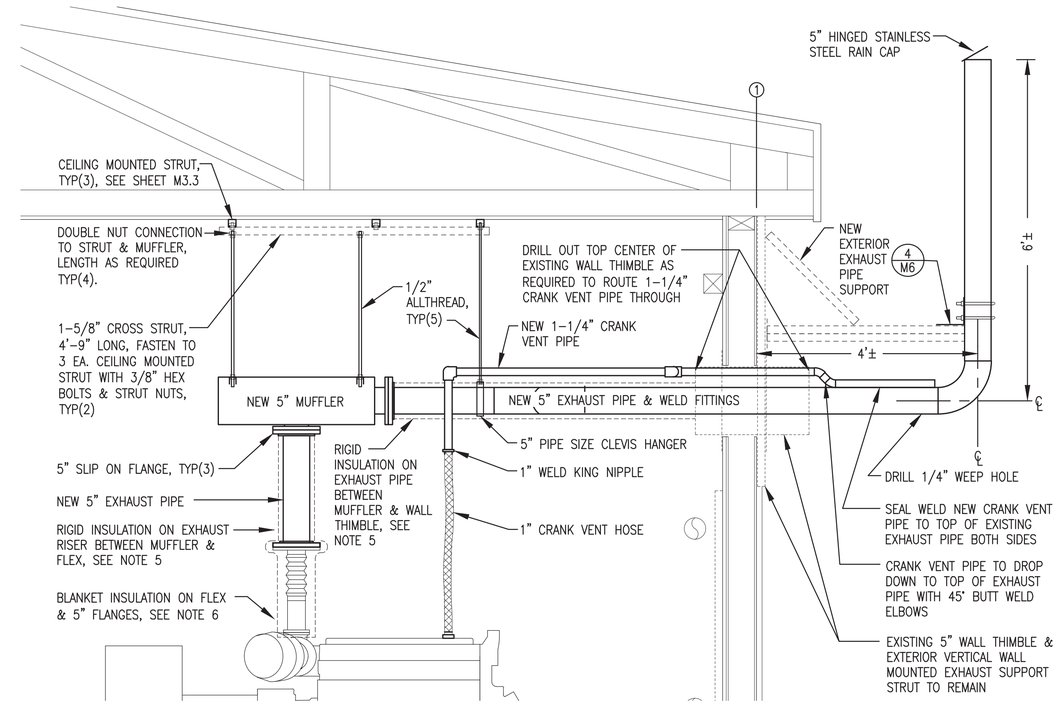
TITLE: USED OIL BLENDER 25 GALLON HOPPER FABRICATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

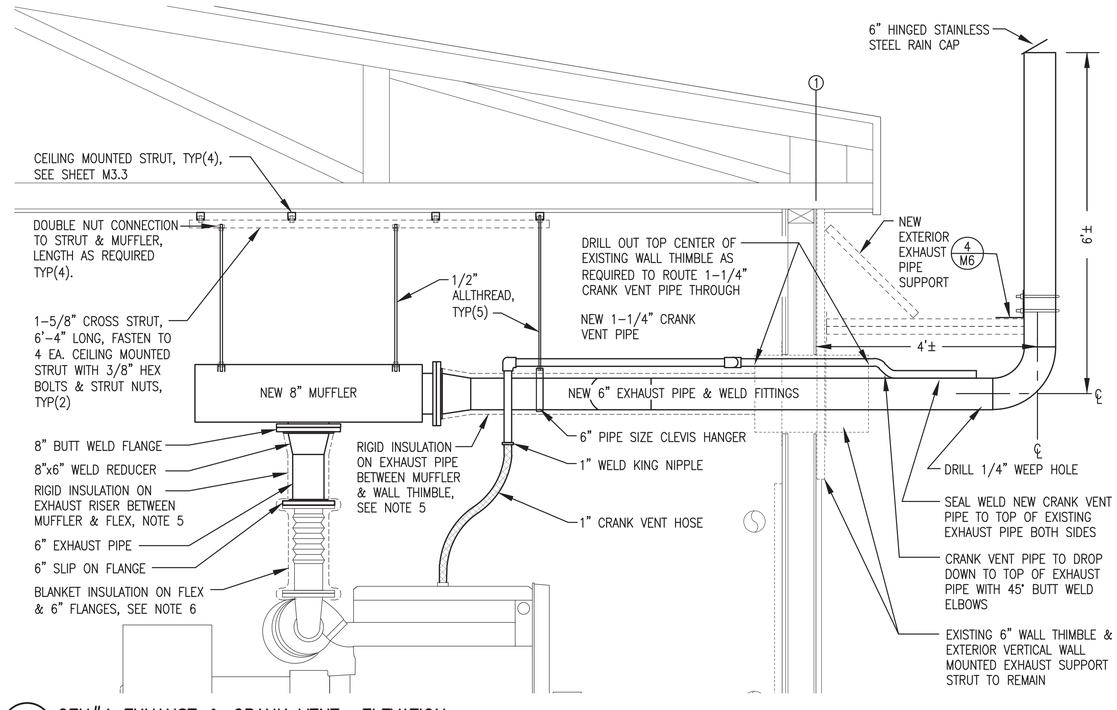
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M5.7
PROJECT NUMBER:	



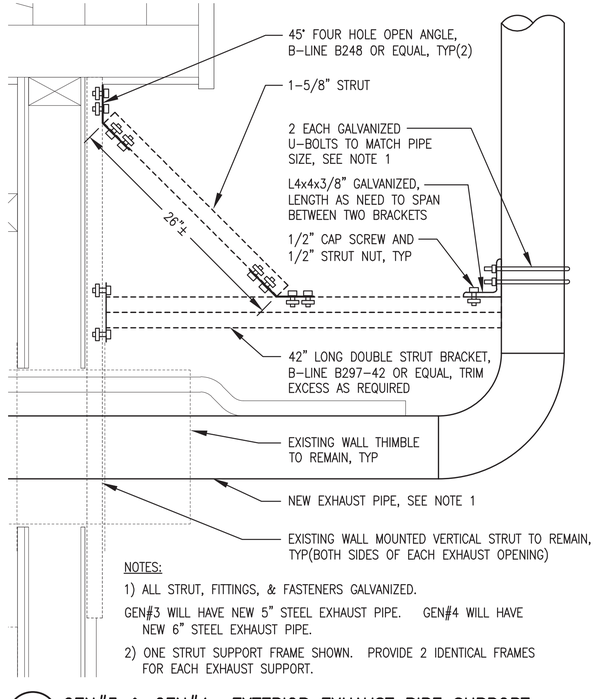
1 M6 EXHAUST & CRANK VENT PLAN
1/2"=1'-0"



2 M6 GEN#3 EXHAUST & CRANK VENT ELEVATION
3/4"=1'-0"



3 M6 GEN#4 EXHAUST & CRANK VENT ELEVATION
3/4"=1'-0"



NOTES:
1) ALL STRUT, FITTINGS, & FASTENERS GALVANIZED.
GEN#3 WILL HAVE NEW 5" STEEL EXHAUST PIPE. GEN#4 WILL HAVE NEW 6" STEEL EXHAUST PIPE.
2) ONE STRUT SUPPORT FRAME SHOWN. PROVIDE 2 IDENTICAL FRAMES FOR EACH EXHAUST SUPPORT.

4 M6 GEN#3 & GEN#4 EXTERIOR EXHAUST PIPE SUPPORT
NO SCALE

EXHAUST SYSTEM GENERAL NOTES:
1) THE MAXIMUM EXHAUST TEMPERATURE FOR THE ENGINES IS LESS THAN 1400°F. THE EXHAUST SYSTEM LAYOUT PROVIDES MORE THAN 9" CLEARANCE TO COMBUSTIBLES IN ACCORDANCE WITH NFPA 37 8.3. PARAGRAPH 8.3.1.
2) THE EXISTING TRIPLE WALL INSULATED/VENTILATED WALL THIMBLES ARE LISTED FOR ZERO CLEARANCE TO COMBUSTIBLES.
3) NEW MUFFLERS SHALL BE PACKED DISC STYLE, BOTTOM CENTER IN AND SIDE OUT, SIZE AS INDICATED, ASA 125# FLANGED CONNECTIONS, 2" INTERNAL ACOUSTICAL/ THERMAL WRAP, FOUR MOUNTING TABS, HIGH TEMPERATURE SATIN BLACK FINISH, CRITICAL GRADE.
4) EXHAUST PIPE SCH 40 ASTM A-53B WITH BUTT WELD 90° ELS, ANSI 150# FLAT FACED SLIP FLANGES WITH HIGH TEMPERATURE FULL FACE GASKETS.
5) CRANK VENT PIPE SCH 40 ASTM A-106B WITH BUTT WELD ELS ON EXTERIOR AND BUTT WELD OR SOCKET WELD ELS ON INTERIOR.
6) INSULATE INTERIOR EXHAUST PIPE WITH 1-1/2" MEDIUM TEMPERATURE RIGID INSULATION WITH ALUMINUM JACKET WHERE INDICATED.
7) INSULATE EXHAUST FLEX INCLUDING FLANGES WITH HIGH TEMPERATURE BLANKET SYSTEM.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

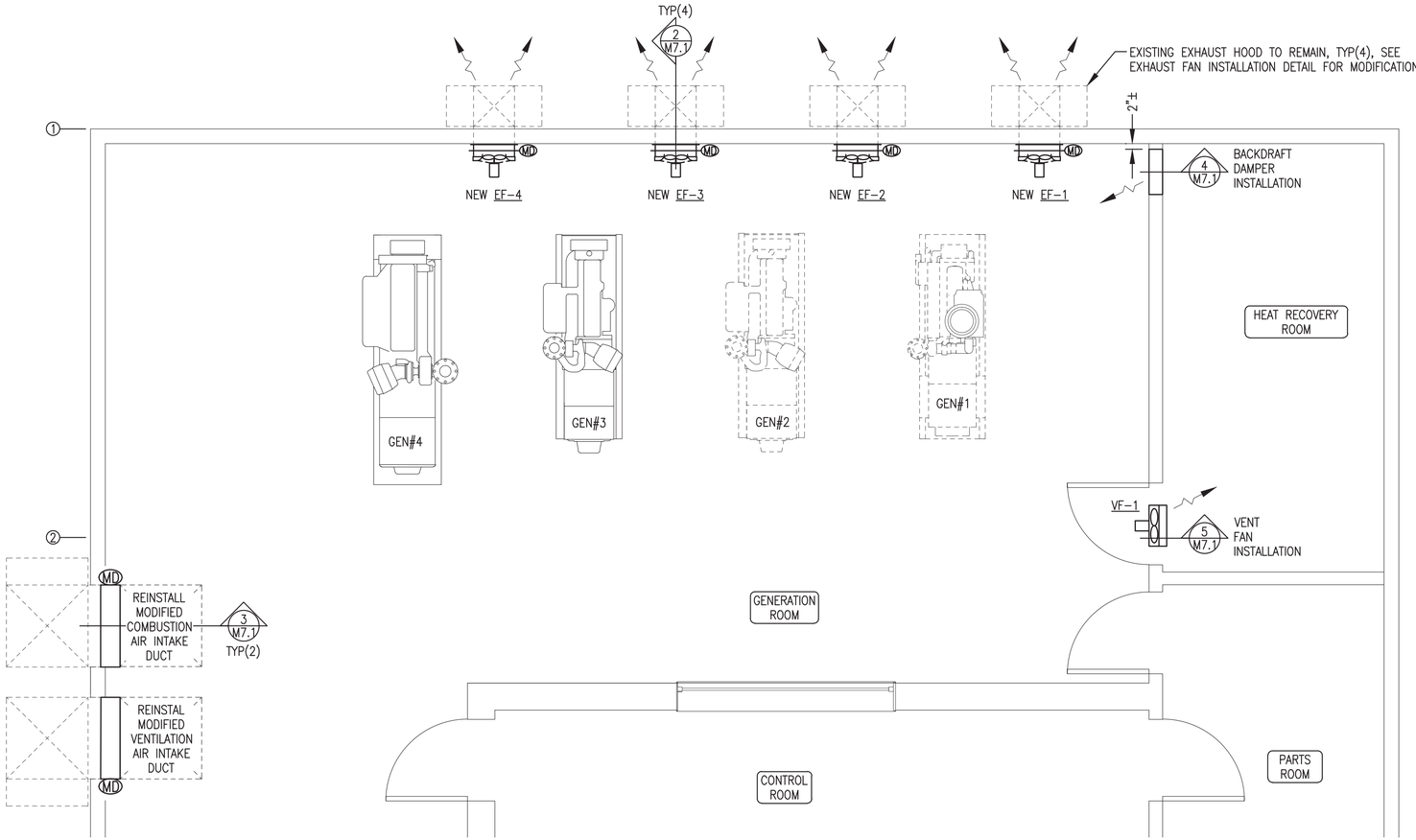
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: EXHAUST & CRANK VENT PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M6
PROJECT NUMBER:	



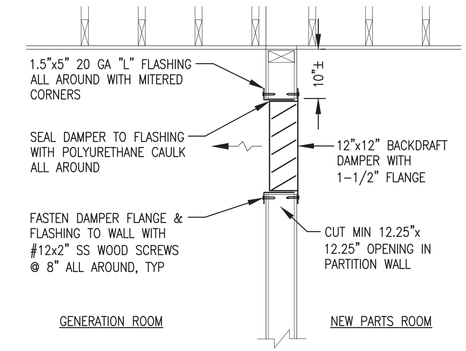
1 M7.1 VENTILATION PLAN
3/8"=1'-0"

VENTILATION EQUIPMENT NOTES

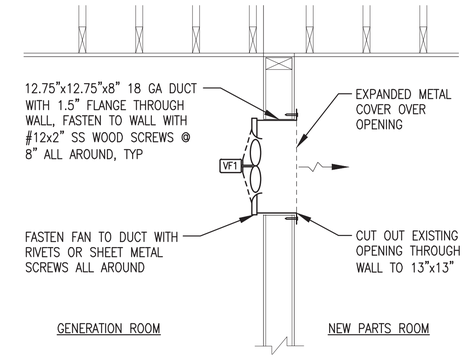
GENERAL – PERFORM ALL WORK IN ACCORDANCE WITH THE LATEST ADOPTED EDITION OF THE INTERNATIONAL MECHANICAL CODE AND APPLICABLE SMACNA STANDARDS.

SEE SCHEDULE SHEET M1.1 FOR EQUIPMENT.

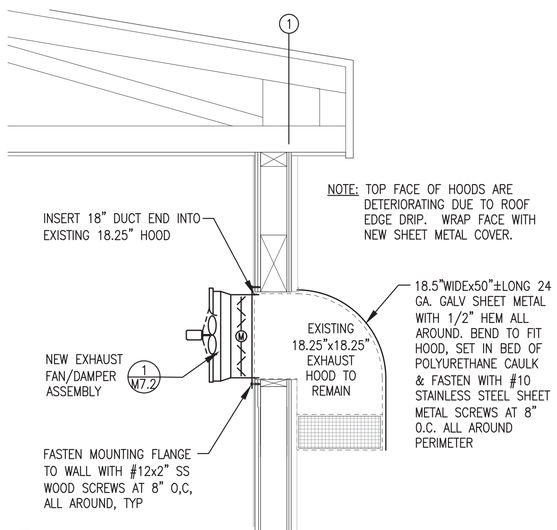
SEE SPECIFICATIONS FOR FABRICATION AND INSTALLATION REQUIREMENTS.



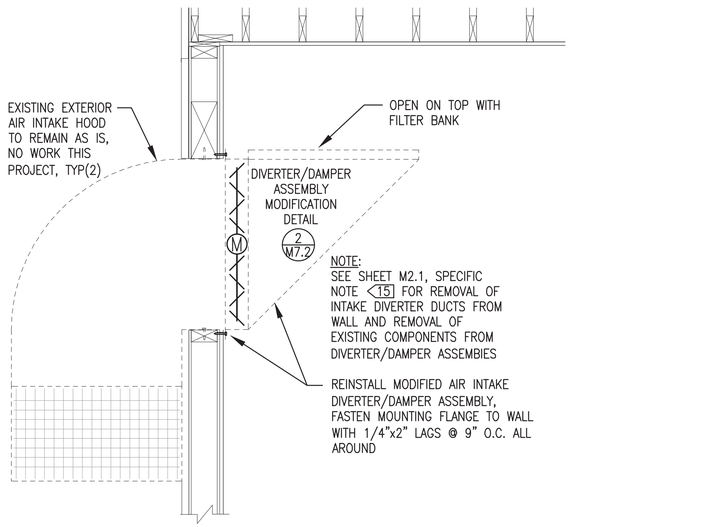
4 M7.1 BACKDRAFT DAMPER INSTALLATION
3/4"=1'-0"



5 M7.1 VENT FAN VF-1 INSTALLATION
3/4"=1'-0"



2 M7.1 EXHAUST FAN INSTALLATION
3/4"=1'-0"



3 M7.1 TYPICAL AIR INTAKE DUCT MODIFICATION DETAIL
3/4"=1'-0"

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

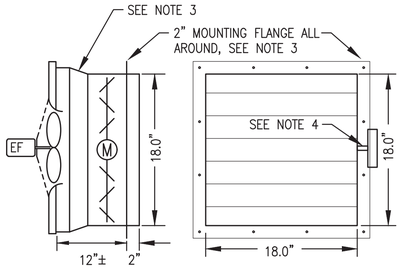
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: VENTILATION SYSTEM PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M7.1
PROJECT NUMBER:	

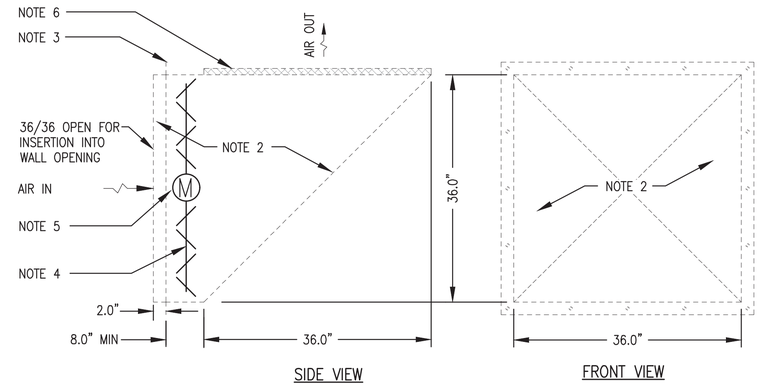


NOTES:

1. FABRICATE EXHAUST FAN ASSEMBLIES COMPLETE WITH FAN AND DAMPER MOUNTED AND SEALED TO DUCT.
2. CONNECT 20"x20" FAN TO 18"x18" DAMPER WITH CONCENTRIC TRANSITION.
3. PROVIDE 4 EACH 1/4" HOLES EACH SIDE FOR FIELD MOUNTING TO WALL.
4. PROVIDE MIN 3" DAMPER ROD EXTENSION ON THE RIGHT SIDE. FABRICATE SHEET METAL STAND-OFF BRACKET TO FULLY SUPPORT THE ACTUATOR FROM THE DAMPER FRAME.

1 M7.2 EXHAUST FAN/DAMPER ASSEMBLY FABRICATION

NO SCALE



NOTES:

1. EXISTING COMPONENTS TO REMAIN SHOWN WITH LIGHT-DASHED LINES. NEW COMPONENTS SHOWN WITH DARK-SOLID LINES.
2. MODIFY TWO EXISTING 36"x36" DIVERTER DUCTS AFTER REMOVAL FROM WALL, SEE SHEET M2.1, SPECIFIC NOTE 15
3. EXISTING 2" WIDE MOUNTING FLANGE ALL AROUND WITH 5/16" HOLES AT 9" O.C.
4. PROVIDE NEW DAMPER FOR INSERTION INTO EXISTING 36/36 OPEN DUCT. DAMPER TO BE OPPOSED BLADE LOW-LEAKAGE CONTROL DAMPER, GALVANIZED STEEL CONSTRUCTION, 304 STAINLESS STEEL BEARINGS AND JAMB SEALS, EPDM BLADE SEALS, TWO-PIECE GALVANIZED STEEL WELDED AIRFOIL BLADES. GREENHECK VCD-33. SEAL TO DUCT ALL AROUND
5. PROVIDE NEW 120V SPRING RETURN ACTUATOR, BELIMO MODEL AF-BUP, NO SUBSTITUTES. PROVIDE MIN 3" DAMPER ROD EXTENSION ON OPPOSITE SIDES OF EACH AIR INTAKE DUCT ASSEMBLY AS INDICATED ON PLAN. FABRICATE EXTERIOR SHEET METAL STAND-OFF BRACKET TO SUPPORT THE ACTUATOR FROM EXISTING DUCT.
6. EXISTING TOP FILTER FRAME SIZED FOR 4 EACH REMOVABLE 18"x18"x1" MERV 8 FILTERS. PROVIDE TWO COMPLETE SETS OF FILTERS FOR EACH ASSEMBLY.

2 M7.2 EXISTING DIVERTER/DAMPER ASSEMBLY MODIFICATION DETAIL

1"=1'-0"

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

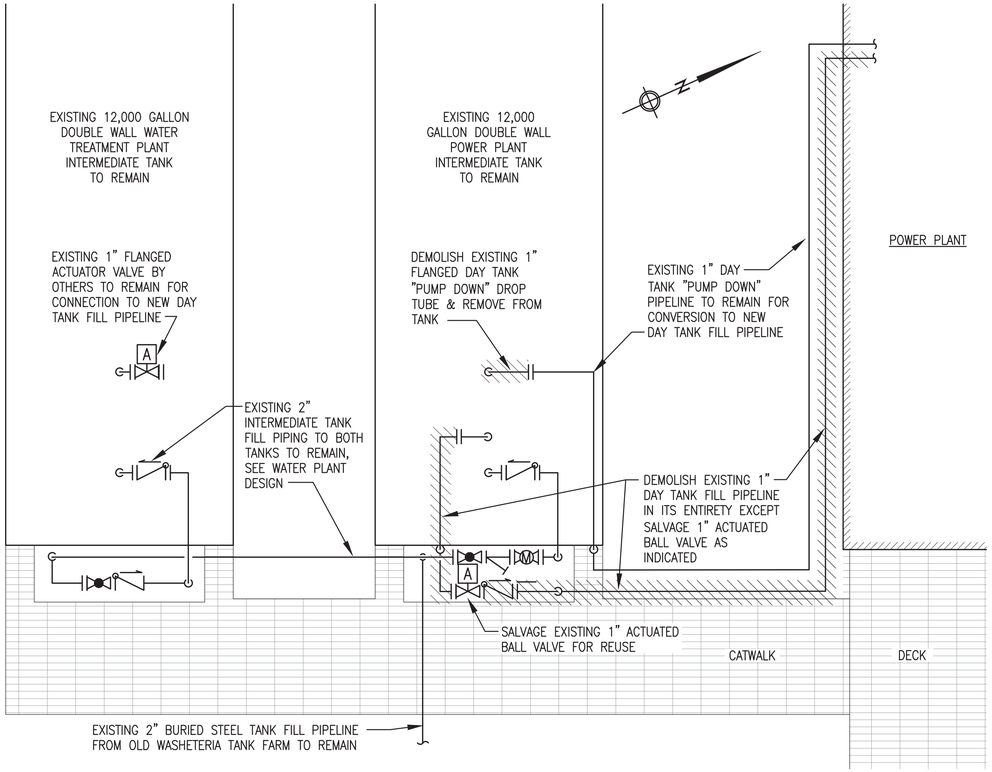
ALASKA ENERGY AUTHORITY

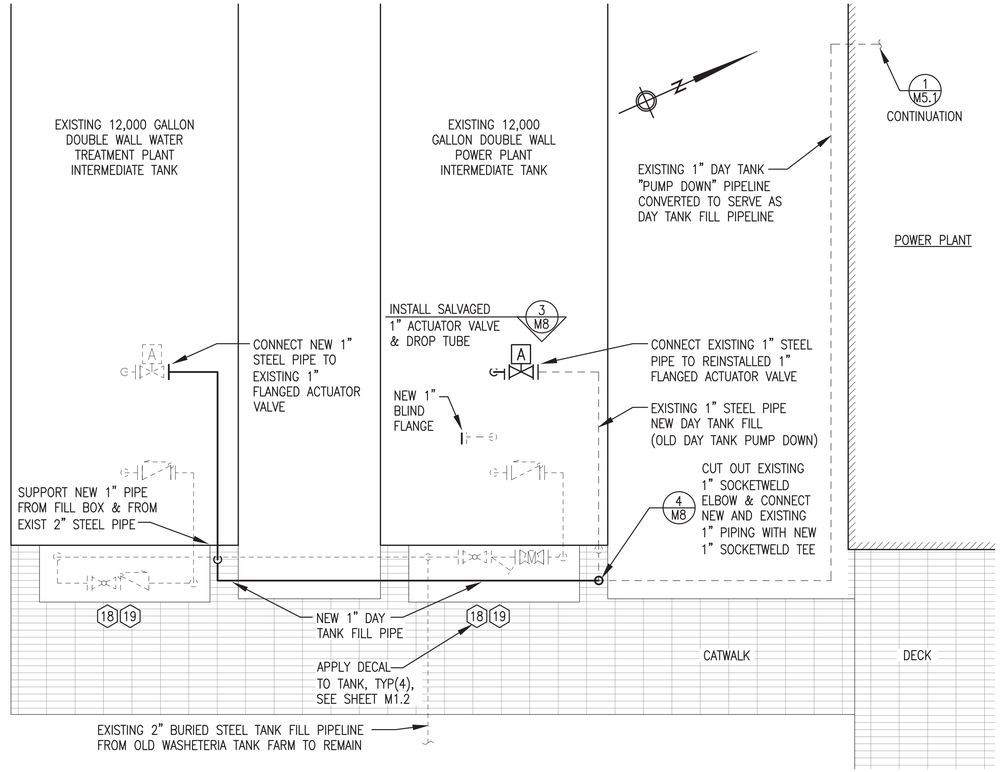
PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SHEET METAL FABRICATION DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME:	SHEET: M7.2
PROJECT NUMBER:	





DEMOLITION GENERAL NOTES:

1. ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL. EXISTING EQUIPMENT AND PIPING TO BE REMOVED INDICATED BY HATCHING.
2. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO FUEL SYSTEM EQUIPMENT BEING REMOVED DURING DEMOLITION. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.
3. SEE ELECTRICAL PLANS FOR ADDITIONAL DEMOLITION.
4. DRAIN AND PURGE ALL PIPING PRIOR TO REMOVAL OR MODIFICATION.
5. AT TIME OF PIPING DEMOLITION DIP TANKS WITH WATER CUT PASTE TO DETERMINE FUEL AND WATER LEVEL AND PROVIDE RESULTS TO ENGINEER.

1 M8 EXTERIOR FUEL PIPING DEMOLITION PLAN

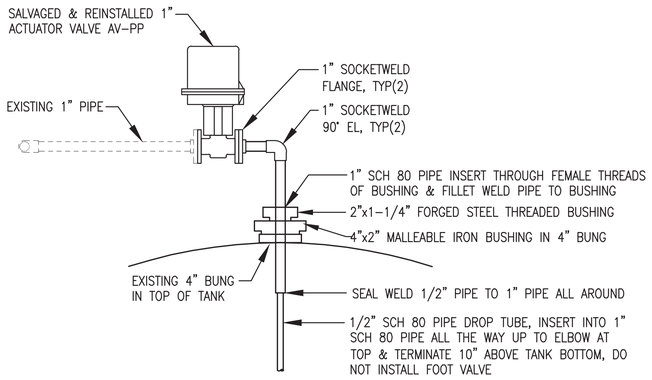
3/8"=1'-0"

NEW WORK GENERAL NOTES:

1. ALL PIPING SHOWN WITH LIGHT/DASHED LINES THIS PLAN EXISTING TO REMAIN IN SERVICE.
2. ALL PIPING AND DEVICES SHOWN WITH DARK/SOLID LINES THIS PLAN ARE NEW OR REUSED AND ARE TO BE INSTALLED THIS PROJECT.
3. ALL NEW PIPING & VALVES NOT SHOWN THIS PLAN FOR CLARITY. SEE PIPING DIAGRAM, ELEVATIONS, AND DETAILS THIS SHEET.
4. SEE ELECTRICAL PLANS FOR ADDITIONAL NEW WORK.
5. TANKS AND PIPING PRESENTLY CONTAIN DIESEL FUEL. PREFABRICATE TANK WITHDRAWAL PIPES OFF THE TANKS. INERT EXISTING PIPES PRIOR TO CUTTING AND WELDING. PERFORM ALL WELDING IN ACCORDANCE WITH APPROPRIATE HOT WORK PROCEDURES PER NFPA 51B.

2 M8 EXTERIOR FUEL PIPING NEW WORK PLAN

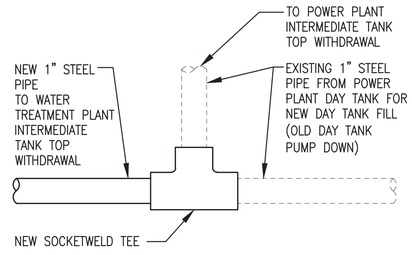
3/8"=1'-0"



NOTE: PRESSURE TEST ENTIRE DROP TUBE ASSEMBLY PRIOR TO INSTALLING IN TANK.

