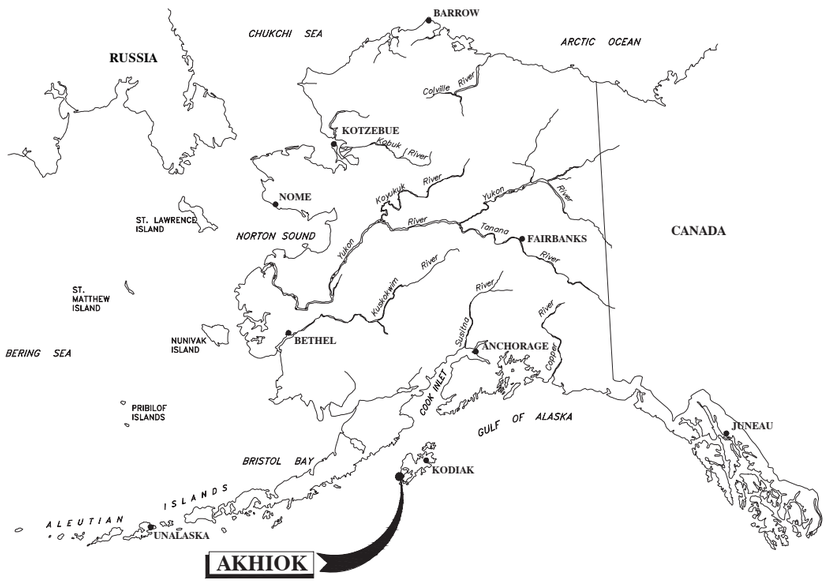


ALASKA ENERGY AUTHORITY

813 West Northern Lights Blvd.
Anchorage, Alaska 99503

AKHIOK, ALASKA

POWER SYSTEM UPGRADE PROJECT
ISSUED FOR CONSTRUCTION
MARCH 2020

Project Number	(Consultant) 30412.00 (AEA) 20048
AEA Project Manager	REBECCA GARRETT
Construction Manager	
Final Design	(Date)
Fire Marshal Approval	(Date)
Construction Period	(From) (To)
As-Builts	(Date)

CRW ENGINEERING GROUP, LLC
3940 Arctic Blvd. Suite 300
Anchorage, Alaska 99503
PHONE: (907) 562-3252
#AKCL882-AK

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

SHEET INDEX

THIS DRWING SET INCLUDES DRAWINGS THAT SHOW WORK THAT IS INCLUDED IN THIS CONTRACT AND REFERENCE DRAWINGS THAT SHOW WORK PERFORMED UNDER TH EPRIOR MODULE ASSEMBLY CONTRACT. SEE RED NOTES ON EACH SHEET FOR DELINEATION OF SCOPE.

PROJECT SCOPE

THIS PROJECT INCLUDES THE FOLLOWING SCOPE:

- CONSTRUCT NEW GRAVEL PAD FOUNDATION
- TRANSPORT AND INSTALLATION OF A NEW MODULAR POWER PLANT
- INSTALL NEW 6,000 GALLON INTERMEDIATE TANK
- INSTALL AND CONNECT NEW STEP UP TRANSFORMER
- SECURITY FENCE AND LIGHTING
- CONSTRUCT HEAT RECOVERY SYSTEM TO SERVE SCHOOL AND CLINIC (ADDITIVE ALTERNATE)

GENERAL NOTES

1. THE CONTRACTOR SHALL PROTECT ALL ITEMS NOT SCHEDULED FOR DEMOLITION DURING CONSTRUCTION. DISTURBED AREAS SHALL BE RESTORED TO PRE-CONSTRUCTION CONDITION.
2. ALL EXISTING UTILITIES MAY NOT BE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL CONSULT WITH THE APPROPRIATE UTILITY ORGANIZATIONS TO VERIFY AND LOCATE UTILITIES PRIOR TO CONSTRUCTION. SEE "CALL BEFORE YOU DIG" CONTACT INFORMATION ON THIS SHEET.
3. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE APPROPRIATE TEMPORARY CUT SLOPES AND SHORING FOR EXCAVATIONS AND TRENCHES FOR SITE SOILS, GROUNDWATER AND RUNOFF CONDITIONS AND SURFACE LOADING CONDITIONS. THE CONTRACTOR MUST COMPLY WITH APPLICABLE FEDERAL AND STATE OSHA REGULATIONS. THE CONTRACTOR SHALL MAINTAIN ALL SIGNS, BARRICADES, WARNING LIGHTS AND OTHER PROTECTIVE DEVICES NECESSARY FOR SAFETY AND TRAFFIC CONTROL.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THEIR WORK WITH EXISTING FACILITY OPERATORS, OTHER CONTRACTORS, SUBCONTRACTORS, THE CITY AND STATE AND FEDERAL AUTHORITIES.
5. THE DRAWINGS ARE DIAGRAMMATIC AND DO NOT NECESSARILY SHOW ALL FEATURES OF THE REQUIRED WORK. PROVIDE ALL LABOR, EQUIPMENT AND MATERIALS REQUIRED FOR A COMPLETE, AND CODE COMPLIANT SYSTEM. VERIFY EXISTING FIELD CONDITIONS PRIOR TO STARTING CONSTRUCTION. IMMEDIATELY CONTACT THE ENGINEER FOR CLARIFICATION OF QUESTIONABLE ITEMS OR APPARENT CONFLICTS.
6. ALL FEATURES OF THE WORK ARE NEW AND TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR UNLESS SPECIFICALLY INDICATED AS EXISTING. INSTALL ALL MATERIALS AND EQUIPMENT IAW MANUFACTURER'S RECOMMENDATIONS, INSTRUCTIONS, AND INSTALLATION DRAWINGS, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
7. THE SPECIFICATION OF A NAME BRAND PRODUCT FOLLOWED BY THE "OR EQUAL" PHRASE IS DONE MERELY TO ESTABLISH THE MINIMUM LEVEL OF QUALITY OF MATERIALS AND EQUIPMENT REQUIRED AND IS NOT A PRODUCT ENDORSEMENT. SUBMIT ANY PROPOSED SUBSTITUTIONS FOR REVIEW AND APPROVAL, UNLESS "NO SUBSTITUTIONS" IS SPECIFIED.
8. FACILITY DESIGN IS IAW THE 2012 INTERNATIONAL FIRE CODE, STATE OF ALASKA FIRE AND SAFETY REGULATIONS ADMINISTRATIVE CODES 13 AAC 50, 13 AAC 55, AND THE MEMORANDUM OF AGREEMENT BETWEEN THE AEA AND THE STATE OF ALASKA FIRE MARSHALL AT THE TIME OF DESIGN.
9. CONTRACTOR TO PROVIDE SIGNAGE IAW THE SIGN SCHEDULE, AND AS IDENTIFIED ELSEWHERE IN THE DRAWINGS.
10. PERFORM WORK WITH SKILLED CRAFTSMEN SPECIALIZED IN SAID WORK. INSTALL ALL MATERIALS IN A NEAT, ORDERLY, AND SECURE FASHION, AS REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND STANDARDS OF GOOD WORKMANSHIP.
11. WHERE PIPE SUPPORTS ARE NOT SHOWN THEY SHALL BE SPACED A MAXIMUM OF 10 FEET ON CENTER IAW THE 2012 UPC.
12. SCHEDULE AND COORDINATE CONSTRUCTION ACTIVITIES SUCH THAT COMPLETE AND OPERABLE POWER GENERATION ARE MAINTAINED AT ALL TIMES.
13. CONTRACTOR SHALL MAINTAIN A "RECORD" SET OF DRAWINGS TO REFLECT FIELD CHANGES THROUGHOUT CONSTRUCTION. RECORD CONSTRUCTION DRAWINGS SHALL BE SUBMITTED TO ENGINEER AT COMPLETION OF THE PROJECT.
14. ALL WORK SHALL BE PERFORMED IAW ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION, AND STATE AND FEDERAL OCCUPATIONAL HEALTH AND SAFETY REGULATIONS.
15. IF ANY ARCHAEOLOGICAL, CULTURAL OR PALEONTOLOGY RESOURCES ARE DISCOVERED AS A RESULT OF CONSTRUCTION ACTIVITIES, CONTRACTORS SHALL STOP ALL WORK THAT WOULD DISTURB SUCH RESOURCES AND CONTACT THE ENGINEER

ABBREVIATIONS

ADEC	ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ADOT	ALASKA DEPARTMENT OF TRANSPORTATION
ALCA	ALUMINUM SURVEY CAP
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
API	AMERICAN PETROLEUM INSTITUTE
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING OF MATERIALS
AST	ABOVEGROUND STORAGE TANK
AWS	AMERICAN WELDING SOCIETY
AVEC	ALASKA VILLAGE ELECTRIC COOPERATIVE
BEG	BELOW EXISTING GRADE
BFG	BELOW FINISHED GRADE
BLDG	BUILDING
CITY	CITY OF AKHIOK
CMP	CORRUGATED METAL PIPE
CPEP	CORRUGATED POLYETHYLENE PIPE
CVC	CORNER VERTICAL CONNECTION
DCCED	DEPARTMENT OF COMMERCE, COMMUNITY & ECONOMIC DEVELOPMENT
DEMO	DEMOLISH
DFT	DRY FILM THICKNESS
DIA	DIAMETER
DWG	DRAWING
E	EAST
EA	EACH
EL	ELEVATION
ELEC	ELECTRIC
EPA	U.S. ENVIRONMENTAL PROTECTION AGENCY
ENGINEER	CRW ENGINEERING GROUP, LLC
E-VENT	EMERGENCY VENT
F	FAHRENHEIT
FBE	FUSION BONDED EPOXY
FF	FINISH FLOOR ELEV.
FG	FINISH GRADE
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FPT	FEMALE NATIONAL PIPE TAPERED THREAD
FT	FOOT OR FEET
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GPM	GALLONS PER MINUTE
HDG	HOT DIP GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HP	HORSE POWER
HR	HOUR
IAW	IN ACCORDANCE WITH
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
IFC	INTERNATIONAL FIRE CODE
IPC	INTERNATIONAL PLUMBING CODE
LF	LINEAR FEET
LB	POUND
LP	LIGHT POLE
M	METERS
MAX	MAXIMUM
ME	MATCH EXISTING
MIL	0.001 INCH
MIN	MINIMUM
MPT	MALE NATIONAL PIPE TAPERED THREAD
N	NORTH
NC	NORMALLY CLOSED
NFS	NON FROST SUSCEPTIBLE (SOIL)
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NPT	NATIONAL PIPE TAPERED THREAD
NTS	NOT TO SCALE
OAE	OR APPROVED EQUAL
OD	OUTSIDE DIAMETER
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OZ	OUNCE
PC	POINT OF CURVATURE
PCC	PORTLAND CEMENT CONCRETE
PI	POINT OF INFLECTION
PL	PLATE
PRV	PRESSURE RELIEF VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENT
R	RADIUS
RF	RAISED FACE
S	SEWER
SCH	SCHEDULE
SHPO	STATE HISTORIC PRESERVATION OFFICER
SIM	SIMILAR
SPEC	SPECIFICATION
SQ	SQUARE
SS	STAINLESS STEEL
SSPC	STEEL STRUCTURES PAINTING COUNCIL
SY	SQUARE YARD
TBM	TEMPORARY BENCH MARK
TP	TEST PIT
TS	TUBE STEEL
TYP	TYPICAL
UG	UNDER GROUND
UL	UNDERWRITERS LABORATORY
ULSD	ULTRA-LOW SULFUR DIESEL
UPC	UNIFORM PLUMBING CODE
UST	UNDERGROUND STORAGE TANK
W/	WITH
W	WATER
VC	VERTICAL CONNECTION

CIVIL LEGEND (GENERAL)

NOTE: SOME DETAILS UTILIZE SYMBOLS NOT IN THIS GENERAL LEGEND. WHERE THIS OCCURS, SYMBOLS ARE DEFINED ON THE SHEET ON WHICH THEY ARE USED.

- GENERAL PROPERTY BOUNDARY
- CENTERLINE
- CULVERT
- EDGE OF GRAVEL
- VEGETATION / TREELINE
- TRAVELED WAY
- FILL SLOPE
- CUT SLOPE
- FENCE
- FIRE EXTINGUISHER
- 20 — GROUND ELEVATION CONTOURS
- BOLLARD
- PP — POWER POLE
- 9 — INFORMATION / WARNING SIGN
- 5 — SHEET NOTE
- SURVEY MONUMENT
- TEST PIT
- XXX — FINISH GRADE ELEVATION
- ø — DIAMETER
- MANHOLE
- PERFORATED DRAINAGE BASIN
- STORM DRAIN CATCH BASIN
- ANTI-SIPHON VALVE
- BALL VALVE
- MOTOR ACTUATED BALL VALVE
- CHECK VALVE
- GATE VALVE
- PRESSURE RELIEF VALVE
- P — PRESSURE TEST TAP
- M — METER
- F — FILTER
- FLEXIBLE CONNECTOR
- WYE STRAINER (MESH SIZE)
- QUICK COUPLING
- SUBMERSIBLE PUMP
- CENTRIFUGAL PUMP
- VERTICAL PIPE TRANSITION
- REDUCER
- LEVEL FLOAT SWITCH
- FS — FLOW SWITCH
- MAGNESIUM ANODE
- STORM DRAIN MANHOLE

UTILITY LINE/PIPELINE DESIGNATIONS

E	UNDERGROUND ELECTRIC
F	FUEL
FM	SEWER FORCE MAIN
HR	HEAT RETURN
HS	HEAT SUPPLY
S	SANITARY SEWER
SD	STORM DRAIN
W	WATER
WS	WATER SERVICE

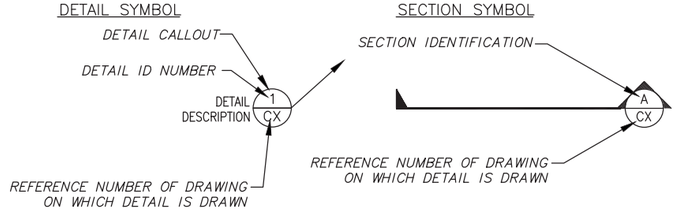
- UNDERGROUND UTILITY LINE/PIPELINE: EXISTING
- UNDERGROUND UTILITY LINE/PIPELINE: NEW
- ABOVEGROUND UTILITY LINE/PIPELINE: EXISTING
- ABOVEGROUND UTILITY LINE/PIPELINE: NEW
- GRAVEL EDGE
- VEGETATION / TREE LINE

CALL BEFORE YOU DIG	
WATER/SEWER	CITY 907-836-2209
ELECTRIC	CITY 907-836-2209

TESTING, STARTUP AND COMMISSIONING PROCEDURES

1. CONTRACTOR SHALL PERFORM SYSTEM TESTING, STARTUP AND COMMISSIONING IAW THE PROCEDURES IN THE CONTRACT DOCUMENTS AND IAW MANUFACTURER INSTRUCTIONS. LEAVE ALL WORK SITES IN AN ORDERLY CONDITION CONSISTENT WITH THAT FOUND UPON ARRIVAL.
2. SEE SPECIFICATIONS FOR DETAILED PROCEDURES.

DETAIL/SECTION REFERENCES



ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — REGISTERED PROFESSIONAL ENGINEER — Karl R. Hiller — CE-16583 — 03/27/20

CRW ENGINEERING GROUP, LLC — PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
GENERAL NOTES, LEGEND, AND ABBREVIATIONS

NO.	REVISION	BY	DATE

Plot Date: FEB. 2020
Designed: KEG
Drawn: KEG
Approved: KMH

Sheet No. G1.1

GRADING POINT TABLE				
POINT NUM.	ELEVATION	NORTHING	EASTING	DESCRIPTION
25	45.25	12141.8743	30962.9443	SCHOOL BUILDING
26	46.02	12123.7951	30915.6054	SCHOOL BUILDING
27	41.14	12109.0537	30921.2353	SCHOOL BUILDING
28	40.95	12102.7095	30904.6236	SCHOOL BUILDING
100	46.78	12143.3820	30856.9162	RADIUS POINT, R=5.0'
101	51.56	12259.4719	30946.7585	RADIUS POINT, R=5.0'
102	51.52	12234.9155	30983.3181	RADIUS POINT, R=5.0'
103	44.21	12119.0136	30876.5698	RADIUS POINT, R=5.0'
104	48.79	12169.6756	30910.6693	RADIUS POINT, R=5.0'
105	51.50	12164.6328	30936.1127	RADIUS POINT, R=5.0'
200	46.53	12138.8724	30854.9690	MATCH EXISTING ROAD
201	47.11	12140.7189	30861.0437	TOP OF PAD
202	51.45	12183.6518	30889.8553	TOP OF PAD, GRADE BREAK
203	51.50	12262.2512	30942.6206	TOP OF PAD
204	51.50	12263.6139	30949.5592	TOP OF PAD
205	51.50	12239.0576	30986.1187	TOP OF PAD
206	51.50	12232.1277	30987.4688	TOP OF PAD
207	51.50	12161.8450	30940.2634	TOP OF PAD
208	51.50	12160.4821	30933.3249	TOP OF PAD
209	51.50	12173.8263	30913.4571	TOP OF PAD
210	51.50	12172.4675	30906.5214	TOP OF PAD, GRADE BREAK
211	44.46	12121.8055	30872.4218	TOP OF PAD
212	43.81	12116.4912	30872.2527	MATCH EXISTING ROAD
300	51.90	12211.7387	30932.2157	CORNER OF MODULAR
301	51.90	12203.6539	30944.2529	CORNER OF MODULAR
302	51.90	12246.6044	30955.6333	CORNER OF MODULAR
303	51.90	12238.5198	30967.6703	CORNER OF MODULAR

MODULAR POWER PLANT

150kVA STEP UP TRANSFORMER (SEE ELECTRICAL)

8'x20' STORAGE CONNEX

6,000 GALLON DOUBLE WALL AST

NEW ELECTRICAL DISTRIBUTION SEE ELECTRICAL DISTRIBUTION UPGRADE PLAN SET

FIRE EXTINGUISHER IN WEATHER PROOF ENCLOSURE (TYP.) SEE NOTE 1)

GRAVEL PAD AND DRIVEWAY

NEAREST PROPERTY BOUNDARY

SCHOOL

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

WARNING SIGNS & INFORMATION PLACARD SCHEDULE:

PROVIDE ALL SIGNS INDICATED IN THE SCHEDULE BELOW, QUANTITY AND LOCATION AS INDICATED ON THE DRAWINGS. ALL SIGNS SHALL BE CONSTRUCTED FROM 0.08" ALUMINUM PLATE, AND SIZED IAW 2012 IFC. SIGN LETTERING IS SHOWN BELOW IN QUOTATIONS. PROVIDE 3/16" HOLES IN ALL FOUR CORNERS. PROVIDE NON-REFLECTIVE VINYL BACKGROUND, 3M 3650-10, WITH 3M SERIES 225 HIGH PERFORMANCE VINYL LETTERS, ONE SIDE ONLY, COLOR AS INDICATED. ATTACH TO FENCING WITH GALVANIZED HOG RINGS OR STAINLESS STEEL CABLE TIES. SIGNAGE PLACED DIRECTLY ON TANKS SHALL CONSIST OF HIGH QUALITY ADHESIVE BACK DECALS OR PAINTED STENCILS.

WARNING SIGNS *– RED LETTERING ON WHITE BACKGROUND (3" HIGH X 1/2" STROKE LETTERS)*

1. *"DANGER COMBUSTIBLE LIQUIDS"*
2. *"NO SMOKING NO OPEN FLAMES"*
3. *"COMBUSTIBLE 5,000 GALLONS DIESEL",*

INFORMATIONAL PLACARDS *– BLACK LETTERING ON WHITE BACKGROUND (2" HIGH X 1/2" STROKE LETTERS)*

4. *PROVIDE ADEC SPILL REPORTING SIGN: CONTRACTOR TO CONTACT ADEC FOR CURRENT SPILL REPORTING PLACARD (907-269-3063)*

NOTES:

1. *FURNISH AND INSTALL PORTABLE FIRE EXTINGUISHERS AT LOCATIONS SHOW (◑). EXTINGUISHERS SHALL BE AMEREX A411 OAE. EXTERIOR EXTINGUISHERS SHALL BE MOUNTED WITHIN ENCLOSURES (STRIKE FIRST USA MODEL HDOC-20 OAE).*

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

10' 0 10' 20'

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — Karl R. Hiller — CE-16583 — 03/27/20 — REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252

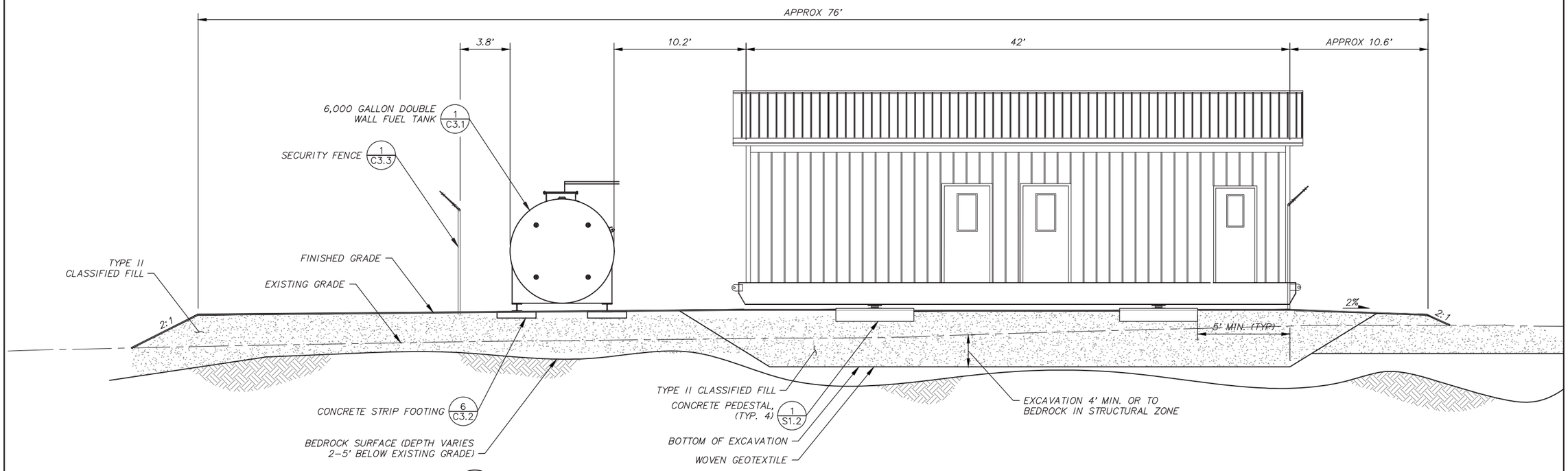
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
MODULAR POWER PLANT SITE AND GRADING PLAN

NO.	REVISION	BY	DATE

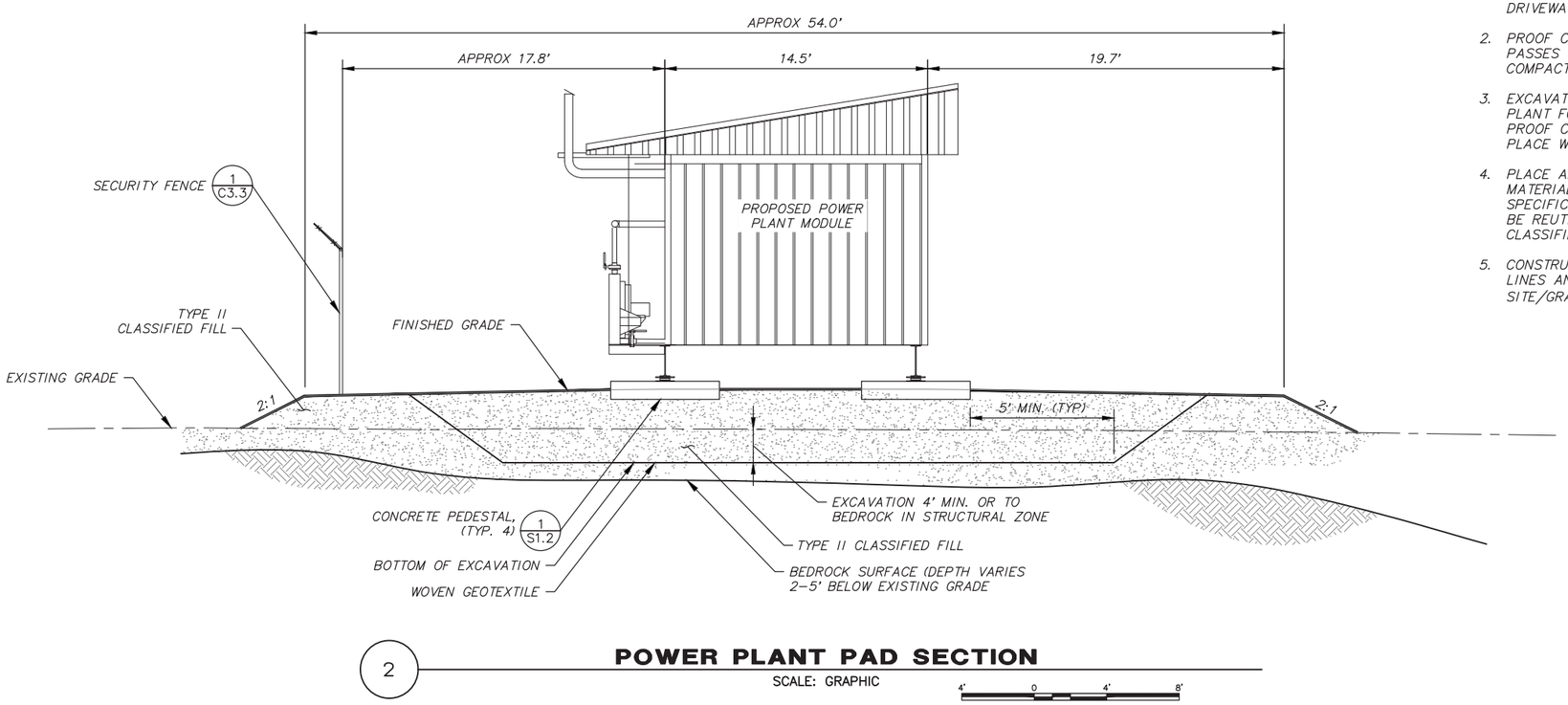
Plot Date: FEB. 2020
Designed: KEG
Drawn: KEG
Approved: KMH

Sheet No. C1.1



1 POWER PLANT PAD SECTION

SCALE: GRAPHIC 4' 0 4' 8'



2 POWER PLANT PAD SECTION

SCALE: GRAPHIC 4' 0 4' 8'

SEQUENCE OF CONSTRUCTION

1. *CLEAR AND GRUB EXISTING GROUND BENEATH PROPOSED FOUNDATION PAD AND DRIVEWAY.*
2. *PROOF COMPACT EXISTING GROUND (MIN 5 PASSES USING APPROVED VIBRATORY COMPACTOR)*
3. *EXCAVATE BENEATH PROPOSED POWER PLANT FOUNDATION PEDESTALS AS SHOWN. PROOF COMPACT BOTTOM OF EXCAVATION. PLACE WOVEN GEOTEXTILE AS SHOWN.*
4. *PLACE AND COMPACT CLASSIFIED FILL MATERIAL IN ACCORDANCE WITH THE SPECIFICATIONS. EXCAVATED MATERIAL MAY BE REUTILIZED IF IT CONFORMS TO CLASSIFIED FILL REQUIREMENTS.*
5. *CONSTRUCT PAD AND DRIVEWAY TO THE LINES AND GRADES SHOWN ON THE SITE/GRADING PLAN.*

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — REGISTERED PROFESSIONAL ENGINEER — Karl R. Hilke CE-11683 03/27/20

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
TYPICAL SECTIONS

NO.	REVISION	BY	DATE

Plot Date: FEB. 2020
Designed: KEG
Drawn: KEG
Approved: KMH

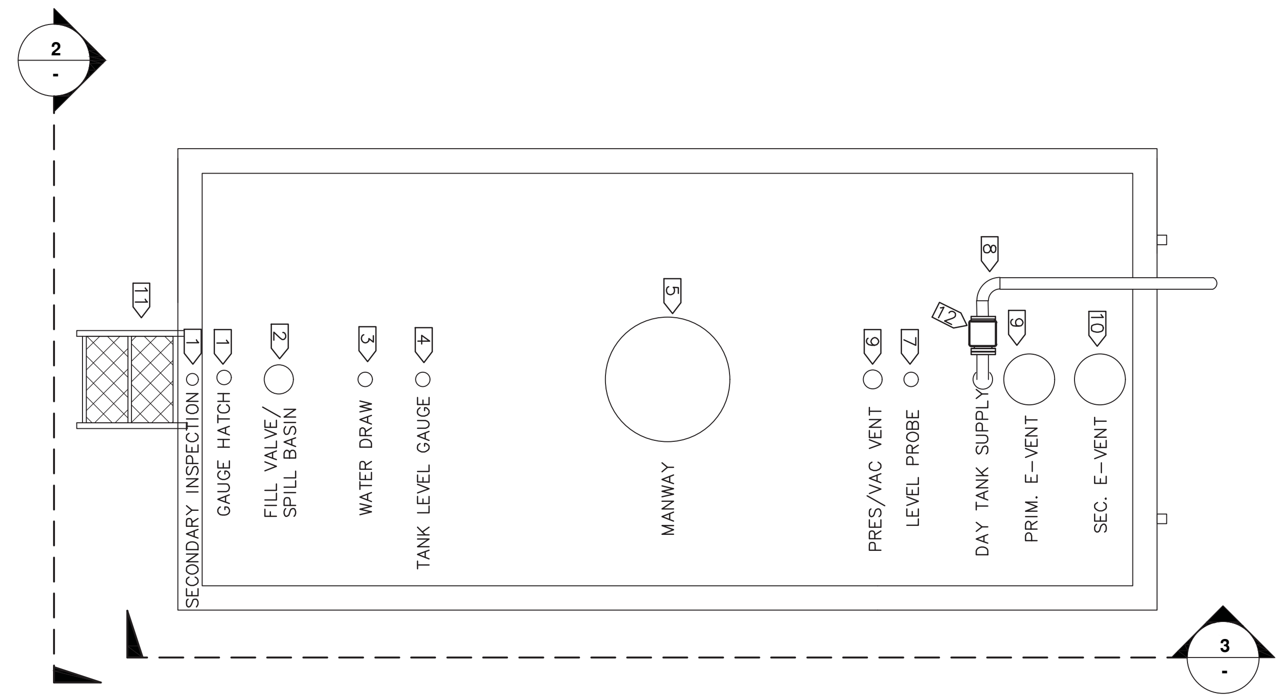
Sheet No. C2.1

SPECIFIC NOTES

1. 2" FPT (INSPECTION/GAUGE HATCH)
2. 4" THREADED PENETRATION (FILL, SPILL BUCKET, MECHANICAL FILL LIMITER & DROP TUBE)
3. 1" WATER DRAW (5/C3.2)
4. 2" THREADED PENETRATION (TANK GAUGE INSTALLED ON 2" X 18" NIPPLE)
5. 24" MANWAY
6. 3" THREADED PENETRATION (2" PRESSURE VACUUM VENT WITH WHISTLE ALARM.) INSTALL WITH 3"X2" REDUCING BUSHING AT ELEVATION SHOWN. SET WHISTLE ALARM TO 90% FULL.
7. 3" FLANGED PENETRATION (2" LEVEL SENSOR PROBE SWITCH, SEE ELECTRICAL)
8. 2" FPT (DAY TANK SUPPLY) (2/C3.2)
9. 8" FLANGED PRIMARY E-VENT.
10. 8" FLANGED SECONDARY E-VENT
11. SHOP FABRICATED BOLT ON LADDER (1/C3.2)
12. ACTUATED BALL VALVE (SEE SCHEDULE IN MECH)
13. ANCHOR SKID TO CONCRETE TANK FOOTING, (SEE NOTE 2) (6/C3.2)

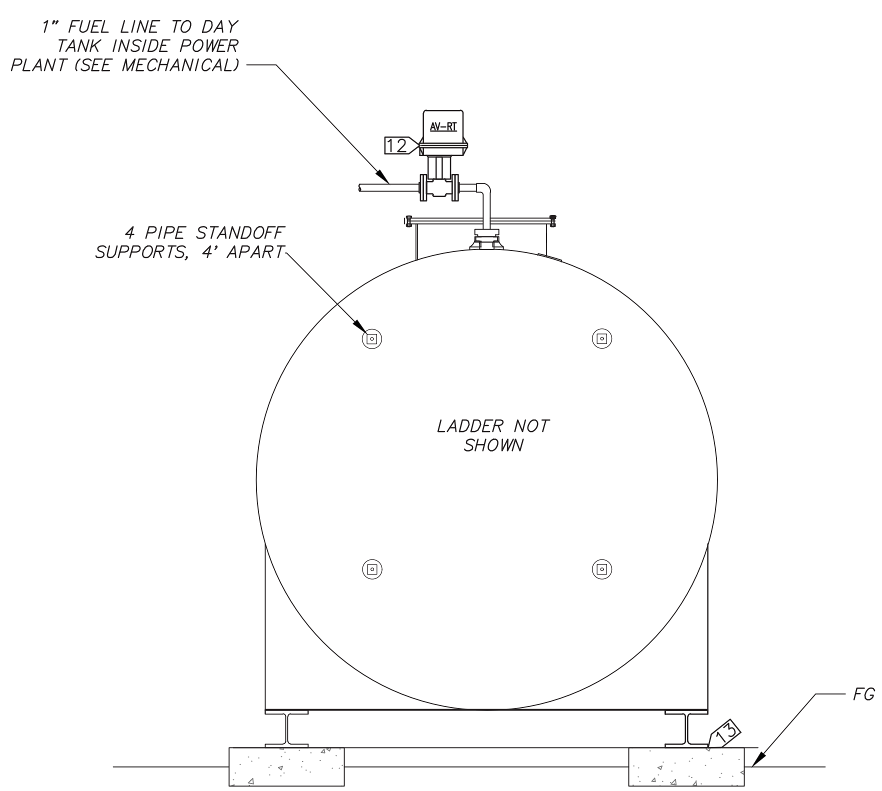
GENERAL NOTES

1. TANK SHALL BE A NEW UL 142 LISTED AND LABELED 8.0'Ø x 17.0' LONG, HORIZONTAL, DOUBLE WALL AST AS DETAILED.
2. CONCRETE TANK FOOTINGS SHALL BE 2'x8"x6" LONGER THAN THE SKID. SEE SHEET C3.2 FOR REBAR & TANK ANCHORAGE DETAILS.



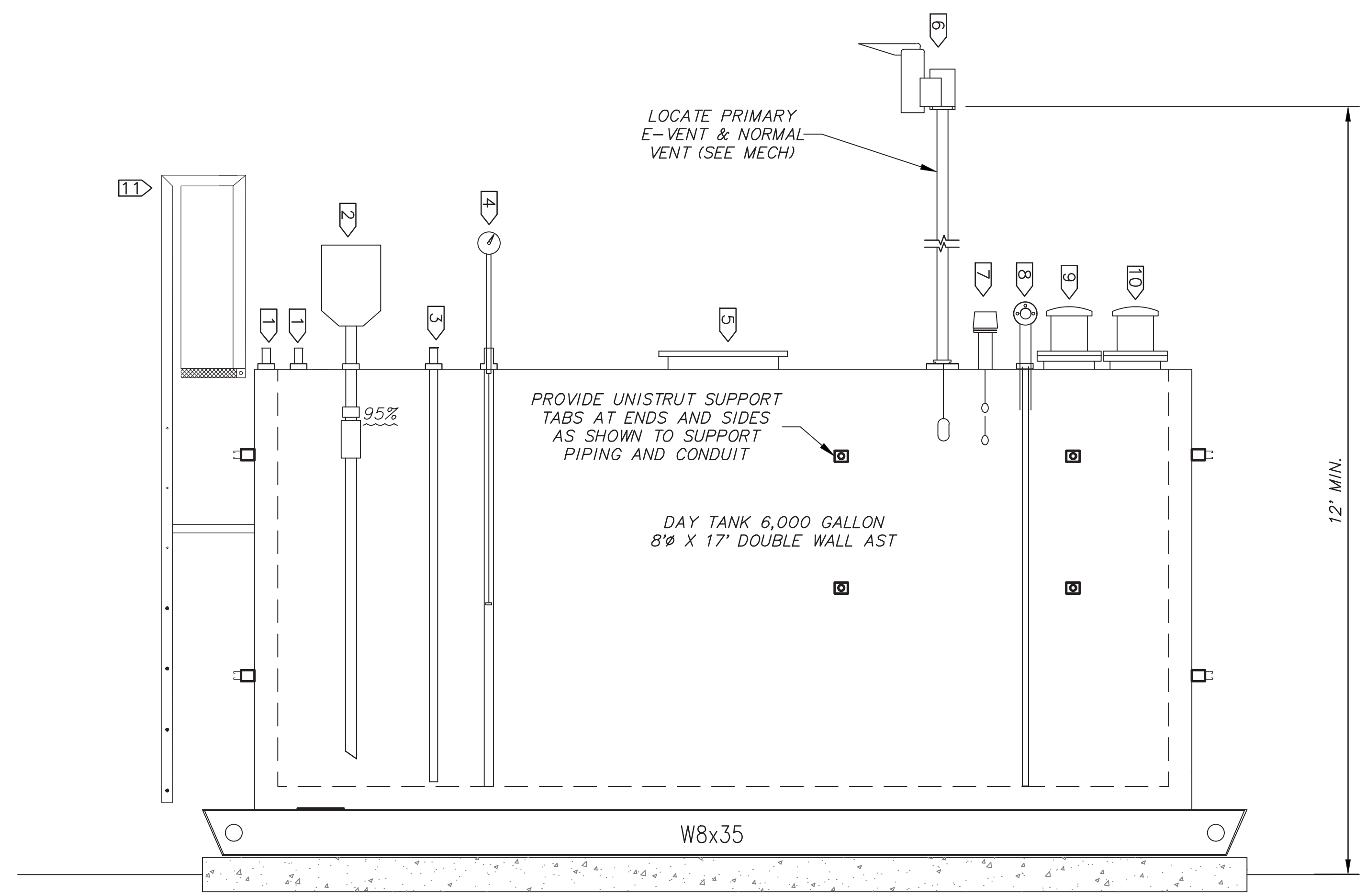
1 PLAN - 6,000 GALLON DOUBLE WALL TANK

NTS



2 END ELEVATION - 6,000 GALLON DOUBLE WALL TANK

NTS



3 ELEVATION - 6,000 GALLON DOUBLE WALL TANK

NTS

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP, LLC PHONE: (907) 562-3252

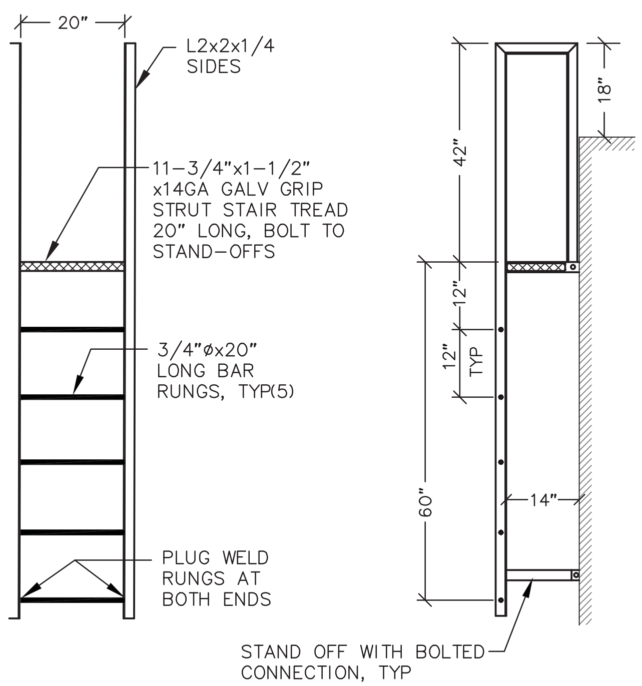
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
6,000 GALLON DOUBLE WALL TANK DETAILS

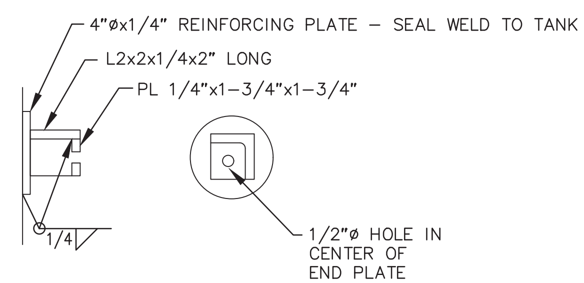
NO.	REVISION	BY	DATE

Plot Date FEB. 2020
Designed KEG
Drawn KEG
Approved KMH

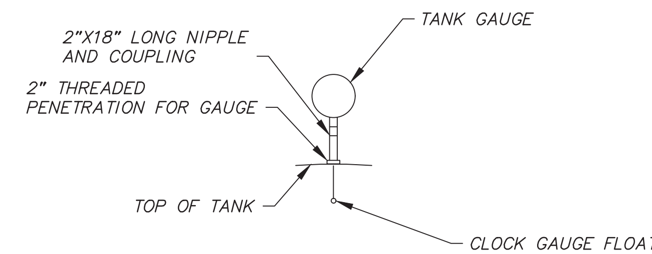
Sheet No. C3.1



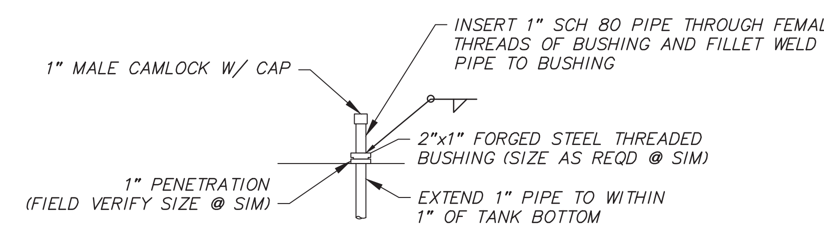
1 LADDER FABRICATION
SCALE: NTS



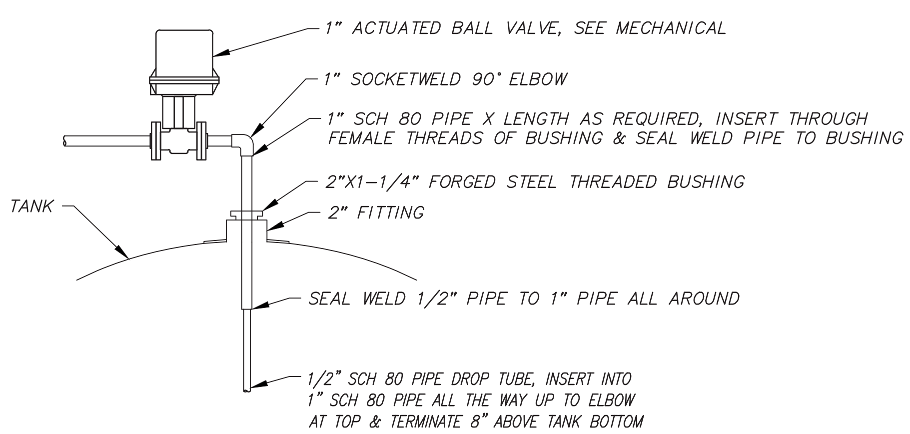
3 TYPICAL PIPE SUPPORT STAND OFF
SCALE: NTS



4 CLOCK GAUGE AND STILLING WELL
SCALE: NTS



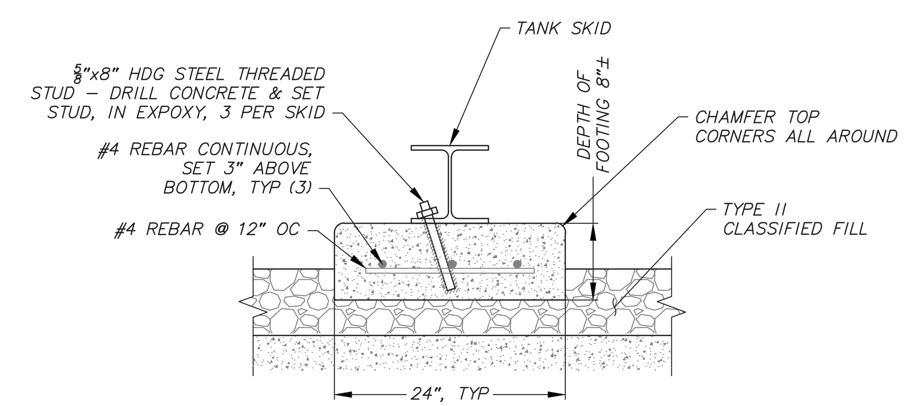
5 WATER DRAW
SCALE: NTS



NOTE

PRESSURE TEST ENTIRE DROP TUBE ASSEMBLY PRIOR TO FINAL INSTALLATION IN TANK.

