NELSON LAGOON POWER SYSTEM UPGRADE PROJECT
MODULAR POWER PLANT ASSEMBLY

MODULAR POWER PLANT ASSEMBLY – MECHANICAL DRAWINGS	
M1.1	MECHANICAL LEGENDS & SCHEDULES
M1.2	WARNING SIGN & FIRE EXTINGUISHER PLAN, SIGN & VALVE TAG SCHEDULES
M1.3	SYSTEM START UP & SEQUENCE OF OPERATIONS
M2.1	MECHANICAL PENETRATIONS PLAN, ELEVATIONS & DETAILS
M2.2	MECHANICAL PENETRATION DETAILS
M2.3	MECHANICAL SUPPORT PLANS & DETAILS
M2.4	MECHANICAL SUPPORT HORIZONTAL WALL STRUT INSTALLATION
M2.5	MECHANICAL SUPPORT VERTICAL WALL STRUT INSTALLATION
M3.1	EQUIPMENT LAYOUT PLAN, SECTION, & DETAILS
M3.2	WALL ELEVATIONS & PIPING DETAILS
M3.3	MECHANICAL DETAILS
M3.4	GENERATOR FABRICATION DETAILS
M4.1	COOLANT & HEAT RECOVERY PIPING PLAN & DETAILS
M4.2	COOLANT & HEAT RECOVERY ISOMETRICS & DETAILS
M4.3	COOLANT & HEAT RECOVERY PIPING DETAILS
M4.4	GLYCOL STORAGE & EXPANSION TANKS FABRICATION
M5.1	DIESEL FUEL & USED OIL PIPING PLAN, DIAGRAM, & DETAILS
M5.2	DIESEL FUEL & USED OIL PIPING ELEVATIONS & DETAILS
M5.3	USED OIL HOPPER & BLENDER INSTALLATION DETAILS
M5.4	200 GALLON DAY TANK FABRICATION
M5.5	USED OIL BLENDER FILTER BANK LAYOUT & CONFIGURATION
M5.6	USED OIL BLENDER TYPICAL FILTER HOUSING DETAILS
M5.7	USED OIL BLENDER 25 GALLON HOPPER FABRICATION
M6	EXHAUST & CRANK VENT PLAN & DETAILS
M7.1	VENTILATION PLAN & DETAILS
M7.2	SHEET METAL FABRICATION DETAILS
FS1	FIRE SUPPRESSION SYSTEM PLAN, SECTION, LEGEND, & NOTES

MODULAR POWER PLANT ASSEMBLY – ELECTRICAL	
E1.1	ELECTRICAL LEGENDS & SCHEDULES
E2	MODULE GROUNDING PLAN & DETAILS
E3.1	WIREWAY PLAN, BUILDING SECTION, & DETAILS
E3.2	ELEVATIONS & DETAILS
E3.3	ELEVATIONS & DETAILS
E4.1	RECEPTACLE & LIGHTING PLANS & PANELBOARD
E4.2	STATION SERVICE PLAN, DETAILS, & PANELBOARD
E5	INSTRUMENTATION & DATA PLAN & DETAILS
E6.1	SWITCHGEAR ENCLOSURE LAYOUT, SETTING TABLE, & DETAILS
E6.2	SWITCHGEAR ONE–LINE & DETAILS
E6.3	24VDC ENGINE WIRING JUNCTION BOX
E7.1	DAY TANK CONTROL PANEL LOGIC DIAGRAM & BILL OF MATERIALS
E7.2	DAY TANK CONTROL PANEL LAYOUT & TERMINAL STRIPS
E7.3	DAY TANK CONTROL PANEL NOTES, SEQUENCE OF OPERATIONS & INTERCONNECT DETAILS
E7.4	DAY TANK FILTER WATER INDICATION PANEL

MODULAR POWER PLANT ASSEMBLY – ARCHITECTURAL DOORS & WINDOWS	
A1	FLOOR PLAN, REFLECTED CEILING PLAN, CODE ANALYSIS, & GENERAL NOTES
A2.1	INTERIOR ELEVATIONS
A2.2	DOOR & WINDOW DETAILS & SCHEDULE

OWNER FURNISHED MODULE STRUCTURE REFERENCE DRAWINGS	
A3	EXTERIOR ELEVATIONS & ROOFING NOTES & TRIM DETAILS
A4	BUILDING SECTIONS & DETAILS
S1.1	FOUNDATION PLAN, CODE ANALYSIS & STRUCTURAL NOTES
S1.2	FOUNDATION DETAILS
S2	MODULE FRAMING PLANS & DETAILS
S3	MODULE SECTIONS & DETAILS
S4	ROOF FRAMING PLAN & DETAILS
S5.1	STAIRS, LANDINGS, LOADING DOCK, & RADIATOR SUPPORT PLAN
S5.2	STAIRS/LANDINGS FABRICATION DETAILS
S5.3	LOADING DOCK FABRICATION DETAILS
S5.4	RADIATOR SUPPORT FABRICATION DETAILS

ALL WORK SHOWN ON THE FOLLOWING PAGES IS INCLUDED IN THE MODULE ASSEMBLY SCOPE EXCEPT WHERE SPECIFICALLY NOTED.

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ON SOME OF THE MECHANICAL AND ELECTRICAL SHEETS THERE ARE SHOP/ON SITE NOTES THAT CLARIFY THE EXTENT OF WORK THAT IS INCLUDED IN THE MODULE ASSEMBLY SCOPE (SHOP) FROM ITEMS THAT WILL ULTIMATELY BE FIELD INSTALLED OR CONNECTED BY OTHERS UNDER A FUTURE CONTRACT (ON SITE).

ISSUED FOR CONSTRUCTION MAY 2023

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MODULAR POWER PLANT ASSEMBLY SCHEDULE OF DRAWINGS

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

DRAWN BY: BCG | SCALE: NO SCALE
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP G1 | 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
- (T) ANALOG THERMOMETER
- (TH) DIGITAL THERMOMETER
- (TT) TEMPERATURE TRANSMITTER
- (PT) PRESSURE TRANSMITTER
- (DP) DIFFERENTIAL PRES GAUGE
- (FM) FLOW METER
- (FS) FLOAT SWITCH
- (LCA) LOW COOLANT SWITCH
- (TLM) TANK LEVEL MONITOR
- (LSP) LEVEL SENSOR PROBE
- (GLS) GLYCOL LEVEL SENSOR

NOTE: SEE ELECTRICAL FOR ADDITIONAL DETAIL ON CONTROL & INSTRUMENTATION DEVICES

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 COOLING SYSTEM EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
R-1 R-2	GLYCOL RADIATOR	SINGLE PASS, 4 ROW, VERTICAL CORE, 3" FLANGED CONNECTIONS, GALVANIZED COATING, EXPANDED METAL GUARD. 6,000 BTU/MIN AT 77°F AMBIENT, 50 GPM 50% ETHYLENE GLYCOL AT 192F IN, 0.22 PSI MAX GLYCOL PRESSURE DROP. 3 HP, 460 V, 3 PH, MOTOR SUITABLE FOR VFD OPERATION AT 10:1 TURNDOWN RATIO.	DIESEL RADIATOR PART NO. DR3490
TV-1	COOLANT THERMOSTATIC VALVE	3" ANSI 125# FLAT FACED FLANGES, CAST IRON BODY, FACTORY SET NON-ADJUSTABLE FIELD REPLACEABLE THERMOSTATIC ELEMENTS, 175F NOMINAL TEMPERATURE	FPE PART NO. A3010-175
TV-2	HEAT RECOV. THERMOSTATIC VALVE	2" ANSI 125# FLAT FACED FLANGES, CAST IRON BODY, FACTORY SET NON-ADJUSTABLE FIELD REPLACEABLE THERMOSTATIC ELEMENTS, 185F NOMINAL TEMPERATURE,	FPE PART NO. AF2012-185
ET-1	GEN COOLANT EXPANSION TANK	24 GALLON CAPACITY TANK, 12.75" O.D x 48" LONG FABRICATED STEEL TANK, SEE FABRICATION DETAIL	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
G-EC	ENGINE COOLANT GLYCOL TANK LEVEL GAUGE	MAGNETIC OPERATED SPIRAL GAUGE FOR #1 DIESEL, 25 PSIG MAX OPERATING PRESSURE, 35" LIQUID COLUMN PLUS 4" RISER.	ROCHESTER MODEL 8660
GT-1	ENGINE COOLANT GLYCOL STORAGE TANK	60 GALLON CAPACITY, 36"x10"x44"HIGH FABRICATED RECTANGULAR STEEL TANK, SEE FABRICATION DETAIL	CUSTOM FABRICATION

HEAT RECOVERY & PLANT HEATING EQUIPMENT SCHEDULE:

HX-1	POWER PLANT HEAT EXCHANGER	316 SS PLATES, BRAZED CONST. 2" SOLDER CUP PORTS, 290 MBH MIN CAPACITY. PRIMARY: 35 GPM 195F EWT (50% ETHYLENE) 2.0 PSI MAX WPD, SECONDARY: 28 GPM 185F LWT (50% PROPYLENE) 1.3 PSI MAX WPD	SWEP INTERNATIONAL AB B120THx60/1P
P-CUH1	CONTROL ROOM HEAT	1 GPM AT 18' TDH, 1/25HP, 115V, 1ø. PROVIDE WITH 3/4" SOLDER COMPANION SHUT OFF FLANGES, GASKETS, & BOLTS.	GRUNDFOS UPS 15-58FC SPEED 3
P-HR1A	HEAT RECOV. PRIMARY	30 GPM AT 7' TDH, 1/8 HP, 115V, 1ø. PROVIDE WITH 1-1/4" NPT COMPANION FLANGES, GASKETS, & BOLTS. SET TO CP-1	GRUNDFOS MAGNA1 32-60 F CONSTANT PRESSURE
P-HR1B	HEAT RECOV. SECONDARY	20 GPM AT 21' TDH, 1/3 HP, 115V, 1ø. PROVIDE WITH 1-1/2" NPT COMPANION FLANGES, GASKETS, & BOLTS. SET TO CP-3. FIELD INSTALL OWNER FURNISHED CIM 500 MODULE.	GRUNDFOS MAGNA3 40-80 F CONSTANT PRESSURE CIM 500 PART# 98301408
CUH-1	CONTROL ROOM HEAT	WALL MOUNTED HOT WATER CABINET UNIT HEATER, 17 MBH AT 1 GPM 180F EWT & 60F EAT.	TOYOTOMI HC-190 WITH WALL MOUNT BRACKET
ET-2	HEAT RECOV. EXP. TANK	BLADDER TYPE EXPANSION TANK, 44 GALLON TANK, 22 GALLON ACCEPTANCE VOL, 125 PSIG WORKING PRESSURE, 12 PSIG PRE-CHARGE.	AMTROL AX-80

PIPE/TUBING STRUT CLAMP SCHEDULE

PIPE/TUBE	CLAMP #	PIPE/TUBE	CLAMP #
1/2" COPPER	BVT062	1/2" STEEL	B2008
3/4" COPPER	BVT087	3/4" STEEL	B2009
1" COPPER	BVT112	1" STEEL	B2010
1-1/4" COPPER	BVT125	1-1/4" STEEL	B2011
1-1/2" COPPER	BVT162	1-1/2" STEEL	B2012
2" COPPER	BVT212	2" STEEL	B2013
2-1/2" COPPER	BVT262	2-1/2" STEEL	B2014
3" COPPER	BVT312	3" STEEL	B2015

NOTES:
1) ALL CLAMP NUMBERS ARE B-LINE. EQUIVALENT EQUALS ACCEPTABLE.
2) ALL COPPER TUBE CLAMPS TO BE CUSHIONED, VIBRA-CLAMP.
3) ALL STEEL PIPE CLAMPS NOT CUSHIONED. USE FOR ALL STEEL PIPE AND RIGID CONDUIT.
4) SEE PLANS, ELEVATIONS, ISOMETRICS, AND DETAILS FOR ACTUAL PIPE SIZES.

VENTILATION EQUIPMENT SCHEDULE:

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
EF-1 EF-2	GENERATION ROOM EXHAUST FANS	DIRECT DRIVE 14"ø PROPELLER SIDEWALL EXHAUST FAN, 2,100 CFM AT 0.375" SP, 1,750 RPM. SPECIAL 1/2 HP, 115 V, 1 PH VARIGREEN MOTOR WITH OPTIONAL 0-10V LEADS AND OPTIONAL TRANSFORMER	GREENHECK SE1-14-436-VG (1/2 HP)
EF-1 EF-2 COMB.	FAN & INTAKE DAMPERS	OPPOSED BLADE LOW-LEAKAGE CONTROL DAMPER, AIRFOIL BLADES, GALV STEEL CONSTRUCTION, ACETAL BEARINGS, STAINLESS STEEL JAMB SEALS, TPE BLADE SEALS.	GREENHECK VCD-33
(MD)	MOTORIZED DAMPER ACTUATOR	MULTI-VOLTAGE SPRING RETURN ACTUATOR	BELIMO AF-BUP

FUEL SYSTEM EQUIPMENT SCHEDULE

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 GMC1DC4-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	THREE FILTER BANK WITH INDIVIDUAL FILTER ISOLATION VALVES, IMPACT RESISTANT "SEE-THRU" BOWLS, 15 PSIG WORKING PRESSURE. WITH 1/2" WATER PROBE PORT & 3 EACH WATER-IN-FUEL DETECTION KITS. INSTALL 3 EACH 10 MICRON AQUABLOC FILTER ELEMENTS & FURNISH 3 SPARES.	RACOR TURBINE 791000FV10-P WATER-IN-FUEL RR30880E 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
F-UOB	USED OIL BLENDER FILTER	CUSTOM FABRICATED FILTER BANK. FURNISH WITH TWO STAGE ELEMENTS: 10 MICRON HYDROSORB II FILTER 2 MICRON PARTICULATE FILTER PROVIDE 3 OF EACH ELEMENT TYPE	CIM-TEK #30034 (HYDROSORB) CIM-TEK #30066 (2 MICRON)
ABV-1	1" ACTUATED BALL VALVE	ACTUATED BALL VALVE ASSEMBLY RATED TO -50F. TYPE 304 STAINLESS STEEL FABRICATED COUPLING BRACKET, SHAFT, AND FASTENERS CONFIGURED TO ALLOW WRENCH ACCESS FOR MANUAL OPERATION OF VALVE WITHOUT REMOVING ACTUATOR. LOW TEMP BALL VALVE, 150# RF FLANGED ENDS. ELECTRIC ACTUATOR WITH OPERATING VOLTAGE, NEMA RATING, AND TORQUE AS INDICATED. CONFIGURE WITHOUT MANUAL OVERRIDE SHAFT EXTENSION. FURNISH WITH PTC SELF REGULATING HEATER, AUXILIARY SWITCH SET (AUXILIARY SWITCHES 3 & 4), AND EXXON BEACON 325 SEVERE COLD LUBRICANT.	VALVE ASSEMBLY: DG VALVE (780) 413-1760 1" BALL VALVE - KECKLEY PART # BVF1RF2RSSRGSL-100 2" BALL VALVE - KECKLEY PART # BVF1RF2RSSRGSL-200 NEMA 7 ACTUATOR - 600 IN-LBS TORQUE, 10 SECOND STROKE TIME, 0.50 LOCKED ROTOR AMPS. RCS MODEL SXR-1023

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
(PT)	PRESSURE TRANSMITTER	0-60 PSIG RANGE, 4-20mA OUTPUT, 1/4" NPT PIPING CONNECTION, HIRSCHMANN ELECTRICAL CONNECTION	NOSHOK 100-60-1-1-2-7
(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
(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
(TLM)	TANK LEVEL MONITOR PANEL	TANK LEVEL MONITOR CONSOLE FOR UP TO SIX TANKS, COLOR LCD SCREEN, ETHERNET CONNECTION WITH WEB INTERFACE, PROGRAMMABLE VOLUME CALCULATIONS WITH TEMPERATURE COMPENSATION	FRANKLIN/INCON EVO 200
(LSP)	DAY TANK/HOPPER TANK LEVEL SENSOR PROBE (SHOP FAB.)	TOP-MOUNT TANK PROBE WITH INSTALLATION KIT FOR 2" NPT RISER, WATER TIGHT COMPRESSION GLAND FITTING FOR CABLE ENTRANCE. FRANKLIN FUEL SYSTEMS, NO SUBSTITUTES. PROBE AND RISER LENGTH AS INDICATED ON INSTALLATION DETAILS.	4' TANK PROBE: FMP-LL3-53-I 2' TANK PROBE: FMP-LL3-29-I FLOAT: TSP-IDF2 2" FOR DIESEL INSTALLATION KIT: TSP-C2A
(LSP)	INTERMEDIATE TANK LEVEL SENSOR PROBE (ON SITE)	TOP-MOUNT TANK PROBE WITH INSTALLATION KIT FOR 2" NPT RISER, WATER TIGHT COMPRESSION GLAND FITTING FOR CABLE ENTRANCE. FRANKLIN FUEL SYSTEMS, NO SUBSTITUTES. PROBE AND RISER LENGTH AS INDICATED ON INSTALLATION DETAILS.	7'ø TANK PROBE: FMP-LL3-89-I FLOAT: TSP-IDF2 2" FOR DIESEL INSTALLATION KIT: TSP-C2A
(LS)	INTERMEDIATE TANK THREE POINT FLOAT TYPE LEVEL SWITCH (ON SITE)	THREE POINT MAGNETIC FLOAT SWITCH - 2-1/2" ANSI 150# FLAT FACE FLANGE MOUNT, 3/4" NPT CONDUIT ENTRY, 8MM DIAMETER FIXED LENGTH STAINLESS STEEL STEM, 3 EACH 1.2" MAX. DIAMETER STAINLESS STEEL FLOATS FOR MINIMUM S.G.=0.65, 50VA FORM A CONTACTS. 47.25" OVERALL STEM LENGTH. ACTUATION LENGTHS 13"(N.O.) & 18"(N.O.) & 46"(N.C.).	APG MODEL FLE-0A2-B3-B-A2-E-47.25in.-13in.NO-18in.NO-46in.NC

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.

AS PART OF THE MODULE ASSEMBLY WORK FURNISH AND INSTALL ALL MATERIALS AND EQUIPMENT ON THE SCHEDULES THIS SHEET EXCEPT FOR THOSE ITEMS SPECIFICALLY NOTED "ON SITE".
ITEMS SPECIFICALLY NOTED AS ON-SITE WILL BE FURNISHED BY OTHERS UNDER A SEPARATE FUTURE ON SITE CONTRACT.

REV#1
ISSUED FOR
CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	DELETE FLOW METER, CHANGE P-HR1B TO MAGNA 3, & ADD OWNER FURN CIM 500	8/16/23	BCG

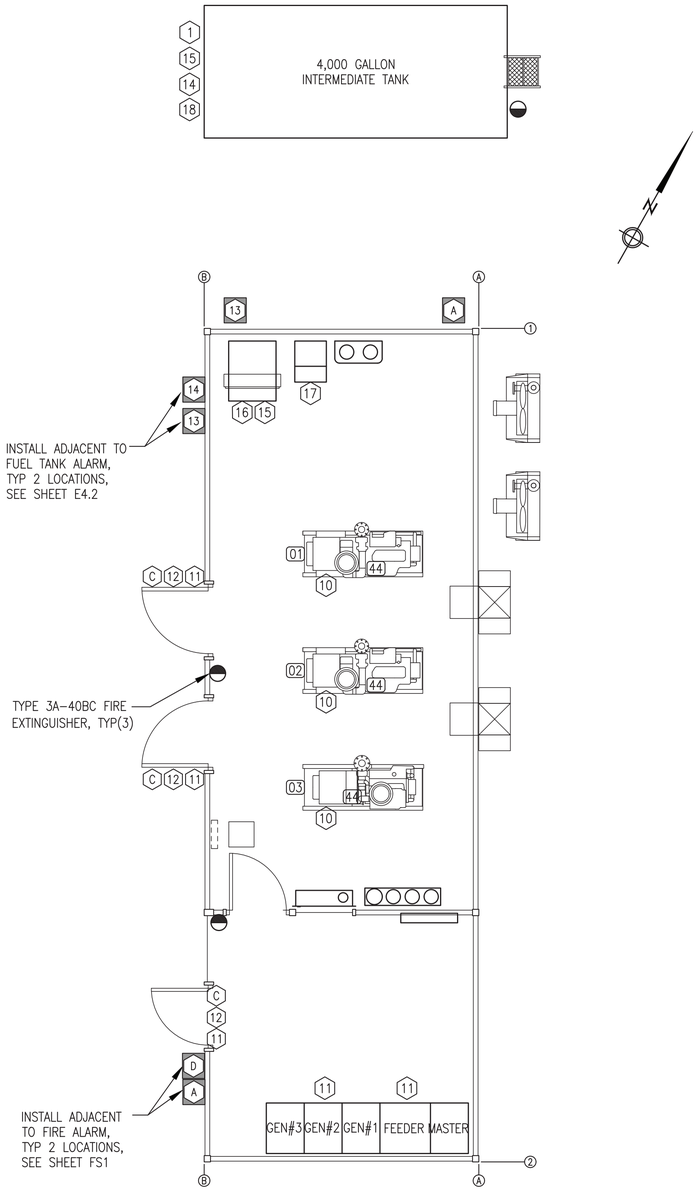
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MECHANICAL LEGENDS & SCHEDULES

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

DRAWN BY: JTD
DESIGNED BY: BCG
FILE NAME: NELS PP M1
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 5/30/23
SHEET: M1.1



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

VALVE TAG SCHEDULE:

WHITE (EQUIPMENT)

01 "GEN#1 100KW" (DECAL)
02 "GEN#2 100KW" (DECAL)
03 "GEN#3 65KW" (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"
25 "NORMALLY CLOSED, OPEN ONLY TO FILL TANK"

BROWN (USED OIL)

41 "NORMALLY CLOSED, OPEN ONLY FOR ENGINE OIL CHANGE"
42 "BLENDER FILTER #1, 10 MICRON HYDROSORB" (DECAL)
43 "BLENDER FILTER #2, 2 MICRON PARTICULATE" (DECAL)
44 "CHECK CONDENSATE LEVEL DAILY, DRAIN AT EACH OIL CHANGE" (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 "NORMALLY CLOSED, OPEN ONLY FOR ADDING FLUID – PROPYLENE GLYCOL ONLY"
62 "NORMALLY OPEN, HEAT RECOVERY SUPPLY"
63 "NORMALLY OPEN, HEAT RECOVERY RETURN"
64 "NORMALLY CLOSED, OPEN ONLY FOR AIR BLEED & PURGE"
65 "NORMALLY OPEN, CLOSE ONLY TO CLEAN STRAINER"
66 "NORMALLY OPEN, CLOSE ONLY FOR TEMPORARY MAINTENANCE"

RED (ELECTRICAL)

71 "THIS PANEL IS POWERED FROM THE MAIN TANK FARM PANEL. LOCK & TAG OUT PRIOR TO SERVICING"

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, DRY, AND WARM 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 CLEAN, DRY, AND WARM 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 CHAIN LINK FENCING WITH HOG RINGS OR STAINLESS STEEL TIES. 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 "DANGER FLAMMABLE, NO SMOKING OR OPEN FLAMES"
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 (14) "IN CASE OF SPILL CALL DEC 1-800-478-9300"

INFORMATIONAL PLACARDS – BLACK LETTERING ON WHITE BACKGROUND.

15 "CHECK INTERMEDIATE TANK LEVEL DAILY, FILL WHEN BELOW 3'-6"

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 INTERMEDIATE TANK 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 "INTERMEDIATE TANK MAX FILL LEVEL 5'-10" (90% TANK CAPACITY)

AS PART OF THE MODULE ASSEMBLY WORK FURNISH AND INSTALL ALL DECALS, SIGN BOARDS, AND FIRE EXTINGUISHERS EXCEPT WHERE SPECIFICALLY NOTED "ON SITE".
AS PART OF THE MODULE ASSEMBLY WORK FURNISH AND INSTALL ALL VALVE TAGS EXCEPT WHERE SPECIFICALLY NOTED "ON SITE".
ITEMS SPECIFICALLY NOTED AS ON-SITE WILL BE FURNISHED BY OTHERS UNDER A SEPARATE FUTURE ON SITE CONTRACT.

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	ADD DECAL 44	8/16/23	BCG

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

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
DESIGNED BY: BCG
FILE NAME: NELS PP M1
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 5/30/23
SHEET: M1.2

Demand Control Table (PLC)				
Demand Control	Generator(s) On Line	On-line kW (Overload)	Level Increase	Level Decrease
Level 1	#3	65	55	---
Level 2	#1 or #2	100	90	45
Level 3	#3 & #1 or #2	165	145	80
Level 4	All	265	---	125

Note : Gen #1 & #2 are equal capacity. Manually select lead unit.

Engine-Generator Alarm Settings (Easygen - EZGN)			
Function	Normal Range	Alarm	Shut Down
Overspeed	1795-1805	----	1900 RPM
Oil Pressure	30-50 PSI	14.5 PSI	10 PSI
Air Filter Vacuum	1-10" H2O	15" H2O	20" H2O
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 (Easygen - EZGN)	
Function	Setting
Gen #1 Breaker Trip Setpoint (EZGN Rated Current)	200 A
Gen #2 Breaker Trip Setpoint (EZGN Rated Current)	200 A
Gen #3 Breaker Trip Setpoint (EZGN Rated Current)	150 A
Gen Breaker Level 1 (100%) Time Over Current	3 sec.
Gen Breaker Level 2 (120%) Time Over Current	1 sec.
Gen Breaker Level 3 (250%) Time Over Current	0.4 sec.

Feeder Breaker Settings (Feeder Protection Relay - FPR)	
Function (Note: Element 1 is the only active element)	Setting
T.O.C. Trip Pickup (amps) Note: 5A = 100% of CT rating	5.0
T.O.C. Curve Selection	U4
T.O.C. Time Dial	5.00
E.M Reset delay (Y/N)	N
Constant Time Adder (seconds)	0.00
Minimum Response Time (seconds)	0.00
Maximum Phase T.O.C. Torque Control	1

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

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:

1) VERIFY THAT THE "SYSTEM MODE" SWITCH ON THE MASTER SECTION IS SET TO AUTO.
2) CHECK THE MASTER SECTION FOR ANY FAULTS AS INDICATED BY THE ALARM LAMPS. 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 THE "ALARM RESET" BUTTON ON THE GENERATOR SECTION.
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) THE PLC WILL AUTOMATICALLY START ALL GENERATORS IN AUTO AND PARALLEL THEM TO THE BUS. AS SOON AS THE BUS IS ENERGIZED THE STATION SERVICE POWER WILL TURN ON.
6) AFTER THE AVAILABLE GENERATORS ARE ON LINE, 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.

DEMAND CONTROL OPERATION (AUTO MODE):

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 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 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 2 MINUTES) THE DEMAND CONTROL WILL SWITCH TO THE NEXT LOWER LEVEL OF GENERATING CAPACITY.
5) NOTE THAT GENERATORS #1 & #2 ARE EQUAL CAPACITY AND THE OPERATOR MUST SELECT A LEAD GENERATOR USING THE SCADA SYSTEM.
6) 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:

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:

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. AN "ENGINE SERVICE" MESSAGE WILL DISPLAY ON THE EZGN AND THE RED "ENGINE ALARM" LAMP WILL ILLUMINATE.

1) IF THE SWITCHGEAR IS IN MANUAL MODE, PERFORM MANUAL OPERATION STEPS 3 AND 6 ABOVE 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 FOR 10 SECONDS.
7) PRESS THE "ALARM RESET" BUTTON.
8) AFTER ALL ALARMS HAVE BEEN CLEARED PRESS THE EZGN "HOME" BUTTON.
9) 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.
10) AFTER THE ENGINE RUNS FOR ONE MINUTE PRESS THE STOP BUTTON.
11) CHECK THE OIL LEVEL USING THE DIPSTICK AND ADD OIL AS REQUIRED.
12) 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. IT 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 DRAWING SHEET E7.3 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. FILLING THE INTERMEDIATE TANK IS A MANUAL PROCEDURE USING THE EXISTING INTERMEDIATE TANK FILL CONTROL PANEL THAT HAS BEEN RELOCATED TO THE NEW POWER PLANT.

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 THREE AIR INTAKES IN THE GENERATION ROOM CEILING. 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 TWO AIR INTAKES ARE LABELED "EF-1" AND "EF-2". THESE DAMPERS OPEN WHENEVER THE ASSOCIATED EXHAUST FAN RUNS. THE FANS ARE EACH EQUIPPED WITH A DISCHARGE MOTORIZED DAMPER THAT OPENS EACH TIME THE ASSOCIATED EXHAUST FAN RUNS.

EXHAUST FANS – THERE ARE TWO EXHAUST FANS ON THE WALL ABOVE THE FRONT OF THE GENERATORS, EF-1 AND EF-2. 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.

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.

PEX ARCTIC PIPE TEMPERING SYSTEM – THE HEAT RECOVERY ARCTIC PIPE IS PEX (PLASTIC) PIPE WHICH HAS A LIMITED LIFE AT ELEVATED TEMPERATURES. THE HEAT RECOVERY SUPPLY TEMPERATURE IS TEMPERED BY A THREE-WAY THERMOSTATIC VALVE "TV-2" THAT IS INSTALLED BETWEEN THE HEAT EXCHANGER AND THE ARCTIC PIPE. THE VALVE MIXES COLD RETURN FLUID WITH HOT FLUID FROM THE HEAT EXCHANGER TO LIMIT THE SUPPLY TEMPERATURE TO APPROXIMATELY 185F.

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 BUILDINGS IN THE COMMUNITY USING UNIT HEATERS AND CABINET UNIT HEATERS AS SHOWN ON SHEET M8.1.

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 AND CALIBRATION OF ENGINE COOLANT SYSTEM AND HEAT RECOVERY SYSTEM THERMOSTATIC VALVES.

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, FLOW METERS, ENERGY METERS, LEVEL GAUGES, ETC. 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.

INITIAL SYSTEM STARTUP, TESTING, AND COMMISSIONING IS INCLUDED IN THE MODULE ASSEMBLY SCOPE. FINAL MODULE TESTING AND COMMISSIONING AND ALL EXTERIOR HEAT RECOVERY SYSTEM STARTUP, TESTING, AND COMMISSIONING WILL BE PERFORMED BY OTHERS UNDER A SEPARATE FUTURE ON SITE CONTRACT.

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: SYSTEM START UP & SEQUENCE OF OPERATIONS

Gray Stassel Engineering, Inc.
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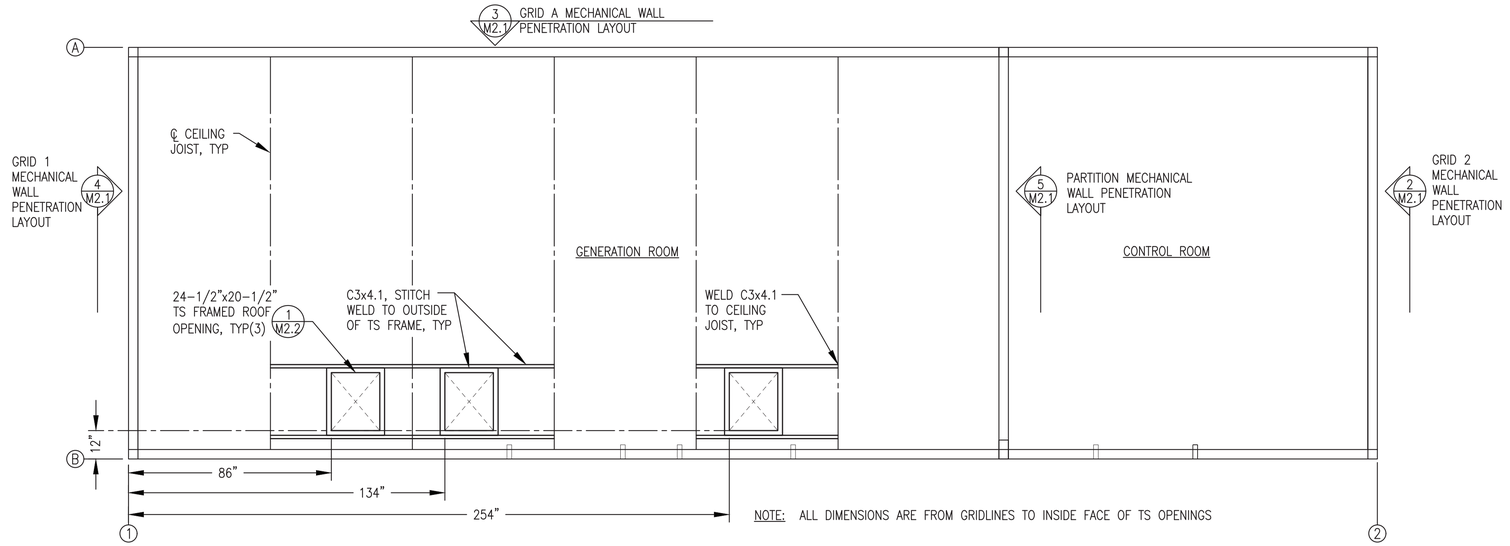
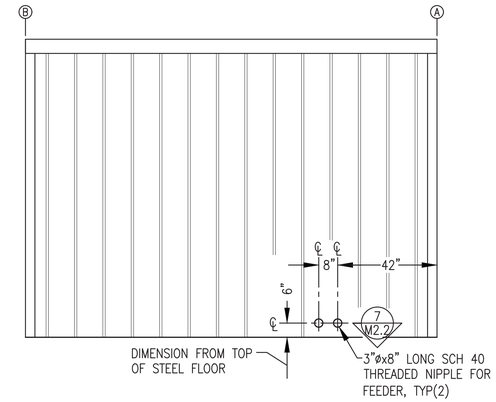
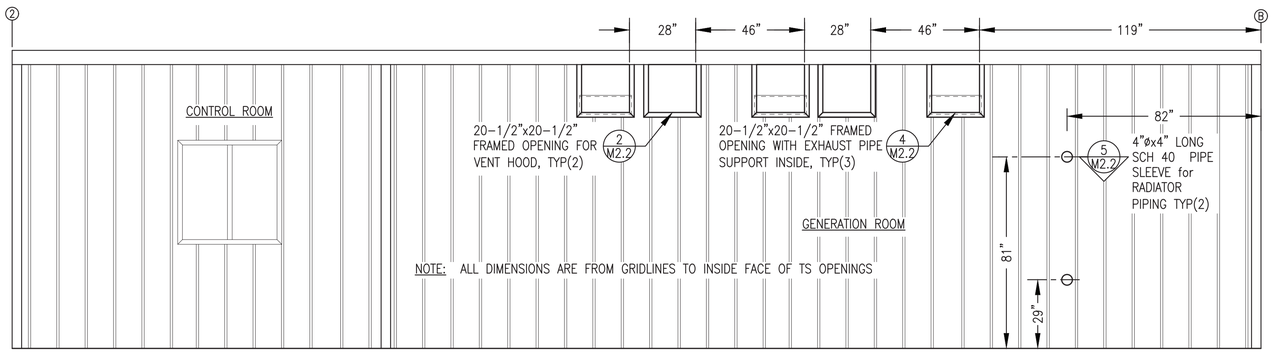
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M1 | SHEET: M1.3
PROJECT NUMBER:



1 M2.1 MECHANICAL PENETRATION LAYOUT & ROOF PLAN
3/8"=1'-0"



2 M2.1 GRID 2 MECHANICAL WALL PENETRATION LAYOUT – EXTERIOR ELEVATION
3/8"=1'-0"



3 M2.1 GRID A MECHANICAL WALL PENETRATION LAYOUT – EXTERIOR ELEVATION
3/8"=1'-0"

4 M2.1 GRID 1 MECHANICAL WALL PENETRATION LAYOUT – EXTERIOR ELEVATION
3/8"=1'-0"

5 M2.1 PARTITION MECHANICAL WALL PENETRATION LAYOUT – INTERIOR ELEVATION
3/8"=1'-0"

THIS DRAWING SHOWS WORK THAT WAS PERFORMED BY OTHERS AS PART OF THE FABRICATION OF THE OWNER FURNISHED MODULE STRUCTURE AND IS PROVIDED FOR REFERENCE ONLY. SEE OWNER FURNISHED MODULE STRUCTURE REFERENCE DRAWINGS FOR ADDITIONAL DETAIL.

ISSUED FOR MODULE FABRICATION MARCH 2023

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

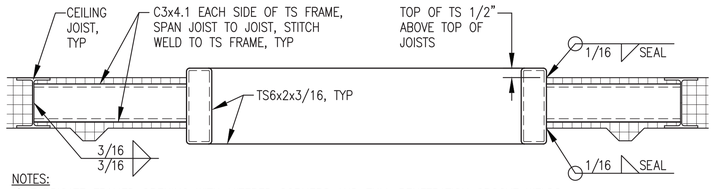
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MECHANICAL PENETRATIONS PLAN, ELEVATIONS & DETAILS

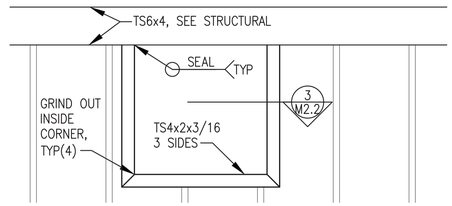
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 3/30/23
FILE NAME: NELS PP M2–M7	SHEET: M2.1
PROJECT NUMBER:	



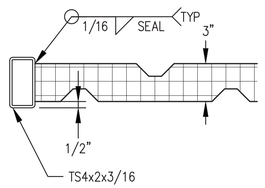
NOTES:
1) FABRICATE FRAMED OPENING WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS.
2) FABRICATE TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED ON PLANS.
3) GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

1 M2.2 TYPICAL ROOF OPENING DETAIL
2"=1'-0"



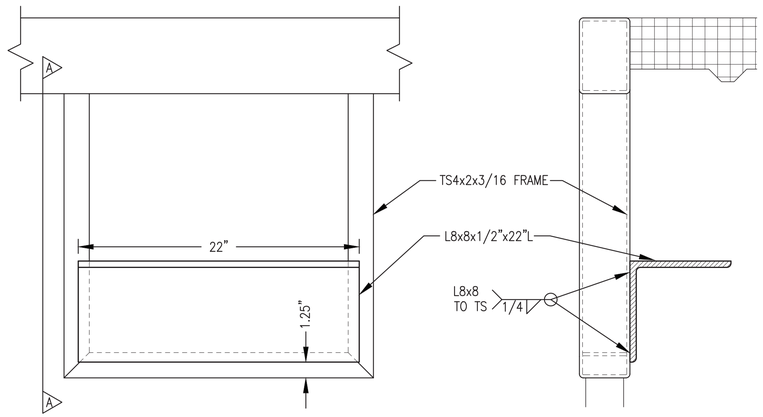
NOTE: SEE ELEVATION FOR INSIDE CLEAR OPENING SIZE.

2 M2.2 TYPICAL WALL OPENING – ELEVATION
1"=1'-0"

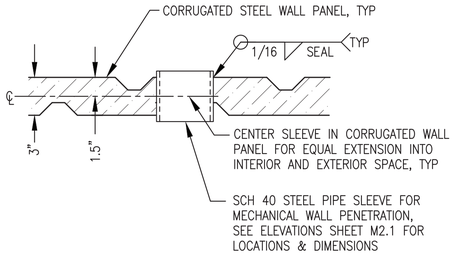


NOTES:
1) FABRICATE FRAMED OPENING WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS.
2) FABRICATE TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED ON ELEVATIONS.
3) GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

3 M2.2 TYPICAL SECTION THROUGH WALL OPENING
2"=1'-0"

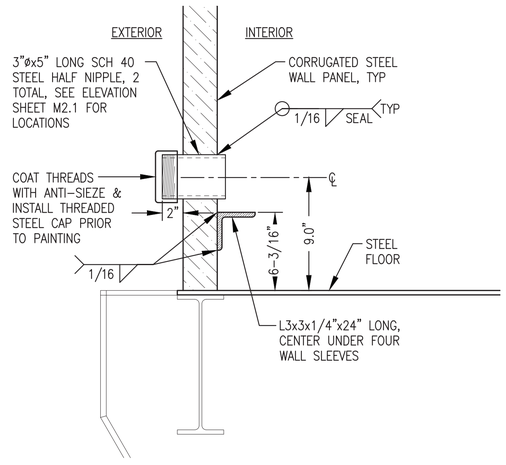


4 M2.2 EXHAUST PIPE SUPPORT AT FRAMED OPENING
2"=1'-0"

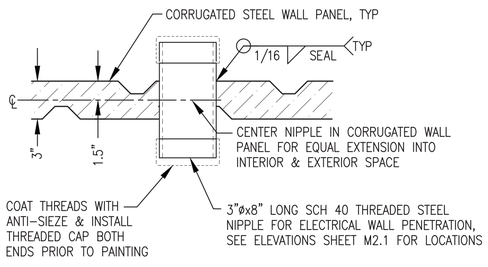


PLAN VIEW

5 M2.2 TYPICAL WALL PENETRATION PIPE SLEEVE
2"=1'-0"



6 M2.2 TYPICAL HEAT RECOVERY ARCTIC PIPE WALL PENETRATION
2"=1'-0"



PLAN VIEW

7 M2.2 TYPICAL ELECTRIC POWER FEEDER CONDUCTOR WALL PENETRATION
2"=1'-0"

THIS DRAWING SHOWS WORK THAT WAS PERFORMED BY OTHERS AS PART OF THE FABRICATION OF THE OWNER FURNISHED MODULE STRUCTURE AND IS PROVIDED FOR REFERENCE ONLY. SEE OWNER FURNISHED MODULE STRUCTURE REFERENCE DRAWINGS FOR ADDITIONAL DETAIL.

ISSUED FOR MODULE FABRICATION MARCH 2023

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

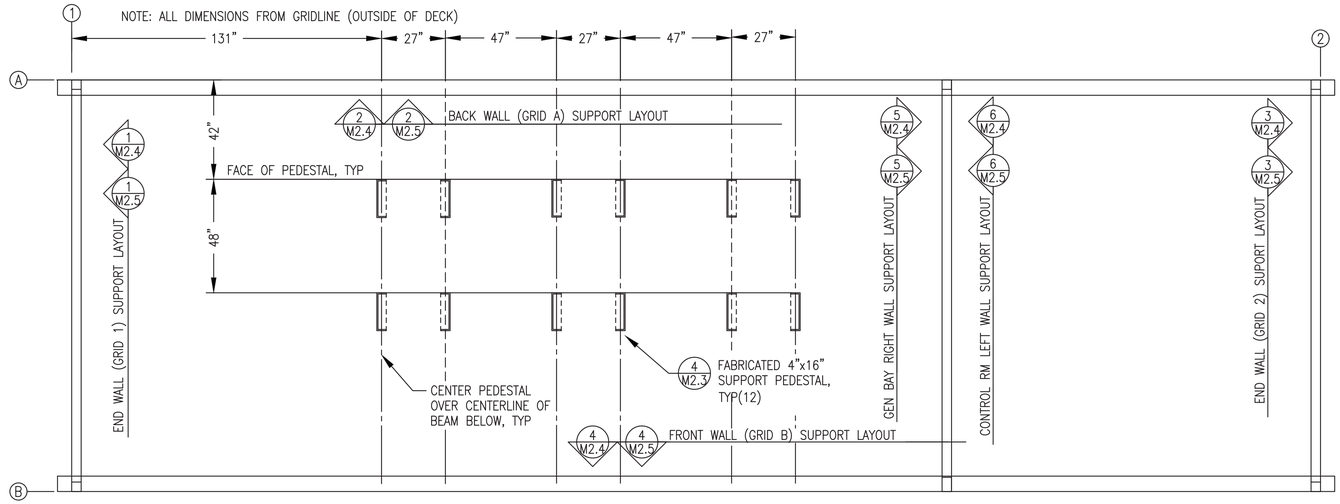
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MECHANICAL PENETRATION DETAILS

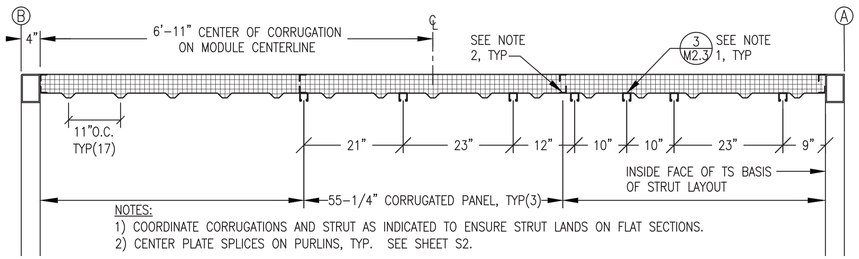
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/30/23
FILE NAME: NELS PP M2-M7 | SHEET: M2.2
PROJECT NUMBER:



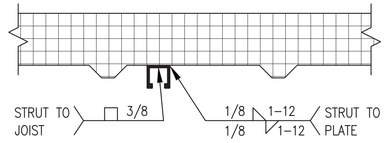
1 M2.3 MODULE MECHANICAL SUPPORT PLAN

3/8"=1'-0"



2 M2.3 SECTION THROUGH CEILING – CORRUGATION & STRUT LAYOUT

3/4"=1'-0"

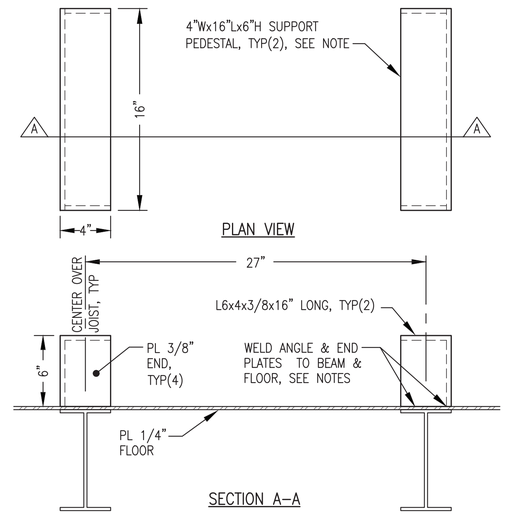


3 M2.3 STRUT ATTACHMENT TO CEILING

NO SCALE

GENERAL NOTES:

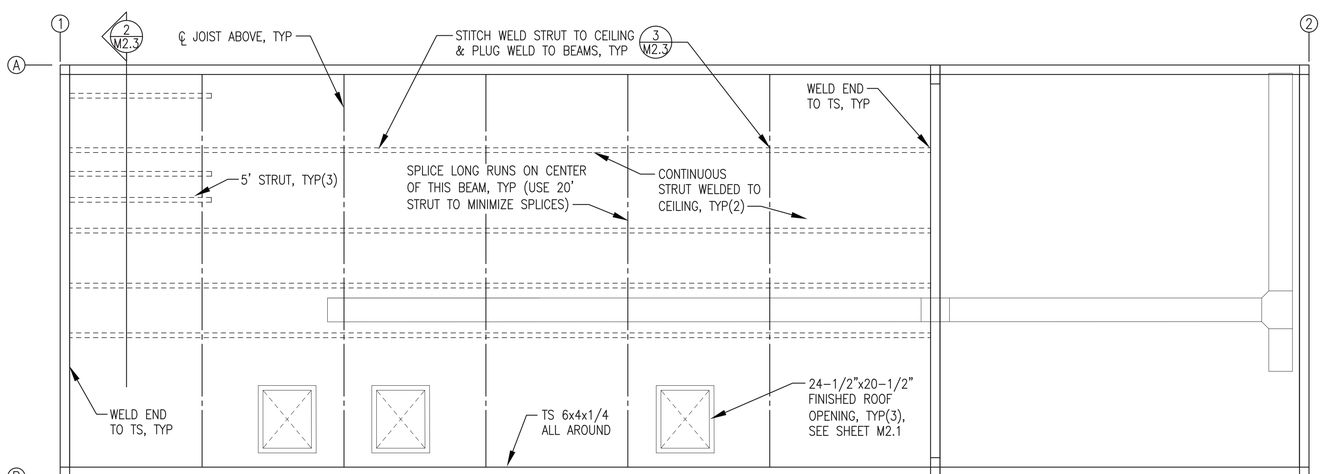
1) FABRICATE PEDESTALS FROM ASTM A36 ANGLE AND PLATES AS SHOWN.
2) ALL STRUT 12 GAUGE 1-5/8"x1-5/8" SOLID BACK PLAIN (UNFINISHED). B-LINE B22-PLN OR EQUAL. PURCHASE IN 20' LENGTHS TO MINIMIZE SPLICES.
3) INSTALL ALL SUPPORTS INDICATED AND GRIND SMOOTH PRIOR TO SANDBLASTING MODULE. SANDBLAST AND PAINT ALL SUPPORTS THIS SHEET EQUIVALENT TO MODULE INTERIOR. SEE SHEET A1 FOR PAINTING SPECIFICATIONS.

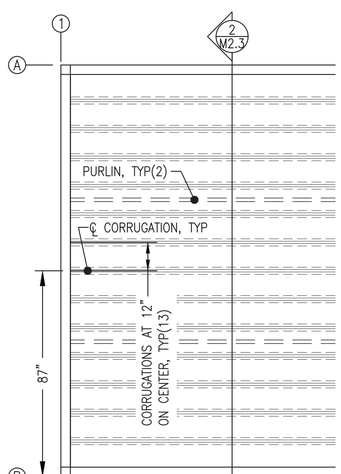


NOTES: 1) MAKE ALL JOINTS WITH CONTINUOUS GROOVE OR FILLET WELDS.
2) SLOT FLOOR PLATE 3 SIDES, WELD PEDESTAL TO TOP OF BEAM, THEN SEAL WELD TO FLOOR PLATE ALL AROUND INSIDE & OUT.

4 M2.3 SUPPORT PEDESTAL FABRICATION

2"=1'-0"





5 M2.3 CEILING STRUT SUPPORT LAYOUT PLAN

3/8"=1'-0"

THIS DRAWING SHOWS WORK THAT WAS PERFORMED BY OTHERS AS PART OF THE FABRICATION OF THE OWNER FURNISHED MODULE STRUCTURE AND IS PROVIDED FOR REFERENCE ONLY. SEE OWNER FURNISHED MODULE STRUCTURE REFERENCE DRAWINGS FOR ADDITIONAL DETAIL.

ISSUED FOR MODULE FABRICATION MARCH 2023

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

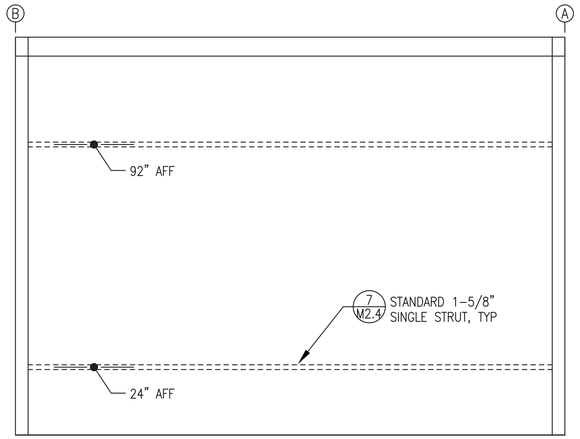
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

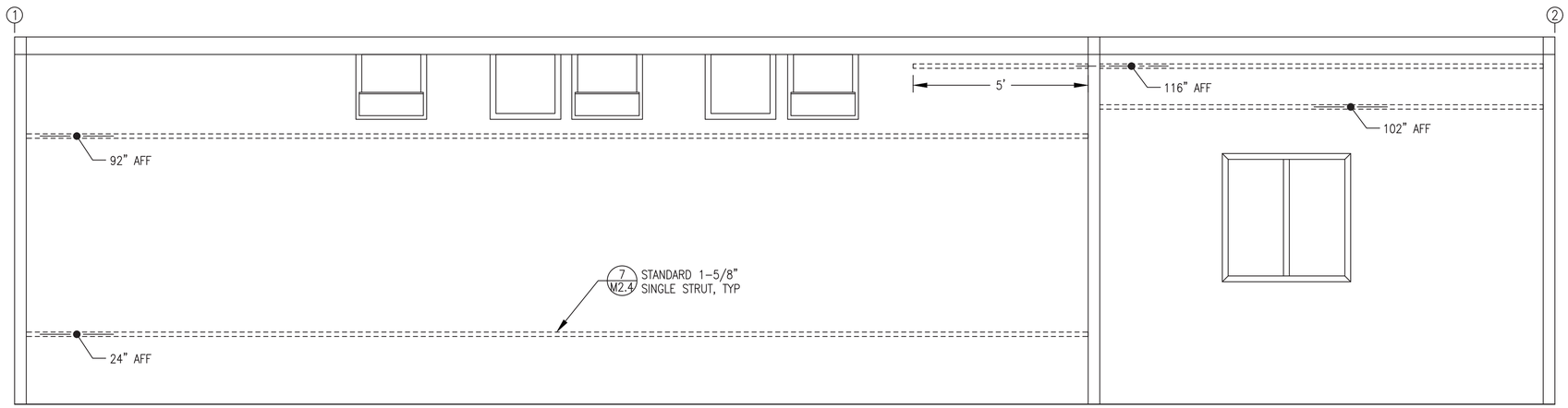
TITLE: MECHANICAL SUPPORT PLANS & DETAILS

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

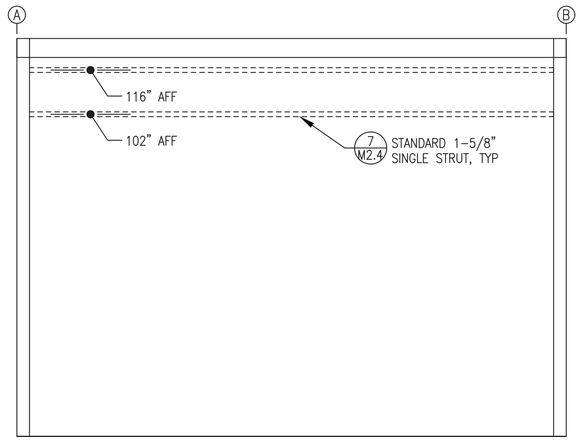
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 3/30/23
FILE NAME: NELS PP M2-M7 | SHEET: M2.3
PROJECT NUMBER:



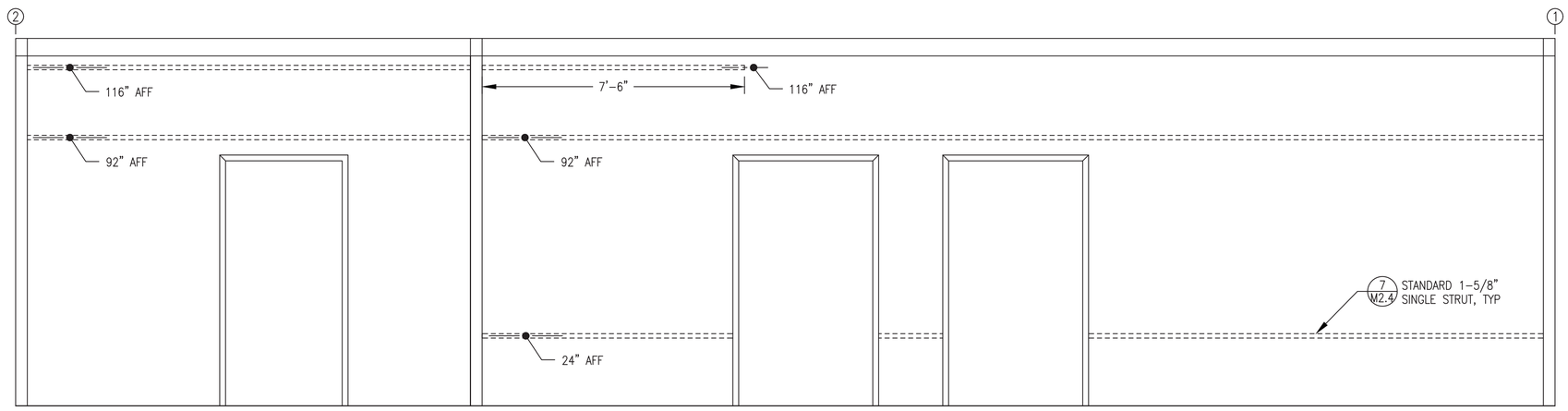
1 M2.4 END WALL (GRID 1) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



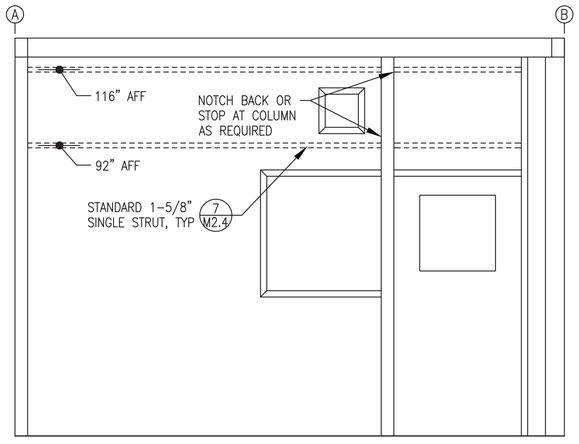
2 M2.4 BACK WALL (GRID A) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



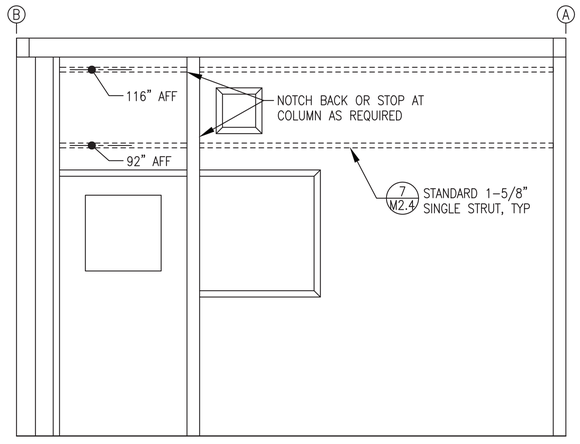
3 M2.4 END WALL (GRID 2) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



4 M2.4 FRONT WALL (GRID B) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



5 M2.4 GEN BAY RIGHT WALL HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



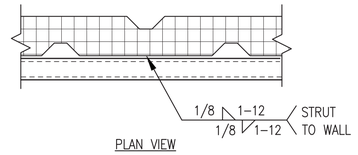
6 M2.4 CONTROL ROOM LEFT WALL HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"

HORIZONTAL WALL STRUT INSTALLATION NOTES:

1) ALL LOCATIONS ARE CENTERLINE OF STRUT ABOVE FINISHED FLOOR (AFF).

2) ALL STRUT SHALL BE 12 GAUGE, 1-5/8" x 1-5/8", PLAIN (UN-FINISHED BLACK) WITH SOLID BACK, B-LINE B22-PLN OR EQUAL.

3) PRIOR TO PAINTING MODULE, WELD ALL HORIZONTAL STRUT SECTIONS TO WALLS AS SHOWN. SANDBLAST AND PAINT STRUT WITH MODULE INTERIOR WALLS. SEE SHEET A1 FOR PAINTING SPECIFICATIONS.



PLAN VIEW

7 M2.4 HORIZONTAL WALL STRUT ATTACHMENT
NO SCALE

THIS DRAWING SHOWS WORK THAT WAS PERFORMED BY OTHERS AS PART OF THE FABRICATION OF THE OWNER FURNISHED MODULE STRUCTURE AND IS PROVIDED FOR REFERENCE ONLY. SEE OWNER FURNISHED MODULE STRUCTURE REFERENCE DRAWINGS FOR ADDITIONAL DETAIL.