3 M8 TYPICAL ACTUATOR VALVE DROP TUBE INSTALLATION

NO SCALE



4 M8 DAY TANK FILL PIPING MODIFCATION TANK

NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

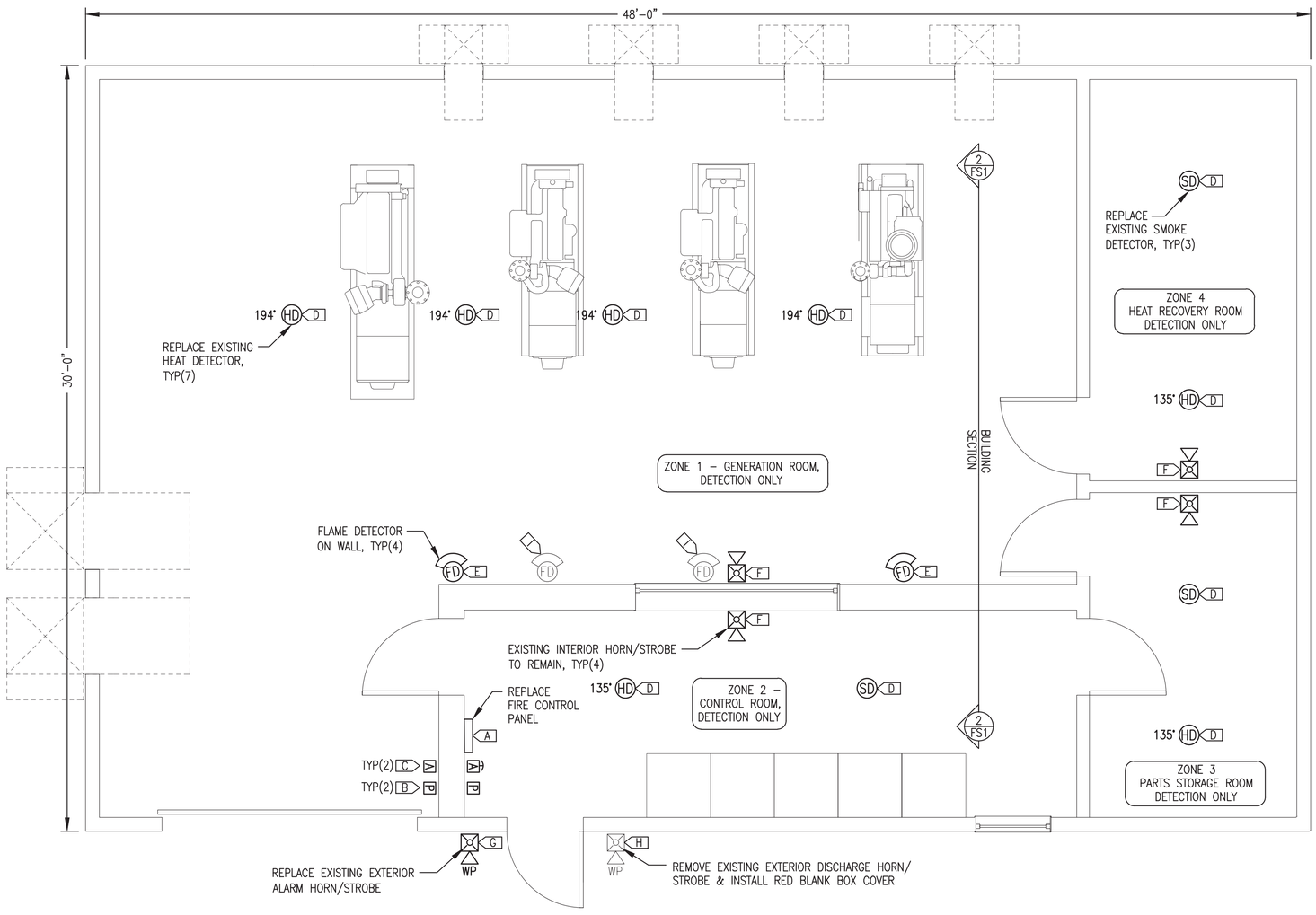
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: EXTERIOR FUEL PIPING PLANS & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 11/24/25
FILE NAME: TULU PP M8	SHEET: M8
PROJECT NUMBER:	



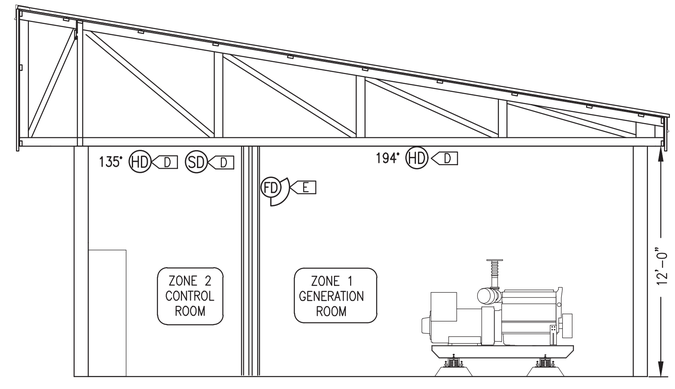
1 FS1 FIRE DETECTION & ALARM SYSTEM RENOVATION PLAN
3/8"=1'-0"

FIRE SYSTEM RENOVATION GENERAL NOTES:

1) THE POWER PLANT IS EQUIPPED WITH AN EXISTING CLEAN AGENT FIRE SUPPRESSION SYSTEM THAT IS CURRENTLY INOPERABLE AND WILL BE DEMOLISHED. SEE SHEETS M2.1 AND E2 FOR ADDITIONAL DEMOLITION NOTES. THE SCOPE OF FIRE ALARM WORK TO REPLACE ALL INDICATED EXISTING COMPONENTS WITH NEW IN ORIGINAL LOCATION AND TO COMMISSION AND CERTIFY THE RENOVATED FIRE ALARM SYSTEM.
2) THE EXISTING RACEWAYS AND BOXES ARE TO REMAIN IN ORIGINAL LOCATION TO THE MAXIMUM EXTENT POSSIBLE. SEE SHEETS M2.1 AND E2 FOR ADDITIONAL DEMOLITION NOTES.
3) SEE SPECIFICATIONS FOR SYSTEM DETAILS INCLUDING SEQUENCE OF OPERATION.
4) SEE SHEET M1.2 FOR WARNING PLACARD INSTALLATION. IN ADDITION TO ANY MANUFACTURER'S SIGNS FURNISH AND INSTALL ALL FIRE SYSTEM SIGNS AND DECALS INDICATED ON M1.2.

FIRE DETECTION & ALARM SYSTEM RENOVATION SPECIFIC NOTES:

- A REPLACE EXISTING FIRE CONTROL PANEL AND BATTERIES, BACKBOX MAY REMAIN. SEE PHOTO.
- B EXISTING PULL STATIONS TO REMAIN. SEE PHOTO.
- C REMOVE EXISTING ABORT BUTTONS. SEE PHOTO.
- D REMOVE ALL EXISTING CEILING MOUNTED SMOKE DETECTORS, NORMAL TEMPERATURE (135°) HEAT DETECTORS, AND HIGH TEMPERATURE (194°) HEAT DETECTORS AND REPLACE WITH NEW.
- E REMOVE EXISTING WALL MOUNTED FLAME DETECTORS AND REPLACE WITH NEW.
- F EXISTING INTERIOR WALL MOUNTED HORN/STOBES TO REMAIN. VERIFY PROPER FUNCTION.
- G REPLACE EXISTING EXTERIOR WALL MOUNTED ALARM HORN/STROBE.
- H REMOVE EXISTING EXTERIOR WALL MOUNTED AGENT DISCHARGE HORN/STROBE.
- I REMOVE EXISTING WALL MOUNTED FLAME DETECTORS, DISCONNECT CONDUCTORS, AND INSTALL RED BLANK BOX COVER.



2 FS1 TYPICAL SECTION THROUGH POWER PLANT
1/4"=1'

3 FS1 PHOTO OF PANEL & PULL STATION
NO SCALE

FIRE DETECTION & ALARM SYSTEM SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
P	MANUAL PULL STATION	HD 135°	NORMAL TEMP. (135°F) DETECTOR
	INTERIOR ALARM HORN/STROBE	HD 194°	HIGH TEMP. (194°F) DETECTOR
WP	EXTERIOR ALARM HORN/STROBE	FD	FLAME (OPTICAL) DETECTOR
A	MANUAL ABORT STATION	SD	SMOKE (IONIZATION) DETECTOR

ALL FIRE ALARM & DETECTION THIS SHEET IS INCLUDED UNDER ADDITIVE ALTERNATE #1.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

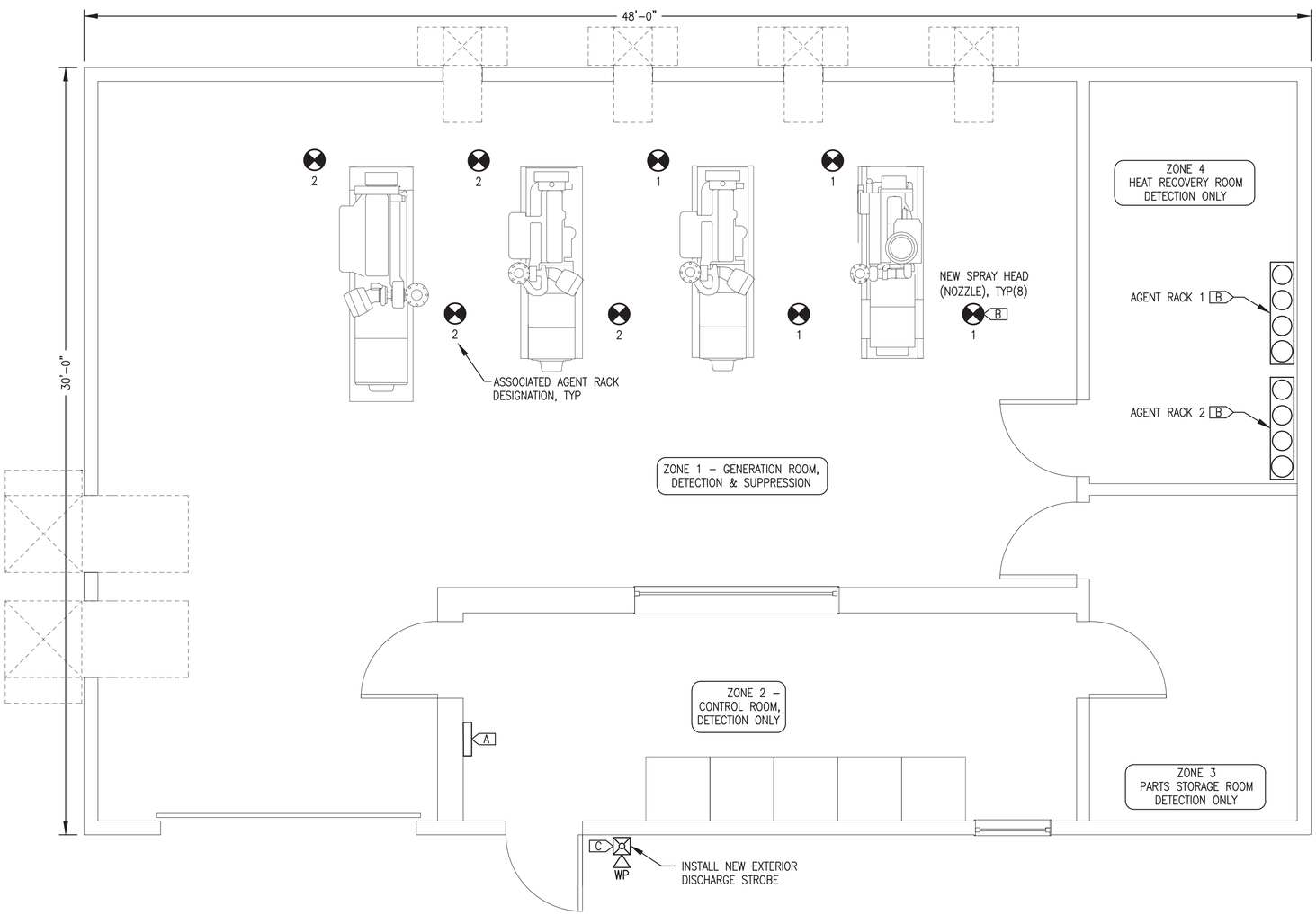
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: FIRE DETECTION & ALARM SYSTEM RENOVATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 11/24/25
FILE NAME: TULU PP FS1-2 | SHEET: FS1
PROJECT NUMBER:



1 FS2 FIRE SUPPRESSION SYSTEM RENOVATION PLAN
3/8"=1'-0"

FIRE SUPPRESSION SYSTEM GENERAL NOTES:

1) THE SCOPE OF FIRE SUPPRESSION WORK IS TO INSTALL A NEW HI-FOG SYSTEM WITH ACCESSORIES AS INDICATED AND SPECIFIED AND TO COMMISSION AND CERTIFY THE NEW SUPPRESSION SYSTEM.
2) SEE SPECIFICATIONS FOR SYSTEM DETAILS INCLUDING SEQUENCE OF OPERATION.
3) THE INTERIOR FINISH OF ALL WALLS AND CEILINGS IS FRP. THE INTERIOR FINISH OF ALL FLOORS IS PAINTED CONCRETE. THE CEILING HEIGHT IN ALL ROOMS 12' ABOVE FINISHED FLOOR.
4) ALL DOORS SELF-CLOSING WITH GASKETS. ALL BUILDING PIPING AND CONDUIT PENETRATIONS SEALED LIQUID TIGHT. ALL BUILDING DUCT PENETRATIONS EQUIPPED WITH MOTORIZED DAMPERS THAT CLOSE ON GENERATOR SHUT DOWN.
5) SEE SHEET M1.2 FOR WARNING PLACARD INSTALLATION. IN ADDITION TO ANY MANUFACTURER'S SIGNS FURNISH AND INSTALL ALL FIRE SYSTEM SIGNS AND DECALS INDICATED ON M1.2

FIRE SUPPRESSION SYSTEM SPECIFIC NOTES:

A RE-PROGRAM THE FIRE CONTROL PANEL TO ADD HI-FOG FIRE SUPPRESSION DISCHARGE FUNCTION.

B INSTALL HI-FOG RACKS, PIPING, NOZZLES, PLUS ALL CONDUIT, CONDUCTORS, AND DEVICES REQUIRED FOR SYSTEM DISCHARGE AND MONITORING.

C INSTALL EXTERIOR FIRE SUPPRESSION AGENT DISCHARGE ALARM STROBE.

FIRE SUPPRESSION SYSTEM SYMBOL LEGEND

SYMBOL	DESCRIPTION
WP	EXTERIOR ALARM STROBE

ALL SUPPRESSION THIS SHEET IS INCLUDED UNDER ADDITIVE ALTERNATE #2.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH BRIAN C. GRAY ME 8210 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: FIRE SUPPRESSION SYSTEM RENOVATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 11/24/25
FILE NAME: TULU PP FS1-2 | SHEET: FS2
PROJECT NUMBER:

ELECTRICAL EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
1	DAY TANK ALARM HORN/STROBE	MULTI-TONE ALARM WITH STROBE, 115V, NEMA 3R, WEATHER RESISTANT SURFACE MOUNT BELL BOX	WHEELOCK MT4-115-WH-VNS
2	DIGITAL THERMOSTAT	MULTIPLE OUTPUT MODULATING DIGITAL THERMOSTAT	HONEYWELL TB7980B
3	LINE VOLTAGE THERMOSTAT	HEATING/COOLING THERMOSTAT, 16 FLA @ 120V, SPDT, 50F TO 80F RANGE.	DAYTON 1UHH2
4	EXTERIOR LIGHT	AREA LIGHT, WIDE DISPERSION WALL PACK WITH PHOTO CONTROL. LED, 17.7W, 120-277V DRIVER	HUBBELL NRG-356L-5K-U-PC
5	EMERGENCY LIGHT	WHITE PLASTIC ENCLOSURE, 120-347V INPUT, DUAL 5.3W LED LAMPS, LITHIUM IRON PHOSPHATE BATTERY	LITHONIA EML6L UVOLT LTP SRDT
6	EMERGENCY/EXIT LIGHT COMBO	WHITE PLASTIC ENCLOSURE, RED EXIT SIGN, 277/120V INPUT, DUAL 1.5W 9.6V LED LAMPS. OPTIONAL HIGH OUTPUT NI-CAD BATTERY	LITHONIA LHQM LED R HO
7	EMERGENCY EXIT REMOTE LIGHT	REMOTE LAMP FIXTURE, DUAL HEAD, RATED FOR EXTERIOR INSTALLATION IN DAMP/WET LOCATIONS, 1.5W 9.6V LED LAMPS.	LITHONIA ELA T QWP L0309
8	INTERIOR LIGHT	SURFACE MOUNTED LED STRIPLIGHT FIXTURE, 48" LONG, 34W, 5000'K WITH SNAP ON FROSTED DIFFUSER	LITHONIA L1N-L48-5000LM-FST
9	TIMER SWITCH	0-5 MINUTE , 120V, 20A, 1HP RATED, INSTALL IN 4"x4" PRESSED STEEL BOX WITH METAL COVER.	INTERMATIC FF5M
10	LIGHT SWITCH	SINGLE POLE SNAP SWITCH, 120V, 20A, METAL, 1-1/2HP RATED, INSTALL IN 4"x4" STEEL BOX WITH METAL COVER, IVORY.	HUBBELL 1221-I
11	1ø SMALL MOTOR DISCONNECT	SINGLE POLE SNAP SWITCH WITH RED PILOT LIGHT, 120V, 20A, 1HP RATED, INSTALL IN 4"x4" STEEL BOX WITH METAL COVER	HUBBELL 1221-PL
12	NOT USED	NOT USED	
13	*STATION SERVICE TRANSFORMER*	*STATION SERVICE TRANSFORMER - ENERGY STAR COMPLIANT, ENCLOSURE TYPE 1, 45kVA, HV 480 DELTA, LV 208Y/120, 125 AMP*	*ECS ELECTRICAL GROUP CAT. NO. T2H45S*
14	*STATION SERVICE PANELBOARD*	*COPPER BUS, 3 PHASE, 4 WIRE, 120/208V, 125A MAIN BREAKER, 42 CIRCUITS, BOLT-IN BREAKERS, NEMA 1 ENCLOSURE, SURFACE MOUNT, NO KNOCKOUTS*	*SIEMENS TYPE P1*
15	*STANDARD RECEPTACLE*	*SURFACE MOUNT 125V NEMA 5-20R RECEPTACLE. INSTALL IN 4"x4" STEEL BOX WITH METAL COVER*	*PASS & SEYMOUR 5362W*
16	*EXTERIOR GFCI RECEPTACLE*	*125V NEMA 5-20R GFCI RECEPTACLE. MOUNT IN CAST FDA BOX WITH WEATHERPROOF COVER*	*PASS & SEYMOUR 2095-W*
17	BATTERY CHARGER	12/24-VOLT SOLID STATE 20-AMP AUTO-EQUALIZING BATTERY CHARGER FOR 120 VAC INPUT, WITH OPTIONAL HIGH/LOW VOLTAGE, AC POWER FAILURE, & REMOTE SUMMARY ALARM RELAYS	SENS NRG22-20-RCLS OR LEMARCHE ECSR-40/20-12/24V-AV1
18	NOT USED	NOT USED	NOT USED
19	NOT USED	NOT USED	NOT USED
20	RADIATOR/ MOTOR DISCONNECT	NON-FUSED LOCKABLE SAFETY SWITCH, NEMA 3R ENCLOSURE, 3PST, 600V, 30A, MIN 5HP RATED	SIEMENS HNF361R OR SQUARE D HU361R
21	NOT USED	NOT USED	NOT USED
22	NOT USED	NOT USED	NOT USED
23	SNAP SWITCH WITH THERMAL UNIT	600VAC, 1HP, 16A MANUAL MOTOR STARTER WITH TYPE S, TYPE A, MELTING ALLOY, CLASS 20 THERMAL UNIT	SQUARE D 2510F01 MOTOR STARTER WITH A14.8 THERMAL UNIT
24	ROUTER - HIGH SPEED INTERNET	4-PORT GIGABIT ROUTER, DUAL 2.4 AND 5 GHz WIFI WITH ADJUSTABLE ANTENNAS, 4 EACH 1 GBPS LAN, 1 GBPS WAN, MINIMUM 256 MB RAM, WITH DDNS AND PORT FORWARDING CAPABILITY, ASUS RT-AX1800S OR APPROVED EQUAL	ASUS RT-AX1800S

EQUIPMENT NOTES:

1) ALL EQUIPMENT SHOWN IN LIGHT ITALIC TEXT IS EXISTING TO REMAIN AND ARE SHOWN HERE FOR REFERENCE ONLY. SOME EXISTING ITEMS WILL BE DEMOLISHED AND/OR REPLACED WITH NEW AS INDICATED ON THE PAGES THAT FOLLOW.
2) ALL EQUIPMENT SHOWN IN BOLD DARK TEXT IS NEW AND IS TO BE FURNISHED AND INSTALLED UNDER THIS PROJECT INCLUDING REPLACEMENTS FOR EXISTING.
3) SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

ELECTRICAL CONDUCTOR SCHEDULE

SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
GENERATOR LEADS (ENGINE STARTER CABLES SIMILAR)	HIGH TEMPERATURE, EXTRA FLEXIBLE CABLE, TIN COATED COPPER CONDUCTOR. THERMOSET EPDM INSULATION, UL 3340/3374, MINIMUM 600V, LISTED 150°C FOR NON-FLEXING	COBRA CABLE, BELDEN, OR OMINI	TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT 150°C.
GENERAL USE CONDUCTORS	CLASS B CONCENTRIC STRANDED, SOFT DRAWN COPPER. TYPE XHHW2 INSULATION, 600V AND 90C RATED.		
SHIELDED/TWISTED INSTRUMENT & CONTROL & CANBUS CONDUCTORS	#18 AWG STRANDED TINNED COPPER CONDUCTORS, 600V POLYETHYLENE INSULATION, 100% COVERAGE ALUMINUM FOIL-POLYESTER TAPE SHIELD WITH STRANDED TINNED COPPER DRAIN WIRE & PVC OUTER JACKET	BELDEN PART #'S SINGLE PAIR: #1120A FOUR PAIR: #1049A SINGLE TRIAD: #1121A	GROUND SHIELD DRAIN WIRE AT ONE END ONLY (DEVICE OR ENGINE J-BOX)
EHTERNET (CAT5e) COMMUNICATION CONDUCTORS	SOLID BARE COPPER CONDUCTORS, 300V FEP INSULATION & JACKET, 100% COVERAGE ALUMINUM FOIL-POLYESTER TAPE SHIELD WITH STRANDED TINNED COPPER DRAIN WIRE	FOUR PAIR #24 BELDEN 1585LC	GROUND SHIELD DRAIN WIRE AT PANEL END ONLY. ROUTE ALL DEVICENET & CAT5e CABLES IN SEPARATE DEDICATED RACEWAY.

UNLESS INDICATED OTHERWISE ALL CONDUCTORS SHALL USE THE FOLLOWING COLOR CODE:

- 480-VOLT POWER (PHASE) CONDUCTORS
  - PHASE A: BROWN
  - PHASE B: ORANGE
  - PHASE C: YELLOW
- 120/208-VOLT POWER (PHASE) CONDUCTORS
  - PHASE A: BLACK
  - PHASE B: RED
  - PHASE C: BLUE
- NEUTRAL: WHITE, NO EXCEPTIONS
- GROUND: GREEN OR BARE, NO EXCEPTIONS
- 24 VOLT DC CONDUCTORS
  - +24VDC: RED or RED W/GRAY STRIPE
  - -24VDC: BLACK or BLACK W/GRAY STRIPE

CONTROL AND INSTRUMENT CONDUCTORS MAY BE COLOR CODED PER MANUFACTURER'S STANDARD

NOTES:

1) COLOR CODING FOR NO. 6 AWG AND SMALLER CONDUCTORS SHALL BE BY USING CONDUCTORS WITH CONTINUOUS COLOR EMBEDDED IN THE INSULATION.
2) COLOR CODING FOR CONDUCTORS LARGER THAN NO. 6, SHALL BE BY:
   A) CONTINUOUS COLOR EMBEDDED IN THE INSULATION, OR
   B) BLACK CABLE WITH SCOTCH 35 OR APPROVED EQUAL MARKING (PHASE) TAPE. AT EVERY ACCESSIBLE LOCATION A MINIMUM 3" LONG SECTION OF CONDUCTOR SHALL BE SPIRAL WRAPPED. NOTE THAT PHASE TAPE MAY NOT BE USED ON COLORED CABLE, BLACK CABLE ONLY.
3) GROUNDING - PROVIDE A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH RACEWAY. DO NOT USE THE CONDUIT AS AN EQUIPMENT GROUNDING CONDUCTOR. EQUIPMENT GROUNDING CONDUCTORS SHALL BE OF THE SAME TYPE AS THE PHASE CONDUCTORS AND SHALL BE SIZED AS INDICATED ON THE DRAWINGS. CONDUCTORS NOT INDICATED SHALL BE SIZED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.

WIRING & DEVICE SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
SS-##	HOME RUN TO PANEL & BREAKER(S) INDICATED. SHORT DASH INDICATES HOT CONDUCTOR, LONG DASH INDICATES NEUTRAL CONDUCTOR, CURVED DASH INDICATES GROUND CONDUCTOR. IF NOT SPECIFICALLY INDICATED, PROVIDE 2#12 AWG & 1#12 AWG GROUND.		125V, 20A, DUPLEX RECEPTACLE
		T	LINE VOLTAGE THERMOSTAT
		DT	DIGITAL THERMOSTAT, MODULATING
#	ELECTRICAL ITEM - SEE EQUIPMENT SCHEDULE	$	SNAP SWITCH / SMALL MOTOR DISCONNECT
1/4	MOTOR (HORESPOWER INDICATED)	T$	TIMER SWITCH
MD	MOTORIZED DAMPER - SEE MECHANICAL		GROUND

INSTRUMENTATION LEGEND

NOTE: SEE SCHEDULES SHEET M1.1 FOR EQUIPMENT SPECIFICATIONS.

SYMBOL	SERVICE/FUNCTION	SYMBOL	SERVICE/FUNCTION
TT	TEMPERATURE TRANSMITTER	DP	DIFFERENTIAL PRESSURE GAUGE/SWITCH
TTH	THERMOMETER/ TEMP TRANSMITTER	LCA	GLYCOL TANK LOW COOLANT ALARM
PTC	COOLING SYSTEM PRESSURE TRANSMITTER	FS	DAY TANK/HOPPER FLOAT SWITCH
PTH	HEAT RECOVERY PRESSURE TRANSMITTER	GLS	GLYCOL TANK LEVEL SENSOR PROBE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

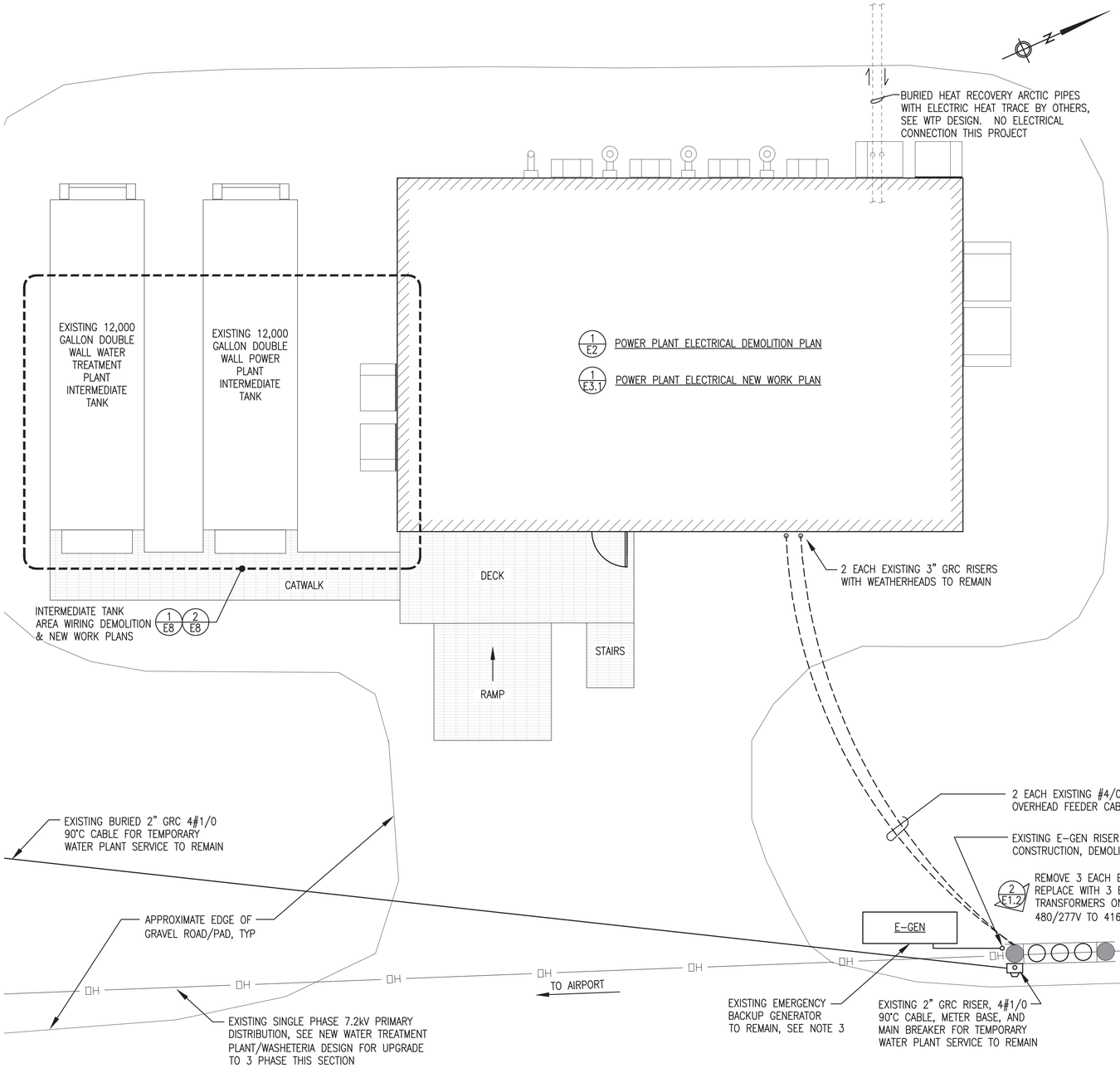
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ELECTRICAL LEGENDS & SCHEDULES

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E1.1
PROJECT NUMBER:	

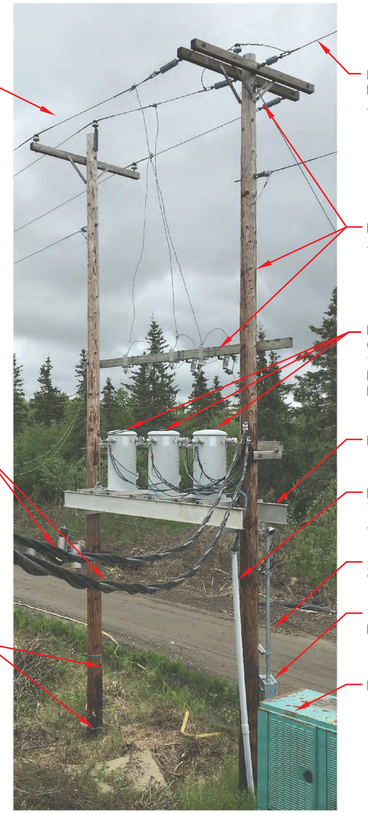


1 E1.2 ELECTRICAL SITE PLAN
3/16"=1'-0"

OVERHEAD TRANSFORMER SCHEDULE										
LOAD DESCRIPTION	SHEET NUMBER	XFMR kVA RATING	TOTAL BANK kVA RATING	PRIMARY VOLTAGE	SECONDARY VOLTAGE	XFMR TYPE	XFMR PHASE	TRANSFORMER CONNECTION	NO. XFMRS IN BANK	3ø CONNECTION
POWER PLANT STEP-UP	E1.2	100	300	4160/2400V	480/277	POLE	1ø	3ø WYE-WYE	3	480/277

PROJECT OVERVIEW:

1. THE POWER PLANT PROVIDES PRIME POWER TO THE COMMUNITY OF TULUKSAK BUT DOES NOT CURRENTLY HAVE THE REQUIRED CAPACITY TO MEET THE EXPECTED HIGHER LOADS FROM THE NEW WATER/SEWER UTILITY CURRENTLY UNDER CONSTRUCTION OR TO PROVIDE POWER TO THE SCHOOL. THE PURPOSE OF THIS POWER PLANT UPGRADE PROJECT IS TO INCREASE THE CAPACITY AND RELIABILITY OF THE POWER PLANT IN ORDER TO MEET THE INCREASING COMMUNITY POWER DEMAND INCLUDING THE SCHOOL.
2. A PORTION OF THE EXISTING POWER PLANT GENERATION EQUIPMENT HAS EITHER REACHED THE END OF ITS USEFUL LIFE OR HAS INSUFFICIENT CAPACITY TO MEET THE CURRENT COMMUNITY GENERATION DEMAND. THE SCOPE OF WORK INCLUDES REPLACEMENT OF GENERATION EQUIPMENT AND MAJOR RENOVATION OF MECHANICAL AND ELECTRICAL SYSTEMS.
3. THE EXTENT OF THE MODIFICATIONS TO THE POWER PLANT WHICH WILL RENDER IT UNAVAILABLE FOR PROVIDING COMMUNITY POWER DURING A SUBSTANTIAL PORTION OF THE CONSTRUCTION. A GRID-CONNECTED STANDBY GENERATOR (E-GEN) IS LOCATED AS INDICATED ON THE PLAN AND IS AVAILABLE FOR USE BY THE CONTRACTOR. IF THE CONTRACTOR CHOOSES TO USE THIS GENERATOR TO PROVIDE COMMUNITY POWER DURING CONSTRUCTION, IT WILL BE THEIR RESPONSIBILITY TO PROVIDE A MINIMUM OF TWO WEEKS NOTICE TO THE UTILITY PRIOR TO NEEDING IT. A COMMUNITY OUTAGE WILL BE REQUIRED WHEN SWITCHING FROM PRIME POWER TO STANDBY POWER. COORDINATE WORK SCHEDULE WITH THE UTILITY.