2 DAY TANK SUPPLY DROP TUBE & ACTUATOR VALVE INSTALLATION
SCALE: NTS



NOTE:
1. *TAKE STEPS TO PROTECT LINER WHILE FORMING & POURING FOOTING. USE SNAP TIES OR ALL THREAD TO HOLD FORM BOARDS.* ***DO NOT USE STAKES FOR SETTING FORMS.***

6 TANK FOUNDATION DETAIL
SCALE: NTS

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH Karl R. Hulse CE-10583 REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP, LLC PHONE: (907) 562-3252

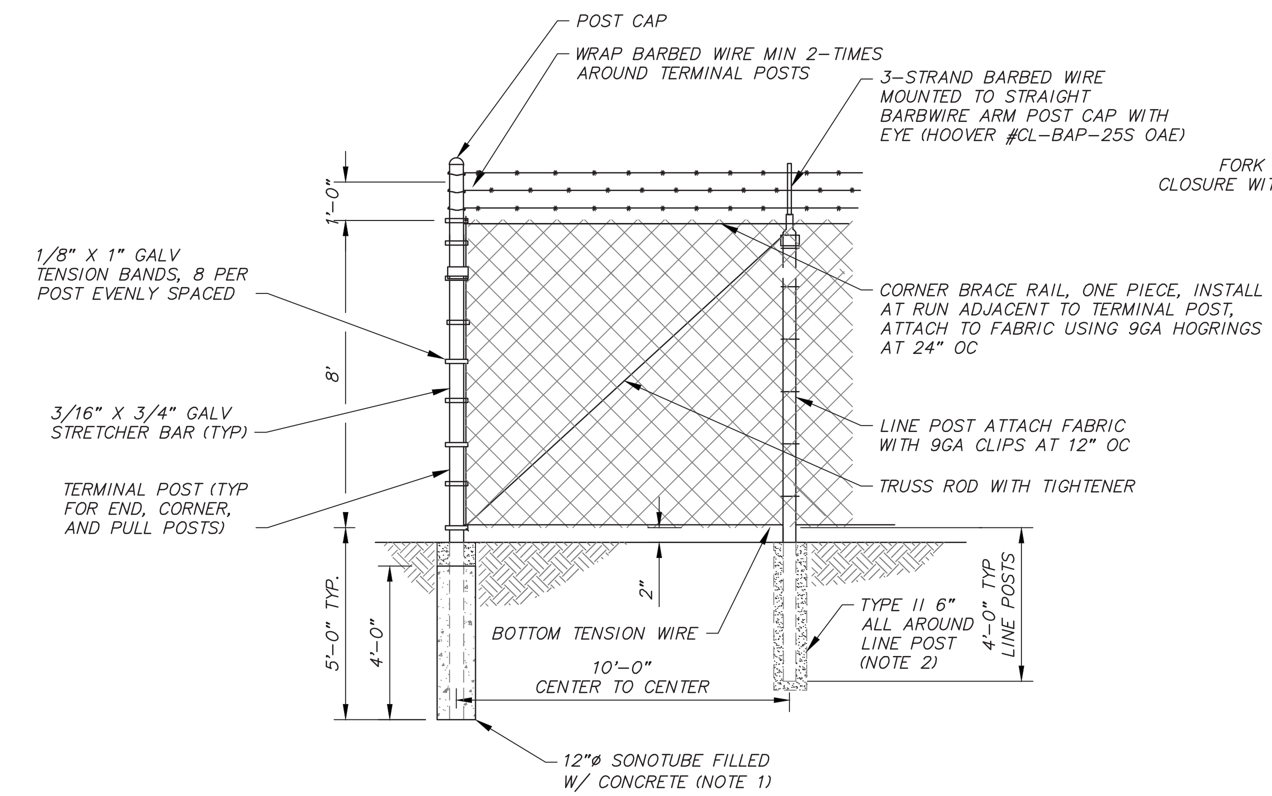
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
TANK DETAILS

NO.	REVISION	BY	DATE

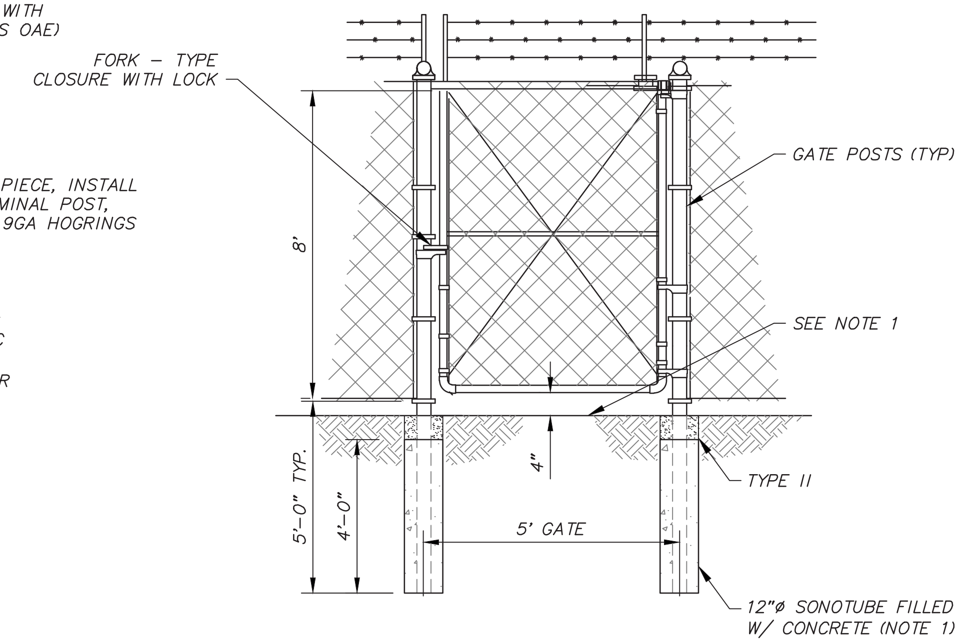
Plot Date FEB. 2020
Designed KEG
Drawn KEG
Approved KMH

Sheet No. C3.2



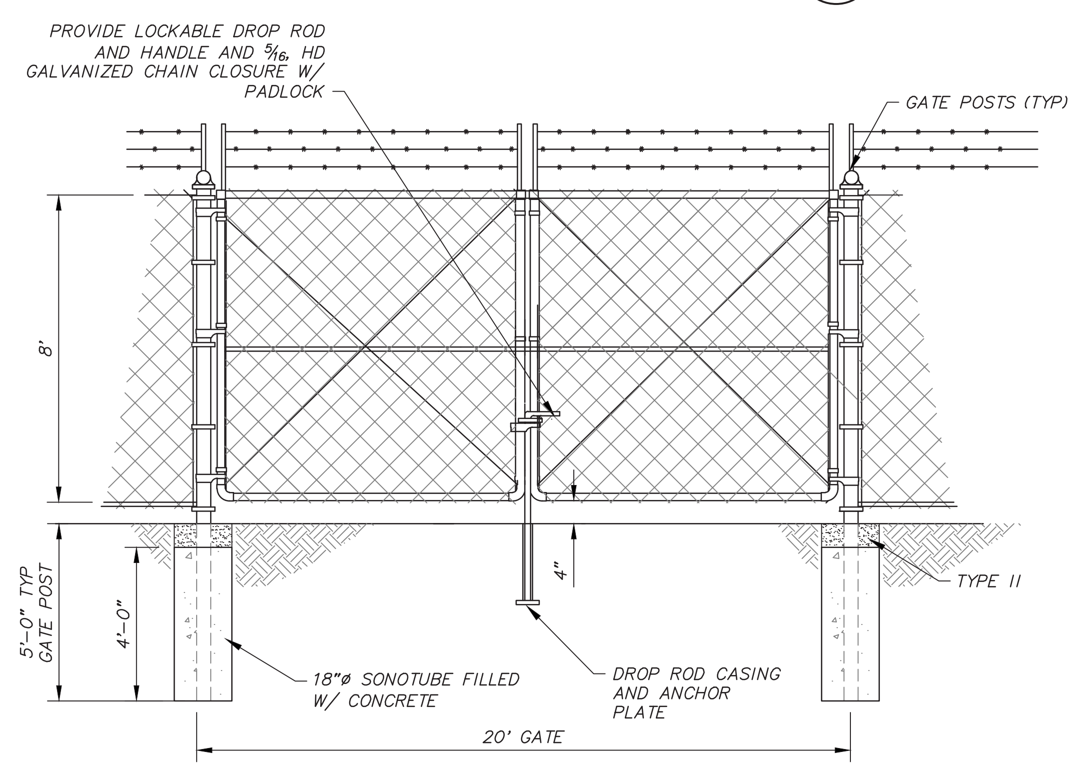
1 **FENCE DETAIL**

SCALE: NTS



2 **MAN GATE DETAIL**

SCALE: NTS



3 **20-FOOT DOUBLE SWING GATE DETAIL**

SCALE: NTS

NOTES

1. IF CORNER, PULL OR GATE FENCE POSTS ENCOUNTER BEDROCK PRIOR TO FULL EMBEDMENT PERFORM ROCK EXCAVATION/DRILLING TO ATTAIN FULL DEPTH AND INSTALL CONCRETE AS SHOWN ON DRAWINGS.
2. IF LINE POSTS ENCOUNTER BEDROCK PRIOR TO FULL EMBEDMENT CONTRACTOR SHALL PERFORM ROCK EXCAVATION/DRILLING TO ATTAIN FULL DEPTH. ALTERNATIVELY CONTACTOR MAY ANCHOR LINE POSTS WITHIN 12"øx36" LONG CONCRETE FILLED SONOTUBE SO LONG AS A MINIMUM 3' EMBEDMENT CAN BE ATTAINED.

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — Karl R. Hulse — CE-10583 — REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP, LLC — PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

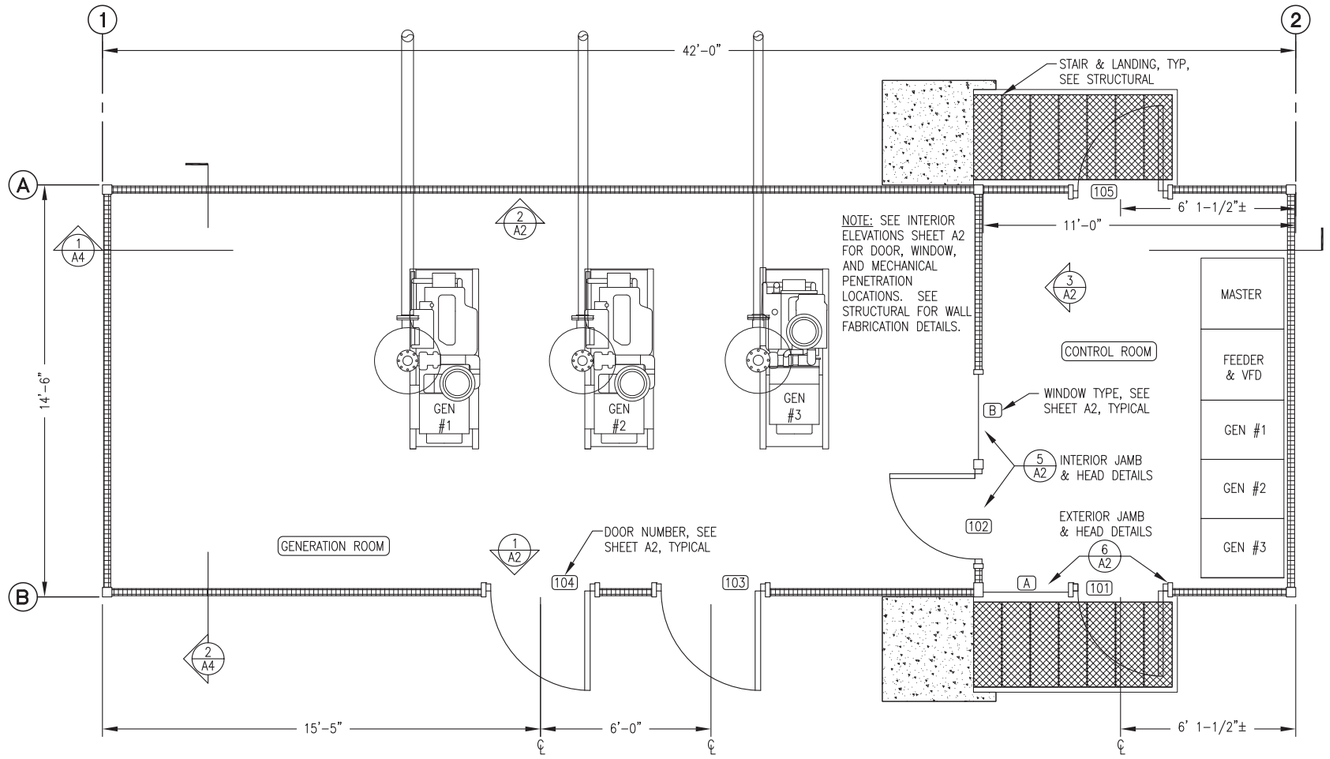
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

FENCE DETAILS

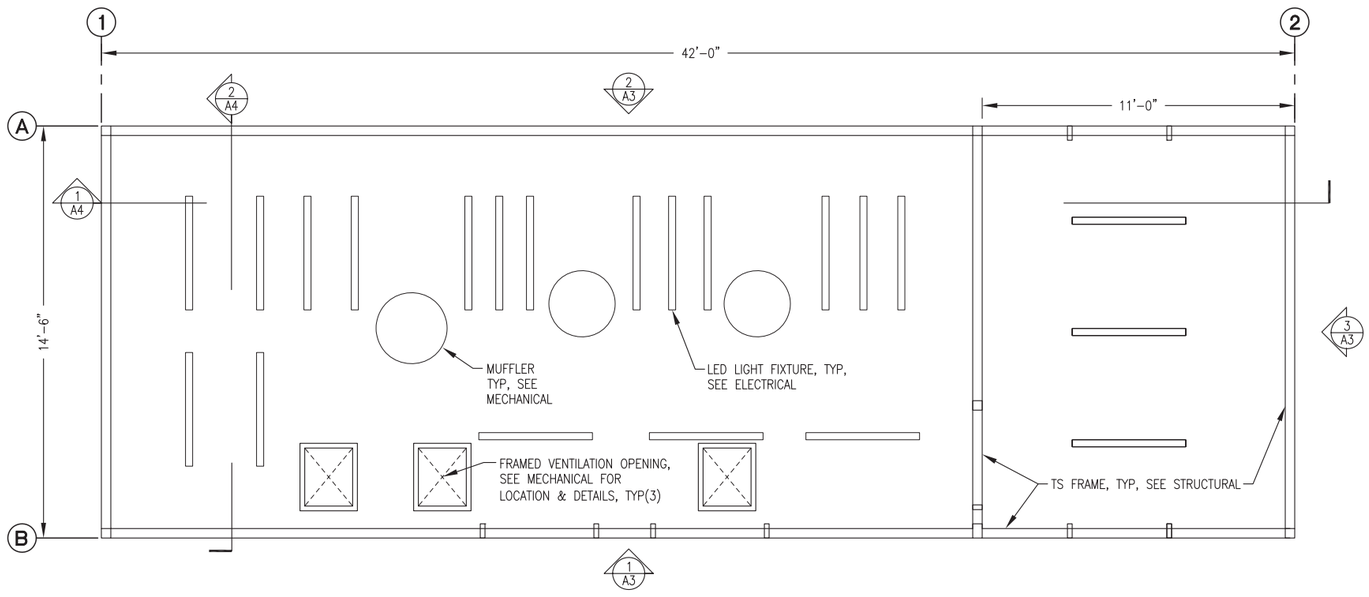
NO.	REVISION	BY	DATE

Plot Date: FEB. 2020
Designed: KEG
Drawn: KEG
Approved: KMH

Sheet No. C3.3



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



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

CODE ANALYSIS – 2012 EDITION INTERNATIONAL BUILDING CODE

OCCUPANCY CLASSIFICATION
GROUP F-1: FACTORY INDUSTRIAL MODERATE HAZARD – ELECTRIC GENERATION PLANT — REF: IBC-2012, SEC. 306.2

TYPE OF CONSTRUCTION — REF: IBC-2012, TABLE 601
TYPE V-B (NON-RATED) — REF: IBC-2012, SEC. 602.5

BUILDING HEIGHTS AND AREAS — REF: IBC-2012, TABLE 503
ALLOWED 40'-0" 1 STORY 8,500 S.F. PROVIDED: 17'-0" 1 STORY 610 S.F.

FIRE RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS — REF: IBC-2012, 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-2012, TABLE 602
EXTERIOR WALLS $10' \leq X \leq 30'$ 0 HR

FIRE PROTECTION SYSTEM — REF: IBC-2012, SEC. 903.2.4
FIRE PROTECTION NOT REQUIRED. WATER MIST FIRE SUPPRESSION SYSTEM PROVIDED (SEE MECHANICAL).

OCCUPANT LOAD — REF: IBC-2012, TABLE 1004.1.2
MECHANICAL/STORAGE = 300 S.F./PERSON 610 S.F./300 S.F. PER OCCUPANT = 2 OCCUPANTS

MEANS OF EGRESS – TRAVEL DISTANCE — REF: IBC-2012, TABLE 1016.2
REQUIRED 200' PROVIDED 20'

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 12 MILS DRY FILM THICKNESS. FIRST COAT COLOR GRAY, SECOND COAT COLOR WHITE.

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.

8) SANDBLAST INTERIOR SURFACE TO SSPC-SP-6. PRIME AND FINISH WITH TWO COATS OF EPOXY, SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, TO 8 MILS TOTAL DRY FILM THICKNESS. CEILING COLOR WHITE. WALL AND FLOOR COLOR STRUCTURAL GRAY 4031. NOTE THAT FIRST COAT ON WALLS AND FLOOR MAY BE WHITE.

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — 49 THE FRONTIER — REGISTERED PROFESSIONAL ENGINEER — David G. Thompson — 7074 — 11/5/19

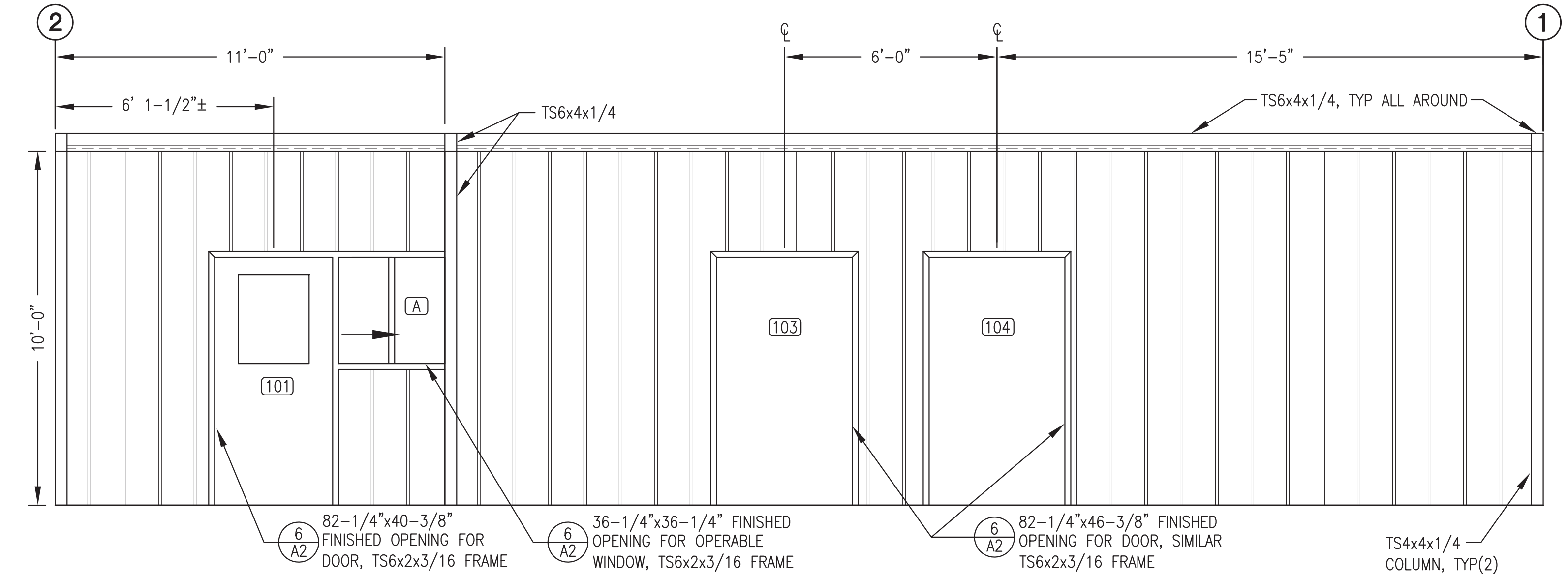
CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
FLOOR PLAN, REFLECTED CEILING PLAN, CODE ANALYSIS, & GENERAL NOTES

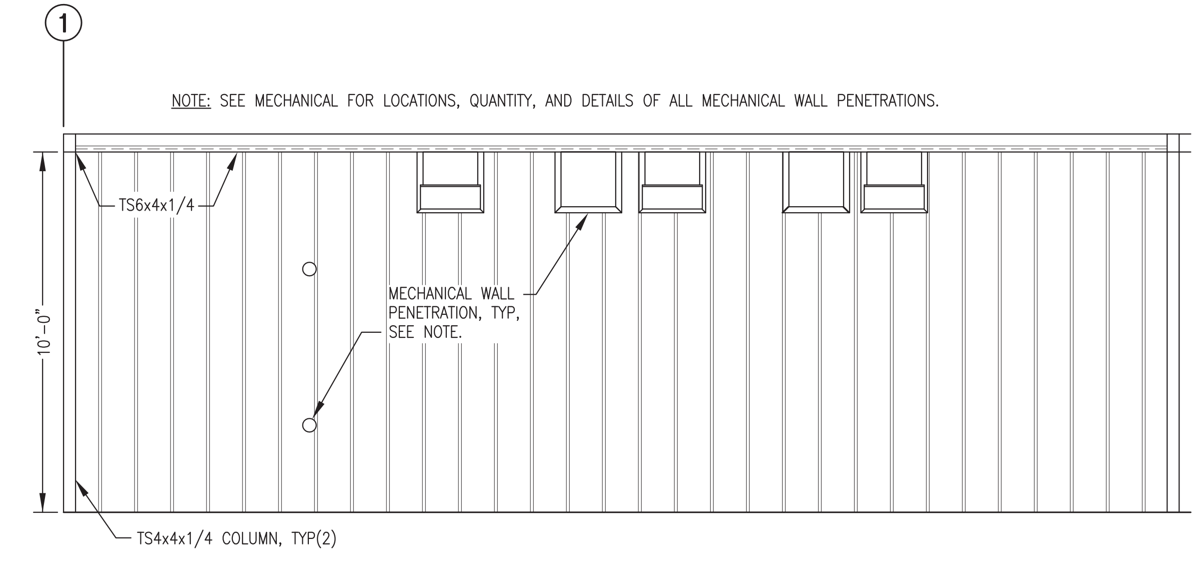
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19
1	REVISED PAINT SPECIFICATIONS	BCG	11/5/19

Plot Date 11/5/19
Designed DGT/BCG
Drawn JTD
Approved DGT

Sheet No. A1

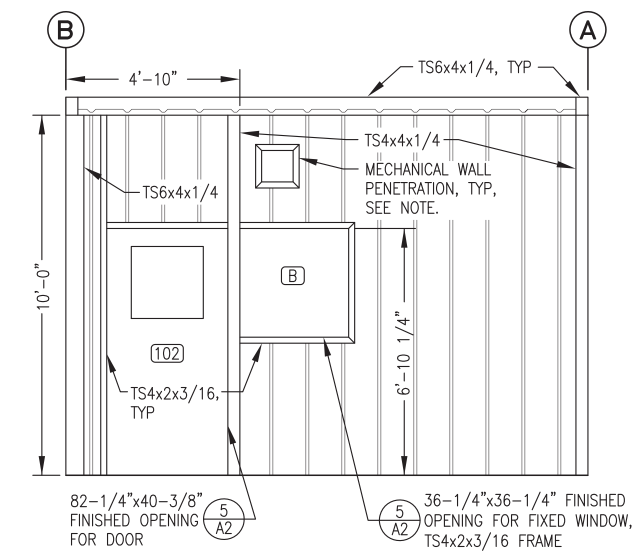


1 / A2 FRONT WALL INTERIOR ELEVATION
3/8"=1'-0"



2 / A2 PARTIAL GENERATOR ROOM BACK WALL INTERIOR ELEVATION
3/8"=1'-0"

NOTE: SEE MECHANICAL FOR LOCATIONS, QUANTITY, AND DETAILS OF ALL MECHANICAL WALL PENETRATIONS.



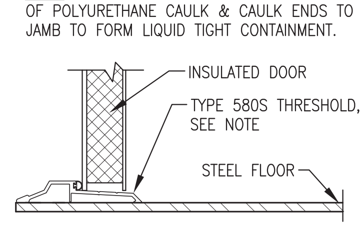
3 / A2 CONTROL ROOM WALL INTERIOR ELEVATION
3/8"=1'-0"

FRAMED OPENING NOTES:

1) FABRICATE FRAMED OPENINGS FOR DOORS, WINDOWS, ETC, WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS. GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

2) FABRICATE TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED AND LOCATE TO INSIDE EDGE OR CENTERLINE AS INDICATED.

NOTE: SET THRESHOLD IN CONTINUOUS BED OF POLYURETHANE CAULK & CAULK ENDS TO JAMB TO FORM LIQUID TIGHT CONTAINMENT.



4 / A2 TYPICAL DOOR THRESHOLD
NO SCALE

DOOR CONSTRUCTION							FRAME CONSTRUCTION						
DOOR NO.	WIDTH	HEIGHT	THICKNESS	MATERIAL	CORE	REMARKS	WALL THICK.	MATERIAL	TYPE	PROFILE	PREP.	FIRE RATING	HDWR. GROUP
101	3'-0"	6'-8"	1-3/4"	16 GA. H.M.	POLYURETHANE	24"x24" RE-LIGHT {4}	N/A	16 GA. H.M.	WELDED	SINGLE RABBETED	DIMPLE & PUNCH	NONE	HW-1
102	3'-0"	6'-8"	1-3/4"	16 GA. H.M.	POLYURETHANE	24"x24" RE-LIGHT {4}	N/A	16 GA. H.M.	WELDED	SINGLE RABBETED	DIMPLE & PUNCH	NONE	HW-2
103	3'-6"	6'-8"	1-3/4"	16 GA. H.M.	POLYURETHANE		N/A	16 GA. H.M.	WELDED	SINGLE RABBETED	DIMPLE & PUNCH	NONE	HW-3
104	3'-6"	6'-8"	1-3/4"	16 GA. H.M.	POLYURETHANE		N/A	16 GA. H.M.	WELDED	SINGLE RABBETED	DIMPLE & PUNCH	NONE	HW-3
105	3'-0"	6'-8"	1-3/4"	16 GA. H.M.	POLYURETHANE	24"x24" RE-LIGHT {4}	N/A	16 GA. H.M.	WELDED	SINGLE RABBETED	DIMPLE & PUNCH	NONE	HW-1

DOOR HARDWARE:

HW-1

QTY		ITEM	MANUFACTURER	MODEL
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	LCN	4040 x CUSH 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	THRESHOLD	HAGER	580S x 36

HW-2

QTY		ITEM	MANUFACTURER	MODEL
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	SOUND SEAL	PEMKO	2891AS x 36 (HEAD)
2	EA	SOUND SEAL	PEMKO	290AS x 80 (SIDE JAMBS)
1	EA	THRESHOLD	HAGER	580S x 36

HW-3

QTY		ITEM	MANUFACTURER	MODEL
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	ROCKWOOD	OH1004M x US32D
1	EA	WEATHER STRIP	PEMKO	2891AS x 42 (HEAD)
2	EA	WEATHER STRIP	PEMKO	290AS x 80 (SIDE JAMBS)
1	EA	THRESHOLD	HAGER	580S x 42

NOTES:

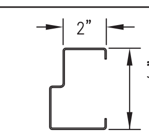
{1} DOORS AND HOLLOW METAL FRAMES GALVANIZED AND FACTORY PRIMED. ALL FRAMES WELDED CONSTRUCTION, DIMPLED AND PUNCHED.

{2} DOORS TO HAVE SOLID POLYURETHANE INSULATION CORE WITH TOPS INVERTED AND CAULKED WATER TIGHT.

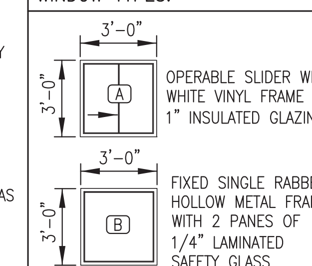
{3} FINISH ALL DOORS AND HOLLOW METAL FRAMES WITH TWO COATS OF PAINT IDENTICAL TO INTERIOR WALLS AND FLOORS AS SPECIFIED ON SHEET A1.

{4} INSTALL INSULATED RE-LIGHT WITH TWO PANES OF 1/4" LAMINATED SAFETY GLASS WITH 1/2" AIR GAP IN EACH DOOR PANEL, 24"x24" OR 24"x18" AS INDICATED.

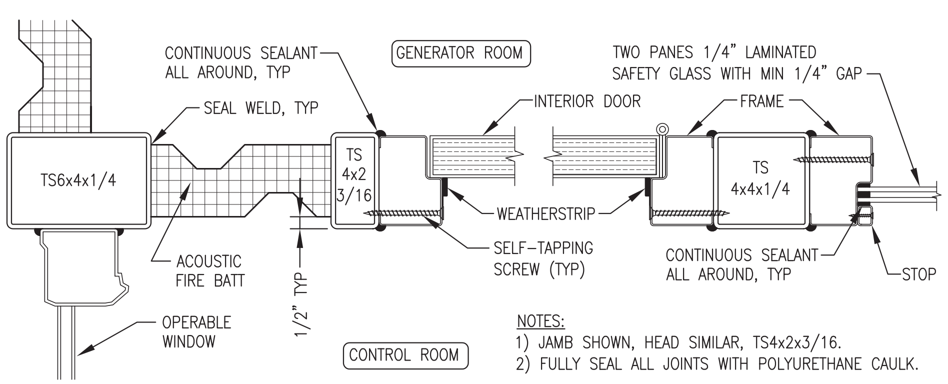
DOOR FRAME PROFILE:



WINDOW TYPES:

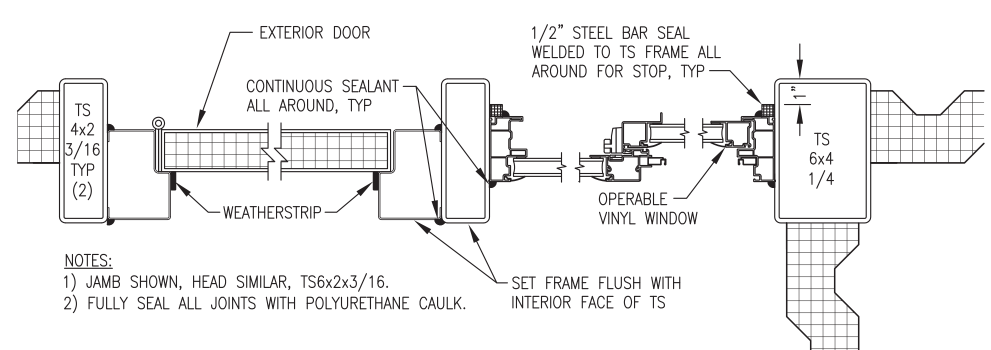


NOTE: DIMENSIONS ARE OVERALL FRAME SIZE.



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

5 / A2 INTERIOR DOOR AND WINDOW JAMB/HEAD
3"=1'-0"



NOTES:
1) JAMB SHOWN, HEAD SIMILAR, TS6x2x3/16.
2) FULLY SEAL ALL JOINTS WITH POLYURETHANE CAULK.

6 / A2 TYPICAL EXTERIOR DOOR AND WINDOW JAMB/HEAD
3"=1'-0"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH · David G. Thompson · No. 7034 · 11/5/19 · REGISTERED PROFESSIONAL ARCHITECT

CRW ENGINEERING GROUP LLC

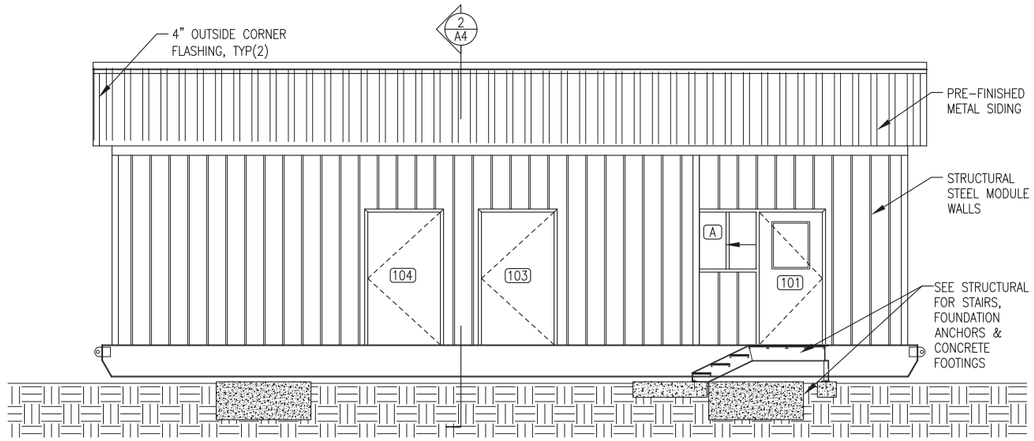
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
INTERIOR ELEVATIONS & DOOR/WINDOW DETAILS & SCHEDULE

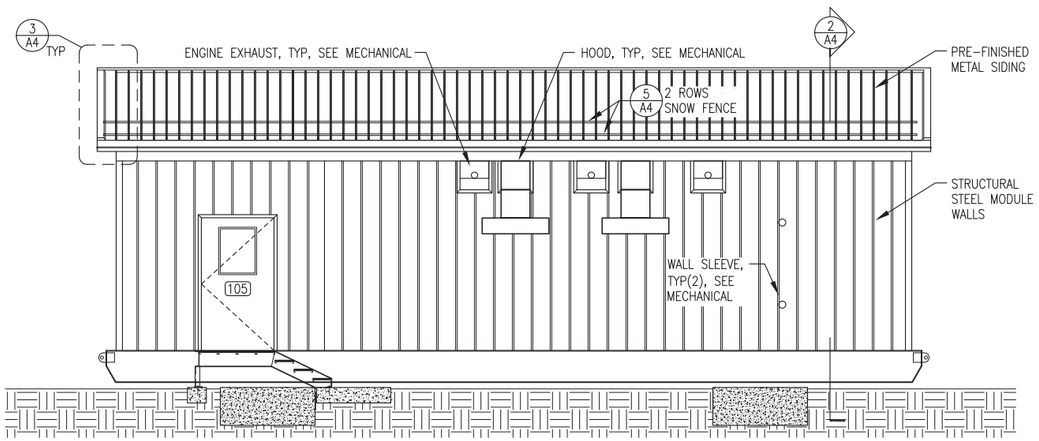
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19
1	REVISED DOOR PAINT NOTE	BCG	11/5/19

Plot Date 11/5/19 · Designed DGT/BCG · Drawn JTD · Approved DGT

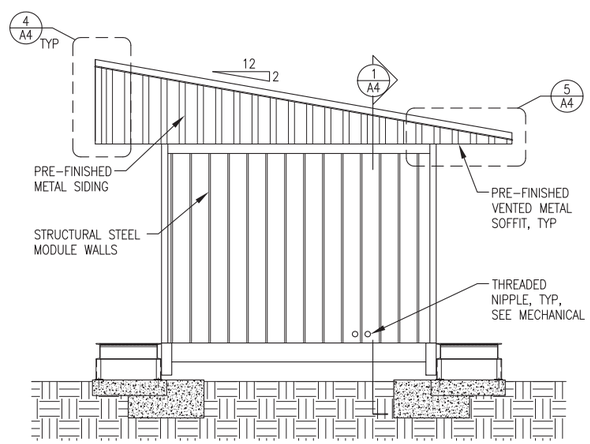
Sheet No. A2



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 JADE GREEN. ALL FASTENERS SHALL BE CORROSION RESISTANT COATED SCREWS AND RIVETS.

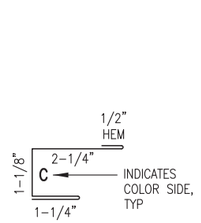
3) ROOFING SHALL BE MECHANICAL STANDING SEAM TYPE, 24 GAUGE, 16" NET COVERAGE, 2" HIGH RIBS AT 16" O.C. WITH TWO PENCIL RIBS BETWEEN. AEP SPAN SPAN LOK HP OR EQUAL. FURNISH CLIPS AND FASTENERS AS REQUIRED TO MEET LOAD CONDITIONS INDICATED ON SHEET S1.

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.

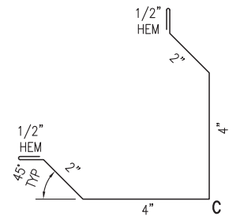
5) VENTED SOFFIT PANELS SHALL BE 24 GAUGE GALVANIZED STEEL, 12" NET COVERAGE, KYNAR FINISH, 1" STANDOFF FROM SUBSTRATE, CONCEALED FASTENERS, WITH TWO PENCIL RIBS PROVIDING MINIMUM 7.8% NET FREE AREA. AEP SPAN FLUSH PANEL OR EQUAL.

6) SEE SHEET A4 FOR ROOF MOUNTED SNOW FENCE.

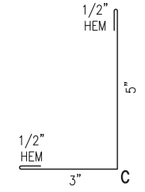
ROOFING SYSTEM TRIM & FLASHING:



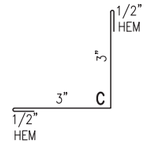
INSIDE COLOR CEE-METAL



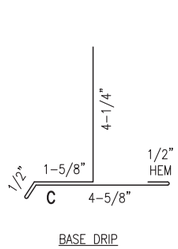
4" OUTSIDE CORNER



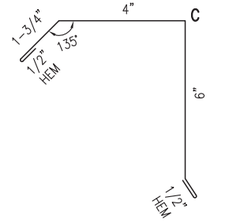
3"x5" OUTSIDE CORNER



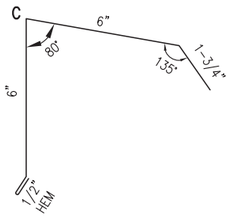
3"x3" INSIDE CORNER



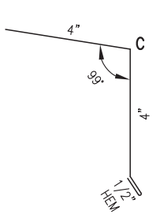
BASE DRIP



GABLE FLASHING



PEAK FLASHING



EAVE FLASHING

FIELD INSTALLED ROOF SYSTEM SHOWN THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49 III DAVID G. THOMPSON 7034 REGISTERED PROFESSIONAL ENGINEER David G. Thompson No. 7034 11/1/19

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

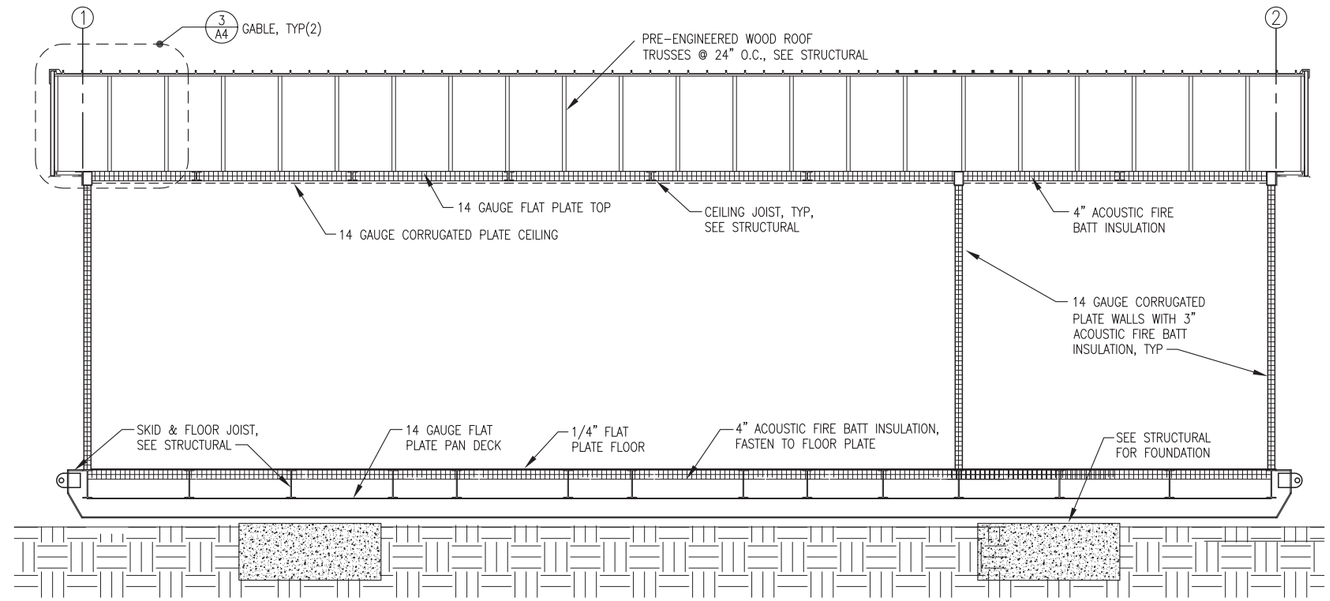
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

EXTERIOR ELEVATIONS & ROOFING NOTES & TRIM DETAILS

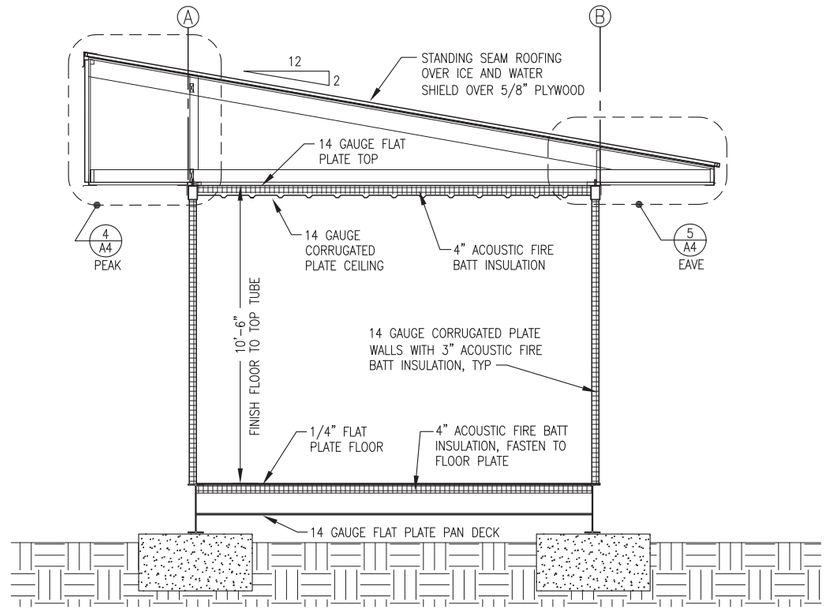
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

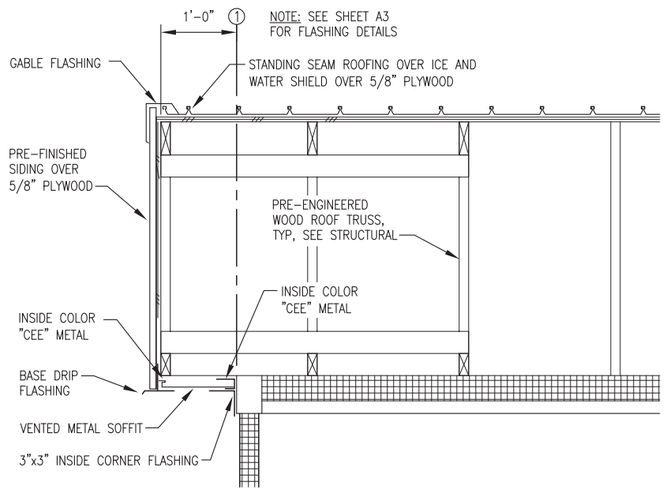
Sheet No. A3



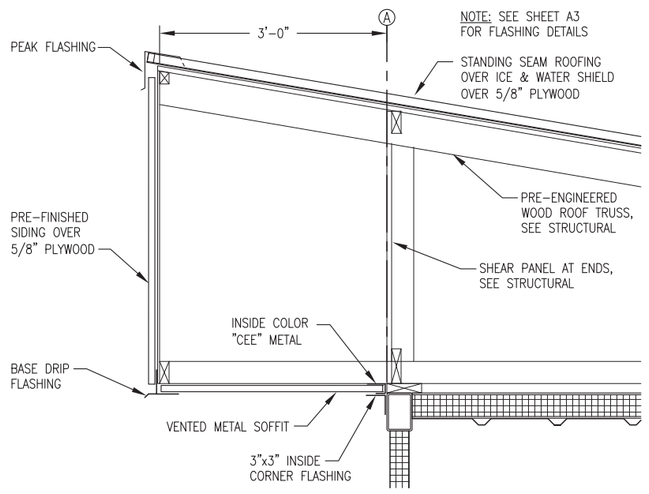
1 A4 BUILDING SECTION
3/8"=1'-0"



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



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

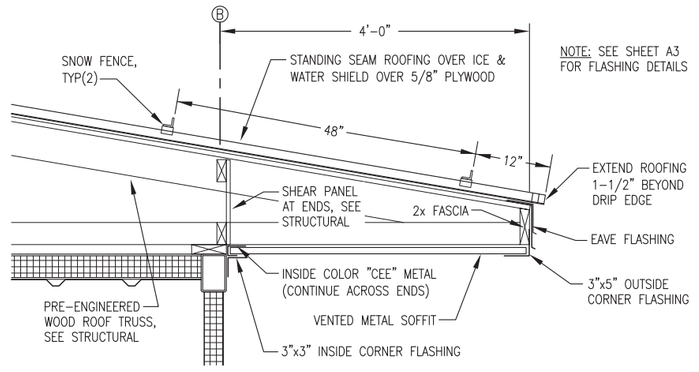


4 A4 PEAK DETAIL
1"=1'-0"

SNOW FENCE SPECIFICATIONS:

1) PROVIDE 2 ROWS OF 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.