ISSUED FOR MODULE FABRICATION MARCH 2023

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

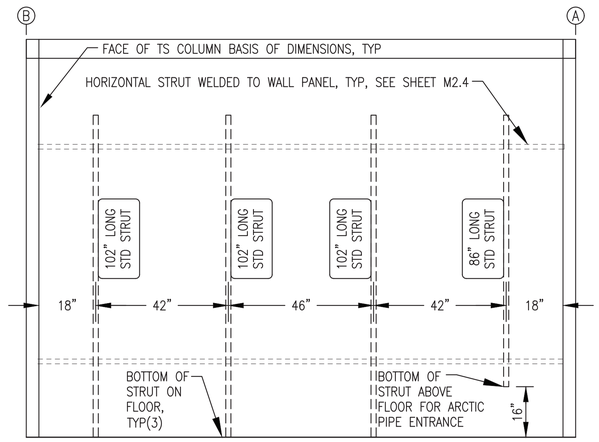
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

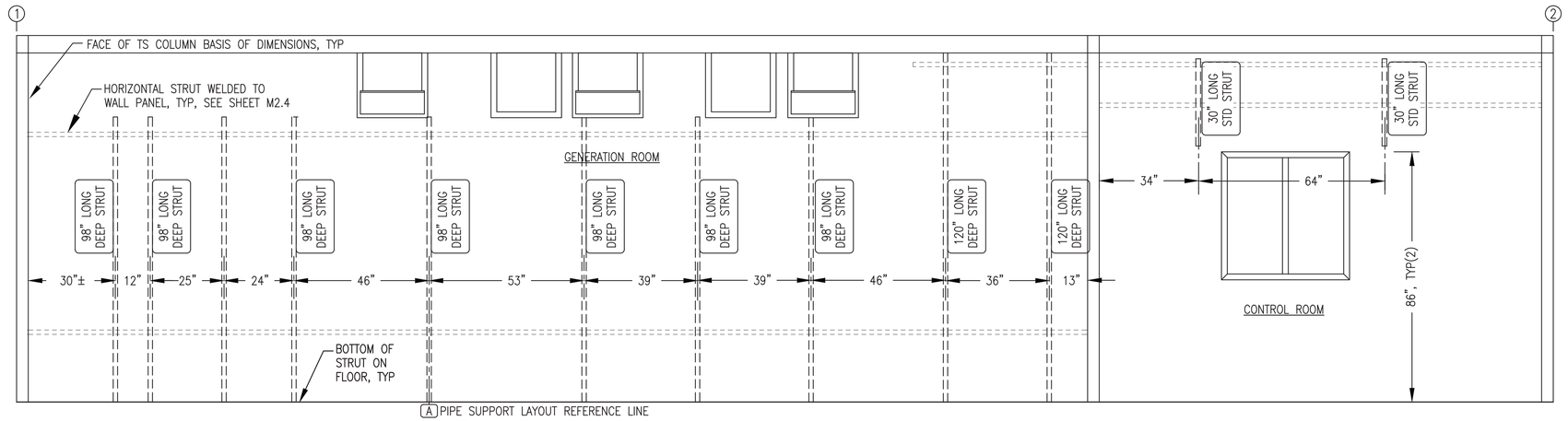
TITLE: MECHANICAL SUPPORT
HORIZONTAL WALL STRUT INSTALLATION

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

DRAWN BY: JTD
DESIGNED BY: BCG
FILE NAME: NELS PP M2-M7
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 3/30/23
SHEET: M2.4



1 M2.5 END WALL (GRID 1) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



2 M2.5 BACK WALL (GRID A) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"

3 M2.5 END WALL (GRID 2) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"

4 M2.5 FRONT WALL (GRID B) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"

5 M2.5 GEN BAY RIGHT WALL VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"

6 M2.5 CONTROL ROOM LEFT WALL VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"

VERTICAL WALL STRUT INSTALLATION NOTES:

1) ALL HORIZONTAL LOCATIONS ARE CENTERLINE OF STRUT FROM FACE OF TS COLUMNS. ALL VERTICAL LOCATIONS ARE END OF STRUT ABOVE FINISHED FLOOR.

2) ALL STRUT SHALL BE 12 GAUGE, PRE-GALVANIZED FINISH WITH SLOTTED BACK.
"STD" DESIGNATES STANDARD 1-5/8" x 1-5/8" SINGLE STRUT, B-LINE B22-SH-GALV OR EQUAL.
"DEEP" DESIGNATES 3-1/4" x 1-5/8" SINGLE STRUT, B-LINE B11-SH-GALV OR EQUAL.

3) FASTEN ALL VERTICAL STRUT SECTIONS TO HORIZONTAL STRUT WITH 1/2"x1" ALLEN HEAD CAP SCREWS & STRUT NUTS.

4) ONLY MAJOR WALL MOUNTED EQUIPMENT SUPPORT STRUT SHOWN THIS SHEET. SEE MECHANICAL AND ELECTRICAL DRAWINGS FOR OTHER EQUIPMENT, PIPING, AND WIREWAY STRUT SUPPORT DETAILS.

ISSUED FOR CONSTRUCTION
MAY 2023

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

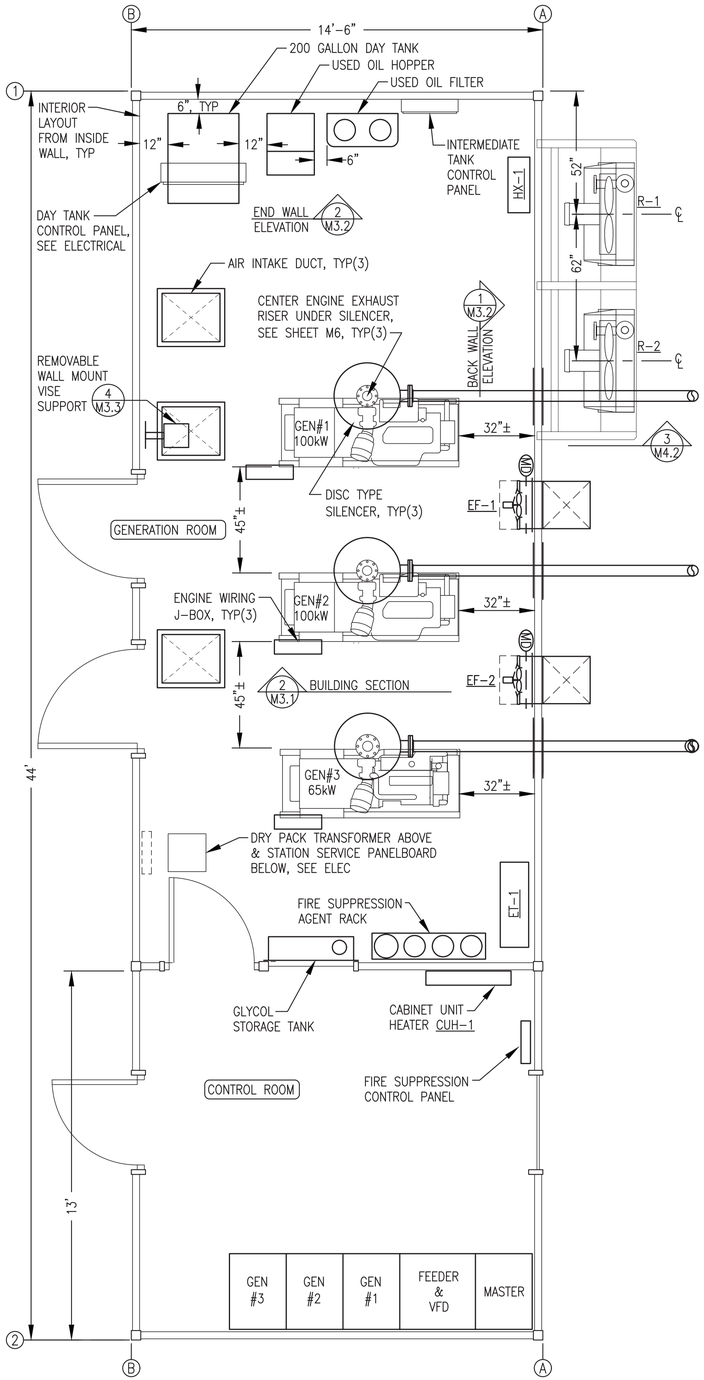
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

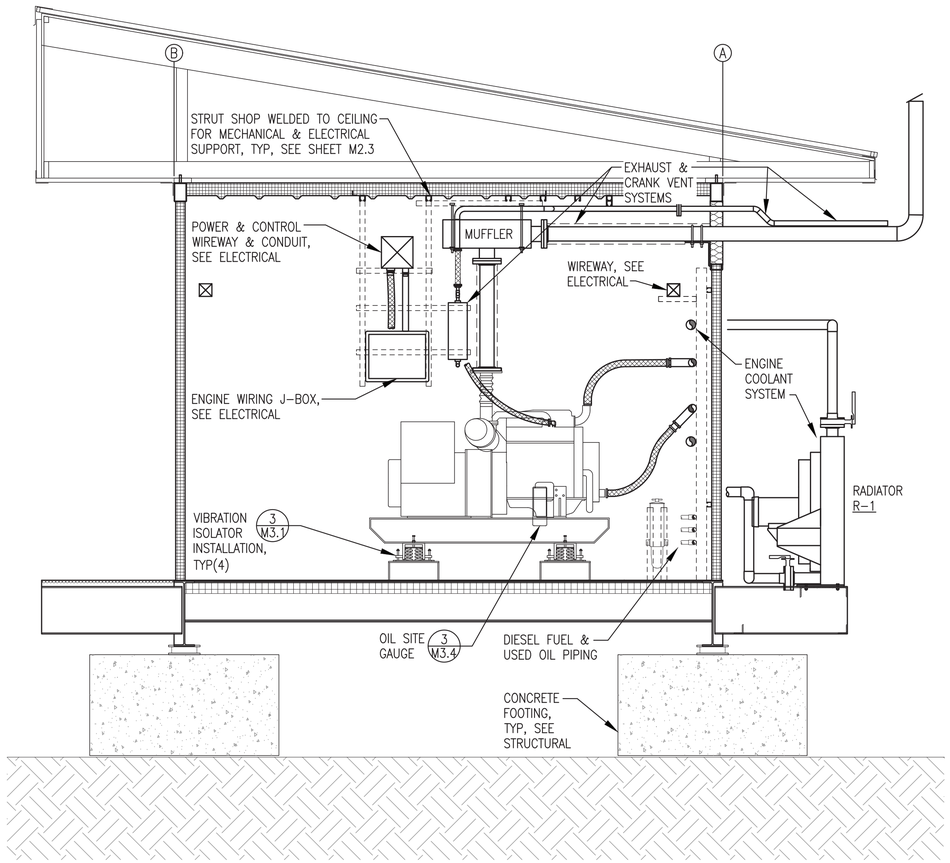
TITLE: MECHANICAL SUPPORT
VERTICAL WALL STRUT INSTALLATION

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

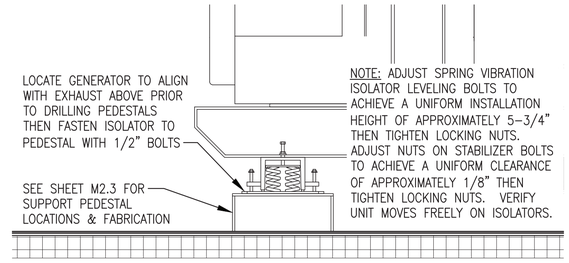
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M2.5
PROJECT NUMBER:	



1/M3.1 EQUIPMENT LAYOUT PLAN
3/8"=1'-0"



2/M3.1 TYPICAL MODULE SECTION/GENERATOR INSTALLATION
1/2"=1'-0"



3/M3.1 VIBRATION ISOATOR INSTALLATION
1"=1'-0"

EQUIPMENT LAYOUT GENERAL NOTES:
1) SEE M2 SHEETS FOR MECHANICAL AND ELECTRICAL SUPPORTS AND PENETRATIONS
2) SEE M3 SHEETS FOR GENERAL EQUIPMENT LAYOUT, BASE SUPPORT, FABRICATIONS, AND GENERATOR ASSEMBLY DETAILS.
3) SEE M4 SHEETS FOR ENGINE COOLANT SYSTEM AND HEAT RECOVERY SYSTEM PLANS, ISOMETRICS, AND DETAILS.
4) SEE M5 SHEETS FOR DIESEL FUEL AND USED OIL SYSTEM PLANS AND DETAILS.
5) SEE SHEET M6 FOR EXHAUST AND CRANK CASE VENTILATION PLANS AND DETAILS.
6) SEE M7 SHEETS FOR VENTILATION SYSTEM PLANS AND SHEET METAL FABRICATIONS.

ENGINE-GENERATOR SCHEDULE	
GENSET	DESCRIPTION
GEN #1	ENGINE – 148 HP, 100 EKW PRIME, JOHN DEERE 4045AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274E.
GEN #2	ENGINE – 148 HP, 100 EKW PRIME, JOHN DEERE 4045AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274E.
GEN #3	ENGINE – 99 HP, 65 EKW PRIME, JOHN DEERE 4045TFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 90 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274C.

ENGINE-GENERATOR CODE COMPLIANCE NOTES
1) PER IMC 915.1 THE ENGINE-GENERATORS AND ASSOCIATED MECHANICAL SYSTEMS SHALL BE IN INSTALLED COMPLIANCE WITH NFPA 37. SEE THE ABOVE REFERENCED DRAWINGS FOR ADDITIONAL DETAIL.
2) PER IMC 915.1 THE ENGINE-GENERATORS SHALL BE FABRICATED AND ASSEMBLED IN ACCORDANCE WITH U.L. 2200. SEE ENGINE-GENERATOR SPECIFICATIONS FOR ADDITIONAL DETAIL.

ISSUED FOR CONSTRUCTION
MAY 2023

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

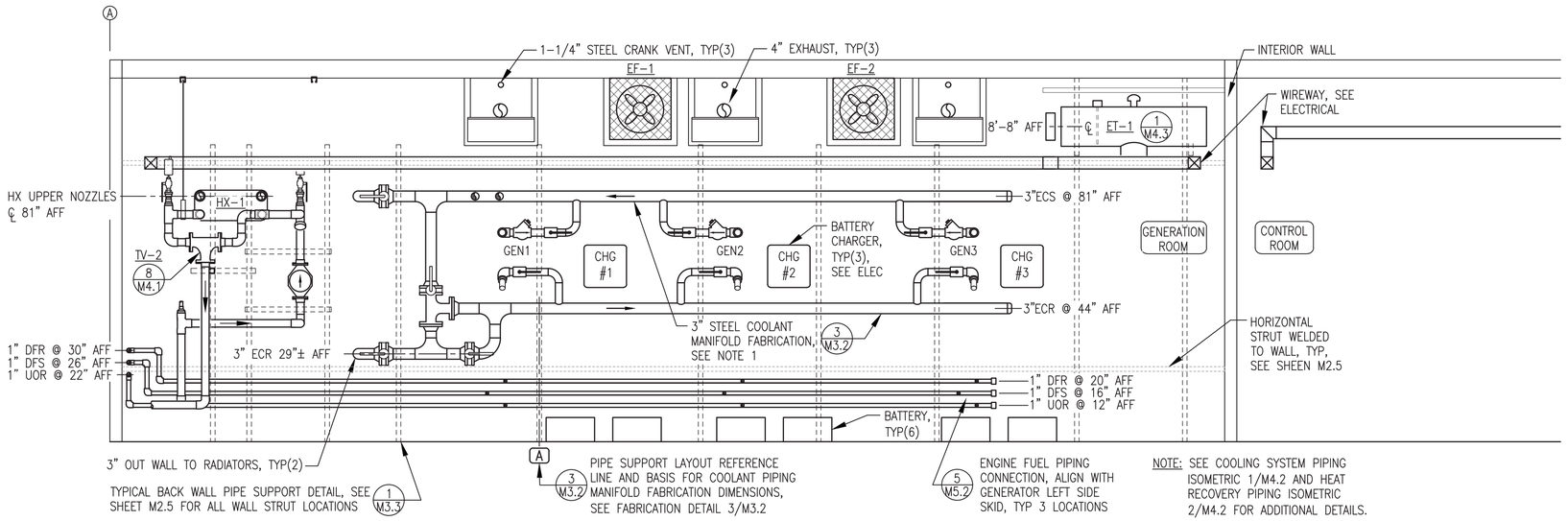
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

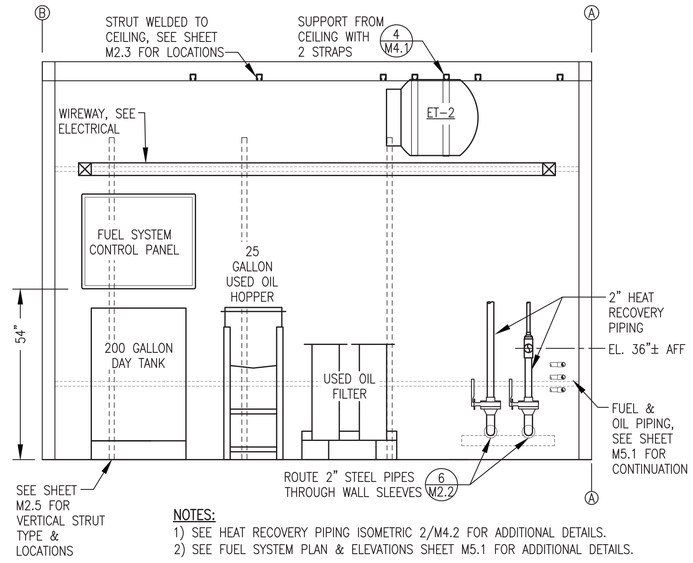
TITLE: EQUIPMENT LAYOUT PLAN, SECTION, & DETAILS

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

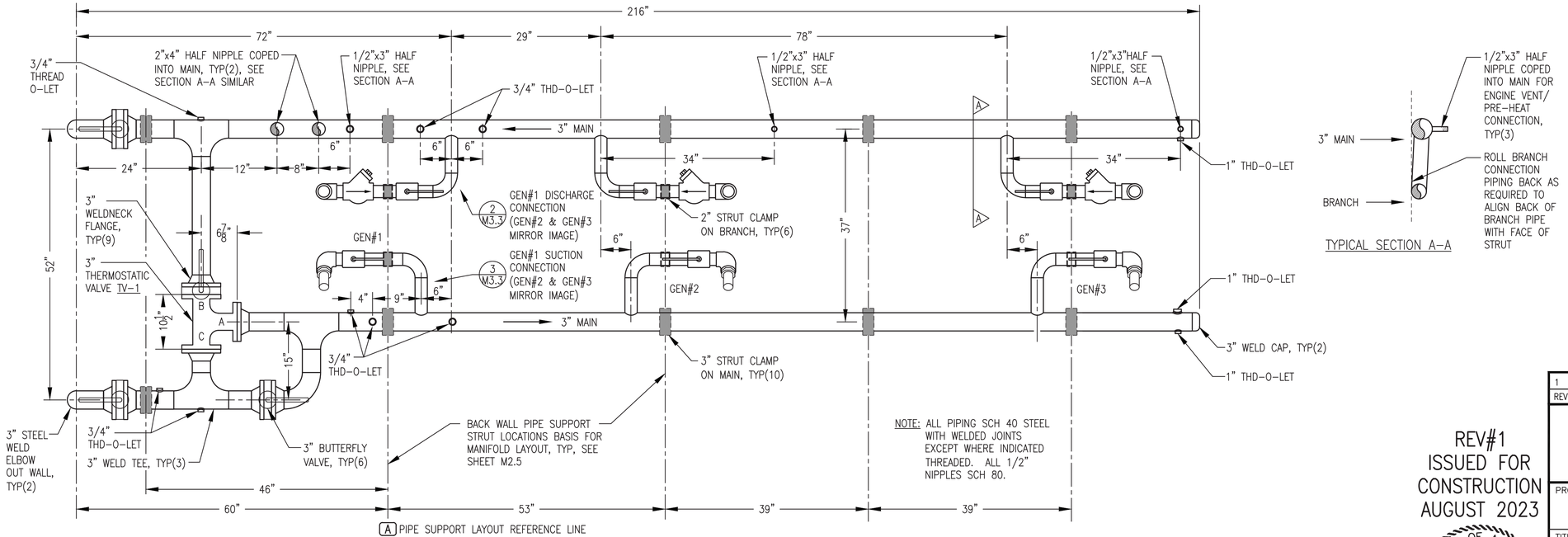
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M3.1
PROJECT NUMBER:	



1/M3.2 BACK WALL ELEVATION
1/2"=1'-0"



2/M3.2 END WALL ELEVATION
1/2"=1'-0"



3/M3.2 COOLANT MANIFOLD ENLARGED FABRICATION DETAIL
1"=1'-0"

TYPICAL SECTION A-A

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	DELETE FLOW METER, DELETE BUTTERFLY VALVES FROM TV-1 PORTS A & C	8/16/23	BCG

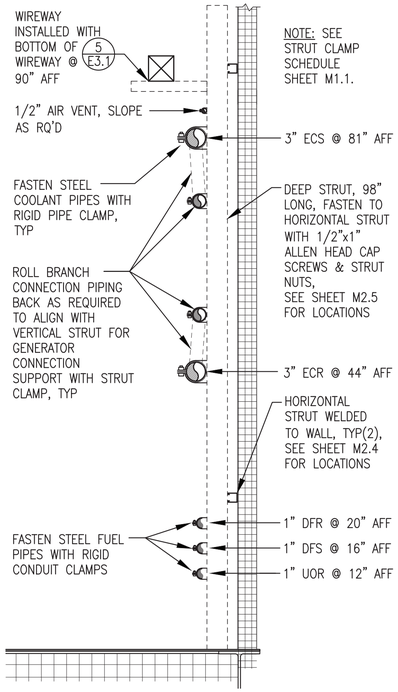
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

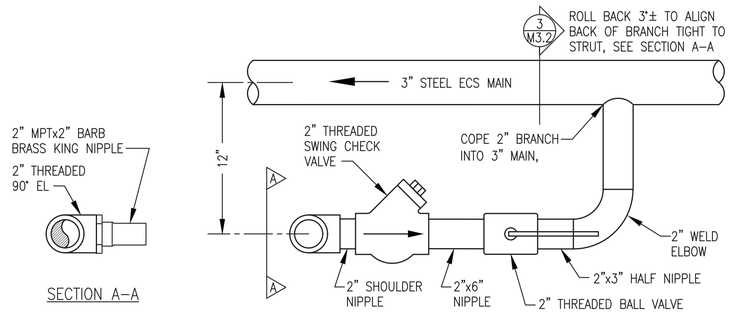
TITLE: WALL ELEVATIONS & PIPING DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M3.2
PROJECT NUMBER:	

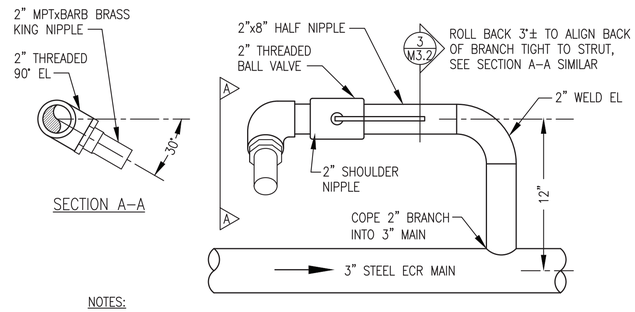


1 M3.3 TYPICAL PIPE SUPPORT AT BACK WALL
1"=1'-0"



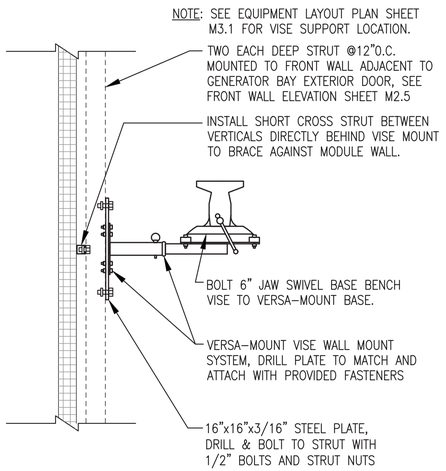
NOTES:
1) GEN#1 DISCHARGE CONNECTION SHOWN, GEN#2 & GEN#3 MIRROR IMAGE
2) MAIN PIPING 3" STEEL WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
3) ALL PIPING SCHEDULE 40 STEEL.

2 M3.3 GEN#1 DISCHARGE CONNECTION (GEN#2 & GEN#3 MIRROR IMAGE)
NO SCALE



NOTES:
1) GEN#1 SUCTION CONNECTION SHOWN, GEN#2 & GEN#3 MIRROR IMAGE
2) MAIN PIPING 3" STEEL WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
3) ALL PIPING SCHEDULE 40 STEEL.

3 M3.3 GEN#1 SUCTION CONNECTION (GEN#2 & GEN#3 MIRROR IMAGE)
NO SCALE



4 M3.3 REMOVABLE BENCH VISE INSTALLATION
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

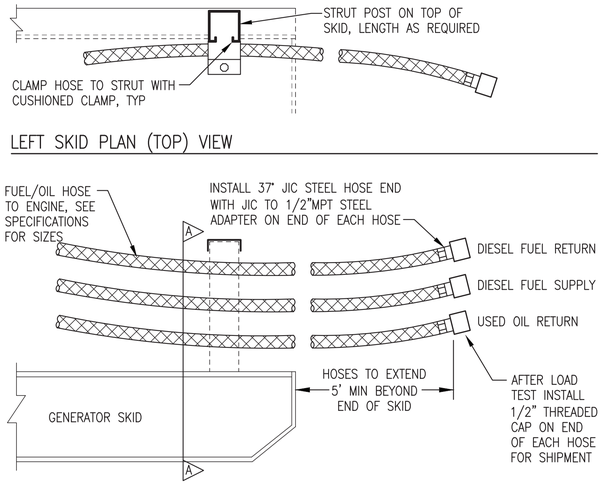
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MECHANICAL DETAILS

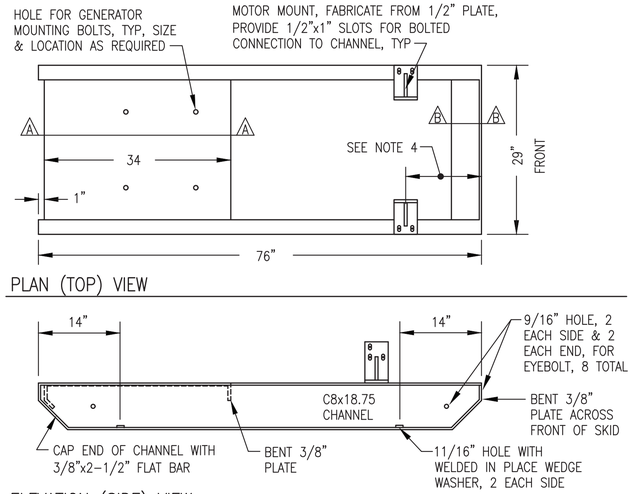
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2–M7	SHEET: M3.3
PROJECT NUMBER:	



NOTE:
GROUP HOSES ON LEFT SKID AS SHOWN TO COORDINATE WITH COOLANT HOSES ABOVE.

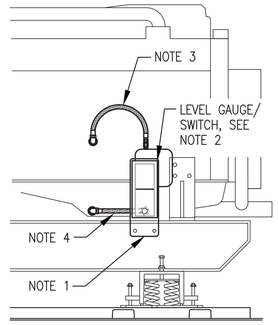
1 M3.4 FUEL/OIL HOSE & BATTERY CABLE INSTALLATION
NO SCALE



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 UNIT ON SKID SO THAT THE EXHAUST RISER CENTERLINE IS 39" FROM THE FRONT OF THE SKID.

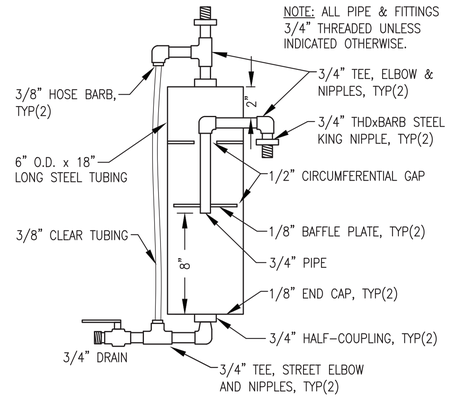
2 M3.4 TYPICAL GENERATOR SKID FABRICATION
NO SCALE



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. ADJUST SWITCH CONTACTS TO 1/2" ABOVE AND BELOW NORMAL FULL LEVEL. PAINT MARK A RED LINE AT BOTH SWITCH LEVELS.
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.

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



4 M3.4 CONDENSATE TRAP FABRICATION
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: GENERATOR FABRICATION DETAILS

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

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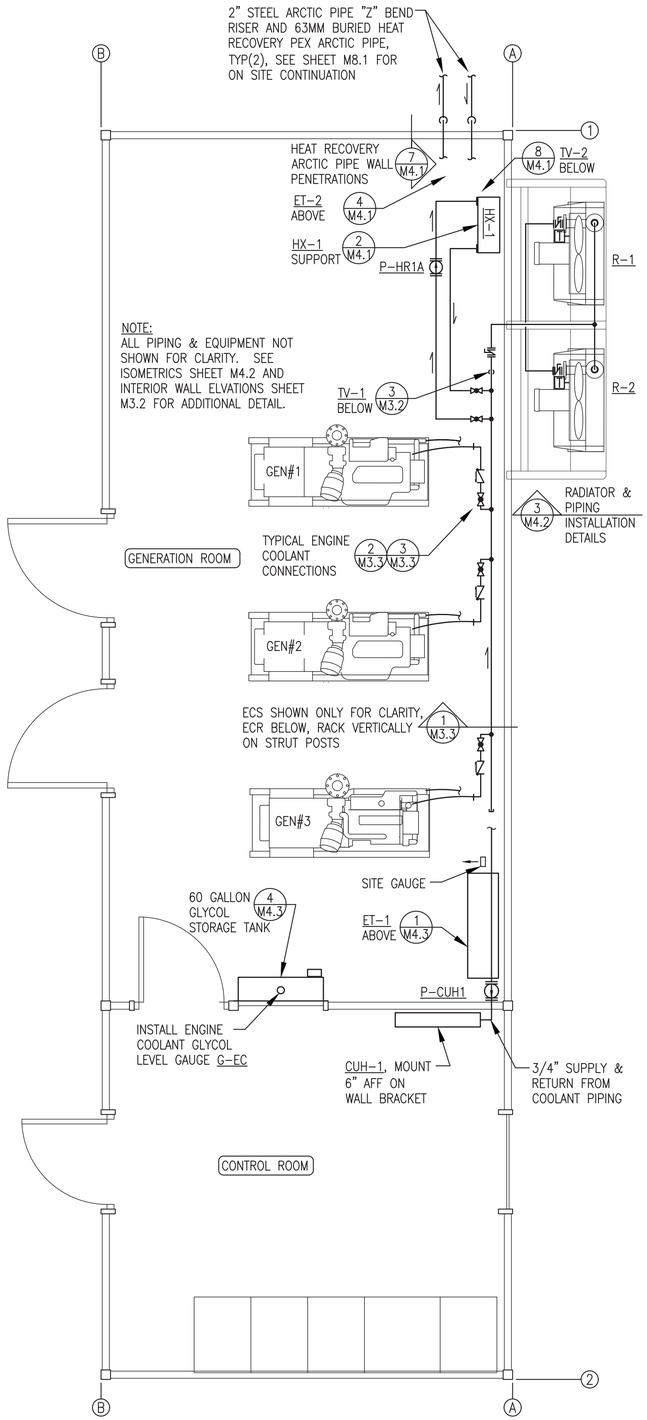
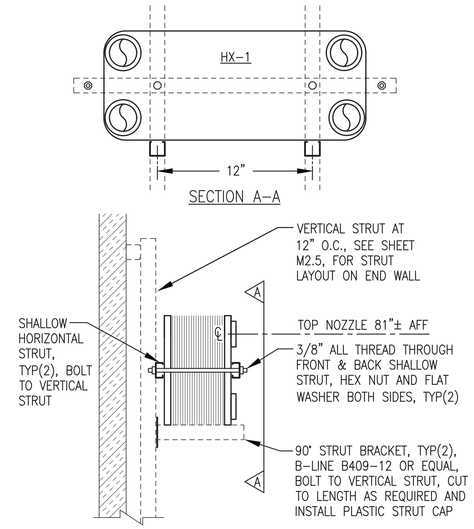
FILE NAME: NELS PP M2-M7	SHEET: M3.4
PROJECT NUMBER:	



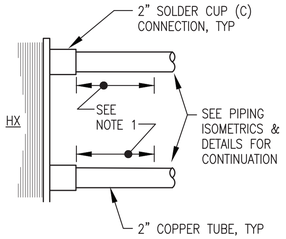
1 M4.1 COOLANT AND HEAT RECOVERY PIPING PLAN
3/8"=1'-0"



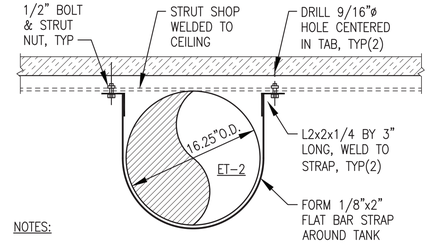
2 M4.1 HEAT EXCHANGER HX-1 SUPPORT FROM WALL
NO SCALE

HX CONNECTION NOTES:

1) PROVIDE 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.



3 M4.1 TYPICAL HX PIPING CONNECTION
NO SCALE

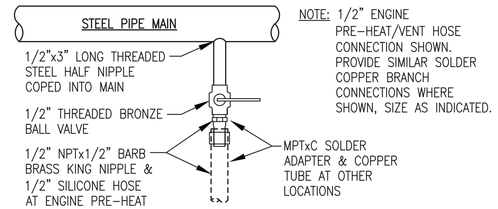


NOTES:

1) SMOOTH EDGES AFTER FABRICATION, WIRE BRUSH, SOLVENT CLEAN, AND PAINT WITH TWO COATS OF COLD GALVANIZING COMPOUND.

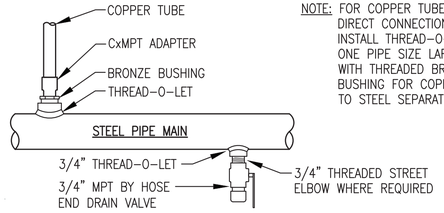
2) ONE STRAP SHOWN. INSTALL FOUR IDENTICAL STRAPS.

4 M4.1 HEAT RECOVERY EXP TANK ET-2 SUPPORT
NO SCALE



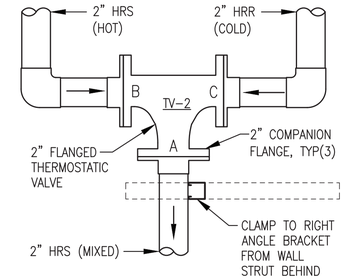
NOTE: 1/2" ENGINE PRE-HEAT/VENT HOSE CONNECTION SHOWN. PROVIDE SIMILAR SOLDER COPPER BRANCH CONNECTIONS WHERE SHOWN, SIZE AS INDICATED.

5 M4.1 TYP VALVED BRANCH CONNECTION TO STEEL MAIN
NO SCALE

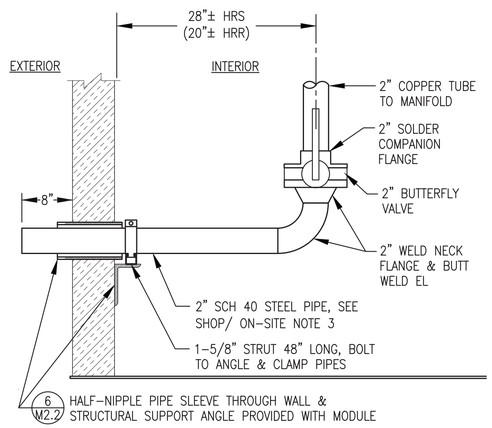


NOTE: FOR COPPER TUBE DIRECT CONNECTION INSTALL THREAD-O-LET ONE PIPE SIZE LARGER WITH THREADED BRONZE BUSHING FOR COPPER TO STEEL SEPARATION.

6 M4.1 TYP DIRECT CONNECTION TO STEEL MAIN
NO SCALE



8 M4.1 TV-2 INSTALLATION
NO SCALE



7 M4.1 HEAT RECOVERY ARCTIC PIPE WALL PENETRATIONS
NO SCALE

ARCTIC PIPE GENERAL NOTES:

1) SEE END WALL ELEVATION 2/M3.2 FOR PIPE WALL PENETRATION LAYOUT.

2) ONE PIPE SHOWN. PROVIDE TWO SIMILAR.

ARCTIC PIPE SHOP/ON-SITE NOTES:

1) SHOP INSTALLATION SHOWN. STUB PIPE 8" MIN BEYOND WALL & TEMPORARILY CONNECT SUPPLY TO RETURN FOR TESTING.

2) AFTER TESTING REMOVE TEMPORARY CONNECTION, BREAK FLANGE JOINT, AND STORE PIPE IN MODULE. INSTALL THREADED PIPE CAP FOR SHIPPING.

3) AS PART OF ON-SITE INSTALLATION REMOVE THREADED PIPE CAP, REINSTALL PIPE THROUGH WALL AND CONNECT TO ARCTIC PIPE, SEE SHEET M8.

4) SHOP INSULATE COPPER TUBE UP TO BUTTERFLY VALVE. SHOP CUT & FIT INSULATION & JACKET FOR STEEL PIPE TO WALL BUT SHIP LOOSE FOR FIELD INSTALLATION.

ISSUED FOR CONSTRUCTION
MAY 2023

STATE OF ALASKA
BRIAN C. GRAY
ME 8210
REGISTERED PROFESSIONAL ENGINEER
4.9TH

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: COOLANT & HEAT RECOVERY PIPING PLAN & DETAILS

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

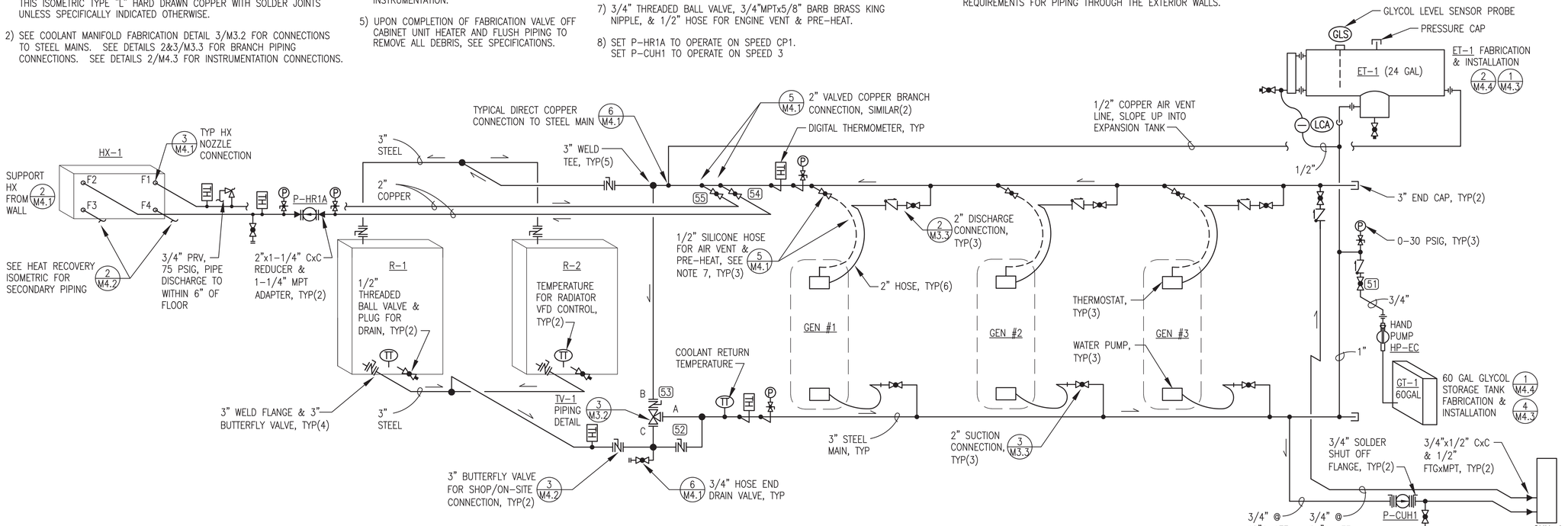
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M4.1
PROJECT NUMBER:	

COOLING SYSTEM ISOMETRIC NOTES:

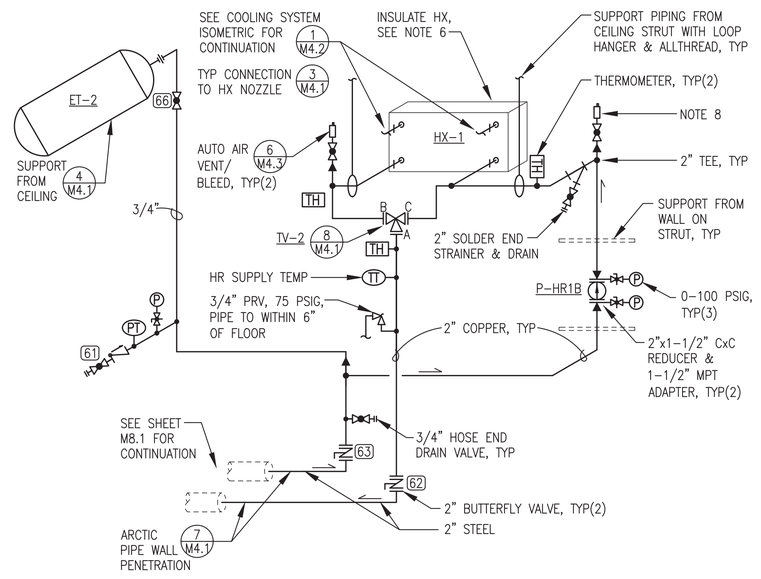
1) ALL PIPING SHOWN THIS ISOMETRIC 4" SCH 40 STEEL WITH WELDED JOINTS UNLESS SPECIFICALLY INDICATED OTHERWISE, SEE DETAIL 3/M3.2 FOR COOLING MANIFOLD DETAILS. ALL ENGINE BRANCH CONNECTIONS SCH 40 STEEL WITH WELDED AND THREADED JOINTS. ALL OTHER PIPE SHOWN THIS ISOMETRIC TYPE "L" HARD DRAWN COPPER WITH SOLDER JOINTS UNLESS SPECIFICALLY INDICATED OTHERWISE.
2) SEE COOLANT MANIFOLD FABRICATION DETAIL 3/M3.2 FOR CONNECTIONS TO STEEL MAINS. SEE DETAILS 2&3/M3.3 FOR BRANCH PIPING CONNECTIONS. SEE DETAILS 2/M4.3 FOR INSTRUMENTATION CONNECTIONS.
3) ALL COOLANT PRESSURE GAUGES 0–30 PSIG.
4) SEE ELECTRICAL 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) SHOP INSULATE COOLANT PIPING MAINS FROM GENERATOR VALVES TO BUTTERFLY VALVES AT WALL PENETRATIONS. SHOP CUT & FIT INSULATION & JACKET FROM VALVES TO WALL BUT SHIP LOOSE FOR FIELD INSTALLATION. ALL OTHER PIPING NOT INSULATED.
7) 3/4" THREADED BALL VALVE, 3/4"MPTx5/8" BARB BRASS KING NIPPLE, & 1/2" HOSE FOR ENGINE VENT & PRE–HEAT.
8) SET P–HR1A TO OPERATE ON SPEED CP1. SET P–CUH1 TO OPERATE ON SPEED 3

HYDRONIC PIPING SHOP/ON–SITE NOTES:

1) SEE SPECIFICATION 23 21 13 FOR COOLING AND HEAT RECOVERY PIPING TESTING, FLUSHING, DRAINING, AND FILLING REQUIREMENTS.
2) SEE DETAILS 7/M4.1, 3/M4.2, AND 5/M4.3 FOR SHOP/FIELD REQUIREMENTS FOR PIPING THROUGH THE EXTERIOR WALLS.



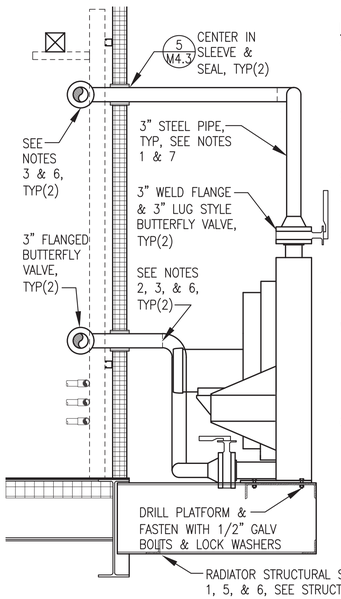
1 M4.2 COOLING SYSTEM PIPING ISOMETRIC
NO SCALE



HEAT RECOVERY ISOMETRIC NOTES:

1) ALL PIPING SHOWN THIS ISOMETRIC TYPE "L" COPPER WITH SOLDER JOINTS, 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.
2) MAKE ALL CONNECTIONS FOR INSTRUMENTATION WITH T–DRILL TAP OR REDUCING TEE. SEE DETAIL 3/M4.3.
3) ALL HEAT RECOVERY PRESSURE GAUGES 0–100 PSIG.
4) SEE INSTRUMENTATION SCHEDULE SHEET M1.1 FOR TEMPERATURE AND PRESSURE TRANSMITTERS.
5) UPON COMPLETION OF FABRICATION FLUSH PIPING TO REMOVE ALL DEBRIS, SEE SPECIFICATIONS.
6) INSULATE ALL 2" HEAT RECOVERY PIPING MAINS. WRAP HEAT EXCHANGER WITH 1" RIGID FOIL–BACK FIBERGLASS INSULATION ALL AROUND AND TAPE ALL SEAMS.
7) SET P–HR1B TO OPERATE ON CP3
8) RISE UP BEHIND WIREWAY FOR THIS AIR VENT CONNECTION.

2 M4.2 HEAT RECOVERY SYSTEM PIPING ISOMETRIC
NO SCALE



RADIATOR SHOP/ON–SITE NOTES:

STEPS 1–2 APPLY TO SHOP FABRICATION

1) INSTALL STRUCTURAL SUPPORT, RADIATOR, VALVES, & ALL PIPING AS INDICATED.
2) DURING SHOP FABRICATION MAKE A SINGLE PASS ROOT WELD AT ONE POINT TO ALLOW FOR REMOVAL OF RADIATORS.

STEPS 3–5 APPLY TO ON–SITE WORK

3) MAKE A CLEAN SQUARE CUT THROUGH SINGLE PASS WELD. TAKE APART FLANGE AT BUTTERFLY VALVE. REMOVE PIPE THROUGH WALL & STORE IN MODULE. SEAL WALL PENETRATION FOR SHIPPING.
4) REMOVE ELECTRICAL CONNECTIONS AS INDICATED ON SHEET E3.3.
5) REMOVE COMPLETE RADIATOR ASSEMBLY INCLUDING STRUCTURAL SUPPORT & RADIATORS TO PACK FOR SHIPPING. NOTE THAT IF PIPING MANIFOLDS ARE REMOVED, BLIND FLANGE RADIATOR CONNECTIONS.
6) IN FIELD BOLT RADIATOR ASSEMBLY TO MODULE, REINSTALL PIPING SECTIONS, & MAKE FINAL PIPE WELD CONNECTIONS.
7) AFTER PRESSURE TESTING, CLEAN ALL EXTERIOR PIPING & COVER WITH THREE COATS OF COLD GALVANIZING COMPOUND. SEAL WALL PENETRATION IN ACCORDANCE WITH DETAIL.

3 M4.2 RADIATOR & PIPING INSTALLATION
3/4"=1'–0"

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	DELETE FLOW METER & HR RETURN TEMP SENSOR, DELETE VALVES TV–1 PORTS A & C	8/16/23	BCG

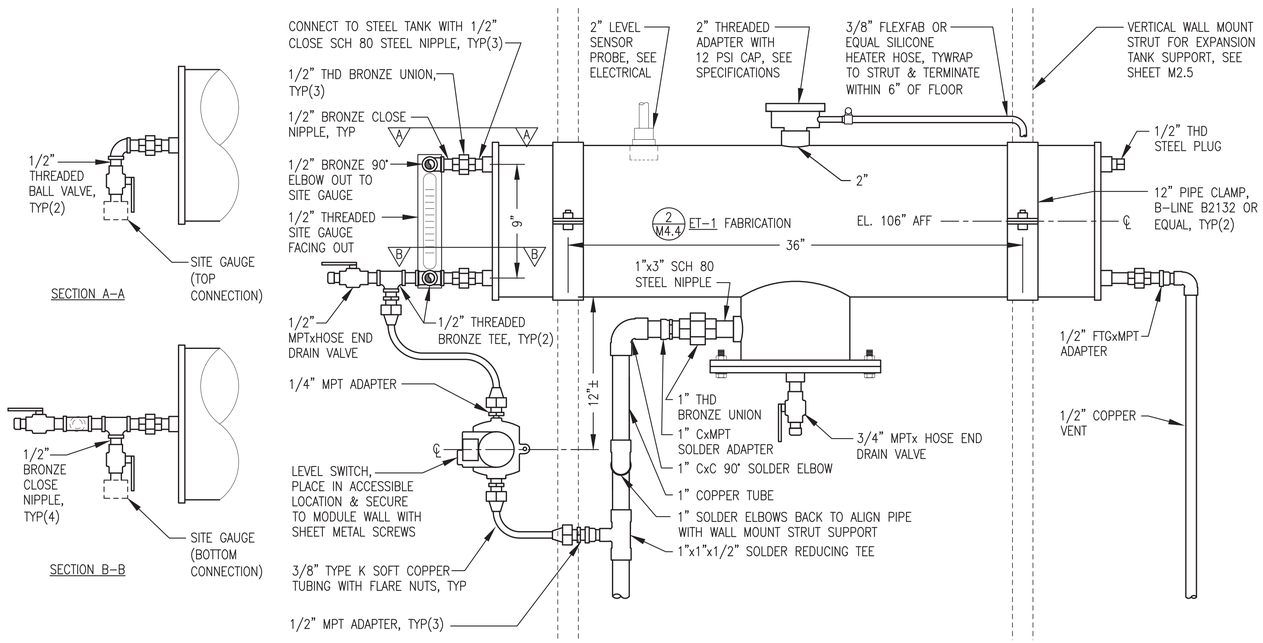
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

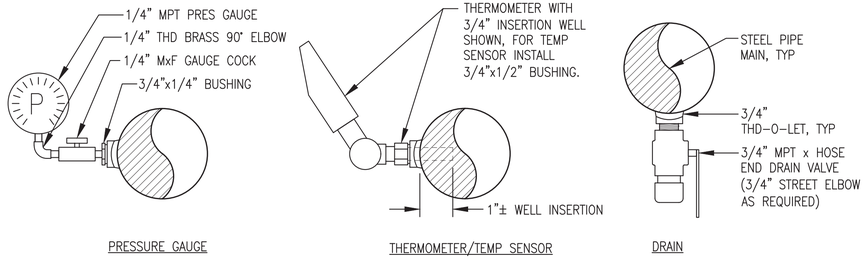
TITLE: COOLANT & HEAT RECOVERY ISOMETRICS & DETAILS

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

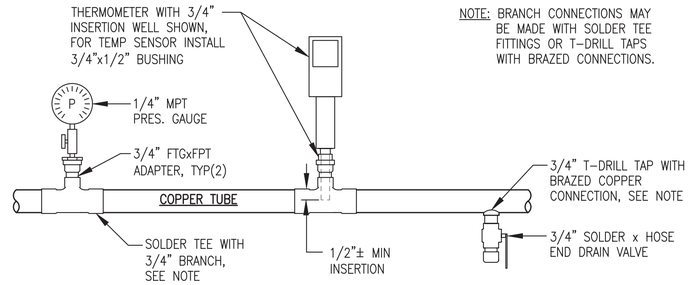
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2–M7	SHEET: M4.2
PROJECT NUMBER:	



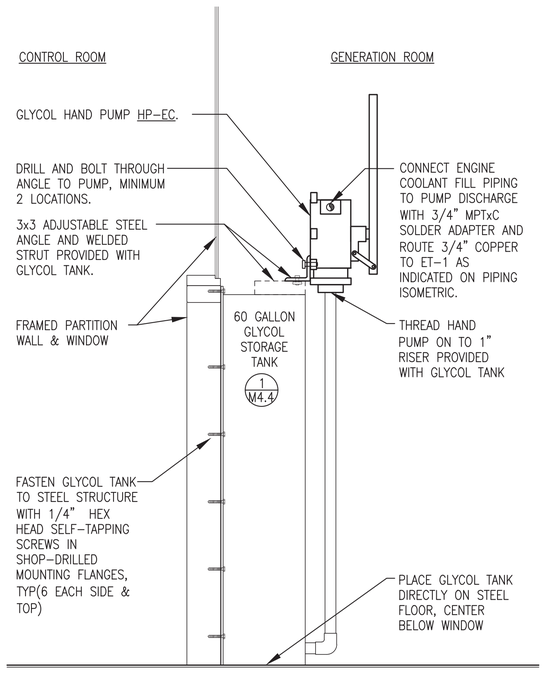
1 M4.3 24 GAL EXPANSION TANK ET–1 INSTALLATION
NO SCALE



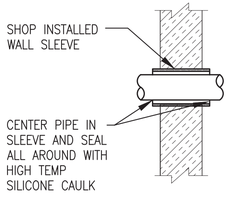
2 M4.3 TYP INSTRUMENT/DRAIN INSTALLATION IN STEEL PIPE
NO SCALE



3 M4.3 TYP INSTRUMENT/DRAIN INSTALLATION IN COPPER
NO SCALE



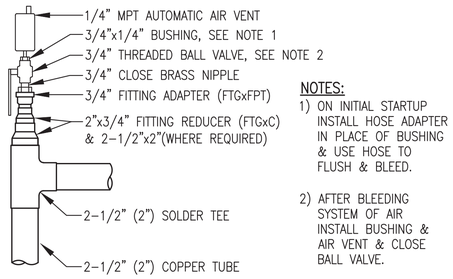
4 M4.3 GLYCOL STORAGE TANK & HAND PUMP HP–EC INSTALLATION DETAIL
NO SCALE



SHOP/ON–SITE NOTES:
1) SEAL OPENINGS AS PART OF ON–SITE WORK.

GENERAL NOTES:
1) THIS DETAIL FOR COOLANT PIPING WITH SHOP INSTALLED WALL SLEEVES.
2) FOR ALL PIPE/CONDUIT LESS THAN 2" O.D. AND WITHOUT A SHOP INSTALLED WALL SLEEVE, HOLE SAW OPENING APPROXIMATELY 1/4" LARGER THAN PIPE O.D. THROUGH WALL & SEAL ALL AROUND WITH POLYURETHANE CAULKING.

5 M4.3 COOLANT PIPING WALL PENETRATION
NO SCALE



NOTES:
1) ON INITIAL STARTUP INSTALL HOSE ADAPTER IN PLACE OF BUSHING & USE HOSE TO FLUSH & BLEED.
2) AFTER BLEEDING SYSTEM OF AIR INSTALL BUSHING & AIR VENT & CLOSE BALL VALVE.

6 M4.3 TYPICAL AIR VENT INSTALLATION IN COPPER
NO SCALE

REV#1
ISSUED FOR CONSTRUCTION
FEB 2024

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

REV.	DESCRIPTION	DATE	BY
1	ADDED ISOLATION VALVES TO ET–1 SITE GAUGE	2/22/24	BCG

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: COOLANT & HEAT RECOVERY PIPING DETAILS

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

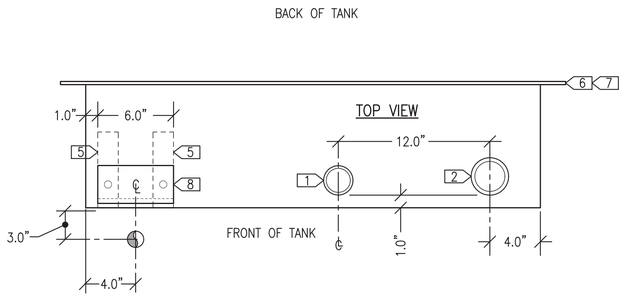
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M2–M7 | SHEET: M4.3
PROJECT NUMBER:

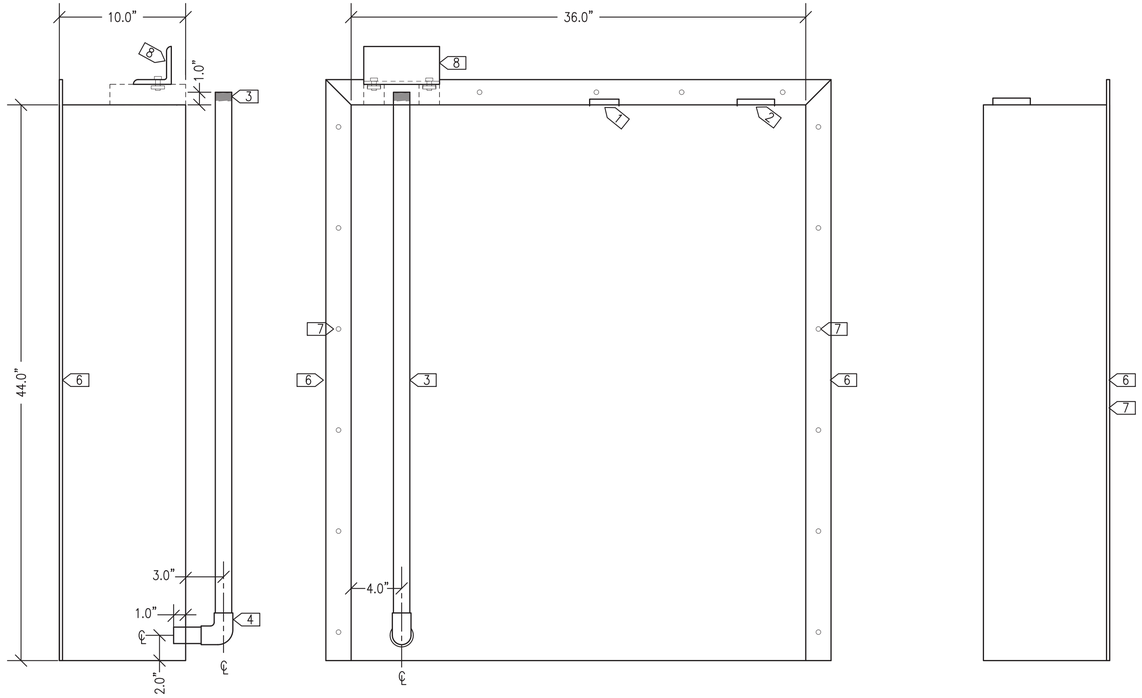
GLYCOL TANK GENERAL NOTES:

1. FABRICATE SINGLE WALL 60 GALLON NOMINAL CAPACITY GLYCOL TANK.
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.
3. PROVIDE WITH ALL OPENINGS AND ATTACHMENTS INDICATED. SEAL WELD ALL TANK ATTACHMENTS.
4. ALL FPT OPENINGS TO BE FORGED STEEL HALF COUPLINGS.
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. PRIME AND COVER WITH TWO COATS OF EPOXY, PPG AMERLOC 2 VOC OR APPROVED EQUAL, COLOR ANSI 61 GRAY.
7. UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS AND AIR DRY INTERIOR. INSTALL 2" SCREENED VENT ON 2" FPT FILL CONNECTION WITH 2" CLOSE NIPPLE FOR SHIPPING. SEAL ALL OTHER OPENINGS WITH PLASTIC OR STEEL PLUGS..

GLYCOL TANK SPECIFIC NOTES:

1. 1-1/2" FPT (TANK GAUGE)
2. 2" FPT (VENT) – INSTALL 2" THREADED VENT CAP
3. 1" SCHEDULE 80 PIPE WITH THREADED TOP CONNECTION (WITHDRAWAL)
4. 1" SOCKETWELD 90° ELBOW
5. 6" LONG STRUT, END FLUSH WITH FRONT OF TANK
6. 2x1/4" FLAT BAR CONTINUOUS THREE SIDES
7. 3/8" HOLE AT 8" O.C. ALL AROUND
8. L3x3x1/4"x6" LONG FOR FUTURE CONNECTION TO HAND PUMP BY OTHERS. PAINT TO MATCH TANK AND FASTEN TO STRUTS WITH 1/2" BOLTS & STRUT NUTS.