2 E1.2 OVERHEAD STEP UP TRANSFOMER BANK MODIFICATIONS
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

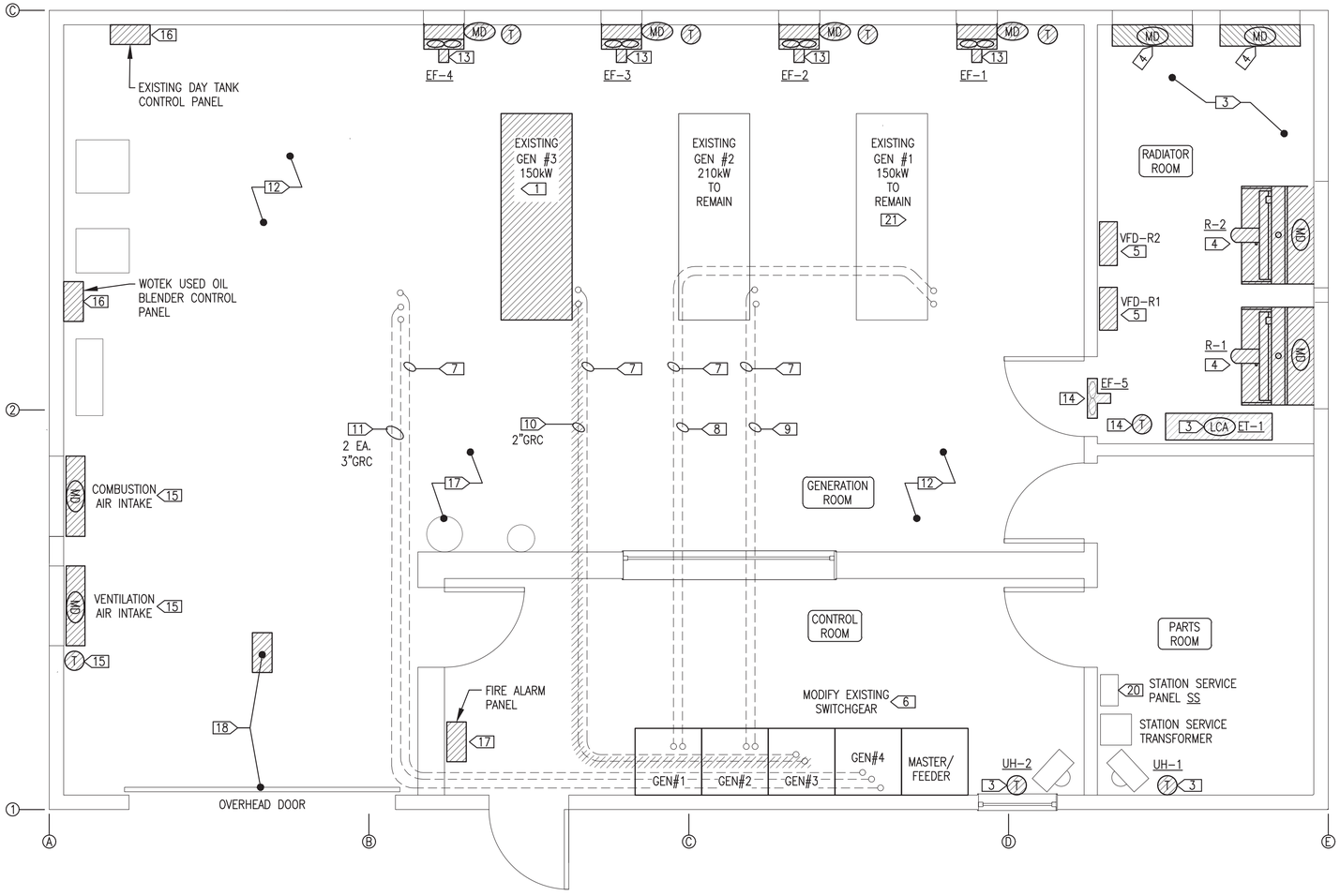
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ELECTRICAL SITE PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E1.2
PROJECT NUMBER:	



1 / E2 ELECTRICAL DEMOLITION PLAN
3/8"=1'-0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR DEMOLITION OR TEMPORARY REMOVAL. EXISTING EQUIPMENT AND DEVICES TO BE REMOVED INDICATED BY HATCHING.
2. ONLY GENERAL DEMOLITION TASKS AND AREAS SHOWN THIS SHEET. SEE NEW WORK PLANS AND DETAILS FOR ADDITIONAL INFORMATION ON LIMITS OF REMOVAL OF EQUIPMENT, DEVICES, CONDUIT AND CONDUCTORS.
3. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO GENERATION EQUIPMENT BEING REMOVED DURING DEMOLITION. TARP GENERATORS AND SEAL ALL EXPOSED CONNECTIONS PRIOR TO REMOVING FROM PLANT. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.

ELECTRICAL DEMOLITION SPECIFIC NOTES:

1. EXISTING GEN#3 TO BE REMOVED IN ITS ENTIRETY INCLUDING BATTERY CHARGER AND BATTERIES. SEE MECHANICAL FOR ADDITIONAL DEMOLITION NOTES.
2. SEE MECHANICAL
3. ENTIRE POWER PLANT ENGINE COOLANT, HEAT RECOVERY, AND PLANT HEAT SYSTEMS TO BE DEMOLISHED (SEE MECHANICAL). DISCONNECT AND REMOVE ALL GENERATION ROOM AND RADIATOR ROOM COOLANT, HEAT RECOVERY, AND PLANT HEAT EQUIPMENT CONDUCTORS, DISCONNECTS, TEMP SENSORS, LEVEL SENSORS, AND CONTROLLERS. REMOVE ALL ASSOCIATED CONDUCTORS BACK TO SOURCE. REMOVE ASSOCIATED RACEWAYS BACK TO WIREWAY AND PLUG UN-USED OPENINGS. UNIT HEATERS UH-1 AND UH-2 AND ASSOCIATED CONDUCTORS, AND DISCONNECTS TO REMAIN BUT REMOVE ASSOCIATED LINE VOLTAGE HEATING THERMOSTATS IN PREPARATION FOR REPLACEMENT.
4. EXISTING RADITAORS R-1 AND R-2 AND ASSOCIATED AIR INTAKE/DISCHARGE DAMPERS TO BE REMOVED IN THEIR ENTIRETY (SEE MECHANICAL). REMOVE ALL ASSOCIATED DISCONNECTS AND CONDUCTORS BACK TO SOURCE (VFD). REMOVE ASSOCIATED RACEWAYS BACK TO WIREWAY AND PLUG UN-USED OPENINGS.
5. EXISTING VFD's TO BE REMOVED IN THEIR ENTIRETY. DISCONNECT AND REMOVE ALL ASSOCIATED LOAD CONDUCTORS TO FAN MOTORS ALONG WITH ASSOCIATED RACEWAYS. EXISTING 208V 3-PHASE POWER SOURCE CONDUCTORS FROM PANELBOARD SS TO REMAIN FOR CONNECTION TO NEW VFD's.
6. REMOVE SWITCHGEAR COMPONENTS AS REQUIRED FOR UPGRADE.
7. ALL EXISTING GUNDERFLOOR 1-1/2" GRC CONTROL CONDUIT AND FLOOR PENETRATION FITTINGS TO REMAIN. ALL EXISTING CONTROL CONDUCTORS TO BE REMOVED AND REPLACED WITH NEW.
8. ALL EXISTING GEN#1 UNDERFLOOR POWER CONDUIT, FLOOR PENETRATION FITTINGS, AND POWER CONDUCTORS TO REMAIN.
9. ALL EXISTING GEN#2 UNDERFLOOR POWER CONDUIT, FLOOR PENETRATION FITTINGS, AND POWER CONDUCTORS TO REMAIN.
10. REMOVE EXISTING GEN#3 UNDERFLOOR 2" GRC POWER CONDUIT, FLOOR PENETRATION FITTINGS, AND CONDUCTORS FOR INSTALLATION OF NEW 3" GRC AND CONDUCTORS.
11. 2 EACH EXISTING EMPTY UNDERFLOOR 3" GRC POWER CONDUITS AND FLOOR PENETRATION FITTINGS TO REMAIN FOR INSTALLING NEW GEN#4 POWER CONDUCTORS.
12. REMOVE ALL EXISTING LIGHTS, CEILING FANS, AND FIRE DETECTION DEVICES FROM GENERATION ROOM CEILING IN PREPARATION FOR DEGREASING & CLEANING OF GENERATION ROOM CEILING SURFACES (SEE MECHANICAL DEMOLITION). INSTALL NEW LIGHTS AND FIRE DETECTION DEVICES AFTER CEILING SURFACES ARE CLEANED.
13. EXISTING FANS EF-1, 2, 3 & 4 AND ASSOCIATED DAMPERS TO BE REMOVED IN THEIR ENTIRETY (SEE MECHANICAL). REMOVE ASSOCIATED LINE VOLTAGE COOLING THERMOSTATS IN PREPARATION FOR INSTALLATION OF NEW DIGITAL THERMOSTATS. ALL OTHER ASSOCIATED RACEWAYS, DISCONNECTS AND CONDUCTORS TO REMAIN FOR RECONNECTION TO NEW EXHAUST FANS AND DAMPER ACTUATORS.
14. DEMOLISH EXISTING FAN EF-5 FOR REPLACEMENT WITH NEW. REMOVE ASSOCIATED LINE VOLTAGE COOLING THERMOSTAT FOR RECONFIGURATION TO RUN CONTINUOUS.
15. EXISTING COMBUSTION AND VENTILATION INTAKE AIR DAMPERS TO BE REMOVED IN THEIR ENTIRETY (SEE MECHANICAL). REMOVE VENTILATION AIR INTAKE LINE VOLTAGE COOLING THERMOSTAT IN PREPARATION FOR INSTALLATION OF NEW THERMOSTAT. ALL ASSOCIATED DISCONNECTS AND CONDUCTORS TO REMAIN FOR RECONNECTION TO THERMOSTAT AND DAMPER ACTUATORS.
16. ENTIRE EXISTING FUEL OIL DAY TANK FILL AND USED OIL BLENDING SYSTEMS TO BE DEMOLISHED (SEE MECHANICAL). DISCONNECT AND REMOVE ASSOCIATED CONTROL PANELS, EQUIPMENT, DEVICES, CIRCUITS, AND DISCONNECTS. REMOVE ALL ASSOCIATED CONDUCTORS BACK TO SOURCE. REMOVE ASSOCIATED RACEWAYS BACK TO WIREWAY AND PLUG UN-USED OPENINGS.
17. ENTIRE EXISTING CLEAN AGENT FIRE DETECTION, ALARM AND SUPPRESSION SYSTEM TO BE DEMOLISHED (SEE MECHANICAL). DISCONNECT AND REMOVE ASSOCIATED CONTROL PANEL, DEVICES, AND SENSORS. REMOVE ALL ASSOCIATED CONDUCTORS BACK TO SOURCE. ASSOCIATED RACEWAYS TO REMAIN WHERE REQUIRED FOR INSTALLATION OF NEW FIRE DETECTION AND ALARM DEVICES.
18. EXISTING OVERHEAD DOOR TO BE DEMOLISHED (SEE MECHANICAL). DISCONNECT AND REMOVE OPENER AND ASSOCIATED ELECTRICAL CIRCUIT IN PREPARATION FOR INSTALLATION OF NEW MANUAL DOOR OPENER.
19. SEE MECHANICAL.
20. MODIFY PANELBOARD CIRCUITS AND RE-LABEL CIRCUIT SCHEDULE. SEE SHEET E4.1.
21. CONVERT EXISTING 6068TFM85 ENGINE FROM 12VDC TO 24VDC. SEE SPECIFICATIONS.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

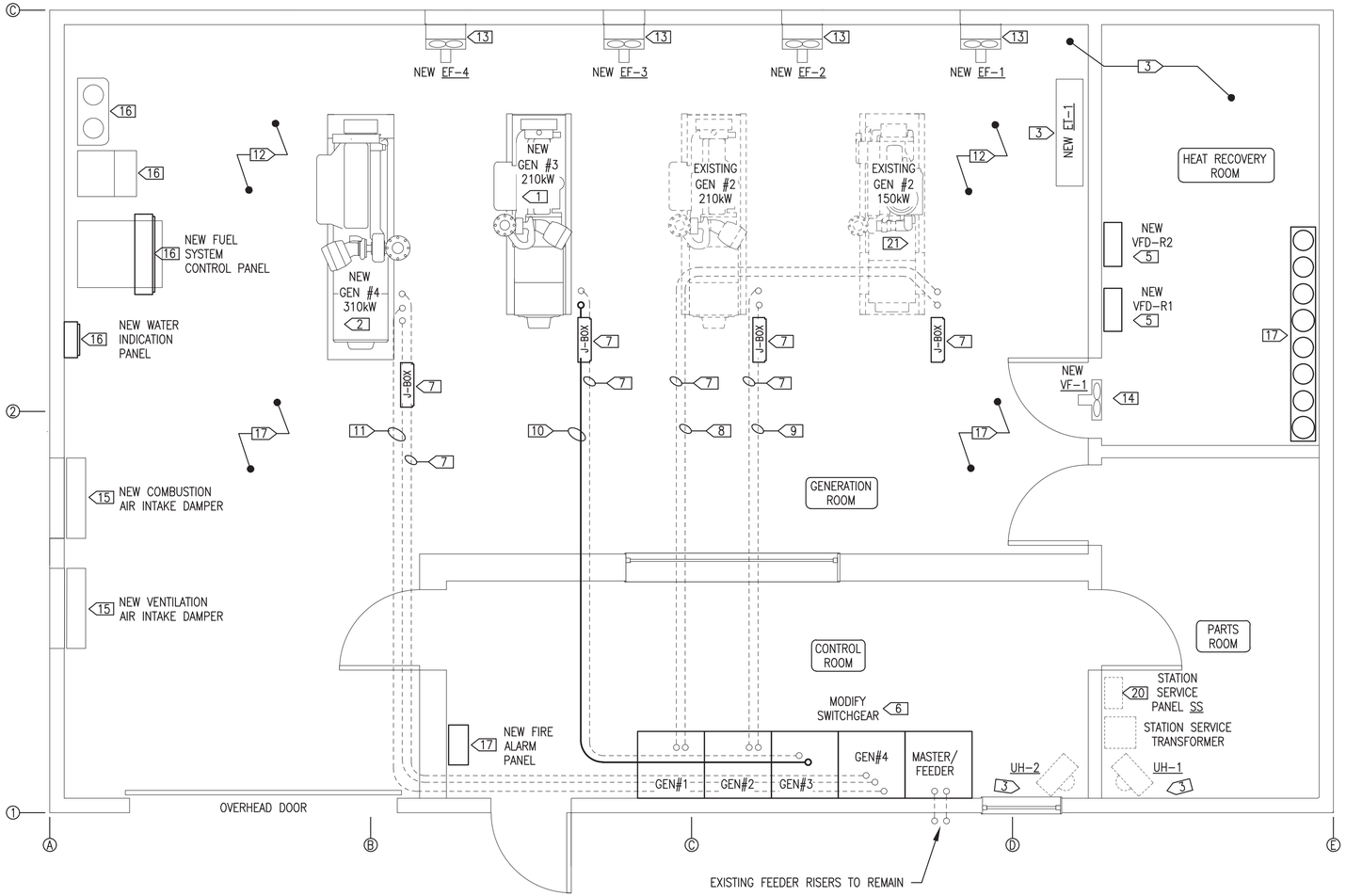
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ELECTRICAL DEMOLITION PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E2
PROJECT NUMBER:	



1 E3.1 ELECTRICAL NEW WORK OVERVIEW
3/8"=1'-0"

ELECTRICAL NEW WORK GENERAL NOTES:

1. EXISTING EQUIPMENT AND RACEWAYS TO REMAIN IN SERVICE SHOWN WITH LIGHT DASHED LINES.
2. NEW EQUIPMENT AND RACEWAYS SHOWN WITH DARK SOLID LINES.
3. NOT ALL EXISTING EQUIPMENT AND RACEWAYS SHOWN. SEE ATTACHED RECORD DRAWINGS OF ORIGINAL POWER PLANT CONSTRUCTION FOR ADDITIONAL DETAIL ON SYSTEMS NOT BEING MODIFIED.
4. ONLY MAJOR NEW WORK ITEMS SHOWN THIS SHEET. SEE NEW WORK PLANS AND DETAILS FOR ADDITIONAL DETAIL.
5. SEE SHEETS E3.1–3.3 FOR NEW WORK OVERVIEW, ELECTRICAL EQUIPMENT LAYOUT, UNDER FLOOR GENERATOR FEEDER & CONTROLS, ELEVATIONS, AND DETAILS.
6. SEE SHEETS E4.1–4.2 FOR STATION SERVICE AND LIGHTING MODIFICATION PLANS.
7. SEE SHEET E5 FOR DATA/CONTROL MODIFICATION PLANS.
8. SEE SHEETS E6.1–6.5 FOR SWITCHGEAR MODIFICATIONS, VFD PANELS, AND NEW GENERATOR J–BOXES.
9. SEE SHEETS E7.1–7.3 FOR DAY TANK CONTROL PANELS.
10. SEE SHEETS FS1 AND FS2 FOR FIRE DETECTION, ALARM, AND SUPPRESSION.

ELECTRICAL NEW WORK SPECIFIC NOTES:

1. INSTALL NEW GEN#3 WITH ASSOCIATED ENGINE WIRING J–BOX, BATTERY CHARGER, AND BATTERIES. CONNECT NEW POWER AND CONTROL CONDUCTORS. COORDINATE WITH MECHANICAL.
2. INSTALL NEW GEN#4 WITH ASSOCIATED ENGINE WIRING J–BOX, BATTERY CHARGER, AND BATTERIES. CONNECT NEW POWER AND CONTROL CONDUCTORS. COORDINATE WITH MECHANICAL.
3. INSTALL NEW AND/OR EXISTING POWER, CONTROL, AND SENSING CIRCUITS FOR NEW ENGINE COOLING, HEAT RECOVERY, AND PLANT HEAT EQUIPMENT AND DEVICES IN GENERATION ROOM AND HEAT RECOVERY ROOM. INSTALL NEW UNIT HEAT THERMOSTATS.
4. INSTALL NEW POWER, CONTROL, AND SENSING CIRCUITS FOR NEW EXTERIOR RADIATORS.
5. INSTALL NEW 208V RADIATOR VFD's IN HEAT RECOVERY ROOM.
6. PERFORM SWITCHGEAR UPGRADE. SEE SHEET E6.1.
7. INSTALL NEW ENGINE J–BOX AT ALL GENSETS AND PULL NEW CONTROL CONDUCTORS IN EXISTING UNDERFLOOR GRC. SEE SHEET E6.3.
8. EXISTING GEN#1 POWER CONDUCTORS IN EXISTING CONDUIT TO REMAIN. SEE SHEET E3.2.
9. EXISTING GEN#2 POWER CONDUCTORS IN EXISTING CONDUIT TO REMAIN. SEE SHEET E3.2.
10. NEW GEN#3 POWER CONDUCTORS AND NEW CONDUIT. SEE SHEET E3.2.
11. NEW GEN#4 POWER CONDUCTORS IN EXISTING CONDUIT. SEE SHEET E3.2.
12. INSTALL ALL REQUIRED NEW LIGHTS, MISCELLANEOUS RACEWAY, AND FIRE DETECTION DEVICES ON GENERATION ROOM CEILING AFTER DEGREASING/CLEANING (SEE MECHANICAL DEMOLITION TASK 12).
13. INSTALL NEW LINE VOLTAGE COOLING THERMOSTATS AND CONNECT EXISTING CONDUCTORS TO 4 EACH NEW EXHAUST FANS AND DAMPER ACTUATORS.
14. RECONNECT NEW FAN FAN EF–5 TO EXISTING DISCONNECT AND CIRCUIT WITHOUT THERMOSTAT. FAN TO RUN CONTINUOUS TO PROVIDE BOTH HEATING AND COOLING FOR HEAT RECOVERY ROOM.
15. RECONNECT EXISTING CONDUCTORS TO NEW DAMPER ACTUATORS AFTER INSTALLING NEW LINE VOLTAGE THERMOSTAT, EXISTING DISCONNECTS TO REMAIN.
16. INSTALL NEW FUEL SYSTEM CONTROL PANEL, WATER INDICATION PANEL AND ALL ASSOCIATED POWER AND CONTROL CIRCUITS FOR NEW DAY TANK AND NEW USED OIL BLENDER.
17. INSTALL NEW FIRE DETECTION, ALARM AND SUPPRESSION SYSTEM CONTROL PANEL AND DEVICES. SEE SHEETS FS1 AND FS2.
18. SEE MECHANICAL.
19. SEE MECHANICAL.
20. MODIFY PANELBOARD CIRCUITS AND RE–LABEL CIRCUIT SCHEDULE. SEE SHEET E4.1.
21. CONVERT EXISTING 6068TFM85 ENGINE FROM 12VDC TO 24VDC. SEE SPECIFICATIONS.

ENGINE GENERATOR SCHEDULE

GENSET	DESCRIPTION
GEN #1 (EXISTING)	ENGINE – 223 HP, 150 EKW PRIME, JOHN DEERE 6068AFM85, TIER 3 MARINE. 12 VDC STARTING & CONTROL. GENERATOR – 150KW CONTINUOUS AT 105°C RISE, MARATHON 431PSL6254
GEN #2 (EXISTING)	ENGINE – 298 HP, 210 EKW PRIME, JOHN DEERE 6090AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – 260KW CONTINUOUS AT 105°C RISE, MARATHON 432PSL6210.
GEN #3 (NEW OWNER FURNISHED)	ENGINE – 298 HP, 210 EKW PRIME, JOHN DEERE 6090AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD S4L1D–D41.
GEN #4 (NEW OWNER FURNISHED)	ENGINE – 447 HP, 310 EKW PRIME, JOHN DEERE 6135AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 270 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD S4L1D–F41.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

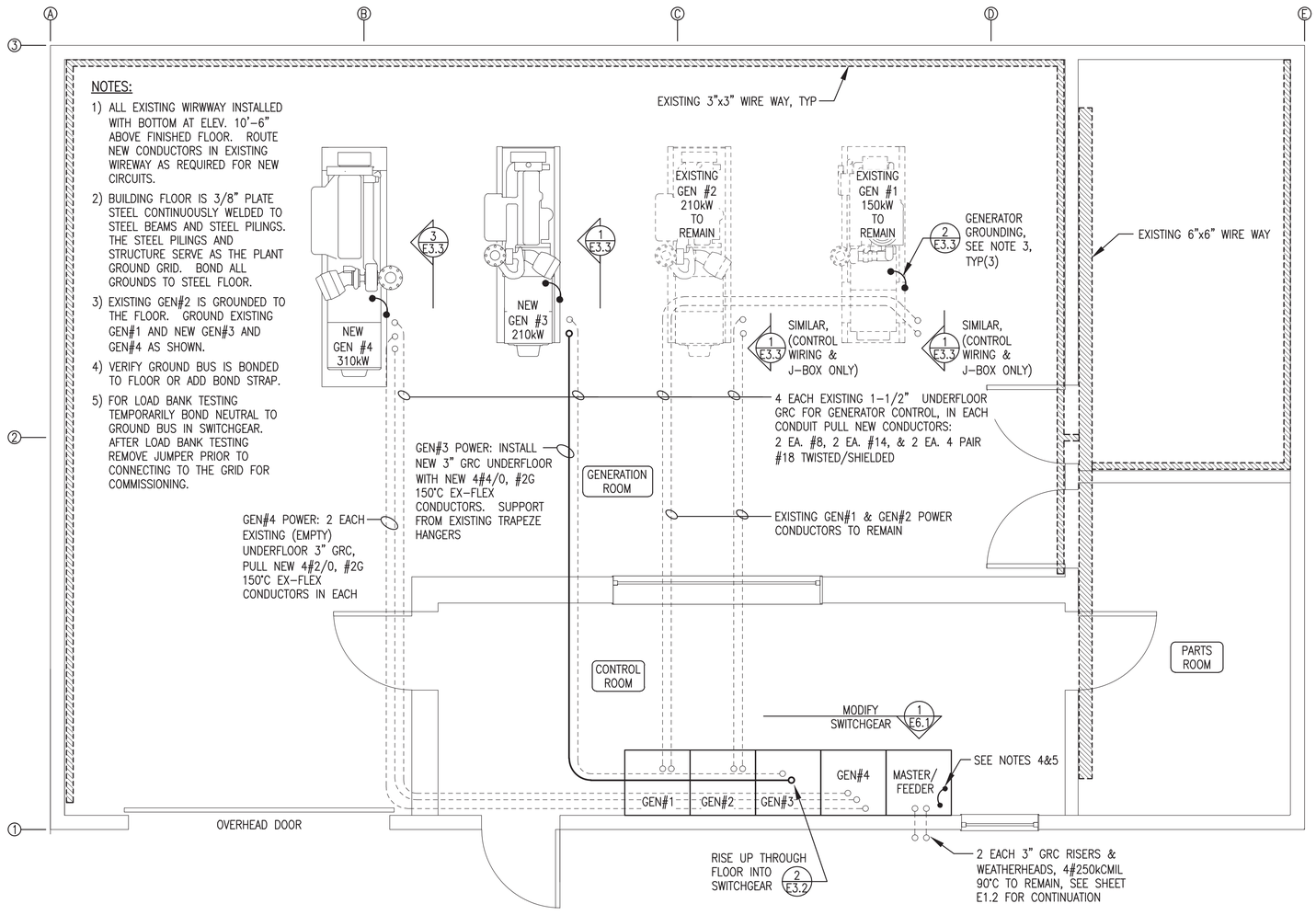
TITLE: ELECTRICAL NEW WORK PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 11/24/25
FILE NAME: | SHEET: E3.1
PROJECT NUMBER:

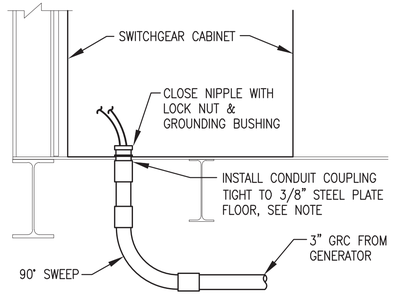
NOTES:

1) ALL EXISTING WIRWWAY INSTALLED WITH BOTTOM AT ELEV. 10'-6" ABOVE FINISHED FLOOR. ROUTE NEW CONDUCTORS IN EXISTING WIREWAY AS REQUIRED FOR NEW CIRCUITS.
2) BUILDING FLOOR IS 3/8" PLATE STEEL CONTINUOUSLY WELDED TO STEEL BEAMS AND STEEL PILINGS. THE STEEL PILINGS AND STRUCTURE SERVE AS THE PLANT GROUND GRID. BOND ALL GROUNDS TO STEEL FLOOR.
3) EXISTING GEN#2 IS GROUNDED TO THE FLOOR. GROUND EXISTING GEN#1 AND NEW GEN#3 AND GEN#4 AS SHOWN.
4) VERIFY GROUND BUS IS BONDED TO FLOOR OR ADD BOND STRAP.
5) FOR LOAD BANK TESTING TEMPORARILY BOND NEUTRAL TO GROUND BUS IN SWITCHGEAR. AFTER LOAD BANK TESTING REMOVE JUMPER PRIOR TO CONNECTING TO THE GRID FOR COMMISSIONING.



1 E3.2 GROUNDING, UNDERFLOOR CONDUIT, & EXISTING WIREWAY PLAN
3/8"=1'-0"

NOTE: AFTER REMOVAL OF EXISTING 2" GRC, ENLARGE EXISTING HOLE THROUGH 3/8" STEEL PLATE FLOOR FOR NEW 3" GRC.