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

FIELD INSTALLED ROOF SYSTEM SHOWN THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA
49 III
David G. Thompson
No. 7034
11/1/19
REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC
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Gray Stassel Engineering, Inc.
PHONE: (907) 349-0100

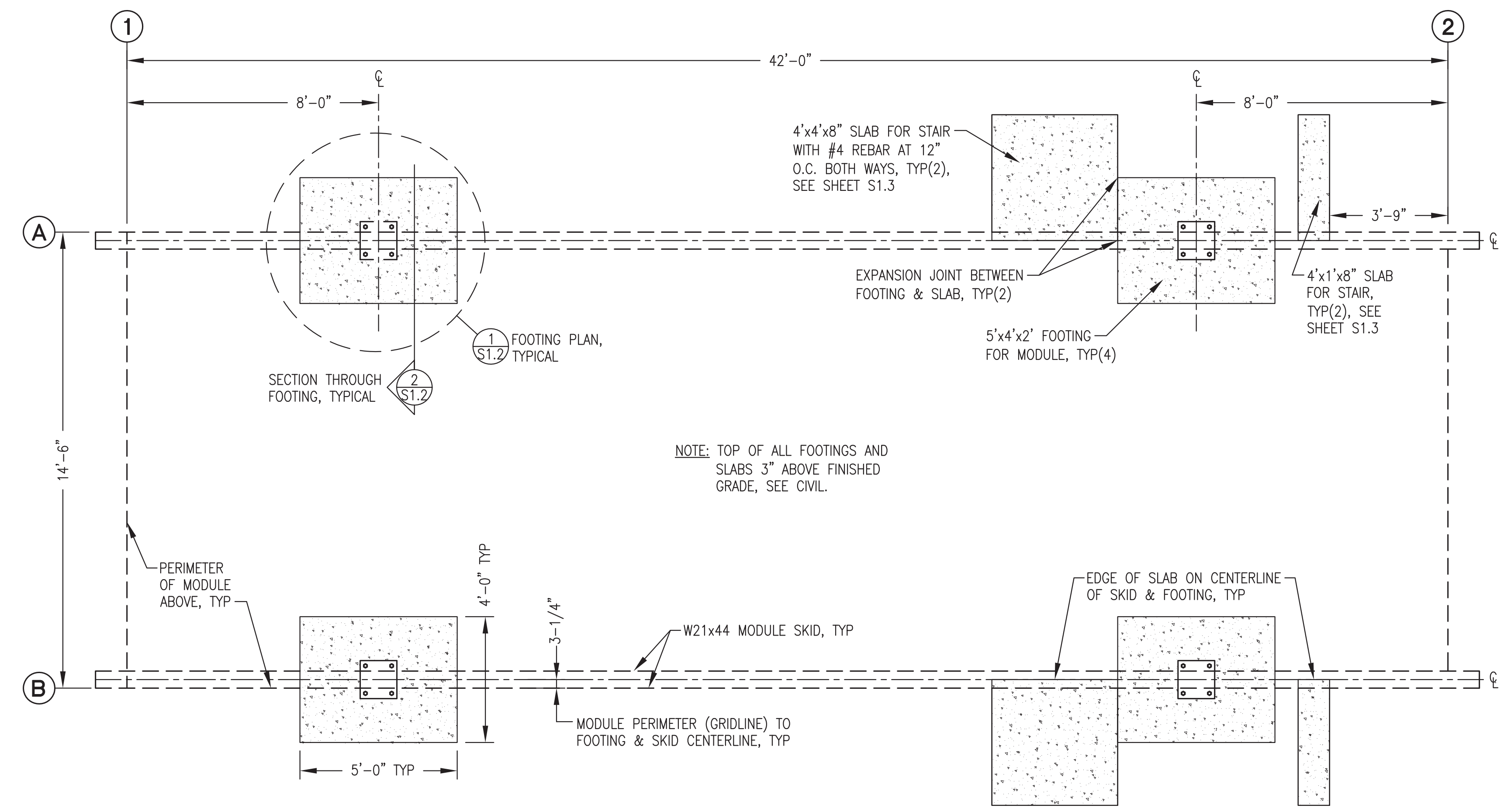
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

BUILDING SECTIONS & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

Sheet No. A4



1 / S1 FOUNDATION PLAN
3/8"=1'-0"

STRUCTURAL GENERAL NOTES:

1.0 DESIGN LOADS:

A. BUILDING CODE: 2012 INTERNATIONAL BUILDING CODE (IBC 2009)

B. FLOOR LIVE LOADS: (IBC TABLE 1607.1)
- LIGHT STORAGE/MANUFACTURING: 125 PSF OR 2000 POUND POINT LOAD
- MAXIMUM GENERATOR UNIT WEIGHT: 6,000 POUNDS

C. SNOW LOADS: (ASCE 7-10)
- GROUND SNOW LOAD, Pg = 40 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 = 40 PSF

D. WIND LOADS:
- BASIC WIND SPEED = 165 MPH, 3 SECOND GUST
- RISK CATEGORY = CATEGORY IV
- EXPOSURE CLASSIFICATION = EXPOSURE D

E. SEISMIC LOADING:
- SEISMIC = Ss = 1.0 S1 = 0.50
- SEISMIC IMPORTANCE FACTOR = 1.50 , CATEGORY IV
- SITE CLASS "D"
- BASIC SEISMIC FORCE RESISTANCE SYSTEM = BUILDING – BEARING WALL WITH STEEL SHEAR PANELS; FOUNDATION – SPREAD CONCRETE FOOTINGS
- SEISMIC RESPONSE COEFFICIENT, R = 7.0

2.0 FOUNDATIONS:

A. SEE CIVIL FOR NFS STRUCTURAL GRAVEL PAD.
B. PROVIDE REINFORCED CONCRETE FOUNDATIONS IN ACCORDANCE WITH SPECIFICATIONS AND AS DETAILED ON SHEET S1.2.

3.0 STRUCTURAL STEEL:

A. THE DESIGN, FABRICATION, AND ERECTION OF ALL STRUCTURAL STEEL SHALL COMPLY WITH THE CODE OF STANDARD PRACTICE OF THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION.
B. ALL STEEL PLATE, SHAPES, AND ROLLED SECTIONS SHALL BE ASTM A36. ALL STEEL TUBING SHALL BE ASTM A500, GRADE B.
C. ALL METAL TO METAL CONNECTIONS SHALL BE EQUAL TO STANDARD CONNECTION, OR AS DETAILED USING A325 BOLTS (BEARING TYPE CONNECTIONS). TIGHTEN HIGH STRENGTH BOLTS WITH PROPERLY CALIBRATED WRENCHES, BY TURN-OF-THE-NUT METHOD, OR BY LOAD WASHERS. ALL CONNECTIONS UNLESS OTHERWISE DETAILED, SHALL HAVE THE MAXIMUM NUMBER OF 3/4" DIAMETER BOLTS USING STANDARD GAUGES AND CLEARANCES.
D. ALL WELDING SHALL BE DONE IN ACCORDANCE WITH THE CURRENT CODE OF THE AMERICAN WELDING SOCIETY. USE AWS 5.1 E70XX ELECTRODES. MINIMUM FILLET WELD SHALL BE 3/16" EXCEPT FOR SEAL WELDS TO GAUGE METAL AS INDICATED.
E. ALL EXPOSED STEEL SURFACES SHALL BE PREPARED AND PAINTED AS INDICATED IN THE ARCHITECTURAL DRAWINGS.

4.0 WOOD:

A. 5/8" PLYWOOD SHALL HAVE A PANEL SPAN RATING OF 32/16 – MINIMUM NAILING FOR PANELS, UNLESS OTHERWISE NOTED, SHALL EQUAL 10d NAILS AT 4" CENTERS AROUND PLYWOOD PANEL EDGES AND 10d'S @ 12" CENTERS ALONG INTERMEDIATE FRAMING. BLOCK ALL DIAPHRAGM PANEL EDGES WITH 2X4 FLAT BLOCKING. OSB PANELS WILL NOT BE ACCEPTED.
B. FRAMING MATERIAL: DOUGLAS FIR OR HEM FIR, NO. 2 OR BETTER MINIMUM FOR JOISTS, STUDS, PANEL JOINTS, WOOD PLATES, BLOCKING, AND HEADERS. MAXIMUM MOISTURE CONTENT SHALL BE 19%. FOR FRAMING SPECIFICALLY INDICATED AS TREATED PROVIDE LUMBER TREATED FOR GROUND CONTACT TO 0.4 RETENTION MINIMUM.
C. ALL METAL TO WOOD OR WOOD TO WOOD CONNECTIONS SHALL BE STANDARD OR AS DETAILED ON THE DRAWINGS. ALL FASTENERS SHALL BE GALVANIZED OR STAINLESS STEEL.
D. ALL METAL FRAMING ANCHORS AND SPLICE PLATES SHALL BE FABRICATED FROM GALVANIZED STEEL AND SHALL SUPPORT THE LOADS INDICATED ON THE DRAWINGS. ANCHORS INDICATED ON THE DRAWINGS ARE "SIMPSON COMPANY" OR EQUAL.
E. MINIMUM NAILING SHALL EQUAL THAT INDICATED IN 2012 IBC TABLE 2304.9.1 UNLESS OTHERWISE INDICATED ON THE DRAWINGS OR ANCHOR MANUFACTURER'S INSTALLATION INSTRUCTIONS. MINIMUM NAILING FOR EXTERIOR PLYWOOD PANELS SHALL EQUAL 10d NAILS AT 4" CENTERS AROUND PLYWOOD PANEL EDGES AND 10d'S @ 12" CENTERS ALONG INTERMEDIATE FRAMING. BLOCK ALL DIAPHRAGM PANEL EDGES WITH 2x4 OR 2x6 BLOCKING.
F. ERECT WOOD FRAMING MEMBERS TRUE TO LINES AND LEVELS. DO NOT DEVIATE FROM TRUE ALIGNMENT MORE THAN 1/4 INCH.
G. PREMANUFACTURED ROOF TRUSSES: ALL PRE-MANUFACTURED WOOD TRUSSES SHALL BE "GANG NAIL" OR EQUAL AND SHALL BE FABRICATED WITH GALVANIZED PLATES AND FASTENERS AS INDICATED ABOVE. TRUSSES SHALL DESIGNED FOR THE GRAVITY LOADS, WIND & SEISMIC LATERAL & UPLIFT LOADS, AND SUPPORT CONDITIONS AS INDICATED ON THE DRAWINGS. NO DURATION OF LOAD INCREASE IN STRESSES WILL BE ALLOWED FOR SNOW LOADING. UNBALANCED SNOW AND DRIFT LOADING IS REQUIRED. SUBMIT TRUSS DESIGNS STAMPED BY AN ENGINEER LICENSED TO PRACTICE IN THE STATE OF ALASKA. TRUSS DRAWINGS SHALL INDICATE ALL MATERIALS OF CONSTRUCTION.

MODULE FOUNDATION SYSTEM SHOWN THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH David G. Thompson SE 14226 11/1/19 REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC

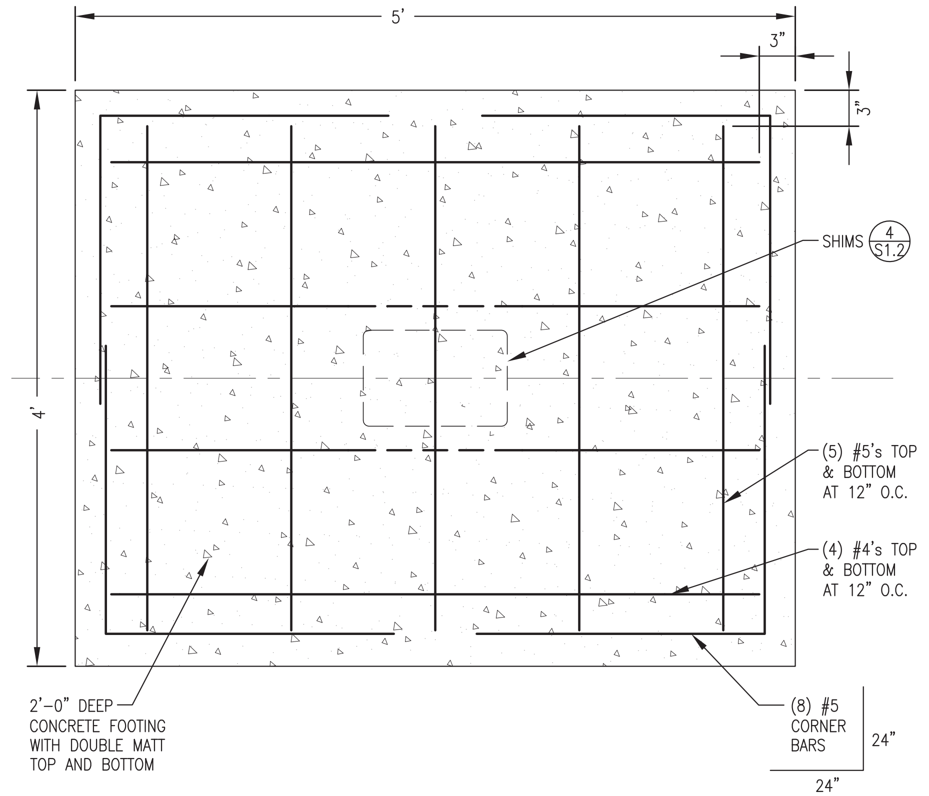
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
FOUNDATION PLAN, CODE ANALYSIS, & STRUCTURAL NOTES

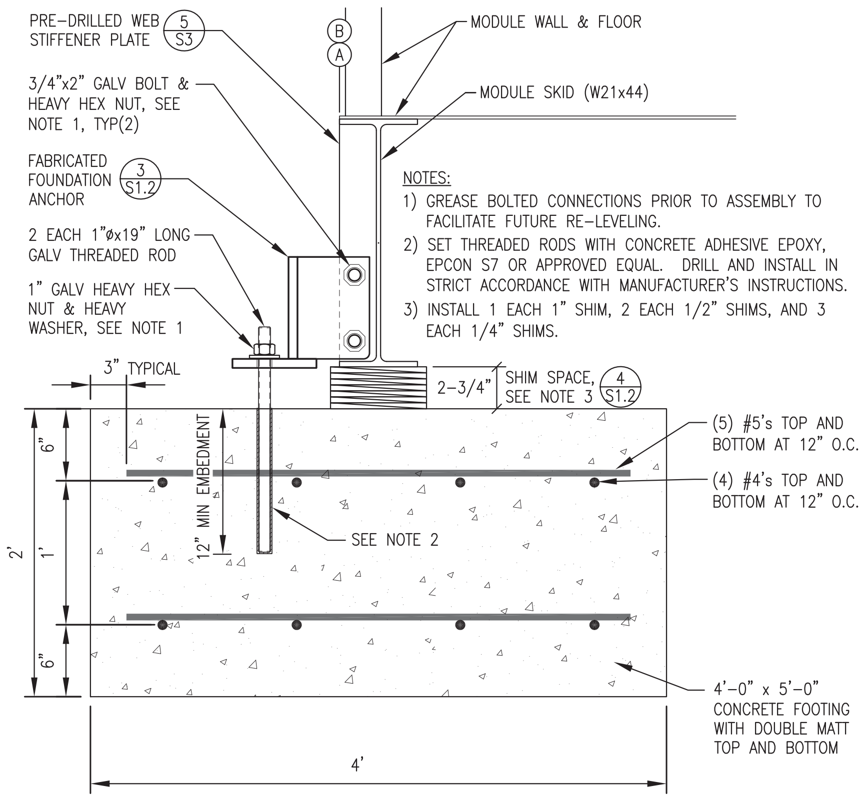
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

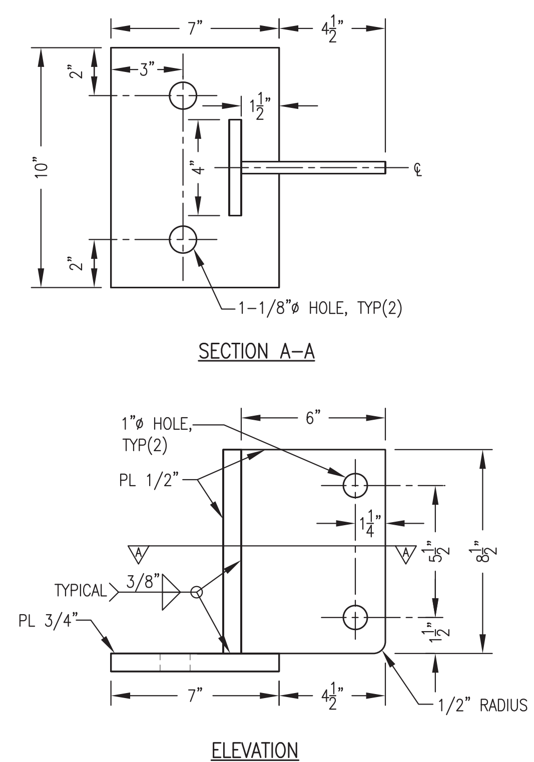
Sheet No. S1.1



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



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



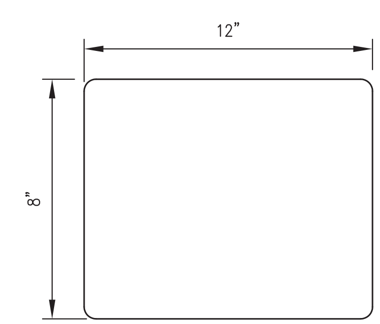
3/S1.2 TYPICAL FOUNDATION ANCHOR
3"=1'-0"

ANCHOR & SHIM FABRICATION NOTES:

1) FABRICATE FOUR IDENTICAL ANCHOR ASSEMBLIES.
2) DO NOT SHEAR PLATES FOR ANCHOR. CUT WITH WATER JET, TORCH, OR SAW.
3) FABRICATE FROM ASTM A-36 STEEL SHAPES AND PLATE AS INDICATED.
4) MAKE ALL JOINTS AND CONNECTIONS WITH CONTINUOUS GROOVE OR FILLET WELDS.
5) FABRICATE SHIMS OF QUANTITY AND THICKNESS AS DESCRIBED IN SHIM FABRICATION TABLE.
6) UPON COMPLETION OF FABRICATION ROUND ALL OUTSIDE CORNERS AND GRIND ALL EDGES SMOOTH.
7) GALVANIZE COMPLETED FABRICATIONS AND SHIMS. PREPARE UTILIZING A CAUSTIC BATH, ACID PICKLE, AND FLUX. HOT-DIP GALVANIZE IN ACCORDANCE WITH ASTM A 123.

SHIM FABRICATION TABLE

THICKNESS	QUANTITY	MATERIAL
1/4"	12	GALV STEEL
1/2"	8	GALV STEEL
1"	4	GALV STEEL



ROUND CORNERS R= 1/2" (TYPICAL)

4/S1.2 TYPICAL SHIM
NO SCALE

MODULE FOUNDATION SYSTEM SHOWN THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA, David G. Thompson, SE 14226, 11/1/19, REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC

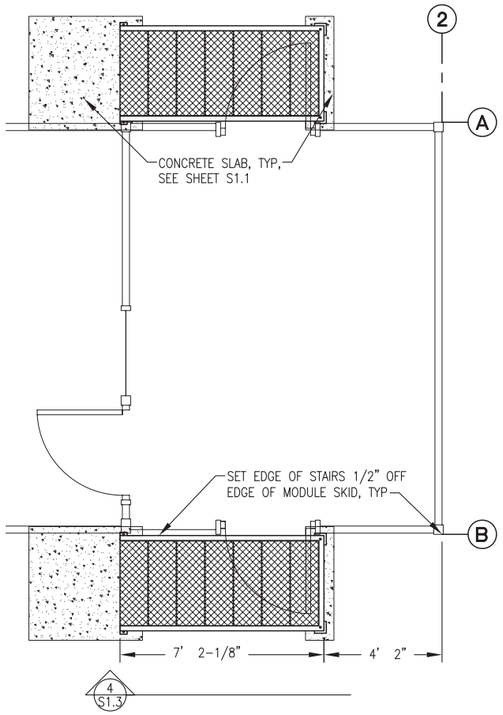
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
FOUNDATION DETAILS

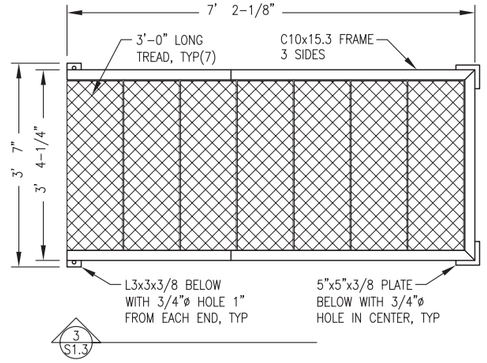
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

Sheet No. S1.2



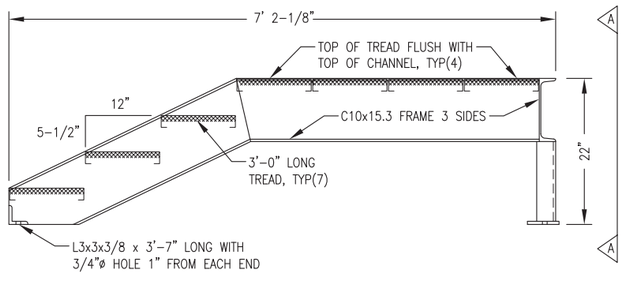
1 S1.3 STAIR INSTALLATION PLAN
3/8"=1'-0"

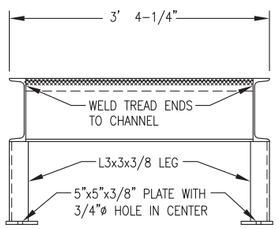


2 S1.3 STAIR FABRICATION PLAN
3/4"=1'-0"

STAIR FABRICATION NOTES:

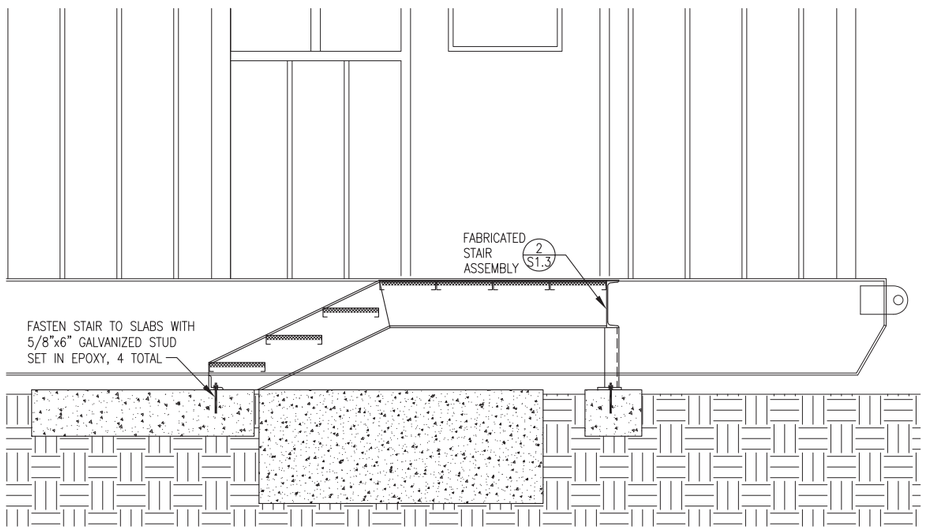
1) FABRICATE TWO IDENTICAL STAIR ASSEMBLIES.
2) FABRICATE FROM ASTM A-36 STEEL SHAPES AND PLATE AS INDICATED. STAIR AND PLATFORM TREADS TO BE 2"x11-3/4"x12 GA. GRIP STRUT.
3) MAKE ALL JOINTS AND CONNECTIONS WITH CONTINUOUS GROOVE OR FILLET WELDS.
4) UPON COMPLETION OF FABRICATION ROUND ALL OUTSIDE CORNERS AND GRIND ALL EDGES SMOOTH.
5) PREPARE COMPLETED ASSEMBLIES FOR GALVANIZING UTILIZING A CAUSTIC BATH, ACID PICKLE, AND FLUX. ALTERNATIVELY, STEEL MAY BE NEAR WHITE BLAST CLEANED TO SPCC-SP10 AND FLUXED. HOT-DIP GALVANIZE COMPLETED ASSEMBLIES IN ACCORDANCE WITH ASTM A 123.





SECTION A-A

3 S1.3 STAIR FABRICATION ELEVATION
1"=1'-0"



4 S1.3 STAIR INSTALLATION ELEVATION
3/4"=1'-0"

FABRICATED STAIR ASSEMBLIES WERE FURNISHED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT. FIELD INSTALLATION OF STAIRS IS INCLUDED IN THE ON SITE

ALASKA ENERGY AUTHORITY

STATE OF ALASKA
49
REGISTERED PROFESSIONAL ENGINEER
Daniel C. Thompson
CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252
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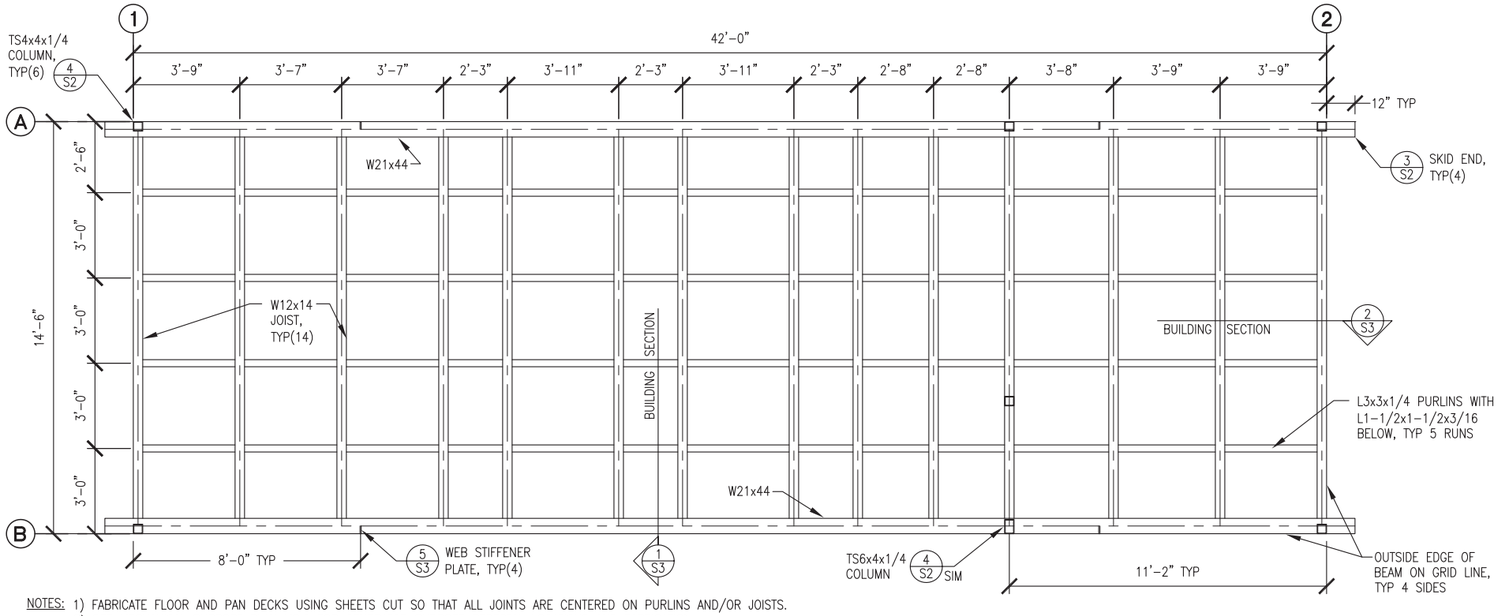
PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
STAIR PLAN & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

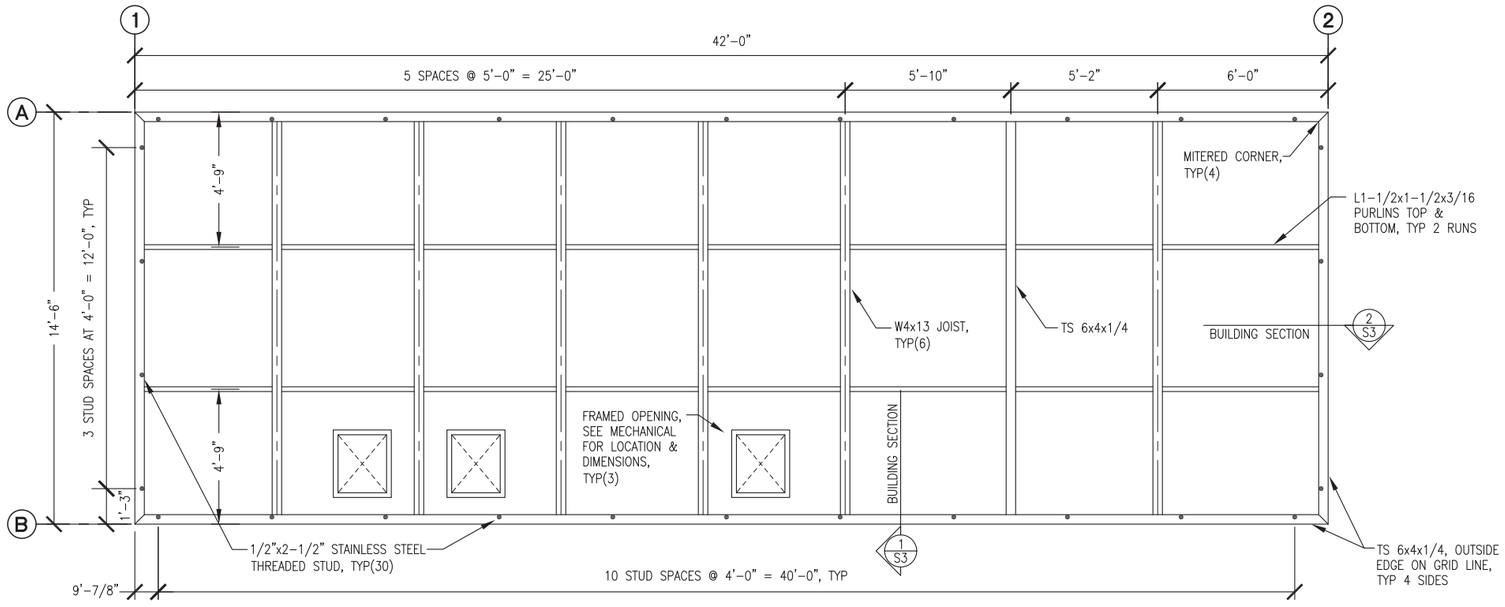
Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

Sheet No. S1.3



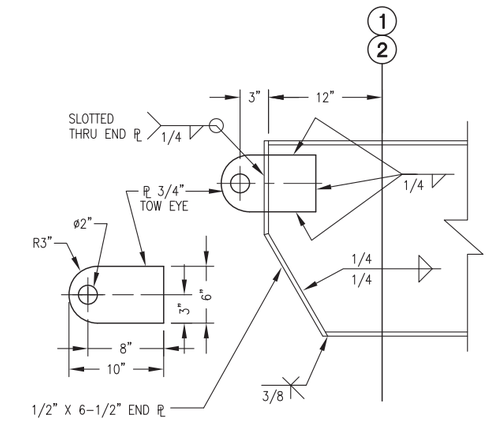
NOTES: 1) FABRICATE FLOOR AND PAN DECKS USING SHEETS CUT SO THAT ALL JOINTS ARE CENTERED ON PURLINS AND/OR JOISTS.
2) SEE MECHANICAL SUPPORT PLAN M2.2 FOR GENERATOR SUPPORT PEDESTAL LOCATIONS AND FABRICATION.

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

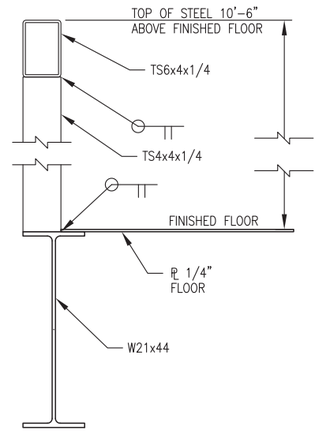


NOTES: 1) FABRICATE CEILING FLAT AND CORRUGATED DECKS USING SHEETS CUT SO THAT ALL JOINTS ARE CENTERED ON PURLINS AND/OR JOISTS.
2) SEE MECHANICAL SUPPORT PLAN M2.2 FOR CEILING CORRUGATION LAYOUT AND STRUT SUPPORT LOCATION AND INSTALLATION.

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



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



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

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — REGISTERED PROFESSIONAL ENGINEER — Daniel C. Thompson — CE 14220 — 11/1/19

CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252

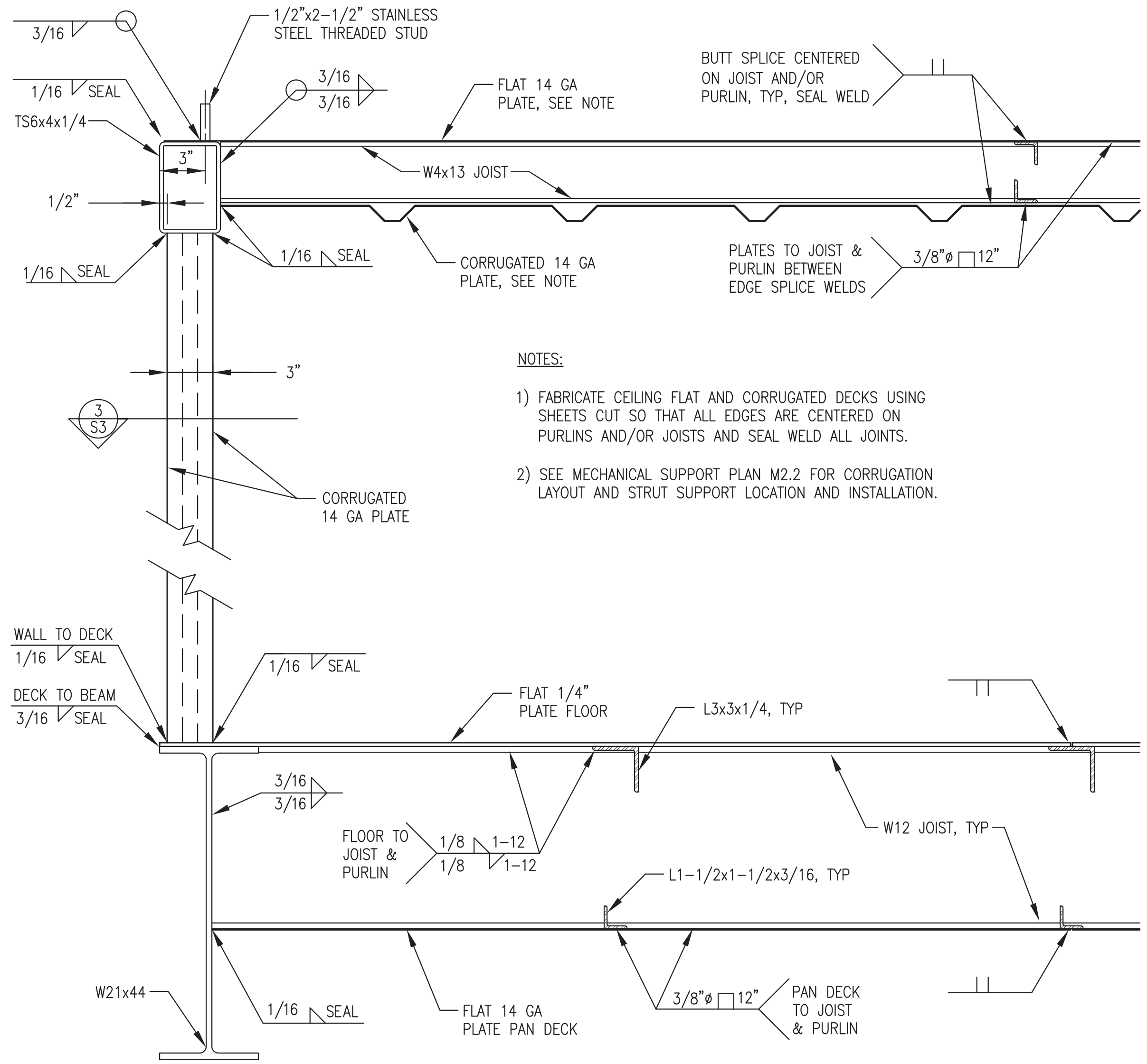
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
FRAMING PLANS & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

Sheet No. S2

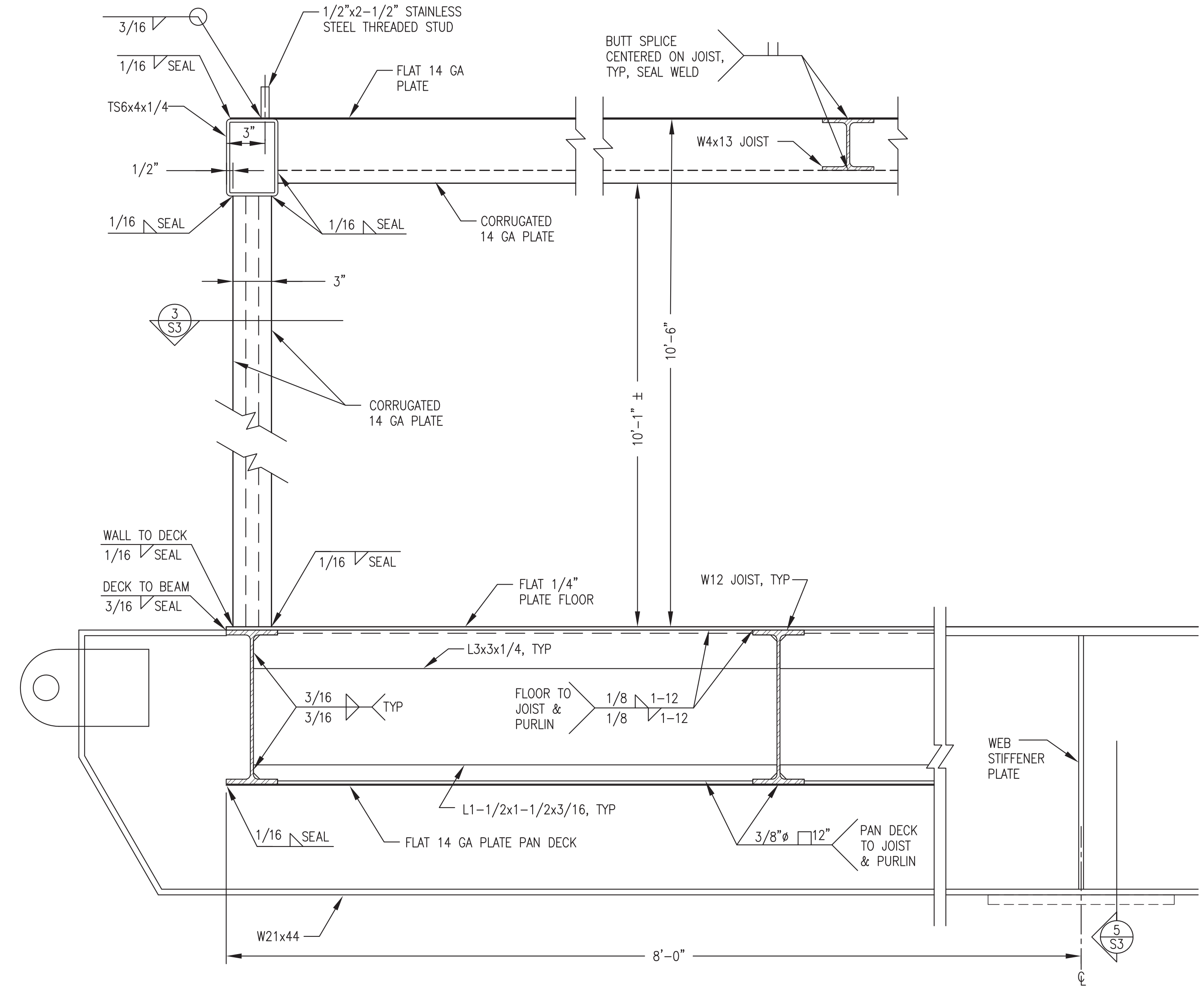


NOTES:

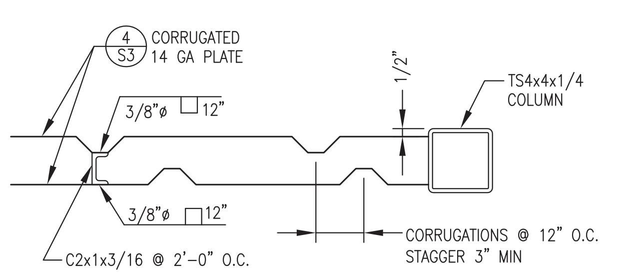
1) FABRICATE CEILING FLAT AND CORRUGATED DECKS USING SHEETS CUT SO THAT ALL EDGES ARE CENTERED ON PURLINS AND/OR JOISTS AND SEAL WELD ALL JOINTS.

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

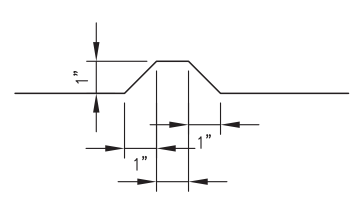
1 / S3 TYPICAL BUILDING SECTION
2"=1'-0"



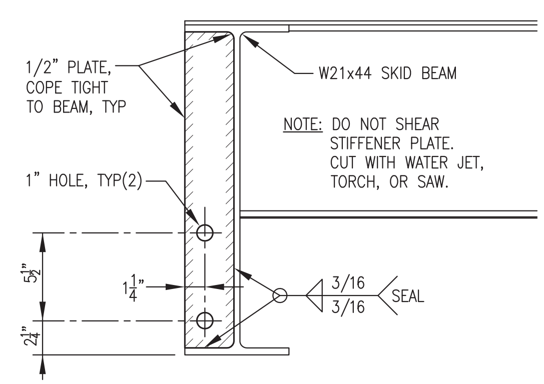
2 / S3 TYPICAL BUILDING SECTION
2"=1'-0"



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



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



5 / S3 WEB STIFFENER PLATE
2"=1'-0"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — 49TH — David G. Thompson — SE 14226 — 11/1/19 — REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

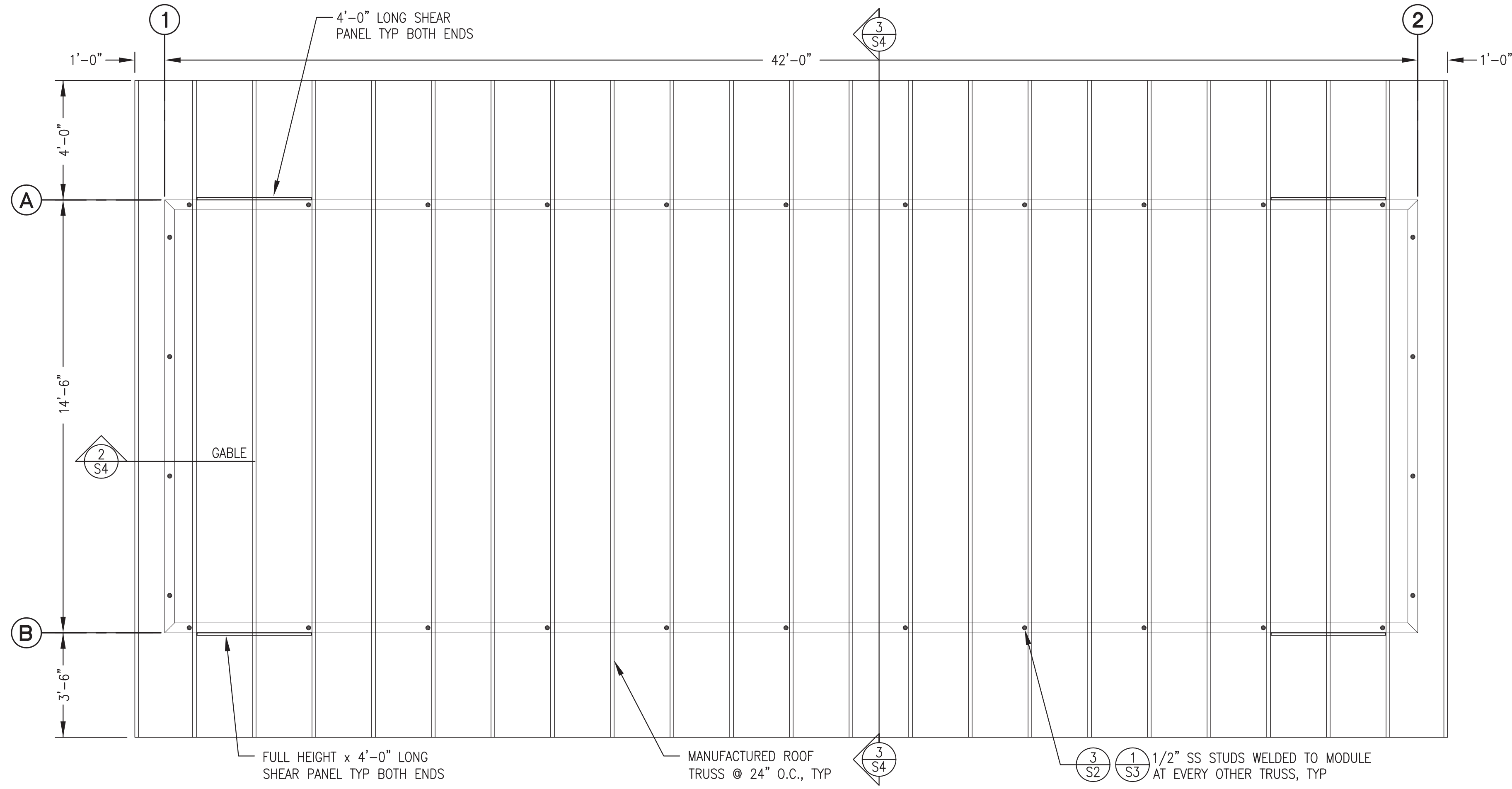
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

SECTIONS & DETAILS

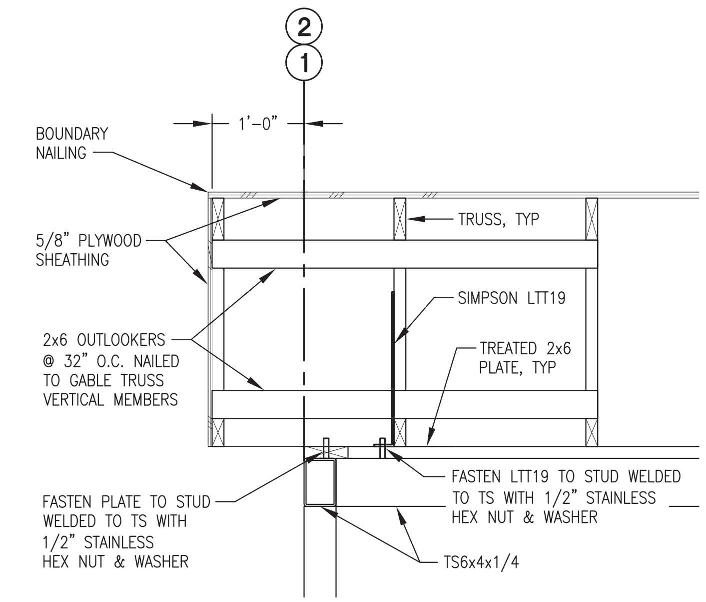
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19
Designed DGT/BCG
Drawn JTD
Approved DGT

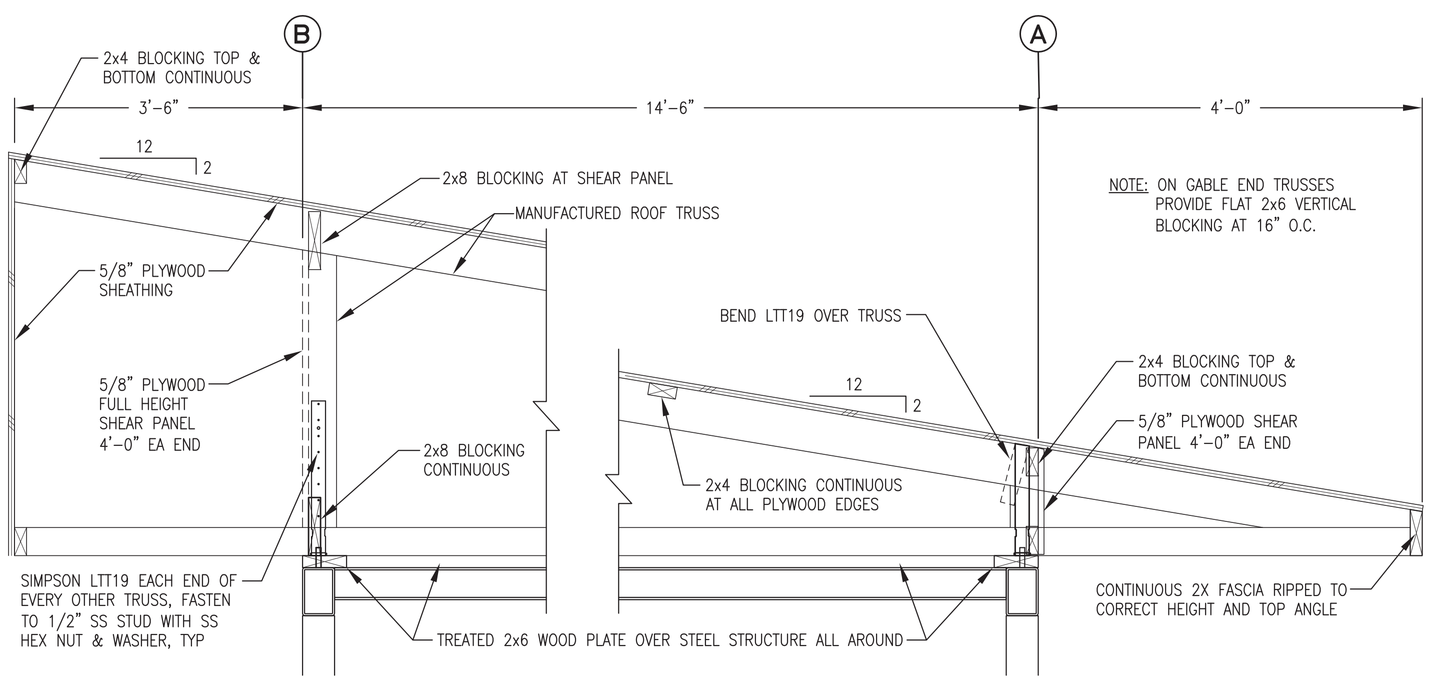
Sheet No. S3



1 S4 ROOF FRAMING PLAN
3/8"=1'-0"



2 S4 TYPICAL GABLE
1"=1'-0"



3 S4 ROOF TRUSS INSTALLATION
NO SCALE

FIELD INSTALLED ROOF SYSTEM SHOWN THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH David G. Thompson SE 14226 11/1/19 REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
ROOF FRAMING PLAN & DETAILS

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Drawn JTD
Approved DGT

Sheet No. S4

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

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.