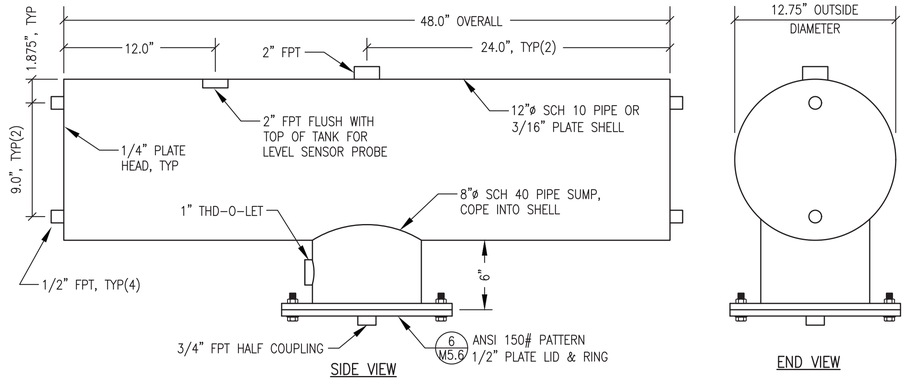




1 M4.4 60 GALLON GLYCOL STORAGE TANK
1"=6"

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 HEAD 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, PPG AMERLOC 2 VOC OR APPROVED EQUAL, COLOR ANSI 61 GRAY.
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 24 GALLON GLYCOL EXPANSION TANK
1"=6"

ISSUED FOR CONSTRUCTION
MAY 2023

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

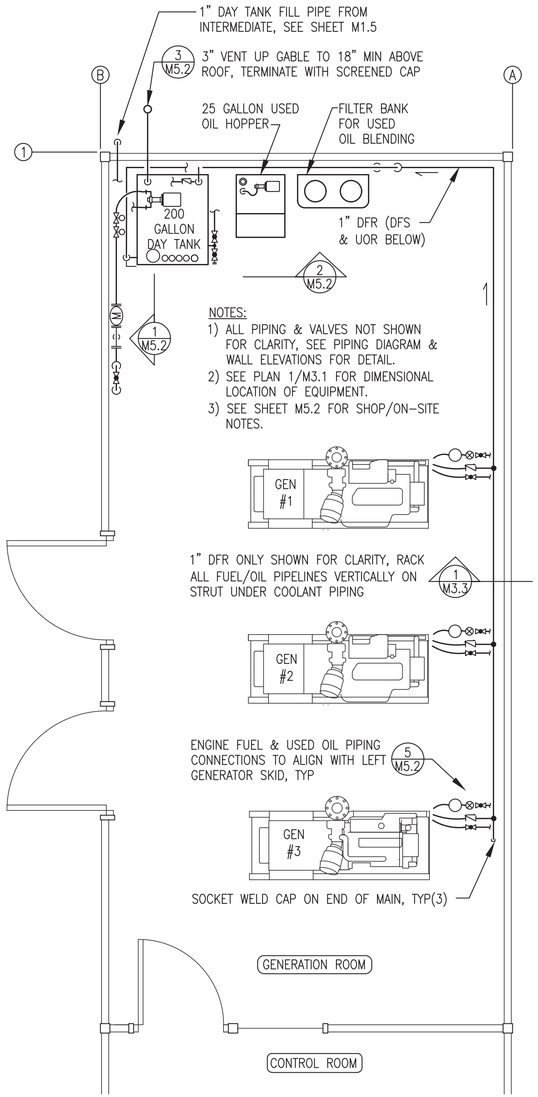
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

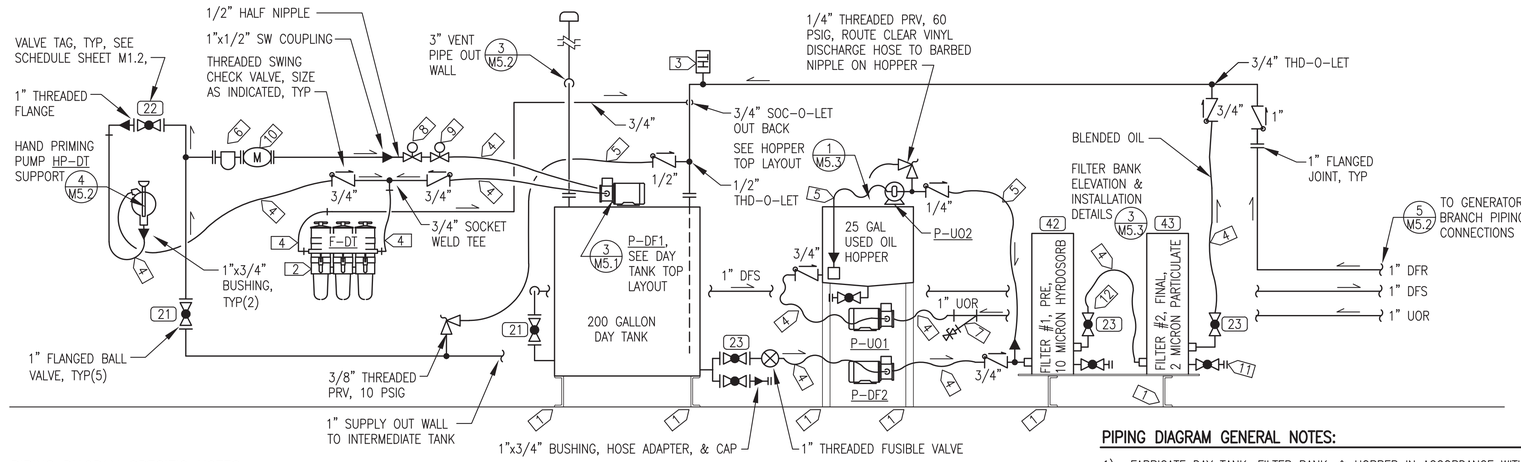
TITLE: GLYCOL STORAGE & EXPANSION TANKS FABRICATION

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M4.4
PROJECT NUMBER:	



1 M5.1 DIESEL FUEL SYSTEM & USED OIL PIPING PLAN
3/8"=1'



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 DUAL FILTER BANK F-DT.
3. DIGITAL THERMOMETER, 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 GAUGE COCK 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).

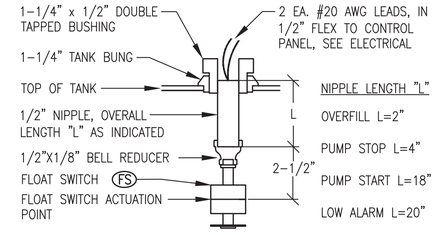
PIPING DIAGRAM GENERAL NOTES:

1) FABRICATE DAY TANK, FILTER BANK, & HOPPER IN ACCORDANCE WITH FABRICATION DETAILS.
2) ALL DFS, DFR & UOR PIPING 1" SCH 80 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.
5) PRIOR TO CONNECTING HOSES TO PUMPS, FILL CAVITIES WITH LUBE OIL AND VERIFY PROPER ROTATION AND INLET/OUTLET CONNECTIONS.

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

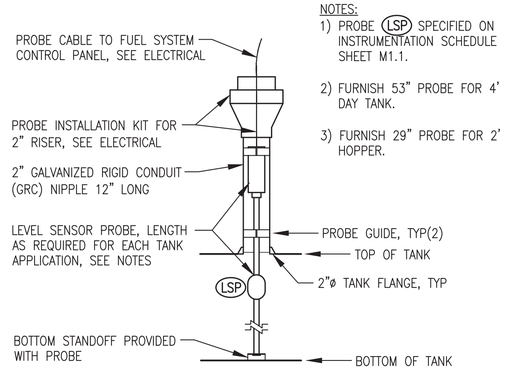
3 M5.1 TOP OF DAY TANK - PLAN VIEW
NO SCALE

NOTES:
1) FLOAT SWITCH (FS) SPECIFIED ON INSTRUMENTATION SCHEDULE SHEET M1.1.
2) PRIOR TO INSTALLATION CHASE THREADS ON FLOAT SWITCH WITH 1/8" PIPE DIE TO CLEAN OFF ANY EXCESS EPOXY, USE CARE TO AVOID DAMAGING WIRES.



4 M5.1 DAY TANK FLOAT SWITCH INSTALLATION
NO SCALE

NOTES:
1) PROBE (LSP) SPECIFIED ON INSTRUMENTATION SCHEDULE SHEET M1.1.
2) FURNISH 53" PROBE FOR 4' DAY TANK.
3) FURNISH 29" PROBE FOR 2' HOPPER.



5 M5.1 TYPICAL LEVEL SENSOR PROBE INSTALLATION
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

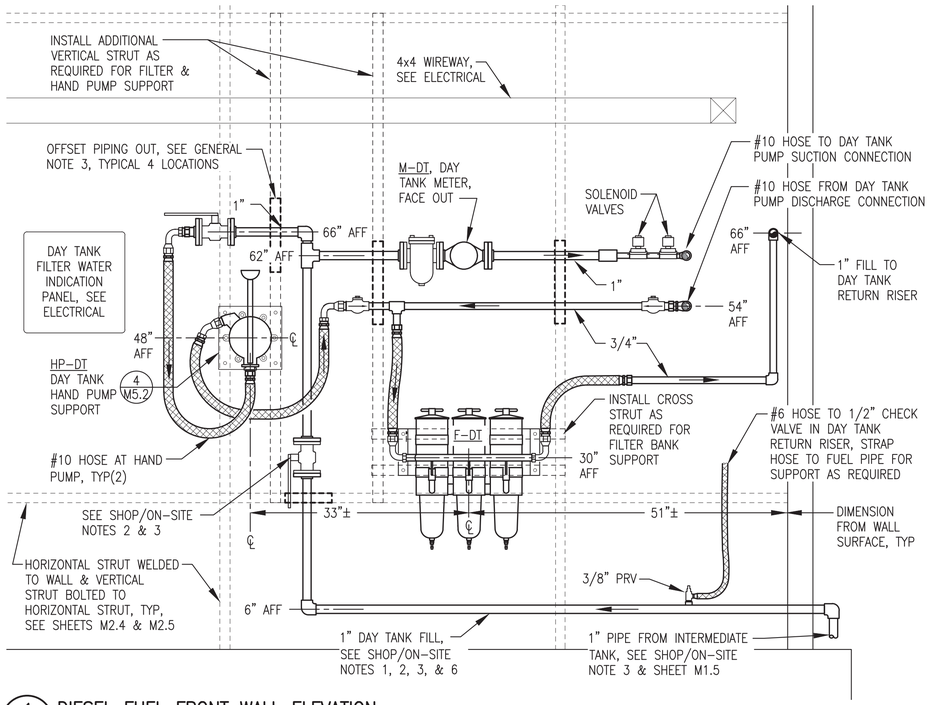
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: DIESEL FUEL & USED OIL PIPING PLAN, DIAGRAM, & DETAILS

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

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M2-M7 | SHEET: M5.1
PROJECT NUMBER:



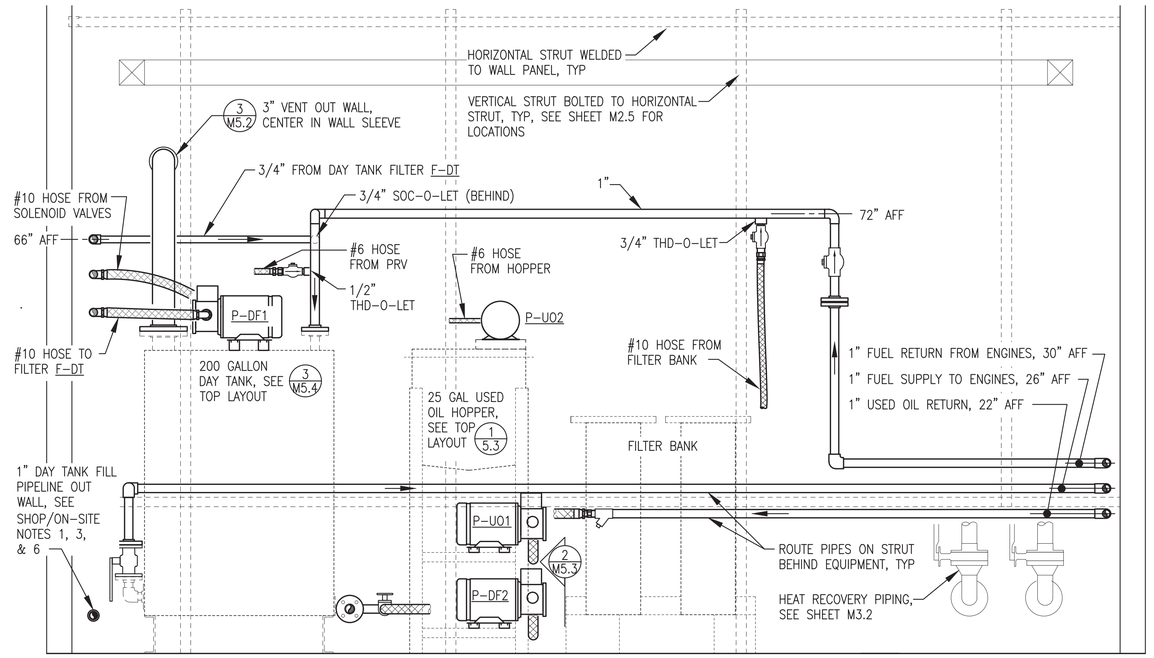
1 M5.2 DIESEL FUEL FRONT WALL ELEVATION
1"=1'

GENERAL NOTES:

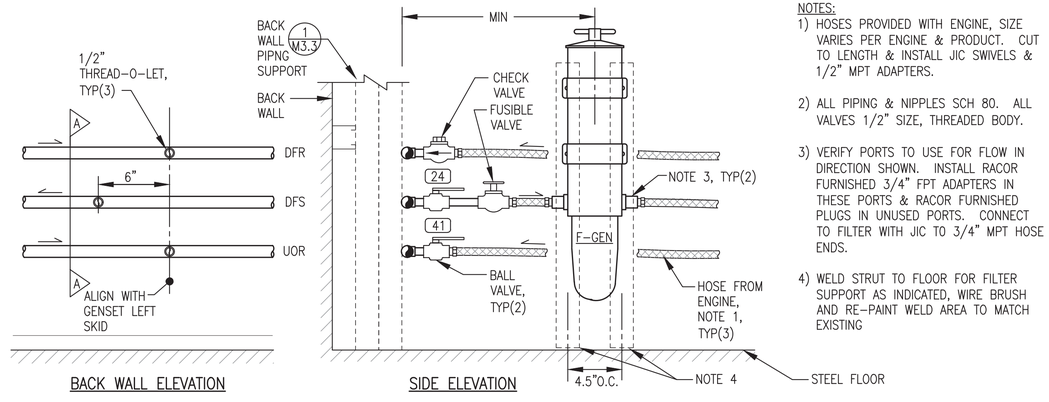
1. GENERAL LAYOUT SHOWN ONLY THIS ELEVATION. SEE PIPING DIAGRAM FOR COMPLETE INSTALLATION DETAILS.
2. CLAMP PIPE TO STRUT INSTALLED ON WALL, SEE SHEET M2.5.
3. ADD SHORT SECTIONS OF SHALLOW STRUT AT 4 LOCATIONS SHOWN TO OFFSET PIPING OUT TO ALLOW DAY TANK METER TO BE INSTALLED FACING OUT.

FUEL SHOP/ON-SITE NOTES:

1. DURING SHOP FABRICATION HOLE SAW 1-1/2"ø OPENING FOR DAY TANK FILL PIPE, STUB PIPE 12" MIN BEYOND WALL, & TERMINATE WITH 1" MALE THREAD FOR TESTING.
2. UPON COMPLETION OF TESTING CLOSE VALVE, DRAIN PIPE, DISCONNECT FLANGE FROM VALVE THEN SLIDE PIPE OVER & SECURE FOR SHIPPING. SEAL WALL OPENING.
3. AS PART OF ON-SITE INSTALLATION REINSTALL FILL PIPE THEN CUT THREADS OFF EXTERIOR END & INSTALL SOCKET WELD ELBOW.
4. DURING SHOP FABRICATION INSTALL TEMPORARY VENT PIPE OUT WALL. UPON COMPLETION OF TESTING REMOVE TEMPORARY PIPE & SEAL WALL OPENING FOR SHIPPING.
5. AS PART OF ON-SITE INSTALLATION INSTALL 3" GALVANIZED THREADED VENT PIPE OUT WALL & UP TO VENT CAP. SEE DETAIL 3/M5.2.
6. UPON FINAL ON-SITE ASSEMBLY SEAL 1" FILL PIPE TO EXTERIOR WALL & 3" VENT PIPE TO WALL SLEEVE WITH POLYURETHANE CAULKING ALL AROUND.

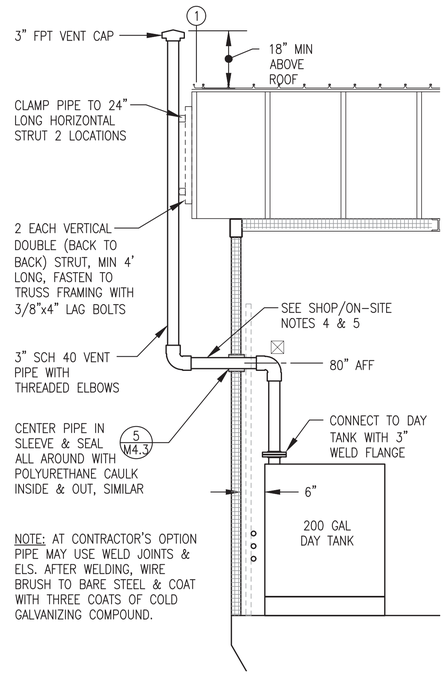


2 M5.2 DIESEL FUEL & USED OIL END WALL ELEVATION
1"=1'

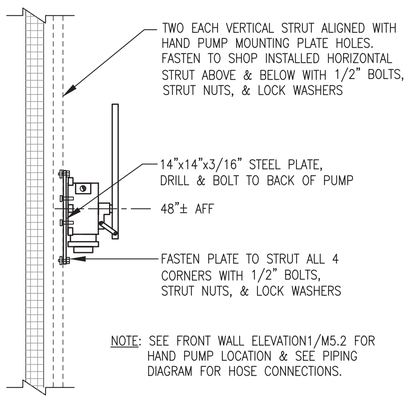


NOTES:
1) HOSES PROVIDED WITH ENGINE, SIZE VARIES PER ENGINE & PRODUCT. CUT TO LENGTH & INSTALL JIC SWIVELS & 1/2" MPT ADAPTERS.
2) ALL PIPING & NIPPLES SCH 80. ALL VALVES 1/2" SIZE, THREADED BODY.
3) VERIFY PORTS TO USE FOR FLOW IN DIRECTION SHOWN. INSTALL RACOR FURNISHED 3/4" FPT ADAPTERS IN THESE 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

5 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 CONSTRUCTION
MAY 2023

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

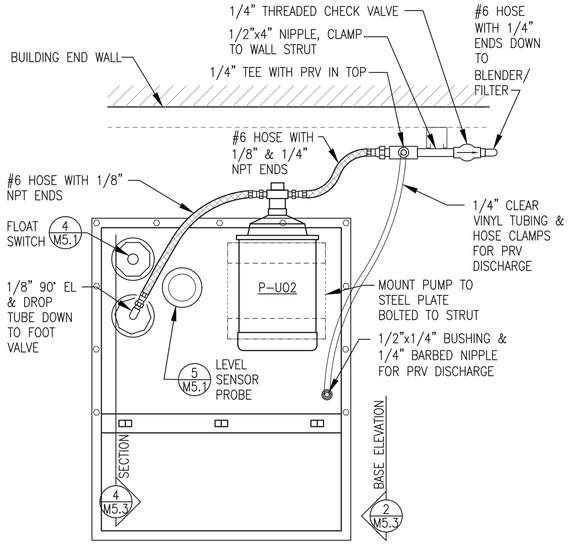
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

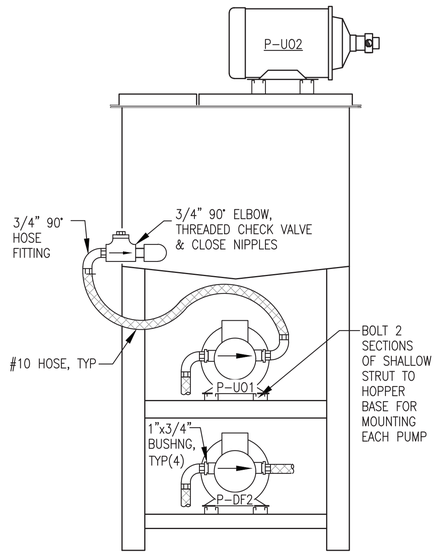
TITLE: DIESEL FUEL & USED OIL PIPING ELEVATIONS & DETAILS

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

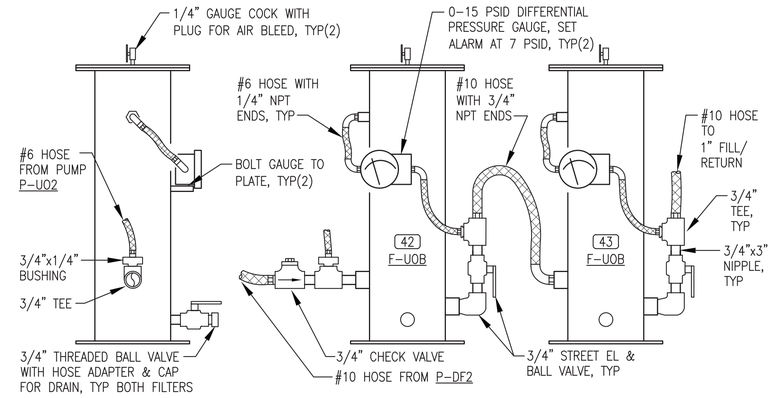
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M5.2
PROJECT NUMBER:	



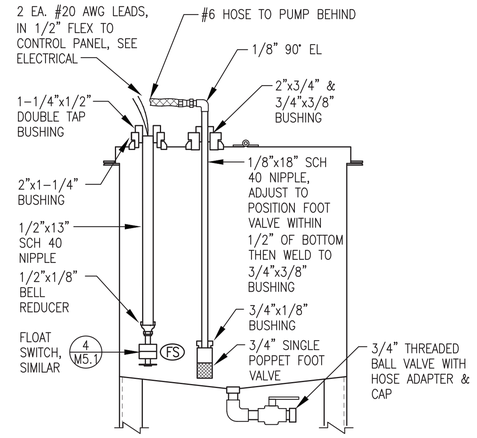
1 M5.3 TOP OF HOPPER – PLAN VIEW
NO SCALE



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 CONSTRUCTION
MAY 2023

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

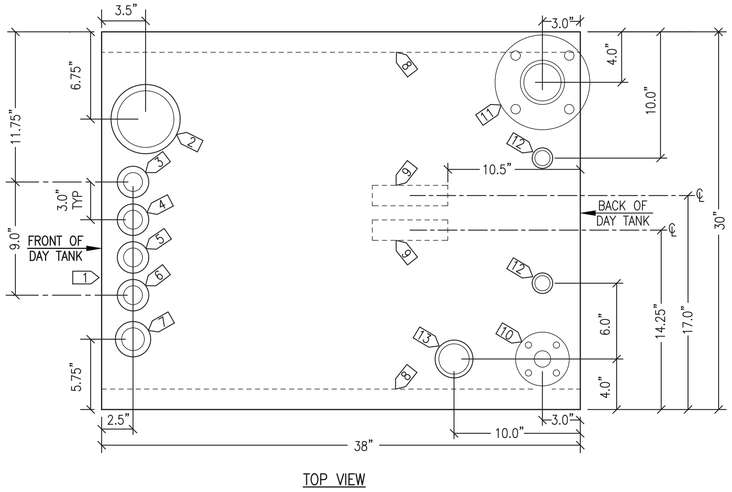
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

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: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M5.3
PROJECT NUMBER:	



TOP VIEW

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.

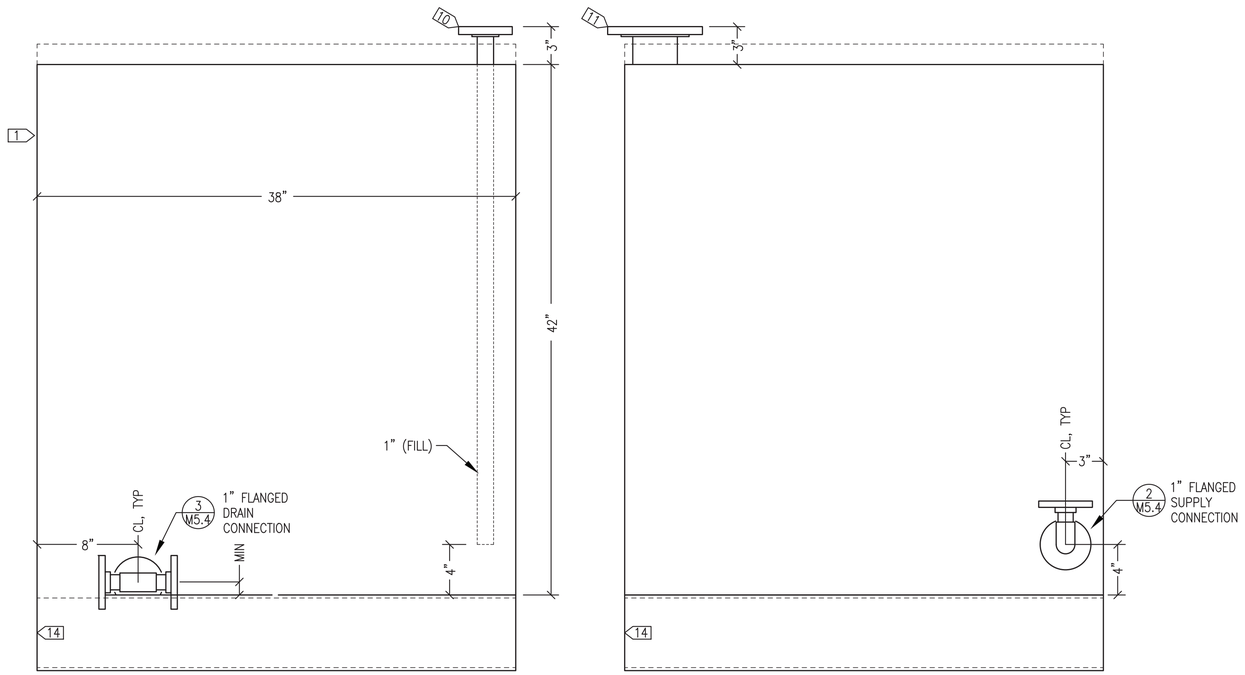
6) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PAINT WITH TWO COATS EPOXY, PPG AMERLOC 2 VOC OR APPROVED EQUAL, COLOR ANSI 61 GRAY.

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:

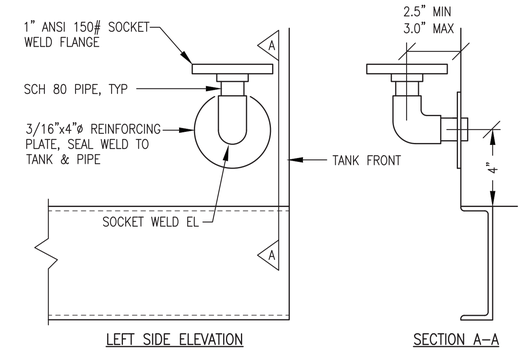
1. PROVIDE 2" HIGH LETTERING: "DIESEL FUEL 200 GALLONS"
2. 4" FPT (MANUAL FILL) – INSTALL THREADED STEEL PLUG
3. 1-1/4" FPT (OVERFILL) – INSTALL VENT CAP FOR SHIPPING
4. 1-1/4" FPT (PUMP STOP)
5. 1-1/4" FPT (PUMP START)
6. 1-1/4" FPT (LOW ALARM)
7. 1-1/2" FPT (TANK GAUGE)
8. 38"L STRUT, ENDS FLUSH WITH TANK
9. 6"L STRUT
10. 1" 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 (TANK LEVEL PROBE)
14. C6x8.2, 38" LONG



RIGHT SIDE VIEW

LEFT SIDE VIEW

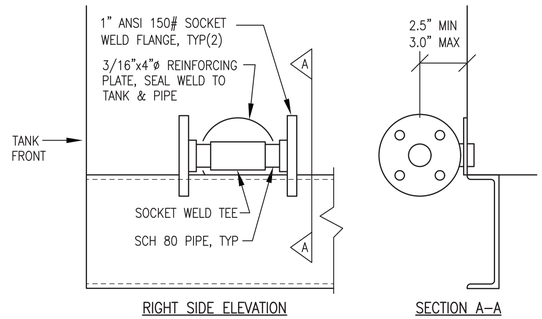
1 M5.5 200 GALLON SINGLE WALL DAY TANK
1"=6"



LEFT SIDE ELEVATION

SECTION A-A

2 M5.4 1" FLANGED SUPPLY CONNECTION
NO SCALE



RIGHT SIDE ELEVATION

SECTION A-A

3 M5.4 1" FLANGED DRAIN CONNECTION
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

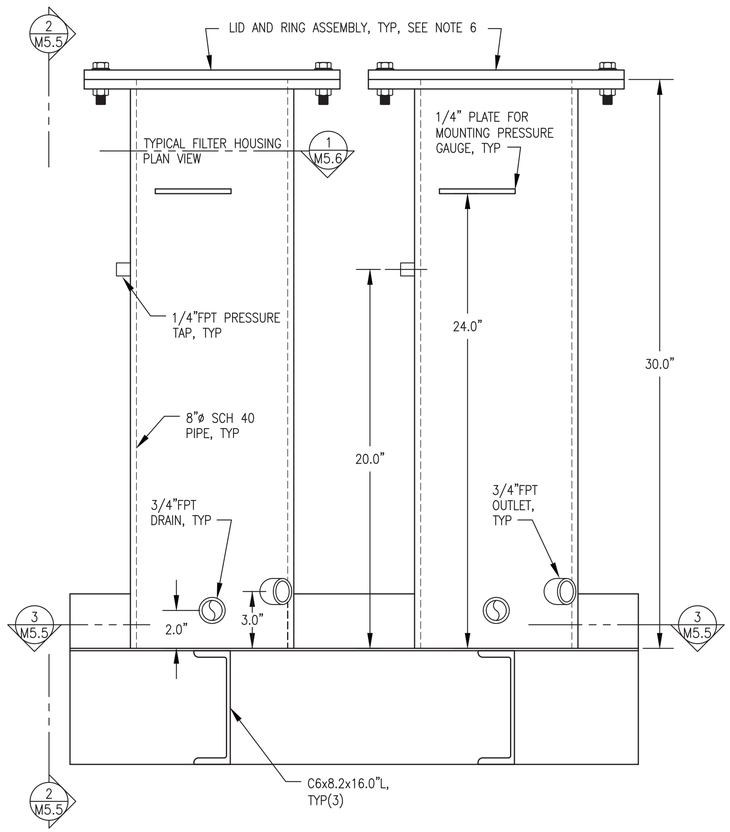
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

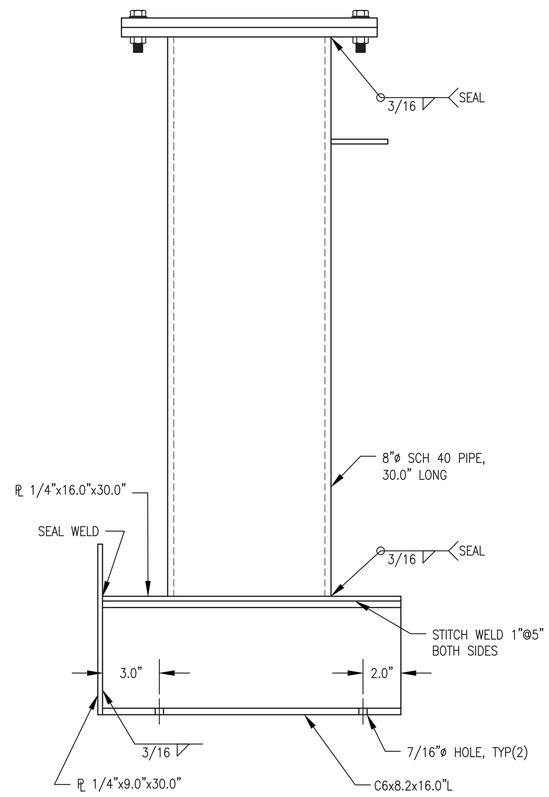
TITLE: 200 GALLON DAY TANK FABRICATION

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

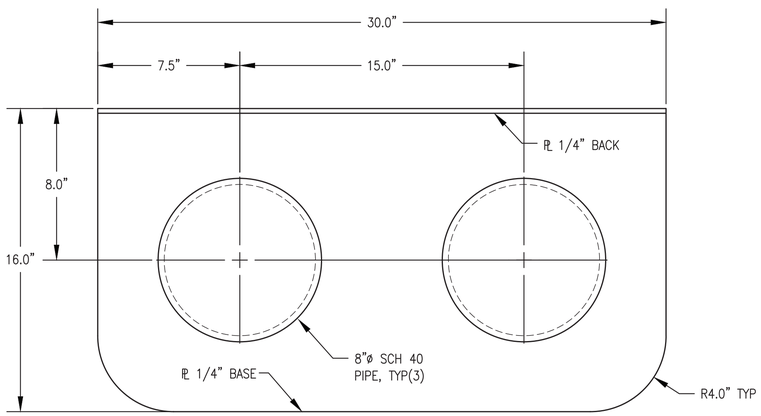
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M5.4
PROJECT NUMBER:	



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, PPG AMERLOC 2 VOC OR APPROVED EQUAL, COLOR ANSI 61 GRAY.
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 CONSTRUCTION
MAY 2023

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

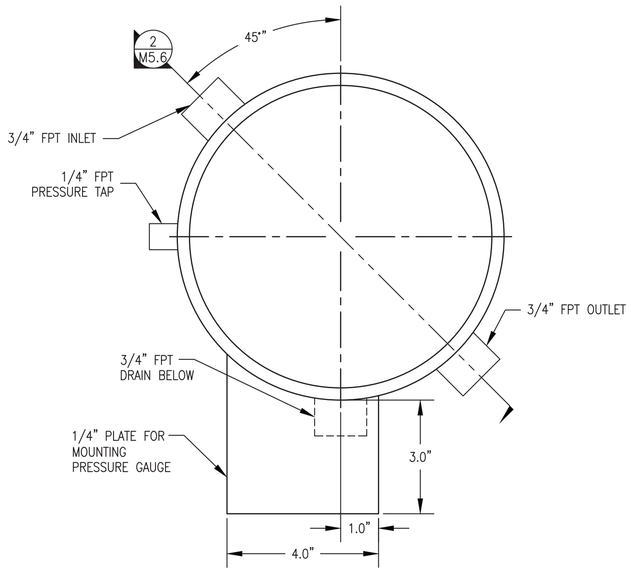
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

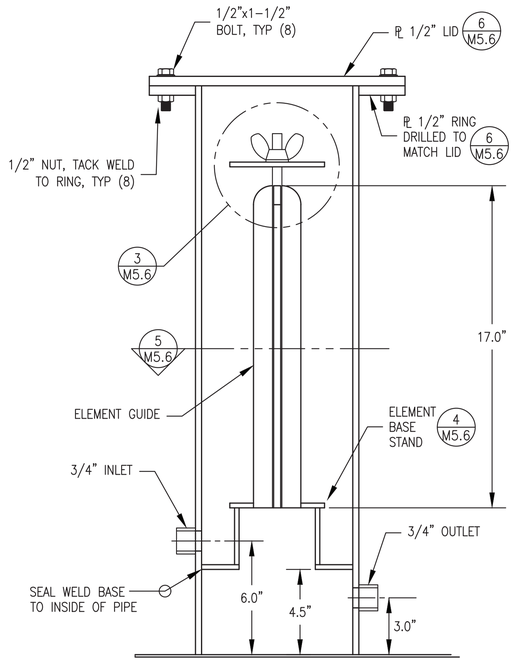
TITLE: USED OIL BLENDER
FILTER BANK LAYOUT & CONFIGURATION

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

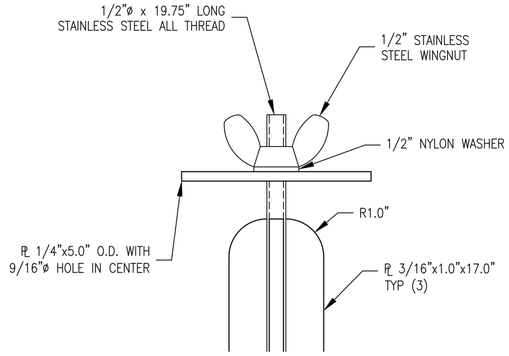
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M2–M7	SHEET: M5.5
PROJECT NUMBER:	



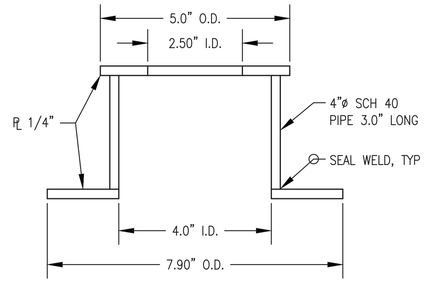
1 M5.6 TYPICAL FILTER HOUSING – PLAN VIEW
1/2" = 1"



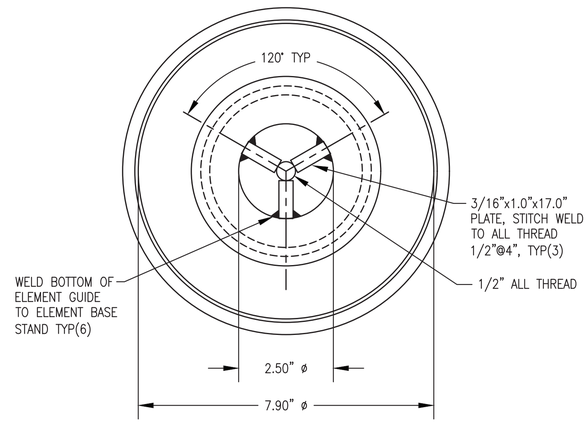
2 M5.6 TYPICAL SECTION THROUGH FILTER HOUSING
1/4" = 1"



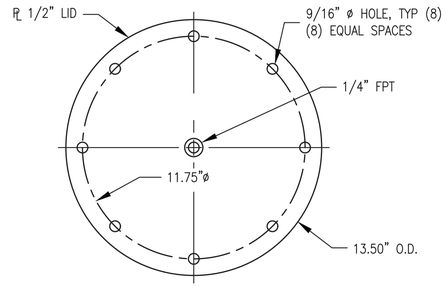
3 M5.6 ELEMENT RETAINER CAP
1/2" = 1"



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



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



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

ISSUED FOR
CONSTRUCTION
MAY 2023

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

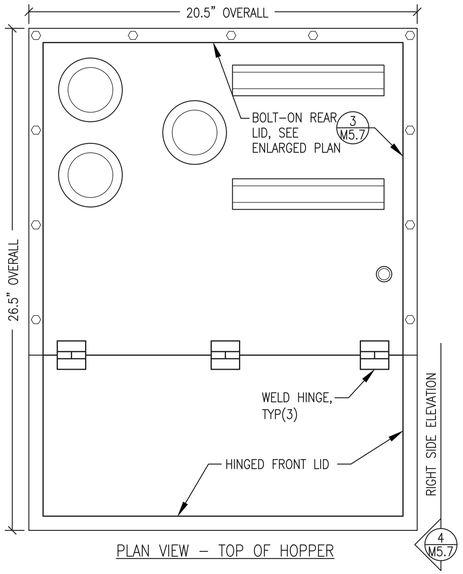
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

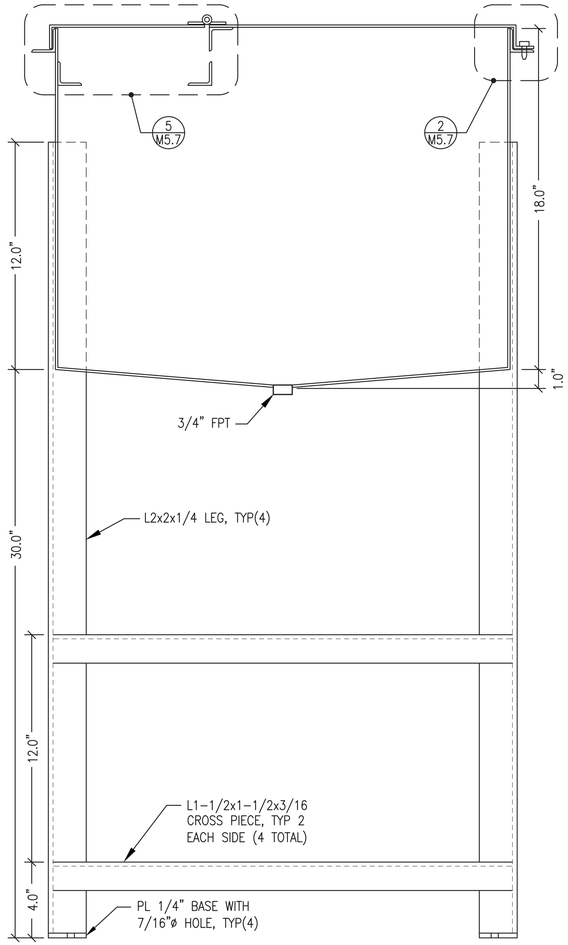
TITLE: USED OIL BLENDER
TYPICAL FILTER HOUSING DETAILS

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

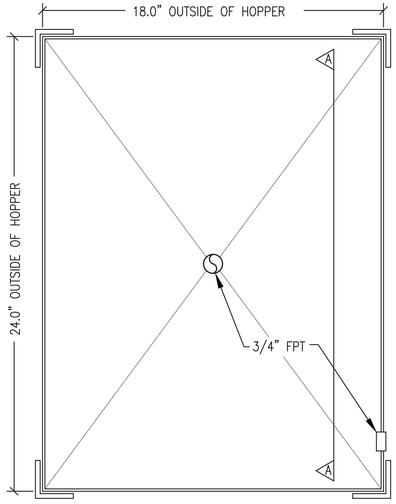
DRAWN BY: JTD
DESIGNED BY: BCG
FILE NAME: NELS PP M2-M7
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 5/30/23
SHEET: M5.6



PLAN VIEW – TOP OF HOPPER



SECTION A–A



PLAN VIEW – BOTTOM OF HOPPER

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

FABRICATION NOTES:

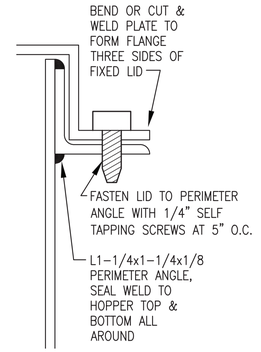
1) FABRICATE SINGLE WALL 25 GALLON USABLE CAPACITY HOPPER.

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.

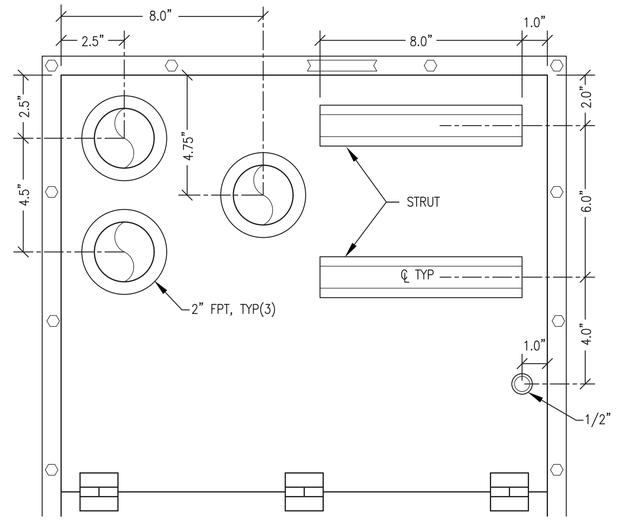
3) PROVIDE WITH ALL OPENINGS AND ATTACHMENTS INDICATED. INSTALL ALL FPT OPENINGS IN ACCORDANCE WITH UL 142 FIGURE 7.1 – #1, #2, #4, OR #6. ALL STRUT TO BE 1-5/8"x1-5/8"x12 GA SOLID BACK PLAIN (BLACK), B-LINE B22 PLN OR EQUAL. FURNISH ALL FASTENERS AS INDICATED.

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, PPG AMERLOC 2 VOC OR APPROVED EQUAL, COLOR ANSI 61 GRAY.

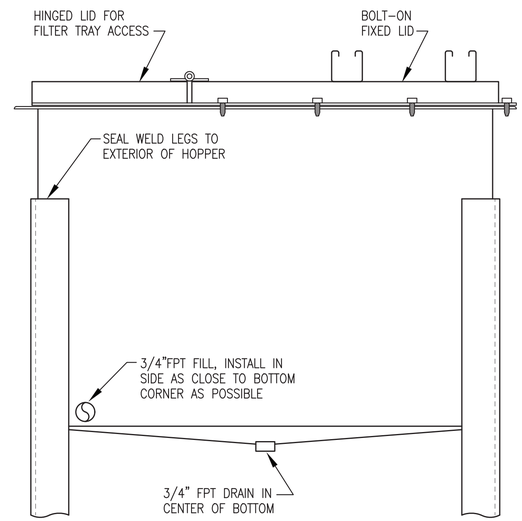
5) PRIOR TO SHIPPING, SEAL ALL FPT OPENINGS WITH PLASTIC OR STEEL PLUGS.



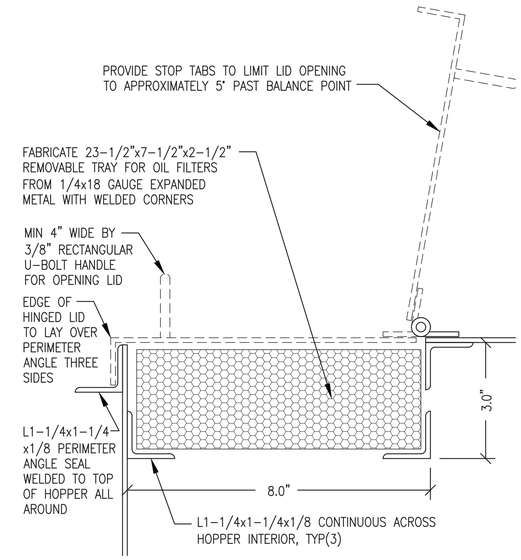
2 M5.7 FIXED LID PERIMETER ATTACHMENT
12"=1'-0"



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 CONSTRUCTION
MAY 2023

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

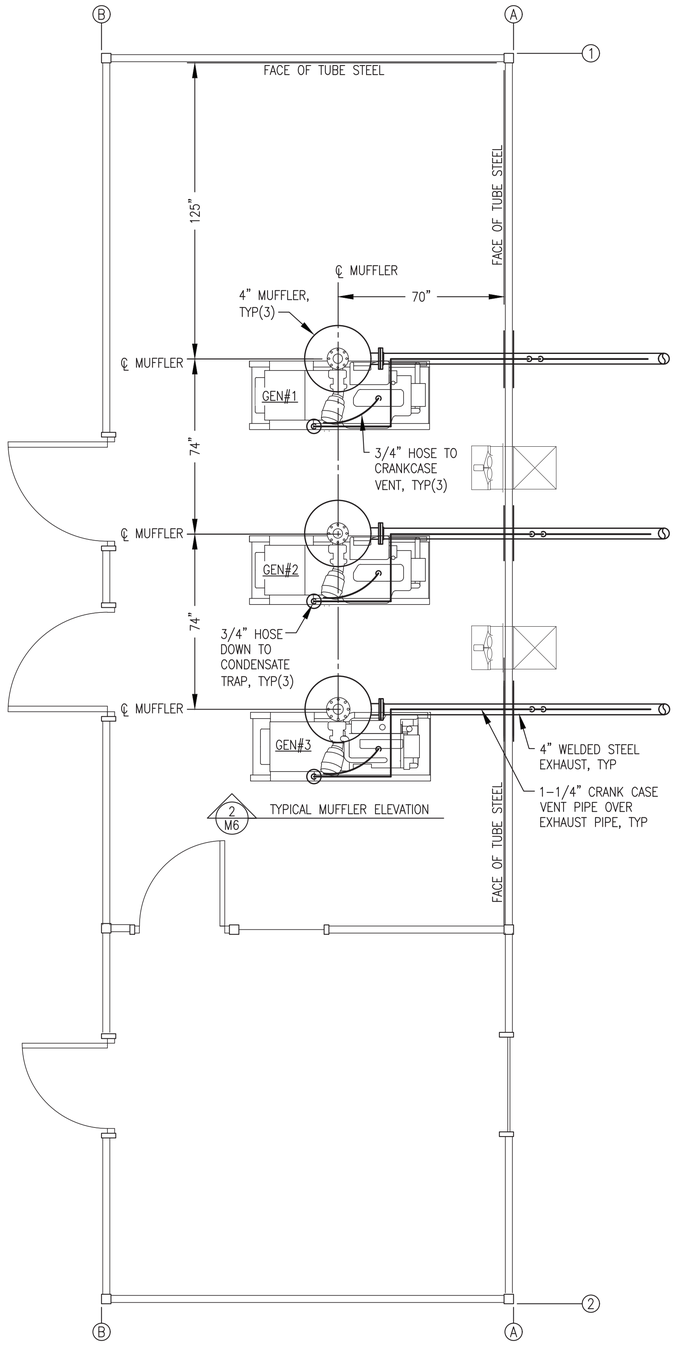
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

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: 5/30/23
FILE NAME: NELS PP M2-M7	SHEET: M5.7
PROJECT NUMBER:	



2 M6 TYPICAL MUFFLER ELEVATION

1 M6 MUFFLER, EXHAUST & CRANK VENT PIPE PLAN
3/8"=1'-0"

EXHAUST & CRANK VENT GENERAL NOTES:

1) THE MAXIMUM EXHAUST TEMPERATURE FOR THE ENGINES IS LESS THAN 1400°F. THE WALLS AND CEILING ARE NON-COMBUSTIBLE CONSTRUCTION CONSISTING OF STEEL WITH HIGH TEMPERATURE ROCKWOOL INSULATION.

2) ALL EXTERIOR EXHAUST PIPE AND FITTINGS (FROM MUFFLER TO RAIN CAP) TYPE 304L STAINLESS STEEL WITH BUTT WELD FITTINGS. INTERIOR EXHAUST PIPE RISER (FROM FLEX TO MUFFLER) CARBON STEEL OR MAY BE STAINLESS AT CONTRACTORS OPTION. ALL FLANGES ANSI 150# FLAT FACED SLIP ON.

3) ALL EXTERIOR CRANK VENT PIPE AND FITTINGS TYPE 304L STAINLESS STEEL WITH BUTT WELD FITTINGS. ALL INTERIOR CRANK VENT PIPE AND FITTINGS CARBON STEEL WITH SOCKET WELD FITTINGS OR MAY BE STAINLESS AT CONTRACTORS OPTION. ALL FLANGES ANSI 150# RAISED FACE SOCKET WELD.

4) ALL EXHAUST FLANGE BOLTS BLACK OR STAINLESS STEEL. COAT WITH HIGH TEMPERATURE ANTI-SIEZE COMPOUND. ALL EXHAUST FLANGE GASKETS HIGH TEMPERATURE FULL FACE.

EXHAUST & CRANK VENT SHOP/ON-SITE NOTES:

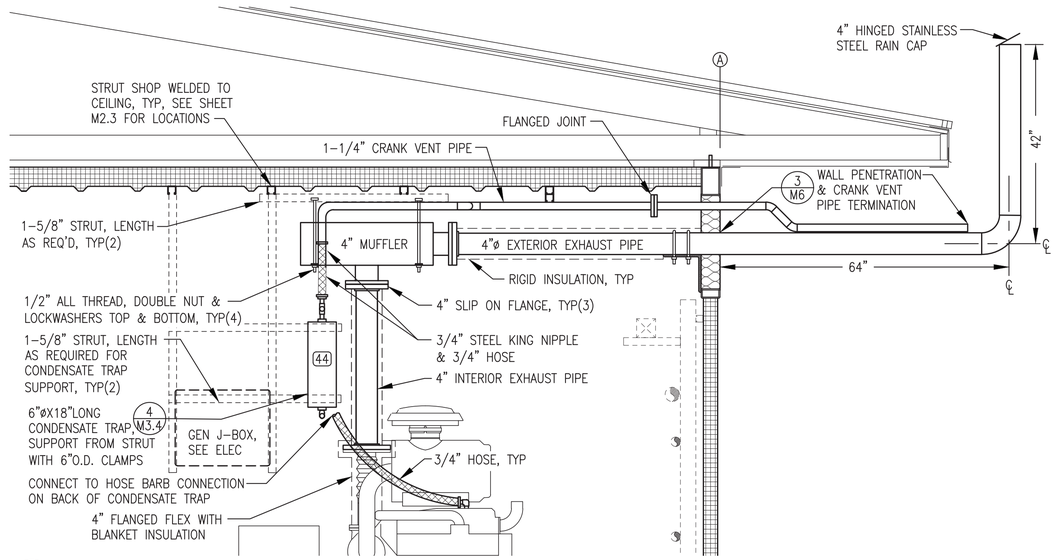
1) SHOP FABRICATE COMPLETE EXHAUST AND CRANK VENT PIPING SYSTEM AS INDICATED.

2) SHOP INSTALL BLANKET INSULATION ON FLEX AND RIGID INSULATION FROM FLEX TO MUFFLER. SHOP FIT INSULATION FROM MUFFLER TO WALL, LABEL FOR THE ASSOCIATED GENERATOR AND STORE INSIDE MODULE.

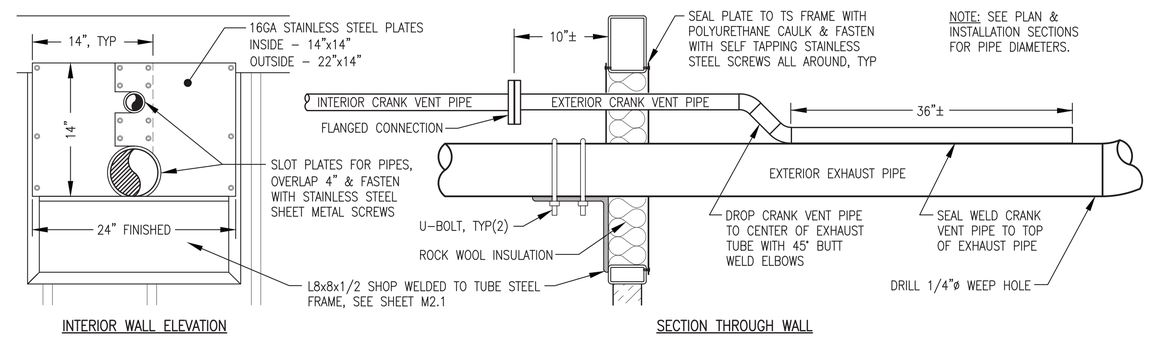
3) SHOP FABRICATE STAINLESS STEEL COVER PLATES BUT DO NOT INSTALL. LABEL COVER PLATES FOR THE ASSOCIATED GENERATOR AND STORE INSIDE MODULE. SHOP FURNISH ROCK WOOL INSULATION AND PACKAGE LOOSE SHIP WITH COVER PLATES.

4) UPON COMPLETION OF TESTING BREAK EXHAUST FLANGE JOINT ON MUFFLER OUTLET AND CRANK VENT FLANGE JOINT AND REMOVE U-BOLTS. REMOVE PIPING FOR SHIPPING AND TEMPORARILY SEAL WALL PENETRATION.

5) IN FIELD REINSTALL PIPING WITH NEW FLANGE GASKETS. RE-INSTALL PIPING INSULATION. INSULATE WALL PENETRATION, INSTALL COVER PLATES, AND SEAL TO WALL.



2 M6 TYPICAL MUFFLER, EXHAUST, CONDENSATE TRAP & CRANK VENT PIPE INSTALLATION
3/4"=1'-0"



NOTE: SEE PLAN & INSTALLATION SECTIONS FOR PIPE DIAMETERS.

3 M6 WALL PENETRATION & CRANK VENT PIPE TERMINATION
NO SCALE

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	ADD DECAL 44 TO CONDENSATE TRAP	8/16/23	BCG

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: EXHAUST & CRANK VENT PLAN & DETAILS

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

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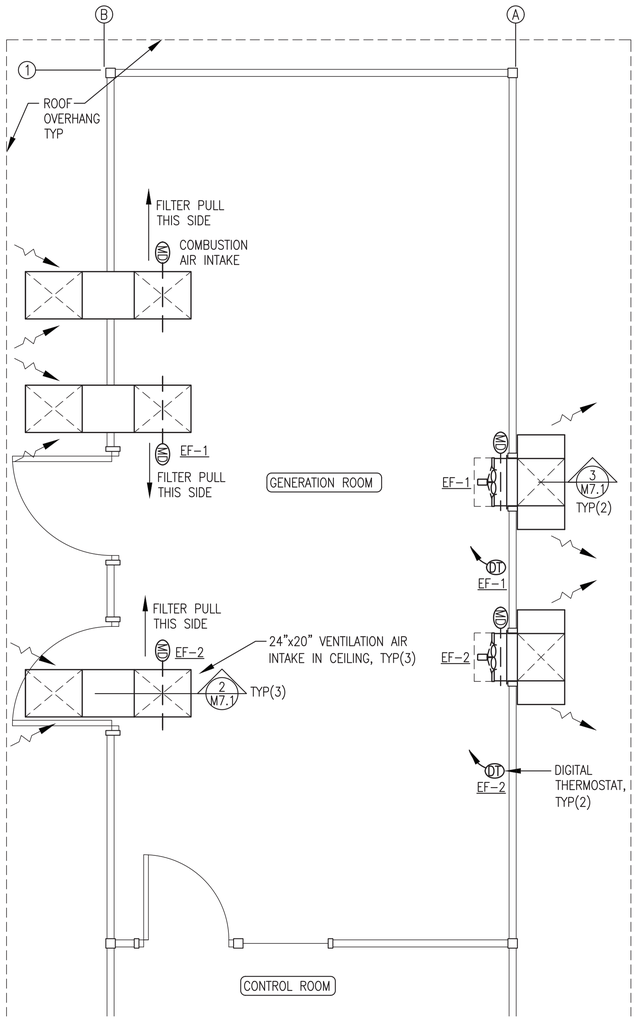
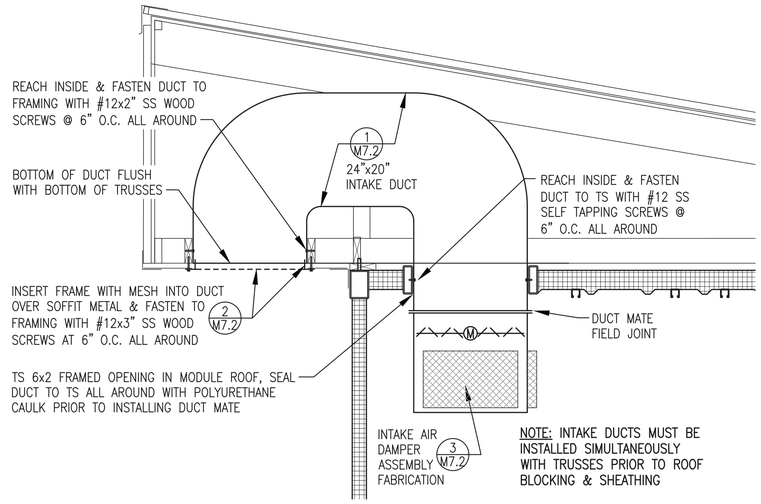
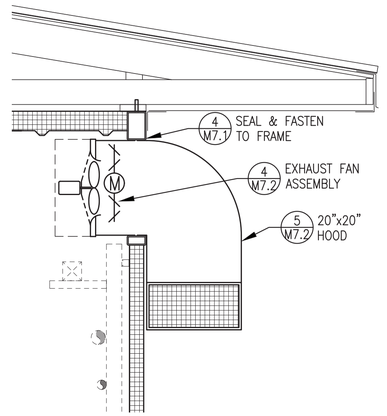


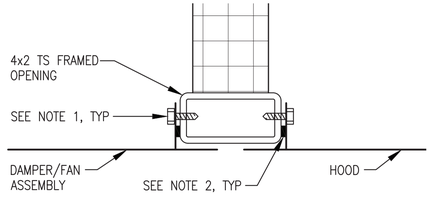
1 M7.1 VENTILATION PLAN
3/8"=1'-0"



2 M7.1 INTAKE DUCT INSTALLATION
3/4"=1'-0"



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



NOTES:

1) FASTEN MOUNTING FLANGE TO TS WITH #12 STAINLESS STEEL SELF TAPPING SCREWS. ON HOODS FASTEN ON TOP AND SIDES ONLY. ON EXHAUST FANS FASTEN ON SIDES ONLY.
2) SEAL MOUNTING FLANGE TO TS WITH CONTINUOUS BEAD OF POLYURETHANE CAULKING ALL AROUND.

4 M7.1 TYPICAL WALL PENETRATION
4"=1'-0"

VENTILATION SYSTEM SHOP/ON-SITE NOTES:

1) FURNISH ENTIRE VENTILATION SYSTEM AS PART OF MODULE SHOP FABRICATION.
2) DURING SHOP FABRICATION INSTALL EXHAUST FAN ASSEMBLIES. TEST FIT EXTERIOR HOODS AND INTAKE DUCTS BUT DO NOT INSTALL.
3) DURING SHOP FABRICATION TEMPORARILY CONNECT INTAKE DAMPERS TO ELECTRICAL ROUGH IN AND TEST TO VERIFY FUNCTION. SEE SHEET E4.2.
4) AS PART OF ON-SITE WORK INSTALL EXHAUST HOODS AND INTAKE DUCTING AS INDICATED.