EXISTING FLOOR PENETRATION

2 E3.2 SWITCHGEAR BOTTOM ENTRANCE
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: GROUNDING, UNDERFLOOR CONDUIT, & EXISTING WIREWAY PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 11/24/25
FILE NAME: | SHEET: E3.2
PROJECT NUMBER:

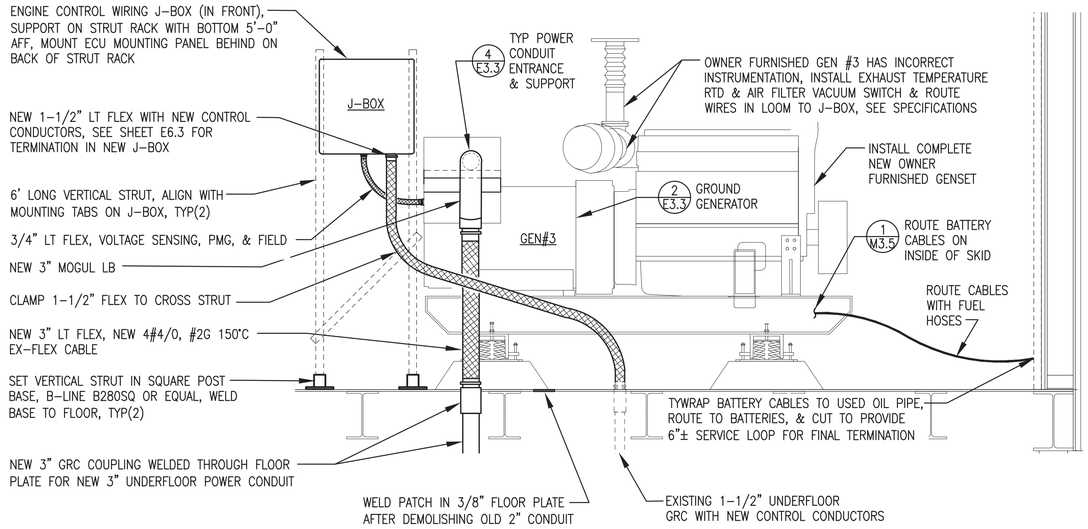
REMOVE EXISTING GENSET, SKID & SUPPORT PEDESTALS IN THEIR ENTIRETY, SEE MECHANICAL

DEMOLISH ALL EXISTING ABOVE FLOOR 1-1/2" CONTROL CONDUIT, FITTINGS, & ALL CONTROL CONDUCTORS BACK TO SWITCHGEAR

EXISTING 1-1/2" UNDERFLOOR CONTROL CONDUIT & 1-1/2" COUPLING THROUGH FLOOR PLATE TO REMAIN

DEMOLISH EXISTING 2" UNDERFLOOR POWER CONDUIT, 2" COUPLING THROUGH FLOOR PLATE, 2-1/2" FLEX RISER, MOGUL, & ALL GEN#3 POWER CONDUCTORS BACK TO SWITCHGEAR

EXISTING GEN#3 PRIOR TO DEMOLITION

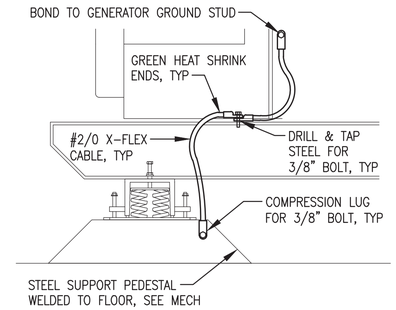


NEW GEN#3 CONDUIT ENTRANCE ELEVATION

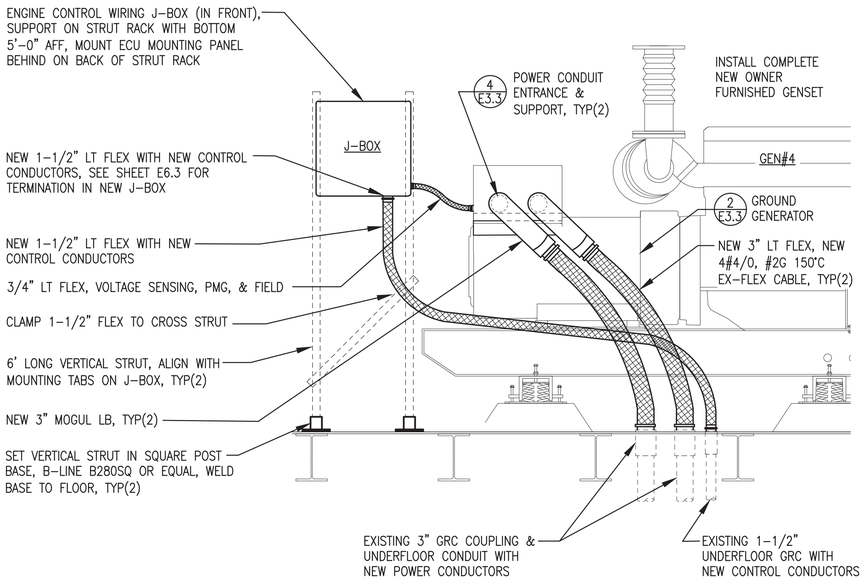
1 E3.3 GEN#3 POWER & CONTROL CONDUIT ENTRANCES
3/4"=1'

EXISTING GEN#1 & GEN#2 WIRING NOTES:

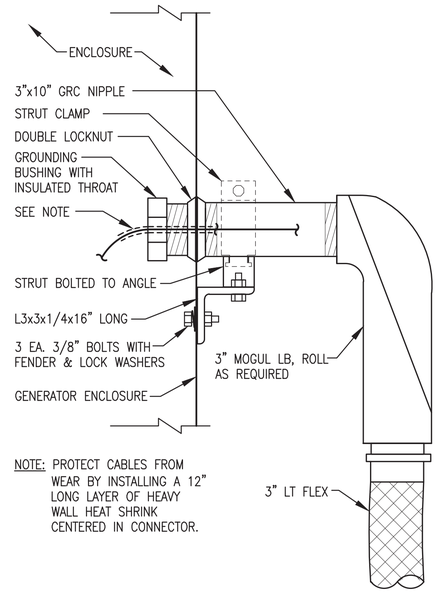
1. EXISTING GEN#1 & #2 POWER CONDUIT & CONDUCTORS ARE TO REMAIN UNCHANGED.
2. ON EXISTING GEN#1 & #2 INSTALL NEW CONTROL WIRING J-BOX, STRUT RACK, CONDUIT, & CONDUCTORS SIMILAR TO GEN #3.
3. ON EXISTING GEN#1 & #2 INSTALL EXHAUST TEMPERATURE RTD & AIR FILTER VACUUM SWITCH & ROUTE WIRES IN LOOM TO J-BOX SIMILAR TO GEN #3.



2 E3.3 TYPICAL GENERATOR GROUNDING
NO SCALE

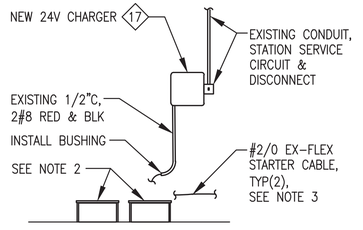


3 E3.3 GEN#4 POWER & CONTROL CONDUIT ENTRANCES
3/4"=1'



4 E3.3 GENERATOR POWER CONDUIT ENTRANCE & SUPPORT
NO SCALE

NEW CHARGER SETTINGS:
- AC LINE VOLTAGE SWITCH TO "115V".
- AUTO BOOST JUMPER TO "NORM".
- FLOAT VOLTAGE JUMPER TO "13.50/27.00" (GEL CELL).
- BATTERY RANGE JUMPER TO "24V".



NOTES:
1. FURNISH AND INSTALL NEW BATTERY CHARGER FOR GEN #1, #3, AND #4.
2. TWO EACH NEW BATTERIES WILL BE OWNER FURNISHED FOR GEN #1, #3, AND #4. INSTALL IN EXISTING RACK.
3. #2/0 BATTERY CABLES WILL BE OWNER FURNISHED WITH GENSET. ROUTE FROM FRONT OF SKID DIRECTLY UNDER FUEL HOSES TO WALL AND TYWRAP TO FUEL PIPES ALONG WALL. CUT TO PROVIDE 6"± SERVICE LOOP FOR FINAL TERMINATION ON BATTERIES. CONNECT TO BATTERIES WITH STRAIGHT CRIMP TERMINAL FITTINGS AND TOP MOUNT TERMINAL COVERS, POLAR WIRE OR EQUAL.

5 E3.3 GEN#2, GEN#3, & GEN#4 BATTERIES & CHARGER INSTALLATION
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

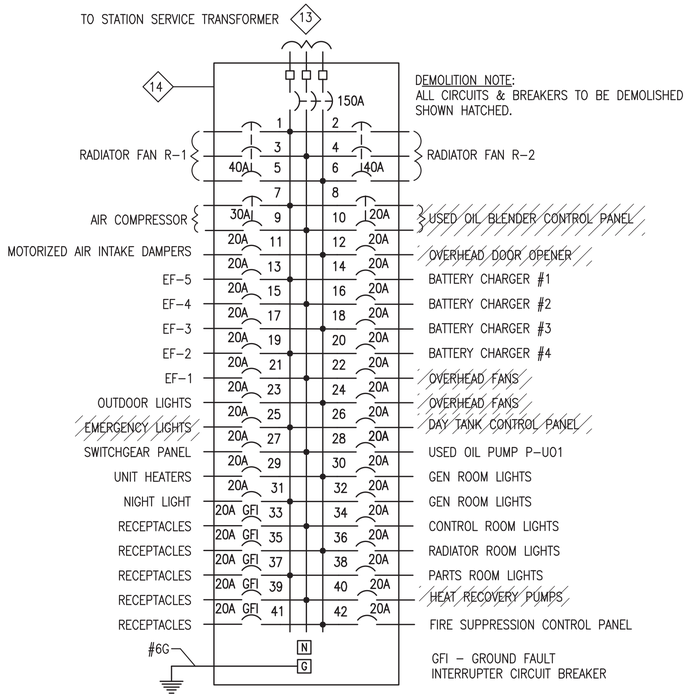
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: ELEVATIONS & DETAILS

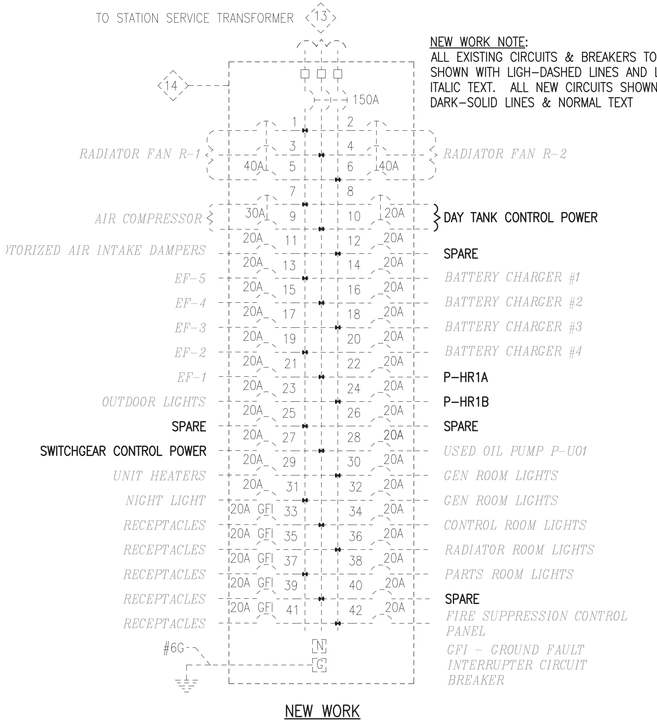
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E3.3
PROJECT NUMBER:	



DEMOLITION NOTE:
ALL CIRCUITS & BREAKERS TO BE DEMOLISHED SHOWN HATCHED.

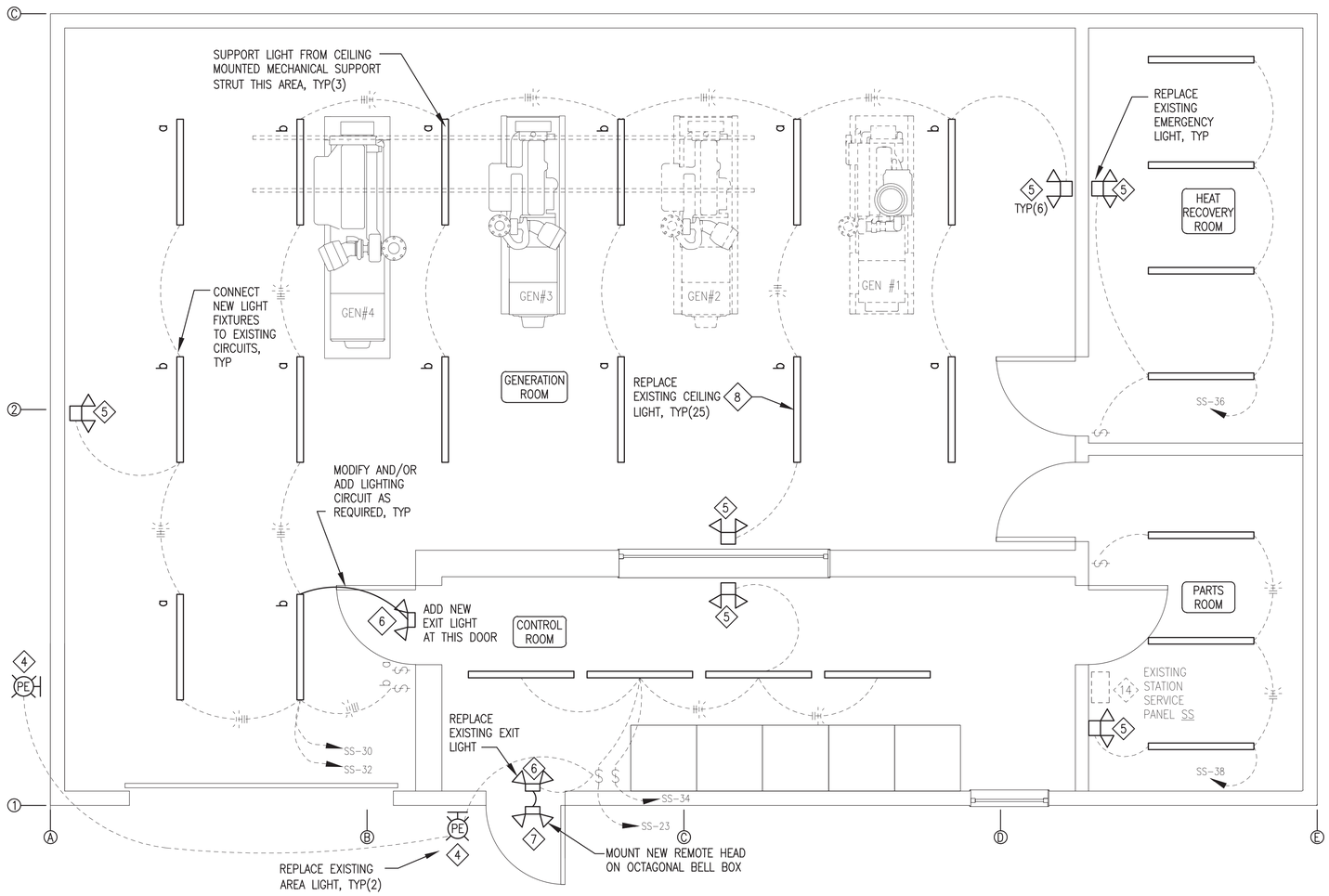
DEMOLITION



NEW WORK NOTE:
ALL EXISTING CIRCUITS & BREAKERS TO REMAIN SHOWN WITH LIGH-DASHED LINES AND LIGHT ITALIC TEXT. ALL NEW CIRCUITS SHOWN WITH DARK-SOLID LINES & NORMAL TEXT

NEW WORK

1 E4.1 STATION SERVICE PANELBOARD SS MODIFICATIONS
NO SCALE



2 E4.1 LIGHTING MODIFICATION PLAN
3/8"=1'-0"

LIGHTING MODIFICATION NOTES:

1. SEE DEMOLITION NOTES SHEET E2 FOR ALL WORK PRIOR TO PERFORMING THESE MODIFICATIONS.
2. ALL EXISTING CIRCUITS AND DEVICES PROPOSED TO REMAIN SHOWN WITH LIGHT-DASHED LINES. ALL PROPOSED NEW CIRCUITS AND DEVICES SHOWN WITH DARK-SOLID LINES. NOTE THAT EXISTING CIRCUITS WERE NOT FIELD VERIFIED FOR DESIGN. TRACE OUT CIRCUITS AND ADJUST WIRING AS REQUIRED.
3. ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.
4. FASTEN NEW INTERIOR LIGHTS TO CEILING WITH #12 WOOD SCREWS UNLESS SPECIFICALLY INDICATED OTHERWISE.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

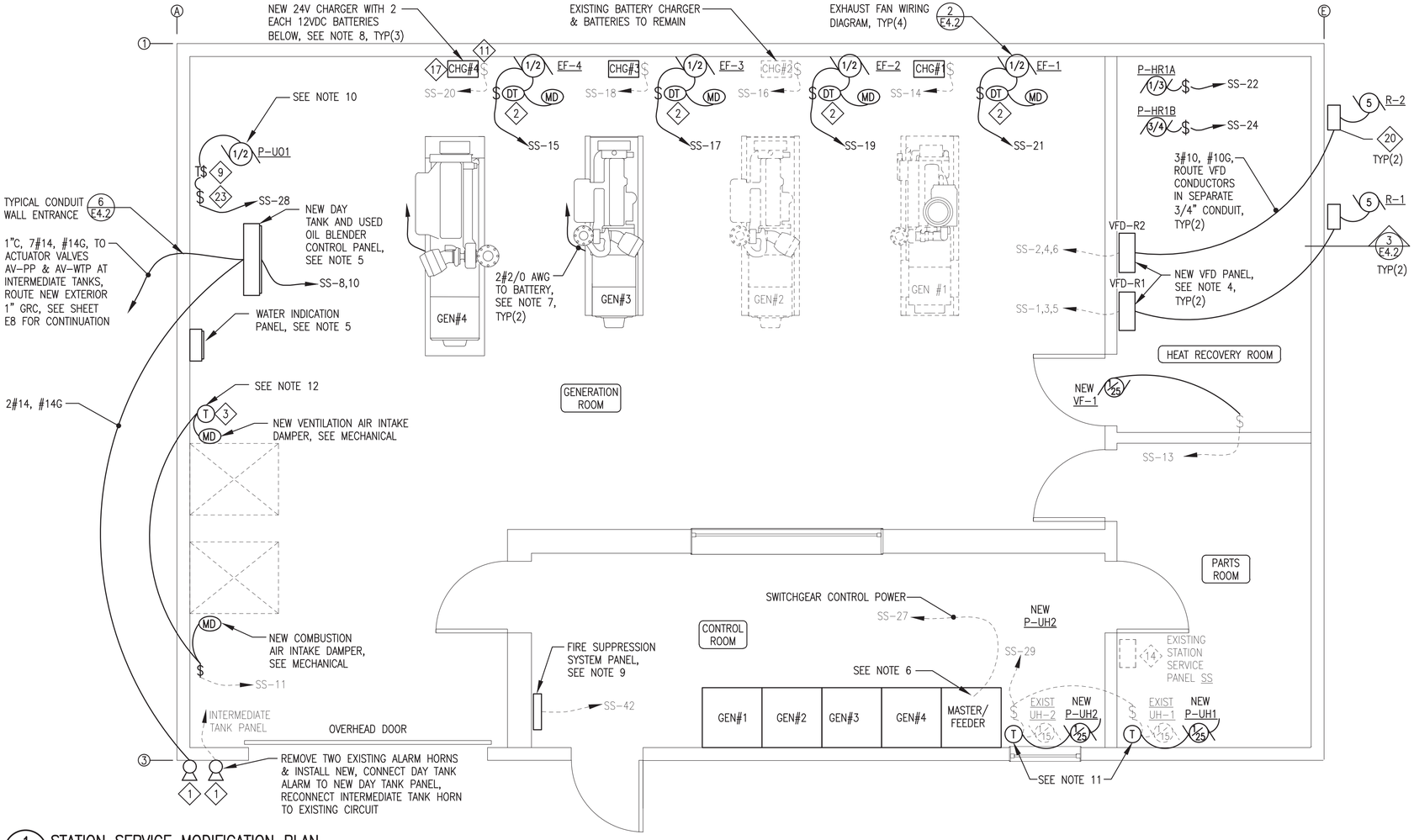
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

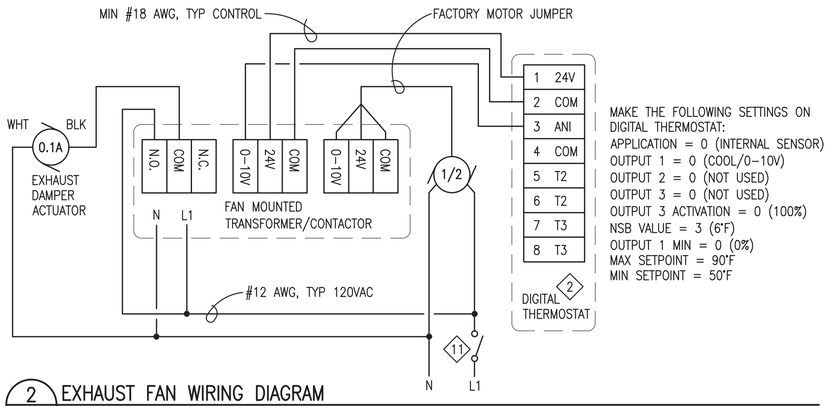
TITLE: STATION SERVICE PANEL SS & LIGHTING MODIFICATION PLAN

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

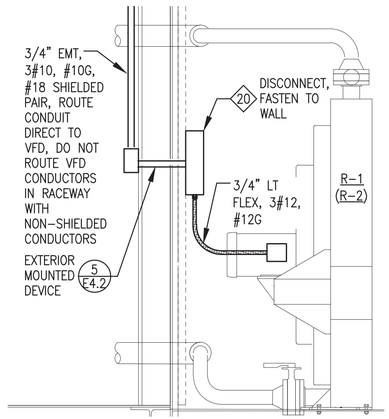
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E4.1
PROJECT NUMBER:	



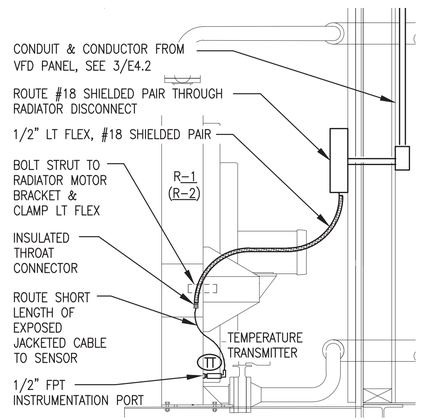
1 E4.2 STATION SERVICE MODIFICATION PLAN
3/8"=1'-0"



2 E4.2 EXHAUST FAN WIRING DIAGRAM
NO SCALE



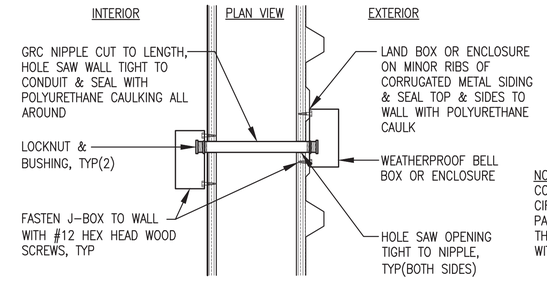
3 E4.2 RADIATOR VFD POWER CONNECTION
NO SCALE



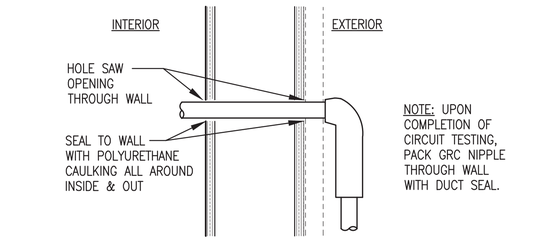
4 E4.2 RADIATOR TEMP TRANSMITTER
NO SCALE

STATION SERVICE MODIFICATION NOTES:

1. SEE DEMOLITION NOTES SHEET E2 FOR ALL WORK PRIOR TO PERFORMING THESE MODIFICATIONS.
2. ALL EXISTING CIRCUITS AND DEVICES PROPOSED TO REMAIN SHOWN WITH LIGHT-DASHED LINES. ALL PROPOSED NEW CIRCUITS AND DEVICES SHOWN WITH DARK-SOLID LINES. NOTE THAT EXISTING CIRCUITS WERE NOT FIELD VERIFIED FOR DESIGN. TRACE OUT CIRCUITS AND ADJUST WIRING AS REQUIRED.
3. ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.
4. SEE SHEET E4.3 FOR VFD PANEL DESIGN AND WIRING TERMINATIONS.
5. SEE SHEETS E7.1-E7.4 FOR DAY TANK CONTROL PANEL AND WATER INDICATION PANEL DESIGNS AND WIRING TERMINATIONS. ALL ACCESSORIES NOT SHOWN ON PLANS. SEE LOGIC DIAGRAMS FOR ADDITIONAL DETAIL. SEE SHEET E5 FOR ASSOCIATED INSTRUMENTATION AND DATA WIRING.
6. SEE SWITCHGEAR MODIFICATION DRAWINGS FOR TERMINATION OF ALL POWER AND CONTROL WIRING.
7. ROUTE BATTERY CABLES TO FRONT OF SKID SUPPORTED WITH CUSHIONED CLAMPS, SEE DETAIL 1/M3.5. ROUTE FROM SKID DIRECTLY UNDER FUEL HOSES TO WALL AND TYWRAP CABLES TO USED OIL PIPE ALONG WALL. CUT TO PROVIDE 6"± SERVICE LOOP FOR FINAL TERMINATION ON BATTERIES.
8. MOUNT BATTERY CHARGER TO WALL AND INSTALL BATTERIES IN RACK ON FLOOR BELOW, SEE DETAIL 5/E3.3.
9. REPLACE EXISTING FIRE SUPPRESSION PANEL WITH NEW. SEE FIRE SYSTEM MODIFICATIONS SHEETS FS1 AND FS2 FOR ALL FIRE SYSTEM WORK THIS PROJECT.
10. NEW PUMP UO2, TIMER AND DISCONNECT WITH OVERLOAD INSTALLED THIS PROJECT ON EXISTING CIRCUIT. REUSE EXISTING CONDUCTORS AND RACEWAY TO THE MAXIMUM EXTENT POSSIBLE.
11. REPLACE EXISTING THERMOSTAT WITH NEW AND SET TO HEATING MODE, 65F.
12. REPLACE EXISTING THERMOSTAT WITH NEW AND SET TO COOLING MODE, 70F.



5 E4.2 TYP EXTERIOR WALL-MOUNT DEVICE
NO SCALE



6 E4.2 TYP CONDUIT WALL PENETRATION
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

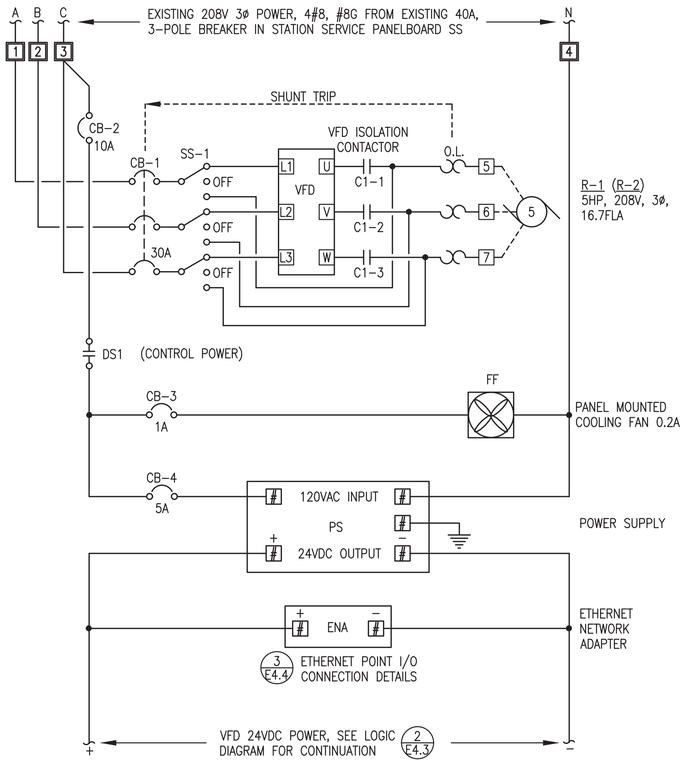
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

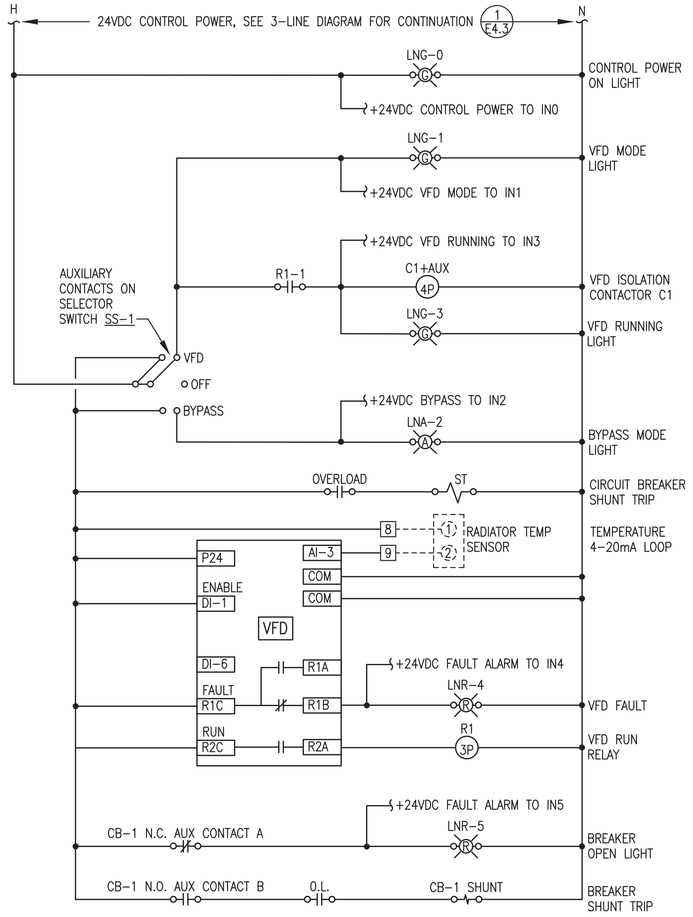
TITLE: STATION SERVICE MODIFICATION PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

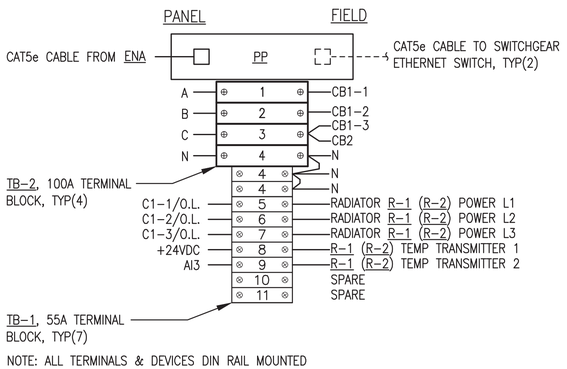
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E4.2
PROJECT NUMBER:	