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

HEAT RECOVERY & PLANT HEATING EQUIPMENT SCHEDULE:

HX-1	POWER PLANT HEAT EXCHANGER	316 SS PLATES, BRAZED CONST. 2" SOLDER CUP PORTS, 150 MBH MIN CAPACITY. PRIMARY: 35 GPM 195F EWT (50% ETHYLENE) 1.5 PSI MAX WPD, SECONDARY: 36 GPM 185F LWT (50% PROPYLENE) 1.5 PSI MAX WPD	AMERIDEX SLB-35T-40M
P-HR1	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-HR2A	HEAT RECOV. PRIMARY	35 GPM AT 8' TDH, 1/6HP, 115V, 1ø. PROVIDE WITH 2" NPT COMPANION FLANGES, GASKETS, & BOLTS.	GRUNDFOS UPS 50-44F
P-HR2B	HEAT RECOV. SECONDARY	36 GPM AT 17' TDH, 1/2HP, 115V, 1ø. PROVIDE WITH 1-1/4" SOLDER COMPANION FLANGES, GASKETS, & BOLTS.	GRUNDFOS UPS 32-80/2 SPEED 3
CUH-1	CONTROL ROOM HEAT	WALL MOUNTED HOT WATER CABINET UNIT HEATER, 18 MBH AT 1 GPM 180F EWT & 60F EAT.	TOYOTOMI HC-20 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

VENTILATION EQUIPMENT SCHEDULE:

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. FURNISH WITH 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, GALVANIZED STEEL CONSTRUCTION, 304 STAINLESS STEEL BEARINGS AND JAMB SEALS, EPDM BLADE SEALS.	GREENHECK VCD-23
(MD)	MOTORIZED DAMPER ACTUATOR	120V SPRING RETURN ACTUATOR	BELIMO AF-BUP

FUEL SYSTEM EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
P-DF1	DAY TANK FILL PUMP	ROTARY GEAR PUMP, 1/2" FPT INLET AND OUTLET, DUCTILE IRON CONSTRUCTION WITH STAINLESS STEEL SHAFT, BUNA-N LIP SEAL, CARBON BEARINGS, DIRECT FLEX COUPLED TO 1725 RPM ODP THERMALLY PROTECTED, AUTO RESET MOTOR, 1/3 HP, 115 V, 1 PH, 60 HZ, 4.0 GPM @ 20 PSID.	OBERDORFER C992M3E5QF50
P-DF2 P-UO1	DIESEL CIRC, & USED OIL DRAIN PUMPS	ROTARY GEAR PUMP, 1/2" FPT INLET AND OUTLET, BRONZE CONSTRUCTION WITH SS SHAFTS, BUNA-N SEAL, CARBON BEARINGS, DIRECT FLEX COUPLED TO 1150 RPM ODP THERMALLY PROTECTED, AUTO RESET MOTOR, 1/2 HP, 115 V, 1 PH, 60 HZ, 6.6 GPM @ 20 PSID. PROVIDE WITH 40 PSID INTERNAL PRV.	OBERDORFER N994RH-J46
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 1725 RPM TEFC THERMALLY PROTECTED AUTO RESET MOTOR, 1/2 HP, 115 V, 1 PH, 60 HZ. FURNISH WITH BASE MOUNT S56C FRAME INDUSTRIAL MOTOR.	MICROPUMP GA-V21.J8FS.A PUMP WITH #81518 ADAPTER & BALDOR CFDL3504M 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	10 MICRON FILTER FOR DIESEL FUEL, CLEAR BOWL WITH BOTTOM DRAIN VALVE, 150 PSIG MAXIMUM OPERATING PRESSURE, 25 GPM MAXIMUM FLOW. REPLACE FPT HEAD ASSEMBLY WITH CUSTOM FABRICATED STEEL HEAD WITH ANSI 150# FLANGED ENDS. FURNISH COMPLETE WITH WRENCH AND 5 SPARE FILTER ELEMENTS.	SUPERIOR MACHINE & WELDING HEAD WITH GOLDEN ROD NO. 495-4 BOWL, 491 WRENCH, 470-5 ELEMENTS
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 CIM-TEK #30066

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
4" COPPER	BVT412	4" STEEL	B2017

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.

INSTRUMENTATION: SEE ELECTRICAL INSTRUMENTATION SCHEDULE ON SHEET E1.1 FOR INSTRUMENTATION DEVICES SHOWN ON THE MECHANICAL DRAWINGS.

SEQUENCE OF OPERATIONS

DAY TANK WILL HAVE AUTOMATIC FILL CONTROLS WITH REDUNDANT HIGH AND LOW LEVEL ALARMS AND TIMERS. USED OIL/DIESEL FUEL BLENDER WILL RUN ANY TIME DAY TANK FILL PUMP RUNS. SEE FUEL SYSTEM CONTROL PANEL DRAWINGS FOR DETAILED SEQUENCE.

ALL DAMPER MOTORS WILL BE NORMALLY CLOSED SPRING RETURN AND WILL CLOSE ON LOSS OF POWER (FIRE ALARM) IN LESS THAN 30 SECONDS. VENTILATION AIR INTAKE AND EXHAUST MOTORIZED DAMPERS WILL OPEN ANY TIME ASSOCIATED EXHAUST FAN OPERATES. THE COMBUSTION AIR INTAKE MOTORIZED DAMPER WILL BE OPEN ANY TIME PLANT OPERATES (STATION SERVICE POWER ON).

EXHAUST FANS EF-1 AND EF-2 WILL OPERATE 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 TEMPERATURE, 75F, ADJUSTABLE.

CABINET UNIT HEATER CUH-1 AND CIRCULATING PUMP P-HR1 WILL OPERATE ON A CALL FOR HEATING THROUGH THE INTERNAL CUH CONTROLS TO MAINTAIN CONTROL ROOM TEMPERATURE, 65F, ADJUSTABLE.

RADIATOR FAN MOTORS WILL OPERATE UNDER VARIABLE FREQUENCEY DRIVE (VFD) CONTROL. WHEN THE COOLANT RETURN TEMP REACHES THE WAKE UP 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 WAKE UP SETPOINT. THE INITIAL OPERATING SETTINGS SHALL BE SET TO THE FOLLOWING VALUES AND SHALL BE ADJUSTABLE:
170F = PID REFERENCE TEMPERATURE 160F = WAKE UP TEMPERATURE
0.93 = PROPORTIONAL GAIN 0.3 = INTEGRAL GAIN 0 = DERIVATIVE
6 HZ = MINIMUM SPEED 60 SEC = LOW SPEED TIME OUT

HEAT RECOVERY PUMPS P-HR2A AND P-HR2B WILL OPERATE CONTINUOUSLY UNDER MANUAL CONTROL.

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.

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.

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.

ELECTRIC BOILER PUMP P-EB1 WILL OPERATE CONTINUOUSLY UNDER MANUAL CONTROL. PUMP SHALL RUN ANYTIME THE REMOTE ELECTRIC WIND POWER GENERATORS ARE AVAILABLE TO RUN.

ALL EQUIPMENT ON SCHEDULES THIS SHEET WERE FURNISHED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT AND ARE SHOWN HERE FOR REFERENCE ONLY. FINAL TESTING AND COMMISSIONING OF THE MODULE IN ACCORDANCE WITH THE SEQUENCE OF OPERATIONS IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

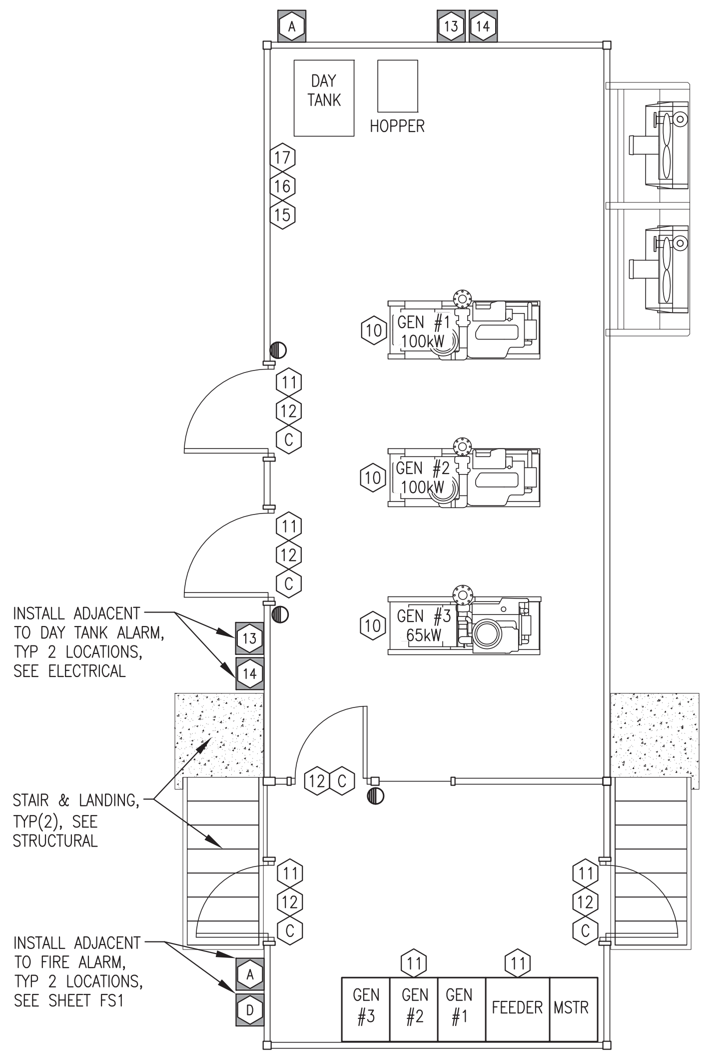
CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
MECHANICAL LEGENDS, SCHEDULES, & SEQUENCE OF OPERATIONS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20
1	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 1/6/20 | Designed BCG | Drawn JTD | Approved BCG

Sheet No. M1.1



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

WARNING SIGN & INFORMATIONAL PLACARD SCHEDULE:

WARNING SIGNS & INFORMATIONAL PLACARDS – PROVIDE DECALS AND SIGN BOARDS AS INDICATED IN THE SCHEDULE BELOW, QUANTITY & LOCATION WHERE SHOWN ON THE WARNING SIGN/PLACARD PLAN THIS SHEET.

(#) 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. INSTALL ON FACE OF DOORS OR ELECTRICAL ENCLOSURES WHERE INDICATED. CLEAN SURFACES AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

[#] 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"
- 10 "CAUTION: THIS UNIT STARTS AUTOMATICALLY, LOCK & TAG OUT PRIOR TO SERVICE"
- 11 "DANGER HIGH VOLTAGE, AUTHORIZED PERSONNEL ONLY"
- 12 "CAUTION HEARING & EYE PROTECTION REQUIRED"
- 13 "FUEL OIL DAY TANK ALARM"
- 14 "IN CASE OF SPILL CALL DEC 1-800-478-9300"

INFORMATIONAL PLACARDS – BLACK LETTERING ON WHITE BACKGROUND.

- 15 "CHECK INTERMEDIATE TANK LEVEL DAILY, FILL WHEN BELOW 4'-0"
- 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) LOCK & TAG GENERATOR OUT OF SERVICE
  2) OPEN NORMALLY CLOSED DRAIN VALVE AT GEN
  3) TURN ON PUMP TIMER & PUMP OUT ENGINE OIL
  4) CHANGE FILTER & PLACE OLD ONE IN HOPPER
  5) CLOSE DRAIN VALVE & REFILL ENGINE
  6) RUN ENGINE, SHUT OFF, & CHECK DIPSTICK
  7) TOP OFF & PLACE ENGINE BACK IN SERVICE"

VALVE TAG SCHEDULE:

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.
NOTE: PROVIDE TAGS NOTED AS DECALS WITHOUT ALUMINUM BACKING PLATE.

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"
- O.S. 25 "NORMALLY CLOSED, OPEN ONLY FOR TANK FILL"

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)

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"

ORANGE (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 OPEN, CLOSE ONLY FOR TEMPORARY MAINTENANCE OF SYSTEM"
- O.S. 65 "NORMALLY OPEN, BOILER RETURN TO HX"
- O.S. 66 "NORMALLY OPEN, HX TO BOILER"

INSTALLATION – SECURE EACH TAG TIGHT TO VALVE, PIPE, OR DEVICE WITH STAINLESS STEEL CABLE TIES OR SAFETY WIRE THROUGH ALL FOUR CORNERS OR FASTEN TO ADJACENT WALL OR SECTION OF STRUT WITH SCREWS.

NOTES:

1) SEE DRAWINGS THAT FOLLOW FOR LOCATIONS OF ALL SPECIFIC FUNCTION TAGS.
2) FOR ALL VALVES NOT INDICATED WITH A SPECIFIC FUNCTION TAG PROVIDE 1-1/2"ø BRASS TAG LABELED "N.O." FOR NORMALLY OPEN VALVES AND 1"ø BRASS TAG LABELED "N.C." FOR NORMALLY CLOSED VALVES. SECURE TAGS TO VALVE OR ADJACENT PIPE WITH BEADED BRASS CHAIN.

MODULE SHOP/ON-SITE NOTES:

1) FURNISH AND INSTALL ALL DECALS, SIGN BOARDS. AND FIRE EXTINGUISHERS AS PART OF THE MODULE SHOP FABRICATION WORK.
2) FURNISH AND INSTALL ALL VALVE TAGS AS PART OF THE MODULE SHOP FABRICATION WORK EXCEPT WHERE DESIGNATED ON SITE (O.S). SEE NOTE 3.
3) FURNISH AND INSTALL ALL VALVE TAGS DESIGNATED O.S. AS PART OF THE ON SITE CONSTRUCTION WORK (NOT PART OF MODULE ASSEMBLY SCOPE). SEE ON SITE WORK DRAWINGS FOR LOCATIONS.

ALL SIGNS AND TAGS ON SCHEDULES THIS SHEET WERE FURNISHED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT AND ARE SHOWN HERE FOR REFERENCE ONLY EXCEPT AS NOTED. TAGS NOTED AS "O.S." ARE INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC
Gray Stassel Engineering, Inc.

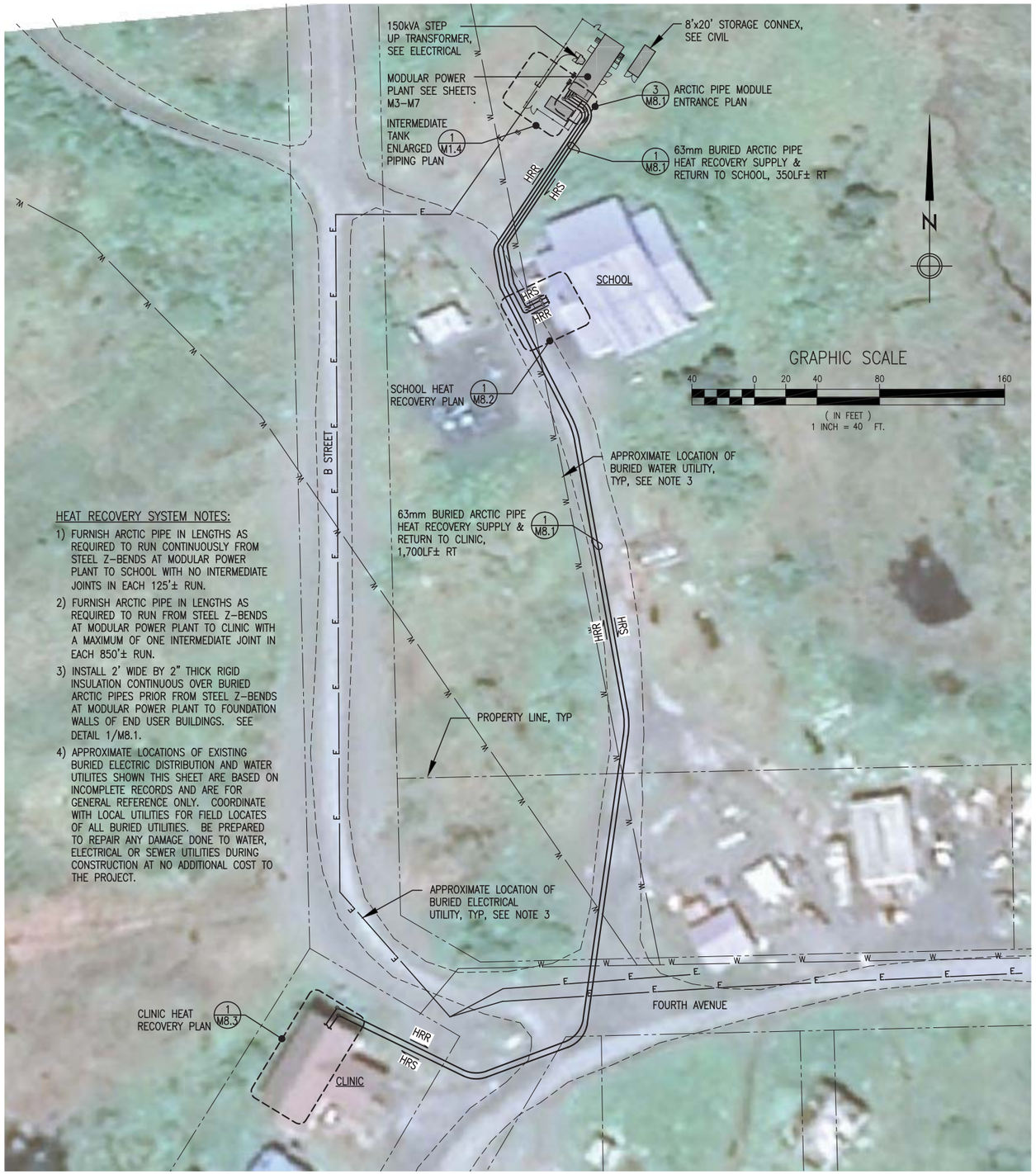
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

WARNING SIGNS & FIRE EXTINGUISHER PLAN, SIGN & VALVE TAG SCHEUDLES

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20 · Designed BCG · Drawn JTD · Approved BCG

Sheet No. M1.2



HEAT RECOVERY SYSTEM NOTES:

1) FURNISH ARCTIC PIPE IN LENGTHS AS REQUIRED TO RUN CONTINUOUSLY FROM STEEL Z–BENDS AT MODULAR POWER PLANT TO SCHOOL WITH NO INTERMEDIATE JOINTS IN EACH 125'± RUN.
2) FURNISH ARCTIC PIPE IN LENGTHS AS REQUIRED TO RUN FROM STEEL Z–BENDS AT MODULAR POWER PLANT TO CLINIC WITH A MAXIMUM OF ONE INTERMEDIATE JOINT IN EACH 850'± RUN.
3) INSTALL 2' WIDE BY 2" THICK RIGID INSULATION CONTINUOUS OVER BURIED ARCTIC PIPES PRIOR FROM STEEL Z–BENDS AT MODULAR POWER PLANT TO FOUNDATION WALLS OF END USER BUILDINGS. SEE DETAIL 1/M8.1.
4) APPROXIMATE LOCATIONS OF EXISTING BURIED ELECTRIC DISTRIBUTION AND WATER UTILITES SHOWN THIS SHEET ARE BASED ON INCOMPLETE RECORDS AND ARE FOR GENERAL REFERENCE ONLY. COORDINATE WITH LOCAL UTILITIES FOR FIELD LOCATES OF ALL BURIED UTILITIES. BE PREPARED TO REPAIR ANY DAMAGE DONE TO WATER, ELECTRICAL OR SEWER UTILITIES DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE PROJECT.

1 / M1.3 OVERALL PROJECT AREA PLAN
1"=40'

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA

POWER SYSTEM UPGRADE PROJECT

OVERALL PROJECT AREA PLAN

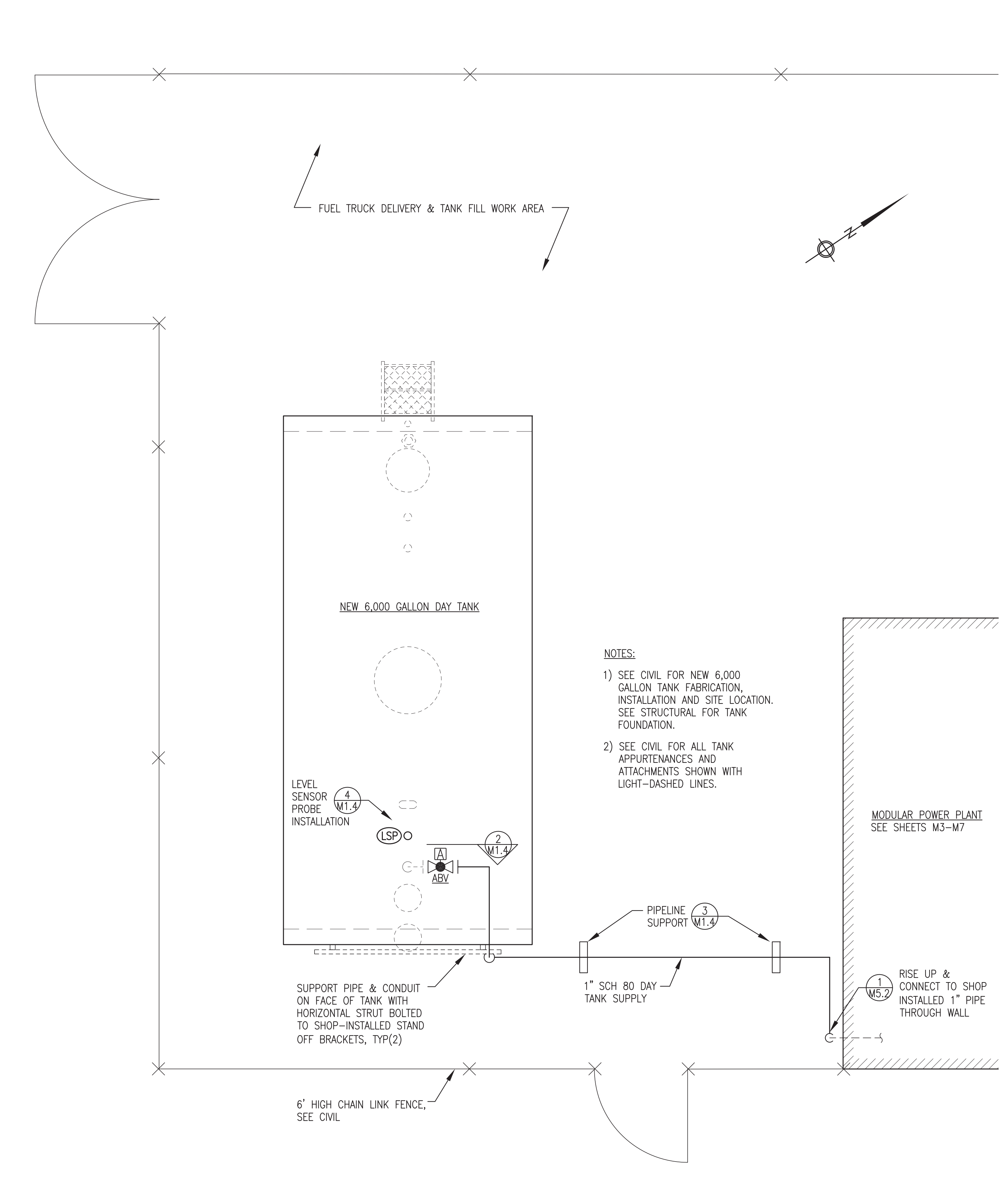
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20
Designed BCG
Drawn JTD
Approved BCG

Sheet No. M1.3

FUEL SYSTEM EQUIPMENT SCHEDULE			
SYMBOL	FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
ABV	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 - 151 IN-LB OPERATING TORQUE @ -50F NUTRON MODEL T3-R10R01LZ NEMA 7 ACTUATOR - 600 IN-LBS TORQUE, 10 SECOND STROKE TIME, 0.50 LOCKED ROTOR AMPS. RCS MODEL SXR-1023

EQUIPMENT REQUIREMENTS FOR APPROVED EQUALS:
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.

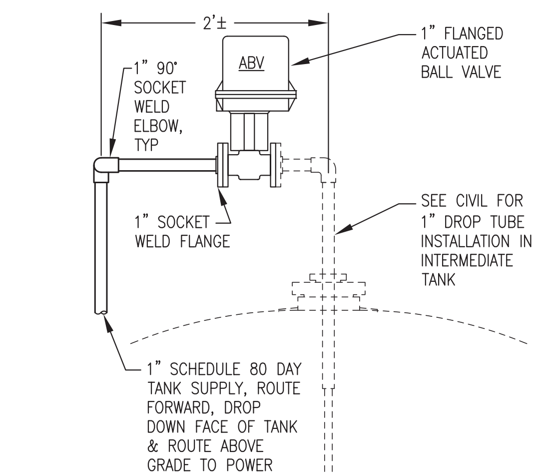


NOTES:

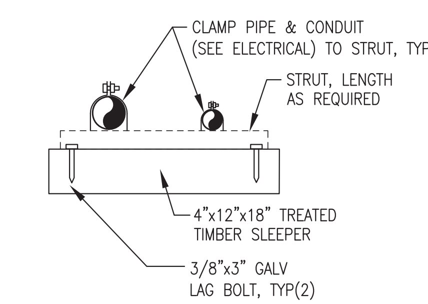
1) SEE CIVIL FOR NEW 6,000 GALLON TANK FABRICATION, INSTALLATION AND SITE LOCATION. SEE STRUCTURAL FOR TANK FOUNDATION.

2) SEE CIVIL FOR ALL TANK APPURTENANCES AND ATTACHMENTS SHOWN WITH LIGHT-DASHED LINES.

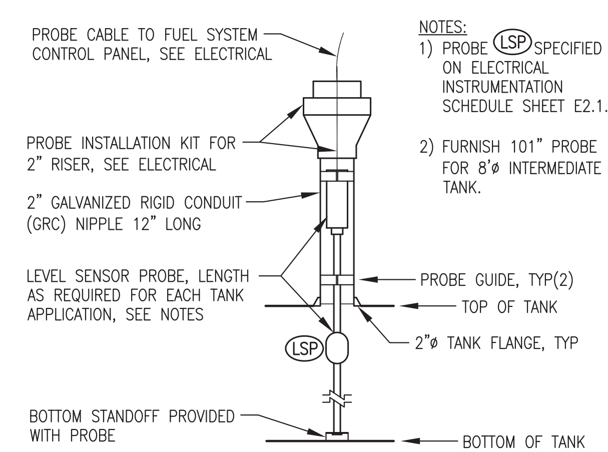
1 / M1.4 INTERMEDIATE TANK & FUEL PIPING PLAN
1"=2'-0"



2 / M1.4 ACTUATED BALL VALVE INSTALLATION
NO SCALE



3 / M1.4 FUEL PIPELINE SLEEPER SUPPORT
NO SCALE



NOTES:
1) PROBE (LSP) SPECIFIED ON ELECTRICAL INSTRUMENTATION SCHEDULE SHEET E2.1.
2) FURNISH 101" PROBE FOR 8'ø INTERMEDIATE TANK.

4 / M1.4 INTERMEDIATE TANK LEVEL SENSOR PROBE INSTALLATION
NO SCALE

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP, LLC PHONE: (907) 562-3252

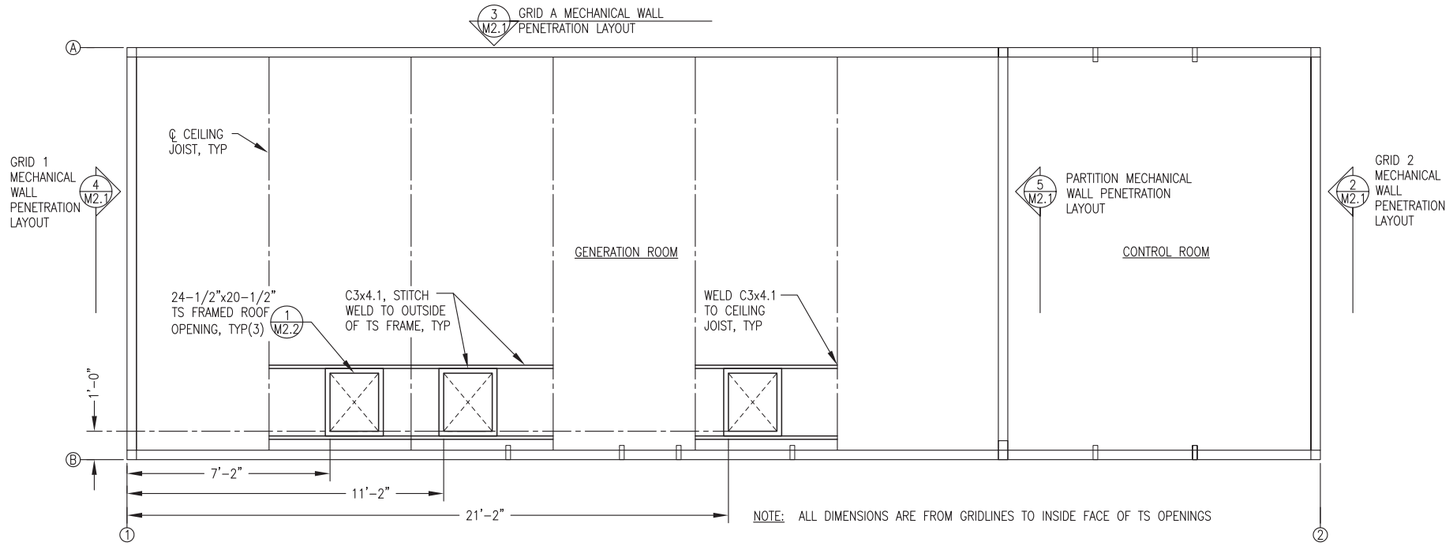
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
INTERMEDIATE TANK PIPING PLAN & DETAILS

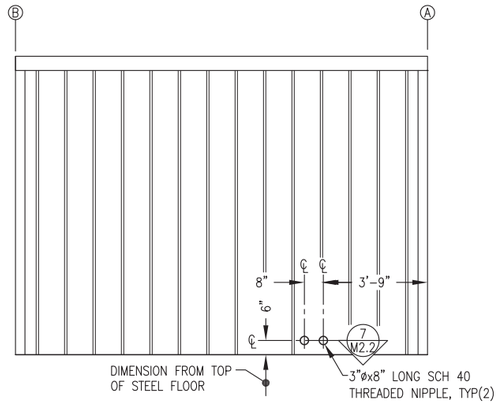
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20
Designed BCG
Drawn JTD
Approved BCG

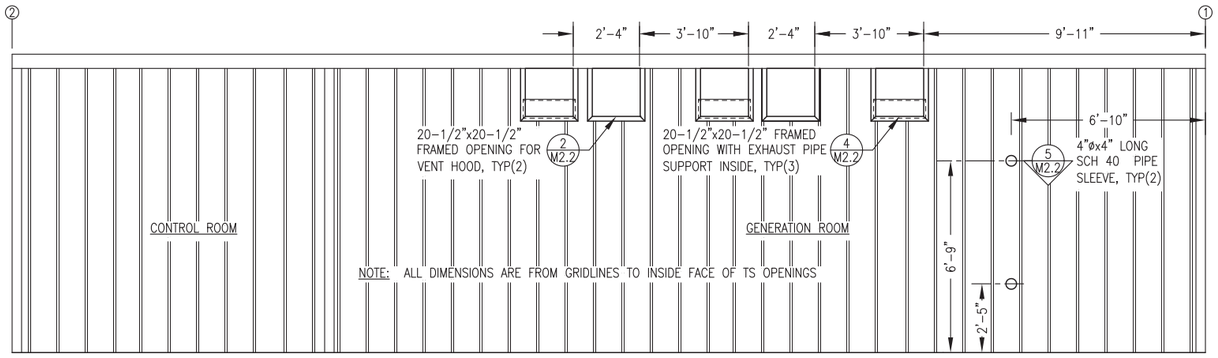
Sheet No. M1.4



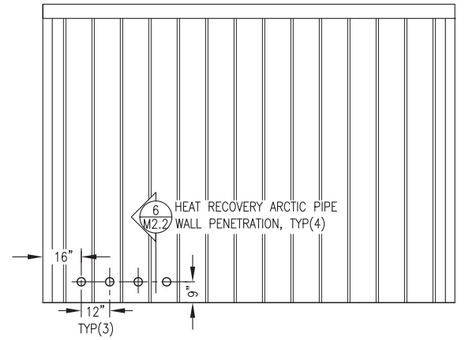
1 M2.1 MECHANICAL PENETRATION LAYOUT & ROOF PLAN
3/8"=1'-0"



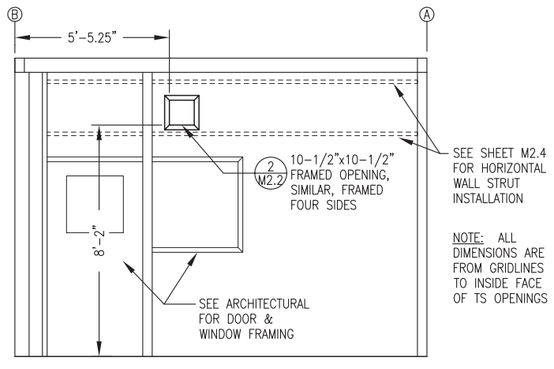
2 M2.1 GRID 2 MECHANICAL WALL PENETRATION LAYOUT – EXTERIOR ELEVATION
3/8"=1'-0"



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"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC · PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. · PHONE: (907) 349-0100

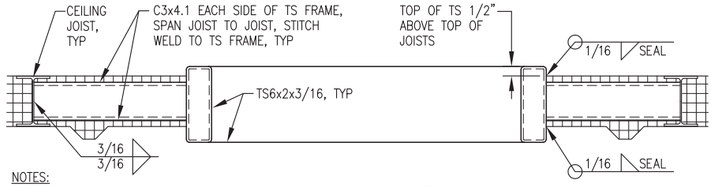
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

MECHANICAL PENETRATIONS PLAN, ELEVATIONS, & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

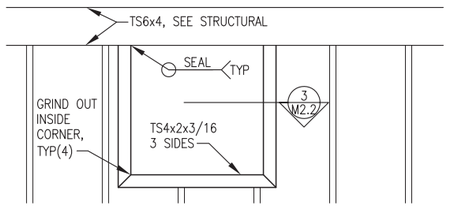
Plot Date 11/1/19
Designed BCG
Drawn JTD
Approved BCG

Sheet No. M2.1



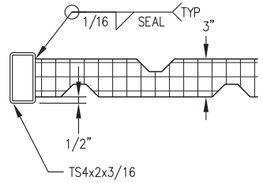
NOTES:
1) FABRICATE FRAMED OPENING WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS.
2) FABRICATE TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED ON PLANS.
3) GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

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



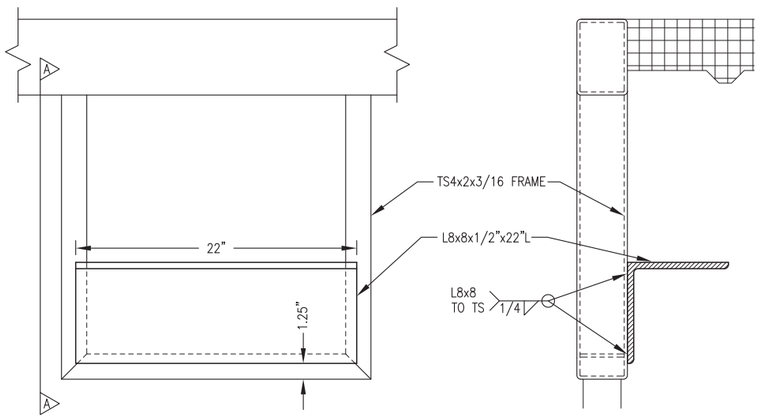
NOTE: SEE ELEVATION FOR INSIDE CLEAR OPENING SIZE.

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

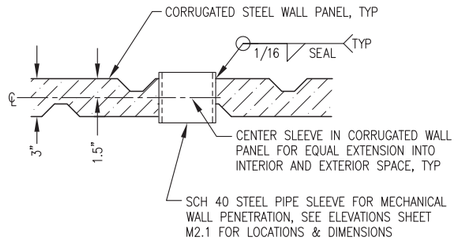


NOTES:
1) FABRICATE FRAMED OPENING WITH MITERED CORNERS AND FULL PENETRATION GROOVE WELDS.
2) FABRICATE TO FINISHED INSIDE (CLEAR) DIMENSIONS INDICATED ON ELEVATIONS.
3) GRIND OUT INSIDE OF MITERED CORNERS TO PROVIDE FULL CLEAR OPENING.

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

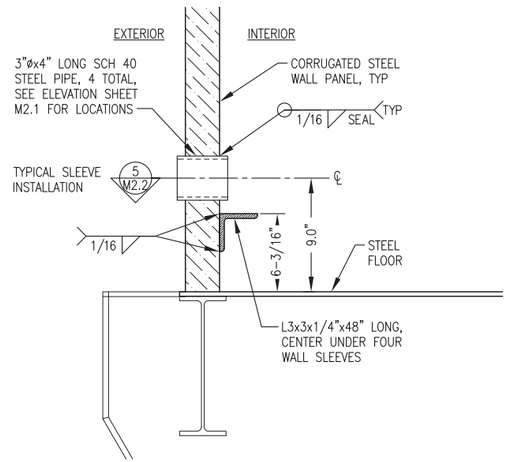


4 M2.2 EXHAUST PIPE SUPPORT AT FRAMED OPENING
2"=1'-0"

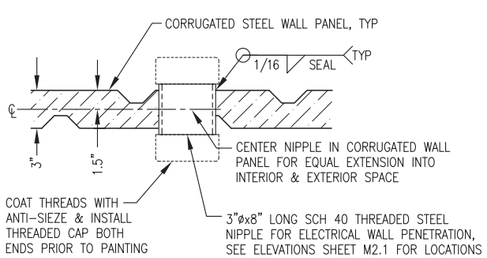


PLAN VIEW

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 PIPE NIPPLE THROUGH WALL
2"=1'-0"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252

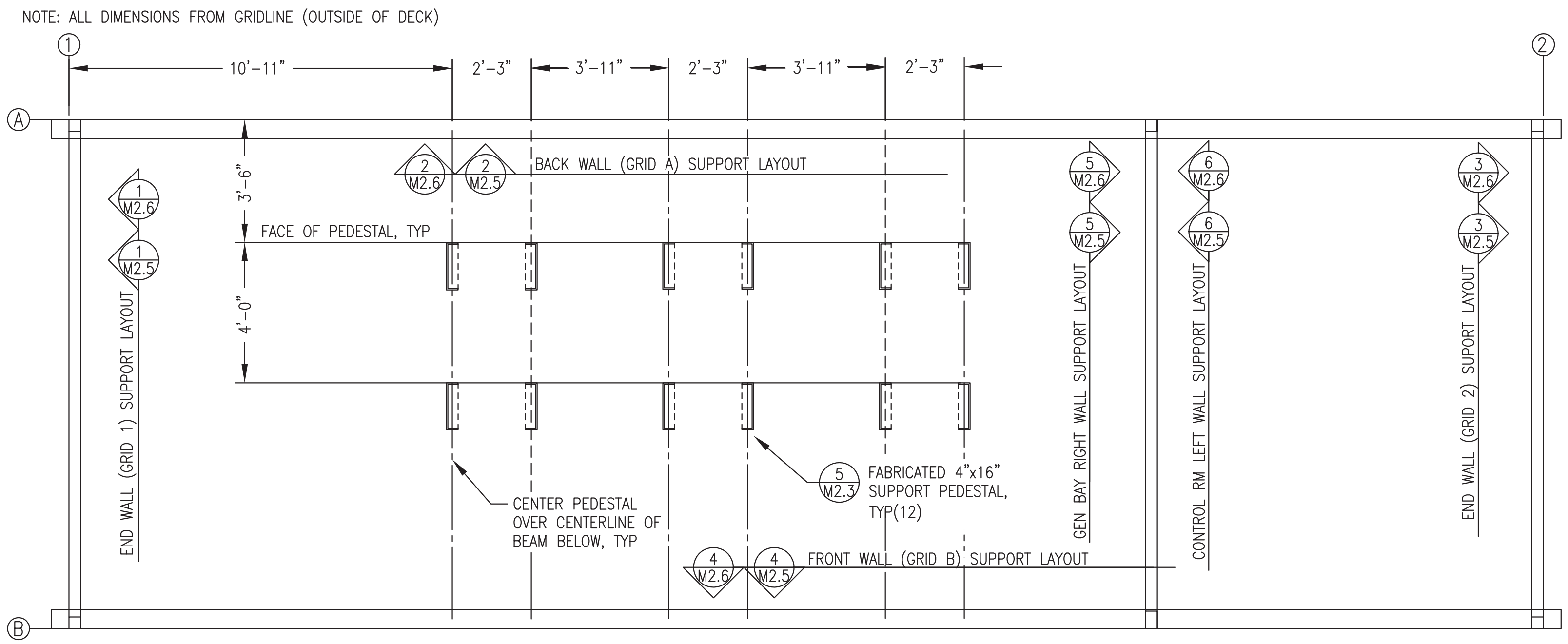
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
MECHANICAL PENETRATION DETAILS

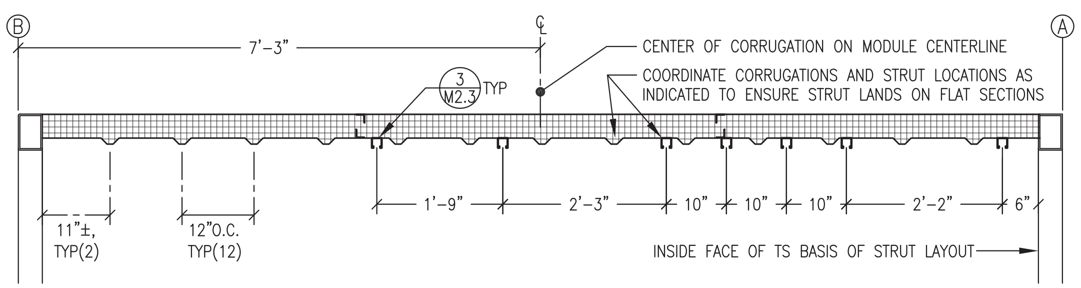
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date 11/1/19 | Designed BCG | Drawn JTD | Approved BCG

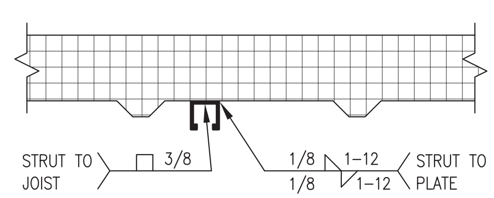
Sheet No. M2.2



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



2 M2.3 SECTION THROUGH CEILING – CORRUGATION & STRUT LAYOUT
3/4"=1'-0"



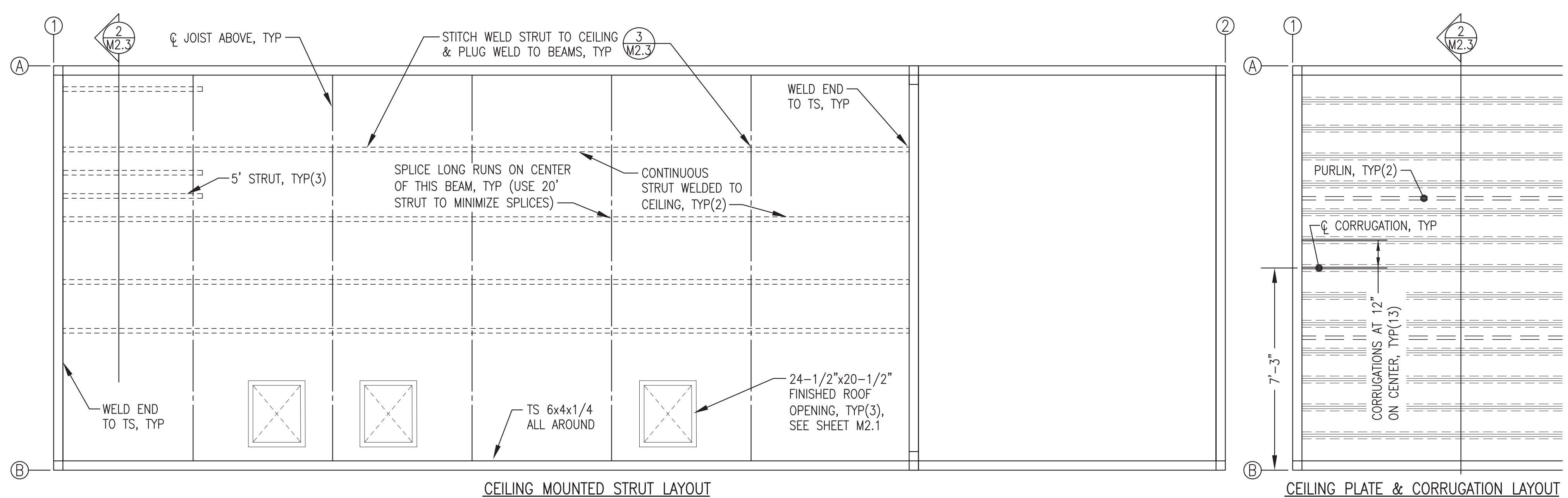
3 M2.3 STRUT ATTACHMENT TO CEILING
NO SCALE

GENERAL NOTES:

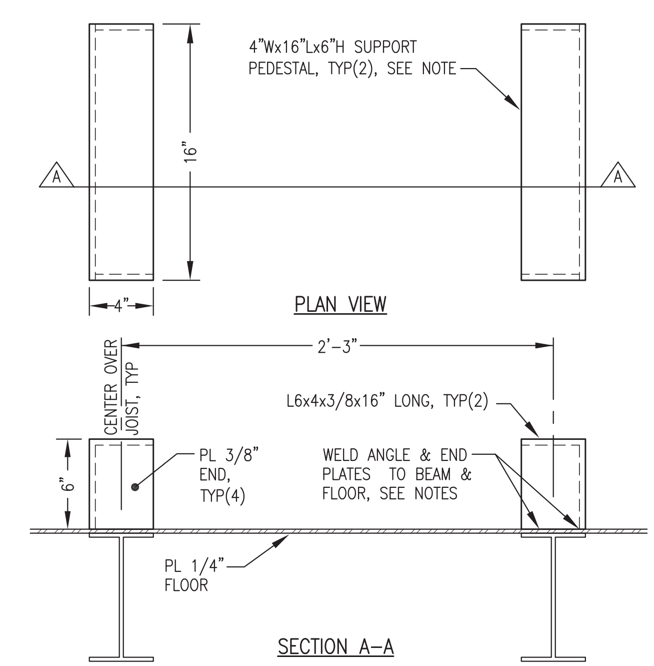
1) FABRICATE PEDESTALS FROM ASTM A36 ANGLE AND PLATES AS SHOWN.