ISSUED FOR CONSTRUCTION MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: VENTILATION PLAN & DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
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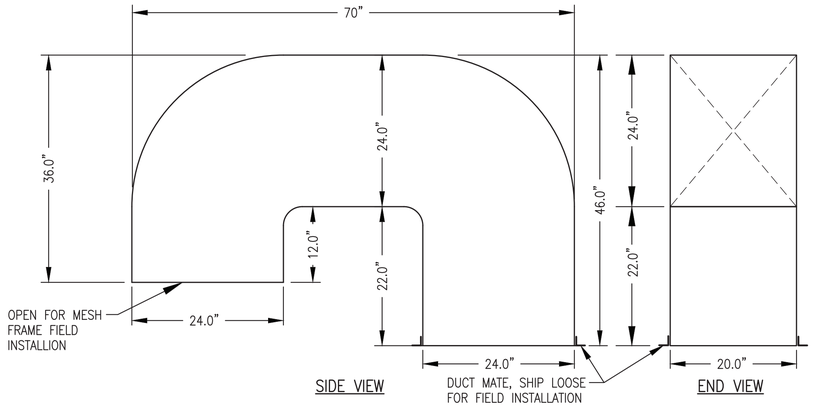
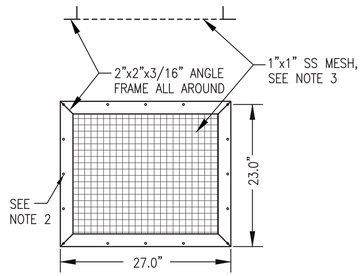


NOTES:

1) FABRICATE 3 IDENTICAL DUCTS FROM MIN 18 GAUGE GALV SHEET METAL WITH SEALED MECHANICAL JOINTS OR AT CONTRACTORS OPTION 0.090" THICK TYPE 5052 ALUMINUM WITH ALL WELDED SEAMS.
2) DUCTS ARE DESIGNED TO FIELD INSTALL BETWEEN TRUSSES. DO NOTE ADD JOINTS.

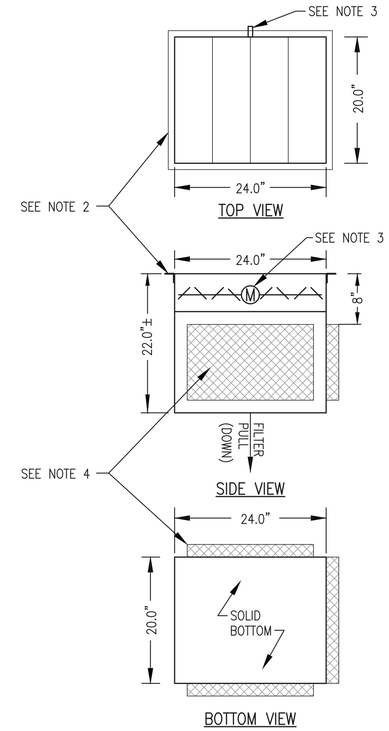
1 M7.2 INTAKE DUCT FABRICATION
1"=1'-0"



NOTES:

1) FABRICATE 3 IDENTICAL AIR INTAKE MESH FRAMES.
2) FABRICATE FRAME FROM 2"x2"x3/16" ALUMINUM ANGLE WITH MITERED AND WELDED CORNERS AND 1/4" HOLES AT 6" O.C. ALL AROUND, 1/2" FROM OUTSIDE EDGE OF FRAME.
3) INSTALL 1"x1" STAINLESS STEEL WIRE MESH IN HEMMED STAINLESS STEEL FRAME AND FASTEN TO ANGLE FRAME WITH STAINLESS STEEL SCREWS ALL AROUND.

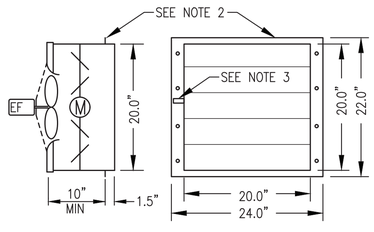
2 M7.2 INTAKE MESH FRAME
1"=1'-0"



NOTES:

1) FABRICATE 4 IDENTICAL VENTILATION INTAKE ASSEMBLIES.
2) SHOP MOUNT DUCTMATE FLANGE.
3) PROVIDE MIN 3" DAMPER ROD EXTENSION ON SIDE INDICATED AND FABRICATE SHEET METAL STAND-OFF BRACKET TO FULLY SUPPORT THE ACTUATOR FROM THE DAMPER FRAME. SEE PLAN VIEW FOR DAMPER ACTUATOR ORIENTATION.
4) INSTALL FRAME FOR REMOVABLE 20"x12"x2" MERV 8 FILTERS. FABRICATE FROM "C" CHANNEL THREE SIDES WITH LATCHING HINGED COVER ON BOTTOM TO ALLOW FILTERS TO SLIDE DOWN FOR REMOVAL. ON 20" SIDE EXTEND FILTER FRAME BEYOND DUCT EACH WAY AS REQUIRED.

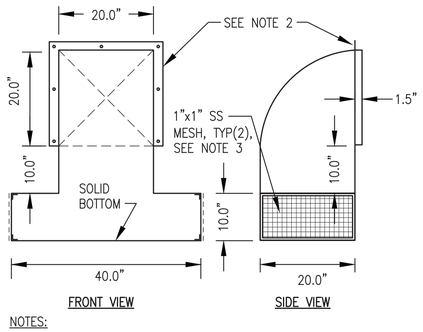
3 M7.2 INTAKE AIR DAMPER FABRICATION
1"=1'-0"



NOTES:

1) FABRICATE 2 IDENTICAL ASSEMBLIES COMPLETE WITH FAN AND DAMPER MOUNTED AND SEALED TO DUCT.
2) PROVIDE 2" WIDE MOUNTING FLANGE ON SIDES WITH 1/4" HOLES AT 5" O.C. PROVIDE 1" MOUNTING FLANGE ON TOP AND BOTTOM WITHOUT HOLES.
3) PROVIDE MIN 3" DAMPER ROD EXTENSION ON THE LEFT SIDE AND FABRICATE SHEET METAL STAND-OFF BRACKET TO FULLY SUPPORT THE ACTUATOR FROM THE DAMPER FRAME.

4 M7.2 EXHAUST FAN ASSEMBLY FABRICATION
1"=1'-0"



NOTES:

1) FABRICATE HOODS FROM 0.090" THICK TYPE 5052 ALUMINUM WITH ALL WELDED SEAMS.
2) PROVIDE 2" WIDE MOUNTING FLANGE ON TOP & SIDES WITH 1/4" HOLES AT 9" O.C.
3) INSTALL 1"x1" STAINLESS STEEL WIRE MESH IN HEMMED STAINLESS STEEL FRAME AND FASTEN TO ANGLE FRAME WITH STAINLESS STEEL SCREWS ALL AROUND, TYP(2).

5 M7.2 EXHAUST HOOD FABRICATION
3/4"=1'-0"

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

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: 5/30/23
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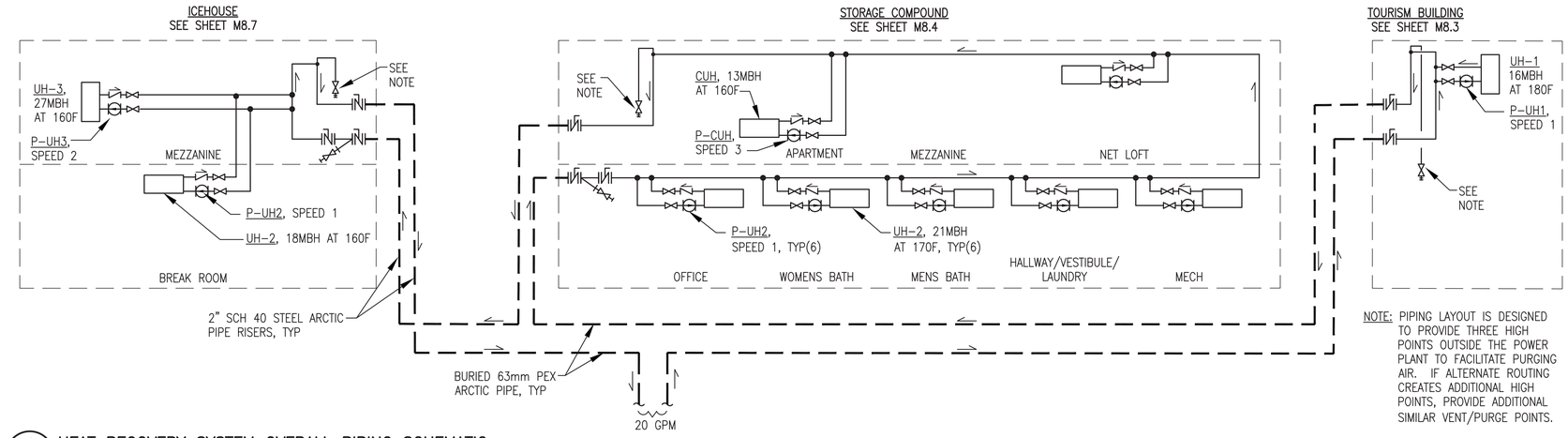
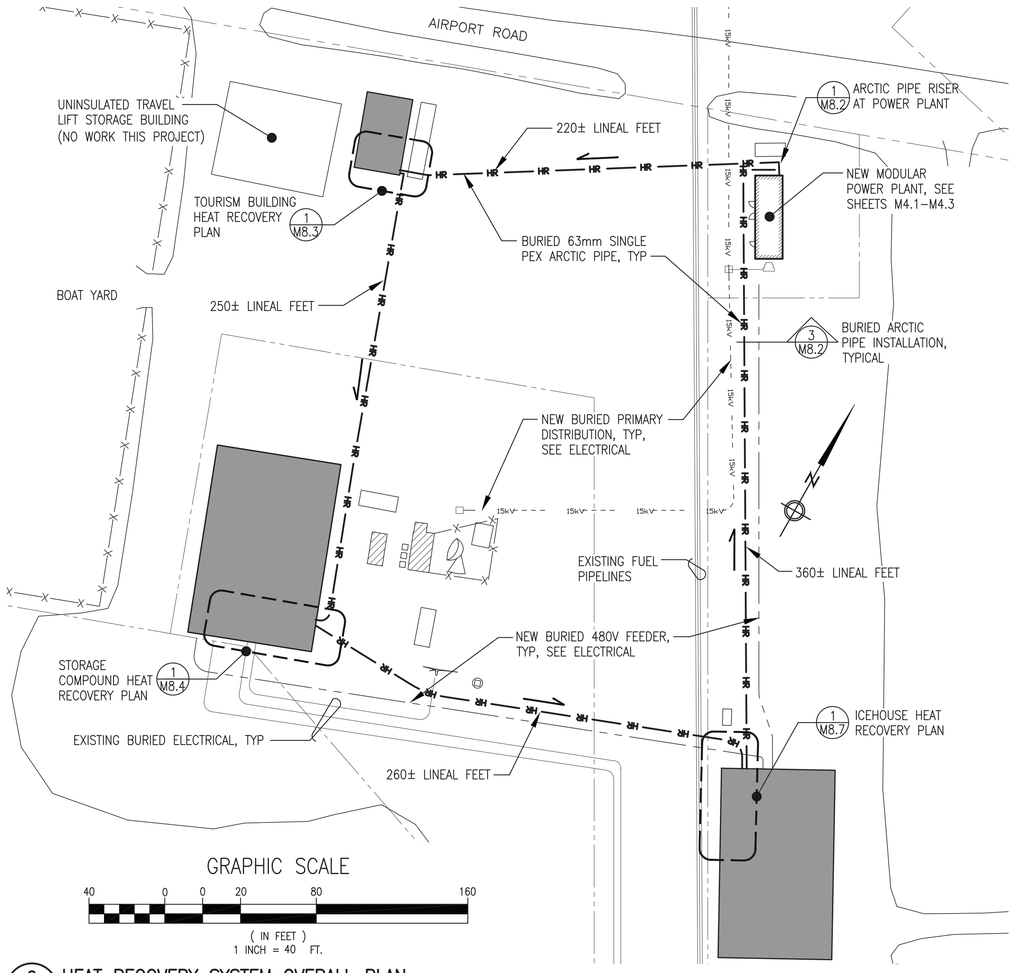
PROJECT NUMBER:	



1 M8.1 HEAT RECOVERY SYSTEM OVERALL PIPING SCHEMATIC
NO SCALE



2 M8.1 HEAT RECOVERY SYSTEM OVERALL PLAN
1"=40'

END USER BUILDING HEAT RECOVERY EQUIPMENT SCHEDULE:

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
CUH	STORAGE COMPOUND APARTMENT SPACE HEAT	HOT WATER CABINET UNIT HEATER, 17 MBH AT 1 GPM 180F EWT & 60F EAT	TOYOTOMI HC-190
UH-1	TOURISM BUILDING SPACE HEAT	HORIZONTAL DISCHARGE HOT WATER UNIT HEATER, 21.7 MBH AT 2.3 GPM, 200F EWT AND 60F EAT, 1/25HP, 120V, 1ø	MODINE HC-33
UH-2	STORAGE COMPOUND & ICEHOUSE OCCUPIED AREAS SPACE HEAT	LOW PROFILE HOT WATER UNIT HEATER, 30.9 MBH AT 2 GPM, 180F EWT AND 60F EAT, 405 CFM, 1/20HP, 120V, 1ø	MODINE "HOT DAWG" HHD30
UH-3	ICEHOUSE MAIN FLOOR AREA HEAT	HORIZONTAL DISCHARGE HOT WATER UNIT HEATER, 45.6 MBH AT 4.7 GPM, 200F EWT AND 60F EAT, 1/12HP, 120V, 1ø	MODINE HC-63
P-CUH	CABINET UNIT HEATER CIRC PUMP	1 GPM AT 18' TDH, 1/25HP, 115V, 1ø. WITH 1/2" SOLDER SHUT-OFF FLANGES	GRUNDFOS UPS 15-58FC SPEED 3
P-UH1	TOURISM BUILDING UNIT HEATER CIRC PUMP	4 GPM AT 6' TDH, 1/25HP, 115V, 1ø. WITH 1/2" SOLDER SHUT-OFF FLANGES	GRUNDFOS UPS 15-58FC SPEED 1
P-UH2	STORAGE COMPOUND & ICEHOUSE OCCUPIED AREAS HEATER CIRC PUMP	2 GPM AT 9' TDH, 1/25HP, 115V, 1ø. WITH 1/2" SOLDER SHUT-OFF FLANGES	GRUNDFOS UPS 15-58FC SPEED 1
P-UH3	ICEHOUSE PROCESSING AREA UNIT HEATER CIRC PUMP	5 GPM AT 10' TDH, 1/25HP, 115V, 1ø. WITH 3/4" SOLDER SHUT-OFF FLANGES	GRUNDFOS UPS 15-58FC SPEED 2

NOTE: UNIT HEATER AND CABINET UNIT HEATER RATINGS ON SCHEDULE ARE BASED ON WATER AT STANDARD TEMPERATURE. RATINGS SHOWN ON SCHEMATIC ARE REDUCED FOR 50% GLYCOL AT REDUCED TEMPERATURE.

ARCTIC PIPE GENERAL NOTES:

1) THE DRAWINGS SHOW APPROXIMATE LOCATION OF SOME EXISTING UNDERGROUND ELECTRIC POWER. PRIOR TO BEGINNING EXCAVATION, LOCATE ALL UNDERGROUND UTILITIES INCLUDING BUT NOT LIMITED TO ELECTRIC POWER, TELECOMMUNICATIONS, WATER, SEWER, AND FUEL.
2) TAKE CARE TO PROTECT EXISTING BUILDING FOUNDATIONS, SLABS, SIDEWALKS, AND OTHER EXISTING FEATURES WHEN EXCAVATING FOR ARCTIC PIPE. BACKFILL WITH EXCAVATION SPOILS OR SANDY GRAVEL, COMPACT, AND BLEND INTO EXISTING GRADE. RESTORE ALL EXCAVATION AREAS TO ORIGINAL CONDITION UPON COMPLETION.
3) ANY UTILITIES DAMAGED DURING EXCAVATION SHALL BE REPAIRED PROMPTLY TO THE SATISFACTION OF THE AUTHORITY AND THE UTILITY AT NO COST TO THE AUTHORITY.
4) WHERE MULTIPLE UTILITIES ARE BURIED IN A COMMON TRENCH, PLAN OUT WORK AND COORDINATE TRADES TO INSTALL ALL BURIED UTILITIES TOGETHER.
5) ALL BURIED ARCTIC PIPE IS 63mm PEX. ALL ARCTIC PIPE RISERS AT BELOW TO ABOVE GRADE TRANSITIONS ARE WELDED 2" SCH 40 STEEL WITH POLYURETHANE INSULATION AND WATERPROOF HDPE CASING. ALL END USER BUILDING INTERIOR PIPING IS COPPER TUBING.
6) LENGTHS OF BURIED RUNS INDICATED THIS PLAN ARE APPROXIMATE, FIELD VERIFY. FURNISH 63mm PEX ARCTIC PIPE IN ADEQUATE LENGTHS TO ALLOW CONTINUOUS RUNS BETWEEN BUILDING RISERS. DO NOT INSTALL SPLICE JOINTS BETWEEN RISERS.

HEAT RECOVERY SYSTEM FILLING, FLUSHING, AND PURGING PROCEDURES:

A. AFTER PRESSURE TESTING ALL PIPING, BLEED AIR RESERVOIR ON THE EXPANSION TANK IN THE MODULE AS REQUIRED TO MAINTAIN 10 PSIG RESIDUAL WITH THE SYSTEM EMPTY.
B. AT END USER BUILDINGS, CLOSE ISOLATION VALVES AT EACH UNIT HEATER AND CABINET UNIT HEATER TO ENSURE NO FLOW THROUGH THE HEATER COILS PRIOR TO FILLING SYSTEM.
C. FILL THE ENTIRE HEAT RECOVERY PIPING SYSTEM WITH PROPYLENE GLYCOL SOLUTION TO 20 PSIG MINIMUM WITH SYSTEM COLD. VENT AIR FROM HIGH POINT VENT IN POWER PLANT AND FROM MANUAL VENT/PURGE VALVES IN EACH END USER BUILDING.
D. CYCLE MAIN HEAT RECOVERY LOOP CIRC PUMP P-HR1B ON AND OFF AND VENT HIGH POINTS UNTIL ALL AIR HAS BEEN PURGED FROM THE MAIN PIPING LOOP. USE HOSES AND BUCKETS TO PURGE AND CAPTURE SALVAGED GLYCOL.
E. ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO MAINTAIN 20 PSIG MINIMUM WITH SYSTEM COLD. WITH DIESEL GENERATOR(S) RUNNING, START THE HEAT RECOVERY SYSTEM PRIMARY AND SECONDARY CIRCULATION PUMPS P-HR1A AND P-HR1B. BRING THE ENTIRE HEAT RECOVERY SYSTEM UP TO NORMAL TEMPERATURE (170°F MINIMUM) AND ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO BRING SYSTEM PRESSURE TO 30 PSIG MINIMUM AT EXPANSION TANK.
F. CIRCULATE HOT GLYCOL IN MAIN LOOP FOR 24 HOURS MINIMUM THEN SHUT MAIN CIRCULATION LOOP PUMP P-HR1B OFF. ISOLATE AND CLEAN PIPING STRAINERS WHICH ARE LOCATED IN THE POWER PLANT, STORAGE COMPOUND, AND ICEHOUSE. AFTER CLEANING STRAINERS OPEN STRAINER ISOLATION VALVES.
G. USE HOSE AND BUCKET TO PURGE AIR AND DEBRIS FROM HIGH POINT BLEEDS IN END USER BUILDINGS THEN GO TO THE MODULE AND ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO BRING SYSTEM PRESSURE TO 30 PSIG MINIMUM AT EXPANSION TANK. START THE MAIN PUMPS P-HR1A AND P-HR1B.
H. GO TO EACH UNIT HEATER (UH-1, UH-2, UH-3) IN THE SYSTEM, SET TO THE PUMP TO THE SPECIFIED SPEED, OPEN THE ISOLATION VALVES, AND TURN UP THE THERMOSTAT TO START THE ASSOCIATED CIRC PUMP.
I. AT THE MEZZANINE APARTMENT CABINET UNIT HEATER (CUH), OPEN THE ISOLATION VALVES AND USING THERMOSTAT CONTROL, CYCLE CABINET UNIT HEATER PUMP ON AND OFF AND VENT BLEED FITTING ON TOP OF CABINET UNIT HEATER.
J. PURGE ANY REMAINING AIR FROM HIGH POINT BLEEDS IN END USER BUILDINGS.
K. WHEN THE ENTIRE SYSTEM COMES UP TO NORMAL TEMPERATURE (170°F MINIMUM) ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO BRING SYSTEM PRESSURE TO 30 PSIG MINIMUM AT EXPANSION TANK.
L. VERIFY PROPER FUNCTION OF ALL INSTRUMENTATION AND CALIBRATE ALL DEVICES. VERIFY POWER PLANT HEAT RECOVERY READINGS ON SWITCHGEAR SCADA SYSTEM.
M. GO THROUGH THE ENTIRE SYSTEM INCLUDING ALL END USER BUILDINGS AND CHECK FOR LEAKS. PERFORM FUNCTIONAL TEST OF EACH UNIT HEATER AND CABINET UNIT HEATER THERMOSTATIC CONTROLS VERIFYING THAT FAN AND PUMP CYCLE ON AND OFF TOGETHER.
N. ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO BRING SYSTEM PRESSURE TO 30 PSIG MINIMUM AT EXPANSION TANK. FILTER SALVAGED GLYCOL WITH 30 MICRON FILTER AND PLACE BACK IN DRUMS. STORE ALL EXCESS PROPYLENE GLYCOL SOLUTION IN THE ORIGINAL DRUMS SEALED FOR LONG-TERM STORAGE. VERIFY THAT DRUMS ARE CLEARLY LABELED "PROPYLENE GLYCOL" WITH YELLOW LETTERING.

ISSUED FOR CONSTRUCTION
MAY 2023

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

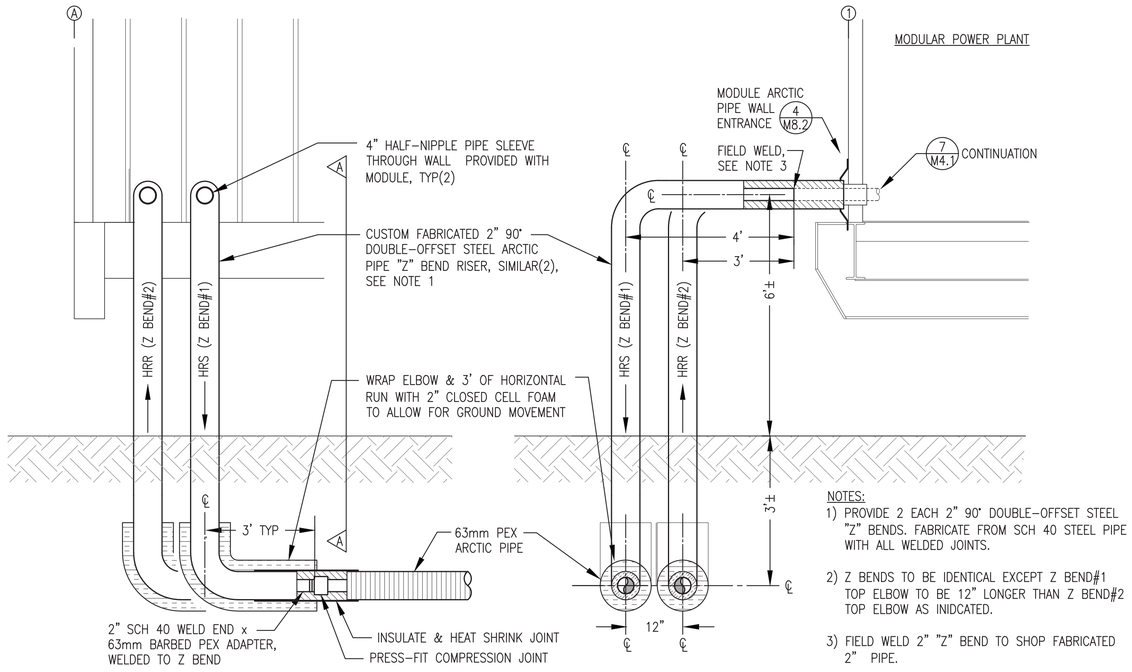
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM OVERALL PLAN, SCHEMATIC, & EQUIPMENT SCHEDULE

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

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M8 | SHEET: M8.1
PROJECT NUMBER:

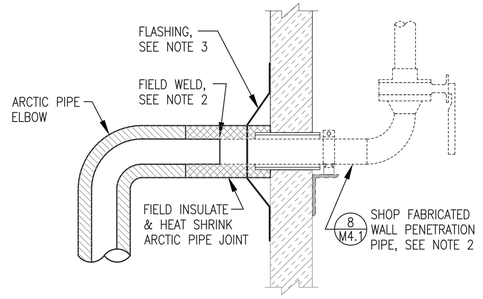


NOTES:

1) PROVIDE 2 EACH 2" 90° DOUBLE-OFFSET STEEL "Z" BENDS. FABRICATE FROM SCH 40 STEEL PIPE WITH ALL WELDED JOINTS.
2) Z BENDS TO BE IDENTICAL EXCEPT Z BEND#1 TOP ELBOW TO BE 12" LONGER THAN Z BEND#2 TOP ELBOW AS INIDCATED.
3) FIELD WELD 2" "Z" BEND TO SHOP FABRICATED 2" PIPE.

1 M8.2 ARCTIC PIPE RISER AT NEW MODULAR POWER PLANT

3/4"=1'-0"



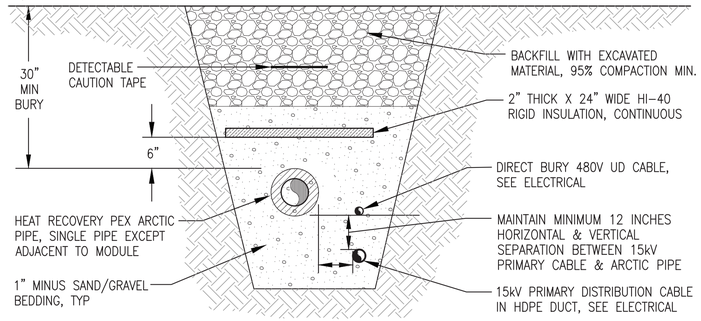
NOTES:

1) ONE ARCTIC PIPE SHOWN. PROVIDE TWO IDENTICAL.
2) FIELD REINSTALL SHOP FABRICATED PIPE SECTION THROUGH WALL AND WELD TO ARCTIC PIPE.
3) INSTALL MULTI-FLASH #5 RETROFIT MF501BA WALL FLASHING OVER ARCTIC PIPE. SEAL TO WALL SURFACE WITH POLYURETHANE CAULKING & FASTEN TO WALL WITH STAINLESS STEEL SHEET METAL SCREWS ALL AROUND.

2 M8.2 ARCTIC PIPE WALL ENTRANCE AT MODULE

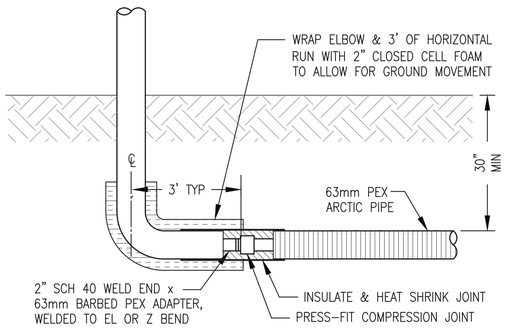
NO SCALE

NOTES:
1) SEE ELECTRICAL FOR LOCATIONS WHERE POWER CABLES ARE BURIED WITH ARCTIC PIPE.
2) COORDINATE TRADES TO INSTALL ALL BURIED UTILITIES TOGETHER.
3) ARCTIC PIPE INSTALLATION WITHOUT POWER SIMILAR.



3 M8.2 TYPICAL BURIED ARCTIC PIPE INSTALLATION WITH ELECTRICAL POWER

NO SCALE



4 M8.2 TYPICAL ARCTIC PIPE RISER AT END USER BUILDING

3/4"=1'-0"

ISSUED FOR CONSTRUCTION
MAY 2023

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

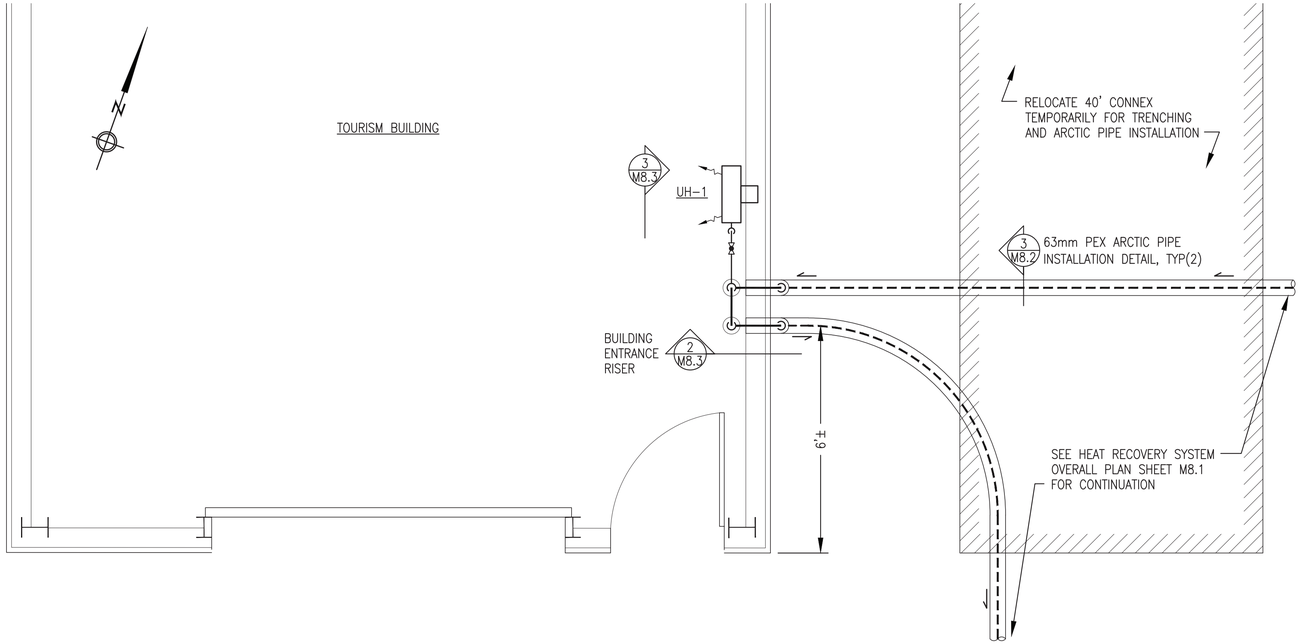
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM ARCTIC PIPE DETAILS

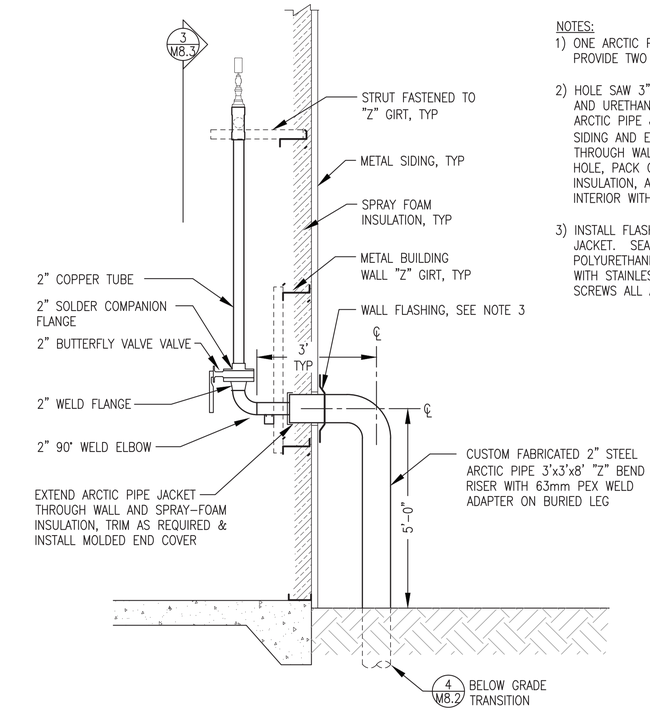
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M8	SHEET: M8.2
PROJECT NUMBER:	



1 M8.3 TOURISM BUILDING HEAT RECOVERY PLAN

1/2"=1'-0"

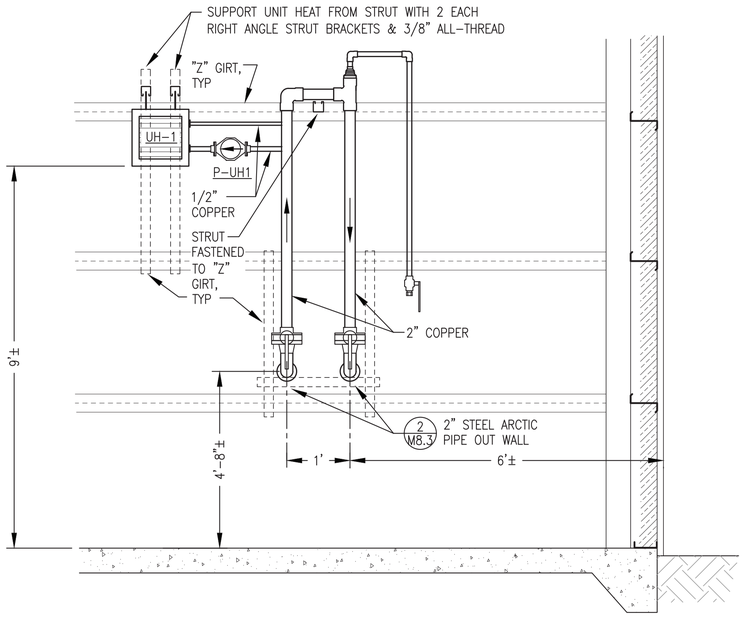


NOTES:

1) ONE ARCTIC PIPE ENTRANCE SHOWN. PROVIDE TWO IDENTICAL.
2) HOLE SAW 3"ø THROUGH WALL SIDING AND URETHANE INSULATION. TRIM ARCTIC PIPE JACKET AT EXTERIOR OF SIDING AND EXTEND 2" STEEL PIPE THROUGH WALL. CENTER PIPE IN HOLE, PACK GAP WITH FIBERGLASS INSULATION, AND SEAL ALL AROUND INTERIOR WITH POLYURETHANE CAULK.
3) INSTALL FLASHING OVER ARCTIC PIPE JACKET. SEAL TO SIDING WITH POLYURETHANE CAULKING AND FASTEN WITH STAINLESS STEEL SHEET METAL SCREWS ALL AROUND.

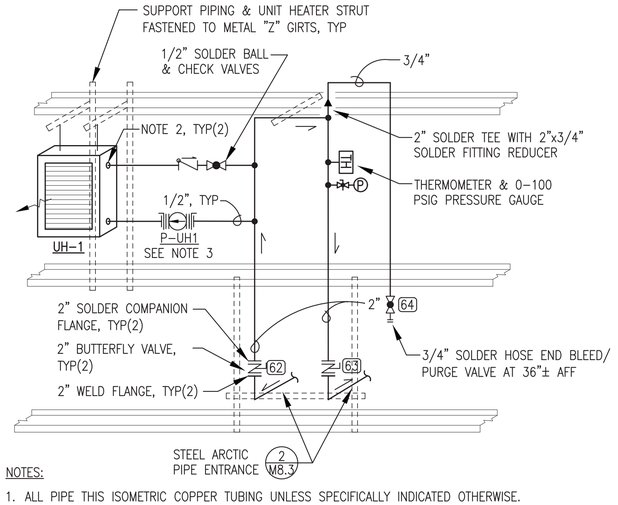
2 M8.3 TOURISM BUILDING ARCTIC PIPE ENTRANCE

NO SCALE



3 M8.3 TOURISM BUILDING ARCTIC PIPE ENTRANCE ELEVATION

NO SCALE



NOTES:

1. ALL PIPE THIS ISOMETRIC COPPER TUBING UNLESS SPECIFICALLY INDICATED OTHERWISE.
2. CONNECT TO UNIT HEATER WITH 3/4"x1/2" BUSHING & 1/2" MPTxC ADAPTER.
3. PUMP P-UH1 WITH 1/2" SOLDER SHUT OFF FLANGES. SET TO SPEED 1.

4 M8.3 TOURISM BUILDING HEAT RECOVERY PIPING ISOMETRIC

NO SCALE

GENERAL NOTES:

1. ALL PLANS AND ELEVATIONS THIS SHEET FOR GENERAL PIPING LAYOUT AND ARRANGEMENT ONLY. NOT ALL PIPE, FITTINGS, AND ACCESSORIES SHOWN FOR CLARITY, SEE PIPING ISOMETRIC THIS SHEET FOR ADDITIONAL DETAIL.
2. ALL PIPING INSIDE BUILDING TYPE L COPPER TUBING, 2" MAINS, 1/2" BRANCH.
3. INSULATE ALL 2" MAIN PIPING WITH FIBERGLASS INSULATION WITH PVC JACKET. ALL BRANCH PIPING NOT INSULATED.

ISSUED FOR CONSTRUCTION MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM TOURISM BUILDING PLAN & DETAILS

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

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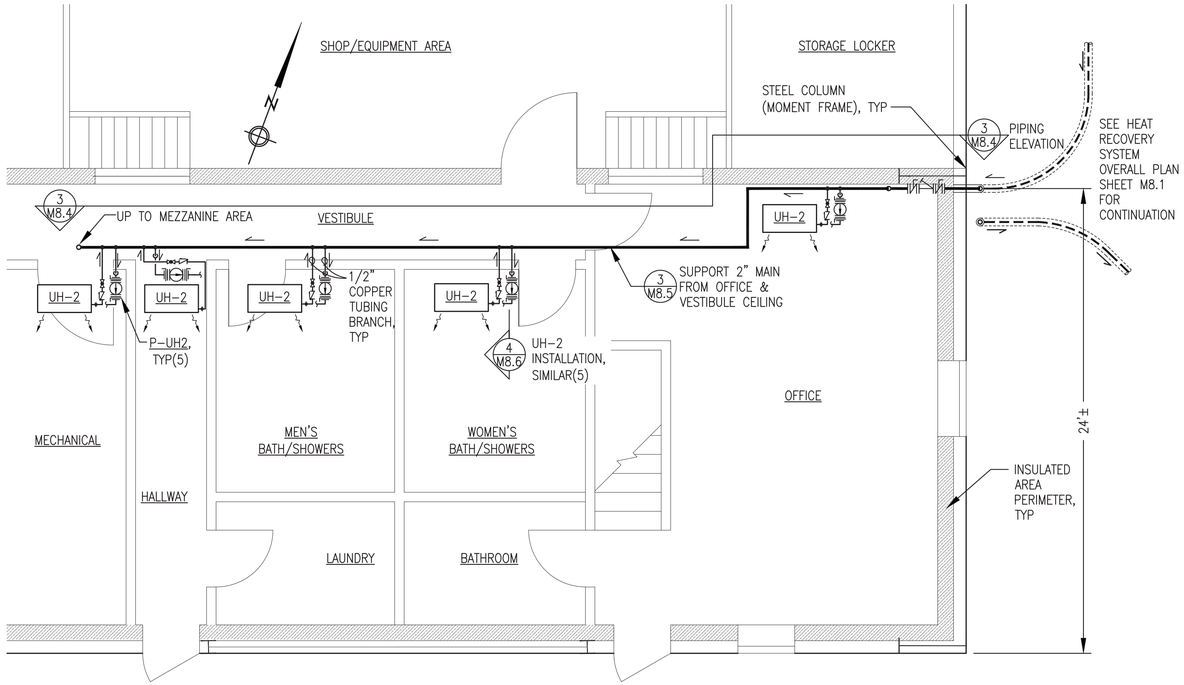
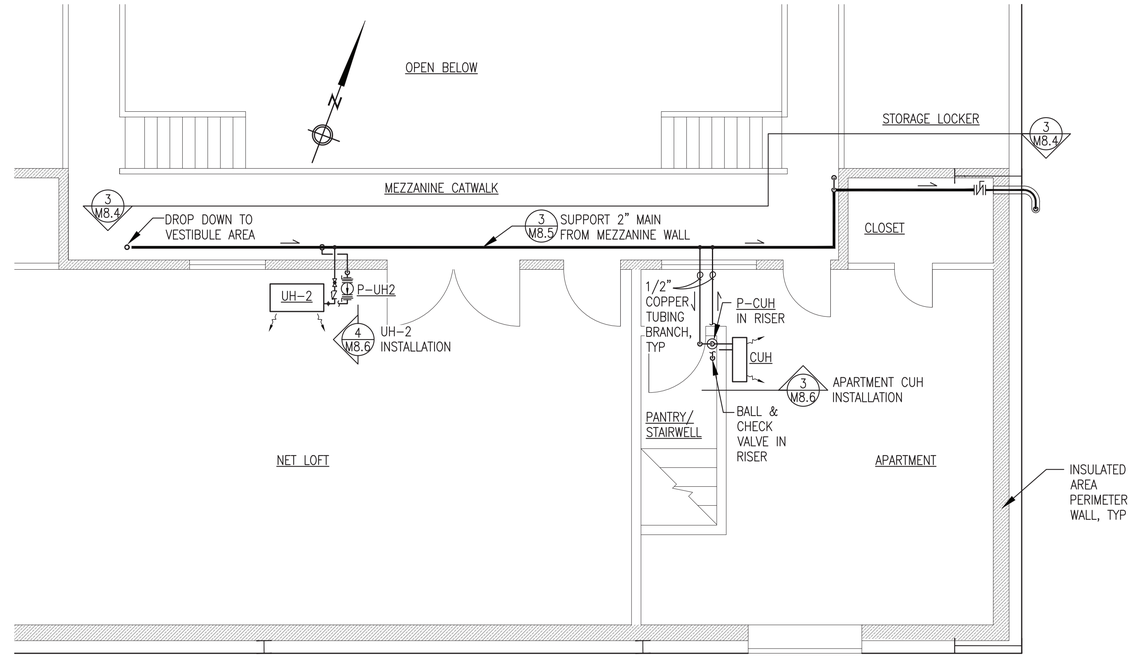
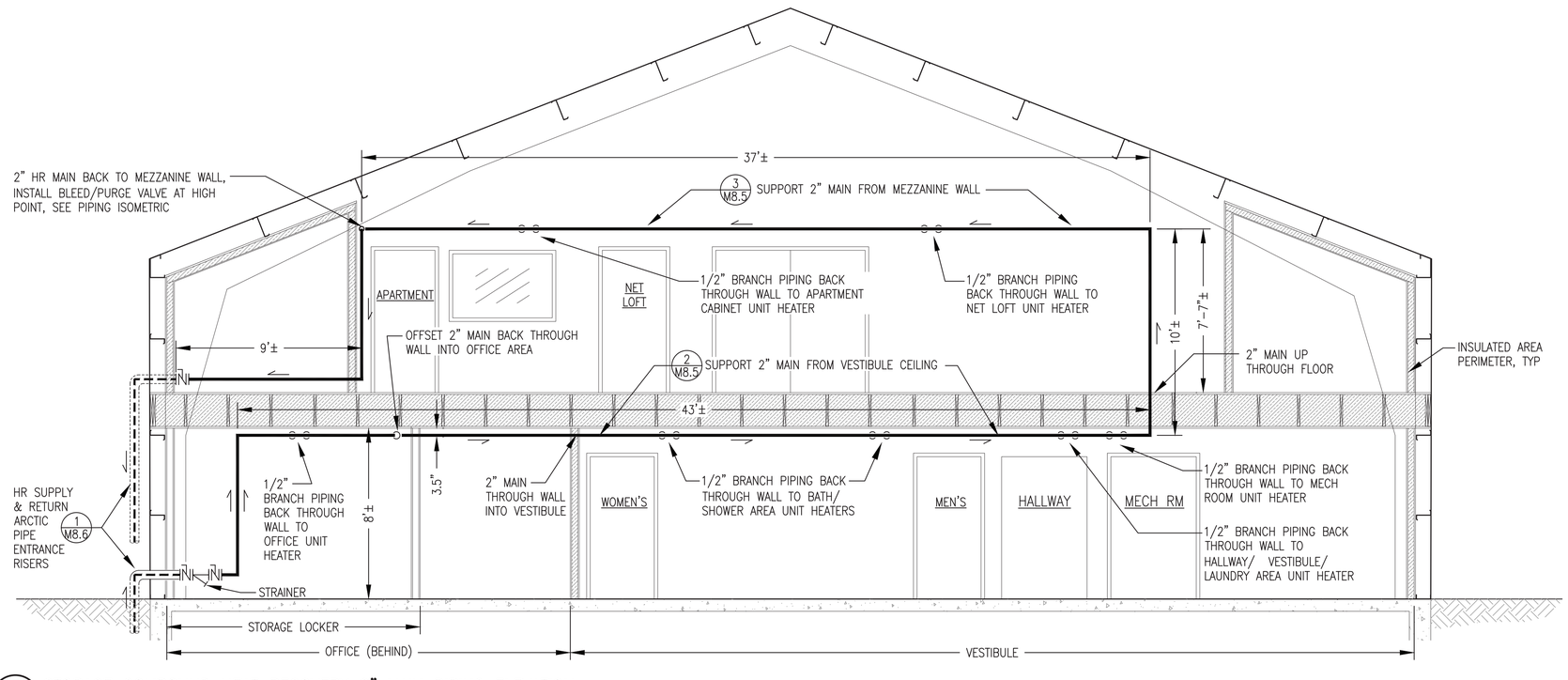
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M8 | SHEET: M8.3
PROJECT NUMBER:



1 M8.4 STORAGE COMPOUND FIRST FLOOR LEVEL HEAT RECOVERY PLAN
1/4"=1'-0"



2 M8.4 STORAGE COMPOUND MEZZANINE LEVEL HEAT RECOVERY PLAN
1/4"=1'-0"



3 M8.4 STORAGE COMPOUND HEAT RECOVERY 2" MAIN PIPING ELEVATION
NO SCALE

GENERAL NOTES:

1. ALL PLANS AND ELEVATIONS THIS SHEET FOR GENERAL PIPING LAYOUT AND ARRANGEMENT ONLY. NOT ALL PIPE, FITTINGS, AND ACCESSORIES SHOWN FOR CLARITY, SEE PIPING ISOMETRIC SHEET M8.5 FOR ADDITIONAL DETAIL.
2. ALL PIPING INSIDE BUILDING TYPE L COPPER TUBING, 2" MAINS, 1/2" BRANCH.
3. INSULATE ALL 2" MAIN PIPING WITH FIBERGLASS INSULATION WITH PVC JACKET. ALL BRANCH PIPING NOT INSULATED..
4. WHERE 2" MAINS PENETRATE A WALL, SEAL INSULATION JACKET TO WALL ALL AROUND WITH POLYURETHANE CAULK.
5. WHERE 1/2" BRANCH PIPING PENETRATES A WALL, PROVIDE ESCUTCHEON PLATES ON BOTH SIDES.

ISSUED FOR CONSTRUCTION MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM
STORAGE COMPOUND PLANS & PIPING ELEVATION

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

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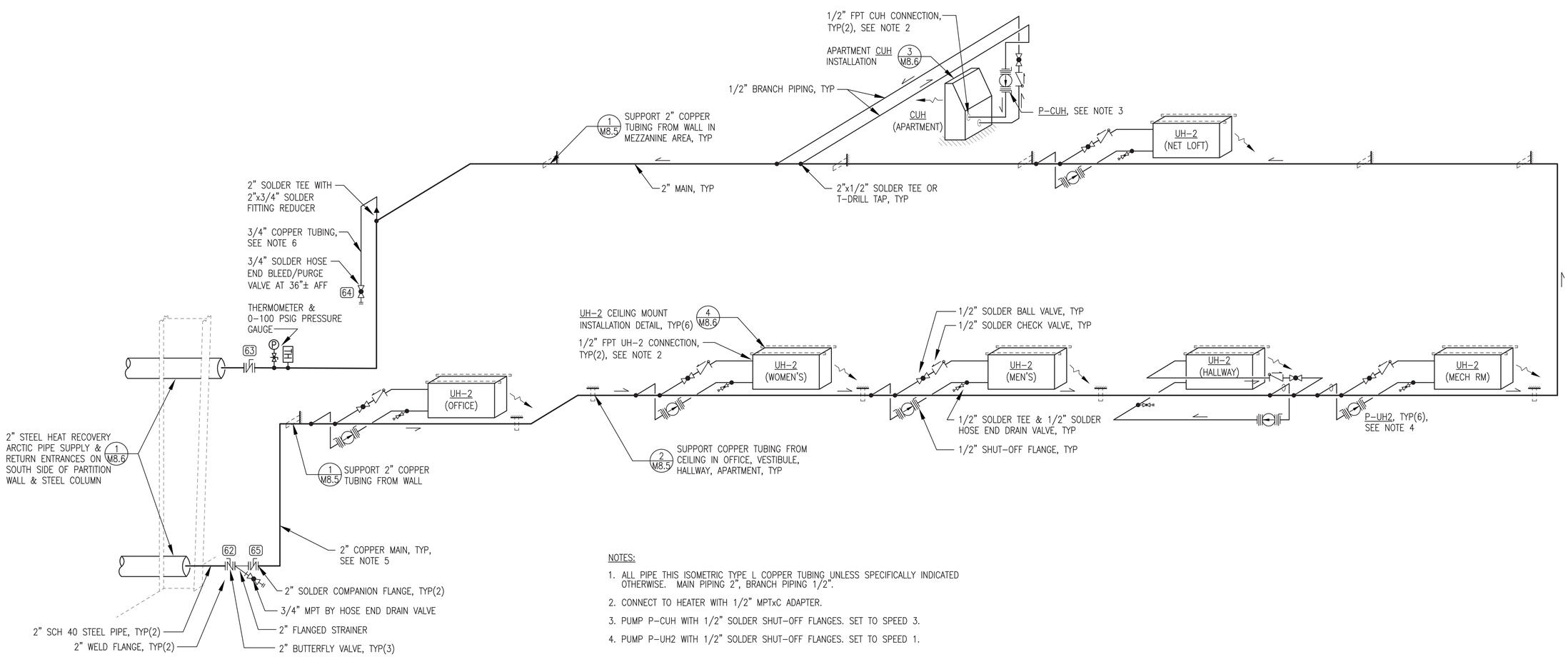
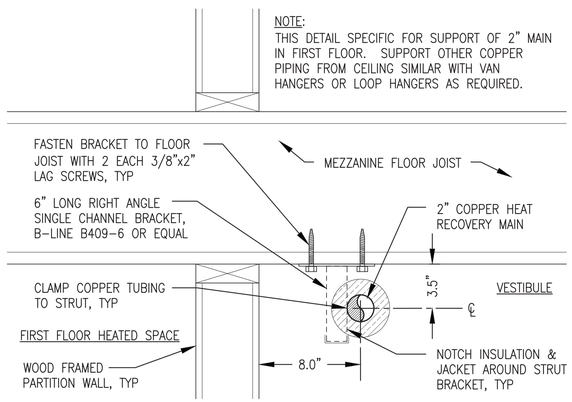
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELS PP M8	SHEET: M8.4
PROJECT NUMBER:	



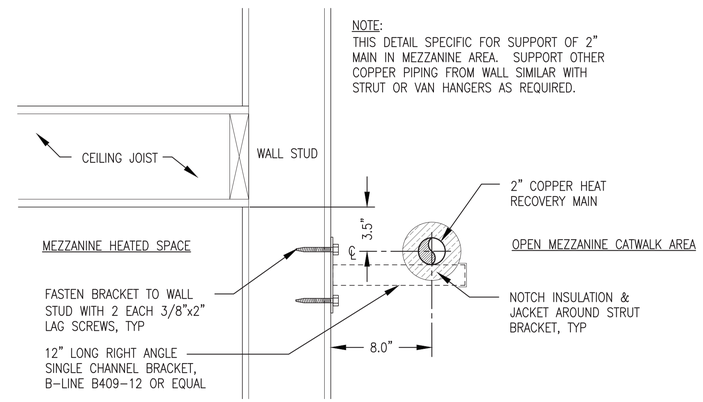
NOTES:

1. ALL PIPE THIS ISOMETRIC TYPE L COPPER TUBING UNLESS SPECIFICALLY INDICATED OTHERWISE. MAIN PIPING 2", BRANCH PIPING 1/2".
2. CONNECT TO HEATER WITH 1/2" MPTxC ADAPTER.
3. PUMP P-CUH WITH 1/2" SOLDER SHUT-OFF FLANGES. SET TO SPEED 3.
4. PUMP P-UH2 WITH 1/2" SOLDER SHUT-OFF FLANGES. SET TO SPEED 1.

1 M8.5 STORAGE COMPOUND HEAT RECOVERY PIPING ISOMETRIC
NO SCALE



2 M8.5 TYPICAL PIPE SUPPORT FROM VESTIBULE CEILING
NO SCALE



3 M8.5 TYPICAL PIPE SUPPORT FROM MEZZANINE WALL
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM
STORAGE COMPOUND PIPING ISOMETRIC & DETAILS

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

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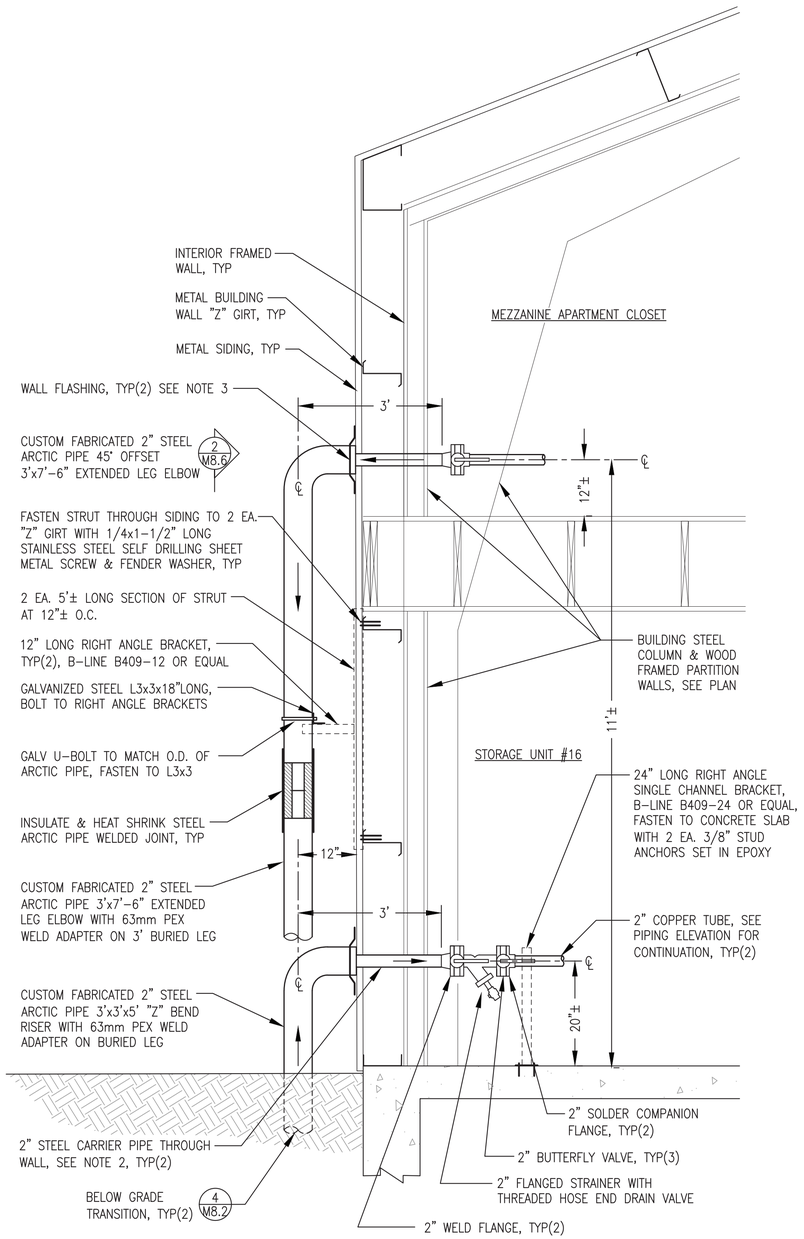
DESIGNED BY: BCG | DATE: 5/30/23
FILE NAME: NELS PP M8 | SHEET: M8.5
PROJECT NUMBER:



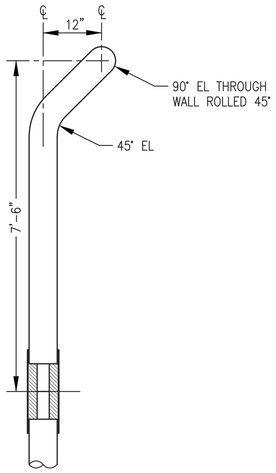
NOTES:

1) HEAT RECOVERY ARCTIC PIPE SUPPLY AND RETURN ENTRANCES ON OPPOSITE SIDES OF PARTITION WALL AND MOMENT FRAME (STEEL COLUMN), SEE PLAN M8.4.

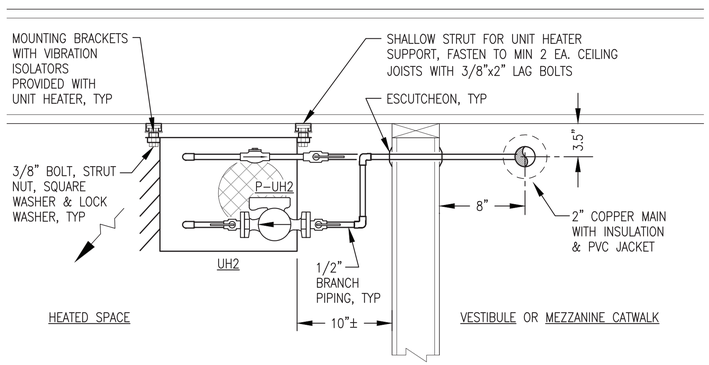
2) HOLE SAW 3"ø THROUGH SIDING AND INTERIOR PARTITION WALL. TRIM ARCTIC PIPE JACKET AT EXTERIOR WALL SIDING EXTEND 2" STEEL PIPE THROUGH WALL. CENTER PIPE IN HOLE AND SEAL ALL AROUND INTERIOR WITH POLYURETHANE CAULK.

3) INSTALL FLASHING OVER ARCTIC PIPE JACKET. SEAL TO SIDING WITH POLYURETHANE CAULKING AND FASTEN WITH STAINLESS STEEL SHEET METAL SCREWS ALL AROUND.