1 E4.3 RADIATOR VFD THREE-LINE DIAGRAM
NO SCALE



2 E4.3 RADIATOR VFD LOGIC DIAGRAM
NO SCALE



NOTE: ALL TERMINALS & DEVICES DIN RAIL MOUNTED

3 E4.3 TERMINAL STRIP
NO SCALE

BILL OF MATERIALS

TAG	MANUFACTURER	MODEL	DESCRIPTION
C	ALLEN-BRADLEY	100-C23EJ10	5HP, 208V, 23A, 3ø, MOTOR CONTACTOR, 24VDC COIL, 4P
CB1	ALLEN-BRADLEY	1489-M3D300	30A, 3P, RAIL MOUNT CIRCUIT BREAKER
	ALLEN-BRADLEY	1489-AMRA3	AUXILIARY CONTACT 1A/1B
	ALLEN-BRADLEY	1489-AMST2	SHUNT TRIP, 24VDC
CB2	ALLEN-BRADLEY	1489-M1C100	10A, 1P, RAIL MOUNT CIRCUIT BREAKER
CB3	ALLEN-BRADLEY	1489-M1C010	1A, 1P, RAIL MOUNT CIRCUIT BREAKER
CB4	ALLEN-BRADLEY	1489-M1C050	5A, 1P, RAIL MOUNT CIRCUIT BREAKER
ENA	ALLAN-BRADLEY	1734-AENT	AB POINT I/O ETHERNET NETWORK ADAPTER WITH MODULES:
DI8	ALLAN-BRADLEY	1734-IB8	DIGITAL INPUT MODULE, 24VDC, 8 POINT, SINKING
DS	ALLEN-BRADLEY	194LE201753	DISCONNECT, 2 POSITION, 3 N.O., 20A, FACE MOUNT
	ALLEN-BRADLEY	194LHC4E1751	KNOB ACTUATOR FOR LOAD SWITCH, ON/OFF, LOCKABLE
FF	HAMMOND	PF22000T12LG	FILTER FAN (INTAKE AIR) WITH FILTER AND GRILLE
	HAMMOND	PFA2000LG	EXHAUST AIR FILTER GRILLE
G	BLACKBURN	ADR2	SCREW TERMINAL GROUND LUG FOR UP TO #2AWG
LNA	ALLEN-BRADLEY	800HQRH2A	AMBER LED PILOT LIGHT, 12-130V, NEMA 4X
LNG	ALLEN-BRADLEY	800HQRH2G	GREEN LED PILOT LIGHT, 12-130V, NEMA 4X
LNR	ALLEN-BRADLEY	800HQRH2R	RED LED PILOT LIGHT, 12-130V, NEMA 4X
OL	ALLEN BRADLEY	193-ED1EB	3ø OVERLOAD, ADJUSTABLE 5.4-27A RANGE
	ALLEN BRADLEY	193-EPB	OVERLOAD DIN RAIL ADAPTER
PP	PHOENIX CONTACT	FLPPRJ45/RJ45	ETHERNET PATCH PANEL, RJ45xRJ45, DIN RAIL MOUNT
PS	PULS	CP.241-S1	5A, 120VAC/24VDC POWER SUPPLY
R	ALLEN-BRADLEY	700-HA33A1	3PDT RELAY, 11 PIN, 10A, 120V COIL
	ALLEN-BRADLEY	700-HN101	11 PIN SOCKET BASE
SS1	SALZER	H22671322013V1	CHANGE-OVER SWITCH, 3P, 32A, 600V, 4 N.O. AUX CONTACTS
TB-1	ALLEN-BRADLEY	1492-CAM1L	55A, 600V, LARGE-HEAD SCREW TERMINALS
TB-2	ALLEN-BRADLEY	1492-CD2	100A, 600V, LARGE-HEAD SCREW TERMINALS
VFD	SQUARE D	ATV320U40M3C	ALTIVAR ATV320 5 HP, 208V, 3ø VARIABLE FREQUENCY DRIVE
	SQUARE D	VW3A1101	ALTIVAR ATV320 VFD DISPLAY
	SQUARE D	VW3A1102	ALTIVAR ATV320 VFD DISPLAY MOUNT
	SQUARE D	VW3A3616	ALTIVAR ATV320 VFD MODBUS TCP/IP CARD

LEGEND

- R# — CONTROL RELAY
- C# — CONTACTOR
- PB-# — NORMALLY OPEN MOMENTARY PUSH BUTTON
- R#-# — NORMALLY OPEN CONTACT
- SS-# — 2-POSITION SELECTOR SWITCH
- R#-# — NORMALLY CLOSED CONTACT
- O.L. — OVERLOADS
- PB-# — NORMALLY CLOSED MOMENTARY PUSH BUTTON
- # — 100A TERMINAL BLOCK
- # — 55A TERMINAL BLOCK
- PANEL WIRING
- FIELD WIRING
- CB-# — CIRCUIT BREAKER

ISSUED FOR AEA PROJECT CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

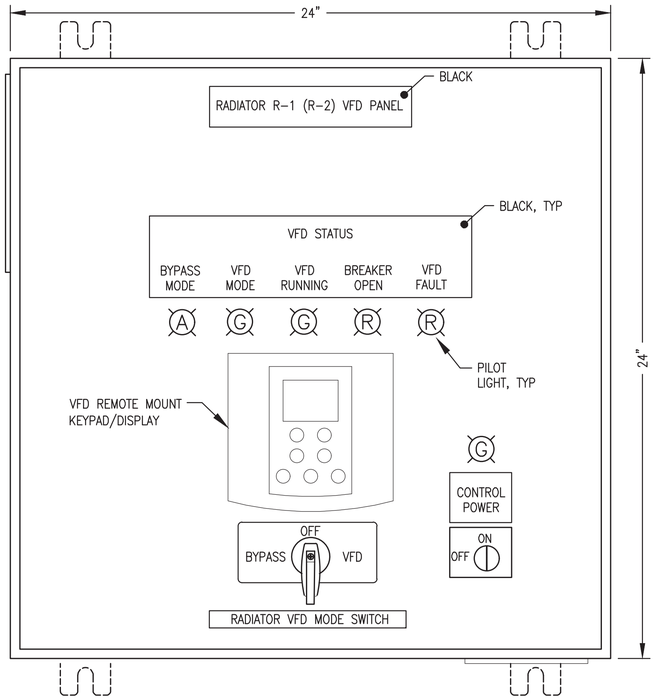
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

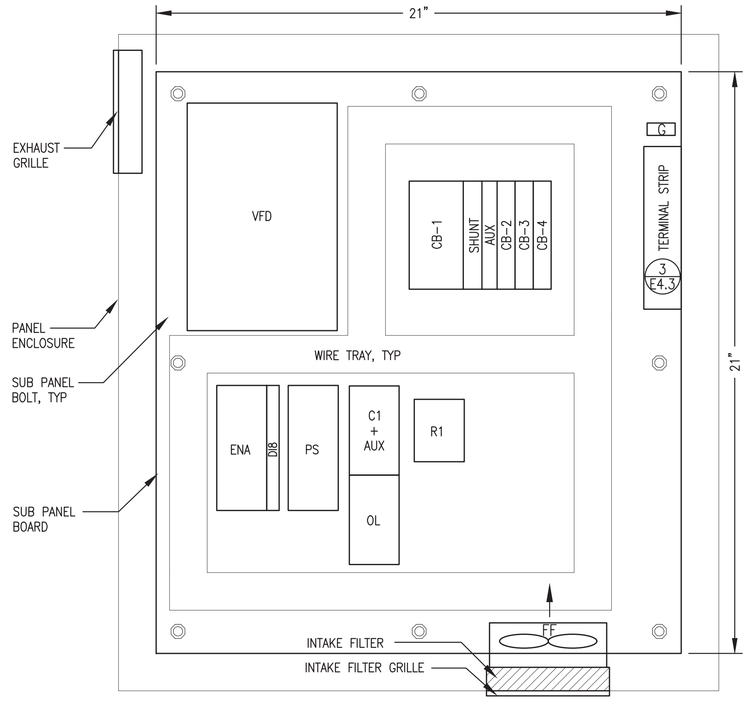
TITLE: RADIATOR VFD PANEL WIRING DIAGRAMS & BILL OF MATERIALS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

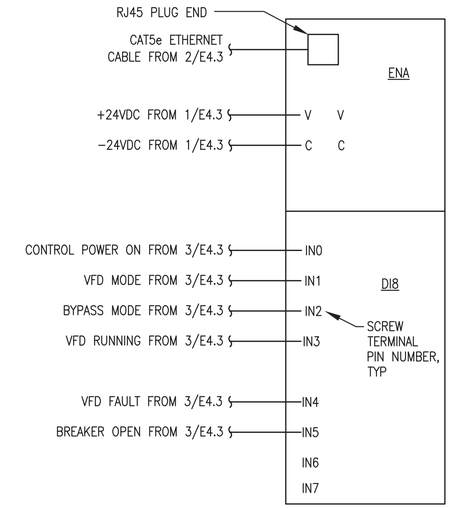
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E4.3
PROJECT NUMBER:	



1 E4.4 FRONT PANEL LAYOUT
NO SCALE



2 E4.4 SUB PANEL LAYOUT
NO SCALE



3 E4.4 ETHERNET POINT I/O CONNECTIONS
NO SCALE

SHOP FABRICATION NOTES:

1) PROVIDE TWO EACH COMPLETE LISTED PANEL ASSEMBLIES WITH ALL DEVICES INDICATED IN LOGIC DIAGRAM EXCEPT FOR FIELD DEVICES. FIELD DEVICES ARE INDICATED BY LIGHT DASHED LINES. FIELD WIRING AND FIELD INSTALLED DEVICES PROVIDED BY OTHERS ARE SHOWN FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT PART OF THE SHOP FABRICATION SCOPE. LABEL ONE PANEL "RADIATOR R-1 VFD PANEL" AND LABEL ONE PANEL "RADIATOR R-2 VFD PANEL".

2) INSTALL IN A 24x24"x12" NEMA 12 ENCLOSURE, MIN 14 GAUGE STEEL CONSTRUCTION WITH WITH 4 EACH INTEGRAL MOUNTING LUGS AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL, AND HINGED LOCKABLE DOOR. PAINT ENCLOSURE ANSI 61 GRAY AND PAINT BACK PANEL WHITE.

3) TAG EACH END OF ALL JUMPERS WITH DEVICE OR TERMINATION DESIGNATOR OF LANDING OF OPPOSITE END OF JUMPER (REVERSE ADDRESS).

4) LABEL ALL PANEL DEVICES ON BASE OR BACK PANEL ADJACENT TO ITEM. LABEL REMOTE EQUIPMENT CONNECTIONS AT EACH TERMINAL BLOCK BY THE ITEM TITLE AS SHOWN ON THE FIELD SIDE OF THE TERMINAL STRIP DRAWING.

5) PROVIDE BEVELED EDGE WHITE CORE NAMEPLATES, FACE COLOR AS INDICATED. SECURE TO PANEL FACE WITH A MINIMUM OF TWO MOUNTING SCREWS.

6) PROGRAM THE VFD IN STANDARD (MATERIAL HANDLING) MODE WITH SETPOINTS AS INDICATED THIS SHEET.

7) BENCH TEST COMPLETED UNIT. PROVIDE A SIGNED AND DATED BENCH TEST REPORT VERIFYING ALL FUNCTIONS. RED-LINE DESIGN DRAWINGS AS REQUIRED TO INDICATE AS-BUILT CONSTRUCTION AND RETURN TO ENGINEER.

FIELD INSTALLATION NOTES:

1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS. LABEL BOTH ENDS OF ALL CONDUCTORS WITH PANEL TERMINAL BLOCK TERMINATION NUMBERS.

2) ADJUST PUMP VFD OVERLOAD TO 115% OF ACTUAL FAN MOTOR NAMEPLATE FLA RATING. WITH RADIATOR RUNNING IN BYPASS MODE CHECK CURRENT IN ALL THREE PHASES AND VERIFY THAT MOTOR IS OPERATING WITHIN NAMEPLATE RATING.

3) FIELD TEST SYSTEM TO VERIFY ALL CONTROL AND ALARM FUNCTIONS. APPLY HEAT TO OUTDOOR TEMPERATURE TRANSMITTER TO RUN THROUGH VFD SEQUENCES.

RADIATOR SEQUENCE OF OPERATION:

RADIATOR FAN MOTORS WILL OPERATE UNDER VARIABLE FREQUENCY DRIVE (VFD) CONTROL. WHEN THE COOLANT RETURN TEMP REACHES THE PID REFERENCE SETPOINT THE MOTOR WILL START AT MINIMUM SPEED AND RAMP UP TO THE REQUIRED SPEED. USING PID CONTROL, THE VFD WILL MODULATE THE FAN SPEED AS REQUIRED TO MAINTAIN COOLANT RETURN TEMP AT THE PID REFERENCE SETPOINT. AS THE COOLANT RETURN TEMP RISES, THE VFD WILL INCREASE THE SPEED OF THE FAN MOTOR UP TO 100%. ONCE THE FAN REACHES THE MINIMUM SPEED, THE VFD WILL MAINTAIN THAT SPEED UNTIL THE LOW SPEED TIME OUT EXPIRES. WHEN THE LOW SPEED TIME OUT EXPIRES THE MOTOR WILL STOP. THE MOTOR WILL REMAIN OFF UNTIL THE COOLANT RETURN TEMP RISES TO THE PID REFERENCE SETPOINT. SEE THE RADIATOR VFD SETTINGS TABLE FOR SETPOINTS.

Radiator VFD Settings	
Function	Setting
Min PID Feedback	20
Max PID Feedback	240
rSL (Wake UP Threshold)	1
PID Reference Temperature	175°F
Proportional Gain	0.93
Integral Gain	0.3
Derivative	0
Minimum Speed	10 Hz.
Low Speed Timeout	10 sec.
Loss of Phase	Ignore

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

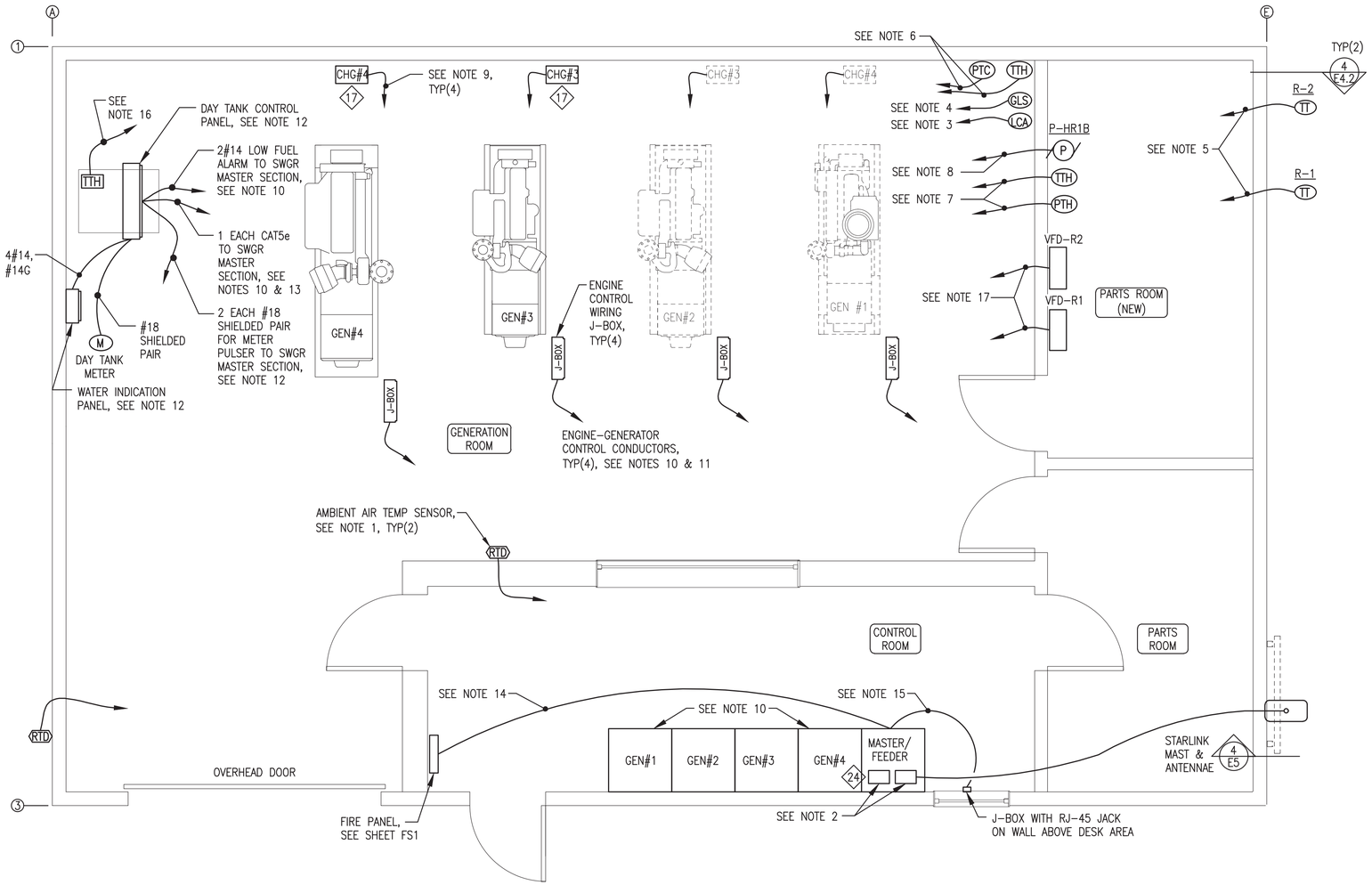
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: RADIATOR VFD PANEL LAYOUTS, SEQUENCE OF OPERATIONS, & SETTINGS TABLE

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

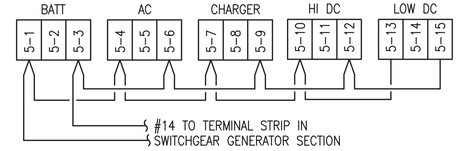
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E4.4
PROJECT NUMBER:	



INSTRUMENTATION & DATA PLAN NOTES:

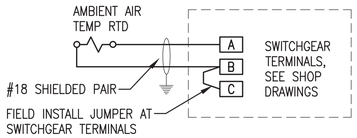
1. RTD TEMPERATURE SENSOR PROVIDED WITH SWITCHGEAR. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR MASTER SECTION. SEE DETAIL 3/E5 AND NOTE 10.
2. INSTALL STARLINK MODEM AND INTERNET ROUTER IN BOTTOM OF MASTER SECTION. CONNECT MODEM TO ROUTER AND CONNECT ROUTER TO ETHERNET SWITCH INSIDE MASTER SECTION. CONNECT BOTH TO 120VAC UPS, SEE NOTE 10.
3. LOW COOLANT LEVEL ALARM SWITCH INSTALLED AT EXPANSION TANK, SEE MECHANICAL. CONNECT TO N.C. SWITCH (WHITE & RED) AND ROUTE 2#14 TO SWITCHGEAR MASTER SECTION. SEE NOTE 10.
4. GLYCOL LEVEL SENSOR WITH 4-20mA SIGNAL CONDITIONER IN EXPANSION TANK, SEE MECHANICAL. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR. SEE NOTE 10
5. INSTALL TEMP TRANSMITTER IN EACH RADIATOR, SEE DETAIL 4/E4.2. ROUTE #18 SHIELDED PAIR FROM EACH TO ASSOCIATED VFD PANEL.
6. INSTALL COOLANT RETURN TEMP AND PRESSURE TRANSMITTERS IN PIPING MAIN WHERE SHOWN ON COOLING PIPING ISOMETRIC. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR MASTER SECTION, SEE NOTE 10.
7. INSTALL ONE TEMP TRANSMITTER (SUPPLY) AND ONE PRESSURE TRANSMITTER FOR HEAT RECOVERY MONITORING WHERE SHOWN ON HEAT RECOVERY PIPING ISOMETRIC 1/M4.5. ROUTE #18 SHIELDED PAIR FROM EACH TO SWITCHGEAR MASTER SECTION. SEE NOTE 10.
8. PUMP P-HR1B HAS INTERNAL MONITORING FOR FLOW RATE AND TEMPERATURE. CONNECT PUMP CIM CARD WITH CAT5e AND ROUTE TO ETHERNET SWITCH IN MASTER SECTION. INSTALL IN SEPARATE DEDICATED RACEWAY OR WITH OTHER INSTRUMENT CABLES. DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.
9. ROUTE 2#14 FROM BATTERY CHARGER ALARM CONTACTS TO ASSOCIATED SWITCHGEAR GENERATOR SECTION, SEE NOTE 10 AND WIRING DIAGRAM 2/E5.
10. SEE SWITCHGEAR SHOP DRAWINGS FOR TERMINATION OF ALL INSTRUMENTATION AND DATA WIRING INCLUDING CONTROL POWER.
11. ROUTE ENGINE-GENERATOR CONTROL CONDUCTORS TO SWITCHGEAR IN UNDERFLOOR 1-1/2" GRC. TERMINATE IN ENGINE CONTROL J-BOX AND TERMINATE IN ASSOCIATED SWITCHGEAR GENERATOR SECTION. SEE PLAN 1/E3.2, SHEET E6.3, AND NOTE 10.
12. SEE SHEETS E7.1-E7.4 FOR DAY TANK CONTROL PANEL AND WATER INDICATION PANEL DESIGNS AND WIRING TERMINATIONS. ALL ACCESSORIES NOT SHOWN ON PLANS. SEE LOGIC DIAGRAMS FOR ADDITIONAL DETAIL.
13. ROUTE CAT5e CONDUCTOR FROM DAY TANK PANEL REMOTE I/O TO ETHERNET SWITCH IN SWITCHGEAR MASTER SECTION. INSTALL IN SEPARATE DEDICATED RACEWAY. DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.
14. ROUTE CAT5e FOR DATA AND 2#14 FOR GENERATOR SHUT DOWN FROM FIRE PANEL TO SWITCHGEAR MASTER SECTION, SEE SHEET FS1 AND NOTE 10. INSTALL IN SEPARATE DEDICATED RACEWAY, COLOR RED. DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.
15. ROUTE CAT5e FROM RJ-45 JACK IN DESK AREA TO ETHERNET SWITCH IN MASTER SECTION. INSTALL IN SEPARATE DEDICATED RACEWAY. DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.
16. INSTALL FUEL RETURN TEMP TRANSMITTER IN PIPING MAIN WHERE SHOWN ON COOLING PIPING ISOMETRIC 4/M5.1. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR MASTER SECTION, SEE NOTE 10.
17. ROUTE CAT5e CABLE FROM VFD PANEL TO SWITCHGEAR MASTER SECTION. INSTALL IN SEPARATE DEDICATED RACEWAY(S). DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS. SEE NOTE 10. SEE SHEET E4.4 FOR CONNECTION TO VFD PANEL.

1/E5 INSTRUMENTATION & DATA MODIFICATION PLAN & DETAILS
3/8"=1'



NOTE: PRIOR TO ENERGIZING MAKE THE FOLLOWING SETTINGS ON CHARGER:
1) AC LINE VOLTAGE SWITCH TO "115V".
2) AUTO BOOST JUMPER TO "NORM".
3) FLOAT VOLTAGE JUMPER TO "13.50/27.00" (FOR GEL CELL).
4) BATTERY RANGE JUMPER TO "24V".

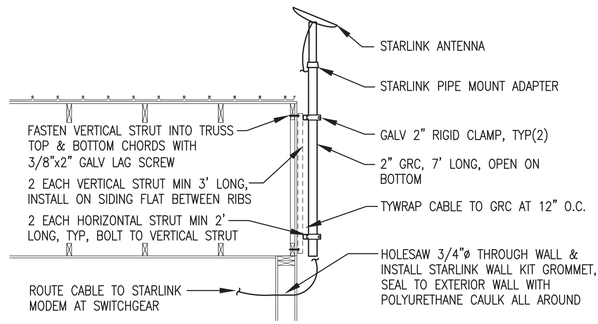
2/E5 BATTERY CHARGER ALARM WIRING DIAGRAM
NO SCALE



3/E5 AMBIENT AIR TEMP RTD TERMINATION
NO SCALE

INTERNET SERVICE GENERAL NOTES:

1) FURNISH AND INSTALL COMPLETE SYSTEM WITH ANTENNA, MOUNTING HARDWARE, MODEM, JACKS, CABLES, CONNECTORS, AND ACCESSORIES REQUIRED TO PROVIDE INTERNET SERVICE TO THE NEW POWER PLANT.
2) THE INTERNET SERVICE SHALL HAVE THE FOLLOWING PERFORMANCE CHARACTERISTICS: 40 MBPS DOWNLOAD, 10 MBPS UPLOAD, 50 GB PRIORITY MONTHLY DATA LIMIT.
STARLINK STANDARD GEN3 KIT WITH BUSINESS LOCAL PRIORITY 50 GB PLAN, NO SUBSTITUTES. CONFIGURE STARLINK ACCOUNT IP POLICY TO "PUBLIC IP" AND ENABLE "BYPASS" MODE.
3) UPON COMPLETION OF INSTALLATION THE INTERNET SYSTEM SHALL BE COMMISSIONED IN ACCORDANCE WITH THE SERVICE PROVIDER'S REQUIREMENTS.
4) IN ADDITION TO FURNISHING AND INSTALLING SYSTEMS, THE CONTRACTOR SHALL PRE-PAY FOR A 1 YEAR INTERNET SERVICE CONTRACT.
5) ROUTER CONFIGURATION: SET SSID TO "TULUKSAK PP" AND FORWARD INCOMING TRAFFIC ON PORT 8088 TO 192.168.1.142:8088



4/E5 STARLINK ANTENNA & MAST INSTALLATION
1/2"=1'-0

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

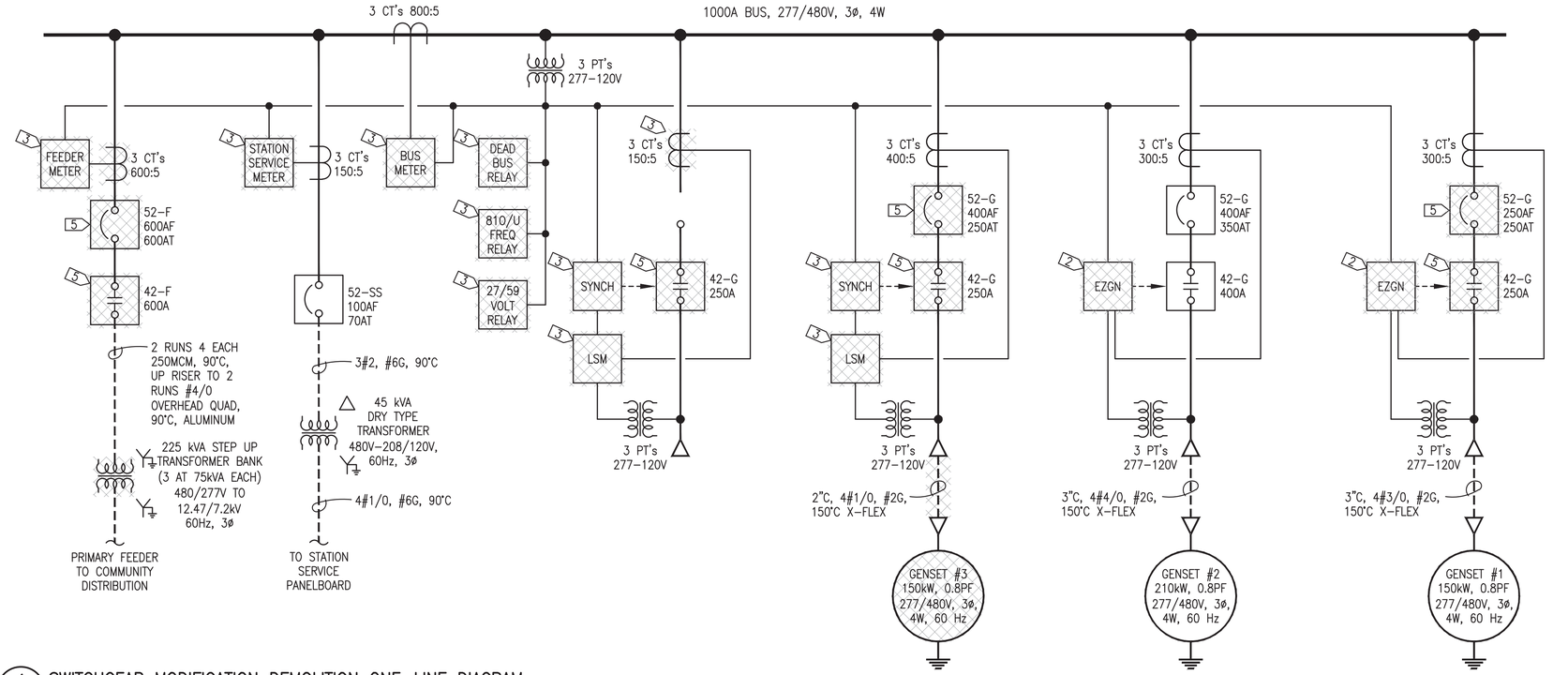
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

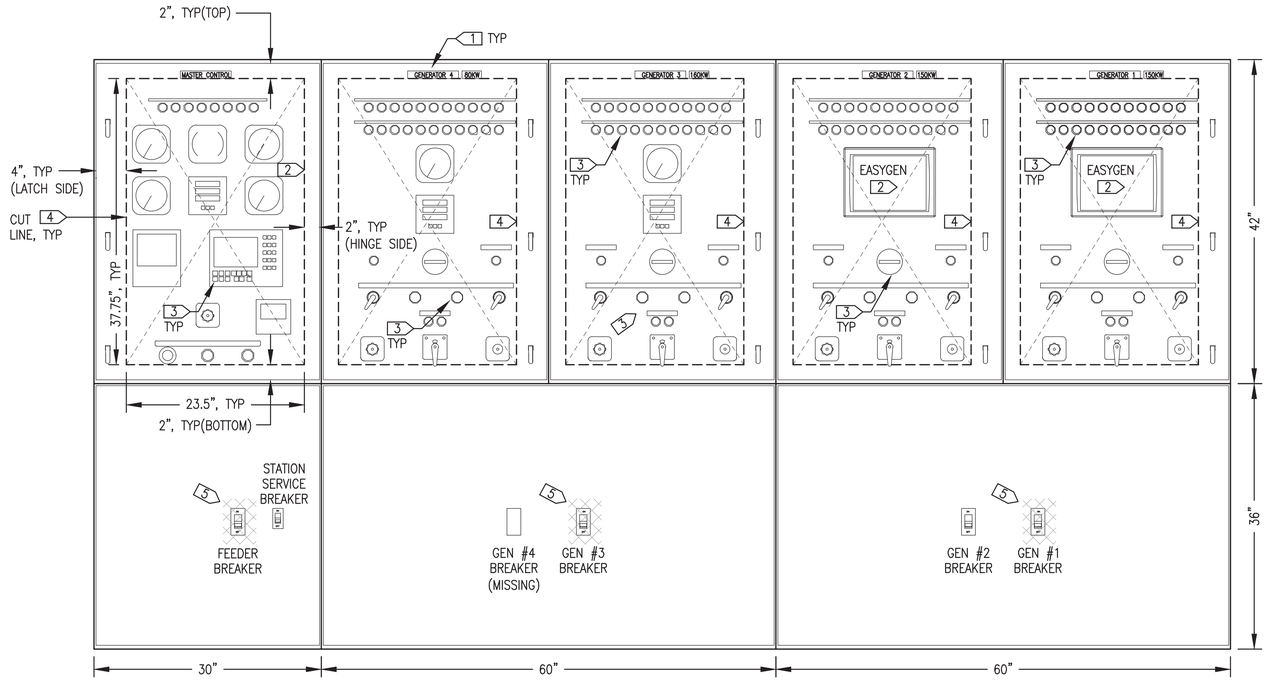
TITLE: INSTRUMENTATION & DATA/COM MODIFICATION PLAN & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E5
PROJECT NUMBER:	



1 E6.1 SWITCHGEAR MODIFICATION DEMOLITION ONE-LINE DIAGRAM
NO SCALE



2 E6.1 SWITCHGEAR MODIFICATION DEMOLITION ELEVATION
NO SCALE

SWITCHGEAR DEMOLITION GENERAL NOTES:

1) COMPLETELY DE-ENERGIZE SWITCHGEAR BY DISCONNECTING FROM ELECTRICAL DISTRIBUTION AND GENERATORS PRIOR TOI BEGINNING DEMOLITION WORK.
2) SWITCHGEAR ENCLOSURE, BUSWORK, POWER WIRING, AND MAJOR EQUIPMENT TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL OR REPLACEMENT. EXISTING EQUIPMENT AND DEVICES TO BE REMOVED INDICATED BY HATCHING ON DEMOLITION ONE LINE.
3) SEE SHEET E6.2 FOR REFERENCE PHOTOS OF EXISTING SWITCHGEAR.
4) SEE SHEETS E6.3 AND E6.4 FOR NEW WORK.