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.



4 M2.3 CEILING STRUT SUPPORT LAYOUT PLAN
3/8"=1'-0"



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.

5 M2.3 SUPPORT PEDESTAL FABRICATION
2"=1'-0"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

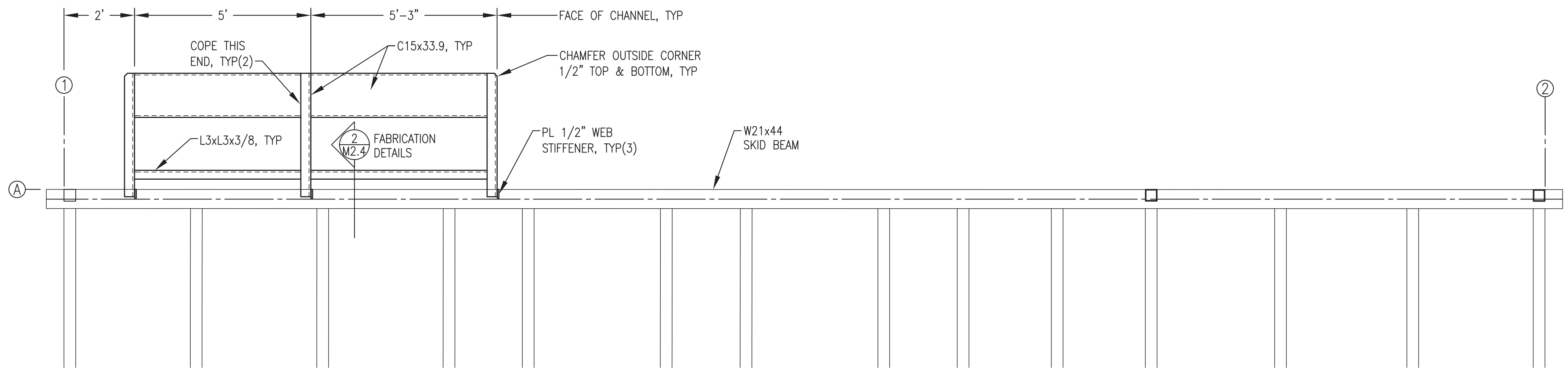
CRW ENGINEERING GROUP, LLC
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
MECHANICAL SUPPORT PLANS & DETAILS

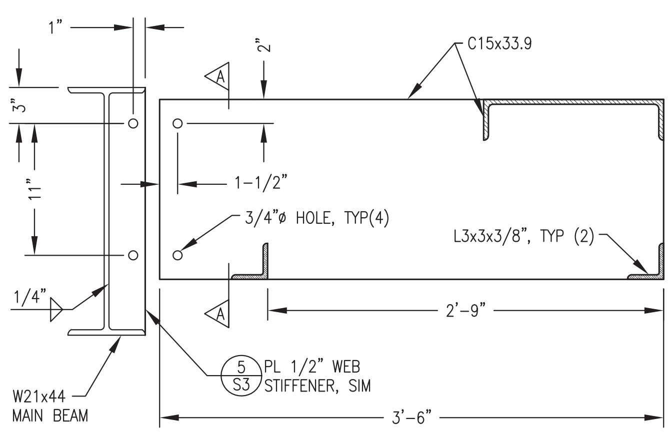
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

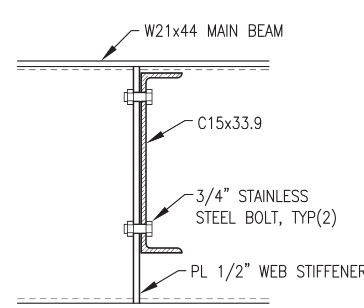
Plot Date 11/1/19 | Designed BCG | Drawn JTD | Approved BCG

Sheet No. M2.3



1 M2.4 RADIATOR SUPPORT PLAN
1/2"=1'-0"





SECTION A–A

SUPPORT FABRICATION NOTES:

1) FABRICATE SUPPORT FROM ASTM A36 ANGLE & CHANNEL AS SHOWN.

2) RACK ALL SUPPORT BRACKETS LEVEL & PERPENDICULAR TO SKID WITH CONNECTIONS BOLTED TIGHT PRIOR TO WELDING.

3) UPON COMPLETION OF WELDING ROUND CORNERS AND GRIND EDGES SMOOTH.

4) PRIOR TO SANDBLASTING MODULE REMOVE SUPPORTS THEN SANDBLAST AND PAINT EQUIVALENT TO MODULE EXTERIOR WALLS. SEE SHEET A1 FOR PAINTING SPECIFICATIONS.

2 M2.4 RADIATOR SUPPORT FABRICATION
1-1/2"=1'-0"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC

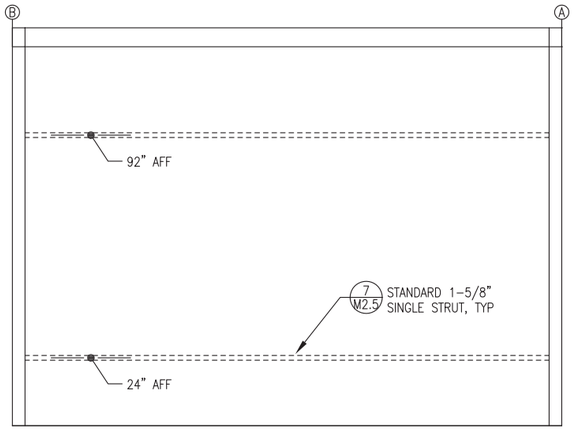
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
RADIATOR SUPPORT PLAN & DETAILS

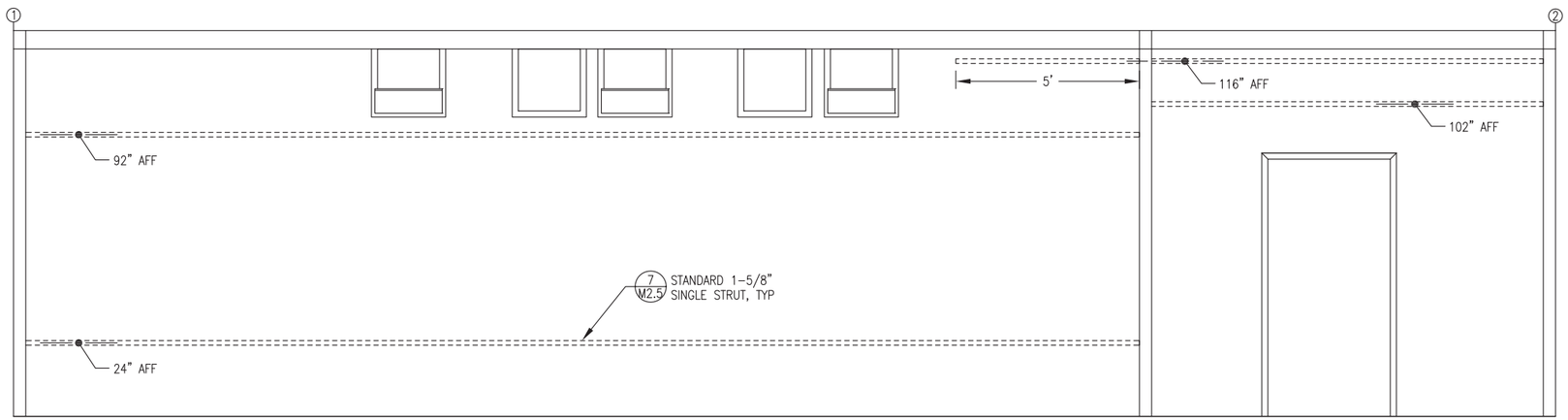
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/9

Plot Date 11/1/19
Designed BCG
Drawn JTD
Approved BCG

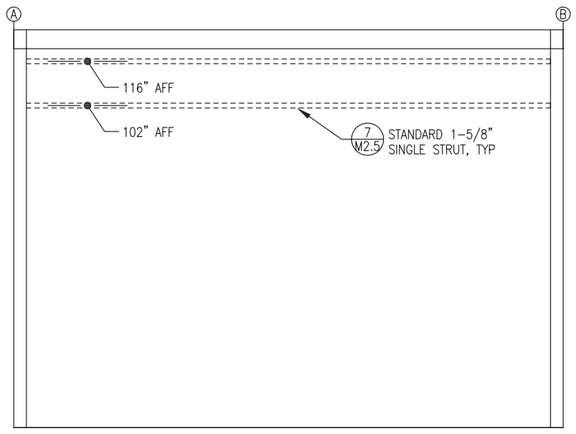
Sheet No. M2.4



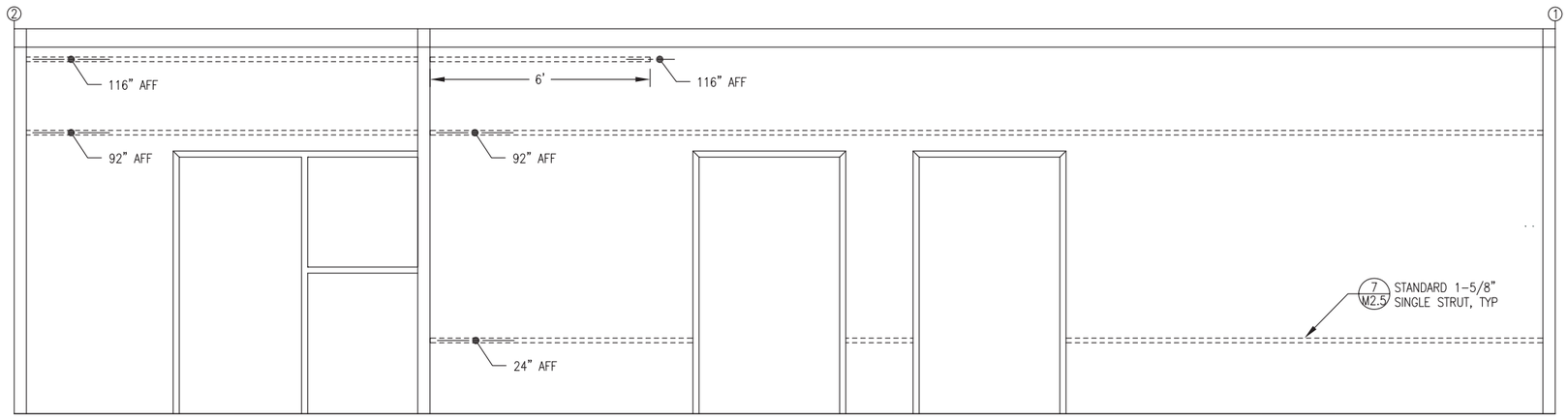
1 M2.5 END WALL (GRID 1) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



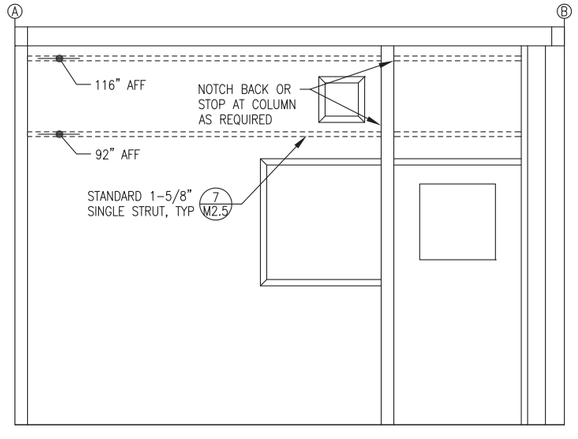
2 M2.5 BACK WALL (GRID A) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



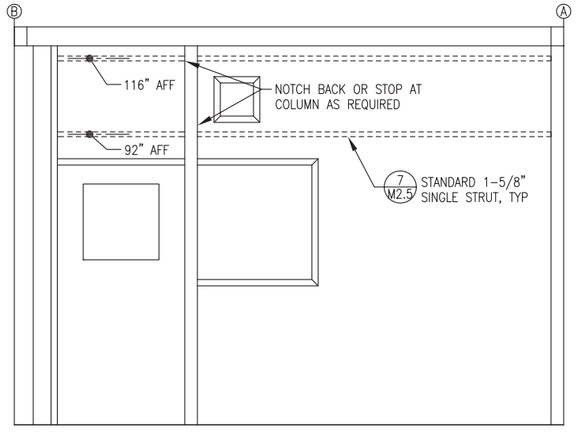
3 M2.5 END WALL (GRID 2) HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"



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



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



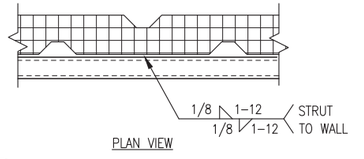
6 M2.5 CONTROL ROOM LEFT WALL HORIZONTAL WALL STRUT LAYOUT
1/2"=1'-0"

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.



7 M2.5 HORIZONTAL WALL STRUT ATTACHMENT
NO SCALE

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252

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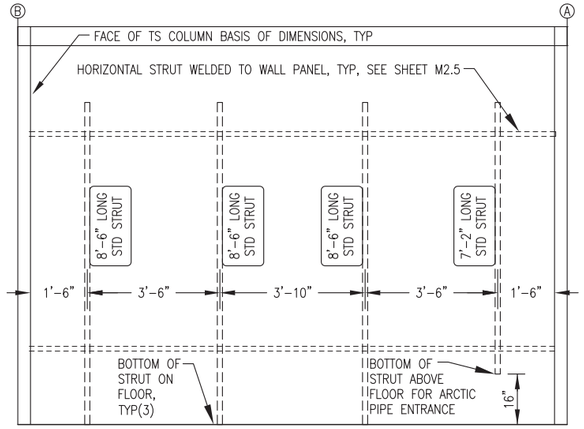
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

MECHANICAL SUPPORT
HORIZONTAL WALL STRUT INSTALLATION

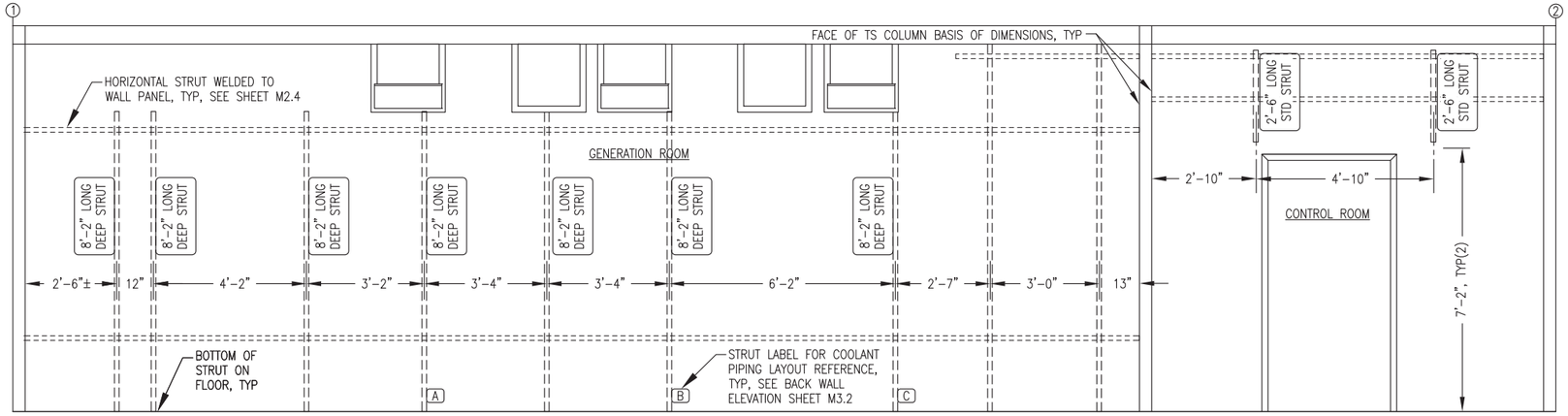
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	11/1/19

Plot Date: 11/1/19
Designed: BCG
Drawn: JTD
Approved: BCG

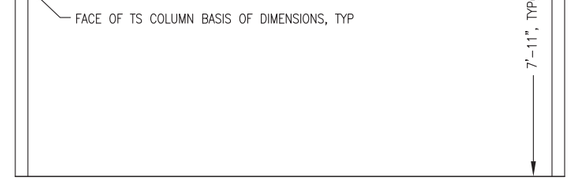
Sheet No. M2.5



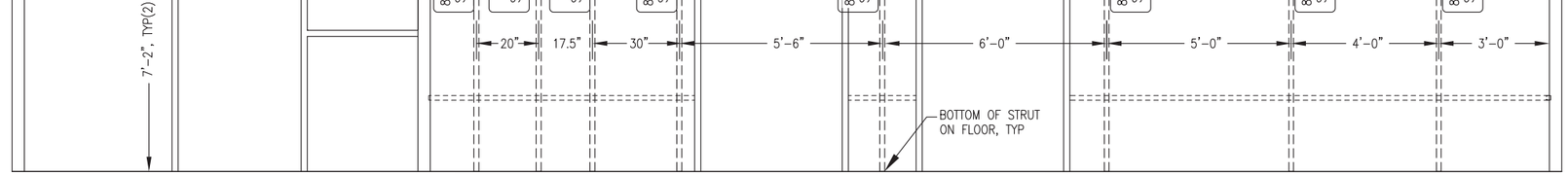
1 M2.6 END WALL (GRID 1) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



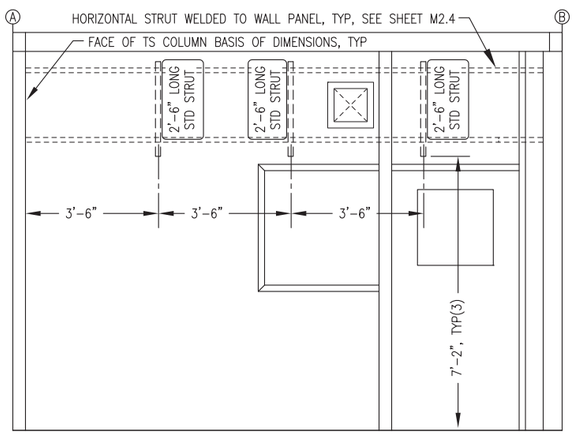
2 M2.6 BACK WALL (GRID A) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



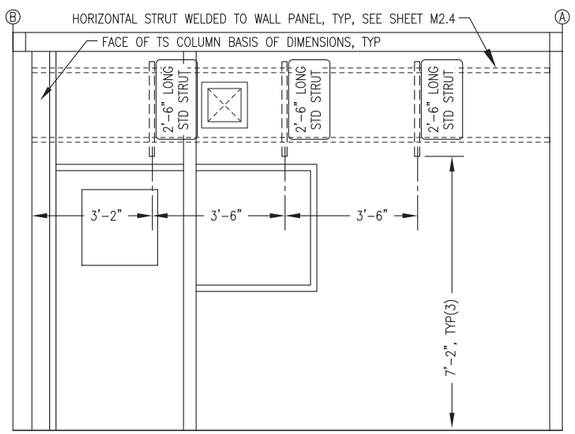
3 M2.6 END WALL (GRID 2) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



4 M2.6 FRONT WALL (GRID B) VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



5 M2.6 GEN BAY RIGHT WALL VERTICAL WALL STRUT LAYOUT
1/2"=1'-0"



6 M2.6 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.

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

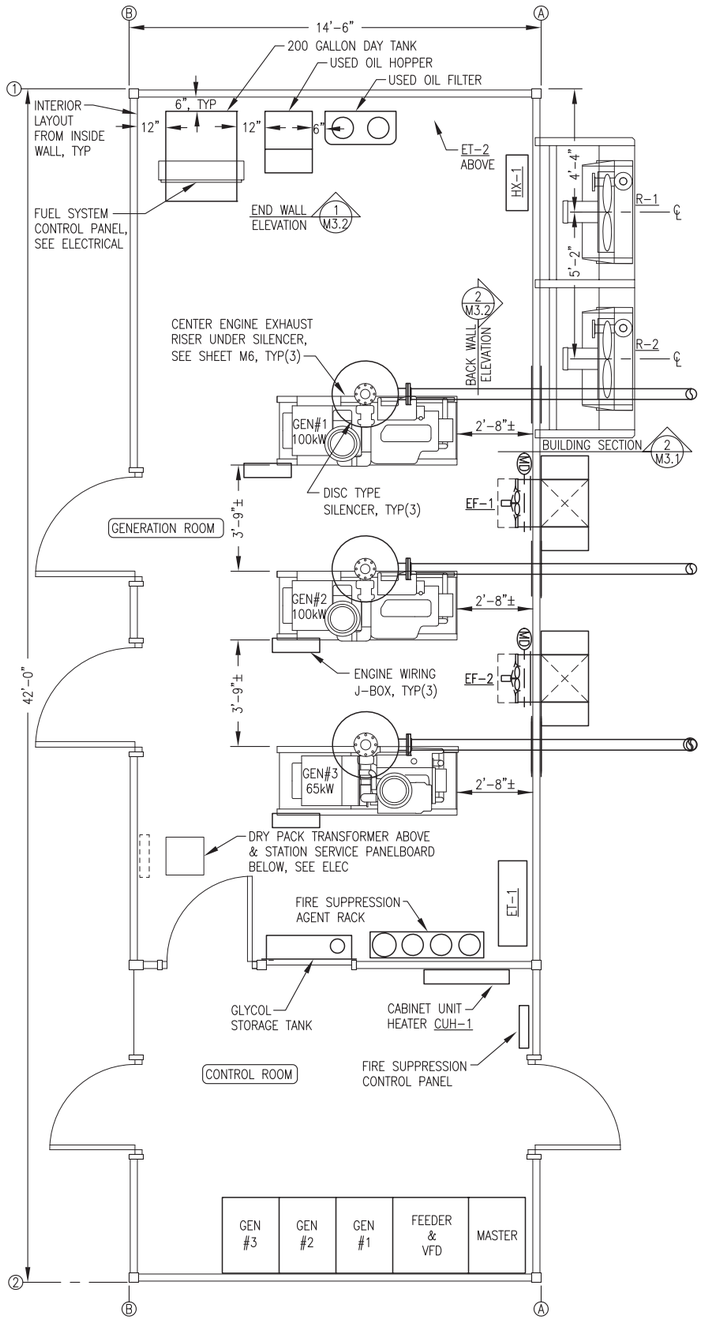
CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
MECHANICAL SUPPORT
VERTICAL WALL STRUT INSTALLATION

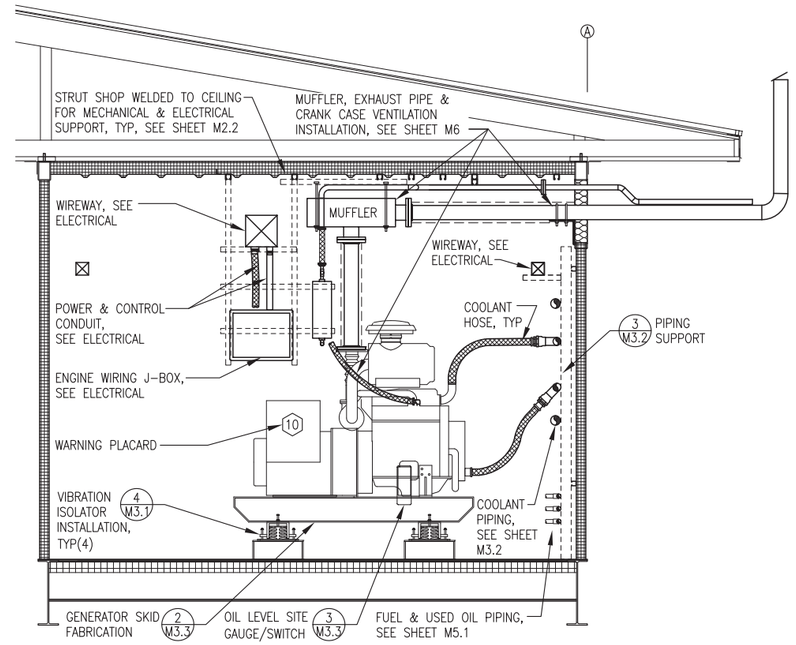
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

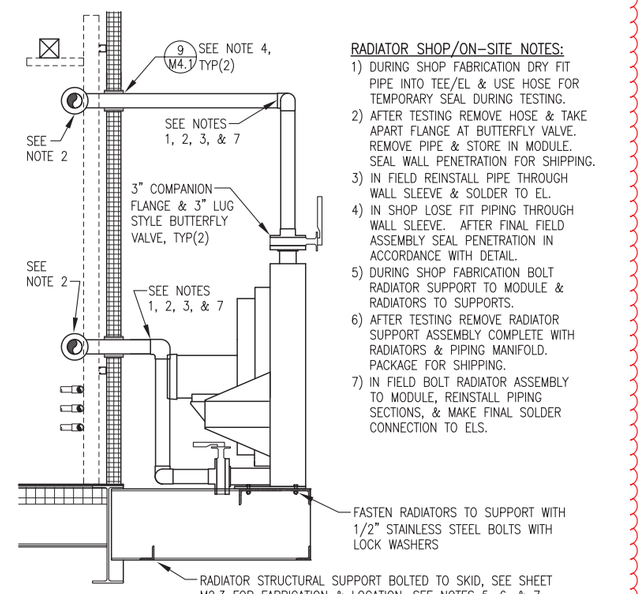
Sheet No. M2.6



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



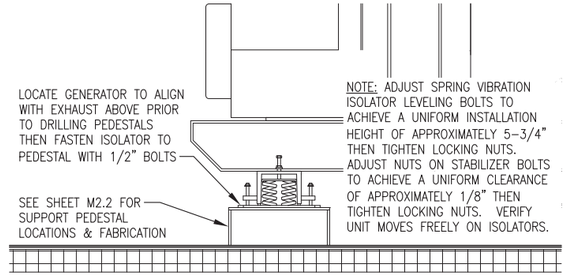
2/M3.1 TYPICAL MODULE SECTION/GENERATOR INSTALLATION
1/2"=1'-0"



RADIATOR SHOP/ON-SITE NOTES:

1) DURING SHOP FABRICATION DRY FIT PIPE INTO TEE/EL & USE HOSE FOR TEMPORARY SEAL DURING TESTING.
2) AFTER TESTING REMOVE HOSE & TAKE APART FLANGE AT BUTTERFLY VALVE. REMOVE PIPE & STORE IN MODULE. SEAL WALL PENETRATION FOR SHIPPING.
3) IN FIELD REINSTALL PIPE THROUGH WALL SLEEVE & SOLDER TO EL.
4) IN SHOP LOSE FIT PIPING THROUGH WALL SLEEVE. AFTER FINAL FIELD ASSEMBLY SEAL PENETRATION IN ACCORDANCE WITH DETAIL.
5) DURING SHOP FABRICATION BOLT RADIATOR SUPPORT TO MODULE & RADIATORS TO SUPPORTS.
6) AFTER TESTING REMOVE RADIATOR SUPPORT ASSEMBLY COMPLETE WITH RADIATORS & PIPING MANIFOLD. PACKAGE FOR SHIPPING.
7) IN FIELD BOLT RADIATOR ASSEMBLY TO MODULE, REINSTALL PIPING SECTIONS, & MAKE FINAL SOLDER CONNECTION TO ELS.

3/M3.1 RADIATOR & PIPING INSTALLATION
3/4"=1'-0"



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

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ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
EQUIPMENT LAYOUT PLAN, SECTION, & DETAILS

NO.	REVISION	BY	DATE
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Plot Date 1/6/20
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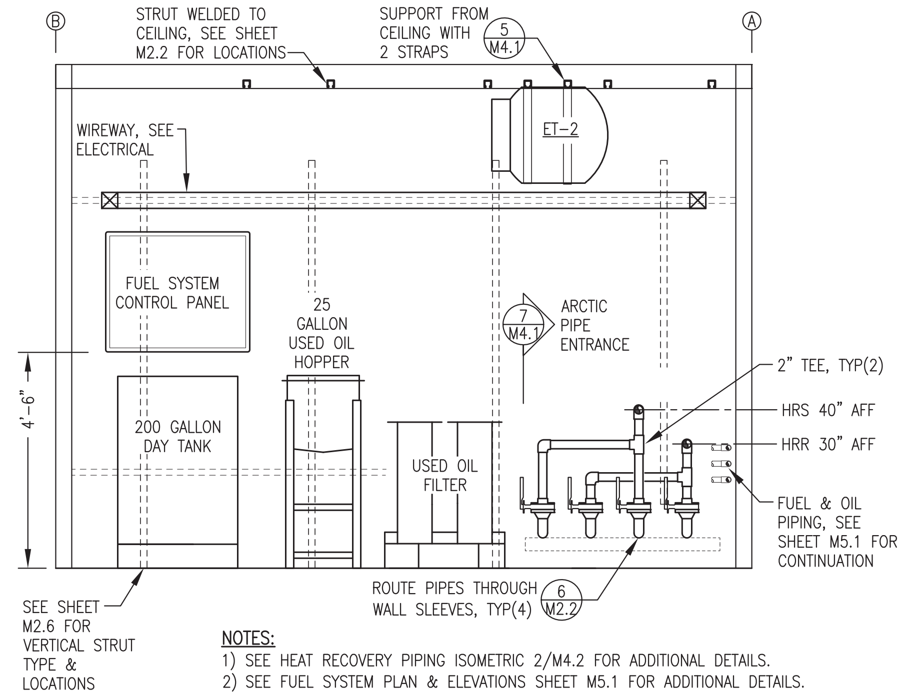
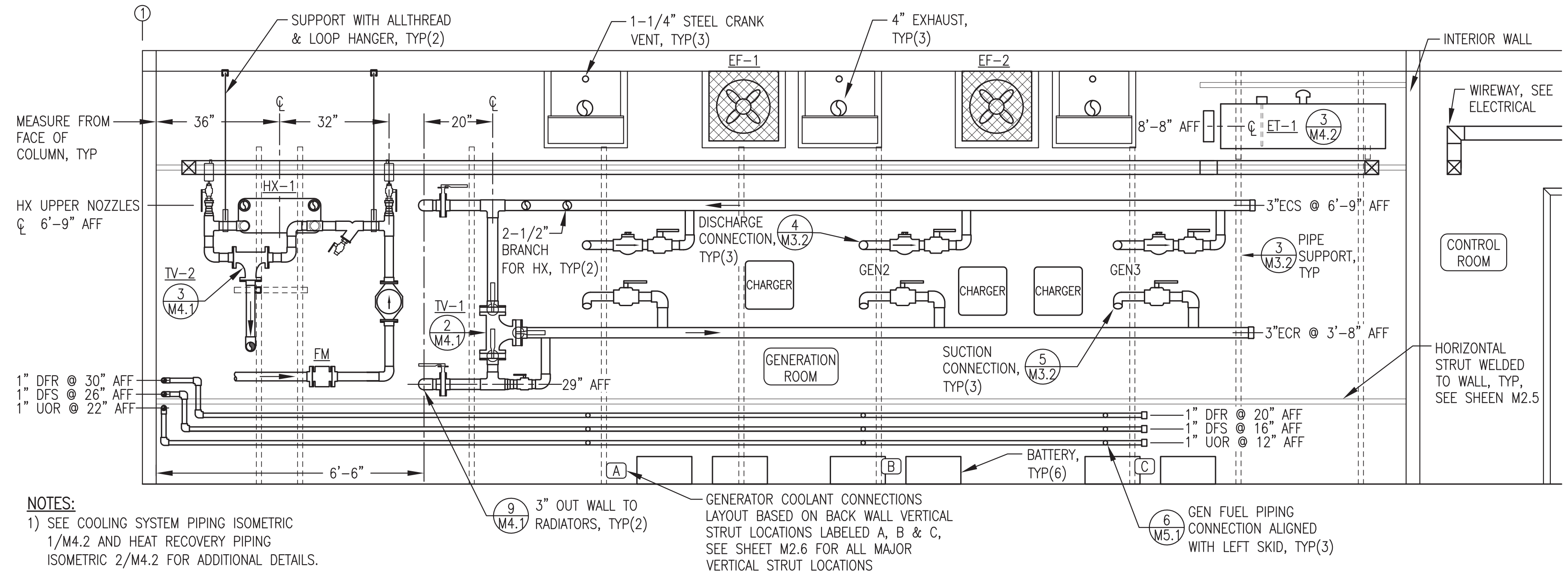
Drawn JTD
Approved BCG

Sheet No. M3.1



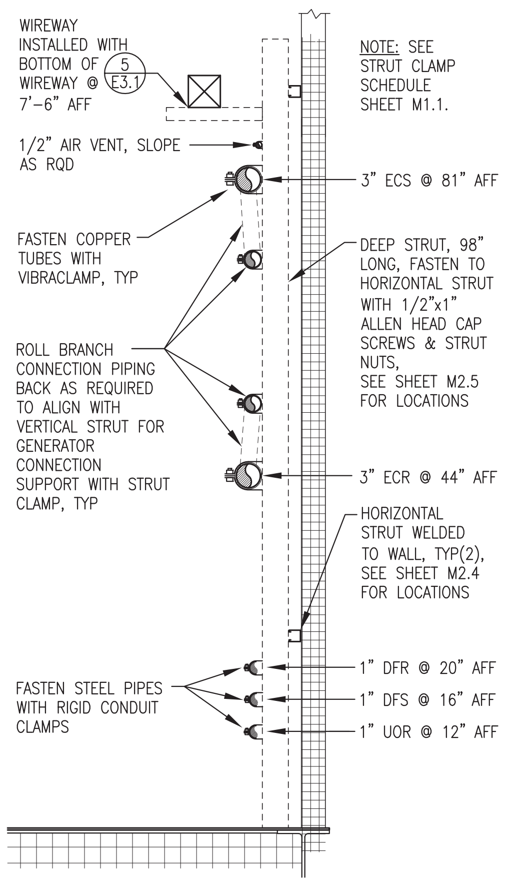
NOTES:
1) SEE HEAT RECOVERY PIPING ISOMETRIC 2/M4.2 FOR ADDITIONAL DETAILS.
2) SEE FUEL SYSTEM PLAN & ELEVATIONS SHEET M5.1 FOR ADDITIONAL DETAILS.

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

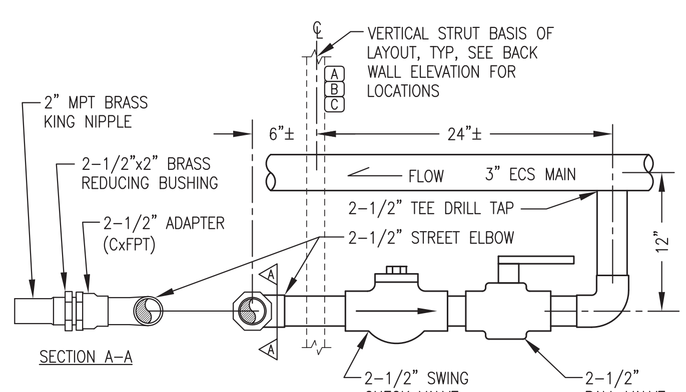


NOTES:
1) SEE COOLING SYSTEM PIPING ISOMETRIC 1/M4.2 AND HEAT RECOVERY PIPING ISOMETRIC 2/M4.2 FOR ADDITIONAL DETAILS.

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

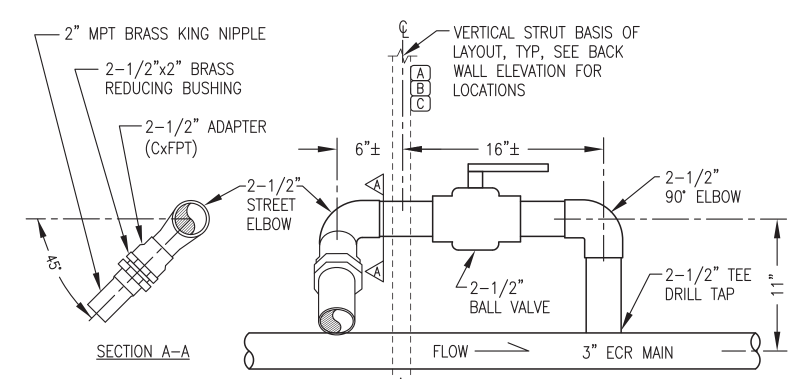


3 M3.2 TYPICAL PIPE SUPPORT AT BACK WALL
1"=1'-0"



NOTES:
1) MAIN PIPING 3" WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
2) ALL PIPING TYPE L COPPER TUBE. ALL LINE SIZE VALVES SOLDER END.

4 M3.2 TYPICAL GENERATOR DISCHARGE CONNECTION
NO SCALE



NOTES:
1) MAIN PIPING 3" WITH 1" INSULATION. ALL BRANCH PIPING NOT INSULATED.
2) ALL PIPING TYPE L COPPER TUBE. ALL LINE SIZE VALVES SOLDER END.

5 M3.2 TYPICAL GENERATOR SUCTION CONNECTION
NO SCALE

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
WALL ELEVATIONS & PPING DETAILS

NO.	REVISION	BY	DATE
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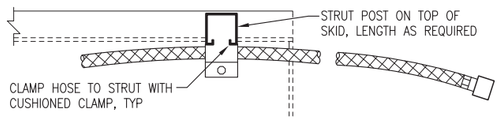
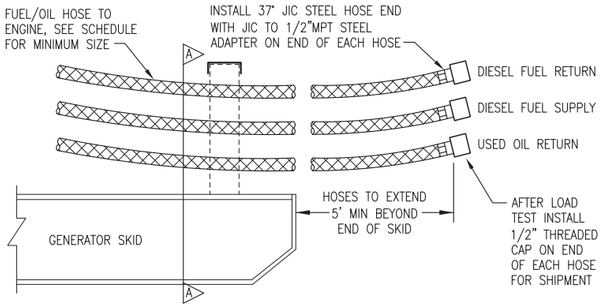
Sheet No. M3.2

MINIMUM HOSE SIZE SCHEDULE		
FUEL SUPPLY	FUEL RETURN	USED OIL
#8	#8	#10

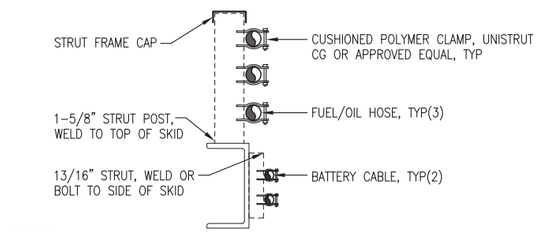
NOTE:
ON 4045'S GROUP HOSES ON LEFT SKID AS SHOWN TO COORDINATE WITH COOLANT HOSES.



LEFT SKID PLAN (TOP) VIEW

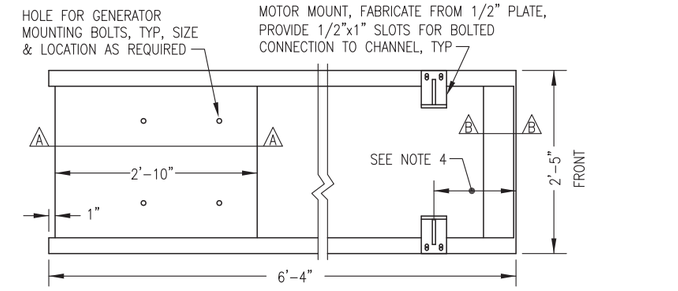


ELEVATION (SIDE) VIEW

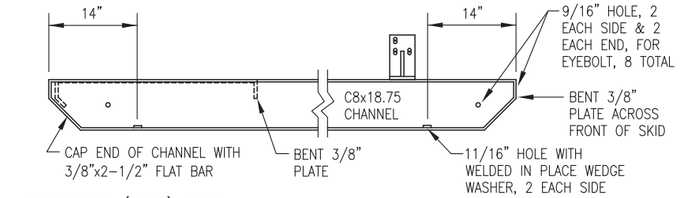


SECTION A–A

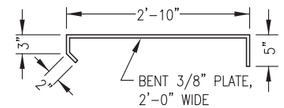
1 M3.3 FUEL/OIL HOSE & BATTERY CABLE INSTALLATION
NO SCALE



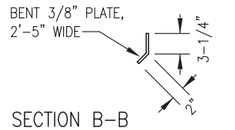
PLAN (TOP) VIEW



ELEVATION (SIDE) VIEW



SECTION A–A

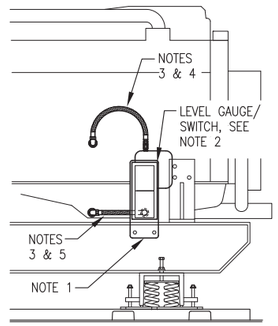


SECTION B–B

NOTES:

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

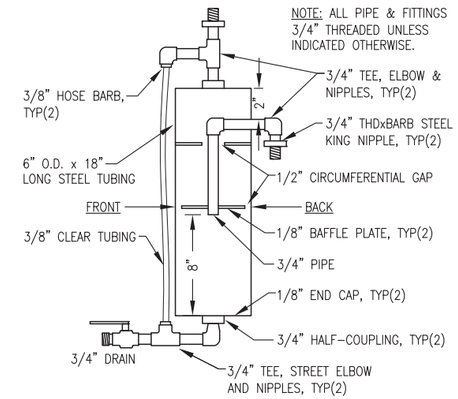
2 M3.3 TYPICAL GENERATOR SKID FABRICATION
NO SCALE



NOTES:

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

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



4 M3.3 CONDENSATE TRAP FABRICATION
NO SCALE

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ALASKA ENERGY AUTHORITY

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
GENERATOR FABRICATION DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

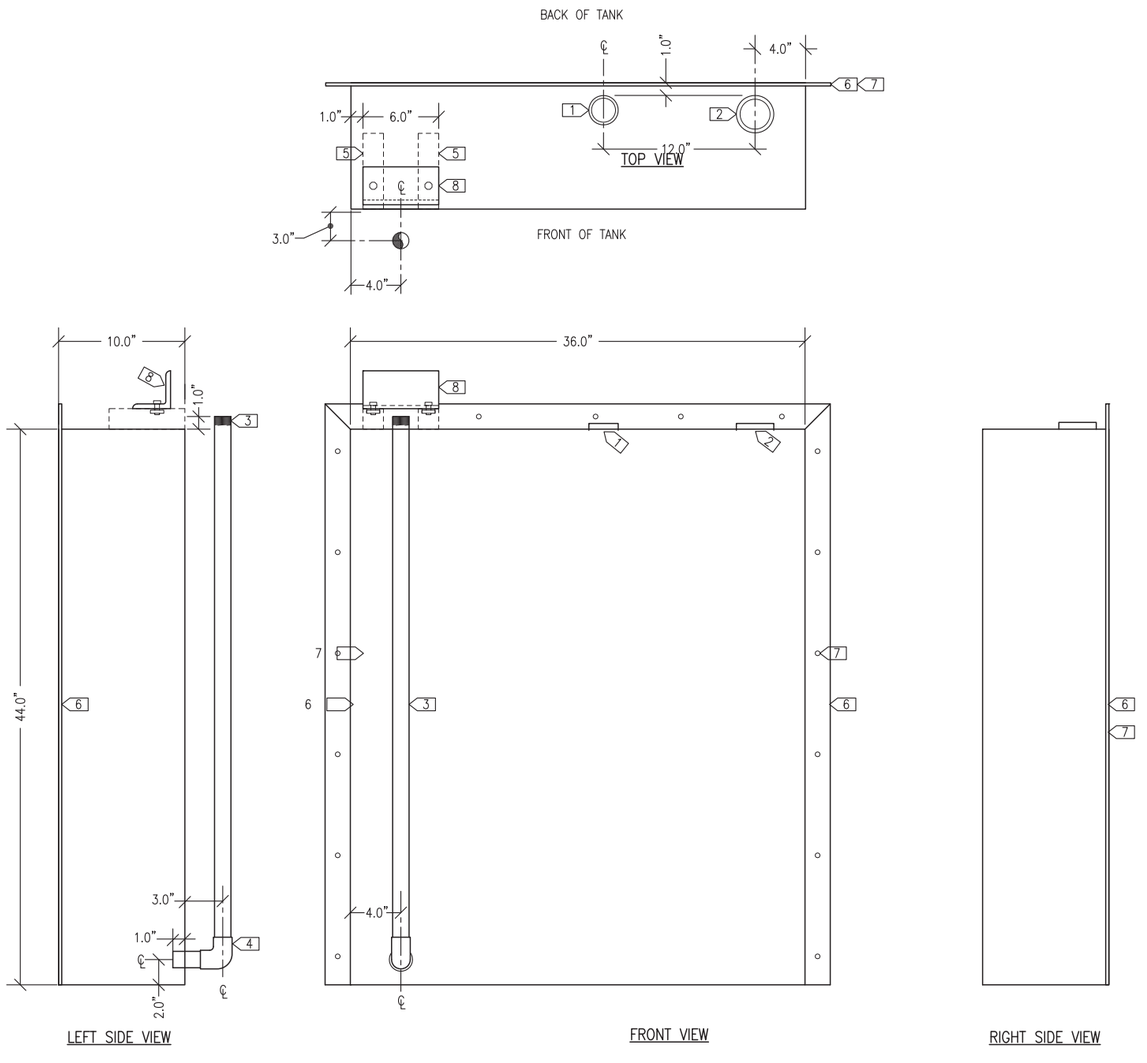
Sheet No.
M3.3

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, SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.
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:

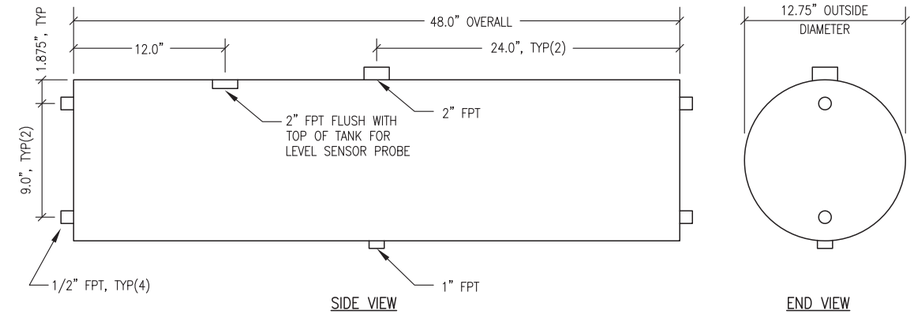
1. 1-1/2" FPT (TANK GAUGE)
2. 2" FPT (VENT) – INSTALL 2" THREADED VENT CAP
3. 1" SCHEDULE 80 PIPE WITH THREADED TOP CONNECTION (WITHDRAWAL)
4. 1" SOCKETWELD 90° ELBOW
5. 6" LONG STRUT, END FLUSH WITH FRONT OF TANK
6. 2x1/4" FLAT BAR CONTINUOUS THREE SIDES
7. 3/8" HOLE AT 8" O.C. ALL AROUND
8. L3x3x1/4"x6"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



1 M3.4 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 10 GAUGE ASTM A-36 PLATE STEEL ROLLED AND WELDED OR SCHEDULE 5 LIGHTWALL ASTM A53 STEEL PIPE. FABRICATE HEADS FROM 3/16" 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 OF SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.
6) UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS, AIR DRY INTERIOR, AND SEAL ALL TANK OPENINGS WITH PLASTIC PLUGS.