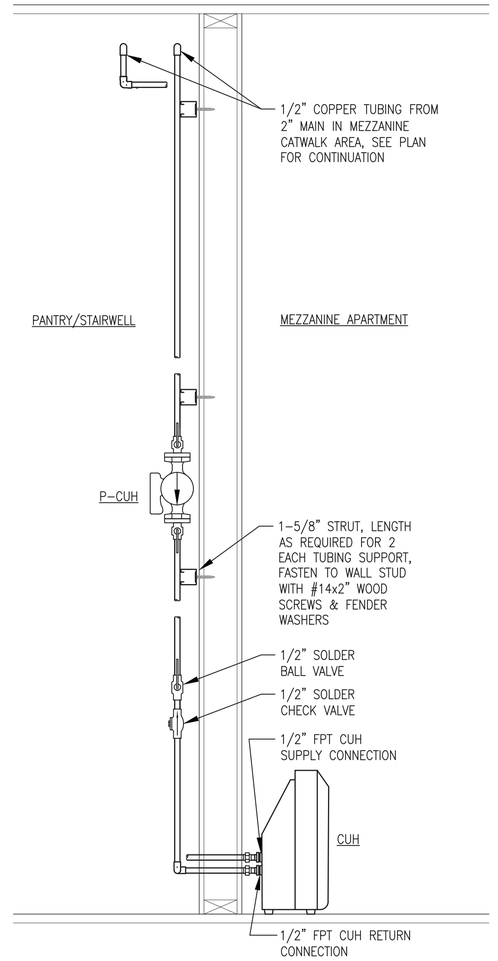
1 M8.6 STORAGE COMPOUND HEAT RECOVERY ARCTIC PIPE ENTRANCE
NO SCALE



2 M8.6 ARCTIC PIPE 45° OFFSET EXTENDED LEG ELBOW
NO SCALE



4 M8.6 TYPICAL UNIT HEATER UH-2 CEILING MOUNT INSTALLATION
1-1/2"=1'-0"



3 M8.6 APARTMENT CABINET UNIT HEATER INSTALLATION
1-1/2"=1'-0"

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM STORAGE COMPOUND PIPING DETAILS

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

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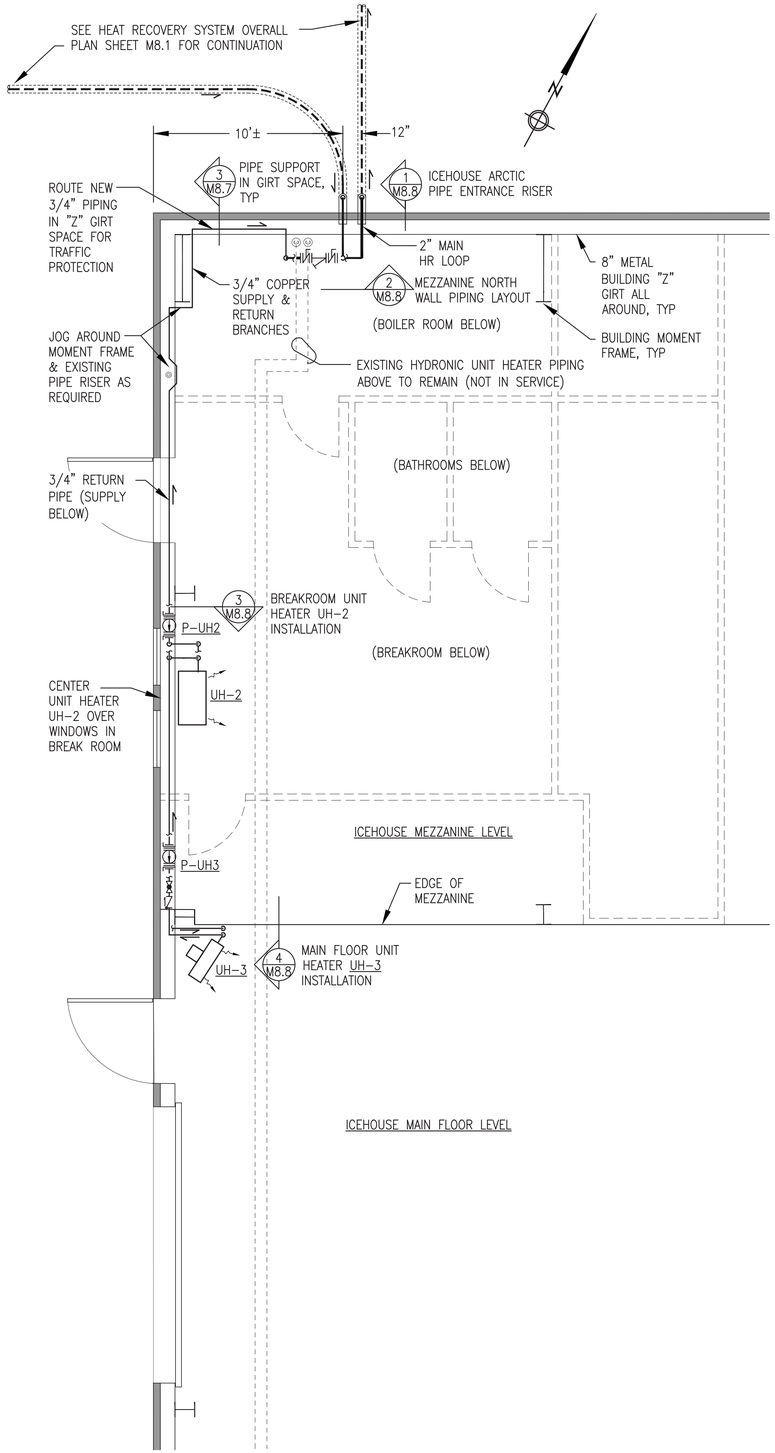
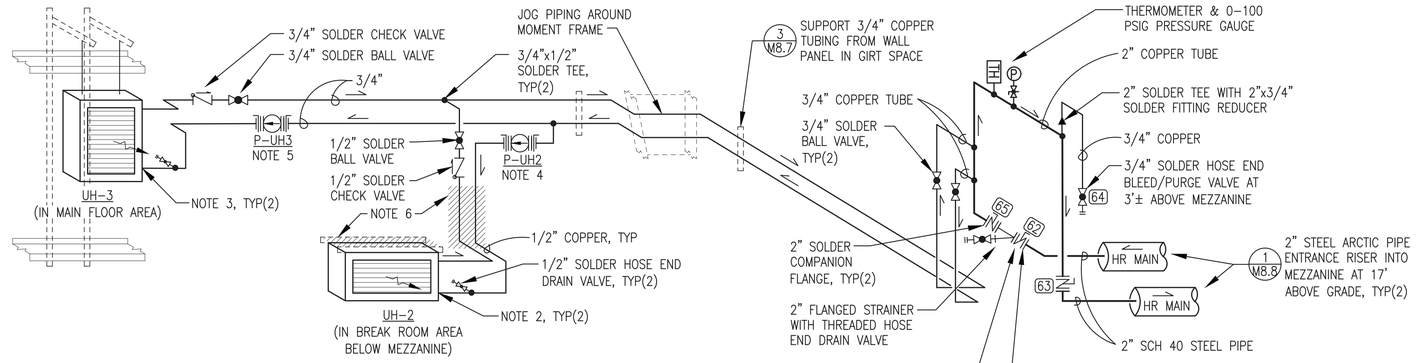
FILE NAME: NELS PP M8	SHEET: M8.6
PROJECT NUMBER:	



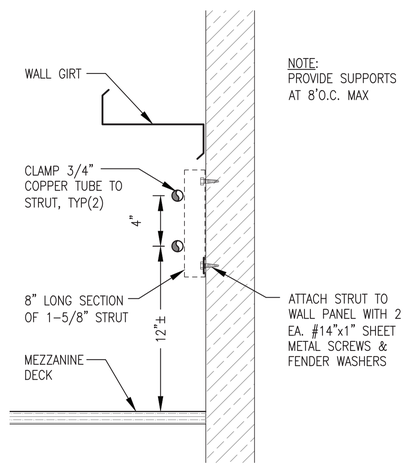
1/M8.7 ICEHOUSE HEAT RECOVERY PLAN
1/4"=1'-0"



NOTES:

1. ALL PIPE THIS ISOMETRIC COPPER TUBING UNLESS SPECIFICALLY INDICATED OTHERWISE
2. CONNECT TO UNIT HEATER UH-2 WITH 1/2" MPTxC ADAPTER.
3. CONNECT TO UNIT HEATER UH-3 WITH 3/4" MPTxC ADAPTER.
4. PUMP P-UH2 WITH 1/2" SOLDER SHUT-OFF FLANGES. SET TO SPEED 1.
5. PUMP P-UH3 WITH 3/4" SOLDER SHUT-OFF FLANGES. SET TO SPEED 2.
6. ROUTE 1/2" COPPER TUBE DOWN THROUGH MEZZANINE FLOOR IN GIRT SPACE BEHIND BREAK ROOM WALL AND FASTEN UH-2 TO BREAK ROOM CEILING STRUCTURE WITH SHALLOW STRUT. SEE DETAIL 3/M8.8.

2/M8.7 ICEHOUSE MEZZANINE HEAT RECOVERY PIPING ISOMETRIC
NO SCALE



3/M8.7 3/4" COPPER TUBING SUPPORT IN GIRT SPACE
NO SCALE

GENERAL NOTES:

1. ALL PLANS AND ELEVATIONS THIS SHEET FOR GENERAL PIPING LAYOUT AND ARRANGEMENT ONLY. NOT ALL PIPE, FITTINGS, AND ACCESSORIES SHOWN FOR CLARITY, SEE PIPING ISOMETRIC THIS SHEET FOR ADDITIONAL DETAIL.
2. ALL PIPING INSIDE BUILDING TYPE L COPPER TUBING, 2" MAINS, BRANCHES 1/2" AND 3/4" AS INDICATED.
3. INSULATE ALL 2" MAIN PIPING WITH FIBERGLASS INSULATION WITH PVC JACKET. ALL BRANCH PIPING NOT INSULATED.

ISSUED FOR CONSTRUCTION MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM ICEHOUSE PLAN, PIPING ISOMETRIC, & DETAILS

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

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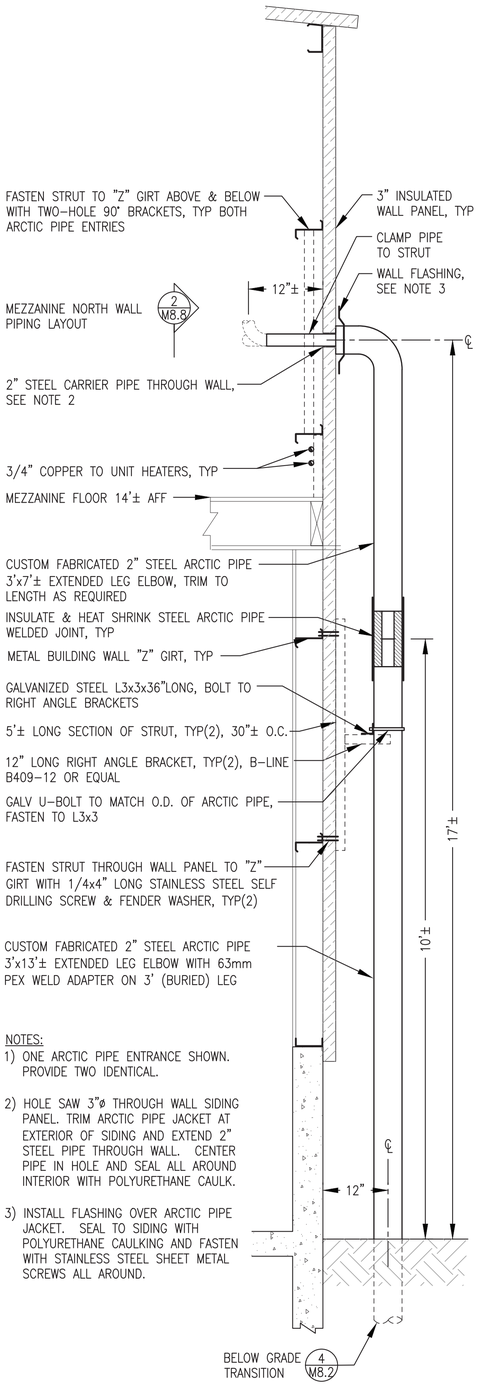
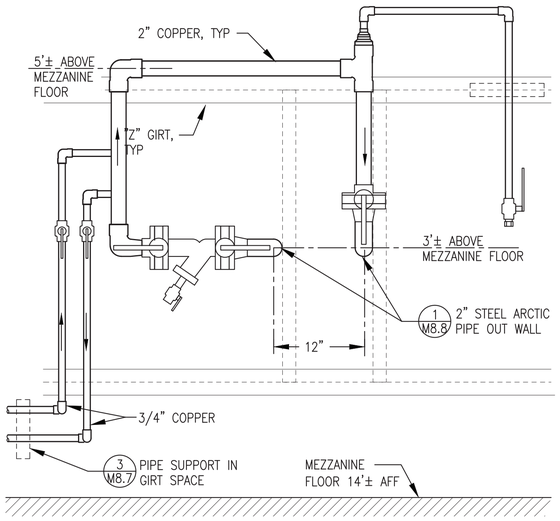
FILE NAME: NELS PP M8	SHEET: M8.7
PROJECT NUMBER:	

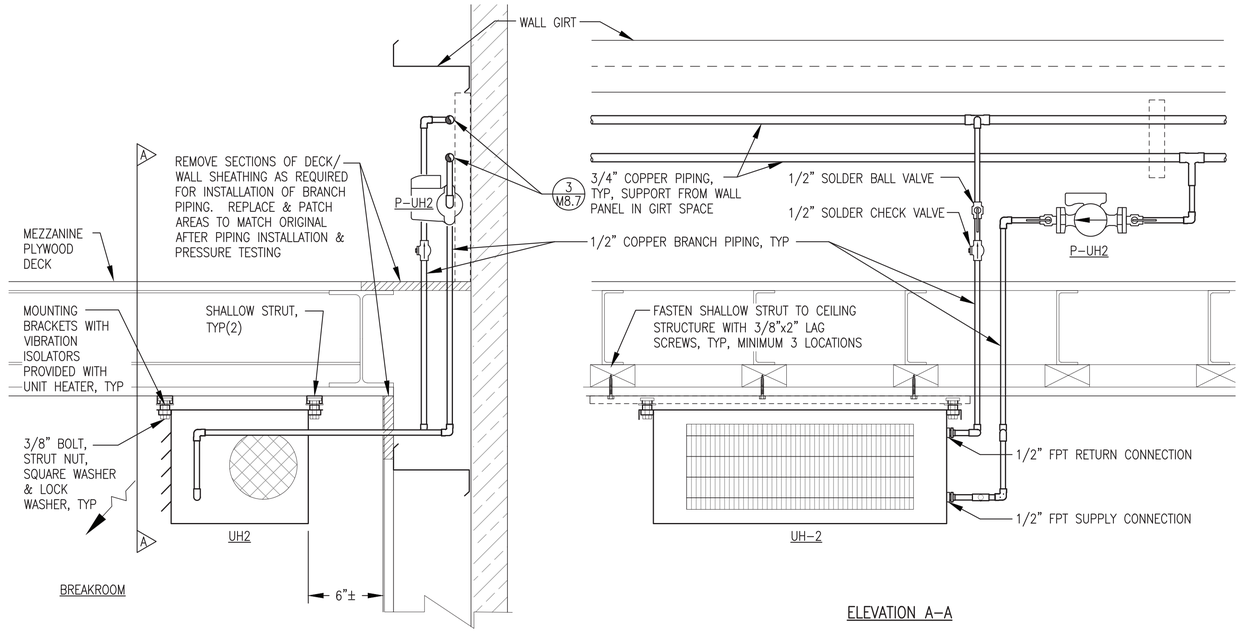


NOTES:
1) ONE ARCTIC PIPE ENTRANCE SHOWN. PROVIDE TWO IDENTICAL.
2) HOLE SAW 3"ø THROUGH WALL SIDING PANEL. TRIM ARCTIC PIPE JACKET AT EXTERIOR OF SIDING AND EXTEND 2" STEEL PIPE THROUGH WALL. CENTER PIPE IN HOLE AND SEAL ALL AROUND INTERIOR WITH POLYURETHANE CAULK.
3) INSTALL FLASHING OVER ARCTIC PIPE JACKET. SEAL TO SIDING WITH POLYURETHANE CAULKING AND FASTEN WITH STAINLESS STEEL SHEET METAL SCREWS ALL AROUND.

1 M8.8 ICEHOUSE ARCTIC PIPE ENTRANCE RISER
NO SCALE

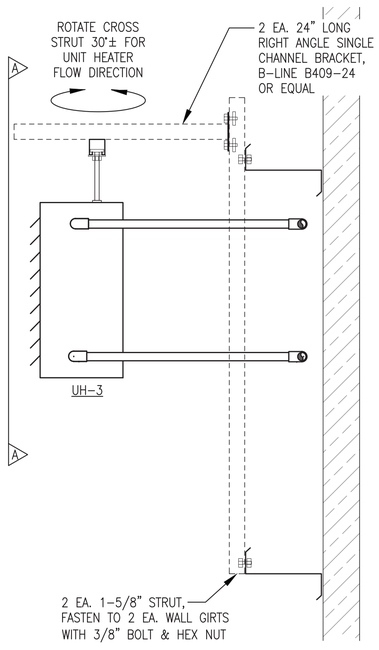


2 M8.8 MEZZANINE NORTH WALL PIPING LAYOUT
NO SCALE

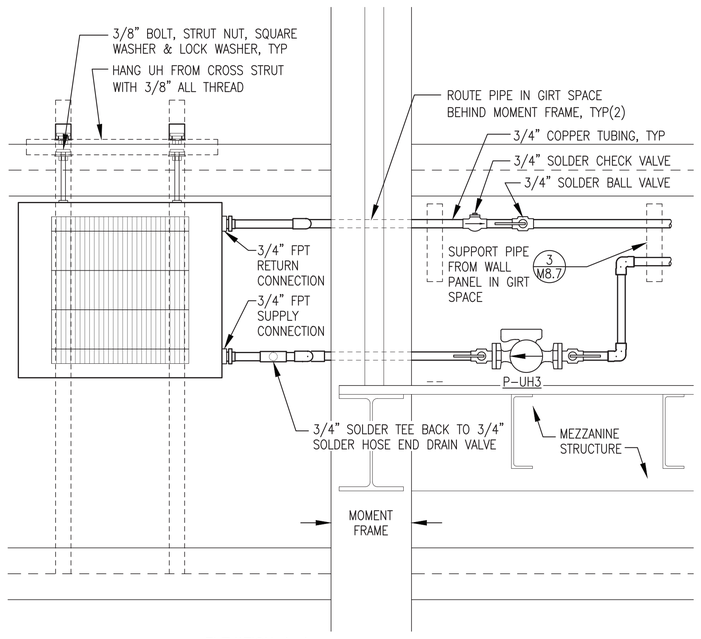


ELEVATION A-A

3 M8.8 BREAKROOOM UNIT HEATER UH-2 INSTALLATION
1-1/2"=1'-0"



4 M8.8 UNIT HEATER UH-3 INSTALLATION
1-1/2"=1'-0"



ELEVATION A-A

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: HEAT RECOVERY SYSTEM ICEHOUSE PIPING DETAILS

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

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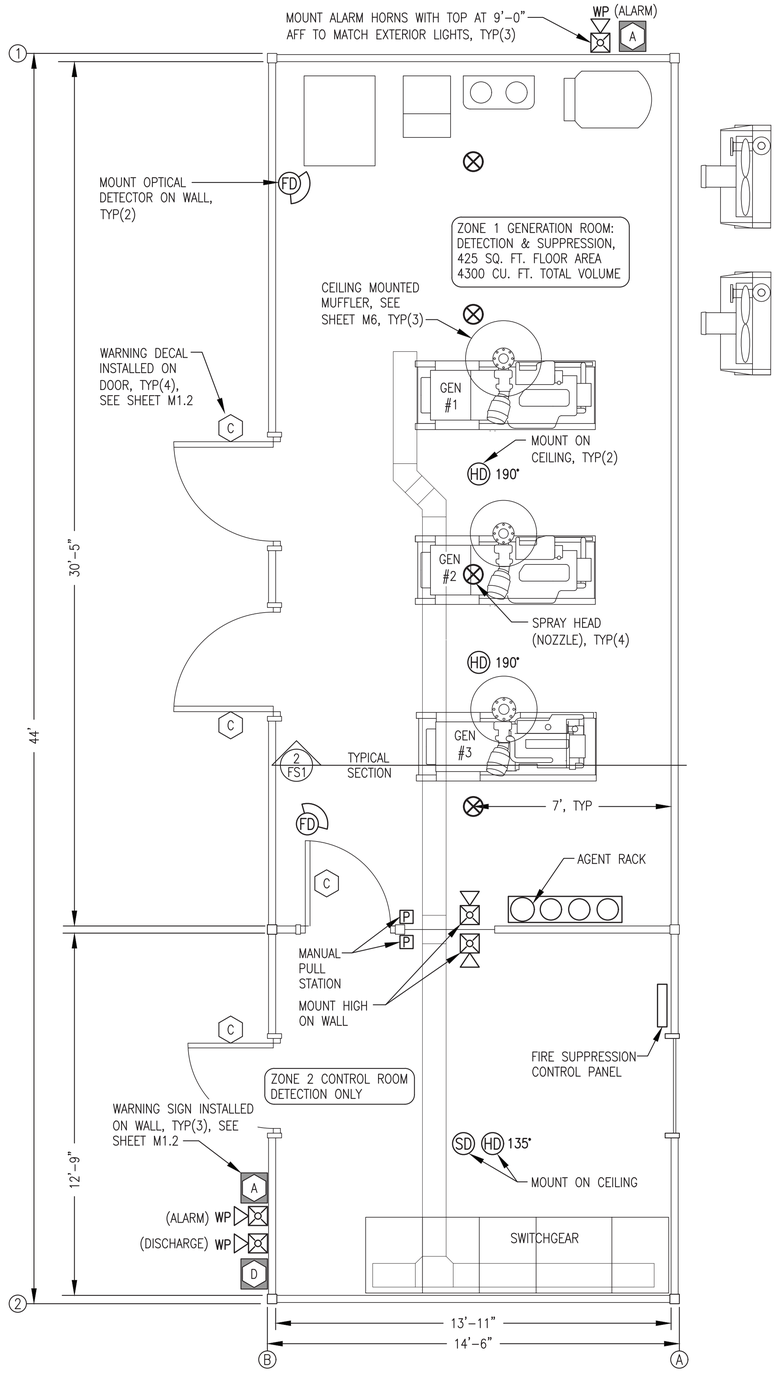
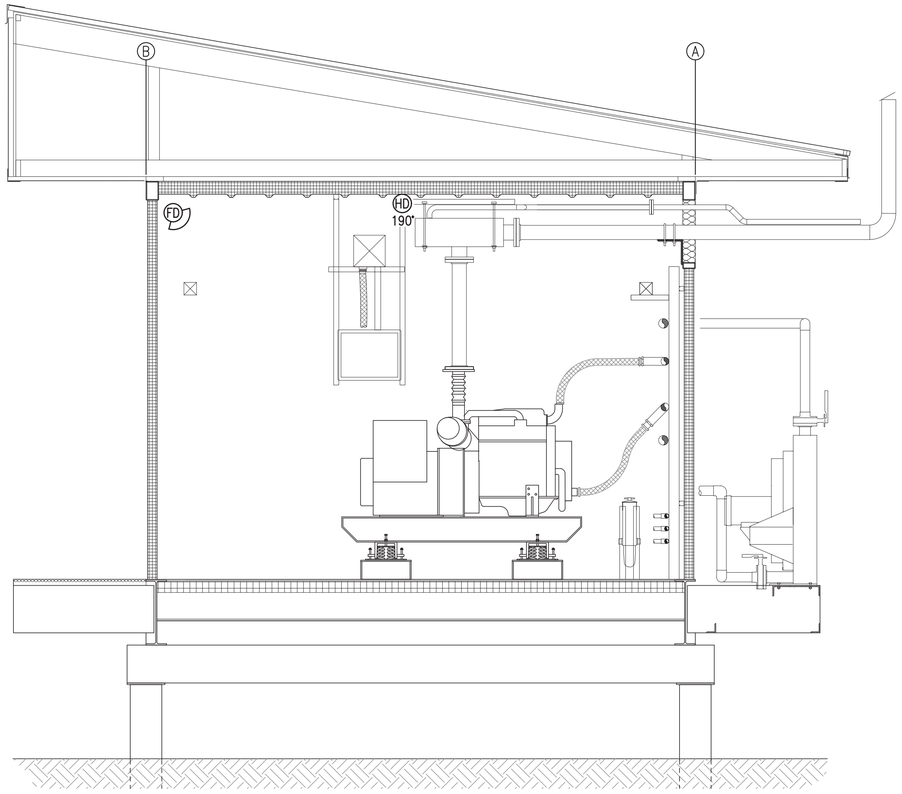
FILE NAME: NELS PP M8	SHEET: M8.8
PROJECT NUMBER:	



1 FS1 FIRE SUPPRESSION SYSTEM PLAN
3/8"=1'-0"



2 FS1 TYPICAL SECTION THROUGH BUILDING
3/8"=1'-0"

FIRE SUPPRESSION SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
HD 135°	NORMAL TEMP. (135°F) DETECTOR	P	MANUAL PULL STATION
HD 190°	HIGH TEMP. (190°F) DETECTOR		INTERIOR ALARM HORN/STROBE
FD	FLAME (OPTICAL) DETECTOR	WP	EXTERIOR ALARM HORN/STROBE
SD	SMOKE (IONIZATION) DETECTOR		

FIRE SUPPRESSION PLACARD SCHEDULE (SEE SHEET M1.2)	
SYMBOL	DESCRIPTION
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"

FIRE SUPPRESSION WIRE SCHEDULE			
SYMBOL	CIRCUIT DESCRIPTION	WIRE TYPE	WIRE COLOR
A	24V DC POWER	#14 AWG SOLID	RED & BLACK
B	DETECTION CIRCUITS	#14 AWG SOLID	BLUE & YELLOW
C	ANNUNCIATION ALARM	#14 AWG SOLID	BROWN & ORANGE
D	ANNUNCIATION DISCHARGE	#14 AWG SOLID	WHITE, & GRAY
E	24V DC AUX POWER	#14 AWG SOLID	RED & BLACK WITH GRAY STRIPE

GENERAL NOTES:

1) INTERIOR FINISH OF ALL WALLS AND CEILING METAL SIDING. INTERIOR FINISH OF FLOOR WELDED STEEL PLATE. CEILING HEIGHT IN ALL ROOMS 10'-2 ABOVE FINISHED FLOOR.

2) 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.

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: FIRE SUPPRESSION SYSTEM PLAN, SECTION, LEGEND, & NOTES

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

DRAWN BY: BCG	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/20/23
FILE NAME: NELS PP FS1	SHEET: FS1 OF 1
PROJECT NUMBER:	

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.

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	NOT USED	NOT USED	NOT USED	
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	DRY TYPE, ENERGY STAR, ENCLOSURE TYPE 1 WITH INTEGRAL WALL MOUNT BRACKETS, 15 kVA, HV 480 DELTA, LV 208Y/120	HAMMOND HPS SENTINEL CAT. NO. SG3A0015KB	
14	STATION SERVICE PANELBOARD	COPPER BUS, 3 PHASE, 4 WIRE, 120/208V, 125A MAIN BREAKER, 42 CIRCUITS, BOLT-IN BREAKERS, 20" WIDE NEMA 1 ENCLOSURE, SURFACE MOUNT, NO KNOCKOUTS	SIEMENS TYPE P1 OR SQUARE D TYPE NQ	
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	WELDER/COMPR. RECEPTACLE	NEMA 6-30R , BLACK, 250V, 30A, 2 POLE, WITH GROUND. INSTALL IN DEEP 4"x4" STEEL BOX WITH 2.15"ø HOLE METAL COVER	PASS & SEYMOUR 3801	
19	NOT USED	NOT USED	NOT USED	
20	RADIATOR MOTOR DISCONNECT	NON-FUSED LOCKABLE SAFETY SWITCH, NEMA 4X ENCLOSURE, 3PST, 600V, 30A, MIN 5HP RATED	SIEMENS HNF361S OR SQUARE D HU361S	
21	24VAC CONTROL TRANSFORMER	120V PRIMARY, 24V SECONDARY, 20VA OUTPUT, 1/2" THREADED HUB MOUNT	FUNCTIONAL DEVICES TR20VA001	
22	ENCLOSED POWER RELAY (RIB)	20A, 1HP RATED CONTACT, SPDT, 24VAC COIL, NEMA 1 ENCLOSURE, RED LED PILOT LIGHT	FUNCTIONAL DEVICES RIB2401B	
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 GIGABIT LAN, 1 GIGBIT WAN, USB 2.0 AND USB 4.0, MINIMUM 256 MB RAM	ASUS RT-ACI-900P	
25	480V NON-FUSED SVC. DISCONNECT	NON-FUSED LOCKABLE SAFETY SWITCH, NEMA 4X ENCLOSURE, 3PST, 600V, 200A	SIEMENS HNF364S OR SQUARE D HU364S	ON SITE
26	480V FUSED SVC. DISCONNECT	FUSED LOCKABLE SAFETY SWITCH, NEMA 4X ENCLOSURE, 3PST, 600V, 200A, PROVIDE WITH 3 EA. 125A TYPE R FUSES PLUS 3 IDENTICAL SPARE FUSES	SIEMENS HF364S OR SQUARE D H364S	ON SITE

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 PANEL END ONLY.
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

DISTRIBUTION PLAN SYMBOL LEGEND

EXISTING	NEW	
kVA / ID	kVA / ID	PADMOUNT TRANSFORMER ID AND KVA INDICATED
ID	ID	PRIMARY SECTIONALIZING CABINET, ID INDICATED, 3ø OR 1ø AS INDICATED IN STAKING SHEETS
		15kV 3ø BURIED 15kV PRIMARY JCN CIC (NEW)
		15kV 1ø BURIED 15kV PRIMARY JCN CIC (NEW)
		15kV 3ø BURIED 15kV PRIMARY JCN CIC (EXISTING)
		3ø DIRECT BURIED 600V UD CABLE

INSTRUMENTATION & ENERGY MEASUREMENT LEGEND

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

SYMBOL	SERVICE/FUNCTION	SYMBOL	SERVICE/FUNCTION
TT	TEMPERATURE TRANSMITTER	FS	DAY TANK/HOPPER FLOAT SWITCH
PT	PRESSURE TRANSMITTER	GLS	GLYCOL TANK LEVEL SENSOR PROBE
TLM	TANK LEVEL MONITOR PANEL	LCA	GLYCOL TANK LOW COOLANT ALARM
LSP	TANK LEVEL SENSOR PROBE		

AS PART OF THE MODULE ASSEMBLY WORK FURNISH AND INSTALL ALL MATERIALS AND EQUIPMENT ON THE SCHEDULES THIS SHEET EXCEPT FOR THOSE ITEMS SPECIFICALLY NOTED "ON SITE".
ITEMS SPECIFICALLY NOTED AS ON-SITE WILL BE FURNISHED BY OTHERS UNDER A SEPARATE FUTURE ON SITE CONTRACT.

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	DELETED FLOW METER	7/7/23	BCG

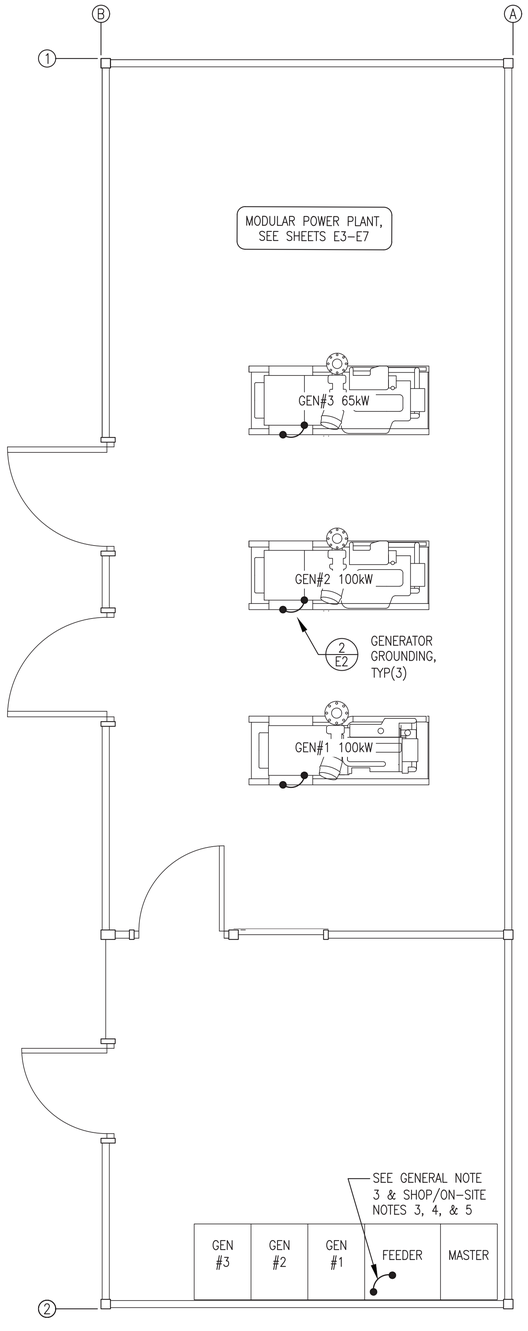
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

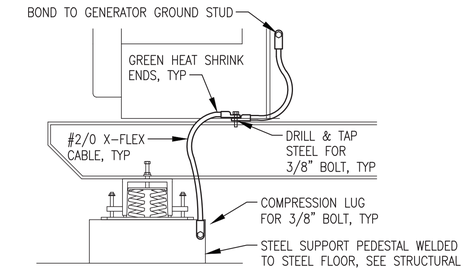
TITLE: ELECTRICAL LEGENDS & SCHEDULES

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

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 5/30/23
FILE NAME: NELS PP E1 | SHEET: E1.1
PROJECT NUMBER:



1 E2 POWER PLANT GROUNDING PLAN
3/8"=1'-0"



2 E2 GENERATOR GROUNDING
NO SCALE

GROUNDING GENERAL NOTES:

1) SEE ON–SITE WORK FOR POWER PLANT GROUNDING GRID.
2) CONTINUOUSLY WELDED STEEL STRUCTURE PROVIDES GROUND PATH THROUGH MODULE.
3) IN FEEDER SECTION PROVIDE #2/0 BARE COPPER JUMPER FROM GROUND BUS TO STEEL FLOOR. SEE DETAIL 2/E2, SIMILAR.

GROUNDING SHOP/ON–SITE NOTES:

1) ALL WORK SHOWN THIS SHEET TO BE PERFORMED AS PART OF THE MODULE ASSEMBLY SHOP FAB WORK.
2) AS PART OF MODULE ASSEMBLY WORK, TEMPORARILY BOND SWITCHGEAR NEUTRAL BUS TO GROUND BUS FOR LOAD BANK TESTING AND LEAVE IN PLACE.
3) AS PART OF ON–SITE WORK LEAVE NEUTRAL TO GROUND BUS BONDING JUMPER IN PLACE AS REQUIRED FOR LOAD BANK TESTING.
4) REMOVE JUMPER AFTER LOAD BANK TESTING AND PRIOR TO CONNECTING TO THE GRID FOR COMMISSIONING.

ISSUED FOR CONSTRUCTION
MAY 2023

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

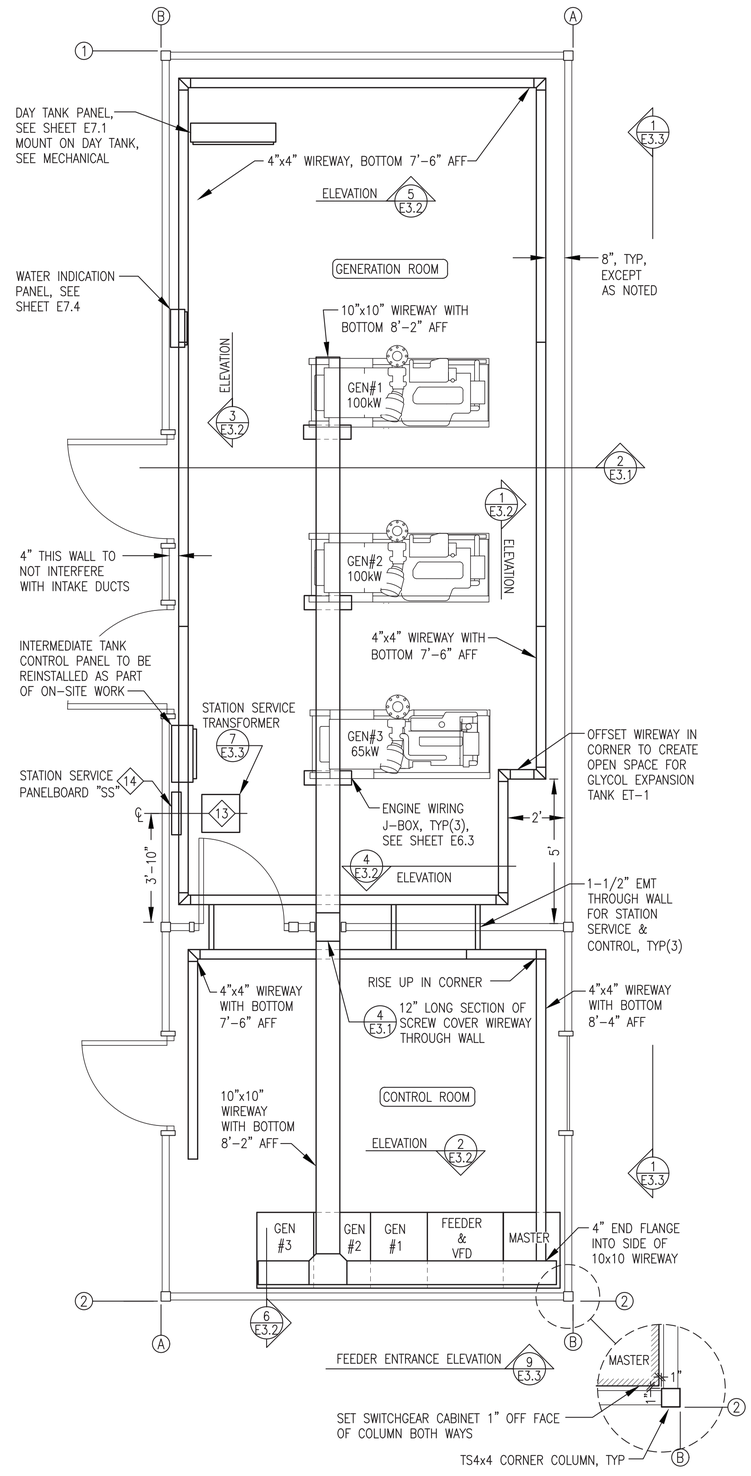
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

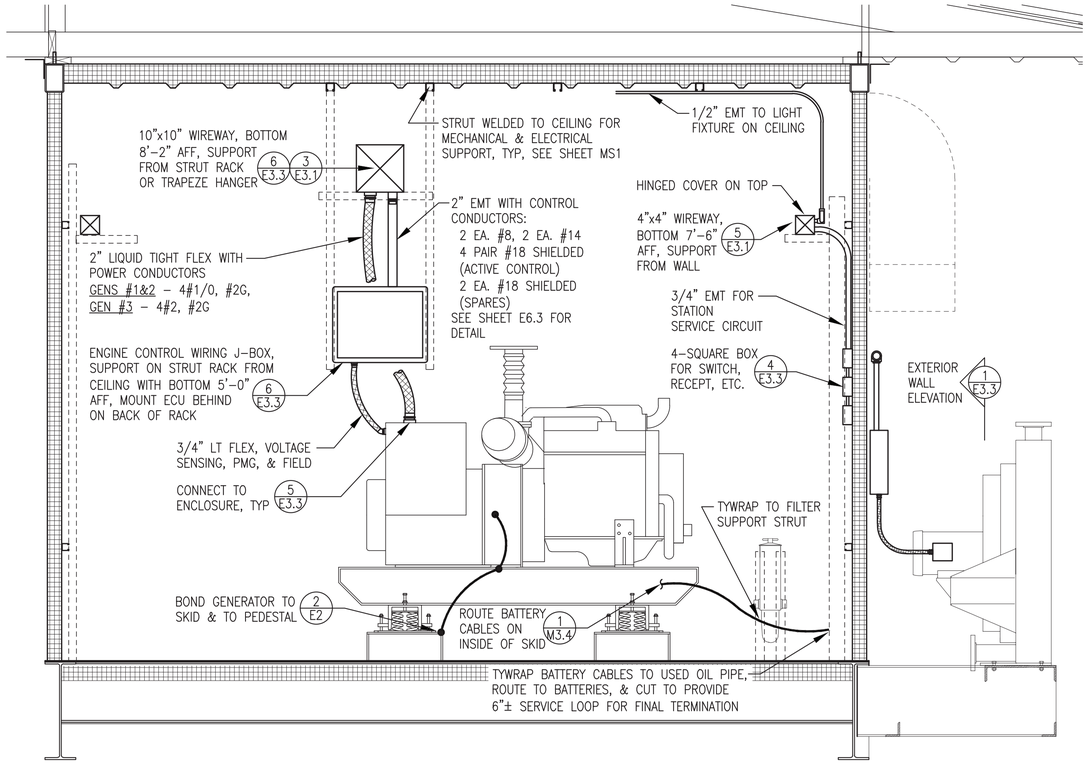
TITLE: MODULE GROUNDING PLAN & DETAILS

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

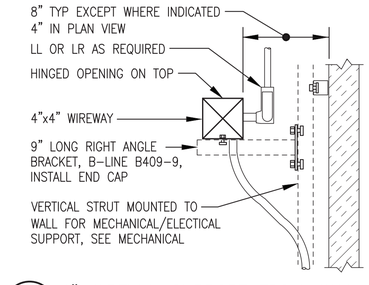
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 5/30/23
FILE NAME: NELS PP E2–E5	SHEET: E2
PROJECT NUMBER:	



1 E3.1 EQUIPMENT LAYOUT & WIREWAY PLAN
3/8"=1'-0"

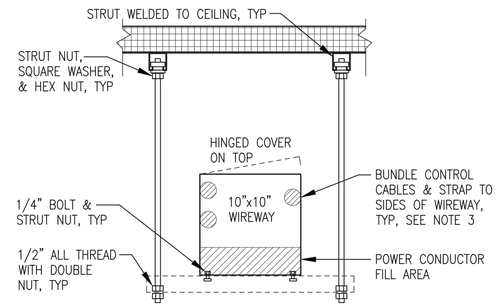


2 E3.1 TYPICAL MODULE SECTION
3/4"=1'-0"



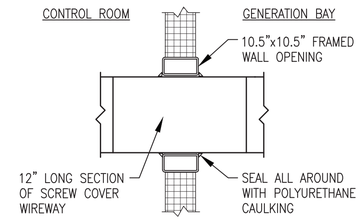
5 E3.1 4" WIREWAY SUPPORT FROM WALL
NO SCALE

ENGINE-GENERATOR SCHEDULE	
GENSET	DESCRIPTION
GEN #1	ENGINE – 148 HP, 100 EKW PRIME, JOHN DEERE 4045AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274E.
GEN #2	ENGINE – 148 HP, 100 EKW PRIME, JOHN DEERE 4045AFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 125 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274E.
GEN #3	ENGINE – 99 HP, 65 EKW PRIME, JOHN DEERE 4045TFM85, TIER 3 MARINE. 24 VDC STARTING & CONTROL. GENERATOR – MINIMUM 90 KW CONTINUOUS AT 105°C RISE, NEWAGE/STAMFORD UCI274C.



NOTES:
1) INSTALL HANGER AT EACH JOINT & AT END.
2) HANGER NOT REQUIRED AT ENGINE J-BOX SUPPORT, SEE DETAIL 4/E4.3.
3) STRAP CABLES AT 5' O.C. MIN USING 3M 06292 OR EQUAL STICKY BACK BASES. FASTEN BASES TO WIREWAY SIDE WITH MACHINE BOLTS.

3 E3.1 10" WIREWAY TRAPEZE HANGER
NO SCALE



4 E3.1 WIREWAY WALL PENETRATION
NO SCALE

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	CHANGED CONTROL CONDUCTOR SHIELDED PAIR COUNT PER NEW ENGINE MONITORING	8/15/23	BCG

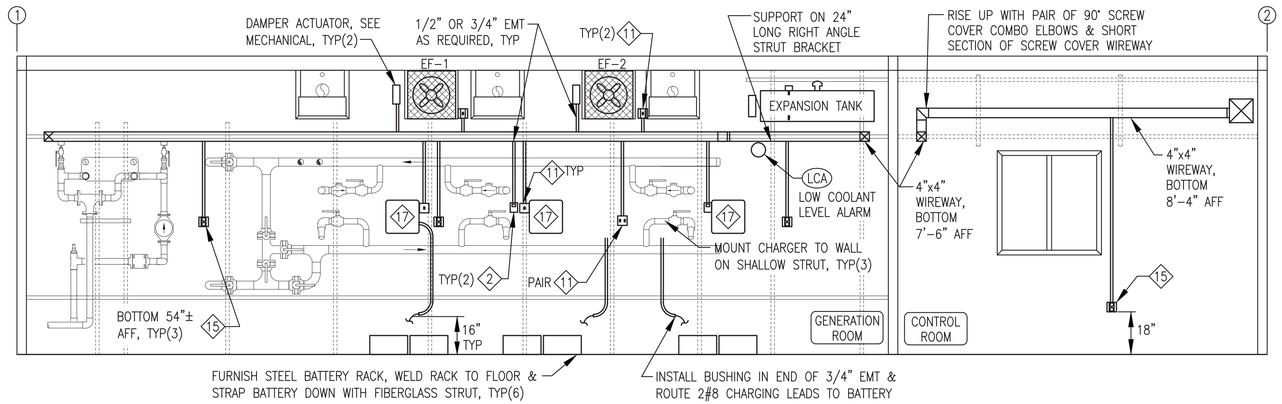
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

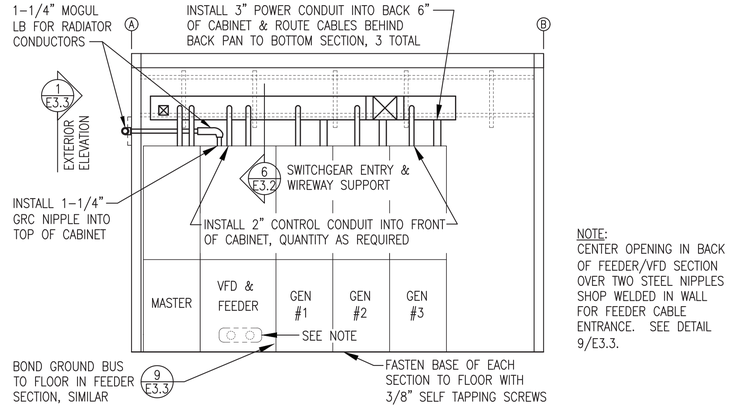
TITLE: WIREWAY PLAN, BUILDING SECTION, & DETAILS

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

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 5/30/23
FILE NAME: NELS PP E2-E5 | SHEET: E3.1
PROJECT NUMBER:

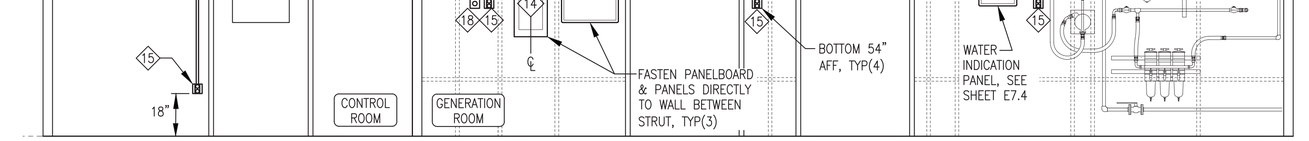


1 E3.2 WALL ELEVATION AT GRID A
3/8"=1'-0"

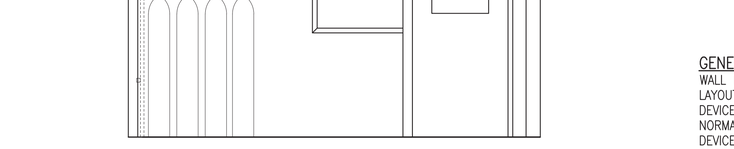


NOTE:
CENTER OPENING IN BACK OF FEEDER/VFD SECTION OVER TWO STEEL NIPPLES SHOP WELDED IN WALL FOR FEEDER CABLE ENTRANCE. SEE DETAIL 9/E3.3.

2 E3.2 WALL ELEVATION AT GRID 2
3/8"=1'-0"

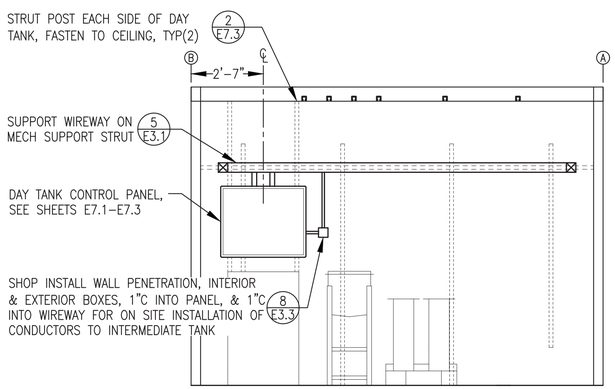


3 E3.2 WALL ELEVATION AT GRID B
3/8"=1'-0"

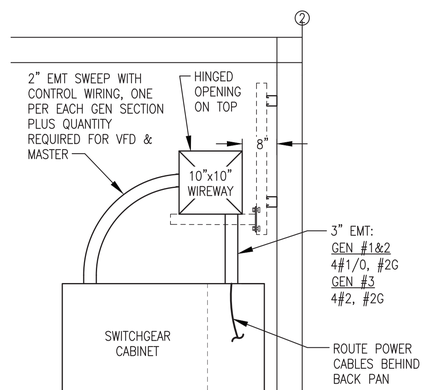


4 E3.2 INTERIOR WALL ELEVATION
3/8"=1'-0"

GENERAL NOTE:
WALL ELEVATIONS SHOWN PRIMARILY FOR GENERAL LAYOUT OF MAJOR RACEWAY, EQUIPMENT, AND DEVICES REQUIRING REGULAR ACCESS FOR NORMAL PLANT OPERATIONS. ALL EQUIPMENT, DEVICES & INSTRUMENTATION CIRCUITS NOT SHOWN FOR CLARITY. SEE PLANS & DETAILS FOR COMPLETE ELECTRICAL INSTALLATIONS.



5 E3.2 WALL ELEVATION AT GRID 1
3/8"=1'-0"



6 E3.2 SWITCHGEAR ENTRY & WIREWAY SUPPORT
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: ELEVATIONS & DETAILS

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

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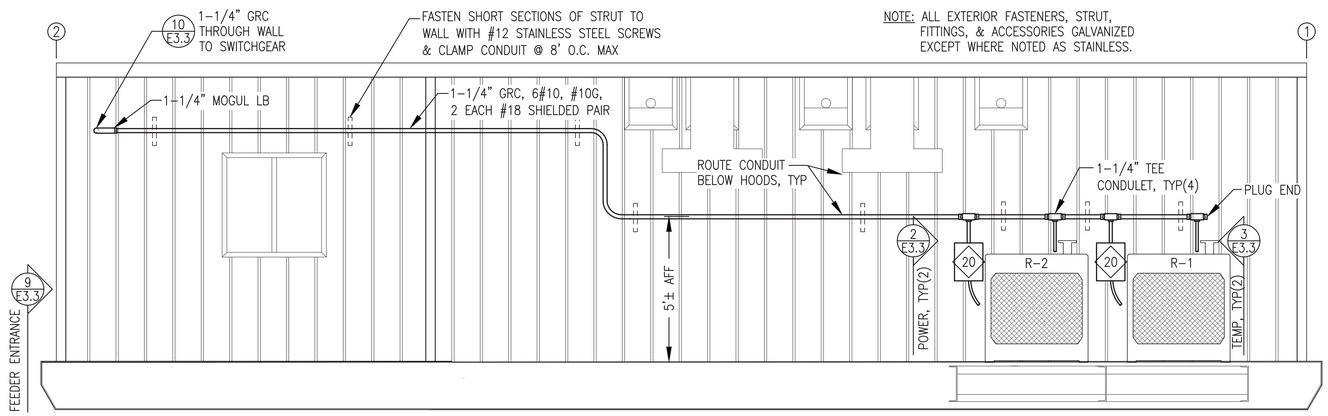
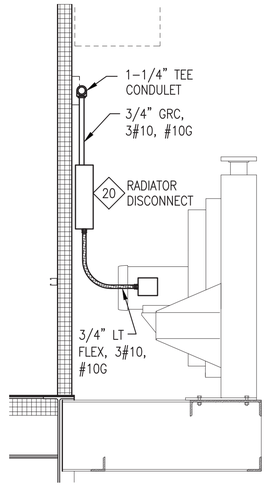
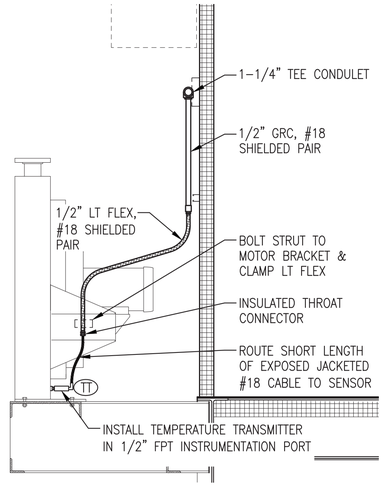
FILE NAME: NELS PP E2-E5	SHEET: E3.2
PROJECT NUMBER:	



1 E3.3 BACK WALL EXTERIOR ELEVATION
3/8"=1'-0"



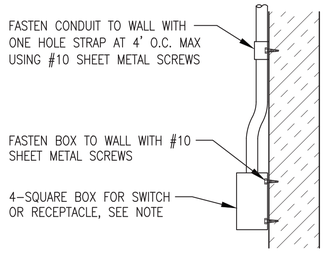
2 E3.3 RADIATOR POWER CONNECTION
3/4"=1'-0"



3 E3.3 RADIATOR TEMPERATURE TRANSMITTER
3/4"=1'-0"

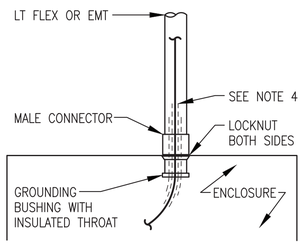
RADIATOR SHOP/ON-SITE NOTES:

1) DURING SHOP FABRICATION INSTALL ALL DEVICES AND RACEWAYS AS INDICATED.
2) AS PART OF ON-SITE WORK, IF RADIATORS ARE REMOVED FOR SHIPPING DISCONNECT LIQUID TIGHT FLEXES AND SEAL ENDS. COIL AND SECURE CONDUCTORS AND FLEXES FOR SHIPPING.
3) AS PART OF ON-SITE WORK REINSTALL AS INDICATED.



NOTE: INSTALL THERMOSTATS & TIMER SWITCHES IN DEEP SINGLE GANG BELL BOX INSTEAD OF 4-SQUARE BOX.

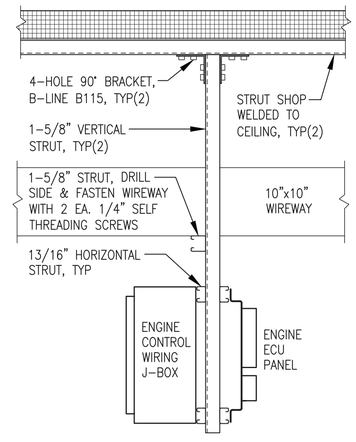
4 E3.3 TYPICAL INTERIOR DEVICE MOUNTING
NO SCALE



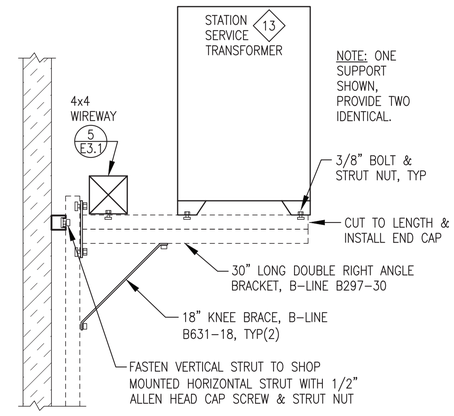
NOTES:

1) THIS DETAIL APPLIES TO CONNECTIONS TO WIREWAY, GENERATOR ENCLOSURES, SWITCHGEAR, AND PANELS.
2) AT A MINIMUM INSTALL GROUNDING BUSHING ON ALL GENERATOR POWER CONDUIT, COMMUNITY FEEDER CONDUIT, STATION SERVICE FEEDERS, AND WHERE OTHERWISE INDICATED OR REQUIRED. BOND GROUNDING BUSHING TO EQUIPMENT GROUNDING CONDUCTOR.
3) INSTALL PLASTIC BUSHING WHERE GROUNDING BUSHING IS NOT REQUIRED.
4) ON GENERATOR ENCLOSURES PROTECT CABLES FROM WEAR BY INSTALLING 2 LAYERS OF HEAVY WALL HEAT SHRINK. BASE LAYER 12" LONG & SECOND LAYER 8" LONG, CENTERED IN CONNECTOR.

5 E3.3 TYP ENCLOSURE CONNECTION
NO SCALE



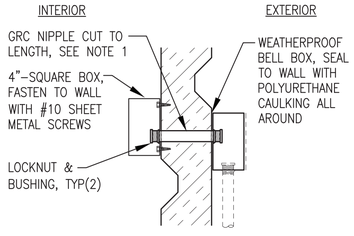
6 E3.3 ENGINE WIRING J-BOX SUPPORT
NO SCALE



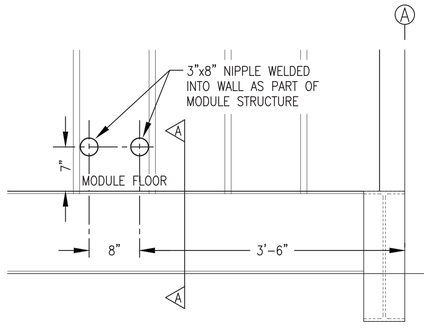
NOTE: ONE SUPPORT SHOWN, PROVIDE TWO IDENTICAL.

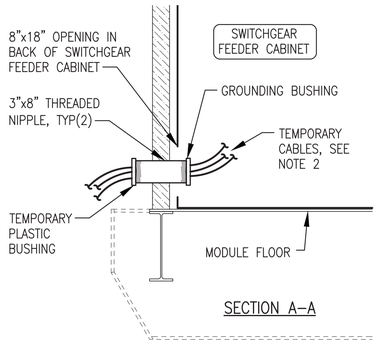
7 E3.3 STATION SERVICE TRANSFORMER SUPPORT
NO SCALE

NOTE: UPON COMPLETION OF CIRCUIT TESTING PACK GRC NIPPLE THROUGH WALL WITH DUCT SEAL.



8 E3.3 TYP EXTERIOR WALL-MOUNT DEVICE
NO SCALE



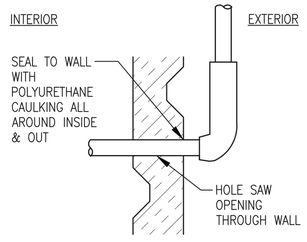


FEEDER SHOP/ON-SITE NOTES:

1) DURING SHOP FABRICATION INSTALL TEMPORARY FEEDER CABLES THROUGH ONE NIPPLE AS SHOWN. SPARE NIPPLE TO REMAIN CAPPED.
2) ROUTE TEMPORARY CABLES TO LOAD BANK FOR TESTING. AFTER TESTING INSTALL THREADED CAP ON EXTERIOR END OF NIPPLE.
3) INSTALL FEEDER TO TRANSFORMER AS PART OF ON-SITE WORK, SEE SHEET E1.3 FOR CONTINUATION.
4) UPON COMPLETION OF TESTING PACK GRC NIPPLES THROUGH WALL WITH DUCT SEAL.

9 E3.3 FEEDER ENTRANCE DETAIL
1"=1'-0"

NOTE: UPON COMPLETION OF CIRCUIT TESTING PACK GRC NIPPLE THROUGH WALL WITH DUCT SEAL.