SWITCHGEAR DEMOLITION SPECIFIC NOTES:

1. REMOVE NAMEPLATES TO MAKE ROOM FOR NEW DOOR FACE PANELS.
2. THE EXISTING GEN#1 & #2 EASYGENS WERE INSTALLED NEW IN 2025. CAREFULLY REMOVE EASYGENS AND ALL PERIPHERAL ACCESSORIES AND TURN OVER TO AEA.
3. DEMOLISH ALL CONTROL DEVICES AND ASSOCIATED WIRING.
4. CUT OUT FACE OF DOOR PANELS TO MAKE PROVISION FOR FIELD INSTALLATION OF NEW FACE PANELS. DIMENSIONS INIDCATED ARE FROM EDGE OF DOOR AND ARE INTENDED TO REMOVE ALL FACE MOUNTED DEVICES AND TO PROVIDE APPROXIMATELY 1-1/2" OVERLAP FOR NEW PANEL FACE MOUNTING. FIELD VERIFY ALL DIMENSIONS PRIOR TO CUTTING.
5. REMOVE BREAKERS AND CONTACTORS AS INDICATED. MODIFY MOUNTING TO POSITION BREAKER IN EXISTING CUTOUTS. ENLARGE CUTOUTS AS REQUIRED IN BREAKERS ARE LARGER OR INSTALL BEZEL IF SMALLER.

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

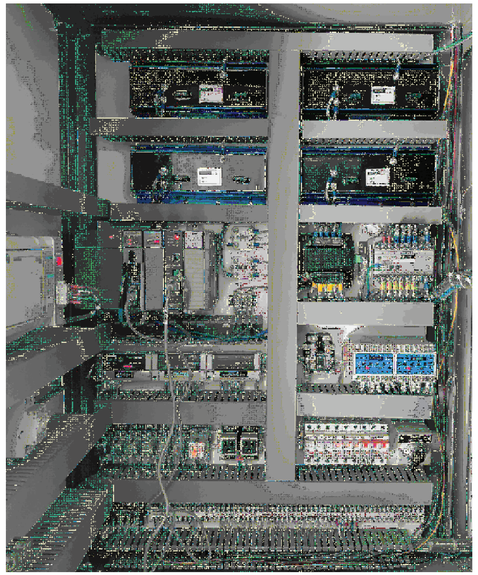
TITLE: SWITCHGEAR MODIFICATION DEMOLITION ONE-LINE DIAGRAM & FRONT ELEVATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E6.1
PROJECT NUMBER:	

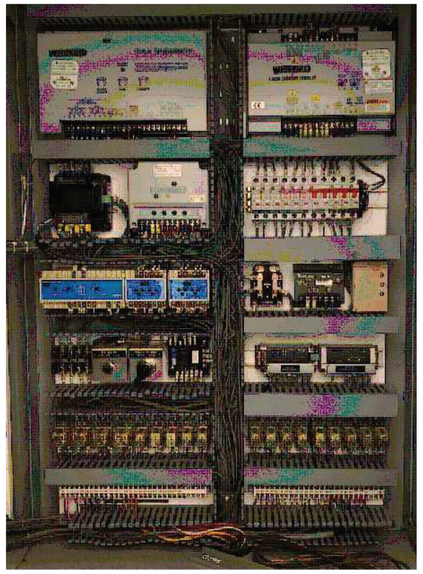
1 E6.2 SWITCHGEAR LAYOUT
NO SCALE

2 E6.2 MASTER SECTION DOOR FACE
NO SCALE



3 E6.2 MASTER SECTION BACK PAN
NO SCALE

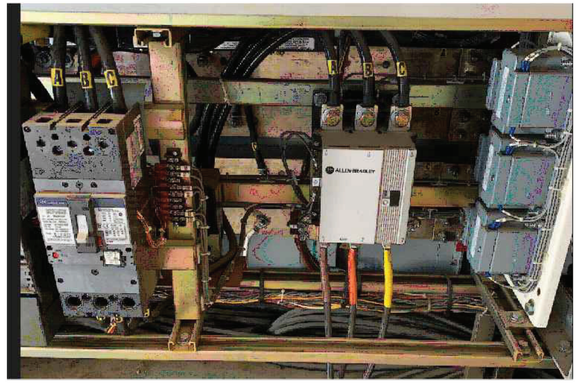
4 E6.2 TYPICAL GENERATOR SECTION DOOR FACE
NO SCALE



5 E6.2 TYPICAL GENERATOR SECTION BACK PAN
NO SCALE

6 E6.2 MASTER SECTION LOWER DOOR FACE
NO SCALE

7 E6.2 TYPICAL GENERATOR LOWER SECTION DOOR FACE
NO SCALE



8 E6.2 TYPICAL BREAKER & CONTACTOR INSTALLATION
NO SCALE

9 E6.2 SWITCHGEAR NAMEPLATE
NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA
49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

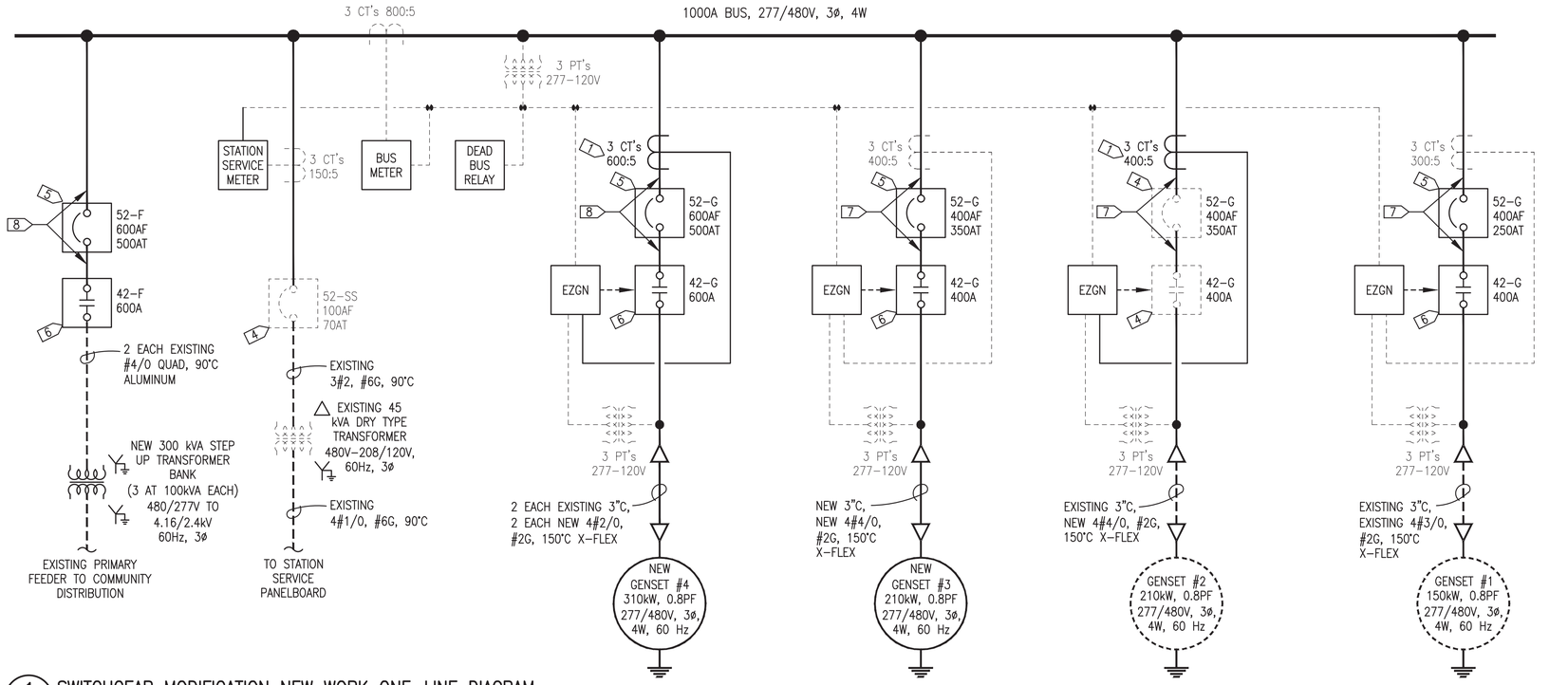
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SWITCHGEAR MODIFICATION DEMOLITION REFERENCE PHOTOS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E6.2
PROJECT NUMBER:	



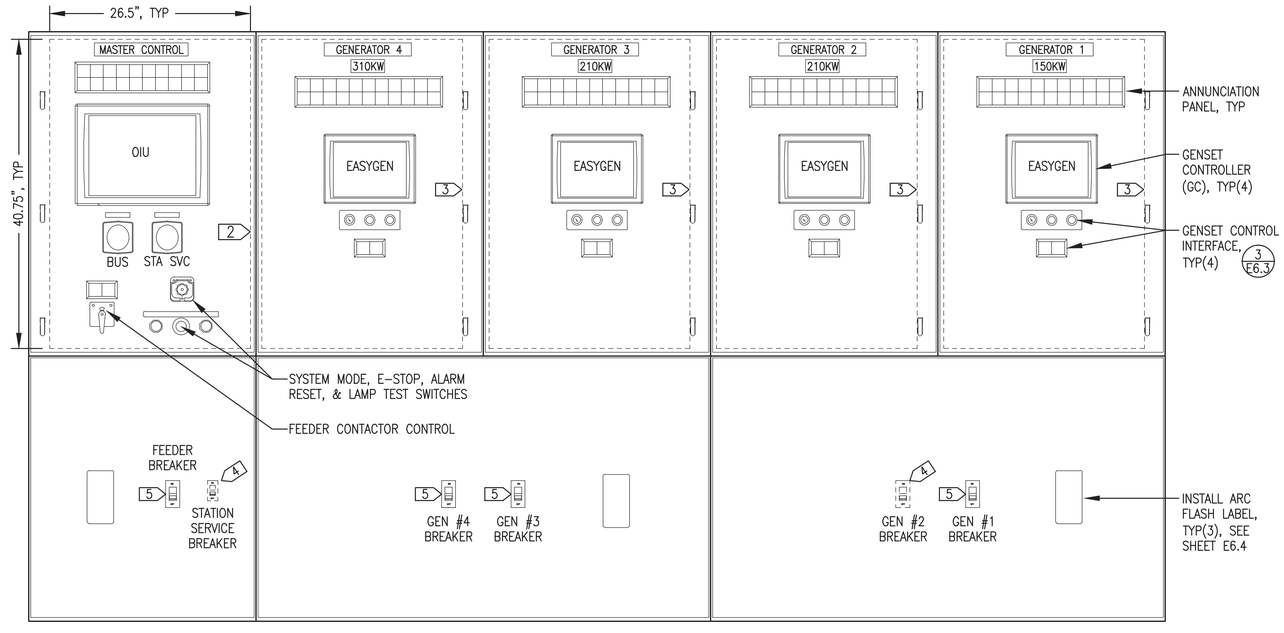
1 E6.3 SWITCHGEAR MODIFICATION NEW WORK ONE–LINE DIAGRAM
NO SCALE

SWITCHGEAR MODIFICATION NEW WORK GENERAL NOTES:

1) EXISTING EQUIPMENT AND DEVICES TO REMAIN INDICATED BY LIGHT DASHED LINES ON NEW WORK ONE LINE. ALL OTHER EQUIPMENT NEW.
2) INSTALL NEW BACKPANS AND SIDE PANS WITH DEVICES, EQUIPMENT, WIRING, AND TERMINALS INSIDE EACH GENERATOR SECTION AND THE MASTER SECTION.
3) SEE SPECIFICATIONS FOR DETAIL ON NEW DEVICES, EQUIPMENT, WIRING, PANEL FACES, BACKPANS, ETC.
4) SEE SHEET E6.4 FOR ARC–FLASH LABELING, COMMUNICATION SCHEMATIC, DEMAND CONTROL/ALARM TABLE, AND SEQUENCE OF OPERATIONS.
5) SEE SHEET E6.5 FOR ENGINE WIRING JUNCTION BOX WHICH DELINEATES THE INTERCONNECTION OF THE SWITCHGEAR TO THE ENGINE–GENERATORS.
6) SEE SHEETS E7.1–E7.3 FOR FUEL SYSTEM (DAY TANK) CONTROL PANEL WHICH DELINEATES THE INTERCONNECTION OF THE SWITCHGEAR TO THE FUEL SYSTEM PANEL.

SWITCHGEAR MODIFICATION NEW WORK SPECIFIC NOTES:

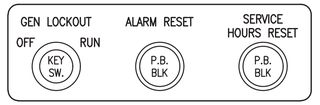
1. REPLACE EXISTING CURRENT TRANSFORMERS WITH NEW, RATIO AS INDICATED.
2. INSTALL NEW 40.75"x26.5" 14 GA. FACEPLATE WITH MASTER CONTROL DEVICES AS SHOWN. ATTACH TO PERIMETER OF EXISTING DOOR WITH RIVETS ALL AROUND.
3. INSTALL NEW 40.75"x26.5" 14 GA. FACEPLATE WITH GENERATOR CONTROL DEVICES AS SHOWN. ATTACH TO PERIMETER OF EXISTING DOOR WITH RIVETS ALL AROUND.
4. EXISTING CIRCUIT BREAKER (AND CONTACTOR) TO REMAIN.
5. NEW CIRCUIT BREAKER. MODIFY MOUNTING TO POSITION BREAKER IN EXISTING CUTOUTS. ENLARGE CUTOUTS AS REQUIRED IF BREAKERS ARE LARGER OR INSTALL BEZEL IF SMALLER.
6. NEW CONTACTOR.
7. INSTALL MINIMUM 400A RATED NEW CONDUCTORS. TWO PARALLEL RUNS #1/0 150°C EX–FLEX CONDUCTOR WITH COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT 150°C.
8. INSTALL MINIMUM 600A RATED NEW CONDUCTORS. TWO PARALLEL RUNS #4/0 150°C EX–FLEX CONDUCTOR WITH COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT 150°C.

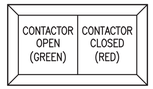


2 E6.3 SWITCHGEAR MODIFICATION NEW WORK ELEVATION
NO SCALE

INTERFACE CONTROLS LEGEND:

P.B.	PUSH BUTTON
KEY SW.	KEY OPERATED LOCKABLE SWITCH





3 E6.3 NEW WORK GENSET CONTROL INTERFACE
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: SWITCHGEAR MODIFICATION NEW WORK ONE LINE DIAGRAM & FRONT ELEVATION

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E6.3
PROJECT NUMBER:	

POWER PLANT GENERATION SWITCHGEAR OPERATION

THIS POWER PLANT IS DESIGNED TO OPERATE IN AUTOMATIC MODE UNDER CONTROL OF THE PROGRAMMABLE LOGIC CONTROLLER (PLC). MONITORING AND CONTROL IS PRIMARILY DONE THROUGH THE OPERATOR INTERFACE UNIT (OIU). IN AN EMERGENCY SUCH AS A FAILURE OF THE PLC IT CAN ALSO BE OPERATED IN MANUAL MODE. EACH ENGINE IS CONTROLLED BY AN INDIVIDUAL EASYGEN (EZGN) GENSET CONTROLLER LOCATED IN EACH GENERATOR SECTION. FOLLOWING ARE INSTRUCTIONS FOR OPERATING THE SYSTEM. SEE SECTION 3.1 OF THE O&M MANUAL FOR DETAILED SEQUENCES.

AUTOMATIC OPERATION BLACK START PROCEDURE:

1) TEMPORARILY SET THE "SYSTEM MODE" SWITCH ON THE MASTER SECTION TO MAN.
2) CHECK THE MASTER SECTION FOR ANY FAULTS AS INDICATED BY THE ALARM LAMPS OR BANNERS ON THE EZGN. CORRECT THE CAUSE OF THE FAULT (EMERGENCY STOP, LOW COOLANT LEVEL, FEEDER BREAKER TRIPPED, ETC.) PRESS THE ALARM RESET BUTTON ON THE MASTER SECTION AND VERIFY THAT THE ALARMS CLEAR.
3) CHECK EACH GENERATOR SECTION FOR ANY FAULTS. FOR ENGINE–GENERATOR RELATED FAULTS CORRECT THE CAUSE OF THE FAULT (LOW OIL LEVEL, HIGH TEMPERATURE, CIRCUIT BREAKER TRIPPED, ETC.). TO CLEAR ANY ALARMS PRESS "STOP" BUTTON THEN PRESS THE "HOME" BUTTON TO GET TO THE MAIN SCREEN. PRESS THE "ALARM RESET" BUTTON AND HOLD DOWN UNTIL ALL ALARMS CLEAR.
4) PLACE EACH AVAILABLE GENERATOR IN SERVICE BY PRESSING THE "AUTO" BUTTON. IF A GENERATOR IS OUT OF SERVICE FOR REPAIR, VERIFY THE STOP BUTTON IS ILLUMINATED.
5) CHANGE THE "SYSTEM MODE" SWITCH ON THE MASTER SECTION TO AUTO.
6) THE PLC WILL AUTOMATICALLY START ALL AVAILABLE GENERATORS IN AUTO AND PARALLEL THEM TO THE BUS. AS SOON AS THE BUS IS ENERGIZED THE STATION SERVICE POWER WILL TURN ON.
7) AFTER THE AVAILABLE GENERATORS ARE ONLINE, THE PLC WILL WAIT FOR A BRIEF INTERVAL (USUALLY 15 SECONDS) AND CLOSE THE FEEDER BREAKER TO ENERGIZE THE COMMUNITY. THE RED BREAKER CLOSED LAMP WILL ILLUMINATE.

AUTOMATIC DEMAND CONTROL OPERATION:

1) GENERATORS ARE CONSIDERED AVAILABLE FOR DEMAND CONTROL ONLY WHEN THEIR EZGN IS IN THE AUTO MODE AND THERE ARE NO ALARMS. THE DEMAND CONTROL SYSTEM WILL UTILIZE ALL AVAILABLE GENERATORS AS REQUIRED TO MEET THE LOAD ON THE SYSTEM.
2) ON INITIAL STARTUP THE DEMAND CONTROL IS ACTIVATED AFTER THE FEEDER BREAKER HAS BEEN CLOSED FOR APPROXIMATELY ONE MINUTE. THIS ALLOWS THE PLC TIME TO DETERMINE THE POWER DEMAND ON THE SYSTEM. THE PLC MONITORS THE LOAD ON THE SYSTEM AND COMPARES IT TO THE CONNECTED GENERATING CAPACITY.
3) THE DEMAND CONTROL PROVIDES TWO TYPES OF CONTROL FOR INCREASING LOAD – INCREASE AND OVERLOAD. THE OVERLOAD SETPOINT IS TYPICALLY THE PRIME RATING OF THE GENSET AND THE INCREASE SETPOINT IS TYPICALLY 90% OF THE OVERLOAD SETPOINT. WHEN THE LOAD EXCEEDS THE INCREASE SETPOINT FOR A PRE–SET TIME DELAY (USUALLY 20–30 SECONDS) THE DEMAND CONTROL WILL SWITCH TO THE NEXT HIGHER LEVEL OF GENERATING CAPACITY. WHEN THE LOAD EXCEEDS THE OVERLOAD SETPOINT THE DEMAND CONTROL WILL IMMEDIATELY SWITCH TO THE NEXT HIGHER LEVEL OF GENERATING CAPACITY (NO TIME DELAY).
4) THE DEMAND CONTROL PROVIDES ONE TYPE OF CONTROL FOR DECREASING LOAD. THE DECREASE SETPOINT IS TYPICALLY 80% OF THE OVERLOAD SETPOINT. WHEN THE LOAD DROPS BELOW THE DECREASE SETPOINT FOR A PRE–SET TIME DELAY (USUALLY 120 SECONDS) THE DEMAND CONTROL WILL SWITCH TO THE NEXT LOWER LEVEL OF GENERATING CAPACITY.
5) AS THE COMMUNITY ELECTRIC LOAD INCREASES, THE PLC WILL STEP UP TO A LARGER GENERATOR AND AS THE LOAD DECREASES THE PLC WILL STEP DOWN TO A SMALLER GENERATOR. MULTIPLE GENERATORS CAN OPERATE IN PARALLEL TO MEET A PEAK DEMAND.
6) NOTE THAT GENERATORS #2 & #3 ARE EQUAL CAPACITY. ON THE SWITCHGEAR OPERATOR INTERFACE UNIT (OIU) UNDER THE DEMAND TAB SELECT ONE GENERATOR TO OPERATE AS THE LEAD UNIT. THE OTHER GENERATOR WILL OPERATE WHEN THE LEAD UNIT IS NOT AVAILABLE.
7) SEE THE DEMAND CONTROL TABLE THIS SHEET FOR DEMAND LEVEL SETPOINTS AT THE TIME OF COMMISSIONING. ON THE SCADA SYSTEM GO TO THE DEMAND TAB TO VERIFY THE PRESENT SETPOINTS.

MANUAL OPERATION BLACK START PROCEDURE:

1) PLACE THE MASTER CONTROL "SYSTEM MODE" SWITCH IN THE MANUAL POSITION.
2) CHECK THE MASTER AND GENERATOR SECTIONS FOR ANY FAULTS AND CLEAR AS DESCRIBED UNDER AUTOMATIC OPERATION STEPS 2 AND 3.
3) TO PLACE A GENERATOR IN SERVICE, PRESS THE EZGN MAN BUTTON, THEN PRESS THE "I" (START) BUTTON. AFTER THE ENGINE STARTS AND STABILIZES, PRESS THE CONTACTOR CLOSE BUTTON ON THE EZGN. THE RED BREAKER CLOSED LAMP WILL ILLUMINATE.
4) REPEAT THIS PROCESS FOR AT LEAST ONE MORE GENERATOR.
5) with two generators on line rotate the feeder breaker control knob for the main feeder breaker to the close position to energize the community. monitor the load on the system for one minute then select the appropriate generator(s) to match the load.
6) TAKE ANY GENERATOR(S) NOT NEEDED OFF LINE BY PRESSING THE RED EZGN STOP BUTTON. THE ENGINE WILL COOL DOWN FOR THREE MINUTES THEN SHUT OFF. NOTE THAT PRESSING THE RED STOP BUTTON TWICE WILL IMMEDIATELY SHUT DOWN THE GENERATOR.
7) TO MANUALLY SWITCH TO A DIFFERENT GENERATOR AS THE LOAD CHANGES REPEAT STEPS 3 AND 6.

SERVICE DUE / OIL CHANGE PROCEDURE:

THE FOLLOWING TASKS NEED TO BE PERFORMED ON EACH ENGINE AFTER EVERY 250 HOURS OF RUN TIME. IF THE REQUIRED MAINTENANCE CANNOT BE PERFORMED AT THE SCHEDULED TIME, TAKE THE ENGINE OUT OF SERVICE UNTIL ALL WORK HAS BEEN COMPLETED.

NOTE THAT UNDER AUTOMATIC OPERATION, WHENEVER THE SERVICE TIME HAS BEEN EXCEEDED THE GENERATOR WILL AUTOMATICALLY BE TAKEN OFF LINE (AS LONG AS ANOTHER GENERATOR IS AVAILABLE IN AUTO), A SERVICE ENGINE MESSAGE WILL DISPLAY, AND THE RED "ENGINE ALARM" LAMP WILL ILLUMINATE.

1) IF THE SWITCHGEAR IS IN MANUAL MODE, PERFORM MANUAL OPERATION STEP 3 TO PLACE ANOTHER GENERATOR ON LINE IN MAN MODE. PERFORM MANUAL OPERATION STEP 6 ON THE GENERATOR TO BE SERVICED TO TAKE IT OFF LINE THEN CONTINUE AT STEP 3 BELOW (LOCK OUT).
2) IF THE SWITCHGEAR IS IN AUTOMATIC MODE, PRESS THE EZGN MAN BUTTON ON THE GENERATOR TO BE SERVICED. THE PLC WILL START ANOTHER GENERATOR. ONCE THE OTHER GENERATOR IS ON LINE, PRESS THE EZGN STOP BUTTON ON THE GENERATOR TO BE SERVICED. NOTE THAT IF THE STOP BUTTON IS PRESSED BEFORE ANOTHER UNIT IS ONLINE, AN OUTAGE WILL OCCUR.
3) LOCK THE UNIT OUT USING THE KEY SWITCH AND TAG OUT OF SERVICE.
4) SERVICE ENGINE (OIL CHANGE, FUEL FILTER, AIR FILTER, ETC.).
5) REMOVE TAG AND TURN THE GENERATOR LOCKOUT SWITCH TO RUN.
6) PRESS THE SERVICE HOURS RESET BUTTON AND HOLD DOWN UNTIL IT RESETS TO 250 HOURS. PRESS THE "HOME" BUTTON TO RETURN TO THE MAIN SCREEN.
7) PRESS THE ALARM RESET BUTTON AND HOLD DOWN UNTIL ALL ALARMS CLEAR.
8) START THE ENGINE BY PRESSING THE MAN BUTTON AND THEN "I" (START) BUTTON.
   a) AFTER THE ENGINE COMES UP TO SPEED VERIFY THAT THE ENGINE OIL PRESSURE IS IN THE NORMAL RANGE.
   b) CHECK THE OIL FILTER FOR LEAKS.
9) AFTER THE ENGINE RUNS FOR ONE MINUTE PRESS THE STOP BUTTON.
10) CHECK THE OIL LEVEL USING THE DIPSTICK AND ADD OIL AS REQUIRED.
11) PLACE THE GENERATOR BACK IN SERVICE BY PRESSING THE AUTO BUTTON ON THE EZGN.

NOTE: AT EACH OIL CHANGE THE LEAD SELECTION TO THE NEXT UNIT TO DISTRIBUTE THE RUN TIME EQUALLY.

ENGINE–GENERATOR PROTECTION ALARMS:

SEE THE TABLES THIS SHEET FOR ALARM LEVEL SETPOINTS AND BREAKER TRIP SETTINGS AT THE TIME OF COMMISSIONING. SEE SECTION 3.1 OF THE O&M MANUAL FOR DETAILED DESCRIPTIONS OF WARNING ALARM AND PROTECTION SEQUENCES.

Demand Control Table (PLC)

Demand Control	Generator(s) On Line	On-line kW (Overload)	Level Increase	Level Decrease
Level 1	#1	150	135	---
Level 2	#2 or #3	210	190	120
Level 3	#4	310	280	170
Level 4	#4 & #1	460	---	250

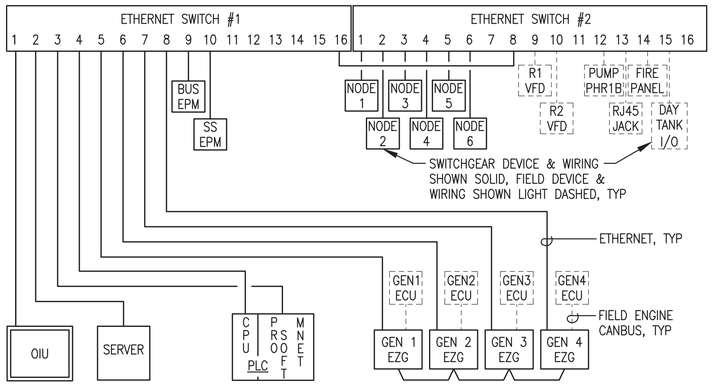
Note : Gen #2 & #3 are equal capacity. Manually select lead unit.

Engine-Generator Alarm Settings (EZGN Genset Controller)

Function	Normal Range	Pre-Alarm	Shut Down
Overspeed	1795-1805	----	1900 RPM
Oil Pressure	30-50 PSI	14.5 PSI	10 PSI
Coolant Temp.	180-200°F	210°F	215°F
Exhaust Temp.	500-850°F	900°F	-----
Under Frequency	59.5-60.5 Hz	----	58.2 Hz
Over Frequency	59.5-60.5 Hz	----	61.8 Hz
Under Voltage	470-490 V	----	432 V
Over Voltage	470-490 V	----	528 V
Reverse Power	0	----	10%

Generator Breaker Settings (EZGN Genset Controller)

Function	Setting
Gen #1 Breaker Trip Setpoint (EZGN Rated Current)	250 A
Gen #2 & #3 Breaker Trip Setpoint (EZGN Rated Current)	325 A
Gen #4 Breaker Trip Setpoint (EZGN Rated Current)	500 A
Gen Breaker Level 1 (100%) Time Over Current	60 sec.
Gen Breaker Level 2 (120%) Time Over Current	30 sec.
Gen Breaker Level 3 (250%) Time Over Current	1 sec.



NOTE: PROVIDE 120VAC POWER FOR SERVER FROM UPS. ALL OTHER DEVICES 24VDC.

1 E6.4 COMMUNICATION SCHEMATIC
NO SCALE

ARC FLASH NOTES:

1) PERMANENTLY AFFIX ARC FLASH LABELS TO EACH SECTION WITH 480V POWER AS INDICATED.
2) SCALED PDF IMAGES OF THESE LABELS WILL BE FURNISHED TO THE FABRICATOR UPON REQUEST.