2 M3.4 24 GALLON GLYCOL EXPANSION TANK
1"=6"

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ALASKA ENERGY AUTHORITY

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

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
GLYCOL STORAGE & EXPANSION TANKS FABRICATION

NO.	REVISION	BY	DATE
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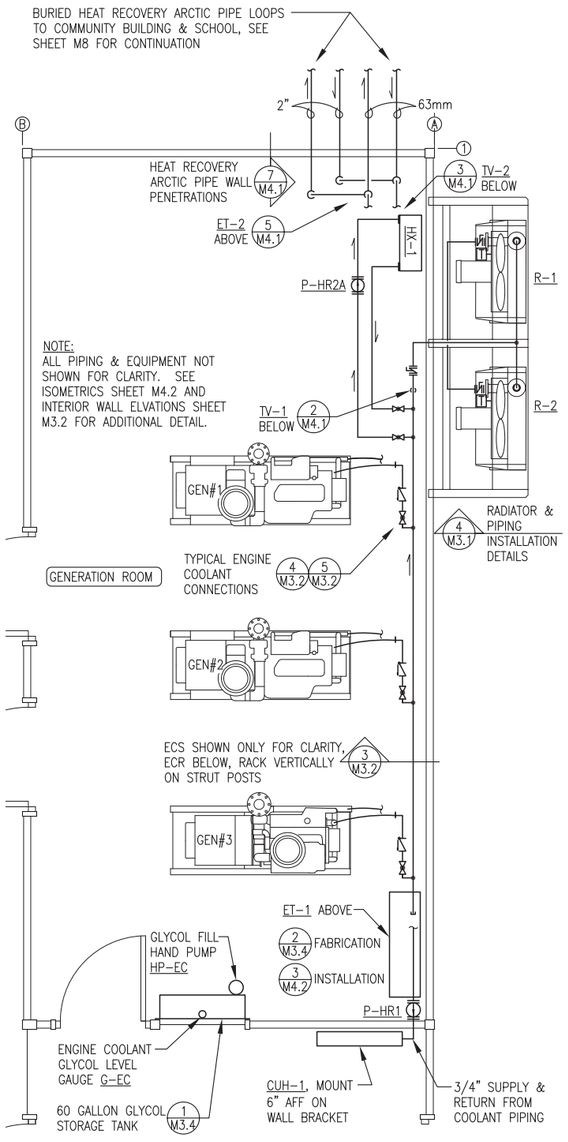
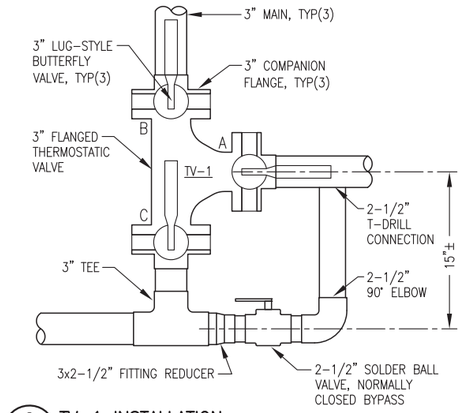
Plot Date 1/6/20 · Designed BCG · Drawn JTD · Approved BCG

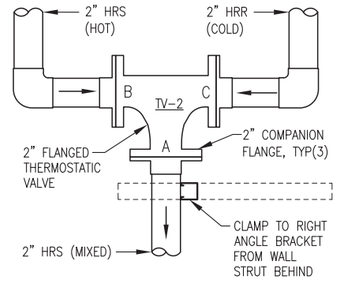
Sheet No. M3.4



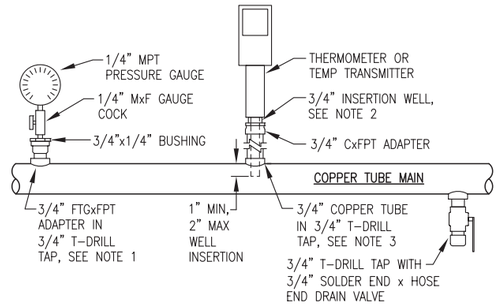
1 M4.1 COOLANT AND HEAT RECOVERY PIPING PLAN
3/8"=1'-0"



2 M4.1 TV-1 INSTALLATION
NO SCALE

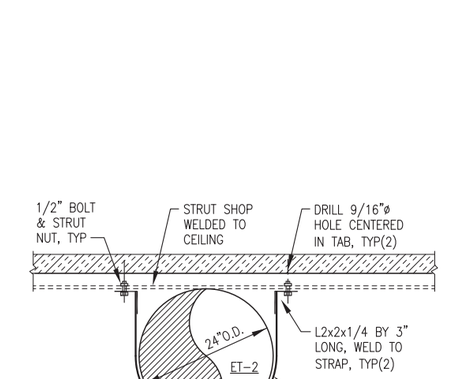


3 M4.1 TV-2 INSTALLATION
NO SCALE



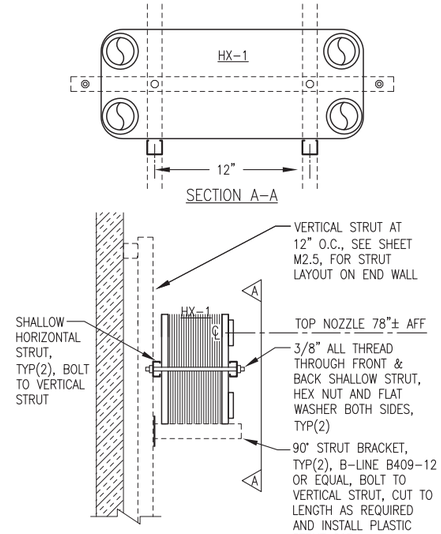
NOTES:
1) USE T-DRILL TAPS AS SHOWN FOR INSTALLATIONS IN 1-1/4" AND LARGER COPPER MAINS. USE LINE SIZE TEE FITTINGS FOR INSTALLING INSTRUMENTATION IN 1" AND SMALLER MAINS.
2) TEMPERATURE TRANSMITTER INSTALLATION SIMILAR TO THERMOMETER EXCEPT USE 3/4"x1/2" BUSHING.
3) FOR MAINS SMALLER THAN 2" USE COPPER TUBE RISER AS SHOWN, LENGTH AS REQUIRED FOR 1" TO 2" WELL INSERTION INTO MAIN. FOR LARGER PIPES OMIT RISER AND INSERT 3/4" FTGxFPT ADAPTER INTO T-DRILL TAP.

4 M4.1 TYPICAL INSTRUMENT INSTALLATION
NO SCALE

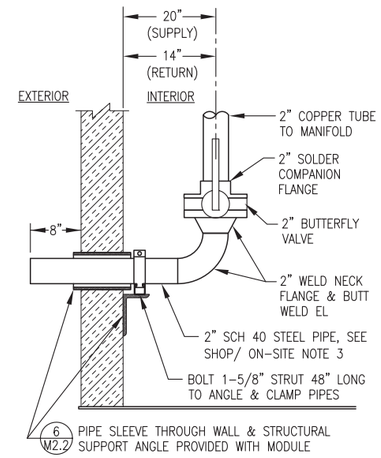


NOTES:
1) SMOOTH EDGES AFTER FABRICATION, WIRE BRUSH, SOLVENT CLEAN, AND PAINT WITH TWO COATS OF DIRECT TO METAL ALKYD ENAMEL, SHERWIN WILLIAMS DTM OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.
2) ONE STRAP SHOWN. INSTALL FOUR IDENTICAL STRAPS.

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



6 M4.1 HEAT EXCHANGER SUPPORT FROM WALL
NO SCALE

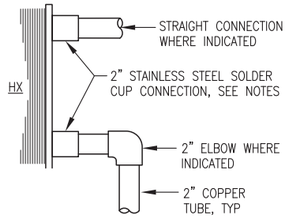


ARCTIC PIPE GENERAL NOTES:
1) SEE ELEVATION 3/M3.2 FOR PENETRATION LOCATIONS.
2) ONE PIPE FOR EACH SIZE SHOWN. PROVIDE TWO IDENTICAL FOR EACH SIZE.

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. PLUG WALL PENETRATION FOR SHIPPING.
3) AS PART OF ON-SITE INSTALLATION REINSTALL PIPE THROUGH WALL AND CONNECT TO ARCTIC PIPE, SEE SHEET M8.

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

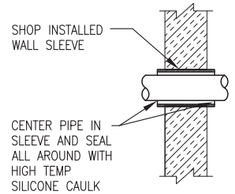
HX CONNECTION NOTES:
1) CONNECT COPPER TUBE TO SS NOZZLE WITH HIGH SILVER BRAZING ROD.
2) PLACE WET RAGS ON HX & COPPER TUBE AS REQUIRED TO LIMT HEAT IMPACT DURING BRAZING.



8 M4.1 HX PIPING CONNECTION
NO SCALE

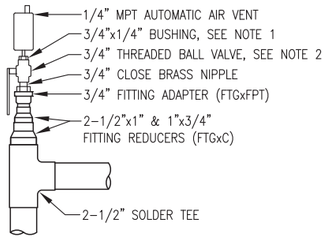
SHOP/ON-SITE NOTES:
1) SEAL OPENINGS AS PART OF ON-SITE WORK.

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 OR DRILL OPENING FOR TIGHT FIT THROUGH WALL AND CAULK ALL AROUND WITH POLYURETHANE SEALANT.



9 M4.1 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.



10 M4.1 TYPICAL AIR VENT INSTALLATION
NO SCALE

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
COOLANT & HEAT RECOVERY PIPING PLAN & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

Sheet No. M4.1

COOLING SYSTEM ISOMETRIC NOTES:

1) ALL PIPING SHOWN THIS ISOMETRIC TYPE "L" COPPER WITH SOLDER JOINTS, 3"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 AS SHOWN ON DETAIL 4/M4.1.

3) ALL COOLANT PRESSURE GAUGES 0-15 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) INSULATE COOLANT PIPING MAINS FROM GENERATOR VALVES TO RADIATORS. 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.

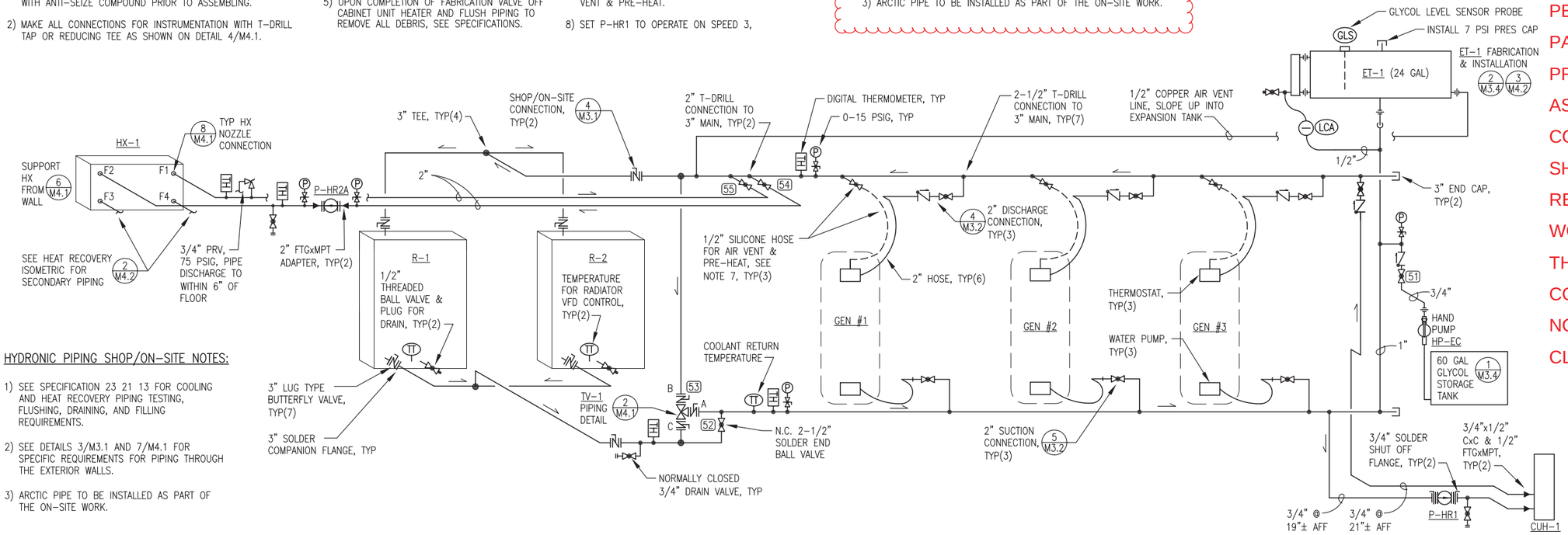
8) SET P-HR1 TO OPERATE ON SPEED 3,

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 3/M3.1, 7/M4.1, AND 9/M4.1 FOR SPECIFIC REQUIREMENTS FOR PIPING THROUGH THE EXTERIOR WALLS.

3) ARCTIC PIPE TO BE INSTALLED AS PART OF THE ON-SITE WORK.



1 M4.2 COOLING SYSTEM PIPING ISOMETRIC

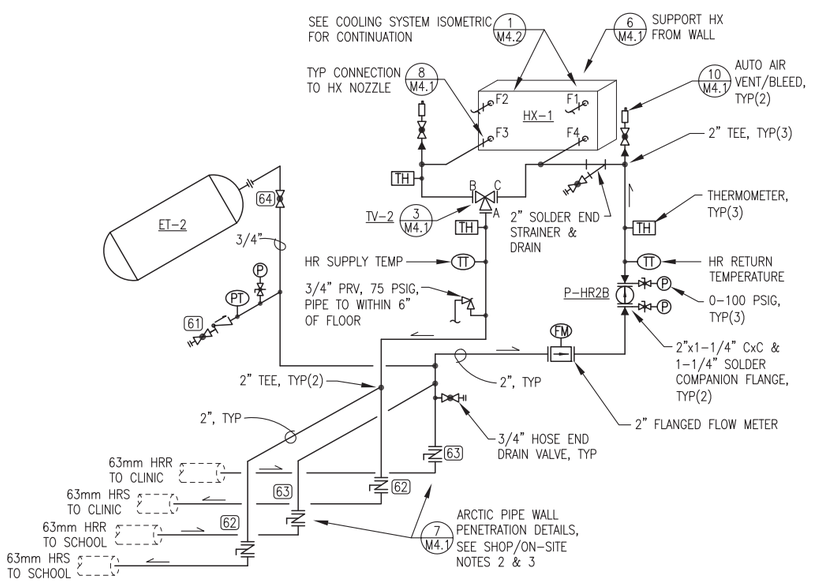
NO SCALE

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 3/M3.1 AND 7/M4.1 FOR SPECIFIC REQUIREMENTS FOR PIPING THROUGH THE EXTERIOR WALLS.

3) ARCTIC PIPE TO BE INSTALLED AS PART OF THE ON-SITE WORK.



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 AS SHOWN ON DETAIL 4/M4.1.

3) ALL HEAT RECOVERY PRESSURE GAUGES 0-100 PSIG.

4) SEE ELECTRICAL INSTRUMENTATION SCHEDULE FOR TEMPERATURE AND PRESSURE TRANSMITTERS AND FLOW METER.

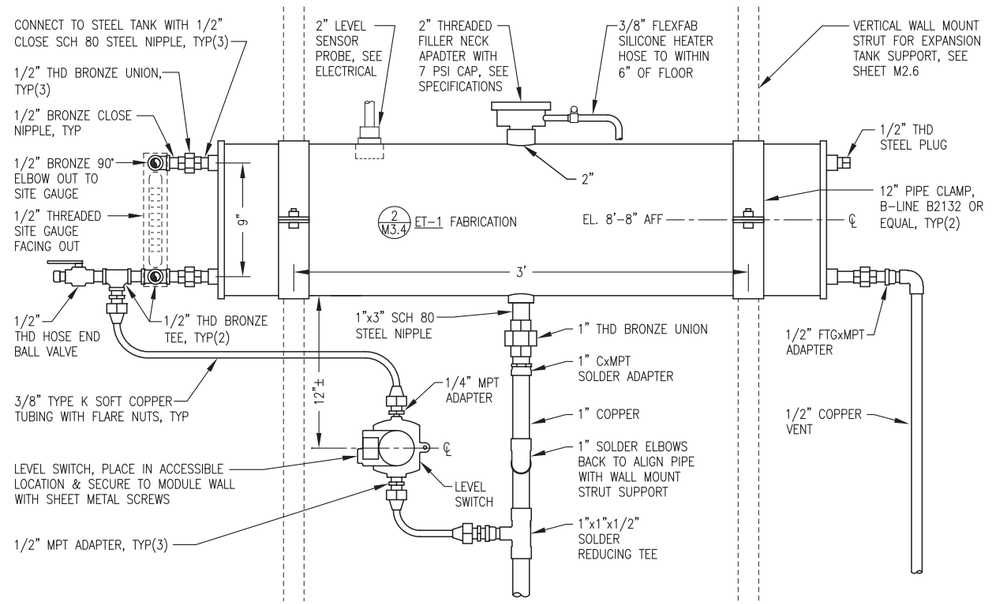
5) UPON COMPLETION OF FABRICATION FLUSH PIPING TO REMOVE ALL DEBRIS, SEE SPECIFICATIONS.

6) INSULATE HEAT RECOVERY PIPING MAINS.

7) SET P-HR2B TO OPERATE ON SPEED 3.

2 M4.2 HEAT RECOVERY SYSTEM PIPING ISOMETRIC

NO SCALE



3 M4.2 24 GAL EXPANSION TANK ET-1 INSTALLATION

NO SCALE

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. WORK INCLUDED IN THE ON SITE CONTRACT IS NOTED WITHIN THE CLOUDED AREAS.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC — PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA

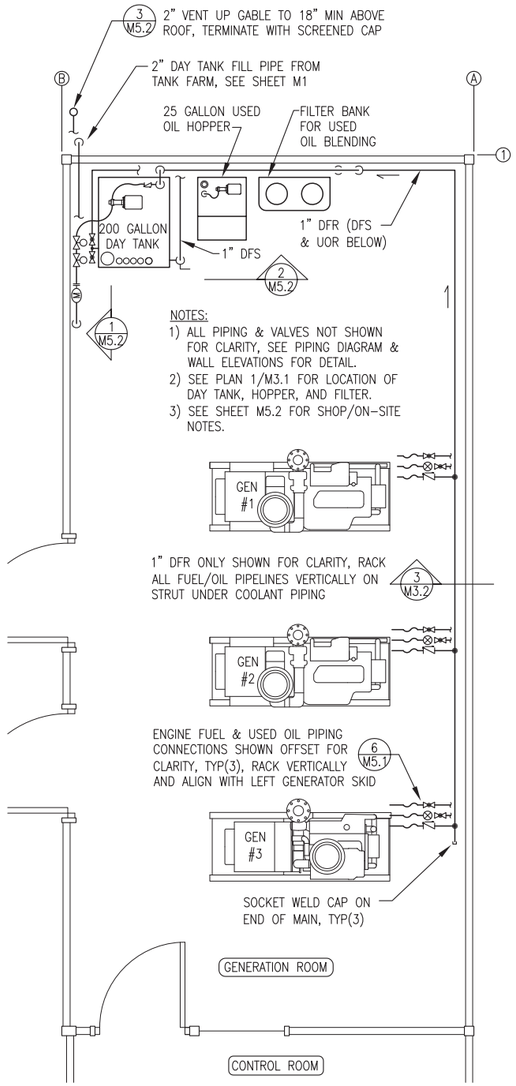
POWER SYSTEM UPGRADE PROJECT

COOLANT & HEAT RECOVERY ISOMETRICS & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20
1	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24.20

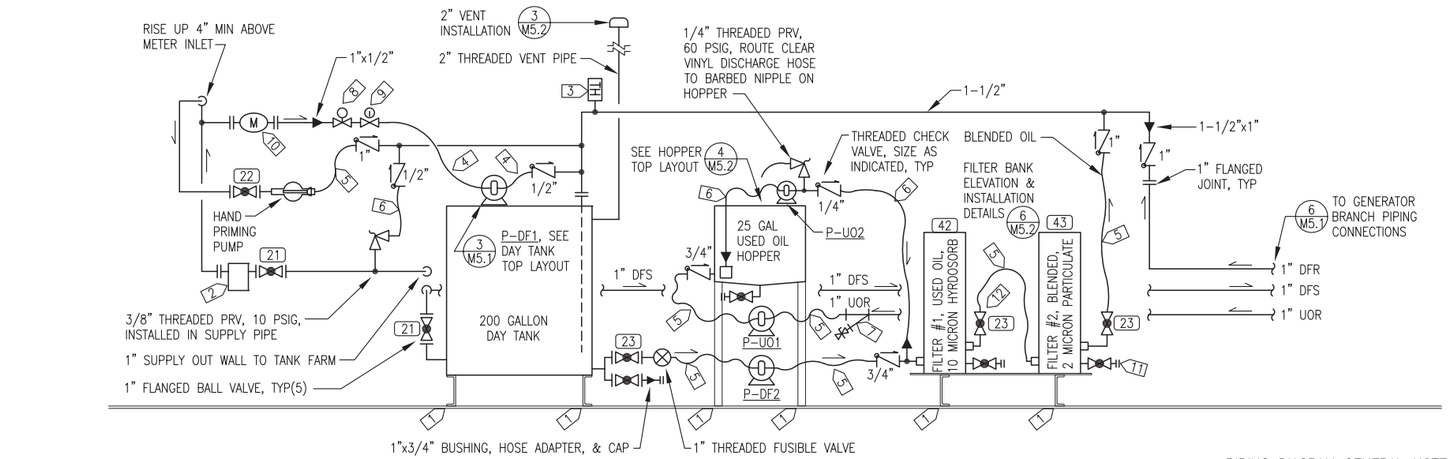
Plot Date 1/6/20 | Designed BCG | Drawn JTD | Approved BCG

Sheet No. M4.2



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. 1" ANSI 150# FLANGED FILTER F-DT, REMOVE DRAIN VALVE & INSTALL 1/8"MxF DRAIN COCK.
3. DIGITAL THERMOMETER, INSTALL WELL IN 3/4" THREAD-O-LET.
4. #10 HOSE WITH 1/2" OR 3/4" NPT ENDS.
5. #12 HOSE WITH 1/2", 3/4", OR 1" NPT ENDS.
6. #6 HOSE WITH 1/8", 1/4", OR 3/8" NPT ENDS.
7. 1" THREADED 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, PROVIDE SOCKET WELD FLANGE ON INLET & THREADED FLANGE ON OUTLET.
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 PLANS AND DETAILS.
2) ALL DAY TANK SUPPLY & RETURN PIPING 1" SCH 80 EXCEPT WHERE INDICATED AS 1-1/2". ALL VENT PIPING 2" SCH 40.
3) ALL PIPING JOINTS SOCKET OR BUTT WELD EXCEPT FOR THREADED VENT & CONNECTIONS TO EQUIPMENT & VALVES.
4) ON ALL HOSES INSTALL JICxNPT SWIVEL ENDS, SIZE REQUIRED TO MATCH PIPING OR PUMPS

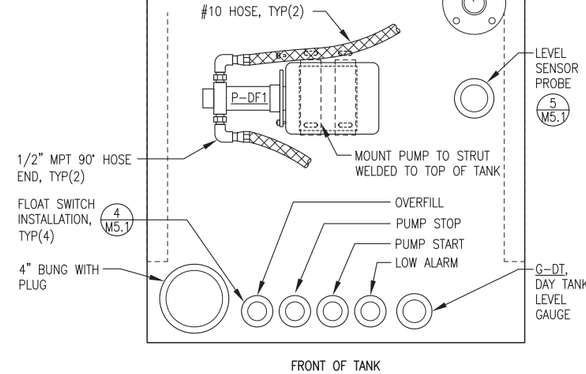
2 M5.1 DIESEL FUEL & USED OIL PIPING DIAGRAM

NO SCALE

NOTES:
1) HOSES PROVIDED WITH ENGINE, SIZE VARIES PER ENGINE & PRODUCT. ALL EQUIPPED WITH JIC SWIVELS & 1/2" MPT ADAPTERS. CUT TO LENGTH & RE-INSTALL ENDS.
2) ALL PIPING & NIPPLES SCH 80. ALL VALVES 1/2" SIZE, THREADED BODY.

6 M5.1 ENGINE FUEL PIPING CONNECTION

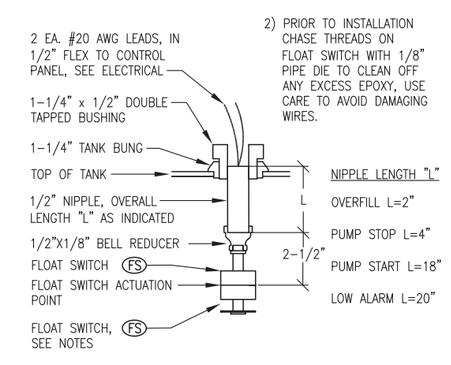
NO SCALE



3 M5.1 TOP OF DAY TANK - PLAN VIEW

NO SCALE

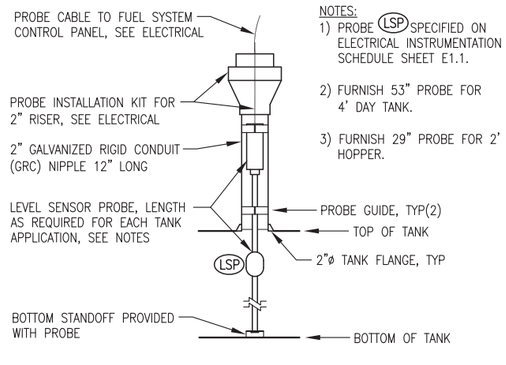
NOTES:
1) FLOAT SWITCH (FS) SPECIFIED ON ELECTRICAL INSTRUMENTATION SCHEDULE SHEET E1.1.
2) PRIOR TO INSTALLATION CHASE THREADS ON FLOAT SWITCH WITH 1/8" PIPE DIE TO CLEAN OFF ANY EXCESS EPOXY, USE CARE TO AVOID DAMAGING WIRES.



4 M5.1 DAY TANK FLOAT SWITCH INSTALLATION

NO SCALE

NOTES:
1) PROBE (LSP) SPECIFIED ON ELECTRICAL INSTRUMENTATION SCHEDULE SHEET E1.1.
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

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252

Gray Stassel Engineering, Inc.
PHONE: (907) 349-0100

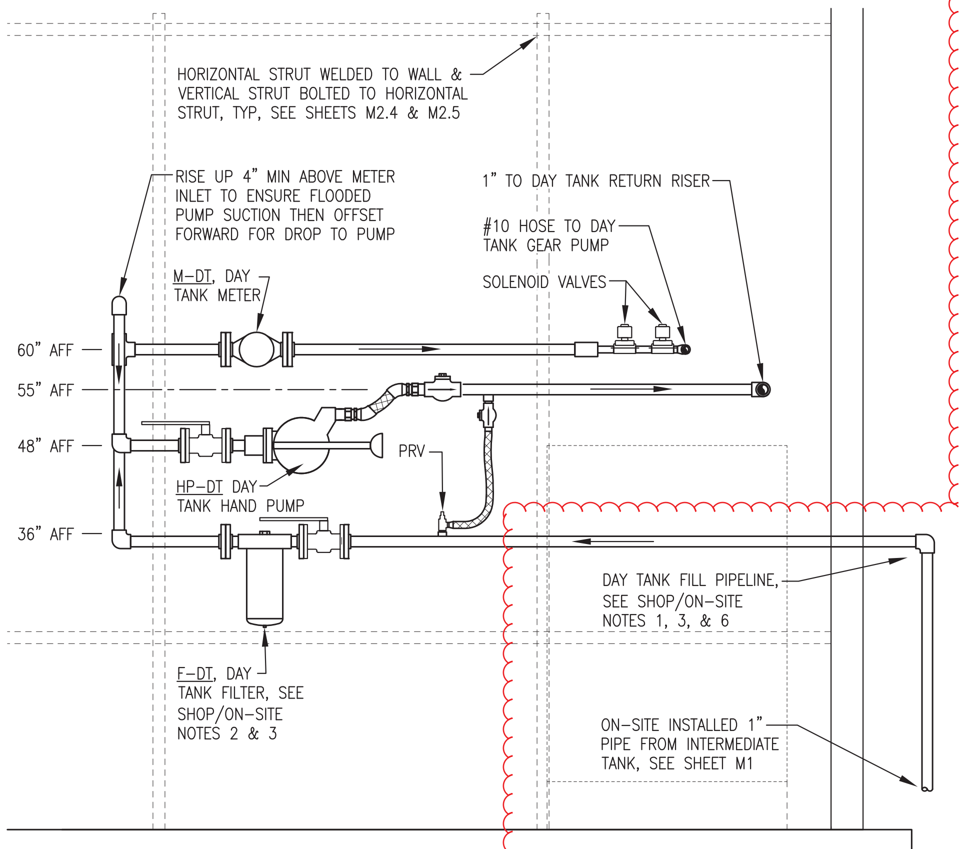
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

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

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

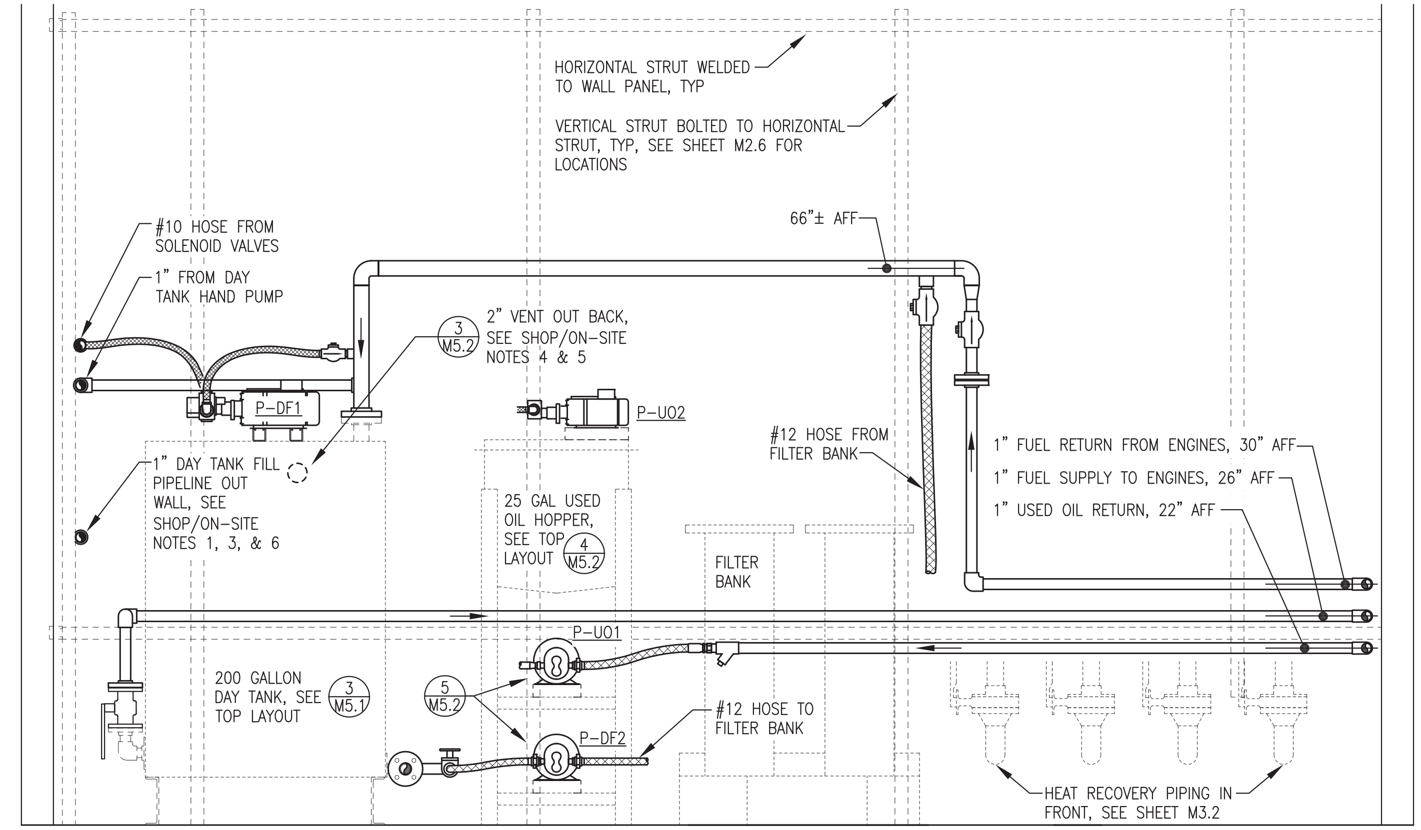
Sheet No. M5.1



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

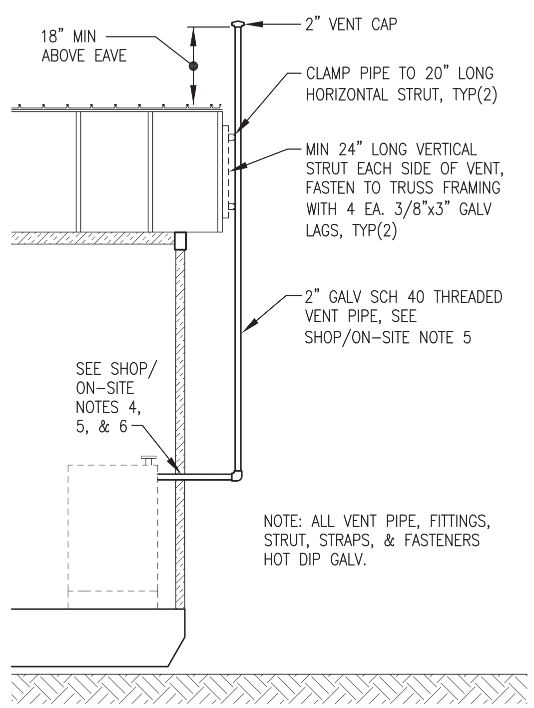
MODULE SHOP/ON-SITE NOTES:

1. DURING SHOP FABRICATION STUB DAY TANK FILL PIPE 8" MIN BEYOND WALL & TERMINATE WITH 1" MALE THREAD FOR TESTING.
2. UPON COMPLETION OF TESTING, DRAIN & REMOVE FILTER & STORE IN MODULE. SLIDE PIPE OVER & SECURE FOR SHIPPING.
3. AS PART OF ON-SITE INSTALLATION REINSTALL FILTER THEN CUT THREADS OFF END OF EXTERIOR PIPE & INSTALL SOCKET WELD ELBOW.
4. DURING SHOP FABRICATION INSTALL TEMPORARY VENT PIPE OUT WALL. REMOVE TEMP PIPE FOR SHIPPING.
5. AS PART OF ON-SITE INSTALLATION INSTALL 2" GALVANIZED THREADED VENT PIPE OUT WALL & UP TO VENT, SEE DETAIL 3/M5.2.
6. DURING SHOP FABRICATION HOLE SAW 1/2"ø OVERSIZE OPENINGS THEN SEAL FOR SHIPPING AFTER REMOVING PIPES. UPON FINAL ON-SITE ASSEMBLY SEAL 1" FILL & 2" VENT PIPES TO EXTERIOR WALL WITH POLYURETHANE CAULKING ALL AROUND.

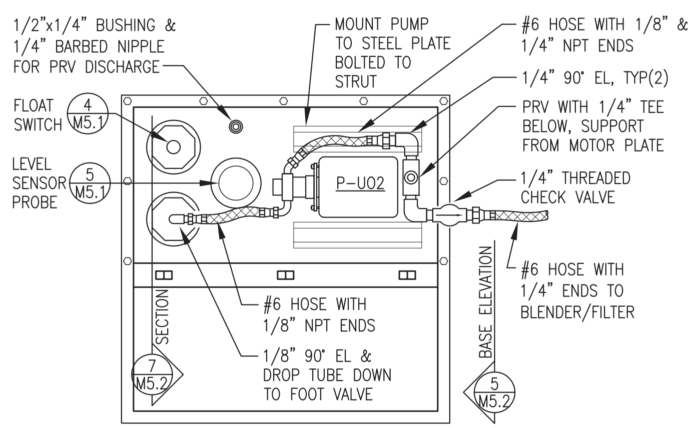


2 M5.2 DIESEL FUEL & USED OIL END WALL ELEVATION
1"=1'

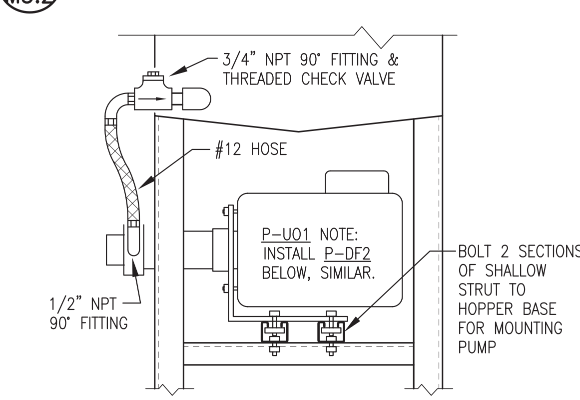
THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. WORK INCLUDED IN THE ON SITE CONTRACT IS NOTED WITHIN THE CLOUDED AREAS.



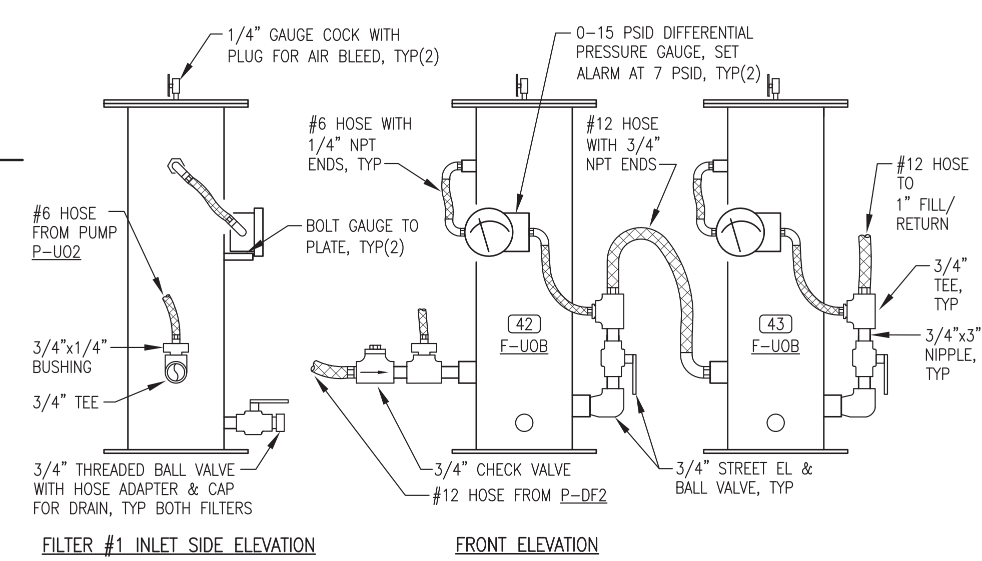
3 M5.2 DAY TANK VENT INSTALLATION
3/8"=1'-0"



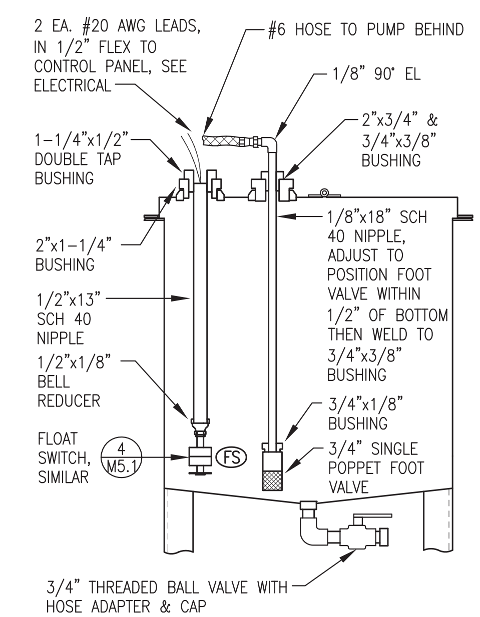
4 M5.2 TOP OF HOPPER – PLAN VIEW
NO SCALE



5 M5.2 HOPPER BASE ELEVATION
NO SCALE



6 M5.2 FILTER BANK ELEVATIONS & INSTALLATION DETAILS
NO SCALE



7 M5.2 SECTION THROUGH HOPPER
NO SCALE

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

DIESEL FUEL & USED OIL PIPING ELEVATIONS & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

Sheet No. M5.2

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.

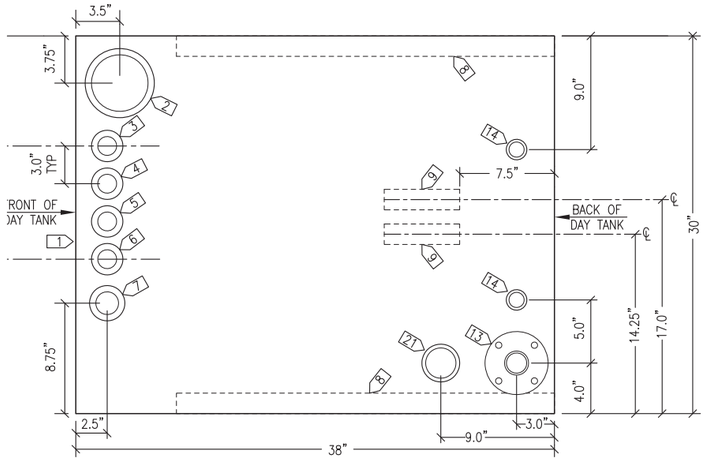
6) UPON COMPLETION OF FABRICATION, ROUND ALL CORNERS AND SHARP EDGES. SANDBLAST TANK EXTERIOR AND ALL ATTACHMENTS IN ACCORDANCE WITH SSPC-SP-6. PAINT WITH TWO COATS OF SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.