10 E3.3 TYP CONDUIT WALL PENETRATION
NO SCALE

ISSUED FOR CONSTRUCTION
MAY 2023

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

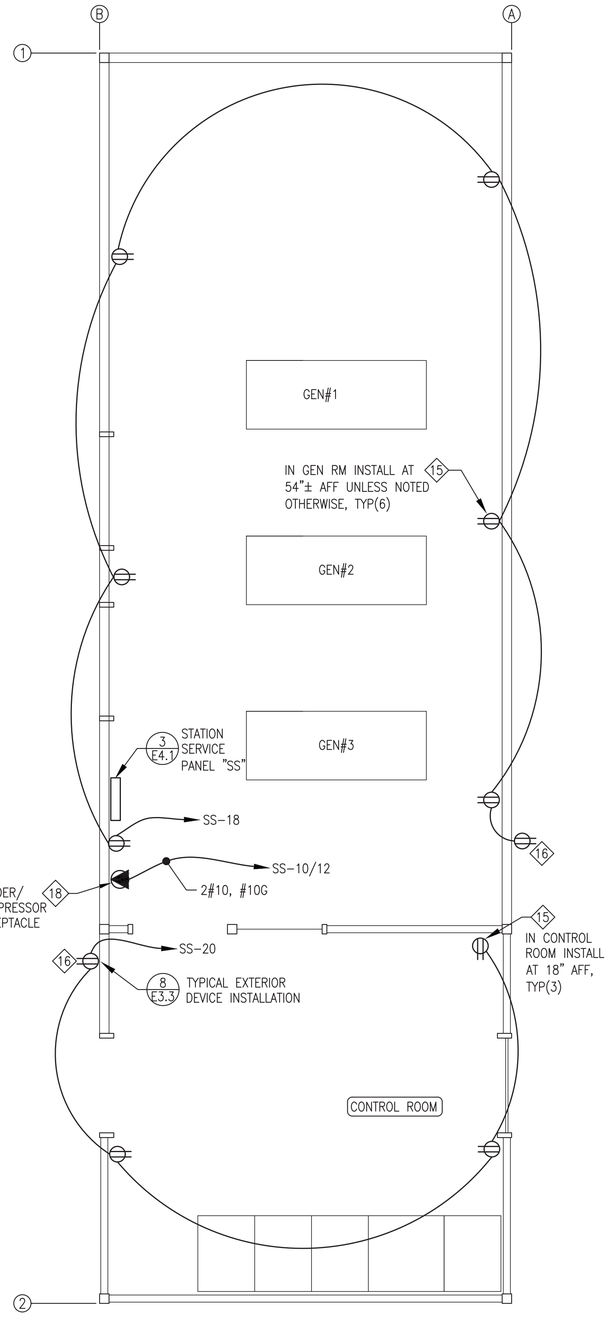
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: ELEVATIONS & DETAILS

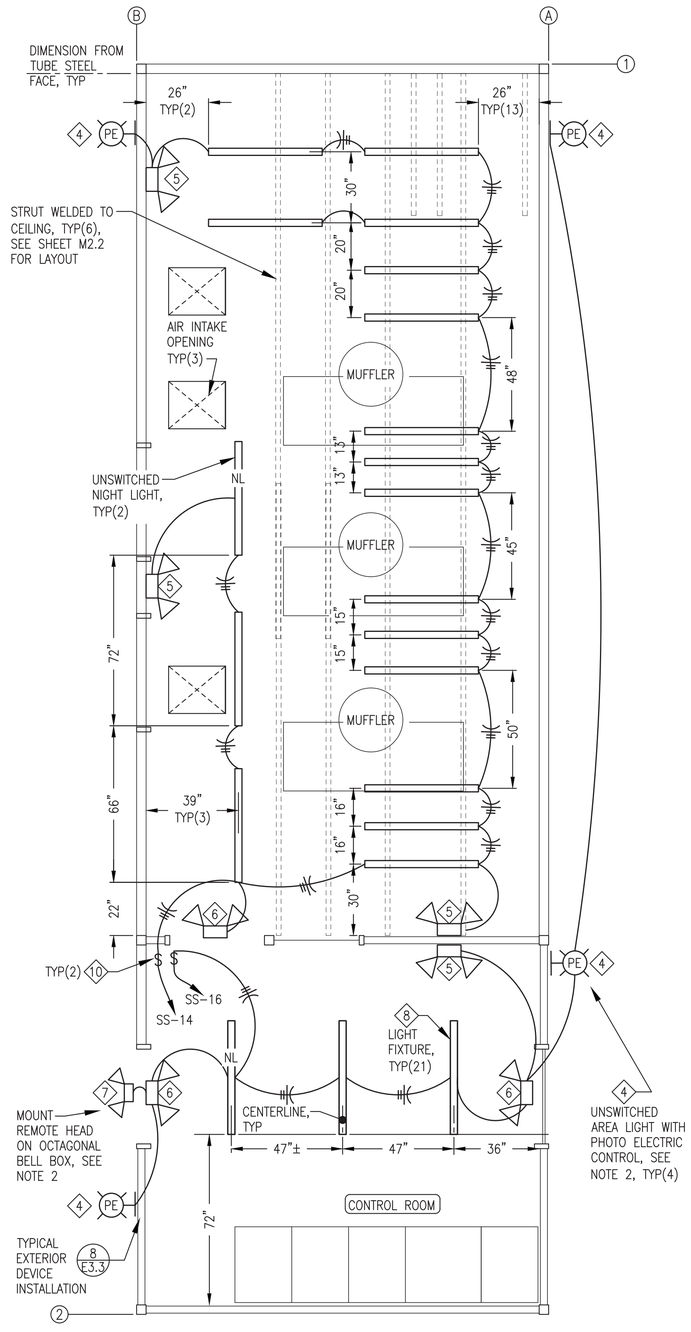
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 5/30/23
FILE NAME: NELS PP E2-E5	SHEET: E3.3
PROJECT NUMBER:	



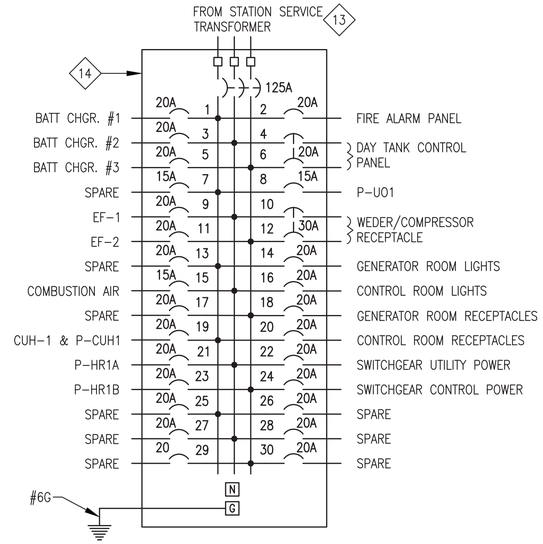
NOTES:
1) ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.

1 E4.1 RECEPTACLE PLAN
3/8"=1'-0"



NOTES:
1) ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.
2) MOUNT EXTERIOR AREA AND EMERGENCY LIGHTS WITH TOP 9'-0" AFF.
3) FASTEN INTERIOR LIGHTS TO CEILING WITH #12 SHEET METAL SCREWS EXCEPT WHERE LIGHTS CROSS STRUT USE 1/4" BOLTS & STRUT NUTS, TYP

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



3 E4.1 STATION SERVICE PANEL "SS"
NO SCALE

ISSUED FOR CONSTRUCTION MAY 2023

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

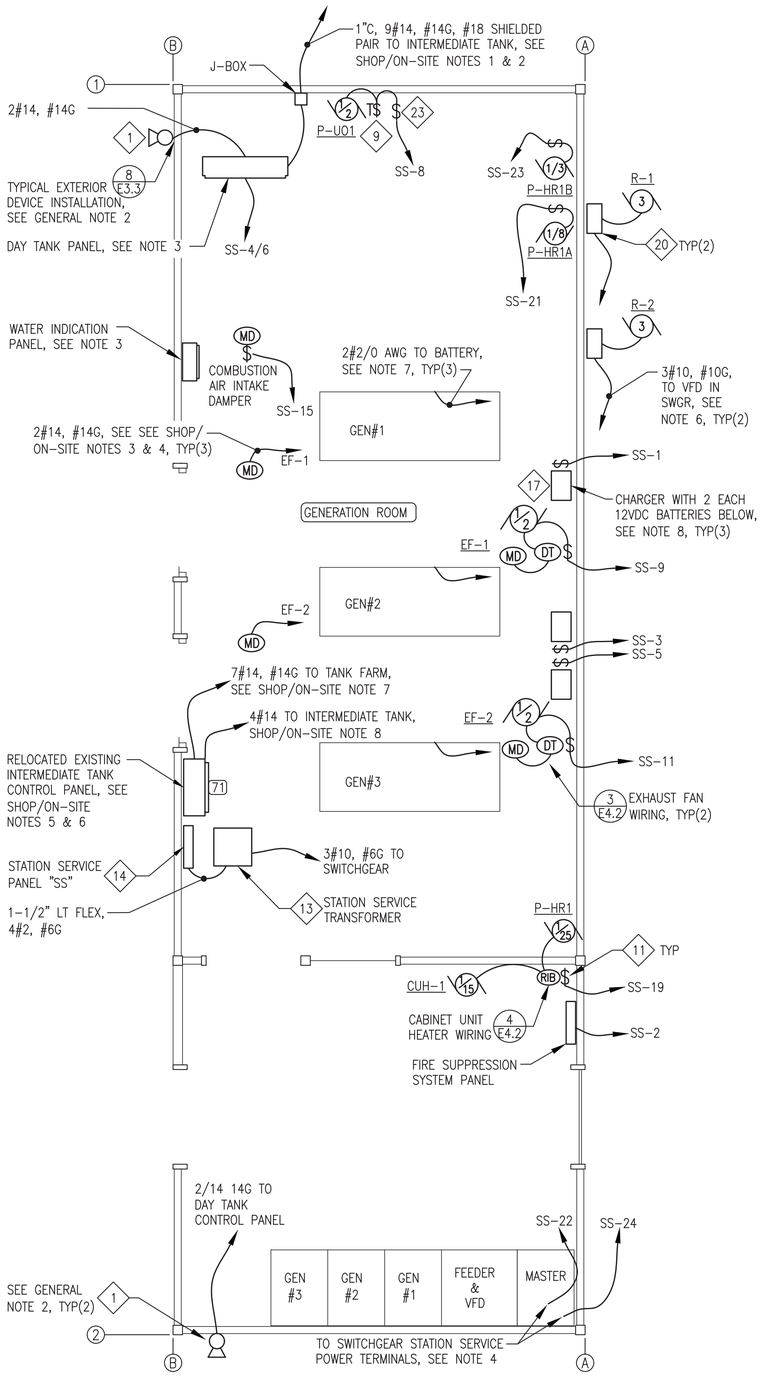
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: RECEPTACLE & LIGHTING PLANS & PANELBOARD

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 5/30/23
FILE NAME: NELS PP E2-E5	SHEET: E4.1
PROJECT NUMBER:	



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

STATION SERVICE GENERAL NOTES:

1) ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.

2) MOUNT ALARMS HORNS WITH TOP AT 9'-0" AFF TO MATCH EXTERIOR LIGHTS, SEE SHEET E4.1

3) SEE SHEETS E7.1-E7.4 FOR DAY TANK AND WATER INDICATION PANEL DESIGN AND WIRING TERMINATIONS. ALL ACCESSORIES NOT SHOWN ON PLANS. SEE LOGIC DIAGRAMS FOR ADDITIONAL DETAIL.

4) SEE SWITCHGEAR SHOP DRAWINGS FOR TERMINATION OF ALL POWER AND CONTROL WIRING.

5) NOT USED.

6) ROUTE RADIATOR VFD POWER CONDUCTORS IN SEPARATE EXTERIOR CONDUIT, SEE ELEVATION 1/E3.3. DO NOT ROUTE IN WIREWAY. NOTE THAT CONDUCTORS ARE OVERSIZED FOR 80% DE-RATE AND PROVIDED WITH 15A BREAKER IN SWITCHGEAR.

7) ROUTE BATTERY CABLES TO FRONT OF SKID SUPPORTED WITH CUSHIONED CLAMPS, SEE SHEET M3.4. ROUTE FROM SKID DIRECTLY UNDER FUEL HOSES TO WALL AND TYWRAP CABLES TO USED OIL PIPE ALONG WALL, SEE DETAIL 2/E3.1. CUT TO PROVIDE 6"± SERVICE LOOP FOR FINAL TERMINATION ON BATTERIES.

8) MOUNT BATTERY CHARGER TO WALL ON SHALLOW STRUT AND INSTALL BATTERIES IN RACK ON FLOOR BELOW, SEE ELEVATION 1/E3.2.

STATION SERVICE SHOP/ON-SITE NOTES:

1) DURING SHOP FABRICATION INSTALL WALL PENETRATION AND CONDUIT INTO DAY TANK PANEL. SEE ELEVATION 5/E3.2.

2) AS PART OF ON-SITE WORK INSTALL CONDUIT AND CONDUCTORS TO INTERMEDIATE TANK, SEE SHEET E1.6.

3) DURING SHOP FABRICATION INSTALL CEILING MOUNTED BOX ADJACENT TO DAMPER ACTUATOR AND TEMPORARILY CONNECT DAMPER TO VERIFY OPERATION.

4) AS PART OF ON-SITE WORK INSTALL CONDUIT AND CONDUCTORS TO DAMPER ACTUATOR. SEE SHEET M7.

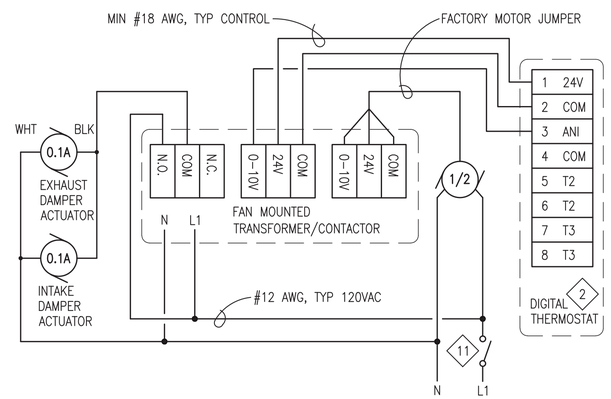
5) EXISTING INTERMEDIATE TANK CONTROL PANEL SALVAGED FROM OLD INTERMEDIATE TANK AND INSTALLED IN MODULE AS PART OF ON-SITE WORK. SEE SHEET E1.2 FOR EXISTING LOCATION OF PANEL. SEE WALL ELEVATION 3/E3.2 FOR NEW LOCATION AND MOUNTING.

6) SEE ORIGINAL BULK FUEL UPGRADE PROJECT SHEETS E6-E9 FOR PANEL DESIGN AND LOGIC. NOTE THAT THIS PANEL IS POWERED FROM THE TANK FARM CONTROL PANEL, NOT THE MODULE. INSTALL DECAL 71 ON FACE. SEE SHEET M1.2.

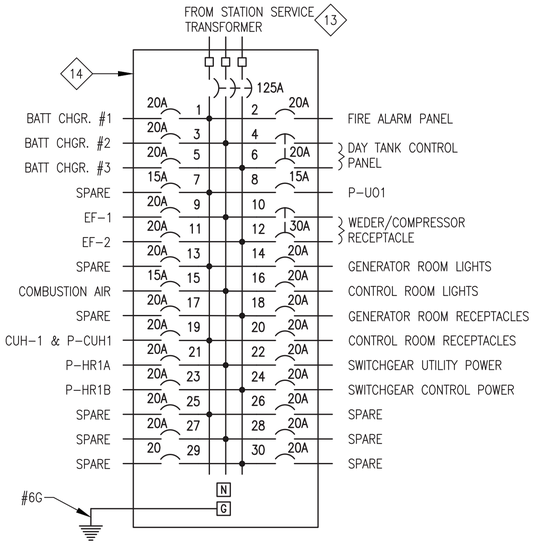
7) SEE SHEET E1.5 FOR RE-CONNECTION OF EXISTING RE-ROUTED ARMORED CABLE FROM TANK FARM.

8) ROUTE NEW CONDUCTORS TO NEW INTERMEDIATE TANK FLOAT SWITCH IN SAME RACEWAY AS DAY TANK CONTROL PANEL CONDUCTORS, SEE SHEET E1.3. CONNECT NEW SWITCH TO MATCH ORIGINAL TERMINATIONS IN PANEL AND VERIFY FUNCTION.

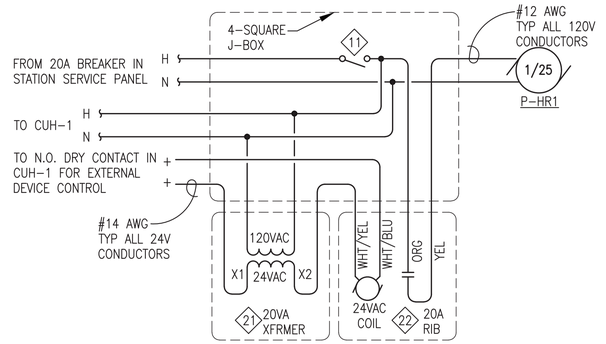
MAKE THE FOLLOWING SETTINGS ON DIGITAL THERMOSTAT:
APPLICATION = 0 (INTERNAL SENSOR)
OUTPUT 1 = 0 (COOL/0-10V)
OUTPUT 2 = 0 (NOT USED)
OUTPUT 3 = 0 (NOT USED)
OUTPUT 3 ACTIVATION = 0 (100%)
NSB VALUE = 3 (6°F)
OUTPUT 1 MIN = 0 (0%)
MAX SETPOINT = 90°F
MIN SETPOINT = 50°F



3 E4.2 EXHAUST FAN WIRING DIAGRAM
NO SCALE



2 E4.2 STATION SERVICE PANEL "SS"
NO SCALE



4 E4.2 CUH-1 WIRING DIAGRAM
NO SCALE

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

REV.	DESCRIPTION	DATE	BY
1	DELETED FLOW METER & ADDED CAT5e FROM PUMP P-HR1B	8/15/23	BCG

ALASKA ENERGY AUTHORITY

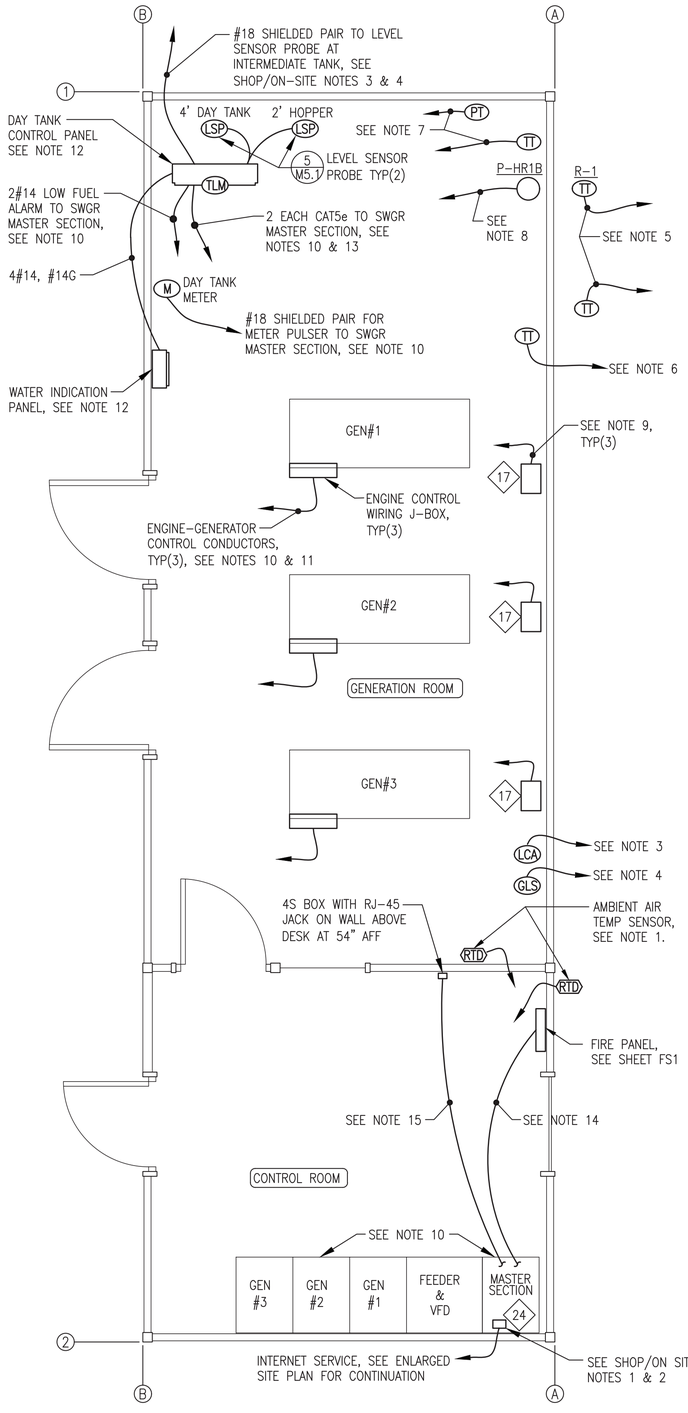
PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: STATION SERVICE PLAN, DETAILS, & PANELBOARD

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

DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: CWV/BCG | DATE: 5/30/23
FILE NAME: NELS PP E2-E5 | SHEET: E4.2
PROJECT NUMBER:

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



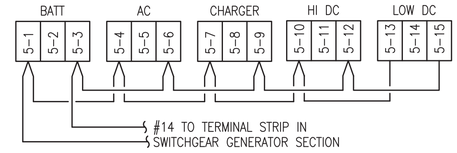
1 E5 INSTRUMENTATION & DATA PLAN
3/8"=1'-0"

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 DSL MODEM AND INTERNET ROUTER ON TOP OF MASTER SECTION IN RACK OR CABINET. CONNECT MODEM TO ROUTER AND TO TELEPHONE LINE. CONNECT ROUTER TO ETHERNET SWITCH INSIDE MASTER SECTION. CONNECT BOTH TO 120VAC UPS. SEE NOTE 10 AND SHOP/ON SITE NOTES 1 AND 2.
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 PROBE INSTALLED IN EXPANSION TANK, SEE MECHANICAL. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR. SEE NOTE 10.
5. INSTALL TEMP TRANSMITTER IN EACH RADIATOR, SEE DETAIL 3/E3.3. ROUTE #18 SHIELDED PAIR FROM EACH TO SWITCHGEAR VFD SECTION. SEE ELEVATION 1/E3.3 AND NOTE 10.
6. INSTALL COOLANT RETURN TEMP TRANSMITTER IN PIPING MAIN WHERE SHOWN ON COOLING PIPING ISOMETRIC 1/M4.2. 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 2/M4.2. 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. INSTALL OWNER FURNISHED PUMP CIM CARD AND ROUTE CAT5e 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 10x10 WIREWAY WITH POWER CONDUCTORS. SEE DETAIL 2/E3.1, SHEET E6.3, AND NOTE 10.
12. SEE SHEETS E7.1-E7.4 FOR DAY TANK AND WATER INDICATION CONTROL PANEL DESIGN AND WIRING TERMINATIONS. ALL ACCESSORIES NOT SHOWN ON PLANS. SEE LOGIC DIAGRAMS FOR ADDITIONAL DETAIL.
13. ROUTE CAT5e CONDUCTORS FROM DAY TANK PANEL REMOTE I/O AND TANK LEVEL MONITOR 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 TO ETHERNET SWITCH IN MASTER SECTION. INSTALL IN SEPARATE DEDICATED RACEWAY. DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.

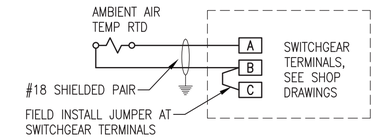
INSTRUMENTATION SHOP/ON-SITE NOTES:

1. AS PART OF SHOP FABRICATION INSTALL ETHERNET SWITCH IN MASTER SECTION.
2. AS PART OF ON-SITE WORK INSTALL STARLINK MODEM WITH ETHERNET ADAPTER IN BOTTOM OF MASTER SECTION. CONNECT MODEM TO ETHERNET SWITCH AND TO 120VAC UPS INSIDE MASTER SECTION. SEE NOTE 10.
3. AS PART OF SHOP FABRICATION INSTALL WALL PENETRATION AND CONDUIT INTO DAY TANK PANEL. SEE ELEVATION 5/E3.2.
4. AS PART OF ON-SITE WORK INSTALL CONDUIT AND CONDUCTORS TO INTERMEDIATE TANK, SEE SHEET E1.6.



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

REV#1
ISSUED FOR CONSTRUCTION
NOV 2023

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

REV.	DESCRIPTION	DATE	BY
2	CHANGED INTERNET SERVICE TO STARLINK	11/13/23	BCG
1	DELETED FLOW METER & HRR, ADDED CAT5e FROM PUMP P-HR1B, SEE NOTES 7 & 8	8/15/23	BCG

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: INSTRUMENTATION & DATA 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: 5/30/23
FILE NAME: NELS PP E2-E5	SHEET: E5
PROJECT NUMBER:	

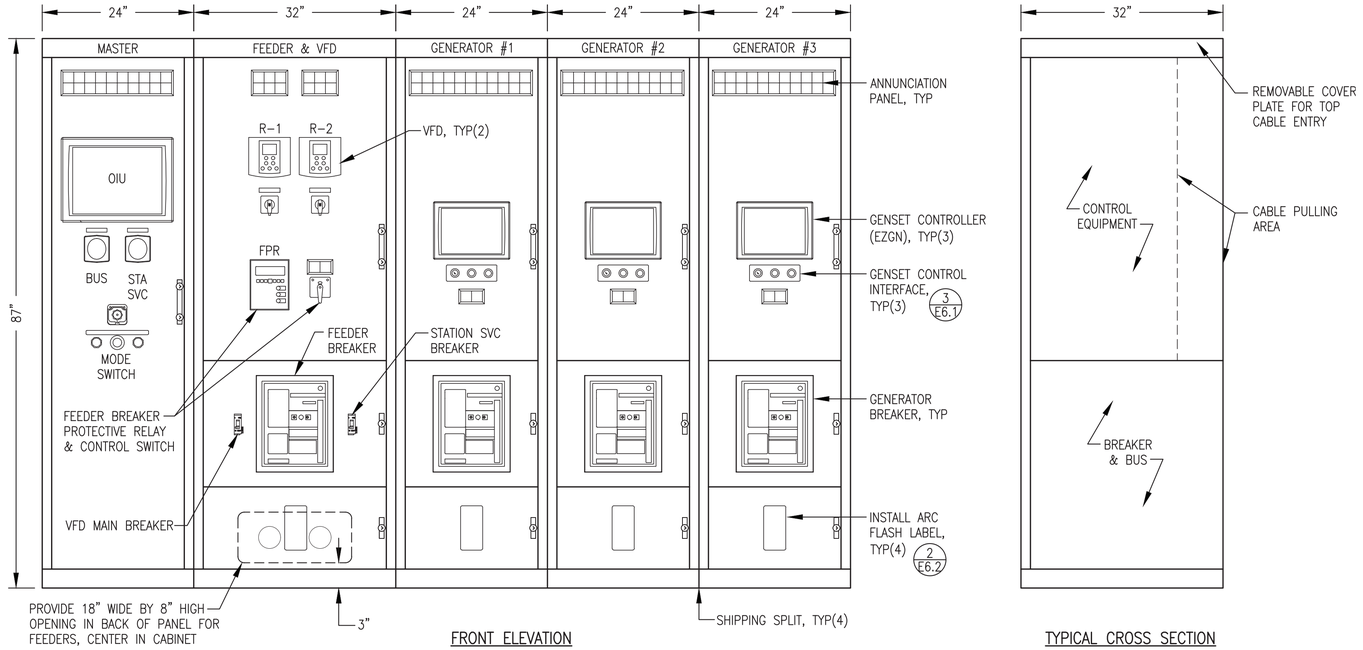
Demand Control Table (PLC)				
Demand Control	Generator(s) On Line	On-line kW (Overload)	Level Increase	Level Decrease
Level 1	#3	65	55	---
Level 2	#1 or #2	100	90	45
Level 3	#3 & #1 or #2	165	145	80
Level 4	All	265	---	125
Note : Gen #1 & #2 are equal capacity. Manually select lead unit.				

Engine-Generator Alarm Settings (Easygen - EZGN)			
Function	Normal Range	Alarm	Shut Down
Overspeed	1795-1805	----	1900 RPM
Oil Pressure	30-50 PSI	14.5 PSI	10 PSI
Air Filter Vacuum	1-10" H2O	15" H2O	20" H2O
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%

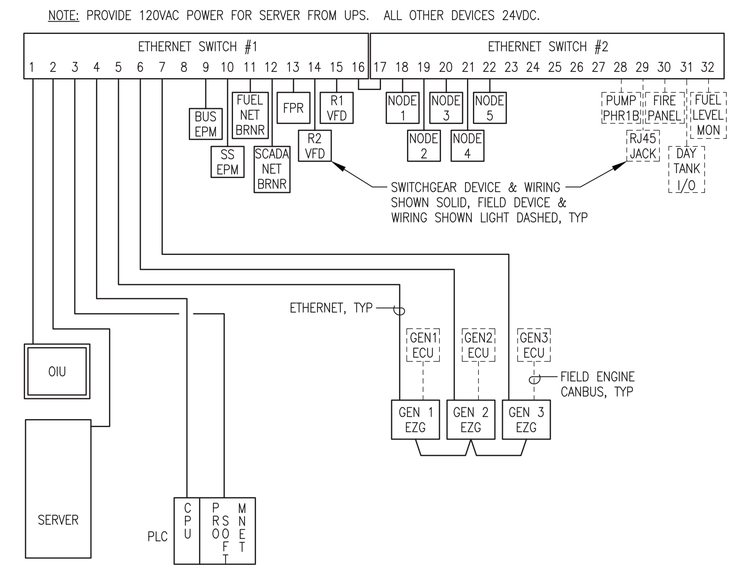
Generator Breaker Settings (Easygen - EZGN)	
Function	Setting
Gen #1 Breaker Trip Setpoint (EZGN Rated Current)	200 A
Gen #2 Breaker Trip Setpoint (EZGN Rated Current)	200 A
Gen #3 Breaker Trip Setpoint (EZGN Rated Current)	150 A
Gen Breaker Level 1 (100%) Time Over Current	3 sec.
Gen Breaker Level 2 (120%) Time Over Current	1 sec.
Gen Breaker Level 3 (250%) Time Over Current	0.4 sec.

Feeder Breaker Settings (Feeder Protection Relay - FPR)	
Function (Note: Element 1 is the only active element)	Setting
T.O.C. Trip Pickup (amps) Note: 5A = 100% of CT rating	5.0
T.O.C. Curve Selection	U4
T.O.C. Time Dial	5.00
E.M Reset delay (Y/N)	N
Constant Time Adder (seconds)	0.00
Minimum Response Time (seconds)	0.00
Maximum Phase T.O.C. Torque Control	1

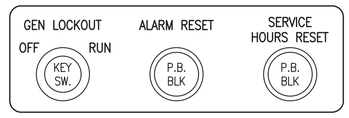
Radiator VFD Settings	
Function	Setting
Min PID Feedback	20
Max PID Feedback	240
rSL (Wake UP Threshold)	1
PID Reference Temperature	175°F
Proportional Gain	0.93
Integral Gain	0.3
Derivative	0
Minimum Speed	10 Hz.
Low Speed Timeout	10 sec.
Loss of Phase	Ignore



1 E6.1 SWITCHGEAR ENCLOSURE LAYOUT
NO SCALE



2 E6.1 COMMUNICATION SCHEMATIC
NO SCALE



INTERFACE CONTROLS LEGEND:
P.B. PUSH BUTTON
KEY SW. KEY OPERATED LOCKABLE SWITCH

EASYGEN INTERFACE CONTROLS

3 E6.1 GENSET CONTROL (EZGN) INTERFACE CONTROLS
NO SCALE

REV#1
ISSUED FOR CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
1	CHANGED COMM SCHEMATIC TO MATCH SWITCHGEAR SHOP DRAWINGS & ADDED P-HR1B	8/15/23	BCG

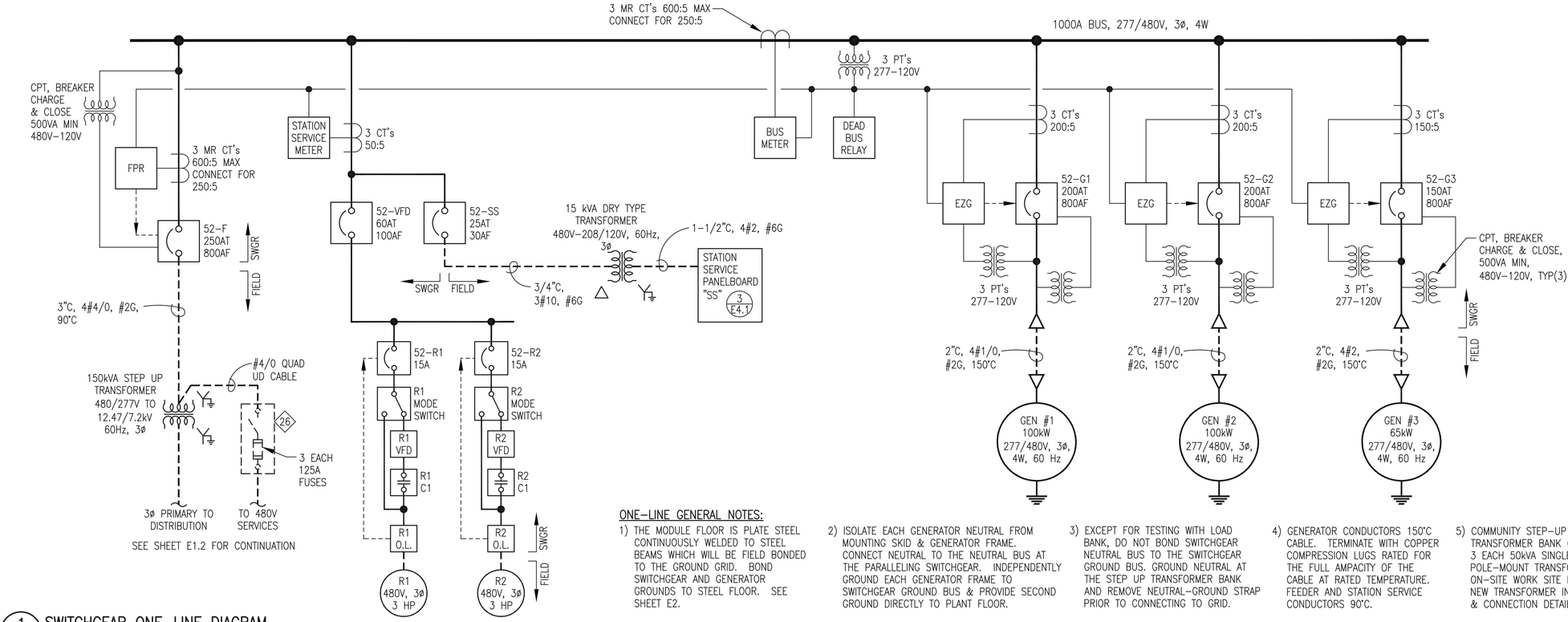
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: SWITCHGEAR ENCLOSURE LAYOUT, SETTING TABLE, & DETAILS

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

DRAWN BY: JTD
DESIGNED BY: CWV/BCG
FILE NAME: NELS PP E6
PROJECT NUMBER:
SCALE: NO SCALE
DATE: 4/10/23
SHEET: E6.1



1 E6.2 SWITCHGEAR ONE–LINE DIAGRAM
NO SCALE

SWITCHGEAR SYMBOL LEGEND

- TRANSFORMER
  PT=POTENTIAL XFRMR
  CPT=CONTROL POWER XFRMR
- CURRENT TRANSFORMER
  M.R. – INDICATES MULTIRATIO
  CT'S RATING FACTOR RF=2.0
- CIRCUIT BREAKER
  AT=AMP TRIP RATING
  AF=AMP FRAME RATING
- EZG — WOODWARD EASYGEN GENSET CONTROLLER
- FPR — FEEDER PROTECTION RELAY
- SHOP INSTALLED POWER WIRING/BUS
- FIELD INSTALLED POWER WIRING
- SHOP INSTALLED CONTROL WIRING

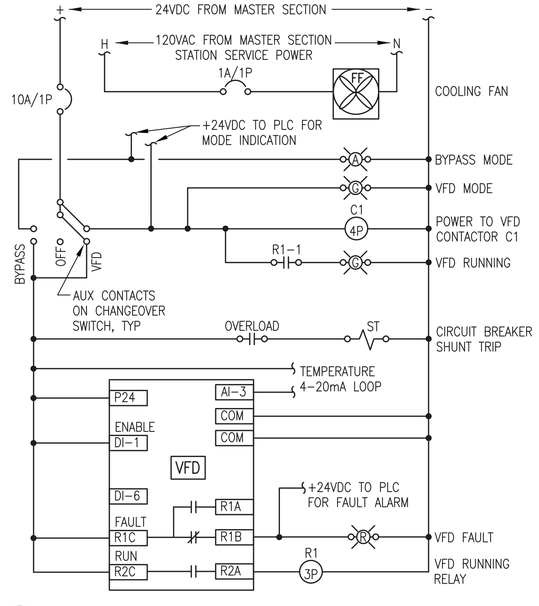
ONE–LINE GENERAL NOTES:

1) THE MODULE FLOOR IS PLATE STEEL CONTINUOUSLY WELDED TO STEEL BEAMS WHICH WILL BE FIELD BONDED TO THE GROUND GRID. BOND SWITCHGEAR AND GENERATOR GROUNDS TO STEEL FLOOR. SEE SHEET E2.
2) ISOLATE EACH GENERATOR NEUTRAL FROM MOUNTING SKID & GENERATOR FRAME. CONNECT NEUTRAL TO THE NEUTRAL BUS AT THE PARALLELING SWITCHGEAR. INDEPENDENTLY GROUND EACH GENERATOR FRAME TO SWITCHGEAR GROUND BUS & PROVIDE SECOND GROUND DIRECTLY TO PLANT FLOOR.
3) EXCEPT FOR TESTING WITH LOAD BANK, DO NOT BOND SWITCHGEAR NEUTRAL BUS TO THE SWITCHGEAR GROUND BUS. GROUND NEUTRAL AT THE STEP UP TRANSFORMER BANK AND REMOVE NEUTRAL–GROUND STRAP PRIOR TO CONNECTING TO GRID.
4) GENERATOR CONDUCTORS 150°C CABLE. TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT RATED TEMPERATURE. FEEDER AND STATION SERVICE CONDUCTORS 90°C.
5) COMMUNITY STEP–UP TRANSFORMER BANK CONSISTS OF 3 EACH 50kVA SINGLE–PHASE POLE–MOUNT TRANSFORMERS, SEE ON–SITE WORK SITE PLAN FOR NEW TRANSFORMER INSTALLATION & CONNECTION DETAILS

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 E6.2 ARC FLASH LABELS
NO SCALE



3 E6.2 TYPICAL RADIATOR VFD LOGIC DIAGRAM
NO SCALE

REV#1
ISSUED FOR
CONSTRUCTION
NOV 2023

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

REV.	DESCRIPTION	DATE	BY
1	REVISE VFD TO MATCH SHOP AS BUILT (DELETE ENABLE TIMER)	11/13/23	BCG

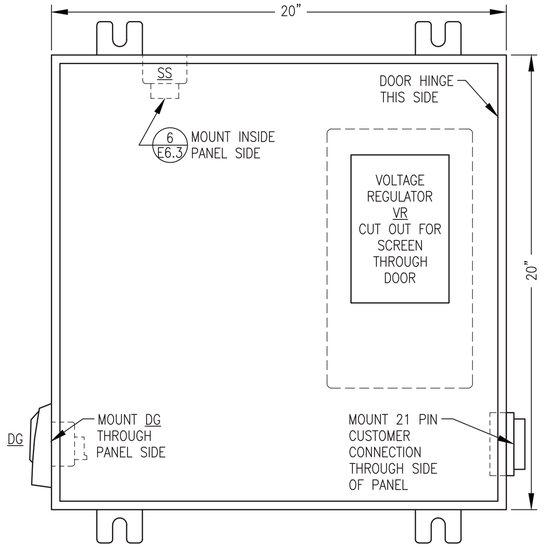
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

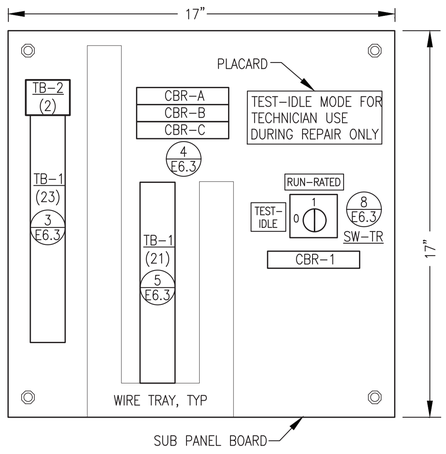
TITLE: SWITCHGEAR ONE–LINE & SCHEMATICS

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

DRAWN BY: JTD | SCALE: NO SCALE
DESIGNED BY: CWV/BCG | DATE: 4/10/23
FILE NAME: NELS PP E6 | SHEET: E6.2
PROJECT NUMBER:



1 E6.3 JUNCTION BOX FRONT PANEL LAYOUT
NO SCALE



2 E6.3 JUNCTION BOX SUB PANEL LAYOUT
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-150 5NS1V1N1S	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.

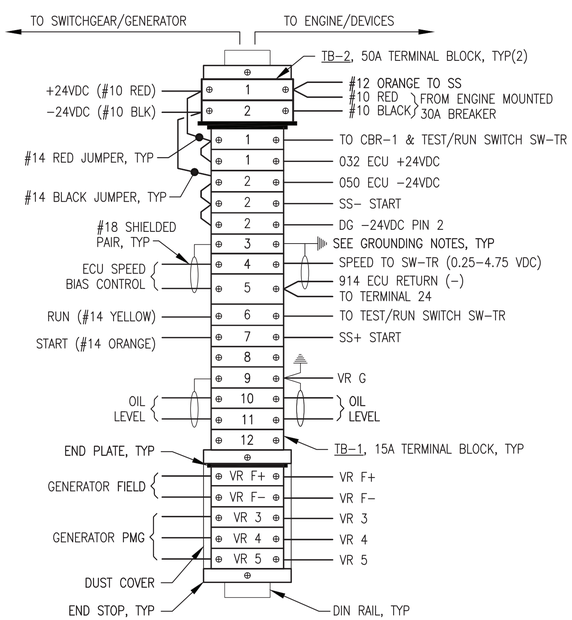
SHOP FABRICATION NOTES:

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:

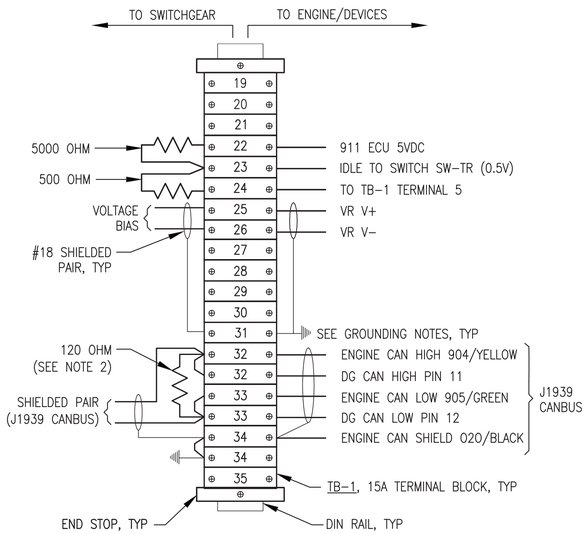
1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH SPECIFICATIONS. LABEL BOTH ENDS OF ALL FIELD WIRING WITH THE ENGINE PANEL TERMINAL NUMBER.
2) ON SHIELDED CONDUCTORS GROUND ALL SHIELD DRAIN WIRES AT ENGINE J-BOX ONLY. CLIP DRAIN WIRES AT OPPOSITE ENDS.

4 E6.3 CIRCUIT BREAKER CONNECTIONS
NO SCALE



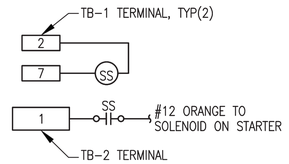
NOTE: TYPICAL JOHN DEERE ECU CONNECTION NUMBERS SHOWN. SEE WIRING HARNESS FOR EACH ENGINE FOR ACTUAL ECU CONNECTIONS.

3 E6.3 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.

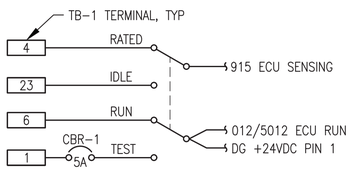
5 E6.3 TERMINAL STRIP CONNECTIONS
NO SCALE



6 E6.3 STARTER AUX SOLENOID SS WIRING
NO SCALE

NOT USED

7 E6.3 EXHAUST RTD CONNECTOR
NO SCALE



8 E6.3 TEST-IDLE/RUN-RATED SWITCH SW-TR WIRING
NO SCALE

ENGINE WIRING JUNCTION BOXES SHOWN HERE WILL BE FURNISHED AS PART OF THE OWNER FURNISHED ENGINE-GENERATORS.

REV#1
ISSUED FOR
CONSTRUCTION
AUGUST 2023

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

REV.	DESCRIPTION	DATE	BY
2	DELETED EXHAUST RTD & VACUUM SENSOR PER NEW J1939 ENGINE MONITORING	8/15/23	BCG
1	UPDATED TO ADD 21 PIN CUSTOMER CONNECTION	5/30/23	BCG

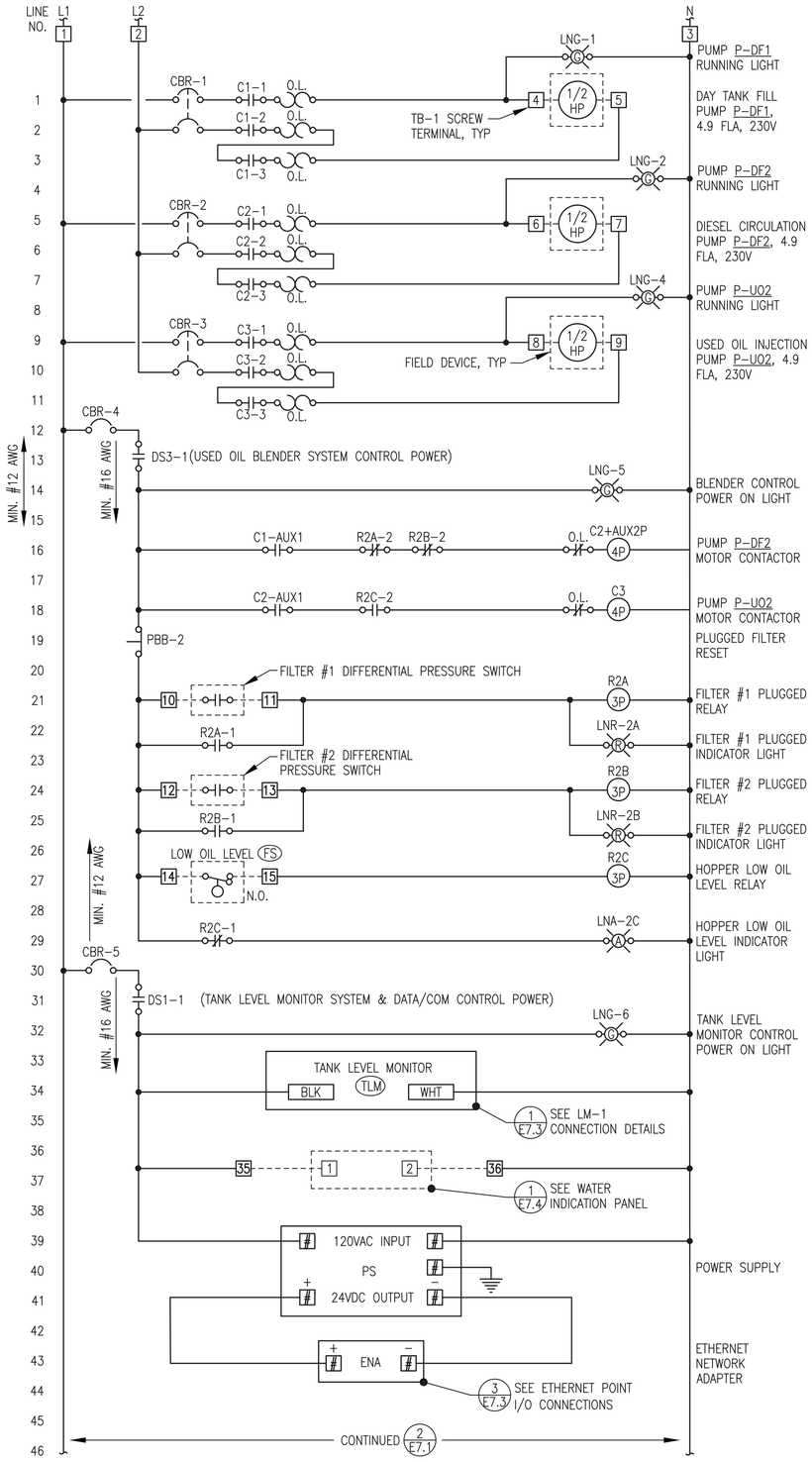
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

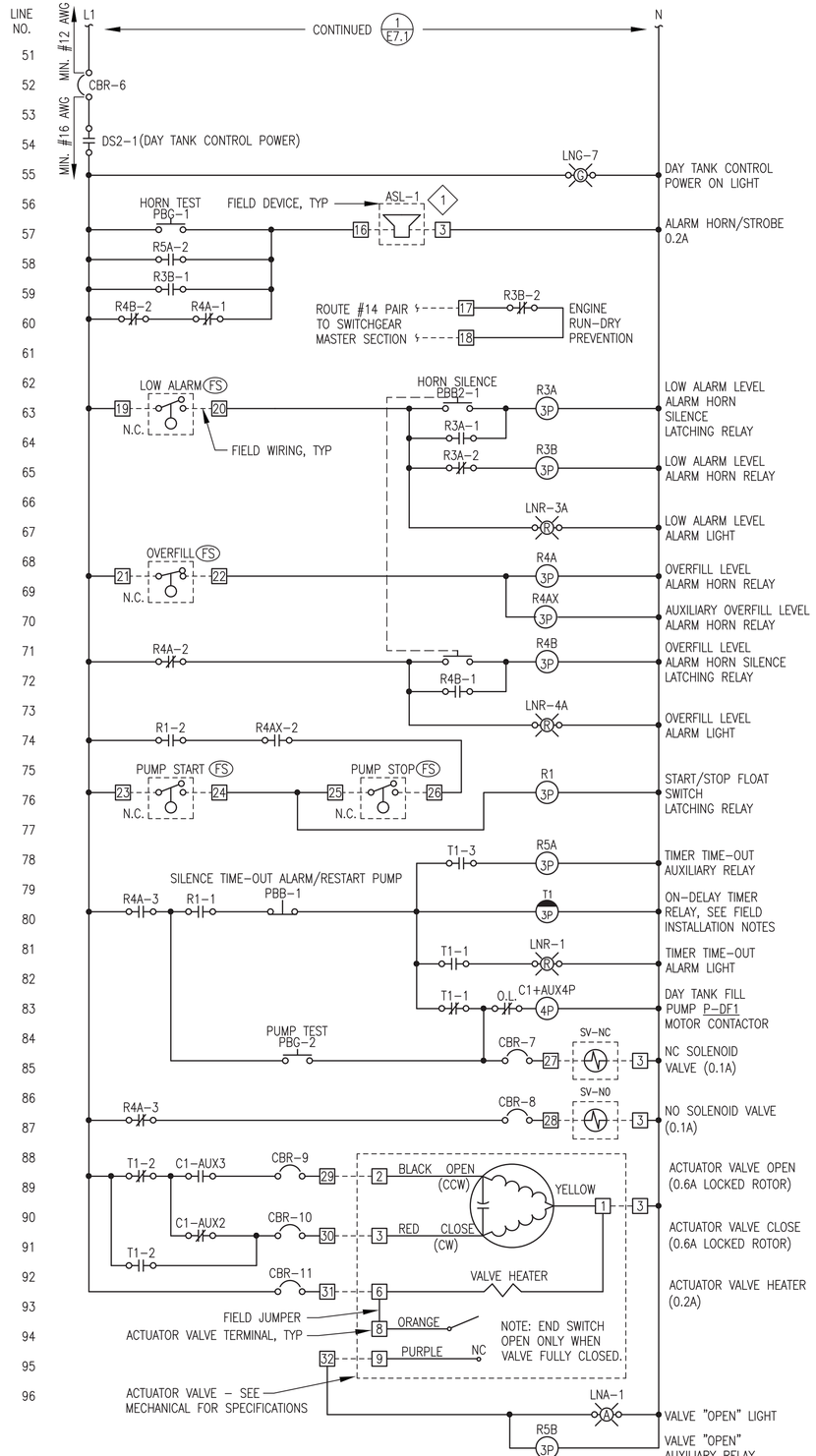
TITLE: 24VDC ENGINE WIRING JUNCTION BOX

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

DRAWN BY: JTD	SCALE: NO SCALE
DESIGNED BY: CWV/BCG	DATE: 4/10/23
FILE NAME: NELS PP E6	SHEET: E6.3
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	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	ALLAN-BRADLEY	1734-AENTR	I/O DUAL PORT ETHERNET NETWORK ADAPTER
DI8	ALLAN-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
OL	ALLEN-BRADLEY	193-1EEDB	OVERLOAD, 230V, 1ø, ADJUSTABLE 3.2A-16.0A RANGE
PBB	ALLEN-BRADLEY	800HAR2D2	MOMENTARY PUSH BUTTON, 1 NO, NEMA 4X, BLACK
PBB2	ALLEN-BRADLEY	800HAR2A2	MOMENTARY PUSH BUTTON, 2 NO, NEMA 4X, BLACK
PBG	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	35A, 600V, LARGE-HEAD SCREW TERMINALS
TLM	TANK LEVEL MONITOR, SEE INSTRUMENTATION SCHEDULE ON SHEET M1.1		

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 CONSTRUCTION
MAY 2023

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

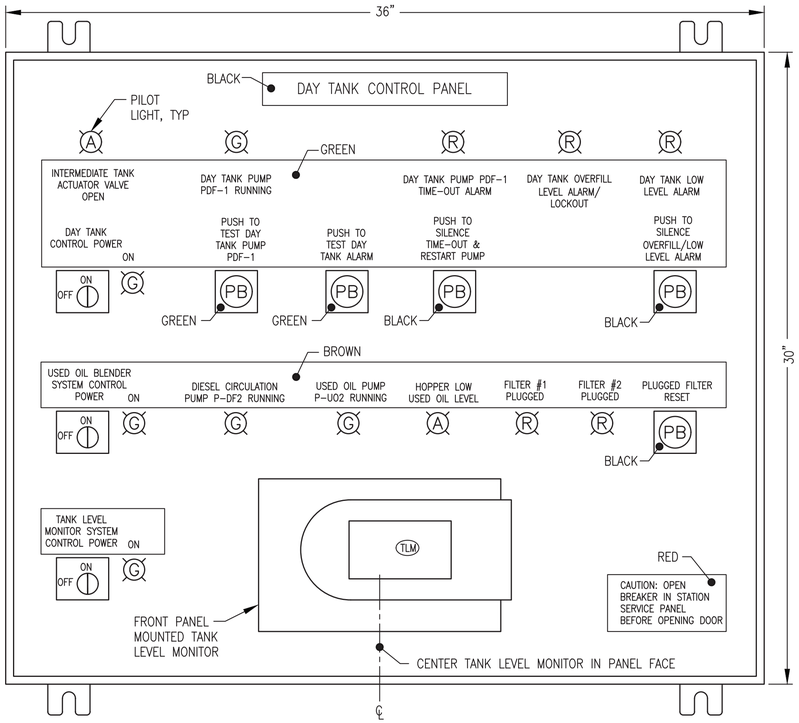
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

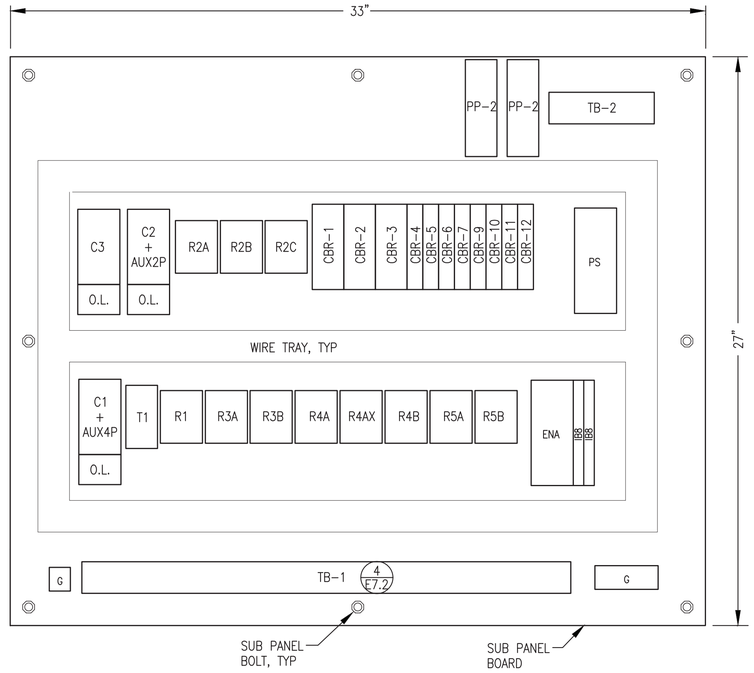
TITLE: DAY TANK CONTROL PANEL LOGIC DIAGRAM & BILL OF MATERIALS

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

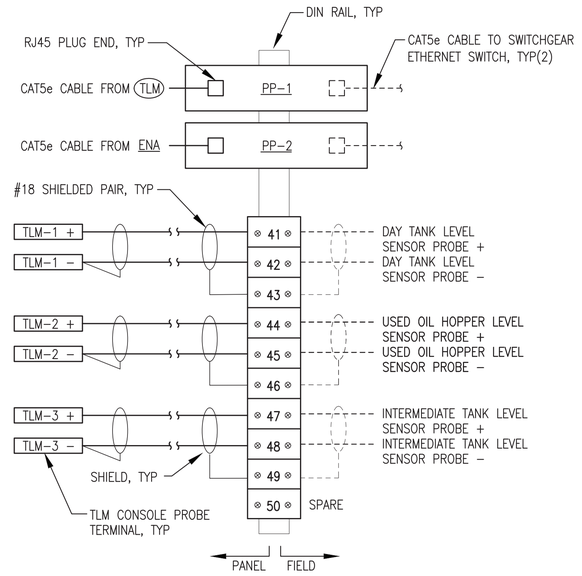
DRAWN BY: BCG/JTD
DESIGNED BY: CWV/BCG
FILE NAME: NELS PP E7
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 5/30/23
SHEET: E7.1



1 E7.2 FRONT PANEL LAYOUT
NO SCALE



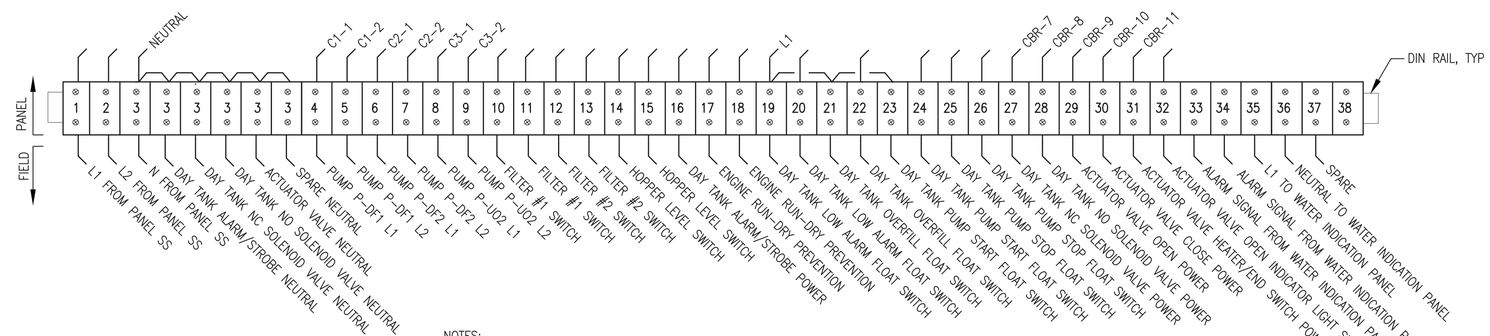
2 E7.2 SUB PANEL LAYOUT
NO SCALE



NOTES:

1. INSTALL TERMINAL STRIP TB–2 AND ETHERNET PATCH PANEL PP–1 ON VERTICAL 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 TB–2 TERM STRIP LAYOUT
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 CONSTRUCTION
MAY 2023

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

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: DAY TANK CONTROL PANEL LAYOUT & TERMINAL STRIPS

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

DRAWN BY: BCG/JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 5/30/23
FILE NAME: NELS PP E7	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.

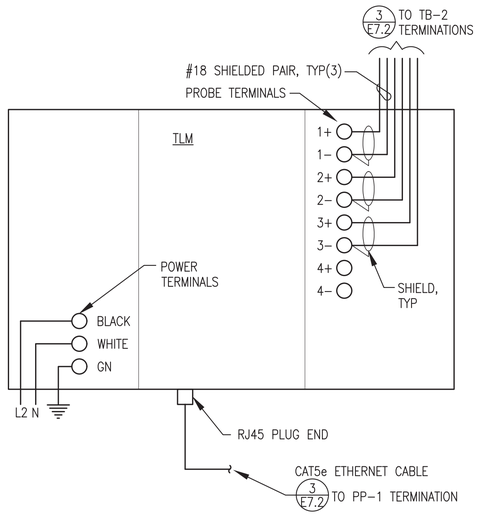
USED OIL BLENDER SYSTEM SEQUENCE OF OPERATIONS:

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.