2 E6.4 ARC FLASH LABELS
NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

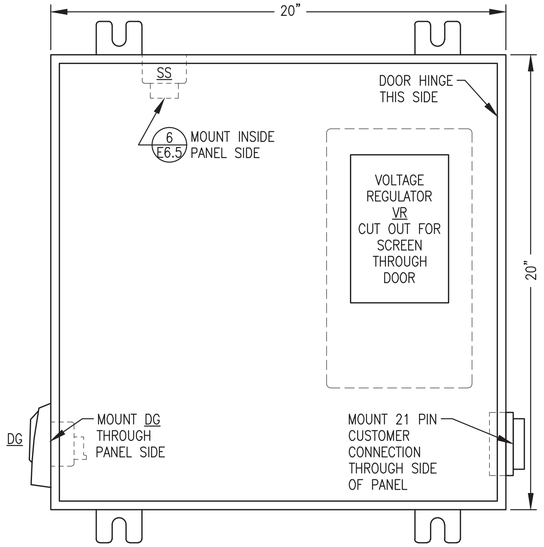
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

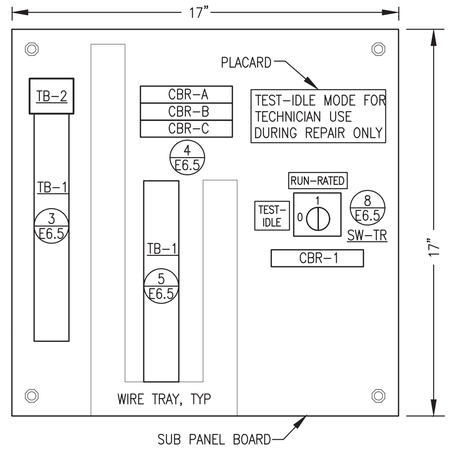
TITLE: SWITCHGEAR MODIFICATION NEW WORK SEQUENCE, SETTINGS, & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

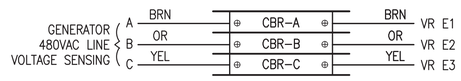
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 11/24/25
FILE NAME: | SHEET: E6.4
PROJECT NUMBER:



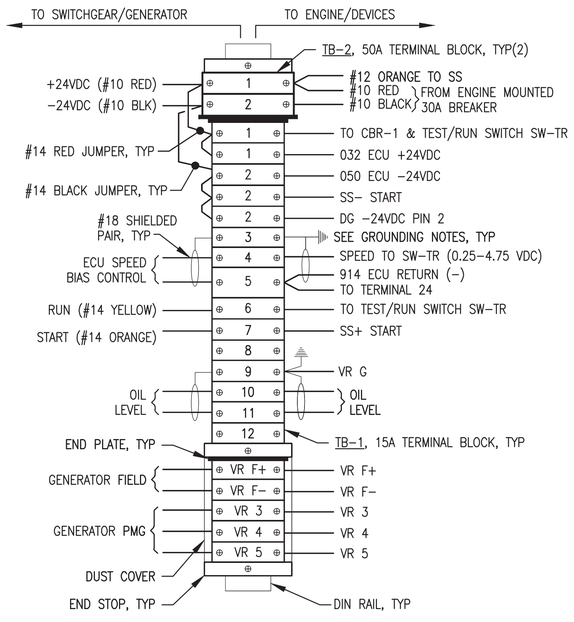
1 E6.5 JUNCTION BOX FRONT PANEL LAYOUT
NO SCALE



2 E6.5 JUNCTION BOX SUB PANEL LAYOUT
NO SCALE

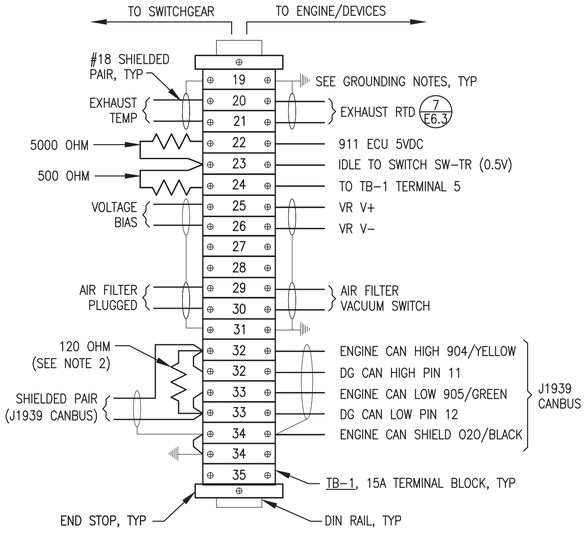


4 E6.5 CIRCUIT BREAKER CONNECTIONS
NO SCALE



NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 E6.5 TERMINAL STRIP CONNECTIONS
NO SCALE



NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

5 E6.5 TERMINAL STRIP CONNECTIONS
NO SCALE

BILL OF MATERIALS

TAG	MANUFACTURER	MODEL	DESCRIPTION
21 PIN	JOHN DEERE OR DEUTZ		21 PIN CUSTOMER CONNECTION ASSY
CBR-A/B/C	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1P, 1A
CBR-1	ALLEN-BRADLEY	1489-M1-C050	RAIL MOUNT CIRCUIT BREAKER, 1P, 5A
DG	JOHN DEERE	DG-14	DIAGNOSTIC GAUGE WITH HARNESS PROGRAMMED FOR MARINE TIER 3 WITH UNIQUE JOHN DEERE FAULT CODE
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
SS	JOHN DEERE	AT145341	STARTER AUXILIARY SOLENOID, 24V
SW-TR	ALLEN-BRADLEY	194L-A12-225-2	CHANGEOVER SWITCH, 12A, 2P
	ALLEN-BRADLEY	194L-HE-4A-175	90 DEGREE I-O HANDLE
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK
VR	BASLER	DECS-100-A05	DIGITAL VOLTAGE REGULATOR

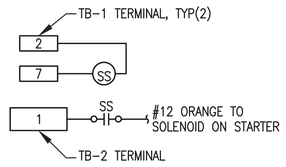
BRAND SPECIFIC NOTE: SPECIFIC PARTS MANUFACTURER AND MODEL SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

SHOP FABRICATION NOTES:

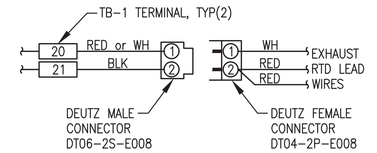
1) PROVIDE ASSEMBLY WITH ALL DEVICES AND WIRING INDICATED.
2) INSTALL IN A NEMA 12 ENCLOSURE WITH MOUNTING FLANGES AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL AND HINGED LOCKABLE DOOR. SIZE AS INDICATED.
3) PROVIDE DIN RAIL, TERMINAL END PLATES, TERMINAL END STOPS, TERMINAL DUST COVERS AND OTHER MISCELLANEOUS HARDWARE AS REQUIRED TO MATCH TERMINALS. LABEL ALL TERMINALS EXACTLY AS INDICATED ON THE DETAILS.
4) ALL WIRE #14AWG EXCEPT WHERE SPECIFICALLY INDICATED OTHERWISE. LABEL BOTH ENDS OF ALL JUMPERS WITH THE ENGINE PANEL TERMINAL NUMBER.
5) PROVIDE MECHANICAL GROUND LUGS FASTENED TO BACK PANEL AND GROUNDED TO ENGINE-GENERATOR. GROUND ALL SHIELD DRAIN WIRES TO LUGS AT BACK PANEL ONLY.
6) PROVIDE WIRING HARNESSES FOR CONNECTION TO GENERATOR AND TO ENGINE. INSTALL WIRES IN LIQUID TIGHT FLEX OR FLEXIBLE PLASTIC WIRE LOOM AND PROVIDE SERVICE LOOPS IN ACCORDANCE WITH SPECIFICATIONS.
7) SHOP TEST EACH NEW ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESSES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

FIELD INSTALLATION NOTES:

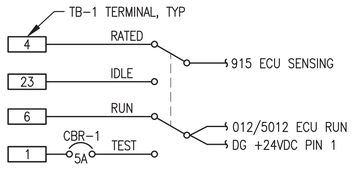
1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.
2) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES AT ENGINE J-BOX ONLY. CLIP DRAIN WIRES AT OPPOSITE ENDS.



6 E6.5 STARTER AUX SOLENOID SS WIRING
NO SCALE



7 E6.5 EXHAUST RTD CONNECTOR
NO SCALE



8 E6.5 TEST-IDLE/RUN-RATED SWITCH SW-TR WIRING
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

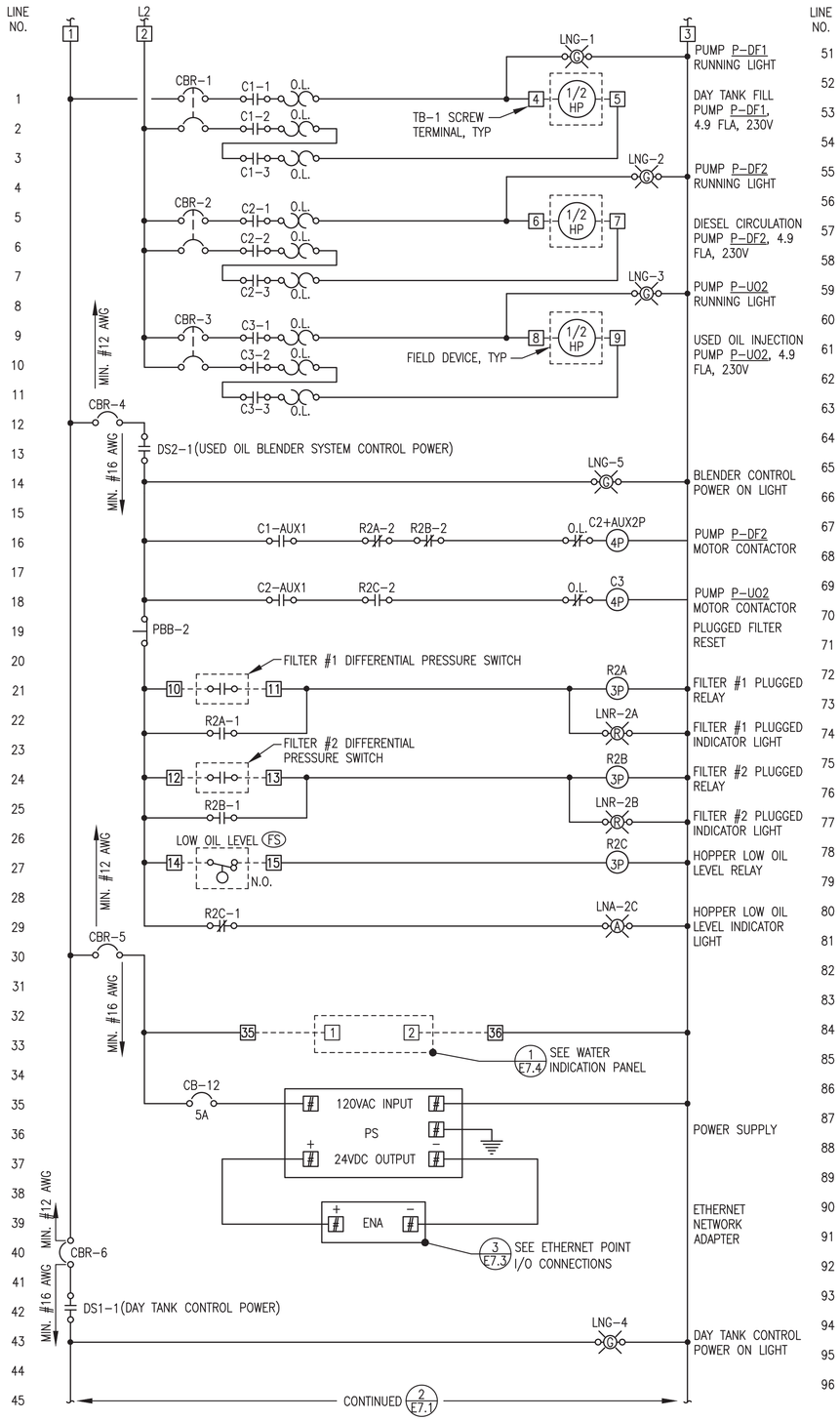
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

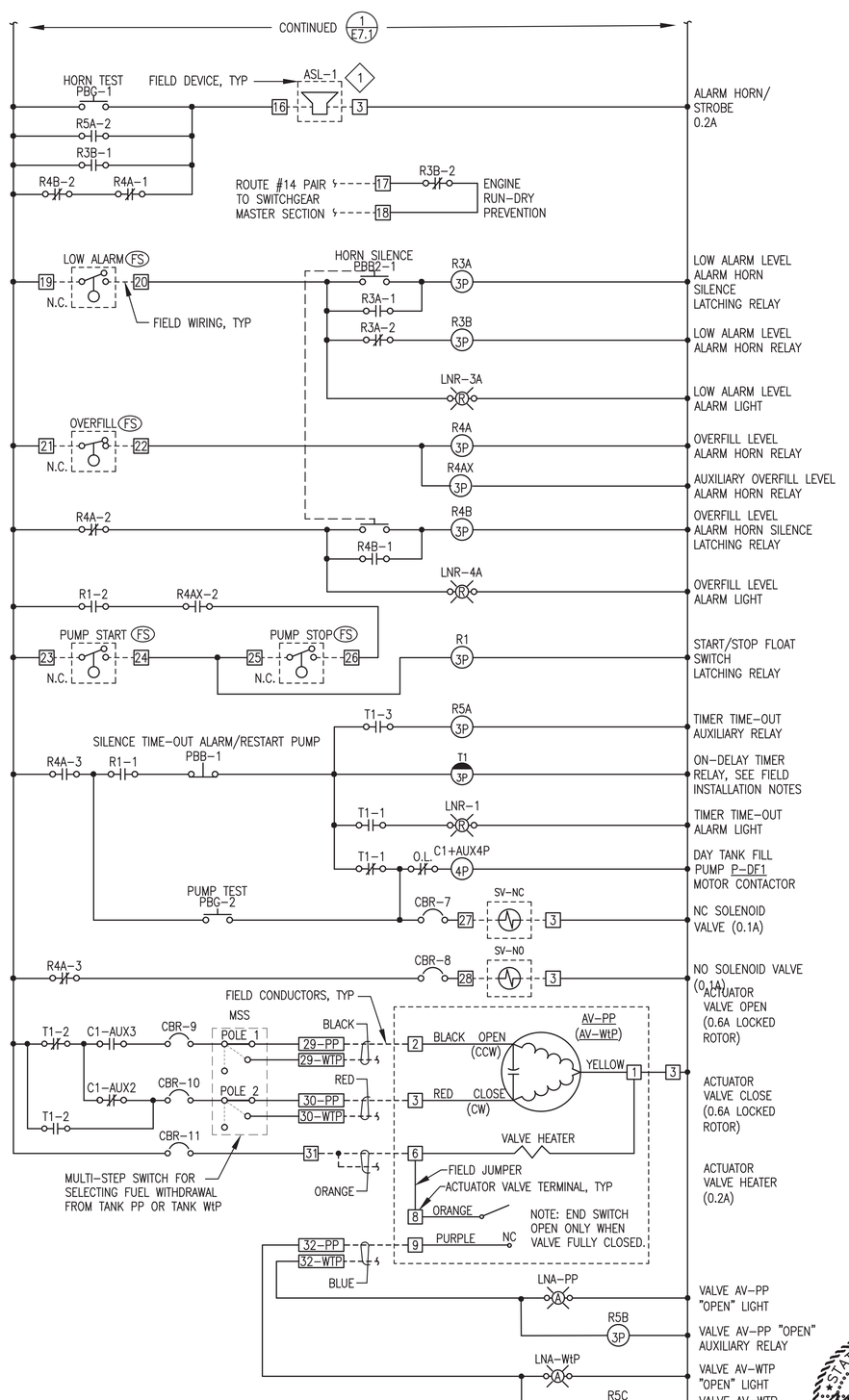
TITLE: NEW 24VDC ENGINE WIRING JUNCTION BOX

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E6.5
PROJECT NUMBER:	



1 E7.1 USED OIL BLENDER SYSTEM LOGIC DIAGRAM
NO SCALE



2 E7.1 DAY TANK LOGIC DIAGRAM
NO SCALE

BILL OF MATERIALS

NOTE: ON THIS SHEET AND THE PANEL DRAWINGS THAT FOLLOW SPECIFIC PARTS MANUFACTURER AND MODEL ARE SELECTED NOT ONLY TO MEET PERFORMANCE FUNCTION BUT ALSO TO COORDINATE AND INTERFACE WITH OTHER DEVICES AND SYSTEMS. APPROVED EQUAL SUBSTITUTIONS WILL BE ALLOWED ONLY BY ENGINEER'S APPROVAL. TO OBTAIN APPROVAL, SUBMITTALS MUST CLEARLY DEMONSTRATE HOW SUBSTITUTE ITEM MEETS OR EXCEEDS SPECIFIED ITEM QUALITY AND PERFORMANCE CHARACTERISTICS AND ALSO COMPLIES WITH MECHANICAL AND/OR ELECTRICAL CONNECTIONS AND PHYSICAL LAYOUT REQUIREMENTS.

TAG	MANUFACTURER	MODEL	DESCRIPTION
AUX2P	ALLEN-BRADLEY	100FA11	AUXILIARY CONTACT FOR CONTACTOR, 2 POLE, NO, NC
AUX4P	ALLEN-BRADLEY	100FA31	AUXILIARY CONTACT FOR CONTACTOR, 4 POLE, 3NO, 1NC
C	ALLEN-BRADLEY	100C09D10	CONTACTOR, 120V COIL, 9A, 4 POLE
CBR-1,2,3	ALLEN-BRADLEY	1489-M2-C150	RAIL-MOUNT CIRCUIT BREAKER, 2 POLE, 15A
CBR-4,5,6,12	ALLEN-BRADLEY	1489-M1-C050	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 5A
CBR-7,8,9,10,11	ALLEN-BRADLEY	1489-M1-C010	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 1A
DS	ALLEN-BRADLEY	194LE201753	DISCONNECT, 2 POSITION, 3 N.O., 20A, FACE MOUNT
	ALLEN-BRADLEY	194LHC4E1751	KNOB ACTUATOR FOR LOAD SWITCH, ON/OFF, LOCKABLE
ENA	ALLEN-BRADLEY	1734-AENTR	I/O DUAL PORT ETHERNET NETWORK ADAPTER
DI8	ALLEN-BRADLEY	1734-IB8	DIGITAL INPUT MODULE, 24VDC, 8 POINT, SINKING
LNG	ALLEN-BRADLEY	800HQRH2G	GREEN LED PILOT LIGHT, 12-130V, NEMA 4X
LNR	ALLEN-BRADLEY	800HQRH2R	RED LED PILOT LIGHT, 12-130V, NEMA 4X
LNA	ALLEN-BRADLEY	800HQRH2A	AMBER LED PILOT LIGHT, 12-130V, NEMA 4X
MSS	SALZER	61126	MULTI-STEP SWITCH, 6 POLE-3 WAY, WITHOUT OFF, 6A 4-HOLE FRONT PANEL MOUNT, 90° SWITCHING ANGLE M1 HANDLE & ESCUTCHEON
OL	ALLEN-BRADLEY	193-1EEDB	OVERLOAD, 230V, 1ø, ADJUSTABLE 3.2A-16.0A RANGE
PBB	ALLEN-BRADLEY	800HAR2D2	MOMENTARY PUSH BUTTON, 1 NC, NEMA 4X, BLACK
PBB2	ALLEN-BRADLEY	800HAR2A2	MOMENTARY PUSH BUTTON, 2 NO, NEMA 4X, BLACK
RBG	ALLEN-BRADLEY	800HAR1D1	MOMENTARY PUSH BUTTON, 1 NO, NEMA 4X, GREEN
PP	PHOENIX CONTACTS	FLPPRJ45/RJ45	ETHERNET PATCH PANEL, RJ45xRJ45, DIN RAIL MOUNT
PS	PULS	CP5.241-S1	5A, 120VAC/24VDC POWER SUPPLY
R	ALLEN-BRADLEY	700HA33A1	3PDT RELAY
	ALLEN-BRADLEY	700HN101	11 PIN SOCKET BASE
T	ALLEN-BRADLEY	700HT3	SERIES B TIMING MODULE
	ALLEN-BRADLEY	700HA33A1	3PDT RELAY
	ALLEN-BRADLEY	700HN205	11 PIN RELAY SOCKET BASE FOR TIMER
TB-1,2	ALLEN-BRADLEY	1492CAM1L	55A, 600V, LARGE-HEAD SCREW TERMINALS

LEGEND

- PANEL WIRING
- FIELD WIRING
- O.L. OVERLOADS
- R# CONTROL RELAY
- R#-# NORMALLY OPEN CONTACT
- PB-# NORMALLY OPEN MOMENTARY PUSH BUTTON
- T# TIME DELAY RELAY
- SS-# 2-POSITION SELECTOR SWITCH
- R#-# NORMALLY CLOSED CONTACT
- PB-# NORMALLY CLOSED MOMENTARY PUSH BUTTON
- C# CONTACTOR
- SW-# NORMALLY OPEN FLOAT SWITCH
- SV# SOLENOID VALVE
- # TERMINAL BLOCK
- SW-# NORMALLY CLOSED FLOAT SWITCH
- ASL-# ALARM & STROBE LIGHT
- CB-# CIRCUIT BREAKER

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

ALASKA ENERGY AUTHORITY

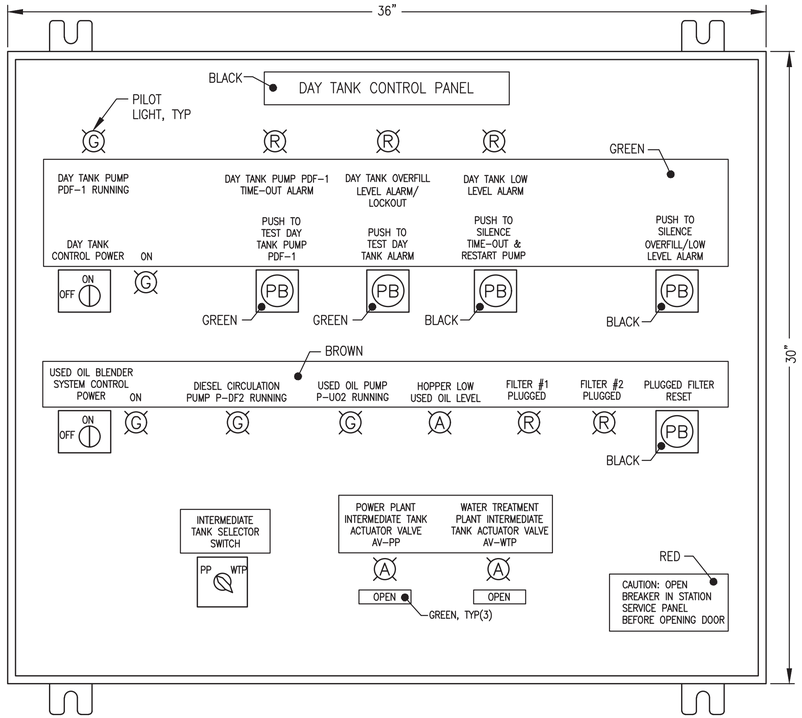
PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: FUEL SYSTEM CONTROL PANEL LOGIC DIAGRAM AND BILL OF MATERIALS

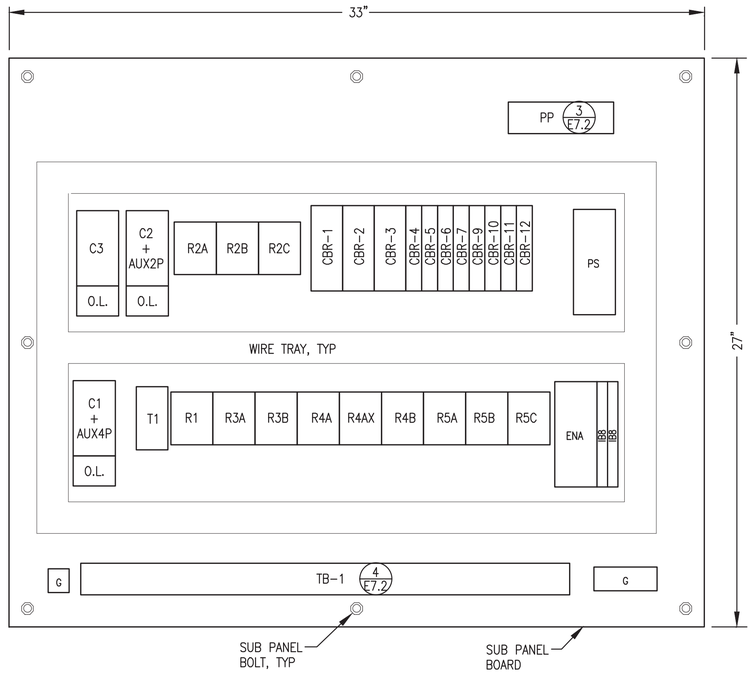
STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

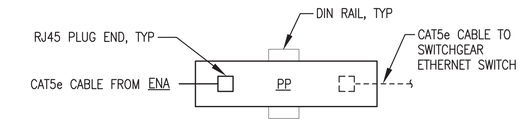
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E7.1
PROJECT NUMBER:	



1 E7.2 FRONT PANEL LAYOUT
NO SCALE

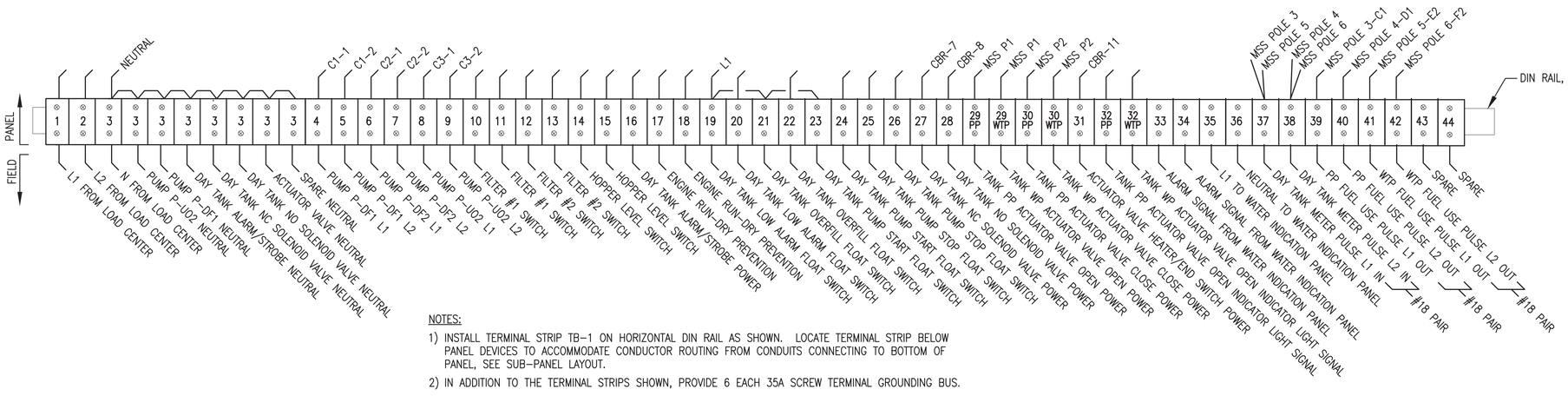


2 E7.2 SUB PANEL LAYOUT
NO SCALE



NOTE: INSTALL ETHERNET PATCH PANEL PP ON DIN RAIL AS SHOWN. LOCATE TERMINAL STRIP IN THE UPPER RIGHT CORNER OF PANEL TO ACCOMMODATE CONDUCTOR ENTRY THROUGH RIGHT SIDE OF PANEL, SEE SUB-PANEL LAYOUT.

3 E7.2 PP INSTALLATION
NO SCALE



NOTES:

1) INSTALL TERMINAL STRIP TB-1 ON HORIZONTAL DIN RAIL AS SHOWN. LOCATE TERMINAL STRIP BELOW PANEL DEVICES TO ACCOMMODATE CONDUCTOR ROUTING FROM CONDUITS CONNECTING TO BOTTOM OF PANEL, SEE SUB-PANEL LAYOUT.
2) IN ADDITION TO THE TERMINAL STRIPS SHOWN, PROVIDE 6 EACH 35A SCREW TERMINAL GROUNDING BUS.

4 E7.2 TB-1 TERMINAL STRIP LAYOUT
NO SCALE

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA 49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: FUEL SYSTEM CONTROL PANEL LAYOUT & TERMINAL STRIPS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E7.2
PROJECT NUMBER:	

PANEL NOTES:

1) PROVIDE COMPLETE LISTED PANEL ASSEMBLY WITH ALL DEVICES INDICATED IN LOGIC DIAGRAM EXCEPT FOR FIELD DEVICES. INSTALL IN A NEMA 12 ENCLOSURE WITH 4 EACH INTEGRAL MOUNTING LUGS AT BACK. SEE SHEET E7.2 FOR PANEL LAYOUT DETAILS.

2) USE MIN #12 WIRE FOR ALL CIRCUITS UP TO FIRST IN-LINE PANEL BREAKERS (FOR 20A FEED). USE MIN #16 AWG ON ALL 5 AMP CIRCUITS AND MIN #14 AWG WIRE ON ALL 15A CIRCUITS. TAG EACH END OF ALL JUMPERS WITH DEVICE OR TERMINATION DESIGNATOR OF LANDING OF OPPOSITE END OF JUMPER (REVERSE ADDRESS).

3) LABEL ALL PANEL DEVICES ON BASE OR BACK PANEL ADJACENT TO ITEM. LABEL REMOTE EQUIPMENT CONNECTIONS AT EACH TERMINAL BLOCK BY THE ITEM TITLE AS SHOWN ON THE FIELD SIDE OF THE TERMINAL STRIP DRAWING. PROVIDE BEVELED EDGE WHITE CORE NAMEPLATES AS SHOWN ON THE PANEL FACE LAYOUT AND SECURE TO PANEL FACE WITH A MINIMUM OF TWO STAINLESS STEEL MOUNTING SCREWS, COLOR AS INDICATED.

4) BENCH TEST COMPLETED UNIT. PROVIDE MIN 48 HOURS NOTICE TO ENGINEER TO SCHEDULE OBSERVATION OF BENCH TEST. PROVIDE SWITCHES AND LAMPS TO SIMULATE OPERATION OF ALL FIELD DEVICES.

5) DEVICES AND WIRING NOTED AS "FIELD" AND SHOWN WITH DASHED LINES WILL BE FIELD INSTALLED AND ARE NOT PART OF THE PANEL SHOP FABRICATION. FOR BENCH TEST, PROVIDE TEMPORARY DEVICES AND WIRING AS REQUIRED TO SIMULATE FIELD DEVICES.

6) POWER TO PANEL PROVIDED FROM DEDICATED 20A 2-POLE CIRCUIT BREAKER IN LISTED LOAD CENTER. SEE FIELD INSTALLATION NOTE #3.

FIELD INSTALLATION NOTES:

1) SEE MECHANICAL FOR DAY TANK INSTALLATION & PIPING. INSTALL CONTROL PANEL & FIELD DEVICES AS INDICATED TO PROVIDE REDUNDANT HIGH & LOW LIMIT CONTROLS & OVERFILL PROTECTION.

2) FIELD WIRING TO FLOAT SWITCHES, SOLENOID VALVES, ACTUATOR VALVE, & ALARM HORN #14 AWG. ALL OTHER FIELD WIRING #12 AWG. LABEL BOTH ENDS OF ALL CONDUCTORS WITH CONTROL PANEL TERMINAL BLOCK TERMINATION NUMBERS. WHEN NOT IN CONDUIT, MAKE JACKETED COM CABLE ENCLOSURE ENTRIES WITH CABLE GLAND CONNECTORS.

3) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS ON SHEET E2. PROVIDE POWER TO DAY TANK PANEL FROM DEDICATED 20A 2-POLE CIRCUIT BREAKER IN STATION SERVICE PANELBOARD.

4) VERIFY THAT ALL DAY TANK FLOAT SWITCHES ARE ORIENTED FOR N.C. (OPEN ON RISE) OPERATION PRIOR TO INSTALLATION. ALL FLOATS SHOWN ON LOGIC DIAGRAM WITH TANK AT FULL (PUMP STOP) LEVEL. VERIFY THAT THE HOPPER FLOAT SWITCH IS ORIENTED FOR N.O. (CLOSE ON RISE) OPERATION.

5) FILL PUMP CAVITIES WITH LUBE OIL PRIOR TO INITIAL OPERATION. VERIFY PROPER ROTATION OF PUMPS. PRIME SYSTEM WITH HAND PRIMING PUMP PRIOR TO BEGINNING DAY TANK FILL.

6) FIELD TEST COMPLETED UNIT TO VERIFY ALL CONTROL AND ALARM FUNCTIONS. MANIPULATE FLOAT SWITCHES BY REACHING IN THROUGH ADJACENT 4" BUNG. TEMPORARILY SET TIMING RELAY TO 30 SECONDS TO VERIFY TIME-OUT AND RESET FUNCTIONS.