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

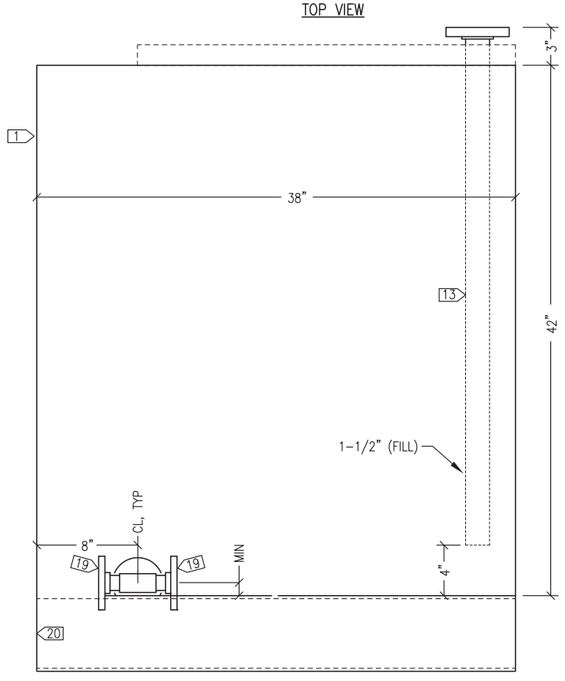
8) UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS AND AIR DRY INTERIOR. SEAL ALL MPT OPENINGS WITH THREADED STEEL CAPS. SEAL FPT TANK OPENINGS WITH THREADED STEEL PIPE PLUGS WHERE INDICATED. INSTALL 1-1/4" VENT CAP WHERE INDICATED. SEAL ALL OTHER FPT OPENINGS WITH PLASTIC OR STEEL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

DAY TANK SPECIFIC NOTES:

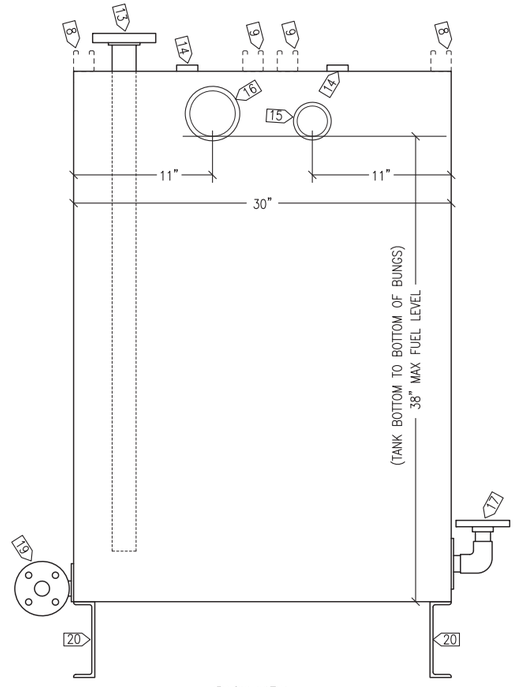
1. PROVIDE 2" HIGH LETTERING: "DIESEL FUEL 200 GALLONS"
2. 4" FPT (MANUAL FILL) - INSTALL THREADED STEEL PLUG
3. 1-1/4" FPT (OVERFILL) - INSTALL VENT CAP FOR SHIPPING
4. 1-1/4" FPT (PUMP STOP)
5. 1-1/4" FPT (PUMP START)
6. 1-1/4" FPT (LOW ALARM)
7. 1-1/2" FPT (TANK GAUGE)
8. 30"L STRUT, END FLUSH WITH BACK OF TANK
9. 6"L STRUT
10. NOT USED
11. NOT USED
12. NOT USED
13. 1-1/2" SCH 40 DROP TUBE (FILL) WITH 150# FLANGE
14. 1" FPT (SPARE) - INSTALL THREADED STEEL PLUG
15. 2" FPT (VENT)
16. 3" FPT (EMERGENCY VENT) - INSTALL THREADED STEEL PLUG
17. 1" FLANGE (SUPPLY) - SEE DETAIL 2/M5.3
18. NOT USED
19. 1" FLANGE (DRAIN) - SEE DETAIL 3/M5.3
20. C6x8.2, 38" LONG
21. 2" FPT (TANK LEVEL PROBE)



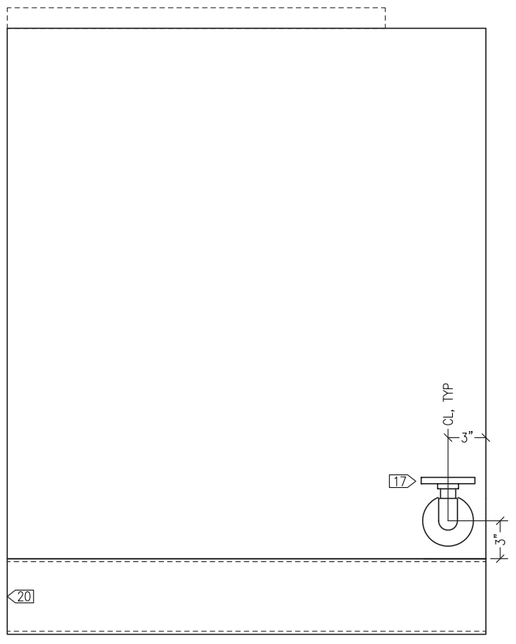
TOP VIEW



RIGHT SIDE VIEW

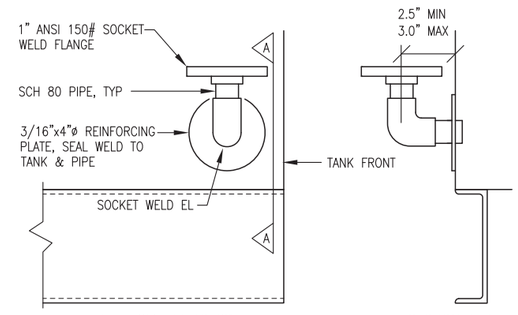


BACK VIEW



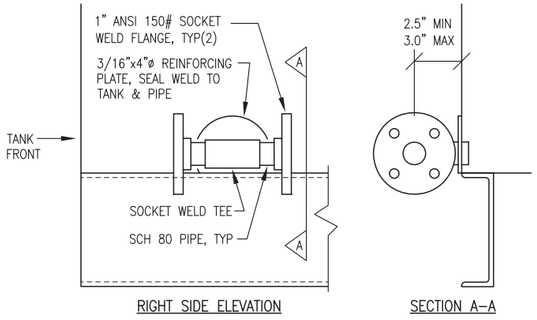
LEFT SIDE VIEW

1 M5.3 200 GALLON SINGLE WALL DAY TANK
1"=6"



LEFT SIDE ELEVATION SECTION A-A

2 M5.3 1" FLANGED SUPPLY CONNECTION
NO SCALE



RIGHT SIDE ELEVATION SECTION A-A

3 M5.3 1" FLANGED DRAIN CONNECTION
NO SCALE

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

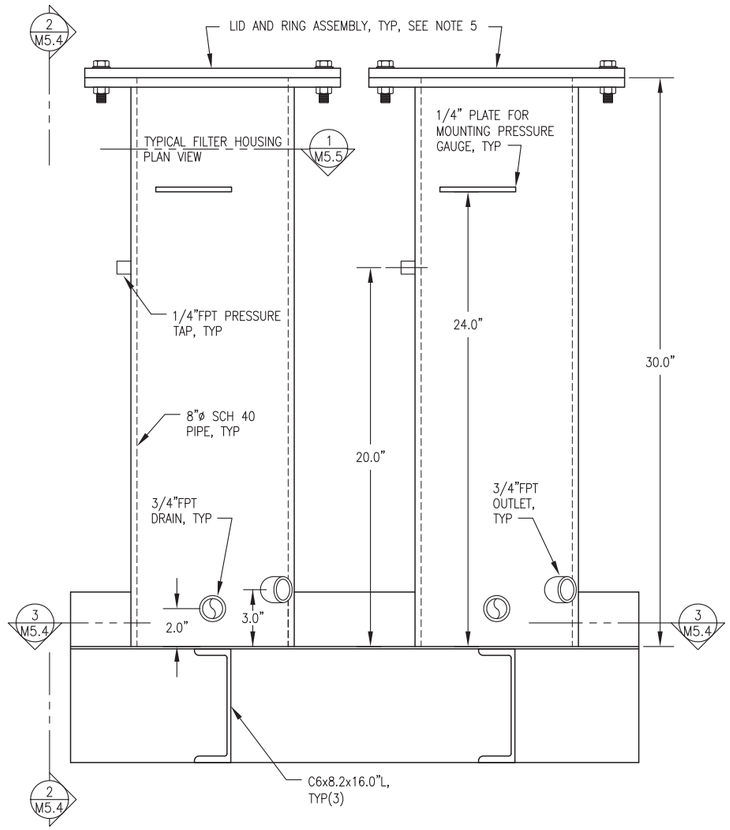
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
200 GALLON DAY TANK FABRICATION

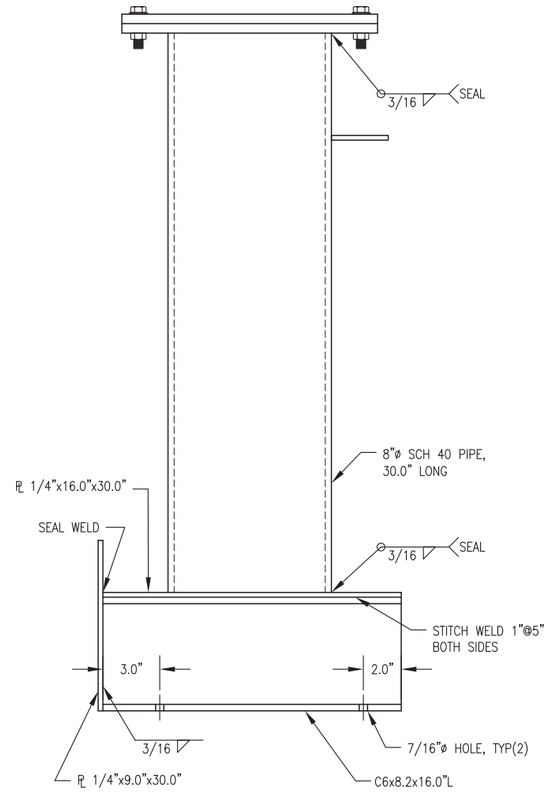
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20 | Designed BCG | Drawn JTD | Approved BCG

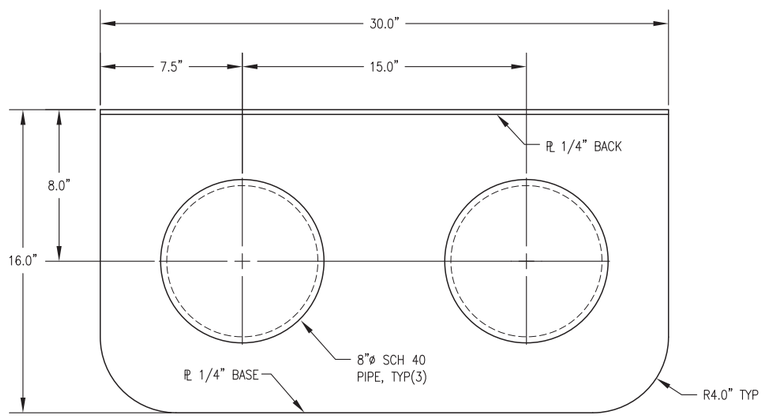
Sheet No. M5.3



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



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



3 M5.4 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 OF SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.
6. AFTER PAINTING REMOVE LID, WIRE BRUSH MATING SURFACES OF LID AND RING TO REMOVE ALL PAINT AND POLISH SURFACES SMOOTH. APPLY A LIGHT COAT OF GREASE OR ANTI-SIEZE PASTE TO BOTH FACES PRIOR TO INSTALLING GASKET. INSTALL 13.5" O.D. FULL-FACED 1/4" BUNA-N RUBBER GASKET (ALASKA RUBBER OR EQUAL) ON FILTER LIDS.
7. FURNISH FASTENERS AS INDICATED AND COAT WITH ANTI-SIEZE.
8. PRESSURE TEST EACH FILTER HOUSING ASSEMBLY TO 50 PSIG MINIMUM.
9. UPON COMPLETION FLUSH INTERIOR OF TANK TO REMOVE ALL DIRT AND DEBRIS, AIR DRY INTERIOR, AND SEAL ALL TANK OPENINGS WITH PLASTIC PLUGS.

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252
Gray Stassel Engineering, Inc.
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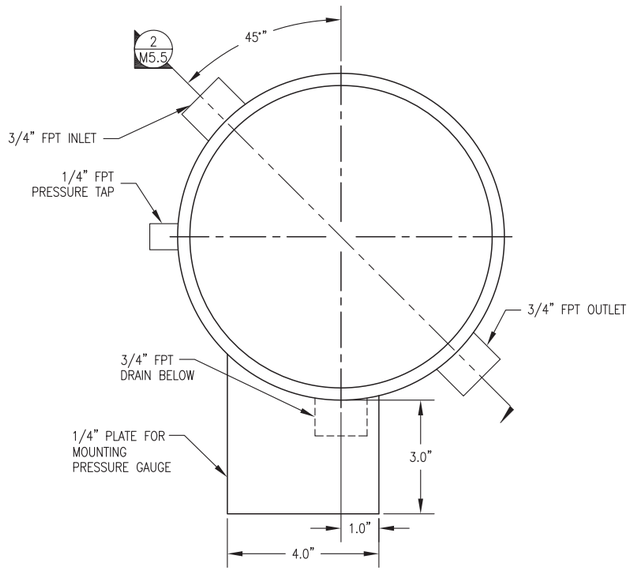
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
USED OIL BLENDER
FILTER BANK LAYOUT & CONFIGURATION

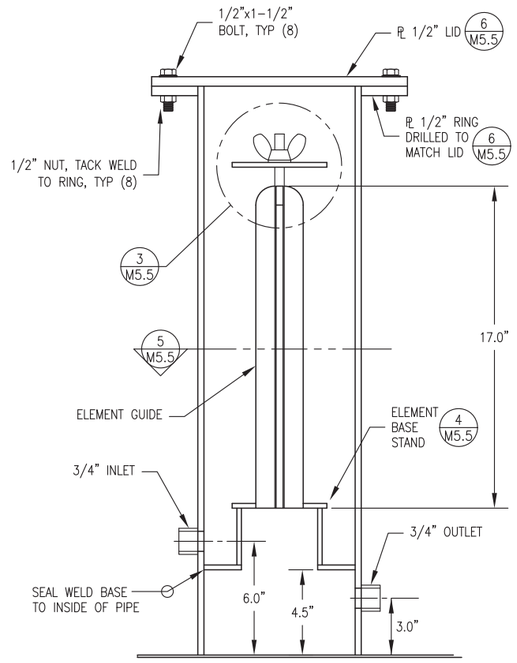
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/20
Designed BCG
Drawn JTD
Approved BCG

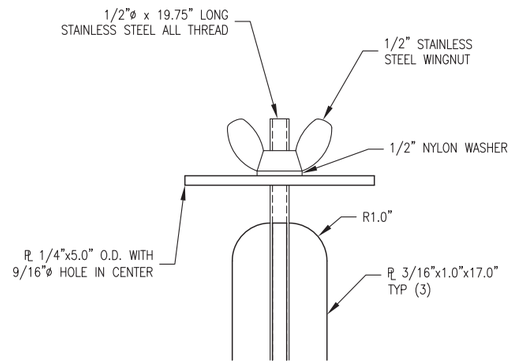
Sheet No. M5.4



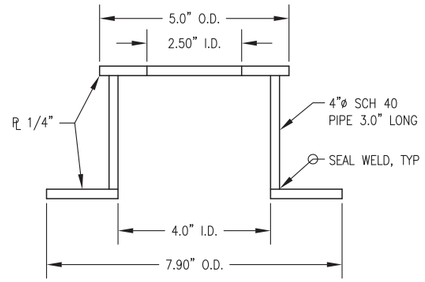
1 M5.5 TYPICAL FILTER HOUSING – PLAN VIEW
1/2" = 1"



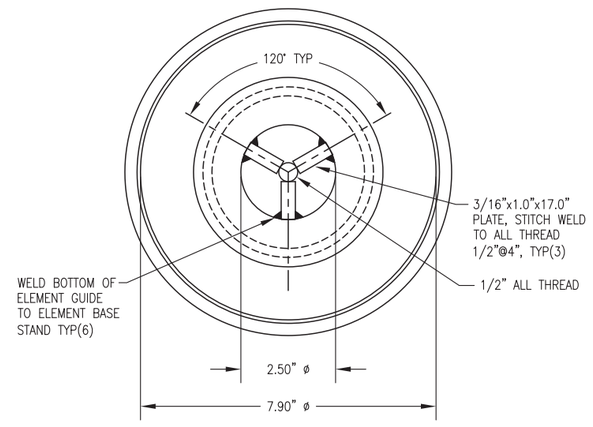
2 M5.5 TYPICAL SECTION THROUGH FILTER HOUSING
1/4" = 1"



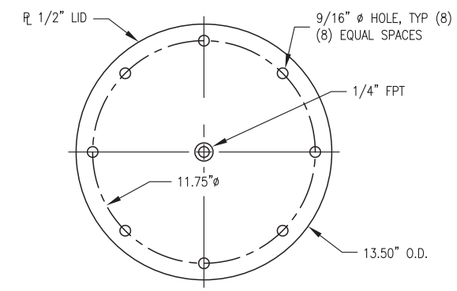
3 M5.5 ELEMENT RETAINER CAP
1/2" = 1"



4 M5.5 ELEMENT BASE STAND
1/2" = 1"



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



6 M5.5 LID & MATING RING – PLAN VIEW
1/4" = 1"

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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ME 8210
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Gray Stassel Engineering, Inc.
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AKHIOK, ALASKA

POWER SYSTEM UPGRADE PROJECT

USED OIL BLENDER
TYPICAL FILTER HOUSING DETAILS

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Plot Date 1/6/20
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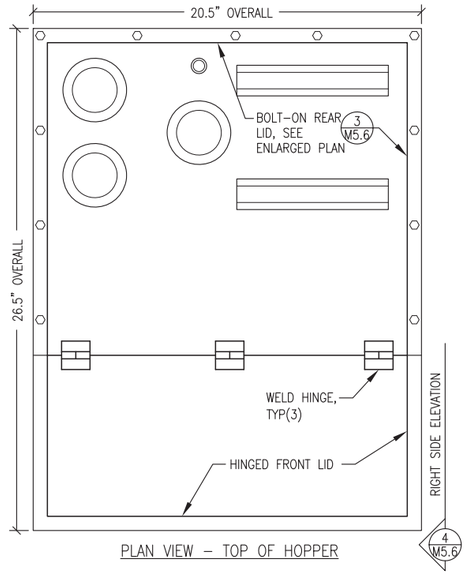
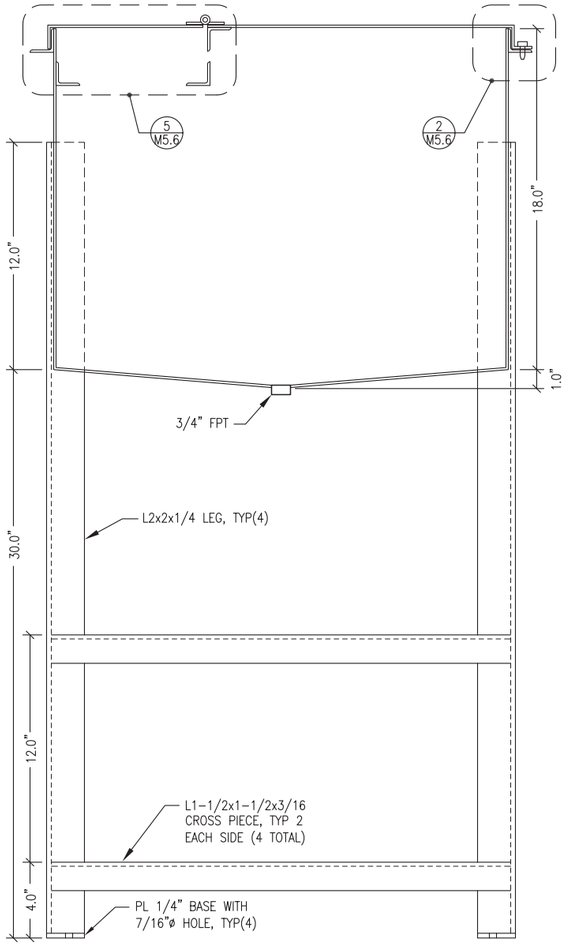
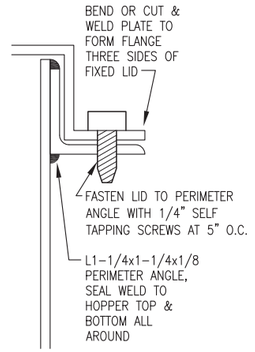
Sheet No.
M5.5



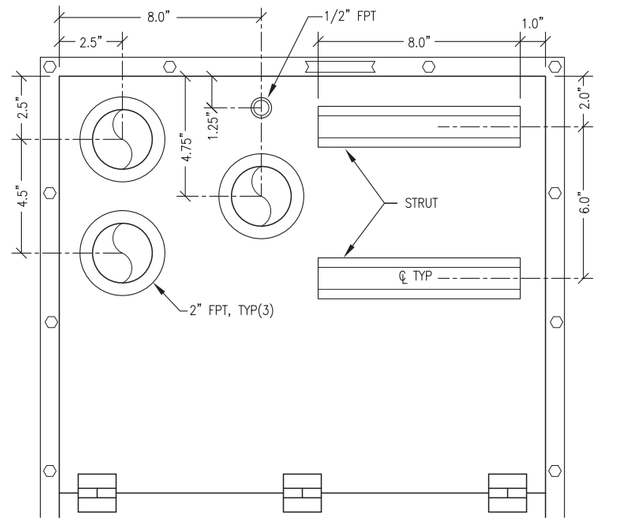
PLAN VIEW – TOP OF HOPPER



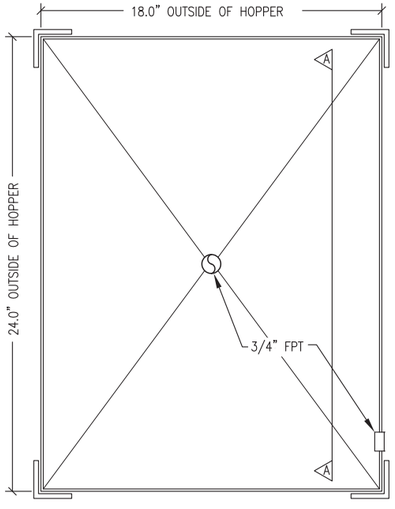
SECTION A–A



2 M5.6 FIXED LID PERIMETER ATTACHMENT
12"=1'-0"

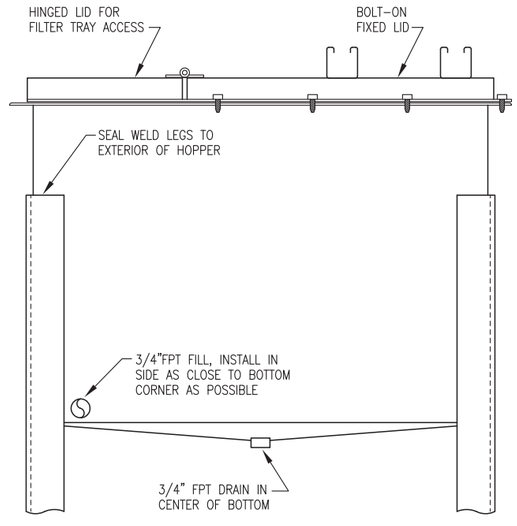


3 M5.6 FIXED LID ENLARGED PLAN VIEW
4"=1'-0"

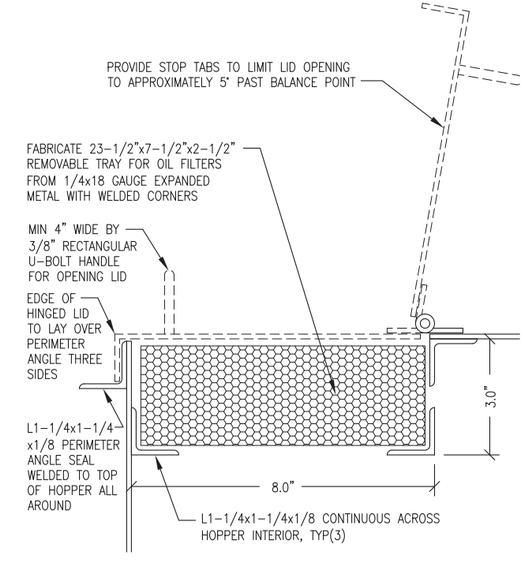


PLAN VIEW – BOTTOM OF HOPPER

1 M5.6 HOPPER PLAN & SECTION
3"=1'-0"



4 M5.6 HOPPER RIGHT SIDE ELEVATION
3"=1'-0"



5 M5.6 HINGED LID & FILTER TRAY DETAIL
6"=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 OF SHERWIN WILLIAMS MACROPOXY 646 OR APPROVED EQUAL, COLOR STRUCTURAL GRAY 4031.
5) PRIOR TO SHIPPING, SEAL ALL FPT OPENINGS WITH PLASTIC OR STEEL PLUGS.

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

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Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
USED OIL BLENDER
25 GALLON HOPPER FABRICATION

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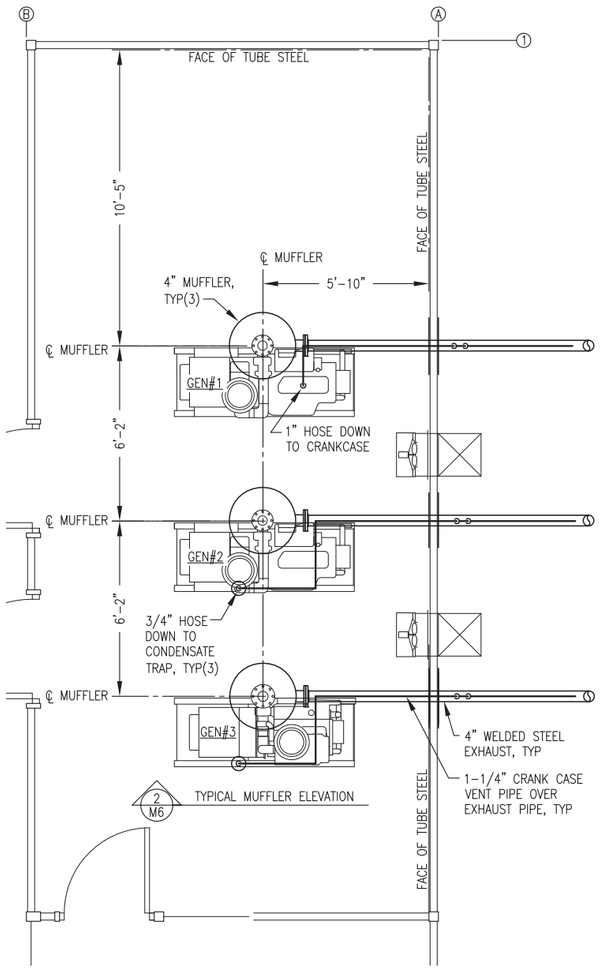


1 M6 MUFFLER, EXHAUST & CRANK VENT PIPE PLAN
3/8"=1'-0"

EXHAUST & CRANK VENT GENERAL NOTES:

1) 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.

2) 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# FLAT FACED SOCKET WELD.

3) ALL EXHAUST FLANGE BOLTS BLACK OR STAINLESS STEEL. COAT WITH HIGH TEMPERATURE ANTI-SIEZE.

EXHAUST & CRANK VENT SHOP/ON-SITE NOTES:

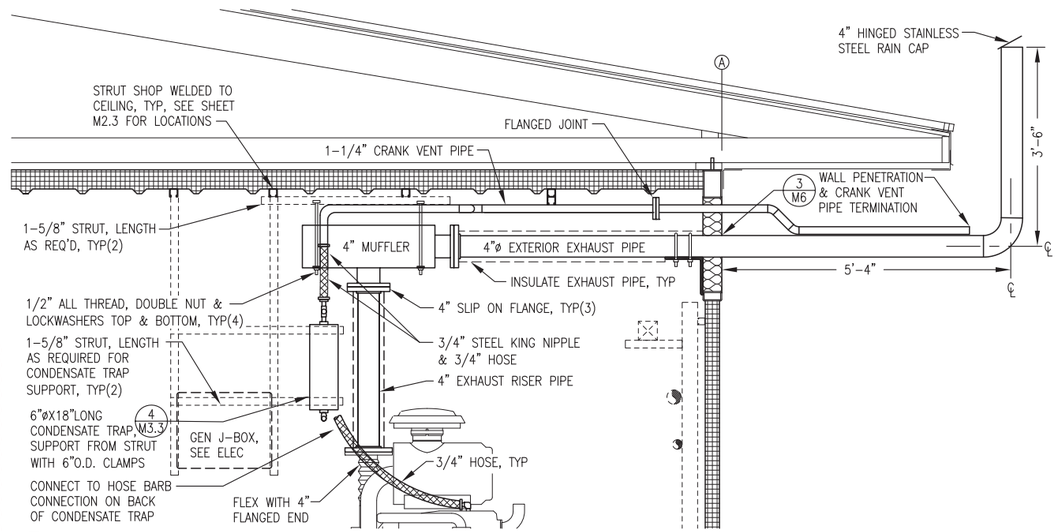
1) SHOP FABRICATE COMPLETE EXHAUST AND CRANK VENT PIPING SYSTEM AS INDICATED.

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

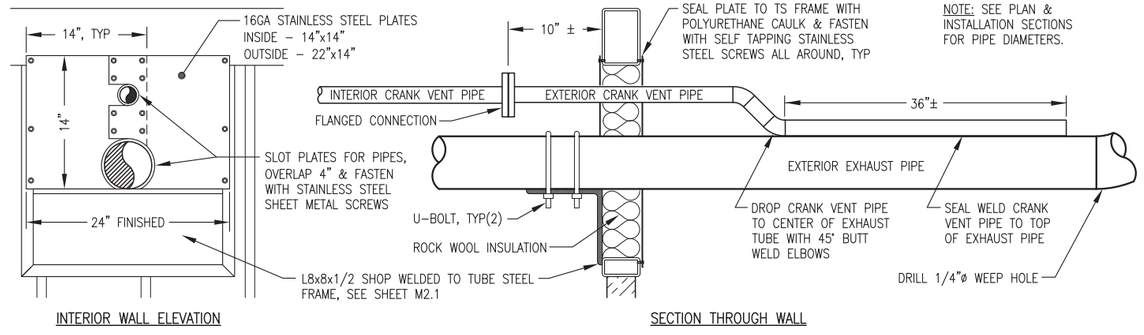
3) SHOP FABRICATE STAINLESS STEEL COVER PLATES BUT DO NOT INSTALL. LABEL COVER PLATES FOR THE ASSOCIATED GENERATOR AND STORE INSIDE MODULE. SHOP FURNISH ROCK WOOL INSULATION AND PACKAGE LOOSE SHIP WITH COVER PLATES.

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"



3 M6 WALL PENETRATION & CRANK VENT PIPE TERMINATION
NO SCALE

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. WORK INCLUDED IN THE ON SITE CONTRACT IS NOTED WITHIN THE CLOUDED AREAS.

ALASKA ENERGY AUTHORITY

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

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

EXHAUST & CRANK VENT PLAN & DETAILS

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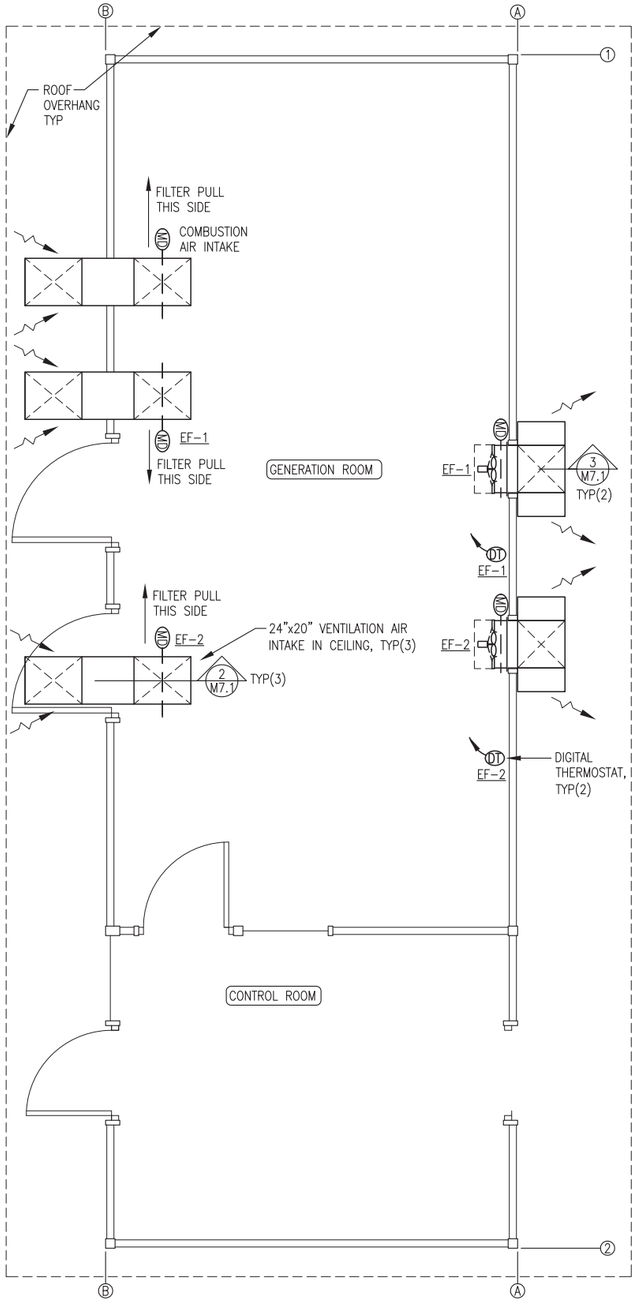
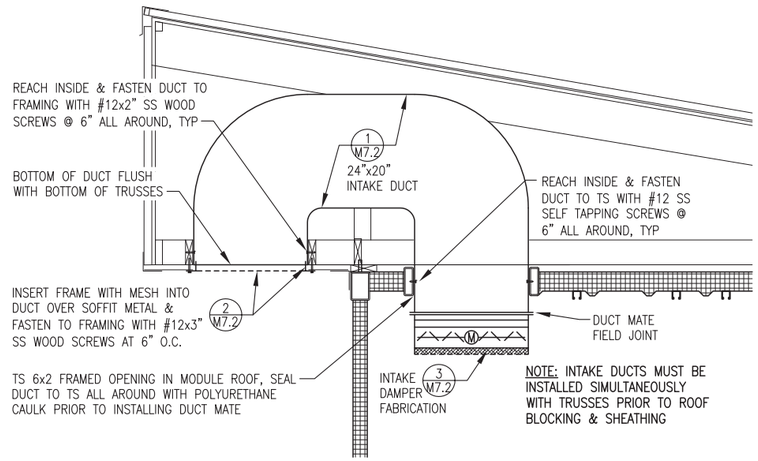
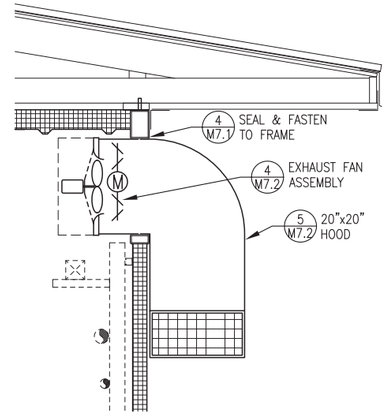
Sheet No. M6



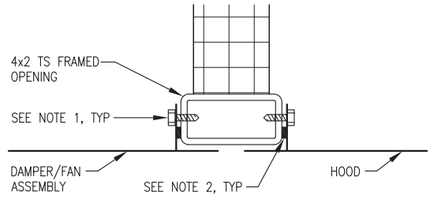
1 M7.1 VENTILATION PLAN
3/8"=1'-0"



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 ASSEMBLY. 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.

ALL FABRICTION WORK AND SOME INSTALLATION WORK WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. SEE SHOP/ON-SITE NOTES FOR DELINEATION OF WORK INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
VENTILATION PLAN & DETAILS

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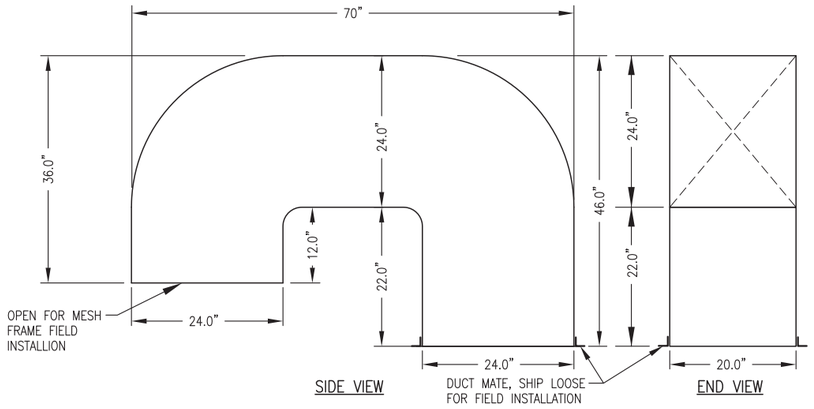
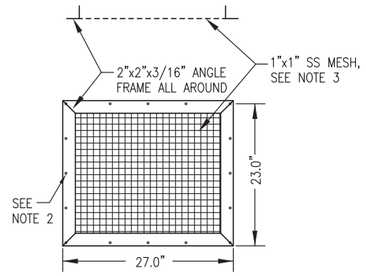
Sheet No. M7.1



NOTE: 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.

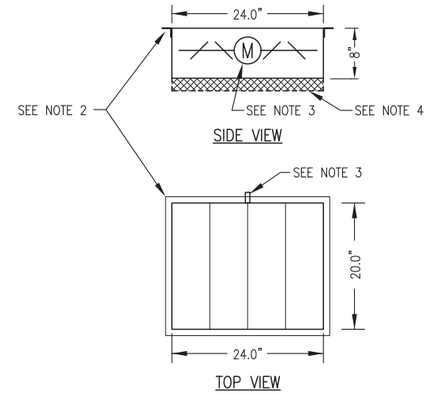
1 M7.2 INTAKE DUCT FABRICATION
1"=1'-0"



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.

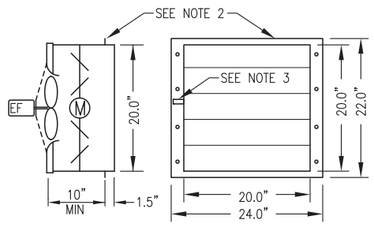
2 M7.2 INTAKE MESH FRAME
1"=1'-0"



NOTES:

1. FABRICATE 3 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.
4. INSTALL FRAME FOR REMOVABLE 24"x24"x2" FURNACE FILTERS. FABRICATE FROM "C" CHANNEL THREE SIDES WITH LATCHING HINGED COVER ON FOURTH SIDE TO ALLOW FILTERS TO SLIDE OUT. SEE PLAN VIEW FOR DAMPER ACTUATOR AND FILTER PULL ORIENTATION. EXTEND FILTER FRAME 2"± BEYOND DAMPER FRAME EACH WAY ON NARROW DIMENSION.

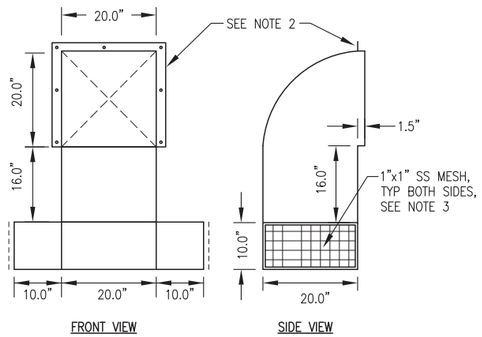
3 M7.2 INTAKE AIR DAMPER FABRICATION
1"=1'-0"



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 2 IDENTICAL 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.

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

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ALASKA ENERGY AUTHORITY

STATE OF ALASKA — BRIAN C. GRAY — 9491 — REGISTERED PROFESSIONAL ENGINEER

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Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA

POWER SYSTEM UPGRADE PROJECT

SHEET METAL FABRICATION & DETAILS

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Sheet No. M7.2

LEGEND

DIRECTION OF FLOW	FLEXIBLE CONNECTOR	AUTOMATIC AIR VENT
CHANGE OF PIPE SIZE	BUTTERFLY VALVE	TH THERMOMETER
PIPING CONNECTION (TEE)	BALL VALVE	P PRESSURE GAUGE
ELBOW TURNED DOWN	CHECK VALVE	TS TEMPERATURE SENSOR
ELBOW TURNED UP	HOSE END DRAIN VALVE	RT RESISTANCE TEMPERATURE DEVICE
FLANGED JOINT	GAUGE COCK	EFM ENERGY METER FLOW METER
UNION		

HEAT RECOVERY PROJECT SCOPE

THE PURPOSE OF THIS PROJECT IS TO REDUCE THE ANNUAL HEATING FUEL CONSUMPTION IN THE COMMUNITY OF AKHIOK BY CONNECTING THE SCHOOL BUILDING AND CLINIC HEATING SYSTEMS TO THE NEW POWER PLANT HEAT RECOVERY SYSTEM. THE HEAT RECOVERY SYSTEM WILL PROVIDE SUPPLEMENTAL HEAT ONLY. ALL EXISTING OIL FIRED HEATING APPLIANCES SHALL REMAIN IN SERVICE. THE SCOPE OF THE HEAT RECOVERY SYSTEM PROJECT IS AS FOLLOWS:

* INSTALLATION OF PEX ARCTIC PIPE FROM THE NEW POWER PLANT TO THE SCHOOL & CLINIC.
* INSTALLATION OF NEW HEAT EXCHANGERS AND PUMPS IN THE SCHOOL BOILER ROOM AND CLINIC CRAWL SPACE WITH TIES TO THE EXISTING HYDRONIC SYSTEMS BOILER RETURN MAINS.
* INSTALLATION OF HEAT RECOVERY CONTROL PANELS IN THE SCHOOL AND CLINIC BOILER ROOMS TO MAINTAIN MINIMUM LOOP SUPPLY TEMPERATURE AND TO PREVENT NEGATIVE HEAT FLOW (DISCHARGE) FROM BUILDING HEATING SYSTEMS TO HEAT RECOVERY SYSTEM, SEE ELEC.
* INSTALLATION OF REVENUE GRADE ENERGY METER IN SCHOOL BOILER ROOM FOR RECORDING SCHOOL ENERGY USE, SEE ELEC.

HEAT RECOVERY SYSTEM ON SITE FILLING AND TESTING

UPON COMPLETION OF ARCTIC PIPE INSTALLATION AND PRIOR TO INSULATING AND COVERING JOINTS, PRESSURE TEST ALL PEX CRIMP JOINTS AND STEEL WELD JOINTS. PRESSURIZE ARCTIC PIPE WITH MINIMUM 20 PSIG AIR, SOAK EACH JOINT WITH A FOAMING SOAPY WATER SOLUTION, AND VISUALLY INSPECT EACH JOINT FOR LEAKS.

AFTER TESTING ARCTIC PIPE, ISOLATE ARCTIC PIPE FROM PIPING IN THE END USER BUILDINGS. FILL ABOVE GRADE PIPING AND EQUIPMENT IN THE END USER BUILDINGS WITH POTABLE WATER AND HYDROSTATICALLY TEST ALL PIPING AT 100 PSIG MINIMUM FOR ONE HOUR WITH NO NOTICEABLE WATER LEAKS OR PRESSURE DROPS EXCEPT AS CAUSED BY TEMPERATURE CHANGE.

FLUSH ABOVE GRADE PIPING AND EQUIPMENT IN THE END USER BUILDINGS SYSTEM WITH POTABLE WATER AND DRAIN OR BLOW OUT WITH AIR TO REMOVE ALL WATER.

AFTER PRESSURE TESTING AND FLUSHING, BLEED AIR RESERVOIR ON THE EXPANSION TANK IN THE MODULE AS REQUIRED TO MAINTAIN 10 PSIG RESIDUAL WITH THE SYSTEM EMPTY. FILL THE ENTIRE HEAT RECOVERY SYSTEM INCLUDING MODULE PIPING, ARCTIC PIPE, AND END USER BUILDING PIPING WITH PROPYLENE GLYCOL SOLUTION TO 20 PSIG MINIMUM WITH SYSTEM COLD. VENT AIR FROM ALL HIGH POINT VENTS PRIOR TO STARTING CIRCULATING PUMPS.

CYCLE PUMPS ON AND OFF AND VENT HIGH POINTS UNTIL ALL AIR HAS BEEN PURGED FROM THE PIPING. ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO MAINTAIN 20 PSIG MINIMUM WITH SYSTEM COLD. WHEN SYSTEM COMES UP TO NORMAL TEMPERATURE (170F MINIMUM) ADD PROPYLENE GLYCOL SOLUTION AS REQUIRED TO BRING SYSTEM PRESSURE TO 30 PSIG MINIMUM AT EXPANSION TANK.

VERIFY PROPER FUNCTION OF ALL INSTRUMENTATION AND CALIBRATE ALL DEVICES.

PERFORM COMPLETE FUNCTIONAL TESTING OF THE HEAT RECOVERY SYSTEM INCLUDING CONTROL DEVICES AND PANELS.

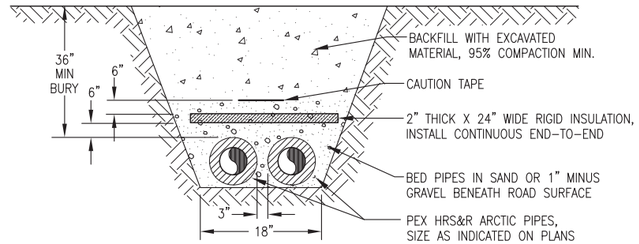
CLEAN ALL PIPING STRAINERS AFTER THE FIRST 24 HOURS OF OPERATION. CLEAN STRAINERS AND BLEED AIR AT LEAST ONE MORE TIME PRIOR TO LEAVING THE PROJECT SITE.

ALL EXCESS PROPYLENE GLYCOL SOLUTION SHALL BE LEFT WITH THE MODULE IN THE ORIGINAL DRUMS SEALED FOR STORAGE.

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.

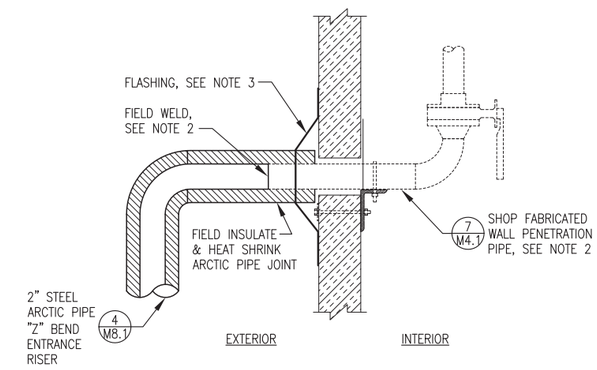
HEAT RECOVERY EQUIPMENT SCHEDULE

HX-3	SCHOOL HEAT EXCHANGER	316 SS PLATES, BRAZED CONSTRUCTION, 1-3/8" I.D. SOLDER CUP PORTS, 100 MBH MIN CAPACITY. PRIMARY: 24 GPM 185F EWT (50% PROPYLENE) 1.5 PSI MAX WPD, SECONDARY: 24 GPM 175F LWT (50% PROPYLENE) 1.5 PSI MAX WPD	AMERIDEX SL-70-100
HX-4	CLINIC HEAT EXCHANGER	316 SS PLATES, BRAZED CONSTRUCTION, 1-3/8" I.D. SOLDER CUP PORTS, 50 MBH MIN CAPACITY. PRIMARY: 12 GPM 185F EWT (50% PROPYLENE) 1.3 PSI MAX WPD, SECONDARY: 12 GPM 175F LWT (50% PROPYLENE) 1.3 PSI MAX WPD	AMERIDEX SL-70-50
P-HR3	SCHOOL HEAT RECOVERY PUMP	24 GPM AT 6' TDH, 1/6HP, 115V, 1ø. PROVIDE WITH 1-1/2" SOLDER SHUT OFF COMPANION FLANGES, GASKETS, & BOLTS.	GRUNDFOS UPS 26-99FC SPEED 2
P-HR4	CLINIC HEAT RECOVERY PUMP	12 GPM AT 7' TDH, 1/25HP, 115V, 1ø. PROVIDE WITH 1-1/4" SOLDER SHUT OFF COMPANION FLANGES, GASKETS, & BOLTS.	GRUNDFOS UPS 15-58FC SPEED 3

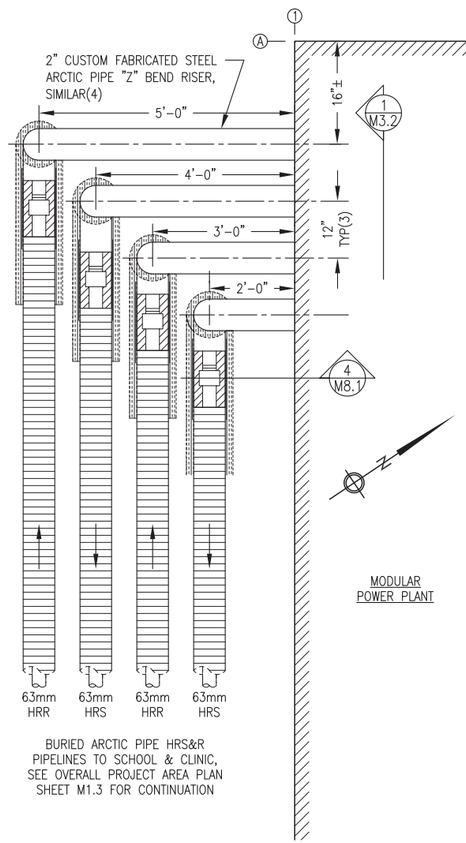


1 M8.1 TYPICAL BURIED ARCTIC PIPE INSTALLATION
NO SCALE

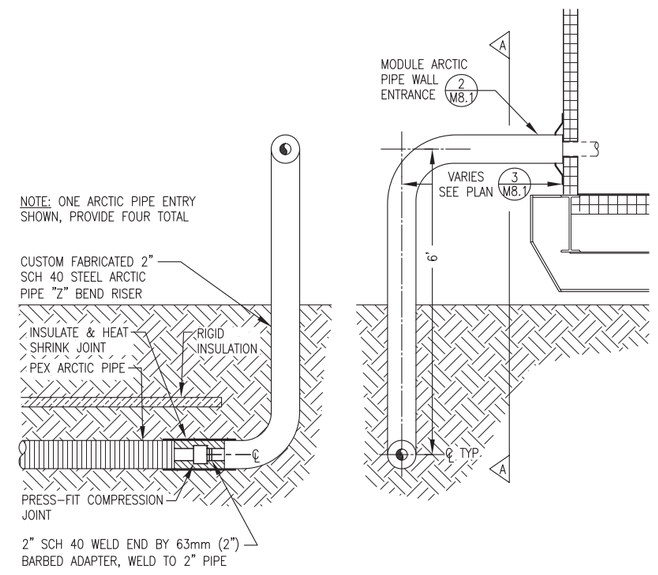
NOTES:
1) ONE PIPE SHOWN. PROVIDE FOUR SIMILAR.
2) FIELD REINSTALL SHOP FABRICATED PIPE SECTION THROUGH WALL AND WELD TO ARCTIC PIPE.
3) AFTER WELDING, PRESSURE TESTING, AND INSULATING JOINT, INSTALL FLASHING OVER ARCTIC PIPE, SEAL TO WALL SURFACE WITH POLYURETHANE CAULKING, & FASTEN TO WALL WITH STAINLESS STEEL SHEET METAL SCREWS ALL AROUND.