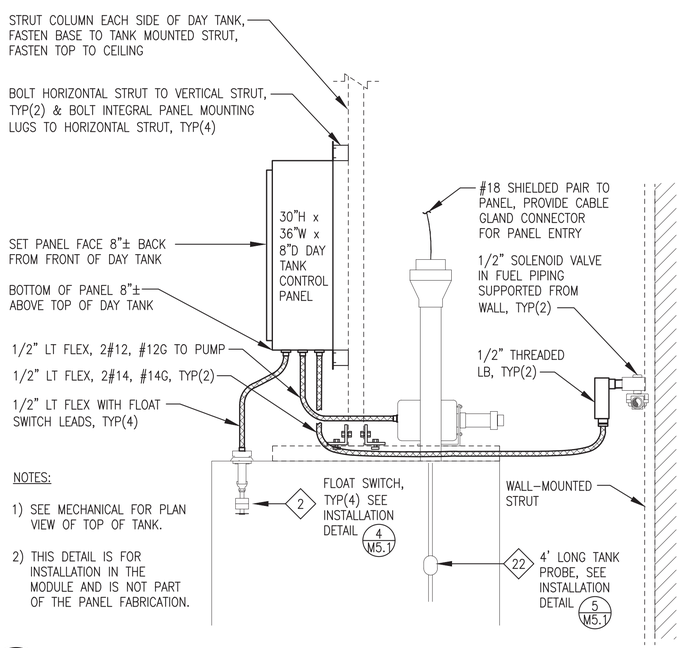
2) NORMAL OPERATION – WHENEVER THE DAY TANK FILL SEQUENCE IS INITIATED, BOTH THE DIESEL CIRCULATING PUMP P-DF2 AND THE USED OIL INJECTION PUMP P-UO2 RUN AND THE ASSOCIATED GREEN PUMP RUNNING LIGHTS ARE ON.

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.

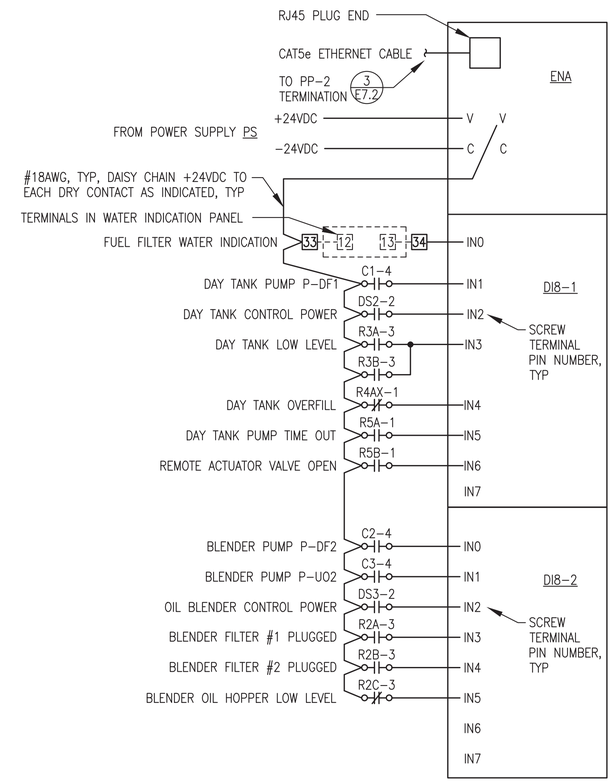
4) HOPPER LOW OIL LEVEL – WHEN THE OIL LEVEL FALLS BELOW THE LOW LEVEL FLOAT SWITCH, USED OIL INJECTION PUMP P-UO2 STOPS RUNNING AND THE AMBER HOPPER LOW OIL LEVEL LIGHT TURNS ON. PUMP P-UO2 WILL NOT OPERATE UNTIL THE USED OIL LEVEL IN THE HOPPER RISES ABOVE THE LOW LEVEL. RESET IS NOT REQUIRED.



1 E7.3 TANK LEVEL MONITOR (TLM) CONSOLE CONNECTIONS
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 CONSTRUCTION
MAY 2023

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

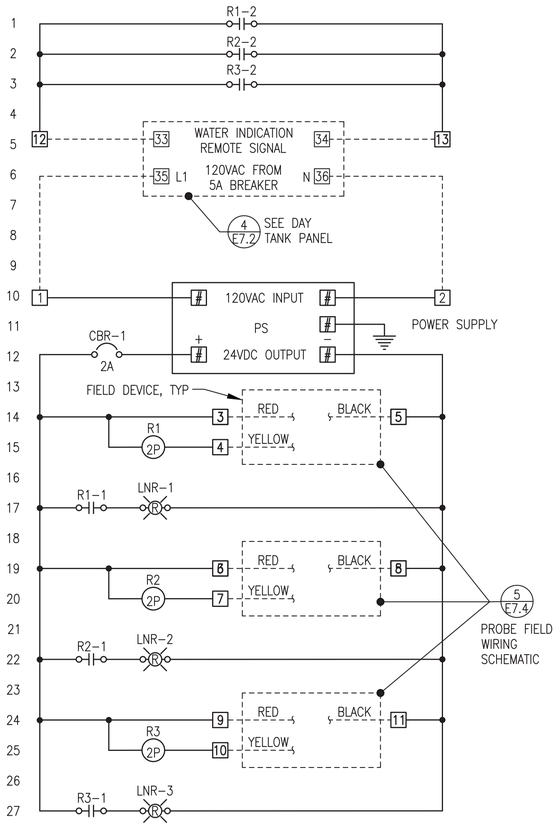
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

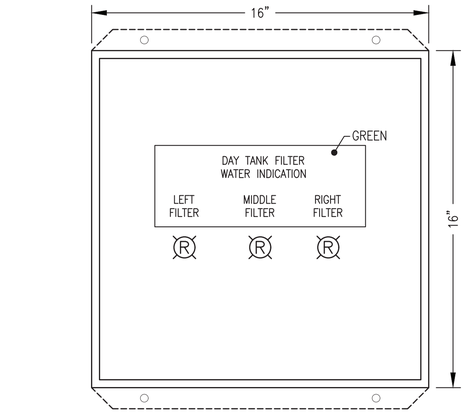
TITLE: DAY TANK CONTROL PANEL NOTES, SEQUENCE OF OPERATIONS & INTERCONNECT DETAILS

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

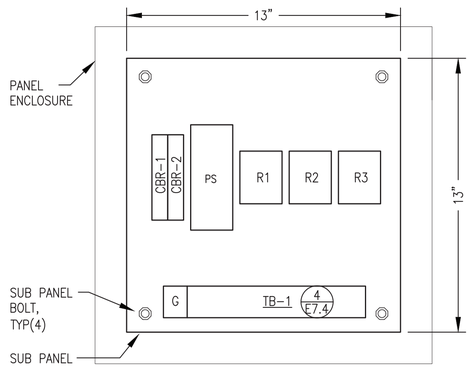
DRAWN BY: BCG/JTD	SCALE: AS NOTED
DESIGNED BY: CWV/BCG	DATE: 5/30/23
FILE NAME: NELS PP E7	SHEET: E7.3
PROJECT NUMBER:	



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	CP5.241-S1	5A, 120VAC/24VDC POWER SUPPLY
R	3	ALLEN-BRADLEY	700HA32A1	2PDT RELAY
	3	ALLEN-BRADLEY	700HN100	8 PIN SOCKET BASE
TB	15	ALLEN-BRADLEY	1492CAM1L	35A, 600V, LARGE-HEAD SCREW TERMINALS

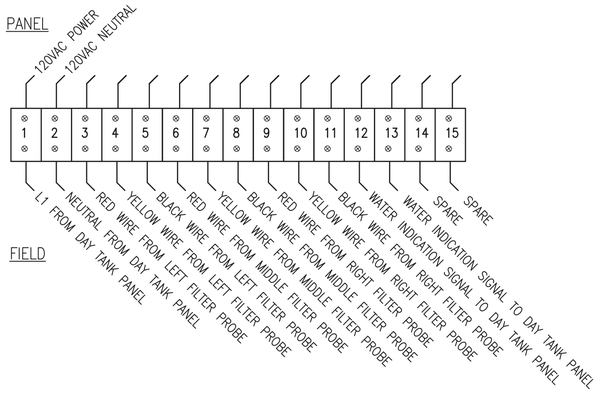
PANEL SHOP FABRICATION NOTES:

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.

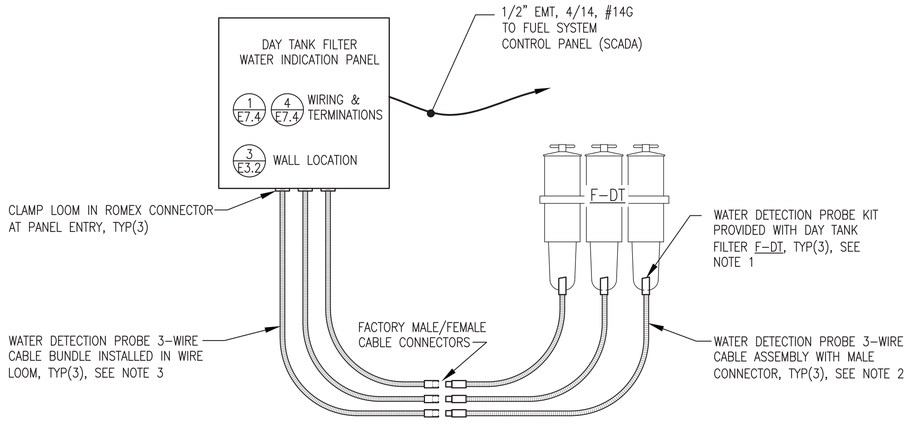
4) CONNECT DEVICES WITH MANUFACTURER PROVIDED CABLES IN ACCORDANCE WITH INSTALLATION INSTRUCTIONS.



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
CONSTRUCTION
MAY 2023

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

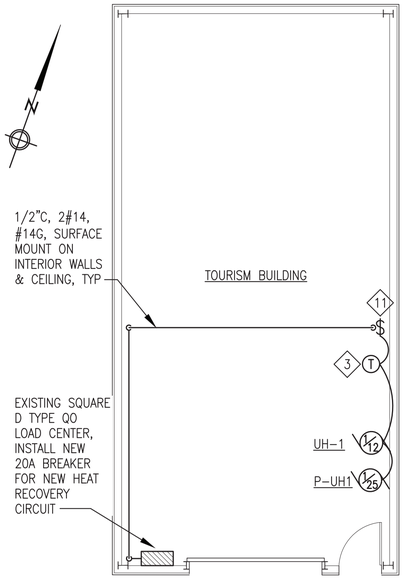
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: DAY TANK FILTER WATER INDICATION PANEL

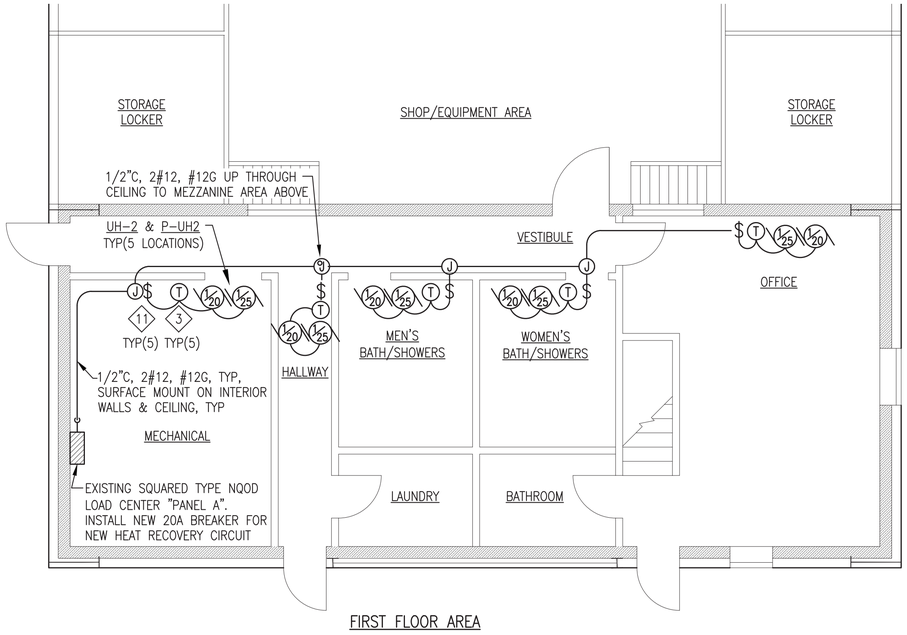
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: BCG/JTD
DESIGNED BY: CWV/BCG
FILE NAME: NELS PP E7
PROJECT NUMBER:
SCALE: AS NOTED
DATE: 5/30/23
SHEET: E7.4

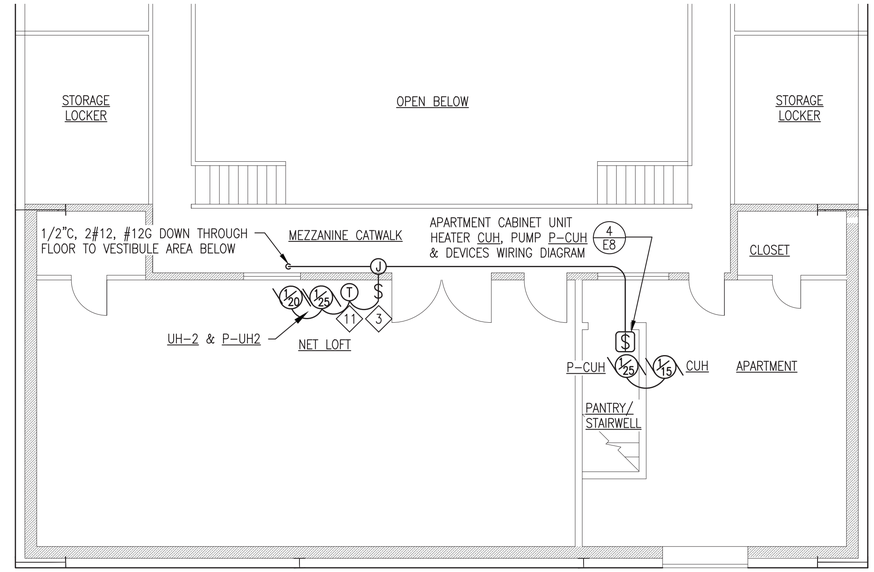


1 E8 TOURISM BUILDING ELECTRICAL PLAN

1/2"=1'-0"



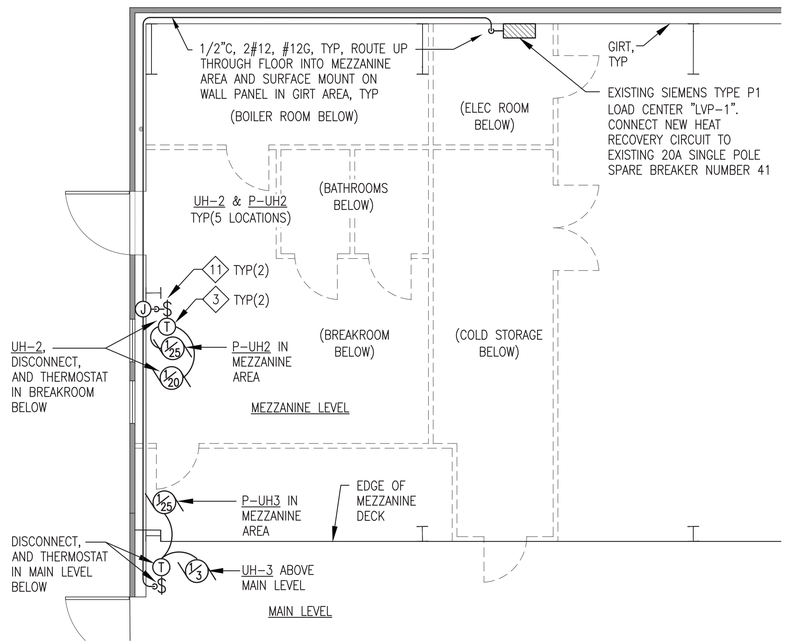
FIRST FLOOR AREA



MEZZANINE AREA

2 E8 STORAGE COMPOUND ELECTRICAL PLAN

3/16"=1'-0"



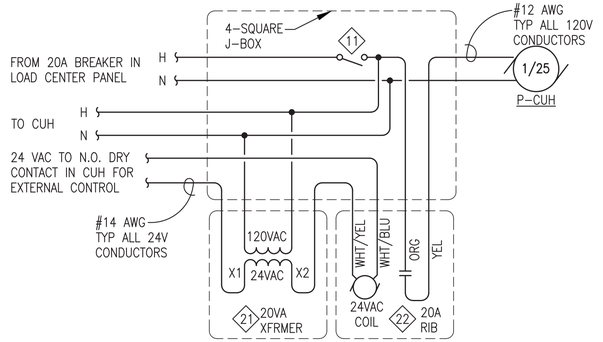
3 E8 ICEHOUSE ELECTRICAL PLAN

3/16"=1'-0"

GENERAL NOTES:

1) SEE SHEET E1.2 FOR BUILDING LOCATIONS.

2) SEE MECHANICAL FOR EQUIPMENT INSTALLATION DETAILS IN EACH BUILDING.



4 E8 CUH WIRING DIAGRAM

NO SCALE

ISSUED FOR CONSTRUCTION MAY 2023

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

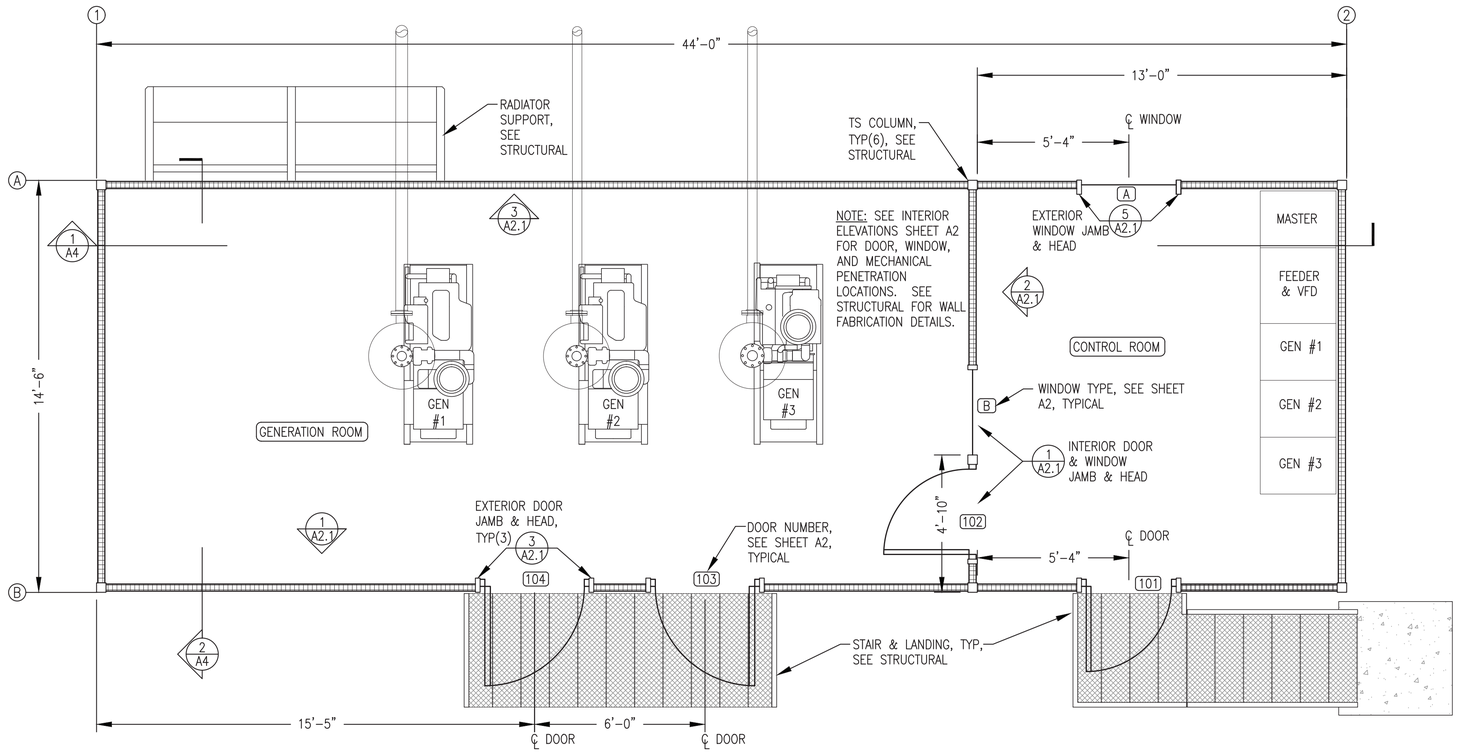
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

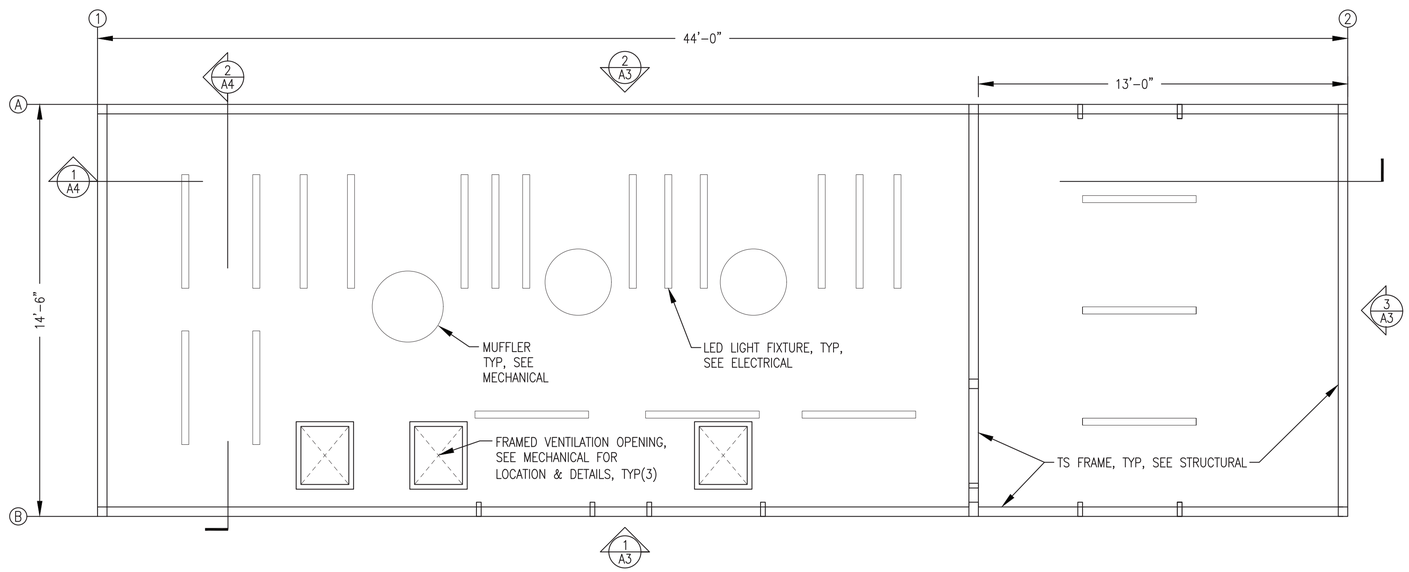
TITLE: HEAT RECOVERY SYSTEM BUILDING A ELECTRICAL PLAN & DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: BCG	DATE: 5/30/23
FILE NAME: NELSS PP E8	SHEET: E8
PROJECT NUMBER:	



1 A1 FLOOR PLAN
3/8"=1'-0"



2 A1 REFLECTED CEILING PLAN
3/8"=1'-0"

CODE ANALYSIS – 2021 EDITION INTERNATIONAL BUILDING CODE

OCCUPANCY CLASSIFICATION	REF: IBC–2021, SEC. 306.2
GROUP F–1: FACTORY INDUSTRIAL MODERATE HAZARD – ELECTRIC GENERATION PLANT	
TYPE OF CONSTRUCTION	REF: IBC–2021, TABLE 601
TYPE V–B (NON–RATED)	REF: IBC–2021, SEC. 602.5
BUILDING HEIGHTS AND AREAS	REF: IBC–2021, TABLES 504.3, 504.4, & 506.2
MAX ALLOWED = 40'–0" 1 STORY 8,500 S.F	ACTUAL = 16'–0" 1 STORY 640 S.F
FIRE RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS	REF: IBC–2021, TABLE 601
STRUCTURAL FRAME: 0 HR BEARING WALLS: 0 HR INTERIOR PARTITIONS: 0 HR	FLOOR: 0 HR ROOF: 0 HR
FIRE RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS	REF: IBC–2021, SEC. 705.5
EXTERIOR WALLS 10' < X < 30' 0 HR	
FIRE PROTECTION SYSTEM	REF: IBC–2021, SEC. 903.2.4
FIRE PROTECTION NOT REQUIRED. WATER MIST FIRE SUPPRESSION SYSTEM PROVIDED (SEE MECHANICAL).	
OCCUPANT LOAD	REF: IBC–2021, TABLE 1004.5
MECHANICAL/STORAGE = 300 S.F./PERSON	610 S.F./300 S.F. PER OCCUPANT = 2 OCCUPANTS
MEANS OF EGRESS – TRAVEL DISTANCE	REF: IBC–2021, TABLE 1017.2
MAX ALLOWED = 200'	ACTUAL = 40'
COMBUSTIBLE LIQUIDS STORAGE	REF: IBC–2021, TABLE 307.1(1)(i)
MAX ALLOWED = 660 GAL CLASS II LIQUIDS	ACTUAL = 200 GAL CLASS II (DIESEL FUEL DAY TANK)
MAX ALLOWED = 13200 GAL CLASS IIIB LIQUIDS	ACTUAL = 110 GAL CLASS IIIB (GLYCOL & LUBE OIL)
STATIONARY STORAGE BATTERY SYSTEMS	REF: IFC–2021, TABLE 1207.1.1
MAX EXEMPT = 50 GAL (FLOODED LEAD ACID)	ACTUAL = 6 GAL (6 BATTERIES AT 1 GAL MAX EACH)

ARCHITECTURAL GENERAL NOTES:

1) SEE CIVIL SITE PLAN FOR LOCATION AND LAYOUT. PROVIDE SEPARATION TO PROPERTY BOUNDARIES IN ACCORDANCE WITH CODE ANALYSIS.
2) PROVIDE A COMPLETE AND OPERATIONAL FACILITY. ALL WORK TO BE IN ACCORDANCE WITH CURRENT APPROVED EDITIONS OF THE IBC, IMC, IFC, AND NEC INCLUDING STATE OF ALASKA AMENDMENTS.
3) SEE SHEET A2 FOR DOOR AND WINDOW DETAILS AND SCHEDULE. SEE SHEETS A3 AND A4 FOR DESCRIPTION OF FIELD INSTALLED ROOF SYSTEM.
4) INSULATE ALL WALLS, FLOORS, AND CEILINGS WITH HIGH TEMPERATURE MINERAL FIBER ACOUSTICAL FIRE BATT INSULATION, MIN R VALUE 4 PER INCH, MIN 2000F MELTING TEMP. ROXUL AFB OR EQUAL. FILL ALL PANEL VOIDS OR PROVIDE THICKNESS AS INDICATED ON DRAWINGS. MECHANICALLY FASTEN FLOOR INSULATION TIGHT TO FLOOR.
5) UPON COMPLETION OF FABRICATION ROUND ALL CORNERS AND GRIND EDGES SMOOTH AND PAINT ALL INTERIOR AND EXTERIOR EXPOSED STEEL. PERFORM ALL PAINTING IN A WARM DRY ENVIRONMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS INCLUDING DRYING TIME TO RE–COAT.
6) SANDBLAST EXTERIOR SURFACE TO SSPC–SP–10. PRIME WITH ONE COAT OF REINFORCED INORGANIC ZINC PRIMER, DEVOE CATHA–COAT 302 OR APPROVED EQUAL, COLOR GREEN, TO 3 MILS DRY FILM THICKNESS. COVER WITH TWO COATS OF EPOXY, DEVOE BAR–RUST 236 OR APPROVED EQUAL, TO 10 MILS DRY FILM THICKNESS. FIRST COAT COLOR WHITE, SECOND COAT COLOR GRAY.
7) FINISH EXTERIOR WALLS AND SKIDS (ALL EXPOSED VERTICAL EXTERIOR SURFACES) WITH ONE COAT OF ALIPHATIC URETHANE ENAMEL, DEVOE DEVTHANE 389 OR APPROVED EQUAL, COLOR WHITE, TO 3 MILS DRY FILM THICKNESS. NOTE: TOTAL EXTERIOR COATING BUILD 16 MILS MINIMUM DRY FILM THICKNESS.
8) SANDBLAST INTERIOR SURFACE TO SSPC–SP–6. PRIME AND FINISH WITH TWO COATS OF EPOXY, PPG AMERLOC 2 VOC OR APPROVED EQUAL, TO 8 MILS TOTAL DRY FILM THICKNESS. CEILING COLOR WHITE. WALL AND FLOOR COLOR ANSI 61 GRAY. NOTE THAT FIRST COAT ON WALLS AND FLOOR MAY BE WHITE.
9) SANDBLAST ALL EXTERIOR PLATFORMS AND FABRICATIONS AND APPLY 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR EQUAL, TO 9 MILS MINIMUM DRY FILM THICKNESS. SEE STRUCTURAL.

THIS DRAWING INCLUDES DETAILS THAT ARE NOT PART OF THE MODULE ASSEMBLY SCOPE AND IS PROVIDED STRICTLY FOR IDENTIFYING LOCATIONS, INSTALLATION DETAILS, AND SPECIFICATIONS FOR DOORS AND WINDOWS.

ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49 TH
David G. Thompson
No. 7034
3/2/23
REGISTERED PROFESSIONAL ARCHITECT

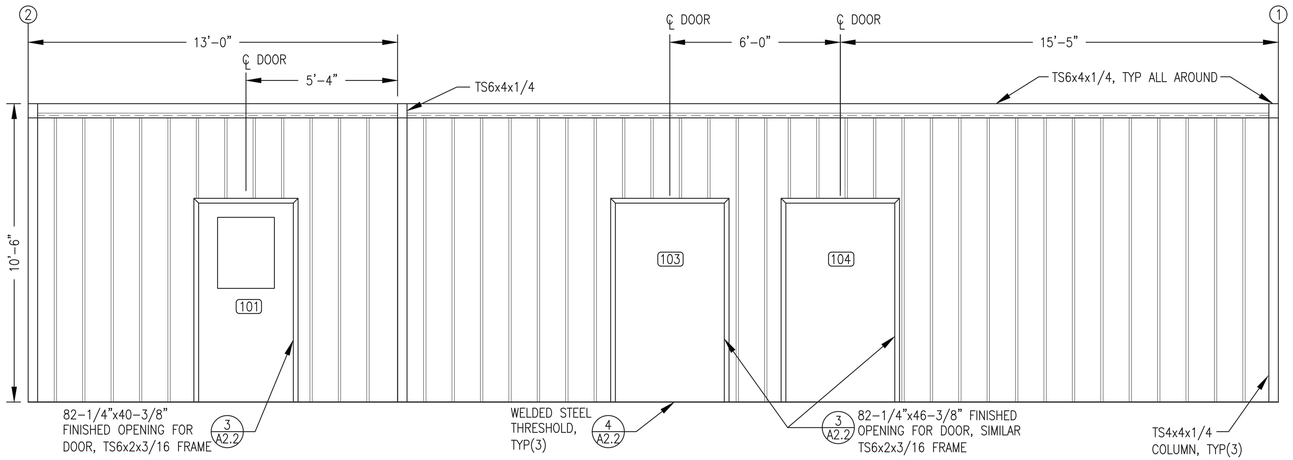
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

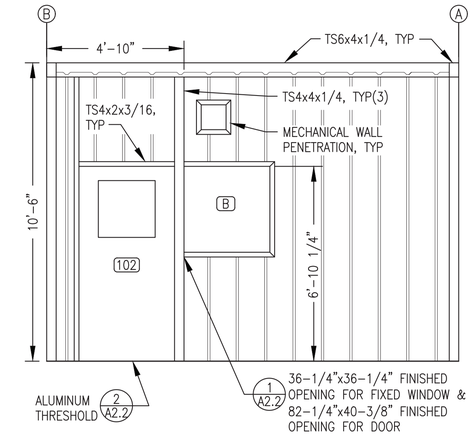
TITLE: FLOOR PLAN, REFLECTED CEILING PLAN, CODE ANALYSIS, & GENERAL NOTES

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

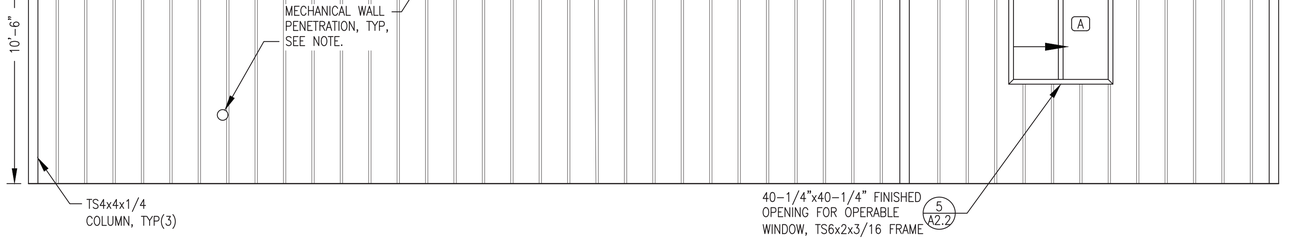
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP A1–A4	SHEET: A1
PROJECT NUMBER:	



1 A2.1 FRONT WALL INTERIOR ELEVATION
3/8"=1'-0"



2 A2.1 CONTROL ROOM WALL INTERIOR ELEVATION
3/8"=1'-0"



3 A2.1 PARTIAL BACK WALL INTERIOR ELEVATION
3/8"=1'-0"

FRAMED OPENING NOTES:

1) SEE MECHANICAL FOR SIZE, LOCATIONS, QUANTITY, AND DETAILS OF ALL MECHANICAL WALL PENETRATIONS.
2) FABRICATE DOOR AND WINDOW FRAMED OPENINGS TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED AND LOCATE TO INSIDE EDGE OR CENTERLINE AS INDICATED.
3) FABRICATE ALL FRAMED OPENINGS WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS. GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

THIS DRAWING INCLUDES DETAILS THAT ARE NOT PART OF THE MODULE ASSEMBLY SCOPE AND IS PROVIDED STRICTLY FOR IDENTIFYING LOCATIONS, INSTALLATION DETAILS, AND SPECIFICATIONS FOR DOORS AND WINDOWS.

ISSUED FOR CONSTRUCTION
MARCH 2023

STATE OF ALASKA 49 TH
David G. Thompson No. 7034 3/2/23
REGISTERED PROFESSIONAL ARCHITECT

ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: INTERIOR ELEVATIONS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP A1-A4	SHEET: A2.1
PROJECT NUMBER:	

DOOR CONSTRUCTION

DOOR NO.	WIDTH	HEIGHT	THICK NESS	FIRE RATING	HARDWARE GROUP	WALL THICK.	FRAME PROFILE	FRAME PREP.	REMARKS
101	3'-0"	6'-8"	1-3/4"	NONE	HW-1	N/A	3-3/4" SINGLE RABBETED	DIMPLE & PUNCH	24"x24" RE-LIGHT {4}
102	3'-0"	6'-8"	1-3/4"	NONE	HW-2	N/A	3-3/4" SINGLE RABBETED	DIMPLE & PUNCH	24"x24" RE-LIGHT {4}
103	3'-6"	6'-8"	1-3/4"	NONE	HW-3	N/A	3-3/4" SINGLE RABBETED	DIMPLE & PUNCH	
104	3'-6"	6'-8"	1-3/4"	NONE	HW-3	N/A	3-3/4" SINGLE RABBETED	DIMPLE & PUNCH	

DOOR HARDWARE:

HW-1				
3	EA	HINGES	HAGER	BB1191 4.5 x 4.5NRP x 630
1	EA	EXIT DEVICE	PRECISION	2108 x 4908AX3 x 630
1	EA	CORE	BEST	BROWN CONSTRUCTION CORE
1	EA	DOOR CLOSER W/SPRING STOP	LCN	4040 x SCUSH x 689
1	EA	KICK PLATE	ROCKWOOD	K1050 10 x 34 x 630
1	EA	WEATHER STRIP	PEMKO	2891AS x 36 (HEAD)
2	EA	WEATHER STRIP	PEMKO	290AS x 80 (SIDE JAMBS)
1	EA	BOTTOM SWEEP	HAGER	750S x 36
HW-2				
3	EA	HINGES	HAGER	BB1191 4.5 x 4.5 x 630
1	EA	EXIT DEVICE	PRECISION	2108 x 4908AX3 x 630
1	EA	DOOR CLOSER	LCN	4040 x CUSH x 689
1	EA	KICK PLATE	ROCKWOOD	K1050 10 x 34 x 630
1	EA	MOP PLATE	ROCKWOOD	K1050 10 x 35 x 630
1	EA	WEATHER STRIP	PEMKO	2891AS x 36 (HEAD)
2	EA	WEATHER STRIP	PEMKO	290AS x 80 (SIDE JAMBS)
1	EA	THRESHOLD	HAGER	580S x 36
HW-3				
3	EA	HINGES	HAGER	BB1191 4.5 x 4.5NRP x 630
1	EA	EXIT LOCK	SCHLAGE	ND25D x RHODES x 626
1	EA	OVERHEAD STOP HEAVY DUTY	ROCKWOOD	OH903H x US32D
1	EA	WEATHER STRIP	PEMKO	2891AS x 42 (HEAD)
2	EA	WEATHER STRIP	PEMKO	290AS x 80 (SIDE JAMBS)
1	EA	BOTTOM SWEEP	HAGER	750S x 42

NOTES:

{1} DOORS TO BE 16 GA. STEEL WITH SOLID POLYURETHANE INSULATION CORE AND WITH TOPS INVERTED AND CAULKED WATER TIGHT.

{2} HOLLOW METAL FRAMES TO BE 16 GA. STEEL WELDED CONSTRUCTION, DIMPLED AND PUNCHED.

{3} DOORS AND HOLLOW METAL FRAMES GALVANIZED AND FACTORY PRIMED. FIELD FINISH WITH TWO COATS OF PAINT IDENTICAL TO INTERIOR WALLS AND FLOORS AS SPECIFIED ON SHEET A1.

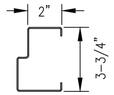
{4} INSTALL INSULATED RE-LIGHT WITH TWO PANES OF 1/4" LAMINATED SAFETY GLASS WITH 1/2" AIR GAP, SIZE AS INDICATED.

{5} MOUNT DOOR CLOSERS AND OVERHEAD STOPS TO VERTICAL INTERIOR FACES OF DOORS AND FRAMES SO THERE IS NO INTERFERENCE WITH WEATHER STRIP.

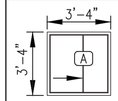
{6} SET FRAMES PLUMB AND ADJUST POSITION AND HARDWARE SO DOORS OPERATE SMOOTH WITHOUT INTERFERENCE.

{7} SET WEATHER STRIPS TIGHT TO DOORS TO MAKE WATER TIGHT SEAL TOP AND SIDE. SEAL CORNERS WITH POLYURETHANE CAULK. UPON COMPLETION, DOORS SHALL BE TESTED FOR WATER TIGHTNESS WITH 10 GPM HOSE STREAM AGAINST EXTERIOR EDGES.

DOOR FRAME PROFILE:



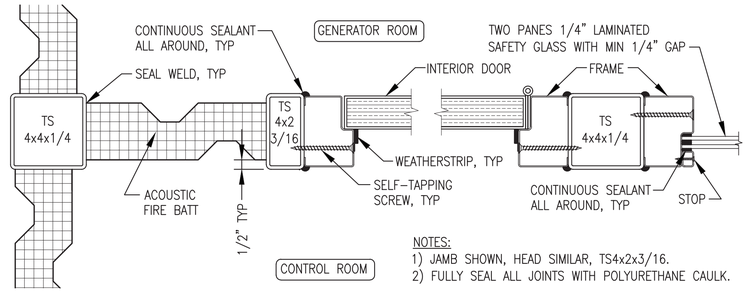
WINDOW TYPES:



OPERABLE SLIDER WITH WHITE VINYL FRAME & 1" INSULATED GLAZING

FIXED SINGLE RABBET HOLLOW METAL FRAME WITH 2 PANES OF 1/4" LAMINATED SAFETY GLASS

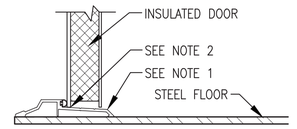
NOTE: DIMENSIONS ARE OVERALL FRAME SIZE.



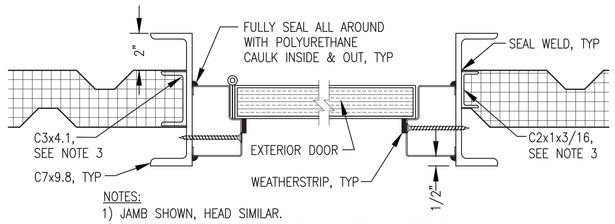
NOTES:
1) JAMB SHOWN, HEAD SIMILAR, TS4x2x3/16.
2) FULLY SEAL ALL JOINTS WITH POLYURETHANE CAULK.

1 A2.2 INTERIOR DOOR AND WINDOW JAMB/HEAD
NO SCALE

NOTES:
1) SET THRESHOLD IN CONTINUOUS BED OF POLYURETHANE CAULK & CAULK ENDS TO JAMB TO FORM LIQUID TIGHT CONTAINMENT.
2) TRIM DOOR BOTTOM TO WITHIN 1/8" MAX OF THRESHOLD TO ACHIEVE FULL CONTACT WITH GASKET.

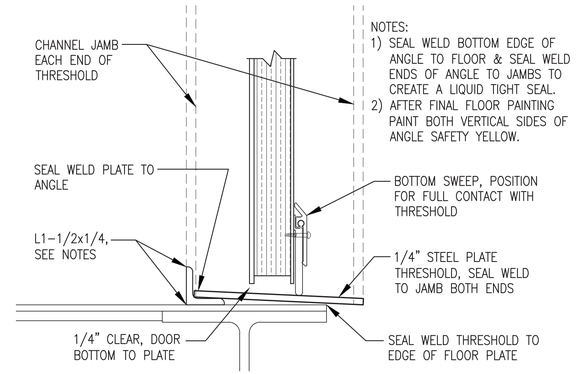


2 A2.2 INTERIOR DOOR THRESHOLD
NO SCALE



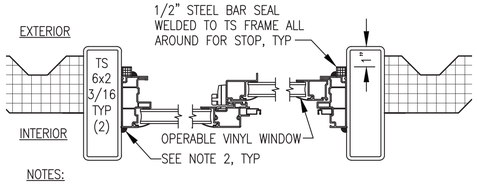
NOTES:
1) JAMB SHOWN, HEAD SIMILAR.
2) MITER TOP CORNERS & SEAL WELD TO FORM WATERTIGHT DAM.
3) PROVIDE 2" CHANNEL AT CORRUGATIONS & ACROSS HEAD. PROVIDE 3" CHANNEL AT FULL PANEL AS SHOWN. ON JAMBS RUN CONTINUOUS FLOOR TO ROOF FRAME.

3 A2.2 TYPICAL EXTERIOR DOOR JAMB/HEAD
NO SCALE



NOTES:
1) SEAL WELD BOTTOM EDGE OF ANGLE TO FLOOR & SEAL WELD ENDS OF ANGLE TO JAMBS TO CREATE A LIQUID TIGHT SEAL.
2) AFTER FINAL FLOOR PAINTING PAINT BOTH VERTICAL SIDES OF ANGLE SAFETY YELLOW.

4 A2.2 EXTERIOR DOOR THRESHOLD
NO SCALE



NOTES:
1) JAMB SHOWN, HEAD & SILL SIMILAR.
2) FULLY SEAL ALL JOINTS WITH POLYURETHANE CAULK.

5 A2.2 EXTERIOR WINDOW JAMB/HEAD
NO SCALE

ISSUED FOR CONSTRUCTION
MARCH 2023

STATE OF ALASKA 49 TH
David G. Thompson No. 7034 3/2/23
REGISTERED PROFESSIONAL ARCHITECT

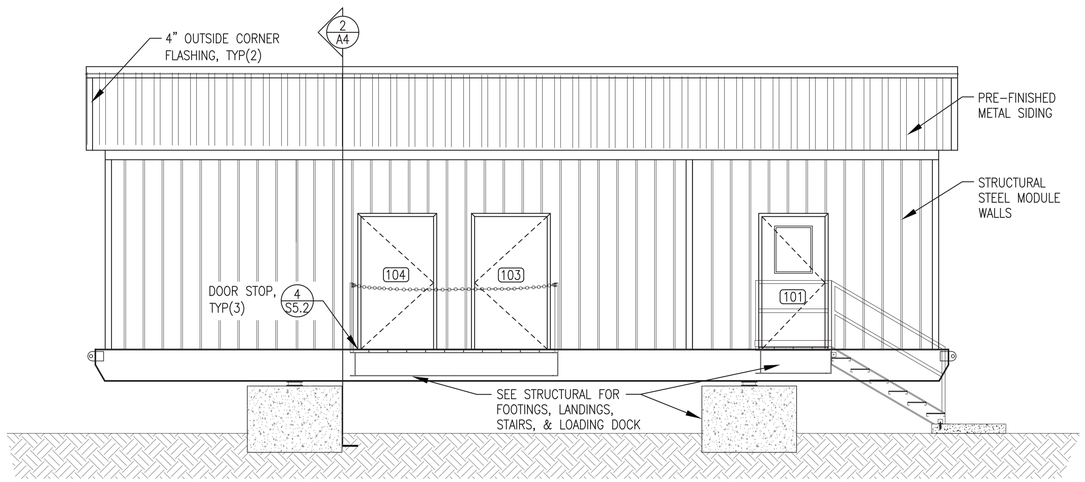
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

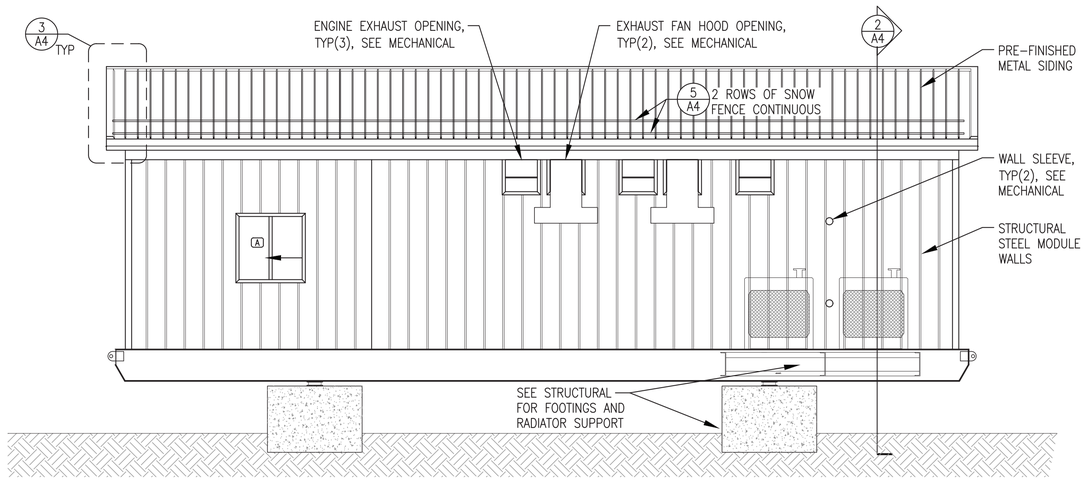
TITLE: DOOR & WINDOW DETAILS & SCHEDULE

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

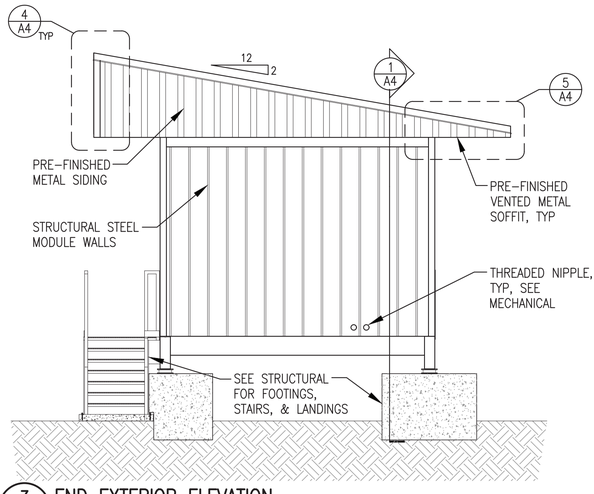
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP A1-A4	SHEET: A2.2
PROJECT NUMBER:	



1 A3 FRONT EXTERIOR ELEVATION
1/4"=1'-0"



2 A3 BACK EXTERIOR ELEVATION
1/4"=1'-0"



3 A3 END EXTERIOR ELEVATION
1/4"=1'-0"

ROOFING SYSTEM NOTES:

1) FIELD INSTALL TRUSSES TO MODULE STRUCTURE, SEE STRUCTURAL. FIELD INSTALL PLYWOOD SHEATHING, ICE AND WATER SHIELD, AND METAL ROOFING/SIDING AS INDICATED. SEAL AND FLASH ALL SEAMS TO FORM A CONTINUOUS WEATHERPROOF SEAL.

2) ALL ROOFING, SIDING, SOFFIT, TRIM, AND FLASHING SHALL BE MIN 24 GAUGE GALVANIZED STEEL WITH KYNAR FINISH, COLOR COOL TAHOE BLUE. ALL FASTENERS SHALL BE CORROSION RESISTANT COATED SCREWS AND RIVETS.

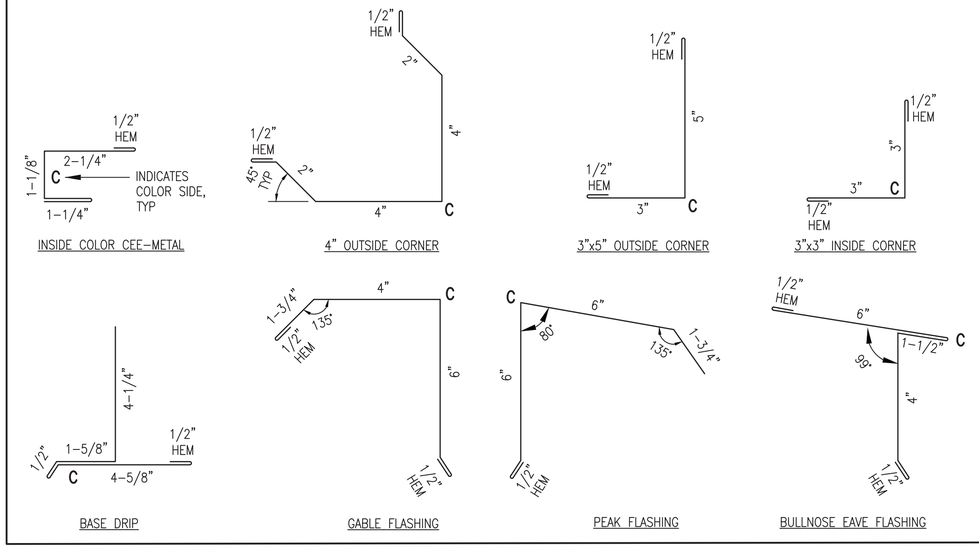
3) ROOFING SHALL BE MECHANICAL STANDING SEAM TYPE, 24 GAUGE, 16" NET COVERAGE, 2" HIGH RIBS AT 16" O.C. WITH TWO PENCIL RIBS BETWEEN. AEP SPAN SPAN LOK HP OR EQUAL. FURNISH CLIPS AND FASTENERS AS REQUIRED TO MEET LOAD CONDITIONS INDICATED ON SHEET S1.

4) SIDING SHALL BE LOW PROFILE, 24 GAUGE, 36" NET COVERAGE, 1-1/4" HIGH MAJOR RIBS AND 1/4 HIGH MINOR RIBS AT 12" O.C. AEP SPAN SUPER-SPAN OR EQUAL. FURNISH FASTENERS AS REQUIRED TO MEET LOAD CONDITIONS INDICATED ON SHEET S1.1.

5) VENTED SOFFIT PANELS SHALL BE 24 GAUGE GALVANIZED STEEL, 12" NET COVERAGE, KYNAR FINISH, 1" STANDOFF FROM SUBSTRATE, CONCEALED FASTENERS, WITH TWO PENCIL RIBS PROVIDING MINIMUM 7.8% NET FREE AREA. AEP SPAN FLUSH PANEL OR EQUAL.

6) SEE SHEET A4 FOR ROOF MOUNTED SNOW FENCE.

ROOFING SYSTEM TRIM & FLASHING:



THIS DRAWING SHOWS WORK THAT WILL BE PERFORMED BY OTHERS UNDER A SEPARATE FUTURE CONTRACT FOR ON SITE INSTALLATION AND IS PROVIDED HERE FOR REFERENCE ONLY.

ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49 TH
David G. Thompson No. 7034 3/2/23
REGISTERED PROFESSIONAL ARCHITECT

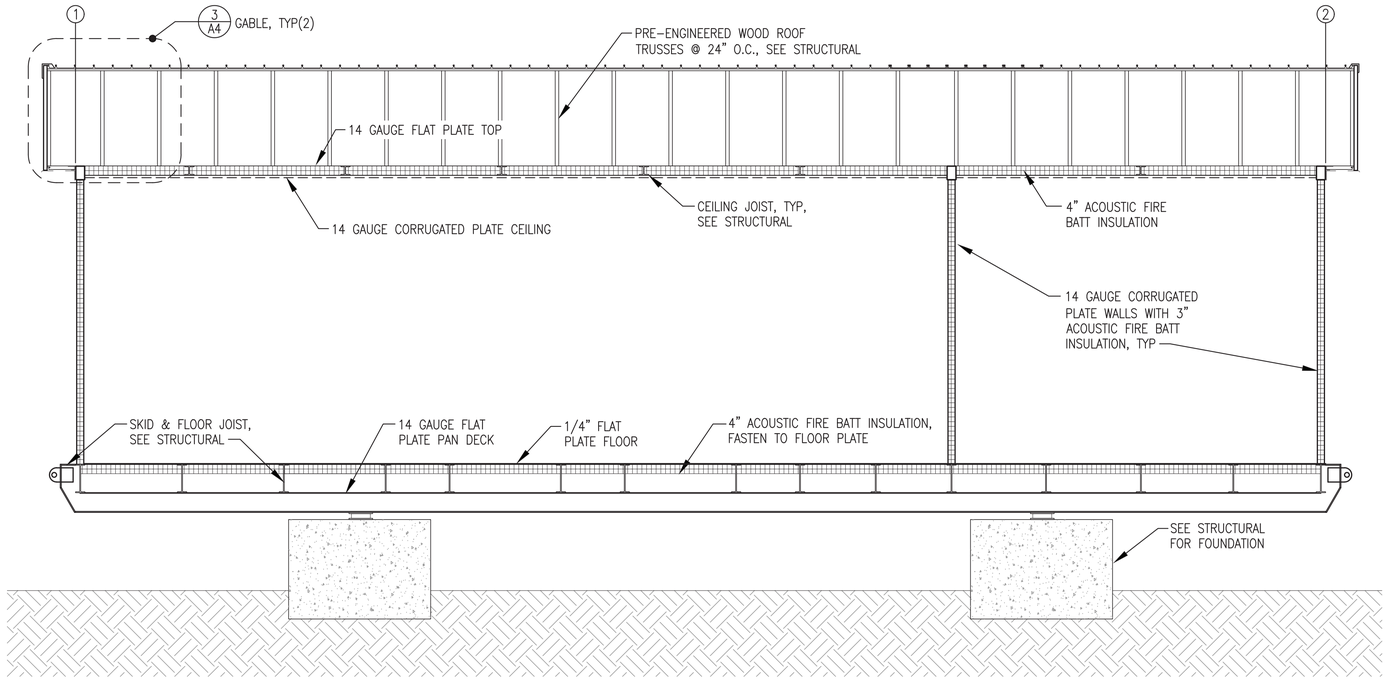
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

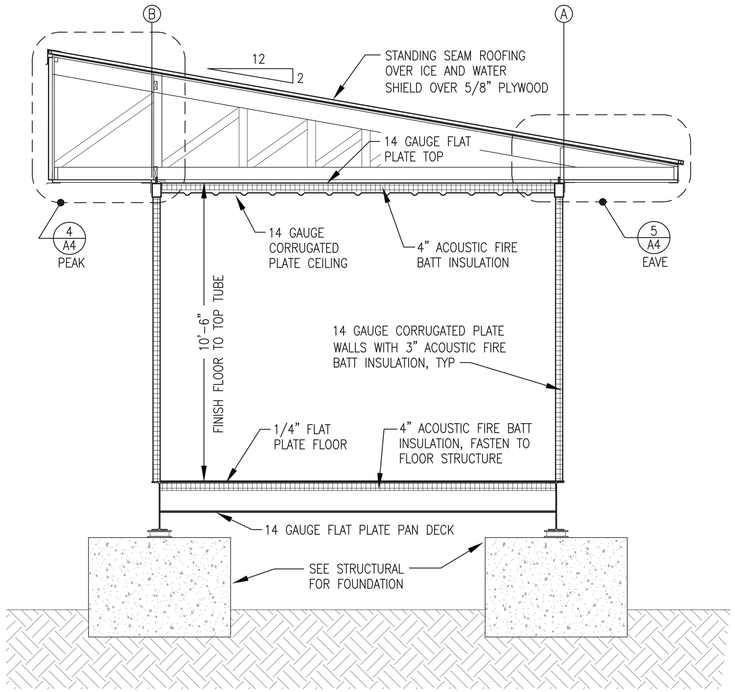
TITLE: EXTERIOR ELEVATIONS & ROOFING NOTES & TRIM DETAILS

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

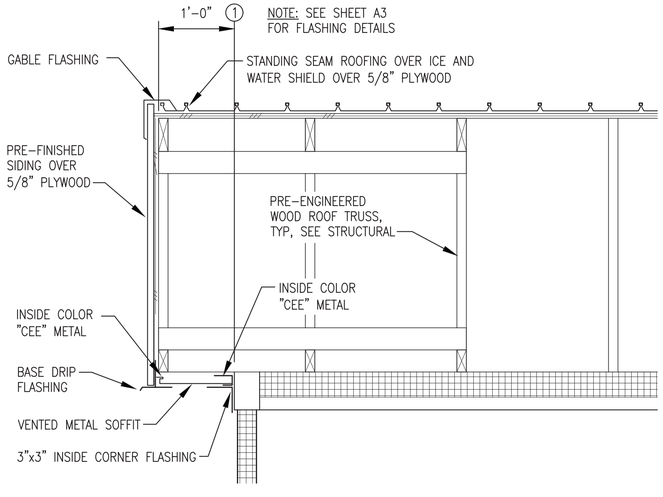
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: DGT/BCG | DATE: 3/2/23
FILE NAME: NELS PP A1-A4 | SHEET: A3
PROJECT NUMBER:



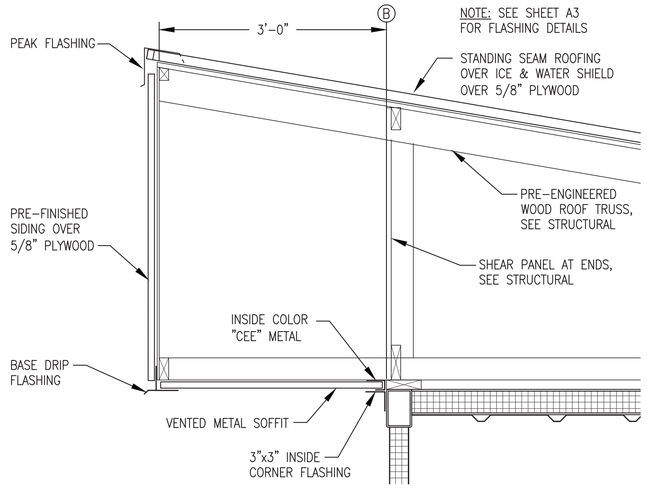
1 A4 BUILDING SECTION
3/8"=1'-0"



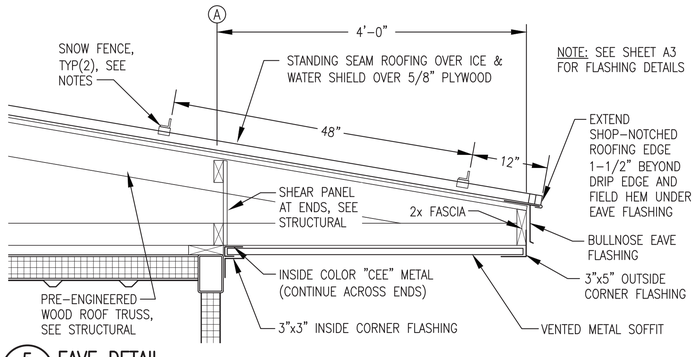
2 A4 BUILDING SECTION
3/8"=1'-0"



3 A4 GABLE DETAIL
1"=1'-0"



4 A4 PEAK DETAIL
1"=1'-0"



5 A4 EAVE DETAIL
1"=1'-0"

SNOW FENCE NOTES:

1) PROVIDE 2 ROWS OF CONTINUOUS SNOW RETENTION FENCE AS INDICATED.
2) SNOW FENCE SHALL BE L.M. CURBS COLOR GUARD OR APPROVED EQUAL. FURNISH COMPLETE SYSTEM INCLUDING UNPUNCHED COLOR GUARD, SPLICES, VERSA CLIPS, SNO CLIPS III, S5–U CLAMPS, AND ALL REQUIRED FASTENERS.