7) SET TIMING RELAY TIME DELAY TO 30 MINUTES (APPROX. 55 GALS. REQUIRED FROM PUMP START TO PUMP STOP LEVEL @ APPROX. 4 GPM). ON THE INITIAL TANK FILL, THE PUMP TEST/RESET BUTTON MAY HAVE TO BE MANUALLY RESET IN ORDER TO GET THE FUEL LEVEL TO WITHIN THE NORMAL OPERATING RANGE. SEE SEQUENCE OF OPERATIONS.

DAY TANK FILL SEQUENCE OF OPERATIONS:

1) WHEN THE DAY TANK CIRCUIT BREAKER AND CONTROL POWER SWITCH ARE CLOSED, THE POWER LIGHT IS ON AND POWER IS PROVIDED TO THE REMOTE ACTUATOR VALVE HEATER/OPEN LIGHT CIRCUIT.

2) WHEN THE DAY TANK IS NOT CALLING FOR FUEL, POWER IS PROVIDED TO THE REMOTE ACTUATOR VALVE CLOSE CIRCUIT. WHEN THE ACTUATOR IS IN THE FULLY CLOSED POSITION, THE CLOSING CIRCUIT IS BROKEN BY INTERNAL ACTUATOR LIMIT SWITCH #2 AND THE REMOTE ACTUATOR VALVE "OPEN" LIGHT IS OFF.

3) NORMAL FILL OPERATION – WHEN THE FUEL LEVEL DROPS TO THE "PUMP START" SWITCH, THE TIMER IS STARTED, THE N.C. DAY TANK SOLENOID VALVE OPENS, THE REMOTE ACTUATOR VALVE OPENS & THE VALVE "OPEN" LIGHT TURNS ON, THE DAY TANK PUMP IS ENERGIZED, THE PUMP "ON" LIGHT TURNS ON, AND THE USED OIL BLENDER RUN SIGNAL DRY CONTACT CLOSES. WHEN THE ACTUATOR IS IN THE FULLY OPEN POSITION, THE OPENING CIRCUIT IS BROKEN BY INTERNAL ACTUATOR LIMIT SWITCH #7 AND THE REMOTE ACTUATOR VALVE "OPEN" LIGHT REMAINS ON. WHEN FUEL REACHES THE "PUMP STOP" FLOAT SWITCH BEFORE THE TIMER TIMES-OUT, THE TIMER IS RESET, THE N.C. DAY TANK SOLENOID VALVE AND REMOTE ACTUATOR VALVE CLOSE, THE REMOTE ACTUATOR VALVE "OPEN" LIGHT TURNS OFF, THE PUMP DE-ENERGIZES, THE PUMP "ON" LIGHT TURNS OFF, AND THE USED OIL BLENDER RUN SIGNAL DRY CONTACT OPENS.

4) TIMER OPERATION – IF THE TIMER TIMES-OUT THE N.C. DAY TANK SOLENOID VALVE AND REMOTE ACTUATOR VALVE CLOSE, THE REMOTE ACTUATOR VALVE "OPEN" LIGHT TURNS OFF, THE PUMP DE-ENERGIZES, THE PUMP "ON" LIGHT TURNS OFF, THE USED OIL BLENDER RUN SIGNAL DRY CONTACT OPENS, THE "TIME-OUT" ALARM LIGHT TURNS ON, AND THE TIME-OUT ALARM HORN SOUNDS. PRESSING THE "TIME-OUT ALARM SILENCE / PUMP RESTART" BUTTON RESETS THE TIMER, SILENCES THE ALARM HORN, AND STARTS THE NORMAL FILL OPERATION. SEE FIELD INSTALLATION NOTES FOR TIMER SETTING.

5) OVERFILL FUEL LEVEL – IF THE TANK OVERFILLS AND THE FUEL LEVEL REACHES THE "OVERFILL" FLOAT SWITCH, THE N.O. DAY TANK SOLENOID VALVE CLOSES, THE "OVERFILL LEVEL" ALARM LIGHT TURNS ON, THE N.C. DAY TANK SOLENOID VALVE AND REMOTE ACTUATOR VALVE CLOSE, THE VALVE "OPEN" LIGHT TURNS OFF, THE PUMP DE-ENERGIZES, THE PUMP "ON" LIGHT TURNS OFF, THE USED OIL BLENDER RUN SIGNAL DRY CONTACT OPENS, THE "OVERFILL LEVEL" ALARM LIGHT TURNS ON, AND THE ALARM HORN SOUNDS. PRESSING THE LEVEL ALARM HORN "SILENCE" BUTTON SILENCES THE ALARM HORN WHILE LEAVING THE "OVERFILL LEVEL" ALARM LIGHT ON. WHEN THE FUEL LEVEL FALLS BELOW THE "OVERFILL" FLOAT SWITCH, THE "OVERFILL LEVEL" ALARM LIGHT TURNS OFF, THE N.O. DAY TANK SOLENOID VALVE OPENS AND THE ALARM HORN TURNS OFF (IF NOT PREVIOUSLY SILENCED). WHEN THE FUEL LEVEL REACHES THE "PUMP START" FLOAT SWITCH, THE NORMAL FILL OPERATION IS REPEATED.

6) LOW FUEL LEVEL – IF THE FUEL LEVEL FALLS BELOW THE "LOW ALARM" FLOAT SWITCH, THE "LOW FUEL LEVEL" ALARM LIGHT TURNS ON, THE ENGINE RUN-DRY PREVENTION DRY CONTACT OPENS, AND THE ALARM HORN SOUNDS. THE LEVEL ALARM HORN "SILENCE" BUTTON SILENCES THE ALARM HORN WHILE LEAVING THE "LOW FUEL LEVEL" ALARM LIGHT ON. WHEN THE FUEL LEVEL RISES ABOVE THE "LOW ALARM" FLOAT SWITCH THE "LOW FUEL LEVEL" ALARM LIGHT TURNS OFF, THE ENGINE RUN-DRY PREVENTION DRY CONTACT CLOSES, AND THE ALARM HORN TURNS OFF (IF NOT PREVIOUSLY SILENCED).

7) PUMP & HORN TEST – MOMENTARY CONTACT BUTTONS ARE PROVIDED TO TEST FUNCTION OF THE DAY TANK PUMP AND ALARM HORN. PRESSING THE "PUSH TO TEST DAY TANK PUMP" BUTTON STARTS THE TIMER, MOMENTARILY OPENS THE N.C. DAY TANK SOLENOID VALVE & ACTUATED BALL VALVE, ENERGIZES THE DAY TANK PUMP, TURNS ON THE DAY TANK PUMP "RUNNING" LIGHT AND CLOSES THE USED OIL BLENDER RUN SIGNAL DRY CONTACT. THE "PUSH TO TEST DAY TANK PUMP" BUTTON IS LOCKED OUT IF THE DAY TANK IS AT THE OVERFILL LEVEL. PRESSING THE "PUSH TO TEST DAY TANK ALARM" BUTTON MOMENTARILY ENERGIZES THE ALARM HORN/STROBE.

8) INTERMEDIATE TANK SELECTION – WHEN THE MANUAL SELECTOR SWITCH IS SET TO "PP" THE DAY TANK WILL DRAW FUEL FROM THE POWER PLANT INTERMEDIATE TANK, THE AV-PP VALVE "OPEN" LIGHT WILL TURN ON, AND THE FUEL METER PULSER WILL SEND A SIGNAL TO THE PLC PP FUEL USE INPUT. WHEN THE MANUAL SELECTOR SWITCH IS SET TO "WTP" THE DAY TANK WILL DRAW FUEL FROM THE WATER TREATMENT PLANT INTERMEDIATE TANK, THE AV-WTP VALVE "OPEN" LIGHT WILL TURN ON, AND THE FUEL METER PULSER WILL SEND A SIGNAL TO THE PLC WTP FUEL USE INPUT.

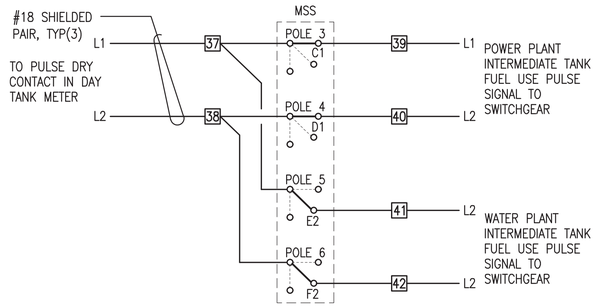
USED OIL BLENDER SYSTEM SEQUENCE OF OPERATIONS:

1) WHEN THE BLENDER CIRCUIT BREAKER AND CONTROL POWER SWITCH ARE CLOSED; THE GREEN POWER LIGHT IS ON AND POWER IS PROVIDED TO ALL CONTROL DEVICES.

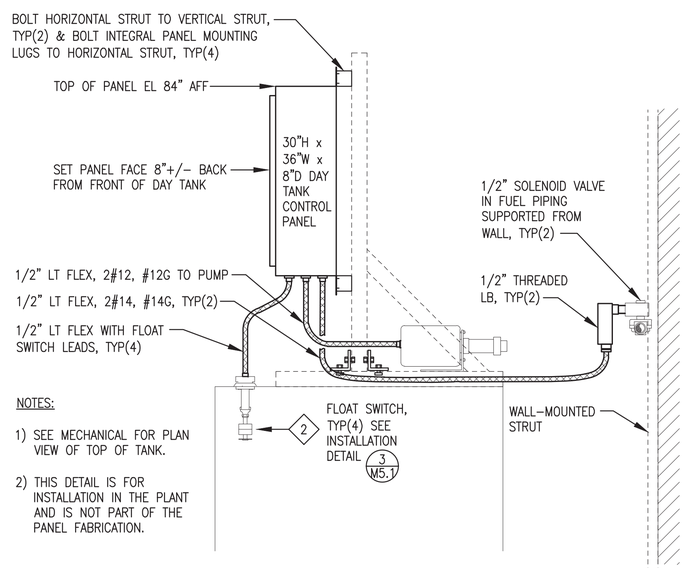
2) NORMAL OPERATION – WHENEVER THE DAY TANK FILL SEQUENCE IS INITIATED, BOTH THE DIESEL CIRCULATING PUMP P-DF2 AND THE USED OIL INJECTION PUMP P-UO2 RUN AND THE ASSOCIATED GREEN PUMP RUNNING LIGHTS ARE ON.

3) PLUGGED FILTER – IF THE DIFFERENTIAL PRESSURE ACROSS A FILTER REACHES THE ALARM SETPOINT, BOTH PUMPS STOP RUNNING AND THE RED FILTER PLUGGED LIGHT FOR THE ASSOCIATED FILTER TURNS ON. THE ALARM LATCHES AND THE SYSTEM WILL NOT OPERATE UNTIL THE PROBLEM IS CORRECTED. AFTER THE FILTER ELEMENT HAS BEEN CHANGED THE BLACK RESET BUTTON MUST BE PRESSED TO RESUME NORMAL OPERATION.

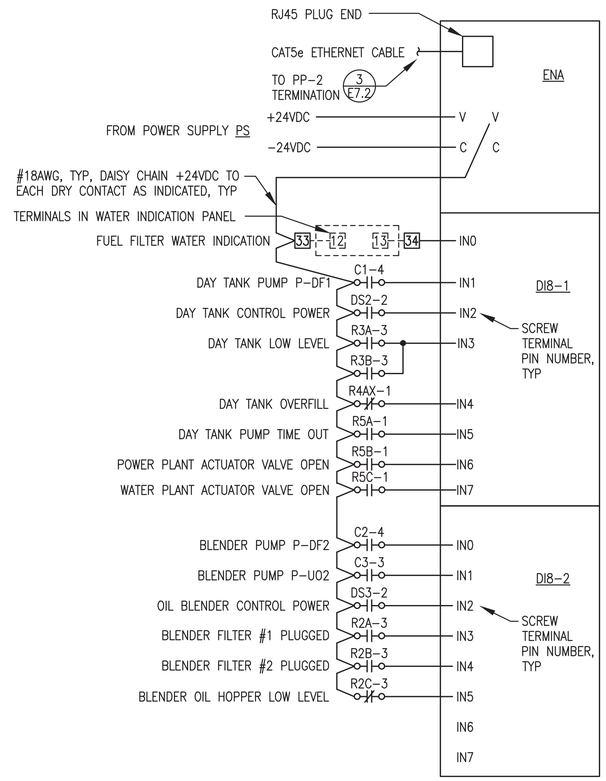
4) HOPPER LOW OIL LEVEL – WHEN THE OIL LEVEL FALLS BELOW THE LOW LEVEL FLOAT SWITCH, USED OIL INJECTION PUMP P-UO2 STOPS RUNNING AND THE AMBER HOPPER LOW OIL LEVEL LIGHT TURNS ON. PUMP P-UO2 WILL NOT OPERATE UNTIL THE USED OIL LEVEL IN THE HOPPER RISES ABOVE THE LOW LEVEL. RESET IS NOT REQUIRED.



1 E7.3 DAY TANK METER PULSE SPLITTER FOR PP & WTP INTERMEDIATE TANKS
NO SCALE



2 E7.3 DAY TANK CONTROL PANEL & DEVICE INSTALLATION
NO SCALE



3 E7.3 ETHERNET POINT I/O CONNECTIONS
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

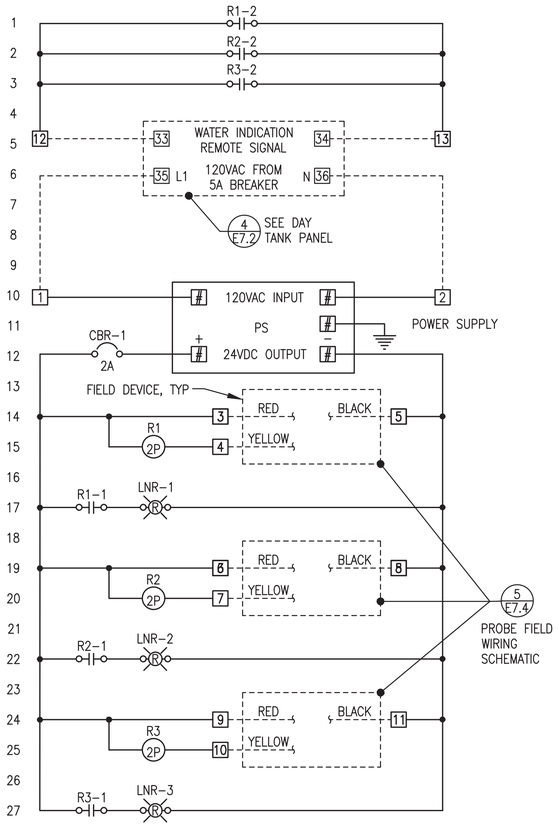
ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

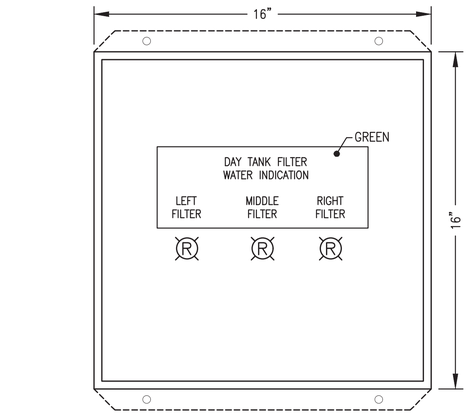
TITLE: FUEL SYSTEM CONTROL PANEL NOTES, SEQUENCE OF OPERATIONS & INTERCONNECT DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

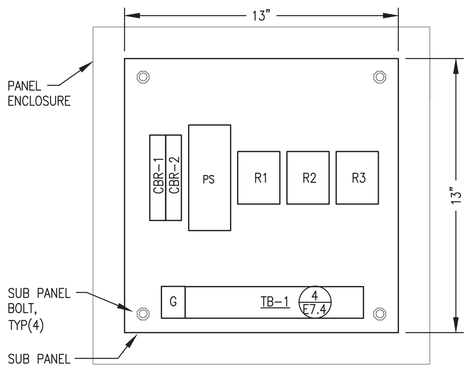
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E7.3
PROJECT NUMBER:	



1 E7.4 PANEL WIRING DIAGRAM
NO SCALE



2 E7.4 FRONT PANEL LAYOUT
NO SCALE



3 E7.4 SUB PANEL LAYOUT
NO SCALE

PANEL BILL OF MATERIALS

TAG	QTY	MANUFACTURER	MODEL	DESCRIPTION
CBR-1	1	ALLEN-BRADLEY	1489-M1-C020	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 2A
LNR	3	ALLEN-BRADLEY	800HQRH2R	RED LED PILOT LIGHT, 12-130V, NEMA 4X
PS	1	PULS	CP.241-S1	5A, 120VAC/24VDC POWER SUPPLY
R	3	ALLEN-BRADLEY	700HA32Z24	24VDC DPDT RELAY
	3	ALLEN-BRADLEY	700HN100	8 PIN SOCKET BASE
TB	15	ALLEN-BRADLEY	1492CAM1L	35A, 600V, LARGE-HEAD SCREW TERMINALS

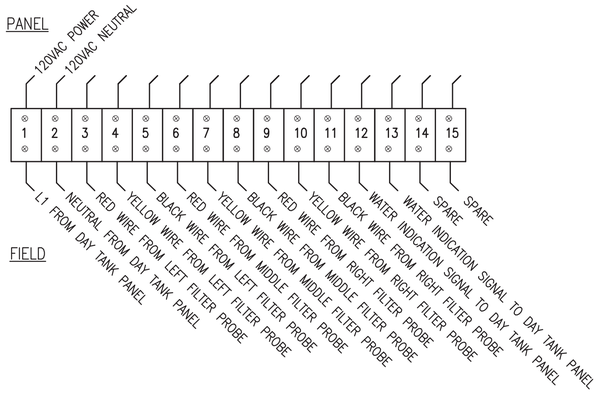
PANEL SHOP FABRICATION NOTES:

1) FURNISH COMPLETE PANEL ASSEMBLY WITH ALL DEVICES INDICATED IN WIRING DIAGRAM AND BILL OF MATERIALS ALONG WITH ALL PANEL DEVICE ACCESSORIES, DIN RAIL, & HARDWARE REQUIRED FOR COMPLETE INSTALLATION.

2) INSTALL IN A 16"x16"x8" NEMA 12 STEEL ENCLOSURE WITH INTEGRAL MOUNTING FLANGES AT BACK, A MIN 16 GAUGE INTERIOR BACK PANEL, AND HINGED DOOR. ENCLOSURE COLOR ANSI 61 GRAY AND BACK PANEL COLOR WHITE.

3) PROVIDE BEVELED EDGE WHITE CORE NAMEPLATES, FACE COLOR AS INDICATED. SECURE TO PANEL FACE WITH A MINIMUM OF TWO MOUNTING SCREWS.

4) CONNECT DEVICES WITH MANUFACTURER PROVIDED CABLES IN ACCORDANCE WITH INSTALLATION INSTRUCTIONS.

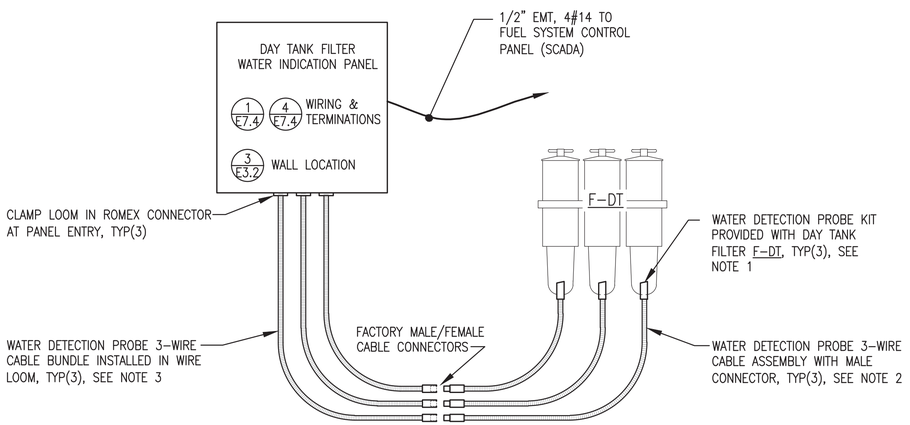


NOTES:

1. INSTALL TERMINAL STRIP TB-1 HORIZONTALLY AS SHOWN. LOCATE TERMINAL STRIP BELOW WIRE TRAY TO ACCOMMODATE FIELD CONDUCTORS ENTERING BOTTOM OF PANEL, SEE SUB-PANEL LAYOUT.

2. IN ADDITION TO THE TERMINAL STRIPS SHOWN, PROVIDE 2 EACH 60A SCREW TERMINAL GROUNDING BUS.

4 E7.4 TERMINAL STRIP TB-1 LAYOUT
NO SCALE



5 E7.4 FIELD WIRING SCHEMATIC
NO SCALE

NOTES:

1. THREE EACH RACOR WATER DETECTION PROBE KITS, MODEL RK30880E, SHIPPED LOOSE WITH 3-FILTER BANK. NOT ALL KIT COMPONENTS USED THIS INSTALLATION. KEEP THREE EACH WATER DETECTION PROBE CABLES WITH MOLDED MALE CONNECTORS AND KEEP THREE EACH 3-WIRE CABLE BUNDLES WITH MOLDED FEMALE CONNECTORS. DISCARD THREE EACH PILOT LIGHTS AND DISCARD THREE EACH MOUNTING PANELS.

2. PRIOR TO FLOODING SYSTEM WITH FUEL INSTALL WATER DETECTION PROBES IN EACH FILTER ACCORDING TO MANUFACTURER'S INSTRUCTIONS. ROUTE FACTORY LOOMED CABLES WITH MOLDED FEMALE CONNECTORS BACK TO WALL IN NEAT AND ORGANIZED FASHION FOR CONNECTION TO WIRE EXTENSION CONNECTORS. TYWRAP LOOM TO CONDUIT OR PIPING.

3. FACTORY 3-WIRE CABLE BUNDLES FURNISHED WITH MOLDED MALE CONNECTORS. FIELD INSTALL IN 3/8" PLASTIC WIRE LOOM FROM CONNECTOR TO PANEL ENTRY AND ROUTE TO PANEL IN NEAT AND ORGANIZED FASHION. TYWRAP LOOM TO ADJACENT CONDUIT, PIPING, OR STRUT.

ISSUED FOR AEA
PROJECT
CONSTRUCTION
NOVEMBER 2025

STATE OF ALASKA
49TH
CLOIS W. VERSYP
EE 7802
REGISTERED PROFESSIONAL ENGINEER

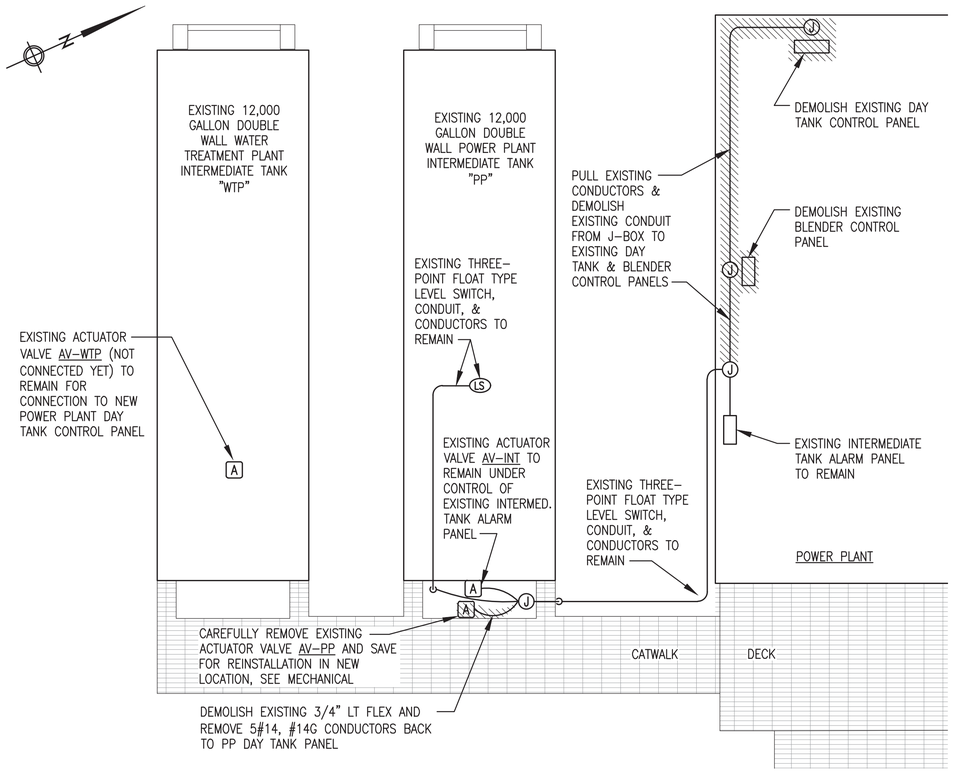
ALASKA ENERGY AUTHORITY

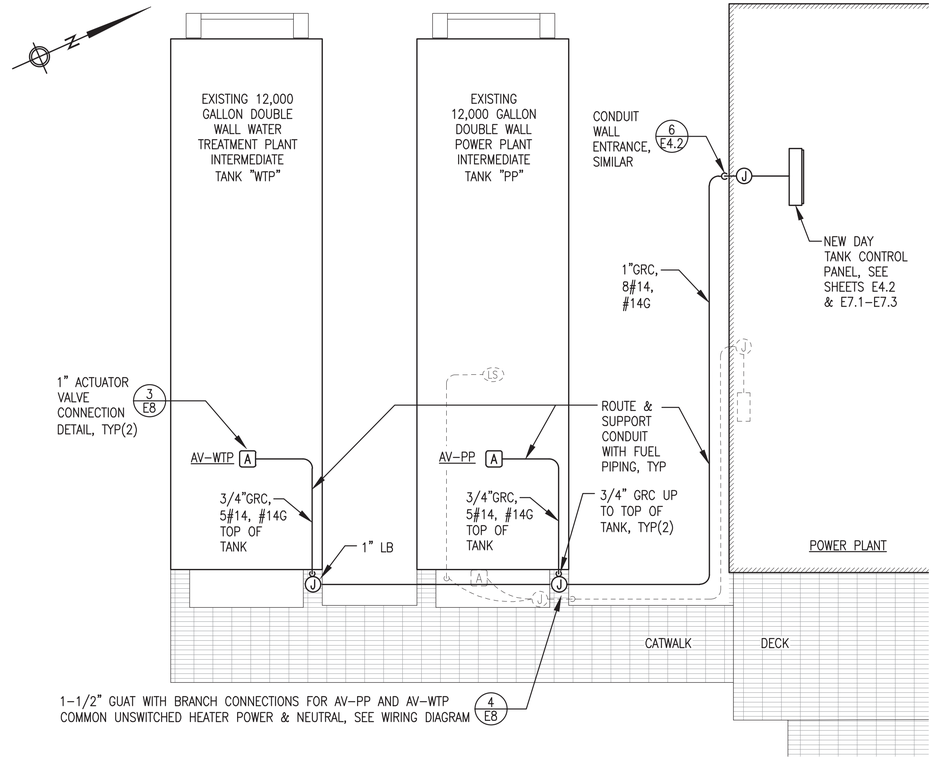
PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: DAY TANK FILTER WATER INDICATION PANEL

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E7.4
PROJECT NUMBER:	





DEMOLITION GENERAL NOTES:

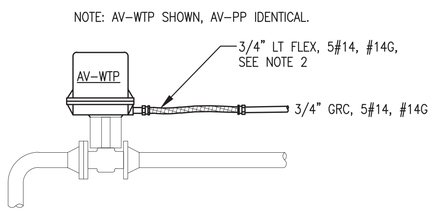
1. ALL ITEMS TO REMAIN UNLESS SPECIFICALLY INDICATED FOR REMOVAL. EXISTING EQUIPMENT AND PIPING TO BE REMOVED INDICATED BY HATCHING.
2. TAKE ALL PRECAUTIONS TO MINIMIZE DAMAGE TO FUEL SYSTEM EQUIPMENT BEING REMOVED DURING DEMOLITION. TURN ALL REMOVED EQUIPMENT OVER TO THE UTILITY FOR FINAL DISPOSITION.
3. SEE MECHANICAL PLANS FOR ADDITIONAL DEMOLITION.

1 E8 INTERMEDIATE TANK AREA WIRING DEMOLITION PLAN
1/4"=1'-0"

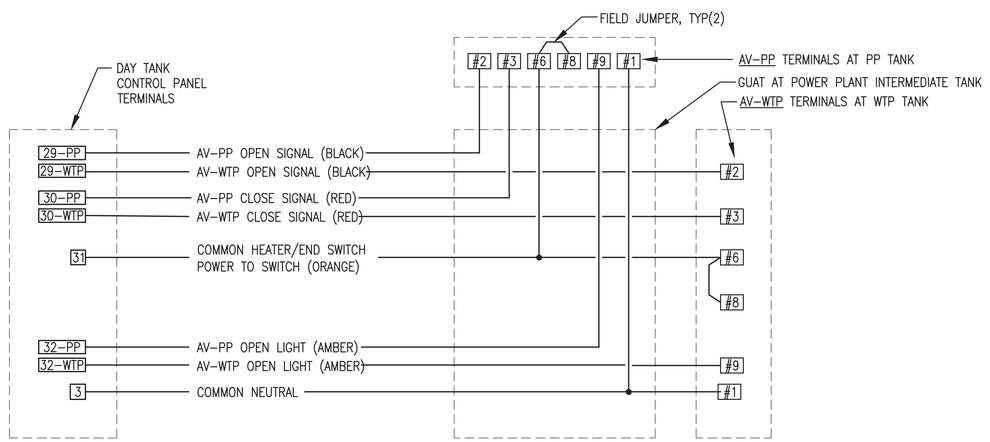
NEW WORK GENERAL NOTES:

1. ALL DEVICES, FITTINGS, AND RACEWAY SHOWN WITH LIGHT/DASHED LINES THIS PLAN EXISTING TO REMAIN IN SERVICE.
2. ALL DEVICES, FITTINGS, AND RACEWAY SHOWN WITH DARK/SOLID LINES THIS PLAN ARE NEW OR REUSED AND ARE TO BE INSTALLED THIS PROJECT.
3. SEE MECHANICAL PLANS FOR ADDITIONAL NEW WORK.
4. TANKS CONTAIN DIESEL FUEL ONLY. NO CLASSIFIED AREAS THIS PLAN.

2 E8 INTERMEDIATE TANK AREA WIRING NEW WORK PLAN
1/4"=1'-0"



3 E8 ACTUATOR VALVE CONNECTION
NO SCALE



4 E8 ACTUATOR VALVE WIRING DIAGRAM
NO SCALE

ISSUED FOR AEA PROJECT CONSTRUCTION NOVEMBER 2025

STATE OF ALASKA 49TH CLOIS W. VERSYP EE 7802 REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

PROJECT: TULUKSAK POWER PLANT UPGRADE PROJECT

TITLE: EXTERIOR FUEL WIRING PLANS & DETAILS

Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 11/24/25
FILE NAME:	SHEET: E8
PROJECT NUMBER:	