THIS DRAWING SHOWS WORK THAT WILL BE PERFORMED BY OTHERS UNDER A SEPARATE FUTURE CONTRACT FOR ON SITE INSTALLATION AND IS PROVIDED HERE FOR REFERENCE ONLY.

ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49 TH
David G. Thompson No. 7034 3/2/23
REGISTERED PROFESSIONAL ARCHITECT

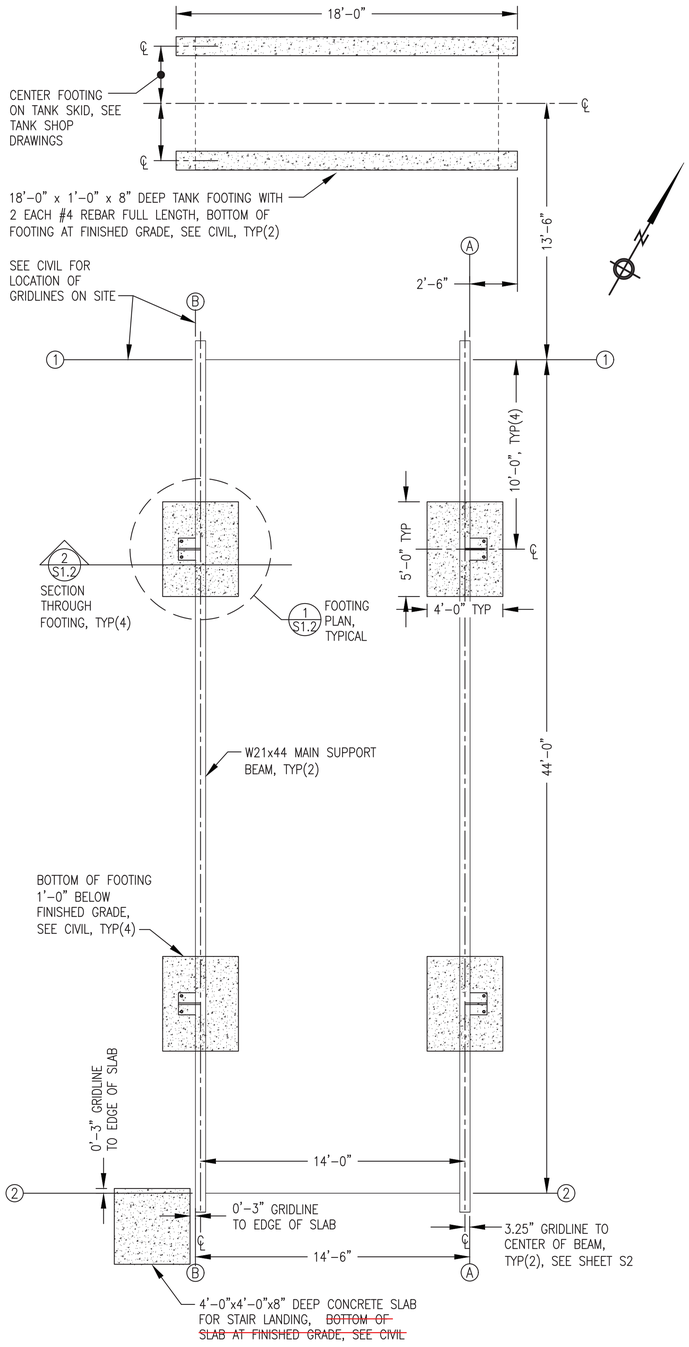
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: BUILDING SECTIONS & DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP A1–A4	SHEET: A4
PROJECT NUMBER:	



TOP OF SLAB 50" BELOW MODULE FINISHED FLOOR

1 S1.1 FOUNDATION PLAN
1/4"=1'-0"

STRUCTURAL GENERAL NOTES:

1.0 DESIGN LOADS:

BUILDING CODE:	2021 INTERNATIONAL BUILDING CODE, ASCE 7-16
A. FLOOR LIVE LOADS: (IBC TABLE 1607.1)	
LIGHT STORAGE/MANUFACTURING	125 PSF OR 2000 POUND POINT LOAD
MAXIMUM GENERATOR UNIT WEIGHT	6,000 POUNDS
B. SNOW LOADS: (ASCE 7-22)	
GROUND SNOW LOAD, Pg =	70 PSF
COEFFICIENT OF EXPOSURE, Ce =	1.0 PARTIALLY EXPOSED
SNOW IMPORTANCE FACTOR, Is =	1.2 CATEGORY IV
THERMAL COEFFICIENT, Ct =	1.2 COLD, VENTILATED ROOF
ROOF/FLAT SNOW LOAD, Pf =	70 PSF
C. WIND LOADS:	
BASIC WIND SPEED =	175 MPH, 3 SECOND GUST
RISK CATEGORY =	CATEGORY IV
EXPOSURE CLASSIFICATION =	EXPOSURE D
D. SEISMIC LOADING:	
SEISMIC =	Ss = 0.931 S1 = 0.401
SEISMIC IMPORTANCE FACTOR =	1.50 , CATEGORY IV
SITE CLASS	"D" (DEFAULT)
BASIC SEISMIC FORCE RESISTANCE SYSTEM	
BUILDING = BEARING WALL WITH STEEL SHEAR PANELS	
FOUNDATION = SPREAD CONCRETE FOOTINGS	
SEISMIC RESPONSE COEFFICIENT	R = 7.0

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ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49TH REGISTERED PROFESSIONAL ENGINEER
David G. Thompson No. 14226 3/2/23

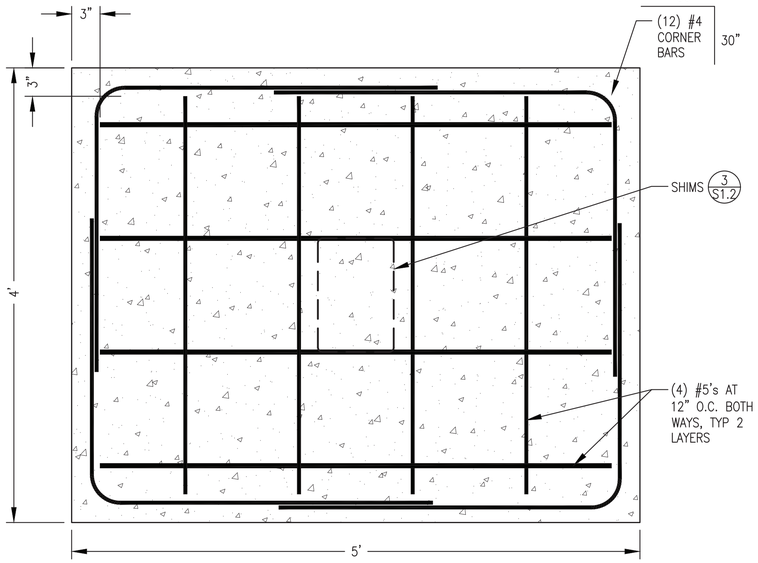
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

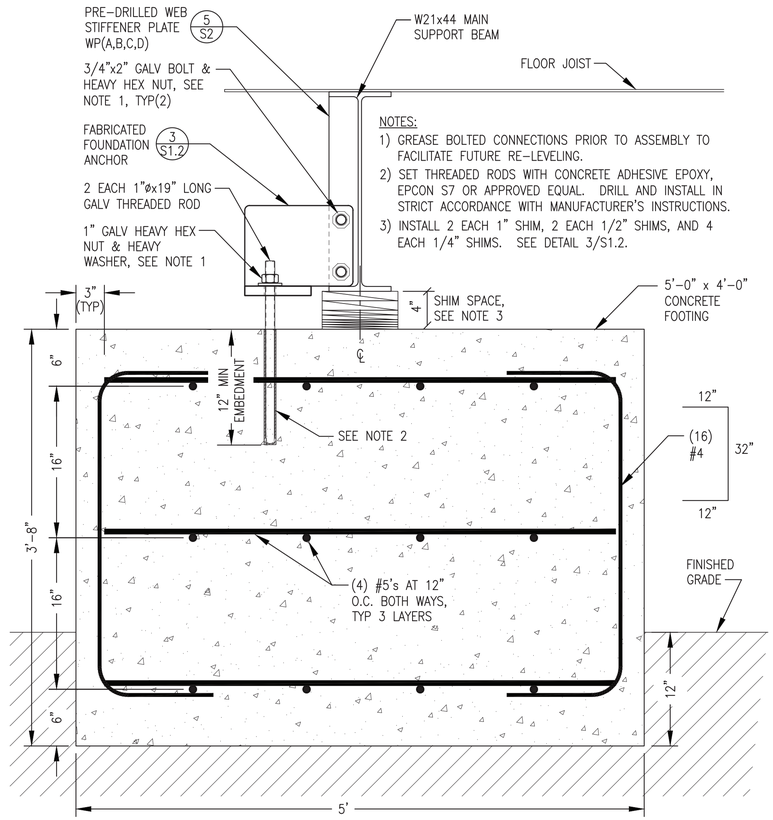
TITLE: FOUNDATION PLAN, CODE ANALYSIS, & STRUCTURAL NOTES

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

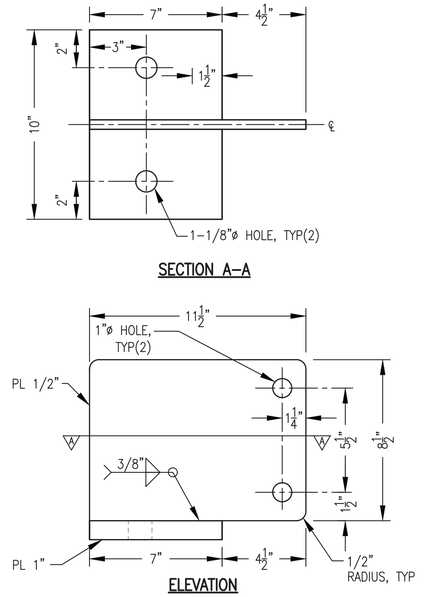
DRAWN BY: JTD | SCALE: AS NOTED
DESIGNED BY: DGT/BCG | DATE: 3/2/23
FILE NAME: NELS PP S1-S5 | SHEET: S1.1
PROJECT NUMBER:



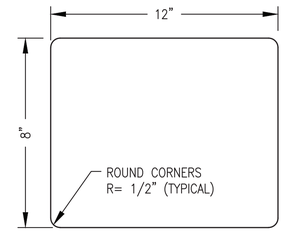
1/S1.2 FOOTING PLAN
1 1/2"=1'-0"



2/S1.2 SECTION THROUGH FOOTING
1 1/2"=1'-0"



3/S1.2 TYPICAL FOUNDATION ANCHOR & SHIM FABRICATION
3"=1'-0"



TYPICAL SHIM

SHIM FABRICATION TABLE		
THICKNESS	QUANTITY	MATERIAL
1/4"	16	GALV STEEL
1/2"	8	GALV STEEL
1"	8	GALV STEEL

ANCHOR & SHIM FABRICATION NOTES:

1) FABRICATE FOUR IDENTICAL ANCHOR ASSEMBLIES. DO NOT SHEAR ANCHOR PLATES. CUT WITH WATER JET, TORCH, OR SAW.
2) FABRICATE FROM ASTM A-36 STEEL PLATE.
3) MAKE ALL JOINTS AND CONNECTIONS WITH CONTINUOUS GROOVE OR FILLET WELDS.
4) FABRICATE SHIMS OF QUANTITY AND THICKNESS AS DESCRIBED IN SHIM FABRICATION TABLE.
5) UPON COMPLETION OF FABRICATION ROUND ALL OUTSIDE CORNERS AND GRIND ALL EDGES SMOOTH.
6) SAND BLAST ALL PIECES TO SSPC-SP-6. COAT WITH 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR APPROVED EQUAL TO 9 MILS MINIMUM DRY FILM THICKNESS.

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ISSUED FOR CONSTRUCTION
MARCH 2023

STATE OF ALASKA
49TH
David G. Thompson
No. 14226
3/2/23
REGISTERED PROFESSIONAL ENGINEER

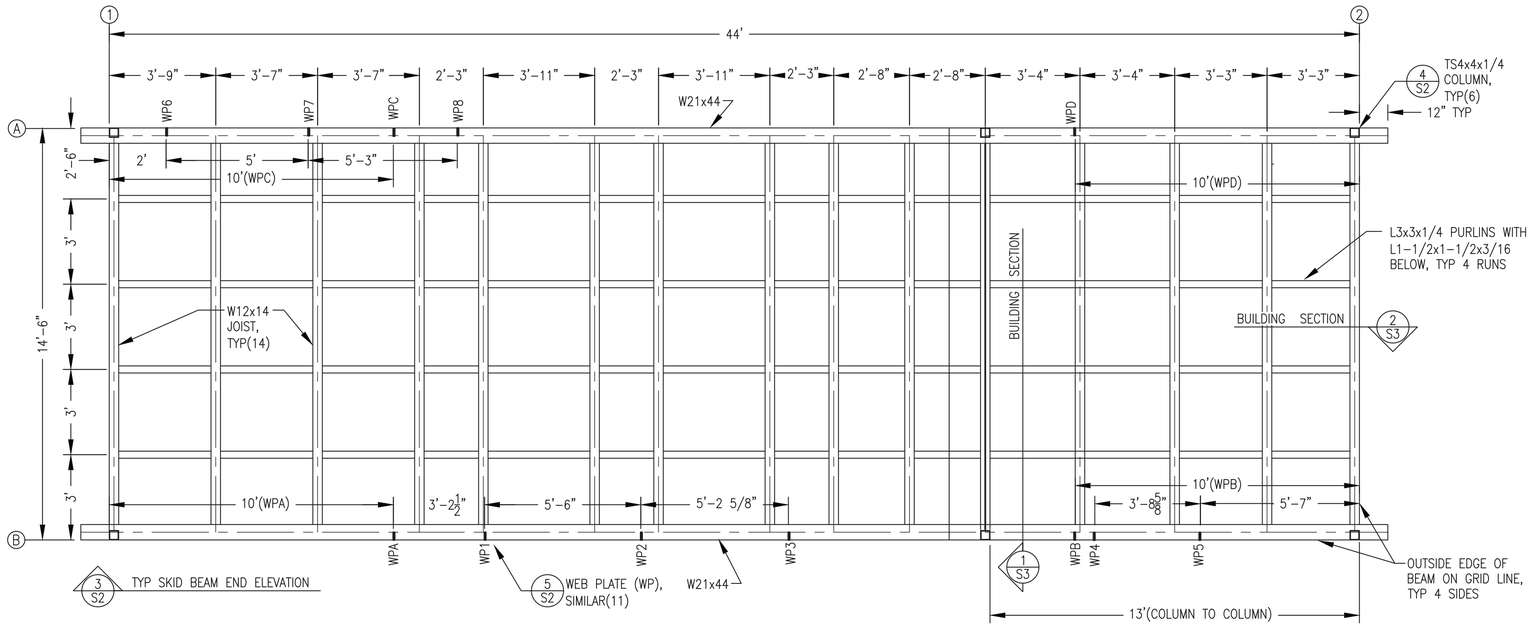
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: FOUNDATION DETAILS

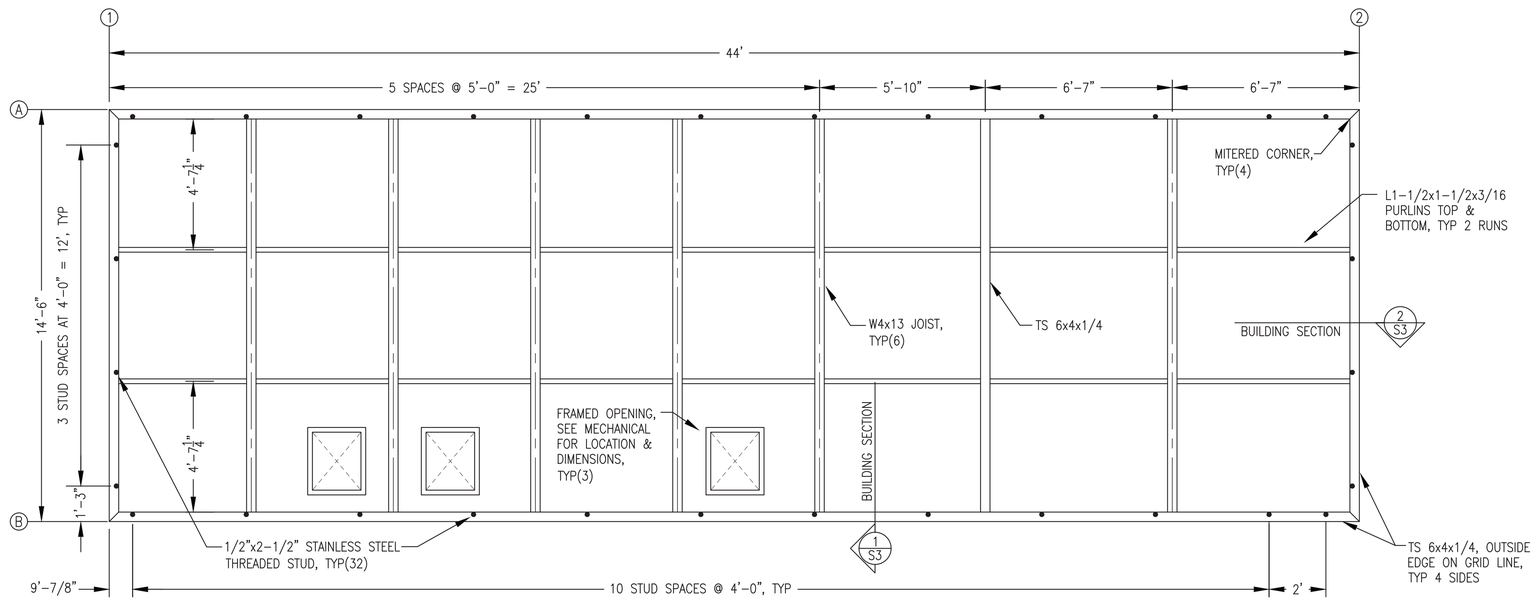
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S1.2
PROJECT NUMBER:	



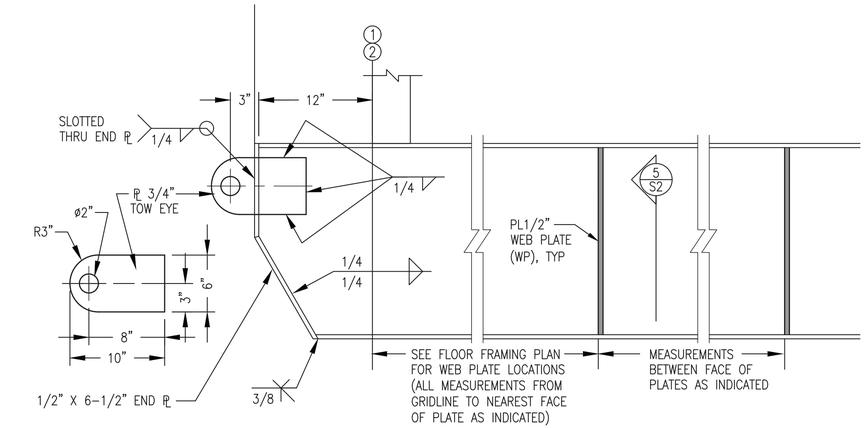
NOTES: 1) FABRICATE FLOOR AND PAN DECKS USING SHEETS CUT SO THAT ALL JOINTS ARE CENTERED ON PURLINS AND/OR JOISTS.
2) SEE MECHANICAL SUPPORT PLAN M2.2 FOR GENERATOR SUPPORT PEDESTAL LOCATIONS AND FABRICATION.

1 S2 FLOOR FRAMING PLAN
3/8"=1'-0"

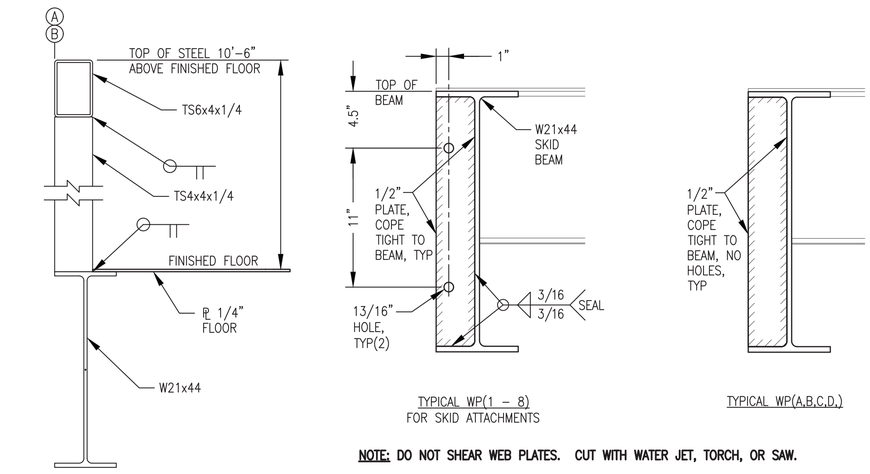


NOTES: 1) FABRICATE CEILING FLAT AND CORRUGATED DECKS USING SHEETS CUT SO THAT ALL JOINTS ARE CENTERED ON PURLINS AND/OR JOISTS.
2) SEE MECHANICAL SUPPORT PLAN M2.3 FOR CEILING CORRUGATION LAYOUT AND STRUT SUPPORT LOCATION AND INSTALLATION.
3) PROVIDE ADDITIONAL L1-1/2" BOTTOM PURLINS AGAINST PERIMETER TS AS REQUIRED FOR CEILING PLATE SUPPORT.

2 S2 CEILING FRAMING PLAN
3/8"=1'-0"



3 S2 TYPICAL SKID BEAM END ELEVATION
1-1/2"=1'-0"



NOTE: DO NOT SHEAR WEB PLATES. CUT WITH WATER JET, TORCH, OR SAW.

4 S2 TYP CORNER COLUMN
1-1/2"=1'-0"

5 S2 TYPICAL WEB PLATE (WP)
2"=1'-0"

THIS DRAWING SHOWS WORK THAT WAS PERFORMED BY OTHERS AS PART OF THE OWNER FURNISHED MODULE STRUCTURE FABRICATION AND IS PROVIDED FOR REFERENCE ONLY.

ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49TH
David G. Thompson No. 14226 3/3/23
REGISTERED PROFESSIONAL ENGINEER

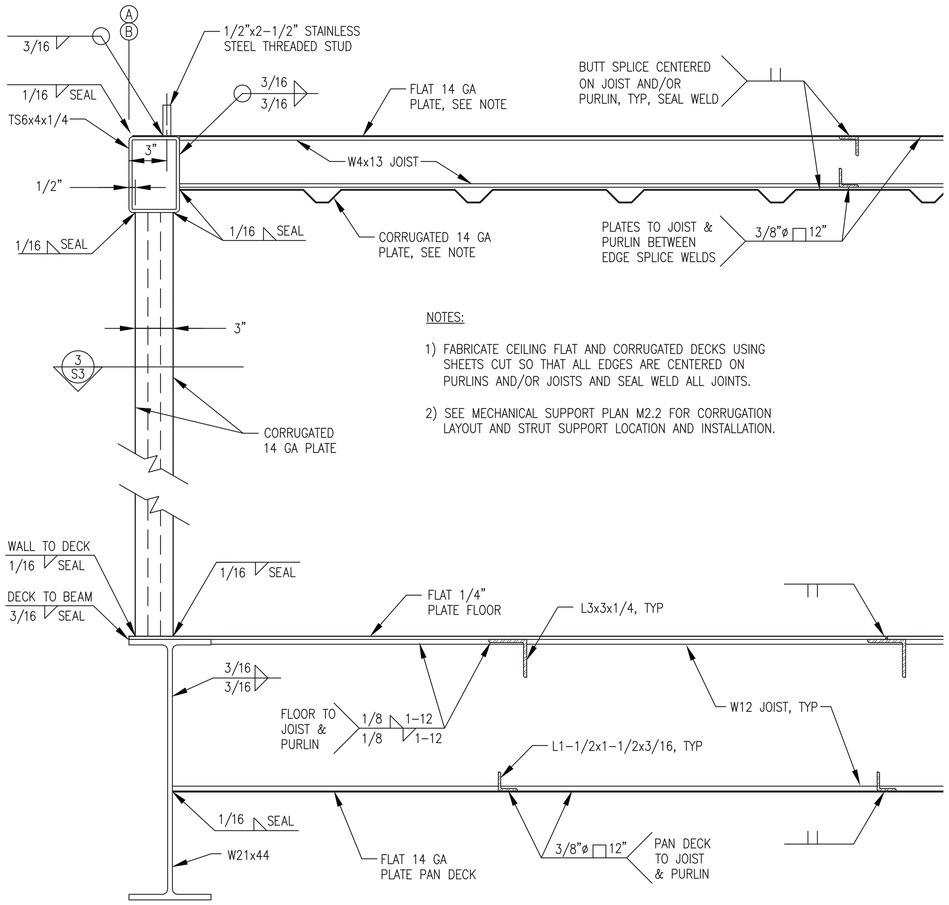
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MODULE FRAMING PLANS & DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S2
PROJECT NUMBER:	

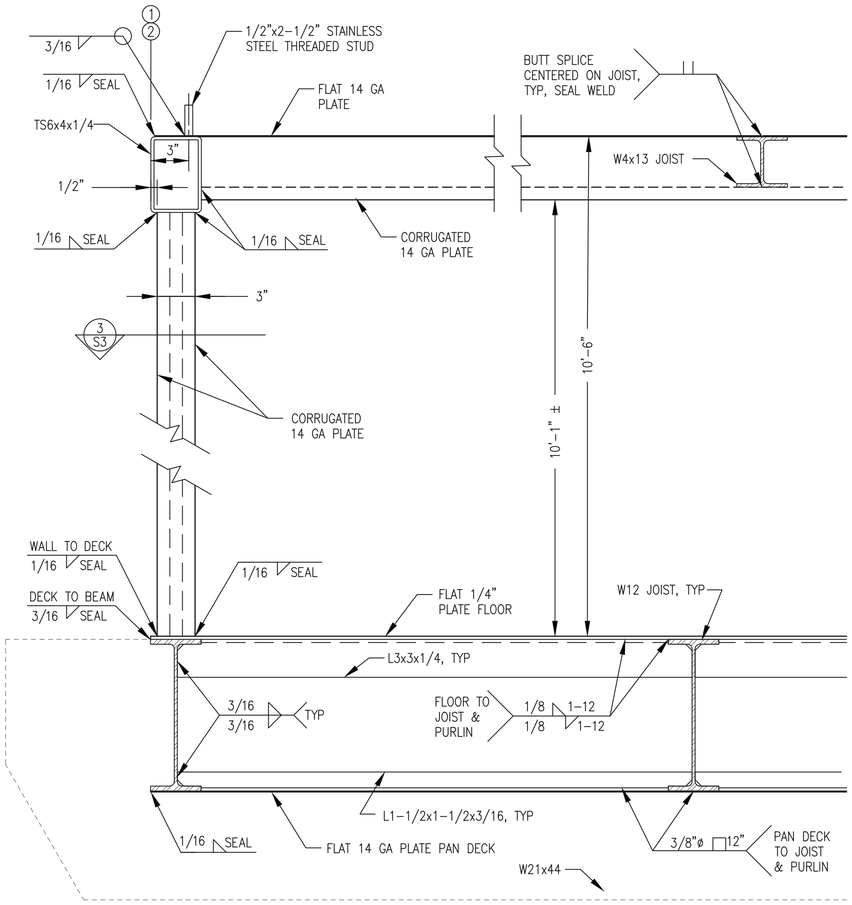


NOTES:

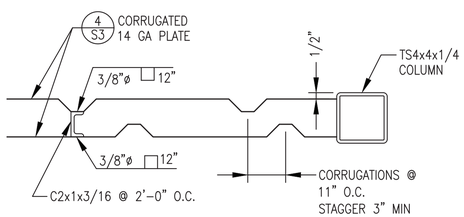
1) FABRICATE CEILING FLAT AND CORRUGATED DECKS USING SHEETS CUT SO THAT ALL EDGES ARE CENTERED ON PURLINS AND/OR JOISTS AND SEAL WELD ALL JOINTS.

2) SEE MECHANICAL SUPPORT PLAN M2.2 FOR CORRUGATION LAYOUT AND STRUT SUPPORT LOCATION AND INSTALLATION.

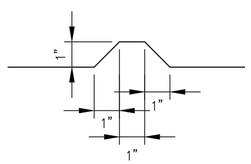
1/S3 TYPICAL BUILDING SECTION
2"=1'-0"



2/S3 TYPICAL BUILDING SECTION
2"=1'-0"



3/S3 TYPICAL EXTERIOR WALL – PLAN VIEW
2"=1'-0"



4/S3 TYPICAL CORRUGATION
4"=1'-0"

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MARCH 2023

STATE OF ALASKA
49TH
David G. Thompson
No. 14226
3/2/23
REGISTERED PROFESSIONAL ENGINEER

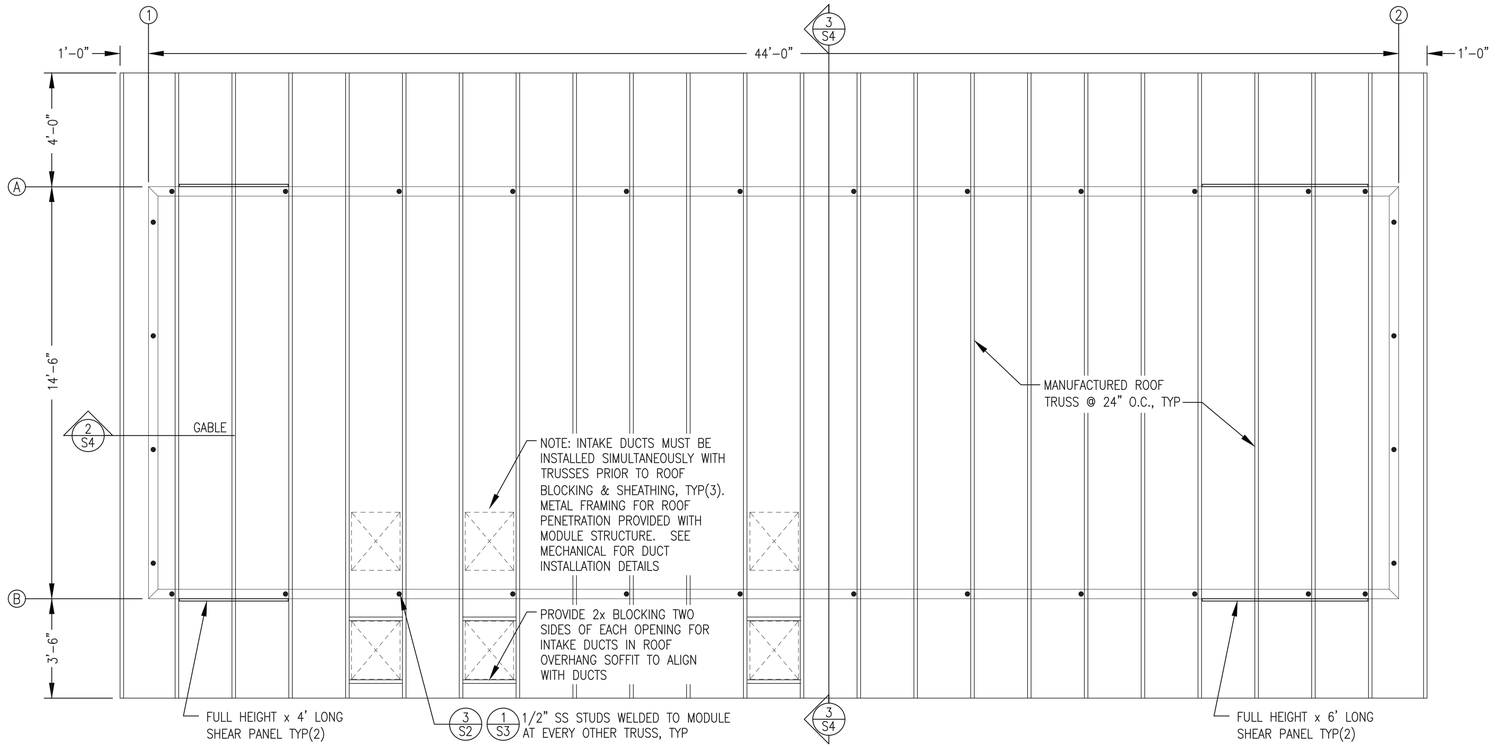
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: MODULE SECTIONS DETAILS

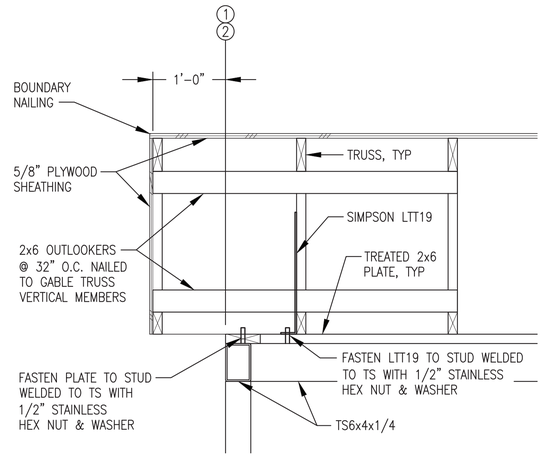
Gray Stassel Engineering, Inc.
P.O. 111405, Anchorage, AK 99511 (907)349-0100

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S3
PROJECT NUMBER:	



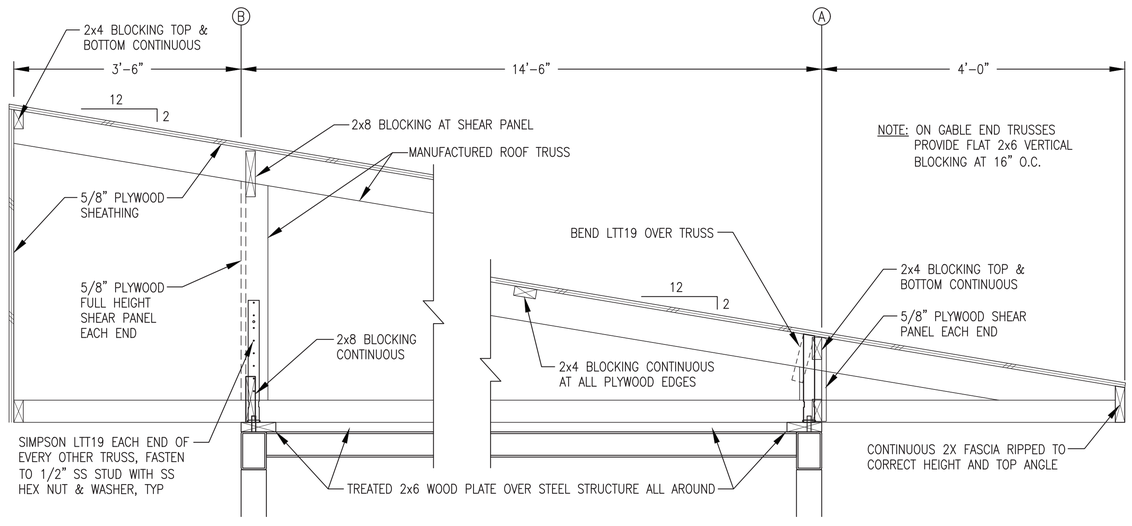
1 S4 ROOF FRAMING PLAN

3/8"=1'-0"



2 S4 TYPICAL GABLE

1"=1'-0"



3 S4 ROOF TRUSS INSTALLATION

NO SCALE

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David G. Thompson
No. 14226
3/2/23
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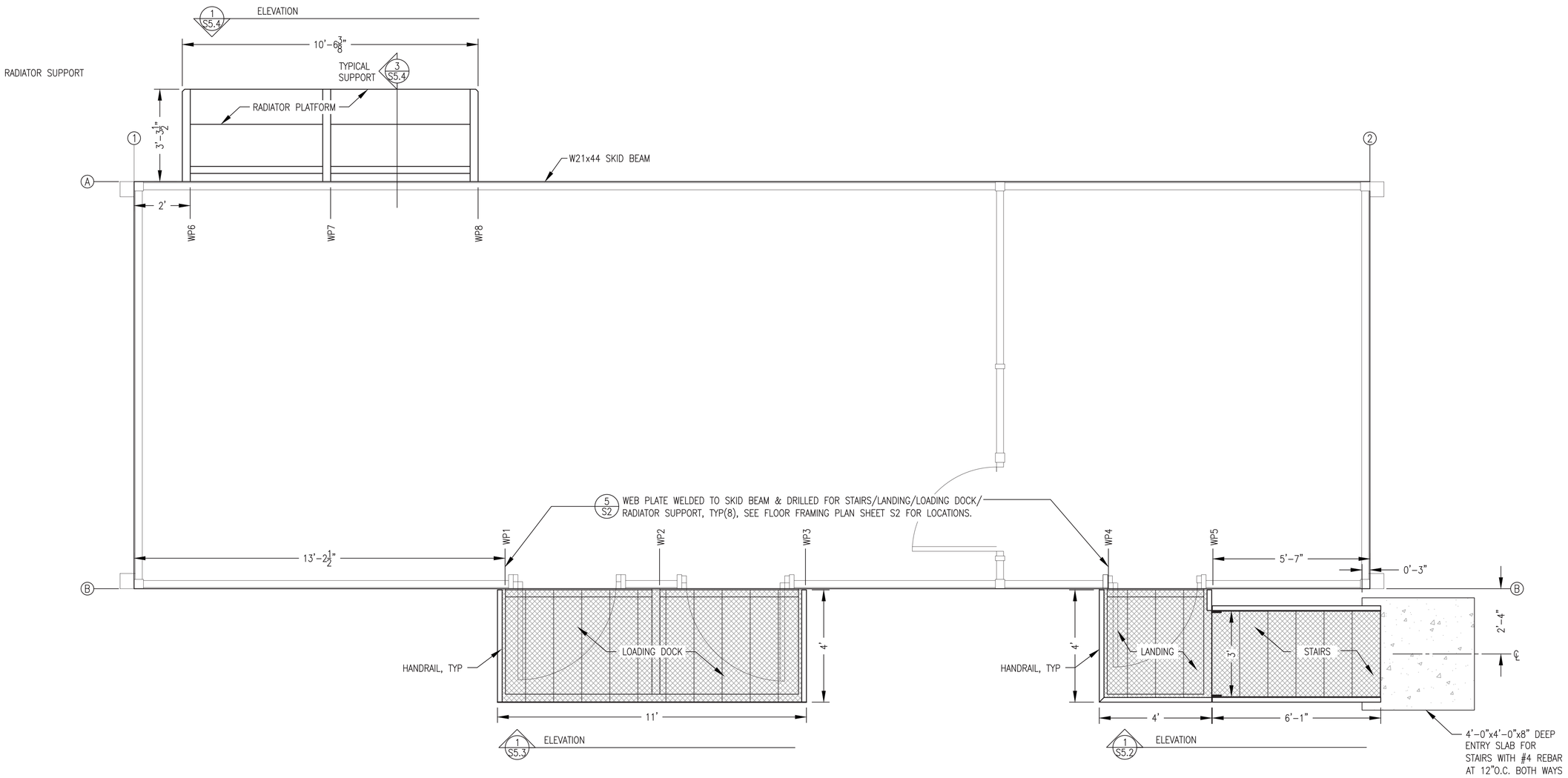
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: ROOF FRAMING PLAN & DETAILS

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

DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S4
PROJECT NUMBER:	



1 S5.1 STAIRS, LANDINGS, LOADING DOCK & RADIATOR SUPPORT PLAN

1/2"=1'-0"

EXTERIOR ASSEMBLY FABRICATION GENERAL NOTES:

1) THESE NOTES APPLY TO THE SHOP FABRICATION OF ALL EXTERIOR ASSEMBLIES SHOWN ON THE S5 SHEETS INCLUDING STAIRS, LANDINGS, LOADING DOCK, AND RADIATOR SUPPORT.
2) FABRICATE FROM ASTM A-36 STEEL SHAPES AND PLATE. STAIR AND PLATFORM TREADS TO BE PRE-GALVANIZED 2"x11-3/4"x12 GA. GRIP STRUT.
4) MAKE ALL JOINTS WITH CONTINUOUS GROOVE OR FILLET WELDS EXCEPT WHERE SPECIFICALLY INDICATED AS BOLTED.
5) PRIOR TO FINAL WELDING, BOLT ASSEMBLIES TO SKIDS AND VERIFY ALL FRAMING IS LEVEL WITH AND PERPENDICULAR TO SKIDS. WELD OUT THEN REMOVE FOR COATING.
6) UPON COMPLETION OF WELDING, ROUND CORNERS AND GRIND EDGES SMOOTH.
6) SANDBLAST OR WIRE BRUSH ENDS OF PRE-GALV TREADS PRIOR TO WELDING TREADS TO FRAMING OR USE BOLT-ON END CAPS.
7) SANDBLAST ALL FABRICATIONS EXCEPT PRE-GALVANIZED GRIP STRUT TO SSPC-SP-6 AND APPLY 3 COATS OF COLD GALVANIZING COMPOUND, ZRC OR EQUAL, TO 9 MILS MINIMUM DRY FILM THICKNESS.
8) FURNISH GALVANIZED STEEL NUTS, BOLTS, AND WASHERS FOR FIELD ASSEMBLY.

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ISSUED FOR CONSTRUCTION MARCH 2023

STATE OF ALASKA 49TH David G. Thompson No. 14226 3/2/23 REGISTERED PROFESSIONAL ENGINEER

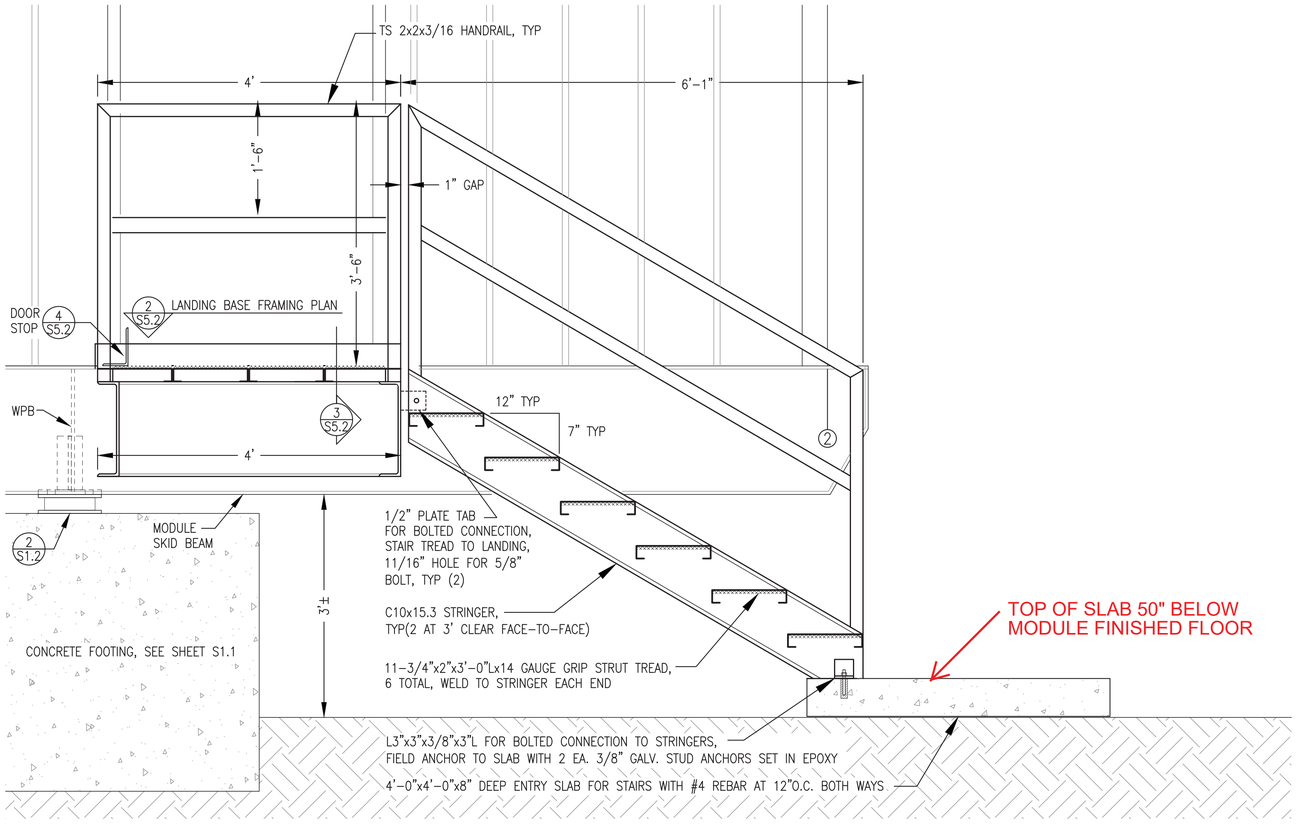
ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

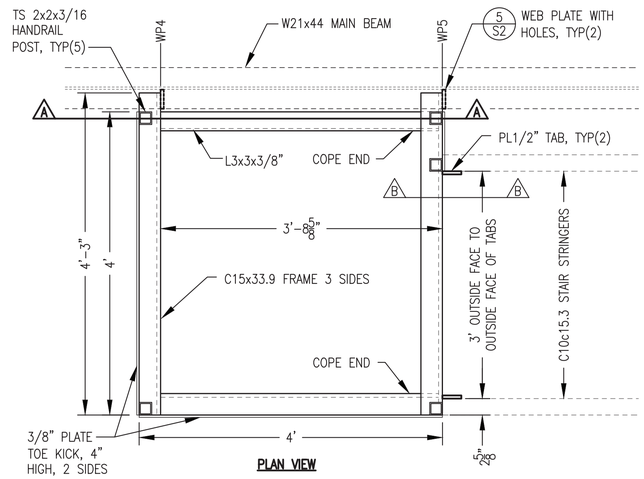
TITLE: STAIRS, LANDINGS, LOADING DOCK, & RADIATOR SUPPORT PLAN

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

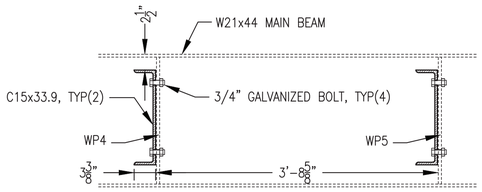
DRAWN BY: JTD	SCALE: AS NOTED
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S5.1
PROJECT NUMBER:	



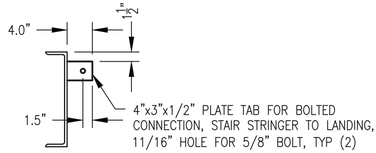
1 S5.2 STAIR/LANDING ELEVATION
1"=1'-0"



PLAN VIEW



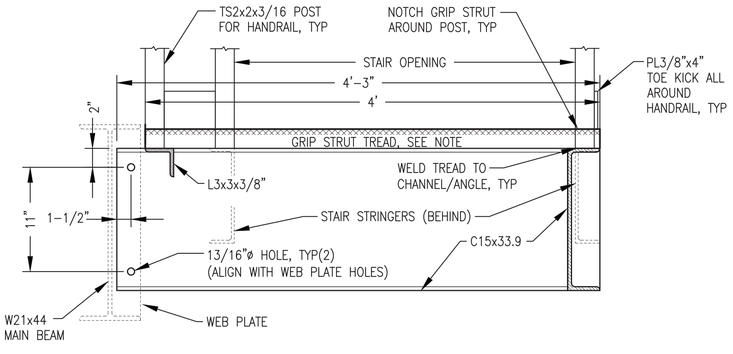
SECTION A-A



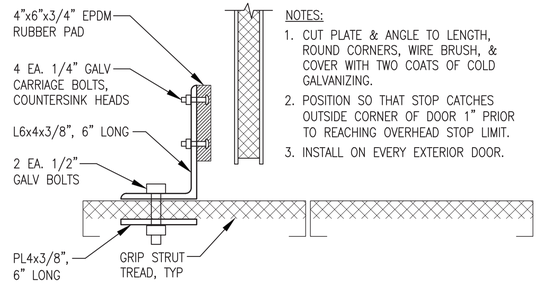
SECTION B-B

2 S5.2 LANDING BASE FRAMING PLAN & SECTIONS
1"=1'-0"

NOTE: INSTALL 4 EACH 11-3/4"x2"x4'-0"Lx14 GAUGE GRIP STRUT TREADS.



3 S5.2 LANDING SECTION & MAIN BEAM CONNECTION DETAIL
1-1/2"=1'-0"



4 S5.2 TYPICAL EXTERIOR DOOR BOTTOM STOP
NO SCALE

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ALASKA ENERGY AUTHORITY

PROJECT: NELSON LAGOON POWER SYSTEM UPGRADE

TITLE: STAIRS/LANDINGS FABRICATION DETAILS

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

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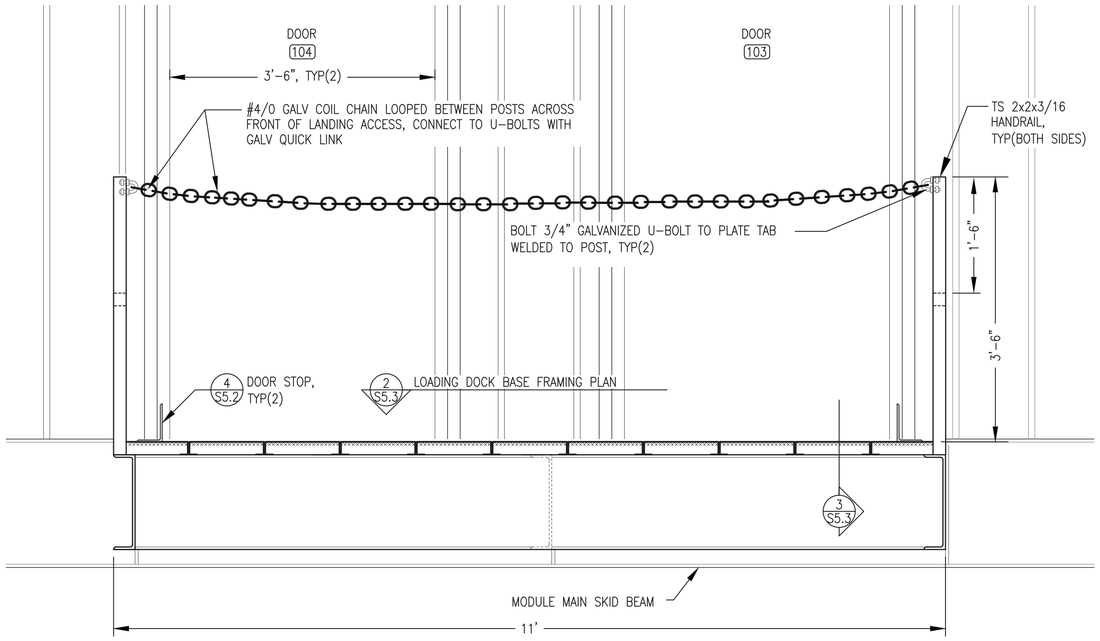
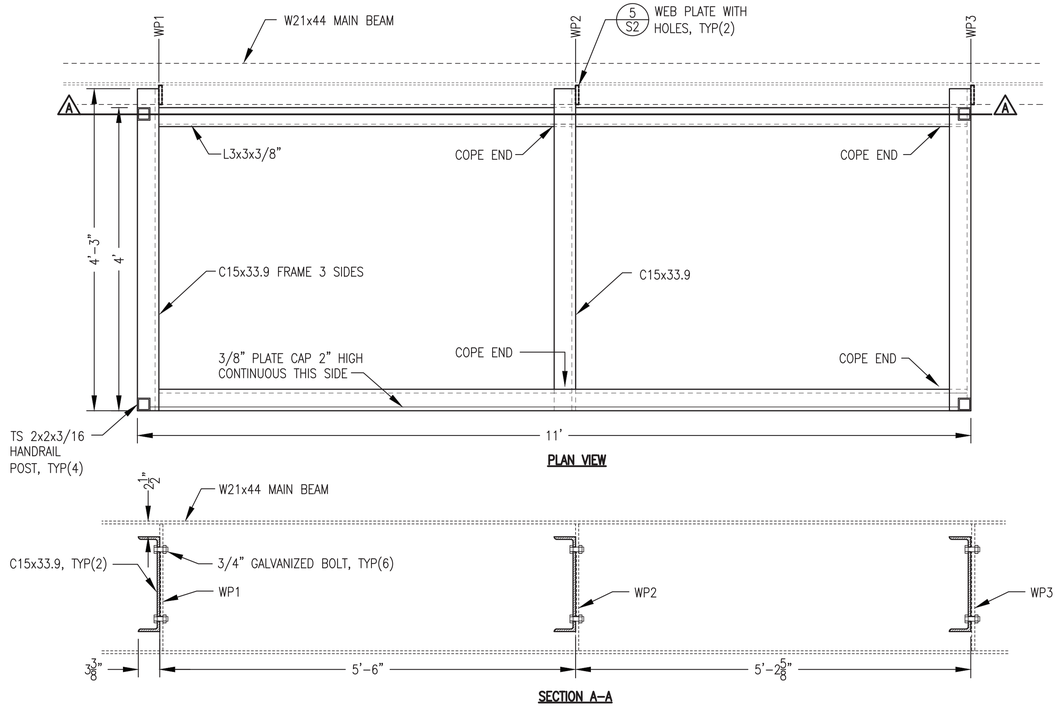
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S5.2
PROJECT NUMBER:	

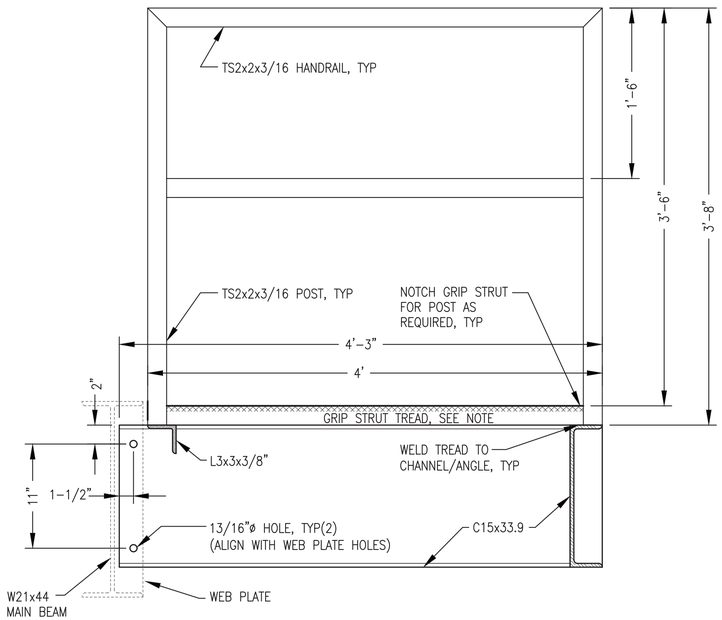


1 S5.3 LOADING DOCK ELEVATION
1"=1'-0"



2 S5.3 LOADING DOCK BASE FRAMING PLAN & SECTION
1"=1'-0"

NOTE: INSTALL 11 EACH 11-3/4"x2"x4'-0"Lx14 GAUGE GRIP STRUT TREADS.



3 S5.3 LOADING DOCK SECTION & MAIN BEAM CONNECTION DETAIL
1-1/2"=1'-0"

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TITLE: LOADING DOCK FABRICATION DETAILS

Gray Stassel Engineering, Inc.
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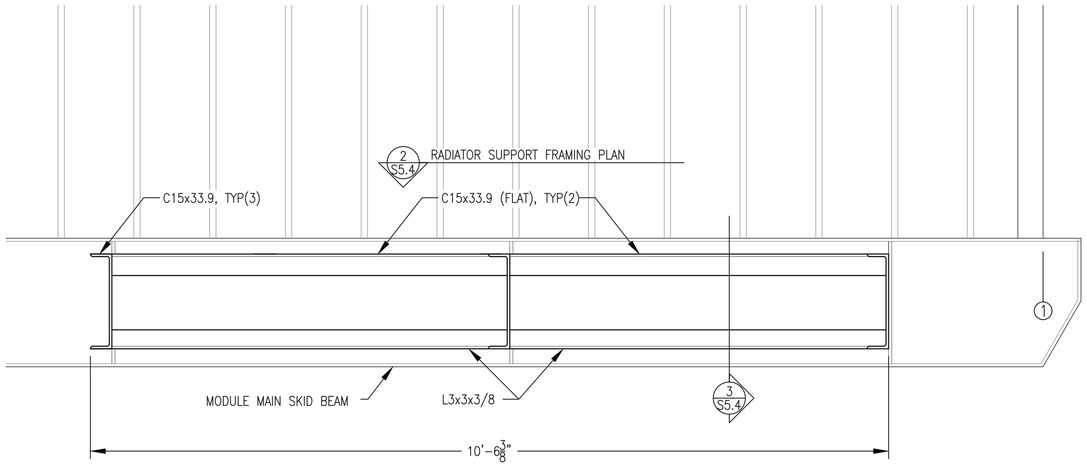
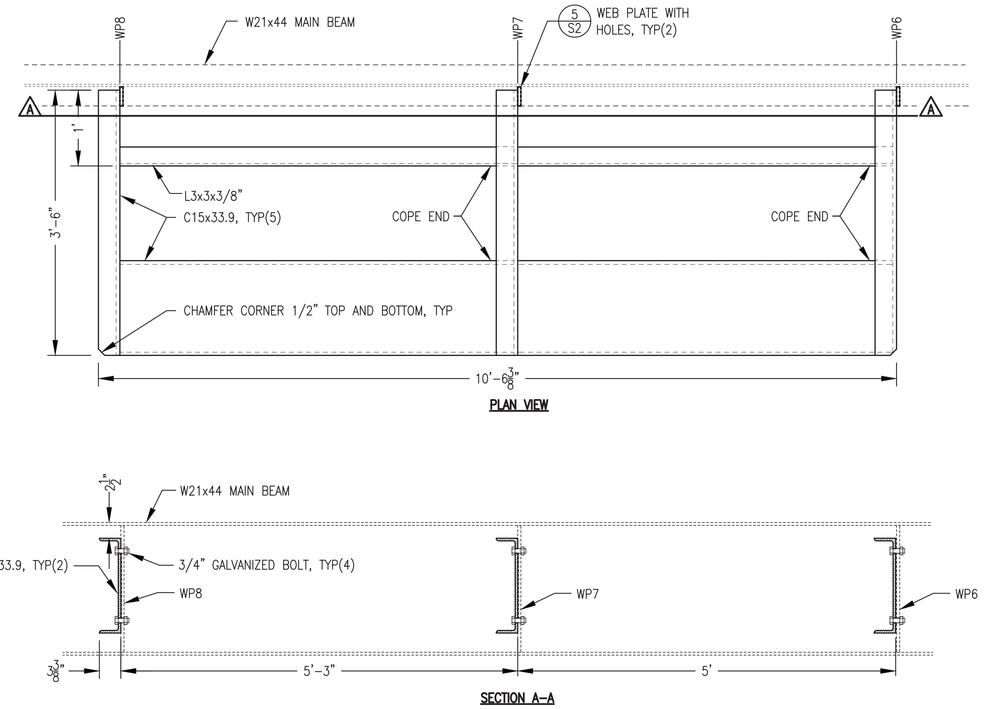
DESIGNED BY: DGT/BCG	DATE: 3/2/23
FILE NAME: NELS PP S1-S5	SHEET: S5.3
PROJECT NUMBER:	



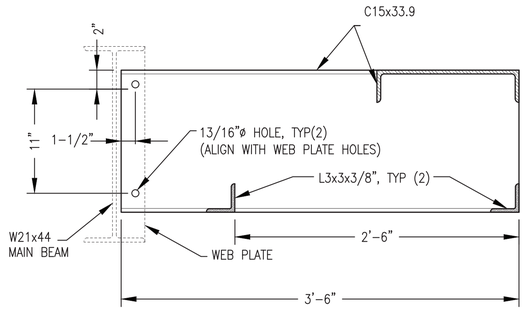
1 S5.4 RADIATOR SUPPORT ELEVATION

1"=1'-0"



2 S5.4 RADIATOR SUPPORT FRAMING PLAN & SECTION

1"=1'-0"



3 S5.4 RADIATOR SUPPORT SECTION & MAIN BEAM CONNECTION DETAIL

1-1/2"=1'-0"

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FILE NAME: NELS PP S1-S5	SHEET: S5.4
PROJECT NUMBER:	