2 M8.1 ARCTIC PIPE MODULE WALL PENETRATION
NO SCALE



3 M8.1 ENLARGED PLAN AT MODULE ARCTIC PIPE ENTRANCE
3/4"=1'-0"



4 M8.1 MODULE ARCTIC PIPE ENTRANCE
3/4"=1'-0"

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252

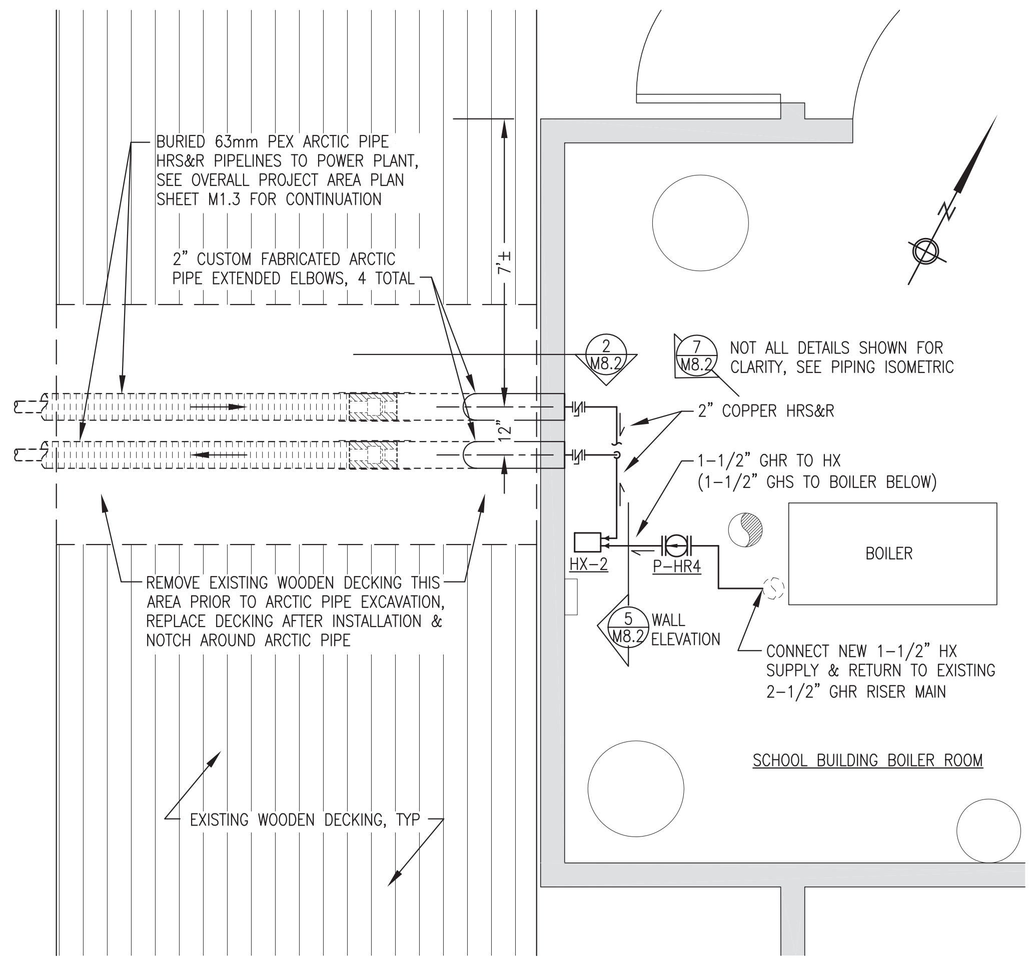
Gray Stassel Engineering, Inc.
BRIAN C. GRAY
ME 8210
PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
HEAT RECOVERY SYSTEM
NOTES, EQUIPMENT SCHEDULE, & DETAILS

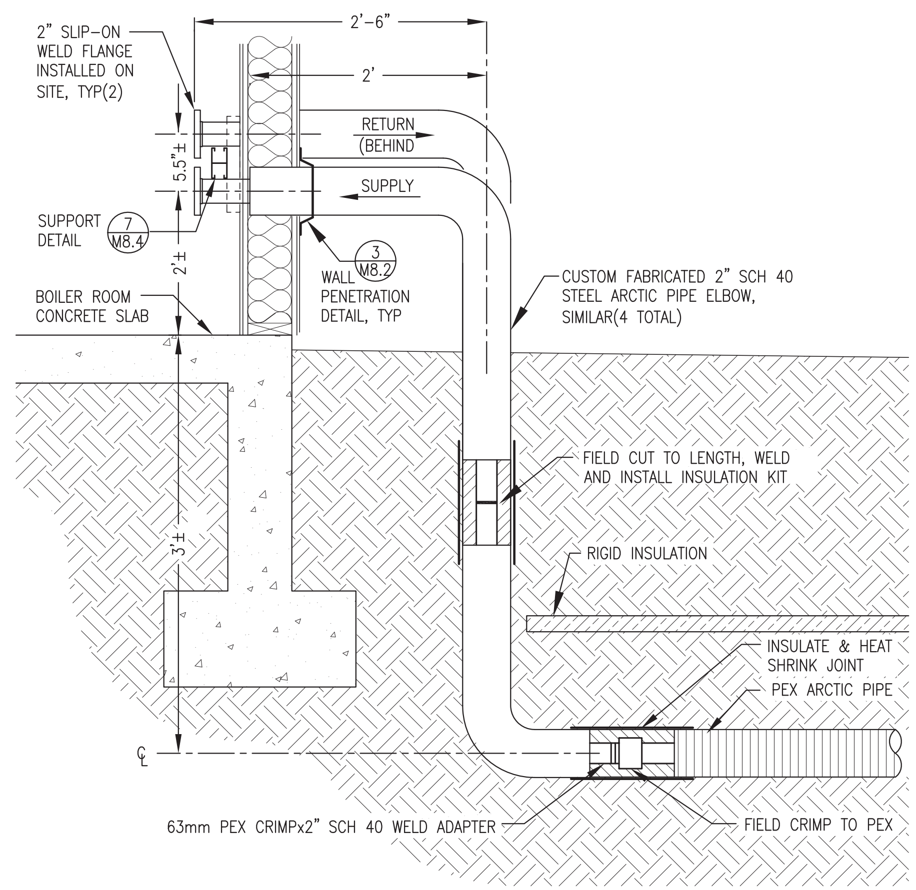
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20
Designed BCG
Drawn JTD
Approved BCG

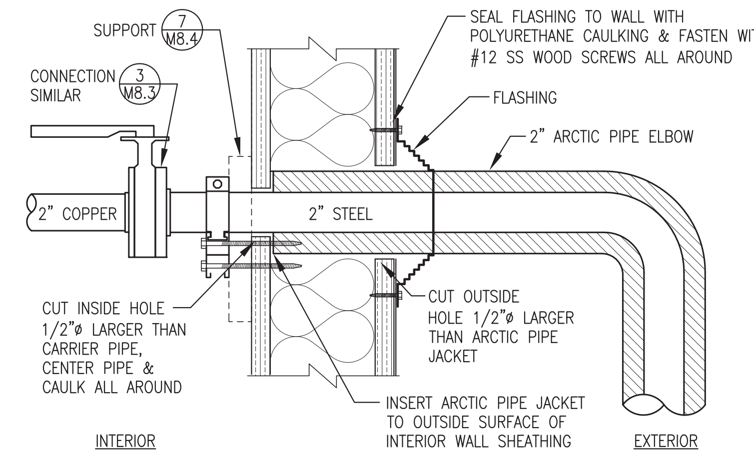
Sheet No.
M8.1



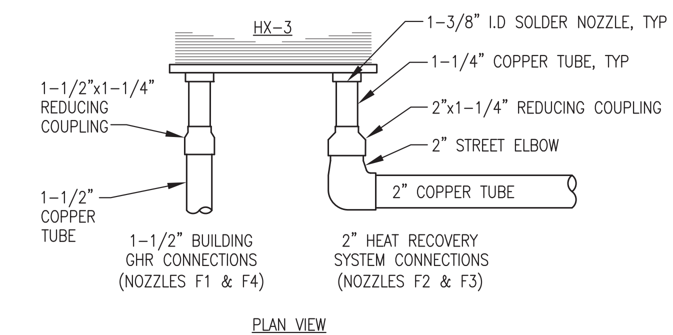
1 M8.2 SCHOOL HEAT RECOVERY PLAN
1/2"=1'-0"



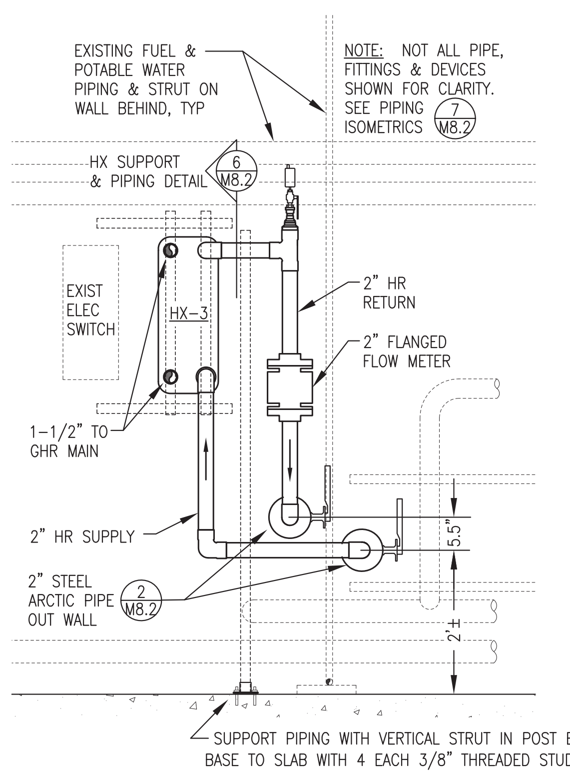
2 M8.2 SCHOOL ARCTIC PIPE ENTRANCE
1"=1'-0"



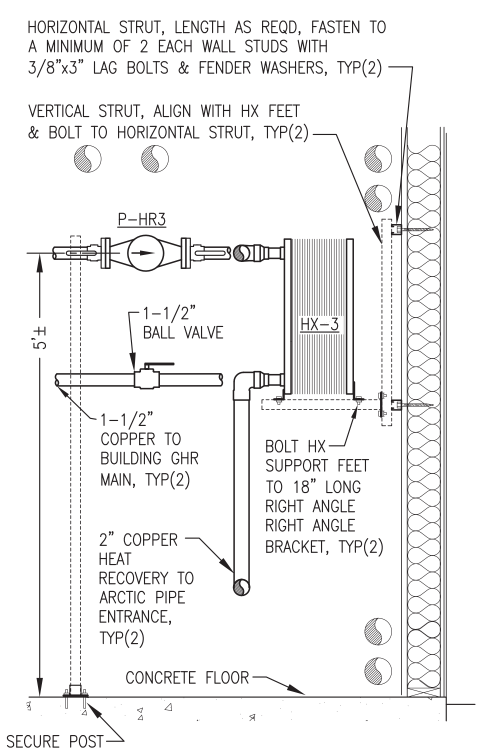
3 M8.2 SCHOOL ARCTIC PIPE WALL PENETRATION
NO SCALE



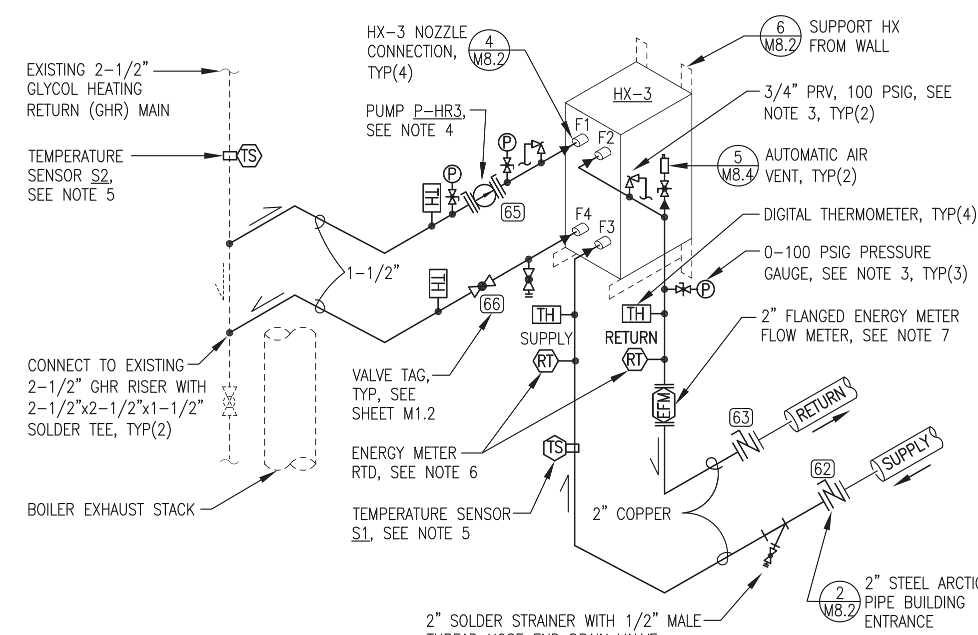
4 M8.2 SCHOOL HX-3 PIPING CONNECTIONS
NO SCALE



5 M8.2 PARTIAL WALL ELEVATION
1"=1'-0"



6 M8.2 HX-3 SUPPORT & PIPING DETAIL
1"=1'-0"



7 M8.2 SCHOOL HEAT RECOVERY PIPING ISOMETRIC
NO SCALE

NOTES:

1. ALL NEW PIPING & EQUIPMENT SHOWN IN DARK SOLID LINES. ALL EXISTING PIPING & EQUIPMENT SHOWN IN LIGHT DASHED LINES.
2. ALL NEW PIPING 2" AND 1-1/2" TYPE "L" COPPER TUBE UNLESS SPECIFICALLY INDICATED OTHERWISE. SUPPORT PIPING & EQUIPMENT FROM BUILDING STRUCTURE WITH STRUT AND FITTINGS AS REQUIRED.
3. SEE DETAIL 6/M8.4 FOR INSTRUMENTATION INSTALLATION. PIPE 3/4" PRV DISCHARGE TO WITHIN 6" OF FLOOR.
4. 1-1/2" SOLDER SHUT OFF COMPANION FLANGES PROVIDED WITH PUMP. SET PUMP TO SPEED 2.
5. TEMPERATURE SENSOR PROVIDED WITH HEAT RECOVERY PANEL, SEE ELECTRICAL. INSTALL ON SURFACE OF PIPING WHERE INDICATED. WIRE BRUSH PIPE TO REMOVE SURFACE RESIDUE AND PLACE SENSOR DIRECTLY ON CLEANED AREA. SPIRAL WRAP MINIMUM 6" LENGTH OF PIPE WITH 1/8"x2" SELF-ADHESIVE FOIL BACKED FOAM INSULATION THEN INSTALL FIBERGLASS PIPE INSULATION OVER.
6. RTD PROVIDED WITH ENERGY METER FOR HEAT RECOVERY FEED (SUPPLY) & RETURN, SEE ELECTRICAL. INSTALL IN 3/4" WELL PROVIDED WITH RTD, SEE DETAIL 6/M8.4.
7. FLOW METER PROVIDED WITH ENERGY METER, SEE ELECTRICAL.
8. EXISTING SCHOOL GHR PIPING INSULATED. PATCH AFTER PIPING MODIFICATION. ALL NEW PIPING TO BE INSULATED. WRAP HEAT EXCHANGER WITH 1" RIGID FOIL-BACK FIBERGLAS INSULATION ALL AROUND & TAPE ALL SEAMS.

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

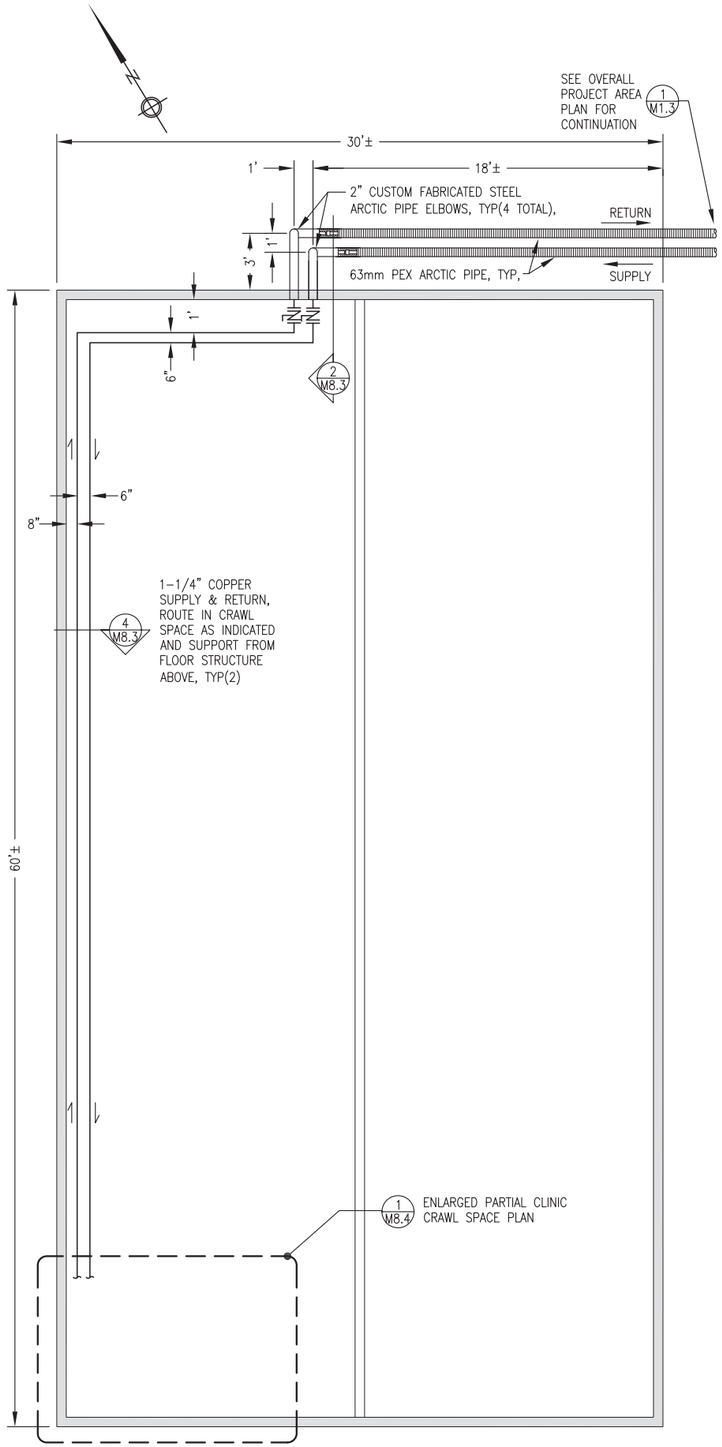
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
HEAT RECOVERY SYSTEM
SCHOOL PLAN, DETAILS, & ISOMETRIC

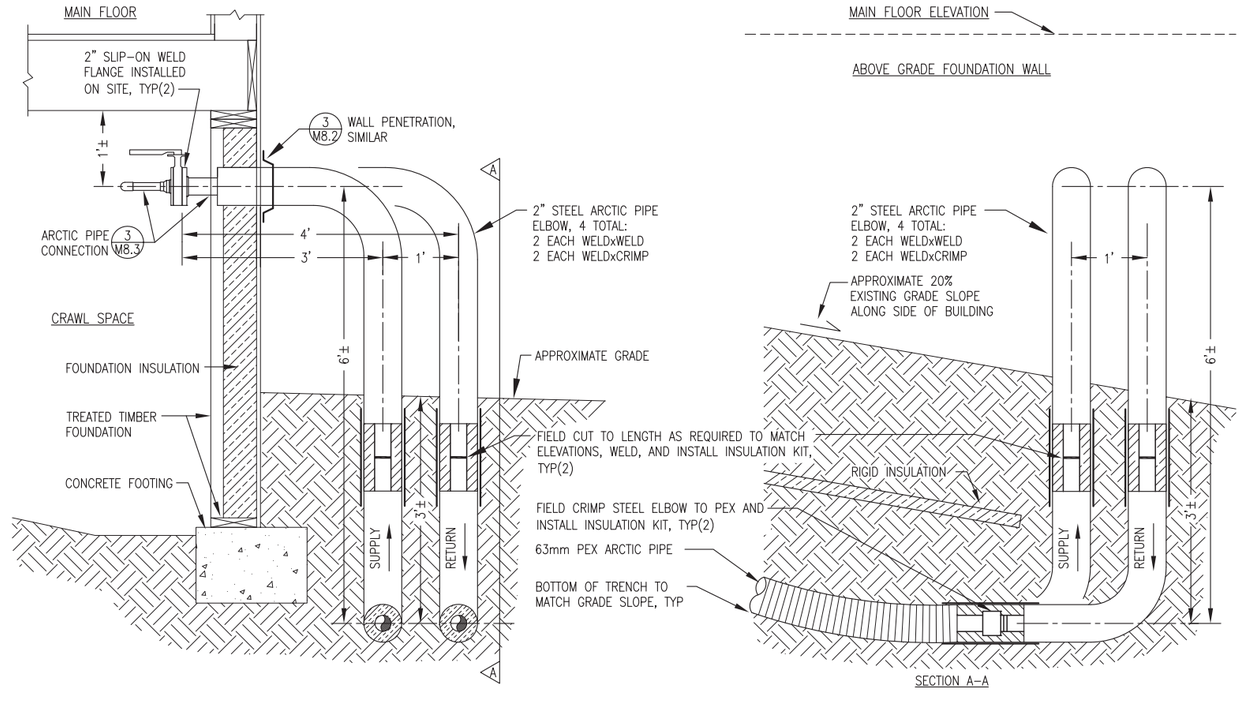
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20
Designed BCG
Drawn JTD
Approved BCG

Sheet No. M8.2



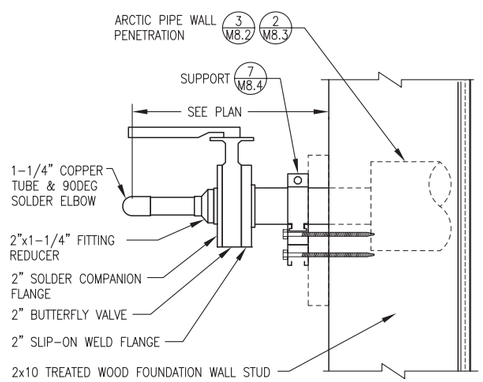
1 M8.3 CLINIC HEAT RECOVERY CRAWL SPACE PLAN
1/4"=1'-0"



2 M8.3 CLINIC ARCTIC PIPE ENTRANCE
1"=1'-0"

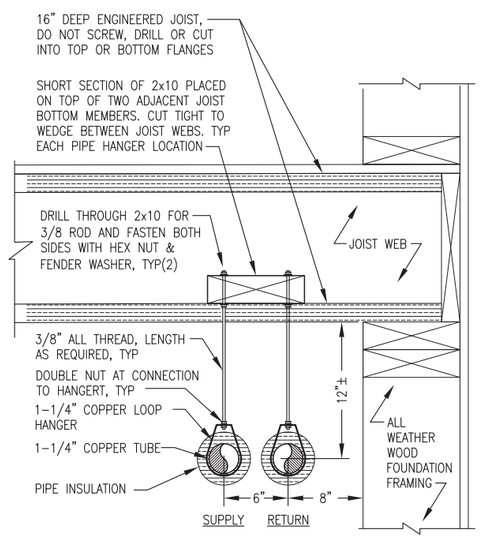
NOTES:

1) ONE ARCTIC PIPE ENTRANCE SHOWN, PROVIDE TWO SIMILAR.
2) CLINIC PIPING SHOWN. SCHOOL PIPING SIMILAR EXCEPT FOR 2" COPPER.
3) CLINIC FOUNDATION WALL IS FRAMED ALL WEATHER WOOD. SCHOOL BOILER ROOM WALL IS CONVENTIONAL FRAMED CONSTRUCTION.



3 M8.3 ARCTIC PIPE CONNECTION
NO SCALE

NOTE: INSTALL SUPPORTS AT 8' O.C. MAXIMUM SPACING.



4 M8.3 CRAWL SPACE PIPING SUPPORT DETAIL
NO SCALE

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

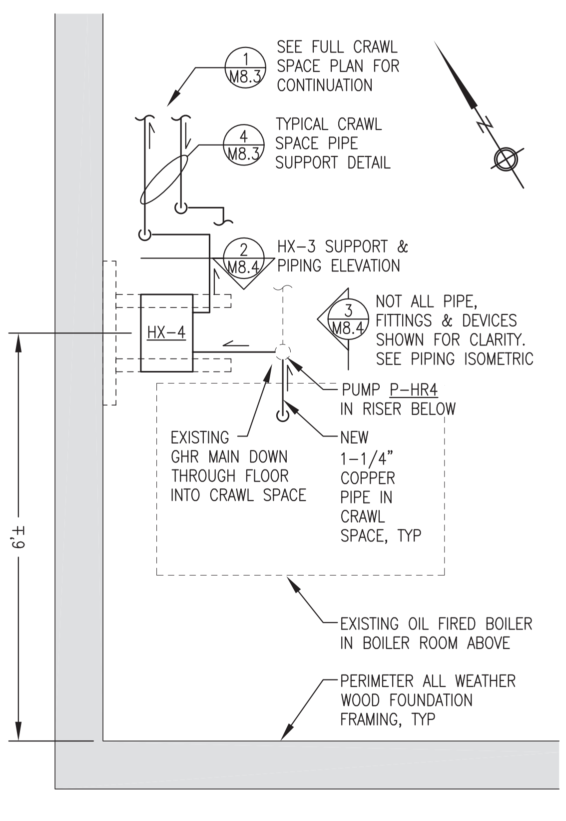
CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
HEAT RECOVERY SYSTEM
CLINIC PLAN & DETAILS

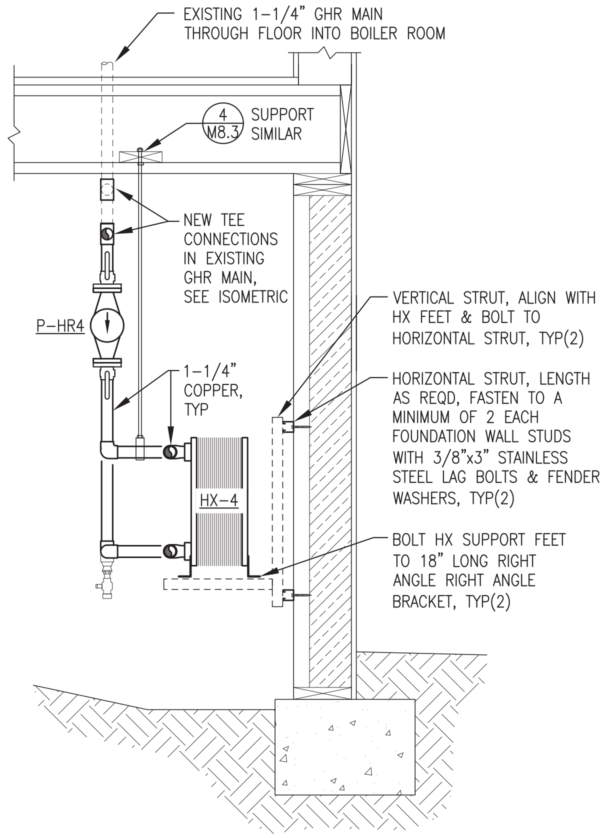
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20
Designed BCG
Drawn JTD
Approved BCG

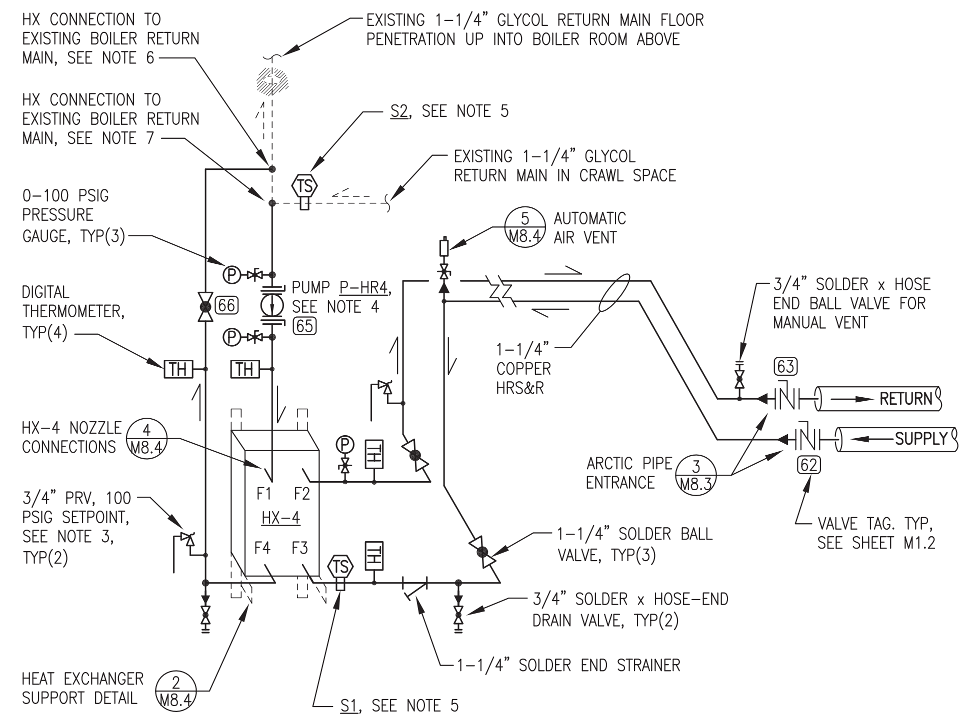
Sheet No. M8.3



1 M8.4 ENLARGED PARTIAL CLINIC CRAWL SPACE PLAN
1"=1'-0"



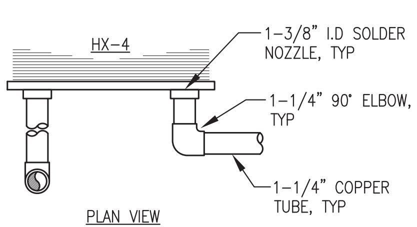
2 M8.4 HX-4 SUPPORT & CRAWL SPACE PIPING
NO SCALE



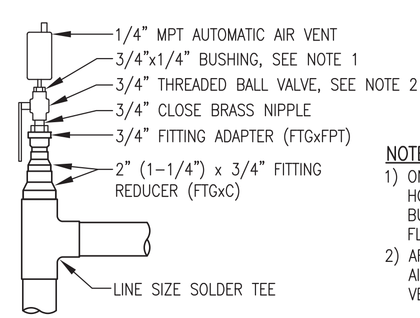
NOTES:

1. ALL NEW PIPING & EQUIPMENT SHOWN IN DARK SOLID LINES. ALL EXISTING PIPING & EQUIPMENT SHOWN IN LIGHT DASHED LINES.
2. ALL NEW PIPING 1-1/4" TYPE "L" COPPER TUBE UNLESS SPECIFICALLY INDICATED OTHERWISE. SUPPORT PIPING & EQUIPMENT FROM BUILDING STRUCTURE WITH STRUT AND FITTINGS AS REQUIRED.
3. SEE DETAIL 6/M8.4 FOR INSTRUMENTATION INSTALLATION. PIPE 3/4" PRV DISCHARGE TO WITHIN 6" OF FLOOR.
4. 1-1/4" SOLDER SHUT OFF COMPANION FLANGES PROVIDED WITH PUMP. SET PUMP TO SPEED 3.
5. TEMPERATURE SENSOR PROVIDED WITH HEAT RECOVERY PANEL, SEE ELECTRICAL. INSTALL ON SURFACE OF PIPING WHERE INDICATED. WIRE BRUSH PIPE TO REMOVE SURFACE RESIDUE AND PLACE SENSOR DIRECTLY ON CLEANED AREA. SPIRAL WRAP MINIMUM 6" LENGTH OF PIPE WITH 1/8"x2" SELF-ADHESIVE FOIL BACKED FOAM INSULATION THEN INSTALL FIBERGLASS PIPE INSULATION OVER.
6. CUT EXISTING 1-1/4" COPPER AS REQUIRED TO INSTALL NEW 1-1/2" SOLDER TEE FOR NEW HX RETURN BRANCH CONNECTION.
7. UNSOLDER EXISTING 1-1/4" SOLDER ELBOW, REMOVE AND INSTALL NEW 1-1/4" SOLDER TEE FOR NEW HX SUPPLY BRANCH CONNECTION.
8. EXISTING GLYCOL PIPING IN CRAWL SPACE INSULATED. PATCH AFTER PIPING MODIFICATION. ALL NEW PIPING TO BE INSULATED. WRAP HEAT EXCHANGER WITH 1" RIGID FOIL-BACK FIBERGLAS INSULATION ALL AROUND & TAPE ALL SEAMS.

3 M8.4 CLINIC CRAWL SPACE HEAT RECOVERY PIPING ISOMETRIC
NO SCALE



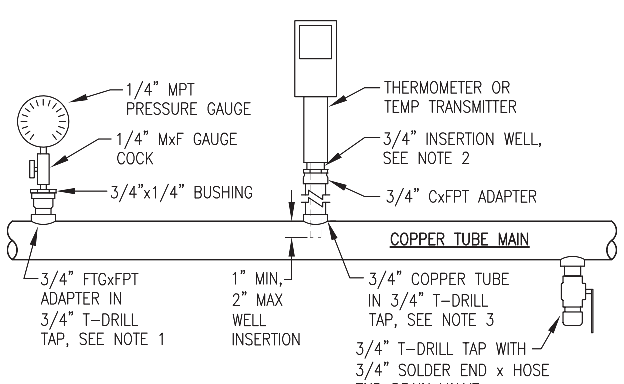
4 M8.4 CLINIC HX-4 PIPING CONNECTIONS
NO SCALE



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.

5 M8.4 TYPICAL AIR VENT INSTALLATION
NO SCALE

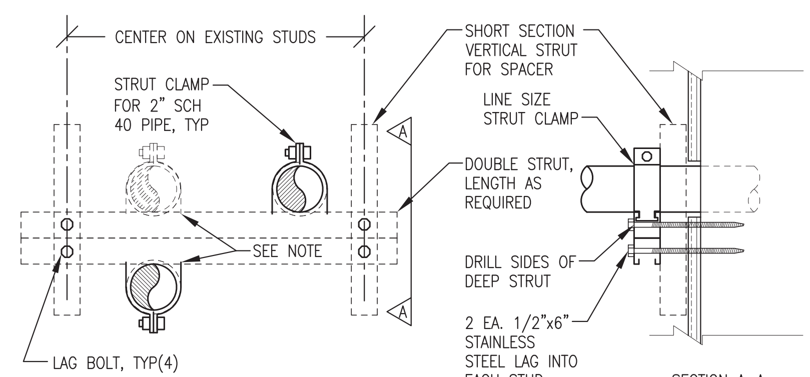


NOTES:

1) USE T-DRILL TAPS AS SHOWN FOR INSTALLATIONS IN 1-1/4" AND LARGER COPPER MAINS. USE LINE SIZE TEE FITTINGS FOR INSTALLING INSTRUMENTATION IN 1" AND SMALLER MAINS.
2) TEMPERATURE TRANSMITTER INSTALLATION SIMILAR TO THERMOMETER EXCEPT USE 3/4"x1/2" BUSHING.
3) FOR MAINS SMALLER THAN 2" USE COPPER TUBE RISER AS SHOWN, LENGTH AS REQUIRED FOR 1" TO 2" WELL INSERTION INTO MAIN. FOR LARGER PIPES OMIT RISER AND INSERT 3/4" FTGxFPT ADAPTER INTO T-DRILL TAP.

6 M8.4 TYPICAL INSTRUMENT INSTALLATION
NO SCALE

NOTE: AT SCHOOL INSTALL ONE PIPE ABOVE & ONE PIPE BELOW. AT CLINIC INSTALL BOTH PIPES ABOVE.



7 M8.4 ARCTIC PIPE ENTRANCE SUPPORT DETAIL
NO SCALE

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

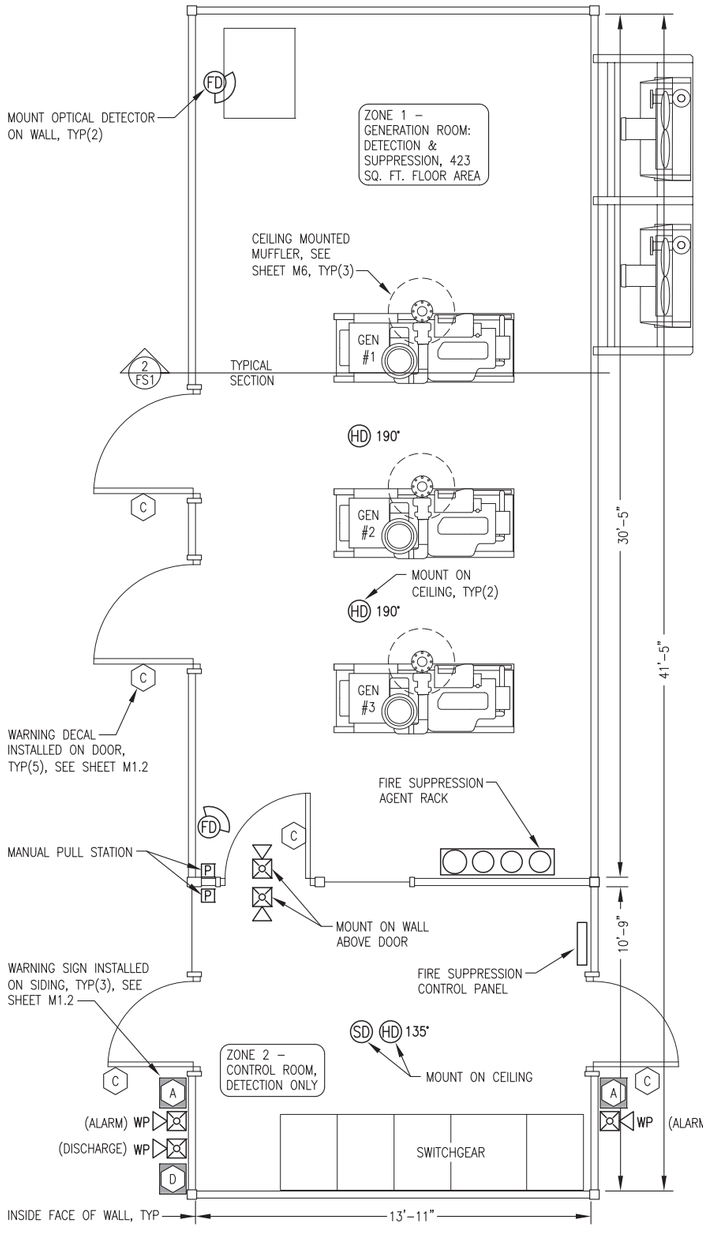
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

HEAT RECOVERY SYSTEM
CLINIC PLAN, ISOMETRIC & DETAILS

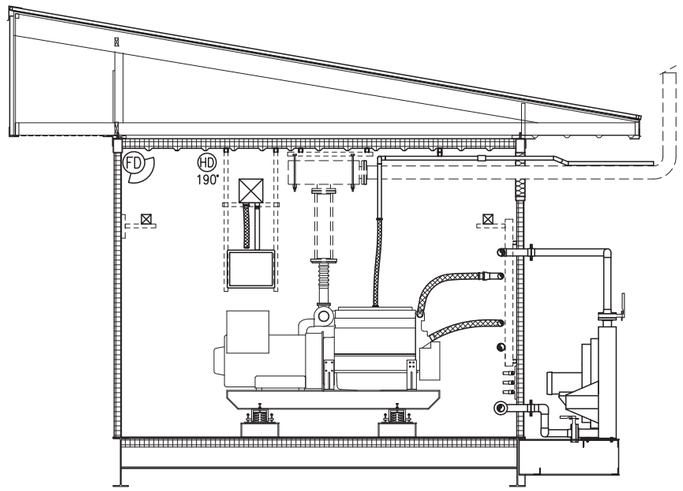
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	BCG	3/24/20

Plot Date 3/24/20 | Designed BCG | Drawn JTD | Approved BCG

Sheet No. M8.4



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



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

FIRE SUPPRESSION GENERAL NOTES:

1) INTERIOR FINISH OF ALL WALLS, FLOOR, AND CEILING 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.

FIRE SUPPRESSION SHOP/ON-SITE NOTES:

1) UPON COMPLETION OF MODULE SHOP TESTING: DISCONNECT BATTERIES. DRAIN ALL WATER OUT OF THE SYSTEM AND BLOW OUT WITH AIR TO PREVENT FREEZE DAMAGE. LEAVE ONE FULLY CHARGED NITROGEN CYLINDER INSTALLED IN THE RACK PLUS ONE LOOSE SHIP FULLY CHARGED SPARE NITROGEN CYLINDER.

2) DURING ON-SITE CONSTRUCTION: FILL BOTTLES WITH CLEAN POTABLE WATER IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS. FULLY TEST AND CERTIFY SYSTEM. TRAIN AEA STAFF AND LOCAL OPERATORS.

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

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY EXCEPT AS NOTED. FINAL TESTING AND COMMISSIONING IS INCLUDED IN THE ON SITE CONTRACT AS NOTED IN THE SHOP/ON-SITE NOTES AND THE SPECIFICATIONS.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA BRIAN C. GRAY 9491 REGISTERED PROFESSIONAL ENGINEER ME 8210

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
FIRE SUPPRESSION SYSTEM PLAN, SECTION, LEGEND, & NOTES

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	BCG	1/6/20

Plot Date 1/6/10
Designed BCG
Drawn JTD
Approved BCG

Sheet No. FS1

BUILDING PLANS SYMBOL LEGEND

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.
◇#	ELECTRICAL ITEM – SEE EQUIPMENT SCHEDULE
(1/4)	MOTOR (HORESPOWER INDICATED)
(MD)	MOTORIZED DAMPER – SEE MECHANICAL
	125V, 20A, DUPLEX RECEPTACLE
(T)	LINE VOLTAGE THERMOSTAT
(DT)	DIGITAL THERMOSTAT, MODULATING
$	SNAP SWITCH / SMALL MOTOR DISCONNECT
T$	TIMER SWITCH
	GROUND

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	LINE VOLTAGE THERMOSTAT	HEATING/COOLING THERMOSTAT, 16 FLA @ 120V, SPDT, 50F TO 80F RANGE.	DAYTON 1UHH2
◇4	AREA 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	WALL MOUNT, WHITE 20 GA STEEL ENCLOSURE, 277/120VAC, 8.4A INPUT, SEALED LEAD-ACID BATTERY, DUAL 5.3W 6VDC LED LAMPS	HUBBEL DUAL-LITE CCU2
◇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 OR EQUAL
◇7	NOT USED	NOT USED	NOT USED
◇8	MODULE INTERIOR LIGHTING	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 3R WITH INTEGRAL WALL MOUNT BRACKETS, 9 kVA, HV 480 DELTA, LV 208Y/120	HAMMOND HPS C3F009KBS WITH NQT6 CASE
◇14	STATION SERVICE PANELBOARD	COPPER BUS, 3 PHASE, 4 WIRE, 120/208V, 100A, 30 CIRCUITS, BOLT-IN BREAKERS, SURFACE MOUNT, NEMA 1	SIEMENS OR SQUARE D
◇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 CHARLES 93-INCHGR20-A
◇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 3R ENCLOSURE, 3PST, 600V, 30A, MIN 5HP RATED	SIEMENS HNF361R OR SQUARE D HU361R
◇21	24VAC CONTROL TRANSFORMER	120V PRIMARY, 24V SECONDARY, 75VA OUTPUT, PLATE MOUNT, INSTALL ON 4"x4" PRESSED STEEL BOX	HONEYWELL AT175A1008
◇22	ENCLOSED POWER RELAY	20A, 1HP RATED CONTACT, SPDT, 24VAC COIL, NEMA 1 ENCLOSURE, RED LED PILOT LIGHT	FUNCTIONAL DEVICES RIB2401B

ELECTRICAL CONDUCTOR SCHEDULE

SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
GENERATOR LEADS & FEEDERS (480V) & ENGINE STARTER CABLES (24VDC)	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 XHHW INSULATION, 600V AND 75C 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.
DEVICENET COMMUNICATION CONDUCTORS	STRANDED TINNED COPPER CONDUCTORS, 300V PVC & FRFPE INSULATION, 100% COVERAGE ALUMINUM FOIL-POLYESTER TAPE SHIELD WITH TINNED COPPER BRAID & PVC OUTER JACKET	TWO PAIR #22 & #24 BELDEN 3084A	GROUND SHIELD DRAIN WIRE AT PANEL END ONLY. ROUTE ALL DEVICENET & CAT5e CABLES IN SEPARATE DEDICATED RACEWAY.
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.

COLOR CODING – UNLESS SPECIFICALLY INDICATED OTHERWISE COLOR CODE CONDUCTORS AS FOLLOWS:
- 480-VOLT POWER CONDUCTORS
  - PHASE A – BROWN
  - PHASE B – ORANGE
  - PHASE C – YELLOW
  - NEUTRAL – WHITE WITH YELLOW STRIPE
- 120/208-VOLT POWER CONDUCTORS
  - PHASE A – BLACK
  - PHASE B – RED
  - PHASE C – BLUE
  - NEUTRAL – WHITE
- 24 VOLT DC CONDUCTORS
  - +24VDC – RED or RED WITH GRAY STRIPE
  - -24VDC – BLACK or BLACK WITH GRAY STRIPE
- CONTROL & INSTRUMENT CONDUCTORS
  - COLOR CODED PER MANUFACTURER'S STANDARD

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

ELECTRICAL 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
(FM)	HEAT RECOVERY FLOW METER	150# ANSI FLANGED CONNECTION, SIZE AS INDICATED, PTFE LINER, HASTELLOY C ELECTRODES, RATED FOR 210F OPERATION. FURNISH WITH TRANSMITTER FOR DIRECT AND REMOTE MOUNTING, 115/230 VAC, 50/60 HZ, AND NEMA 4X BODY.	SIEMENS SITRANS METER: FM MAGFLO MAG 3100 TRANSMITTER: F M MAGFLO MAG 5000, CODE NO. FDK: 7ME6910, OPTION 1AA10-1AA0
(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 COLIBRI CL6D
(LSP)	FUEL/OIL TANK LEVEL SENSOR PROBE	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
(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

ALL EQUIPMENT ON SCHEDULES THIS SHEET WERE FURNISHED AS PART OF THE PRIOR MODULE FABRICATION CONTRACT AND ARE SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
ELECTRICAL LEGENDS & SCHEDULES

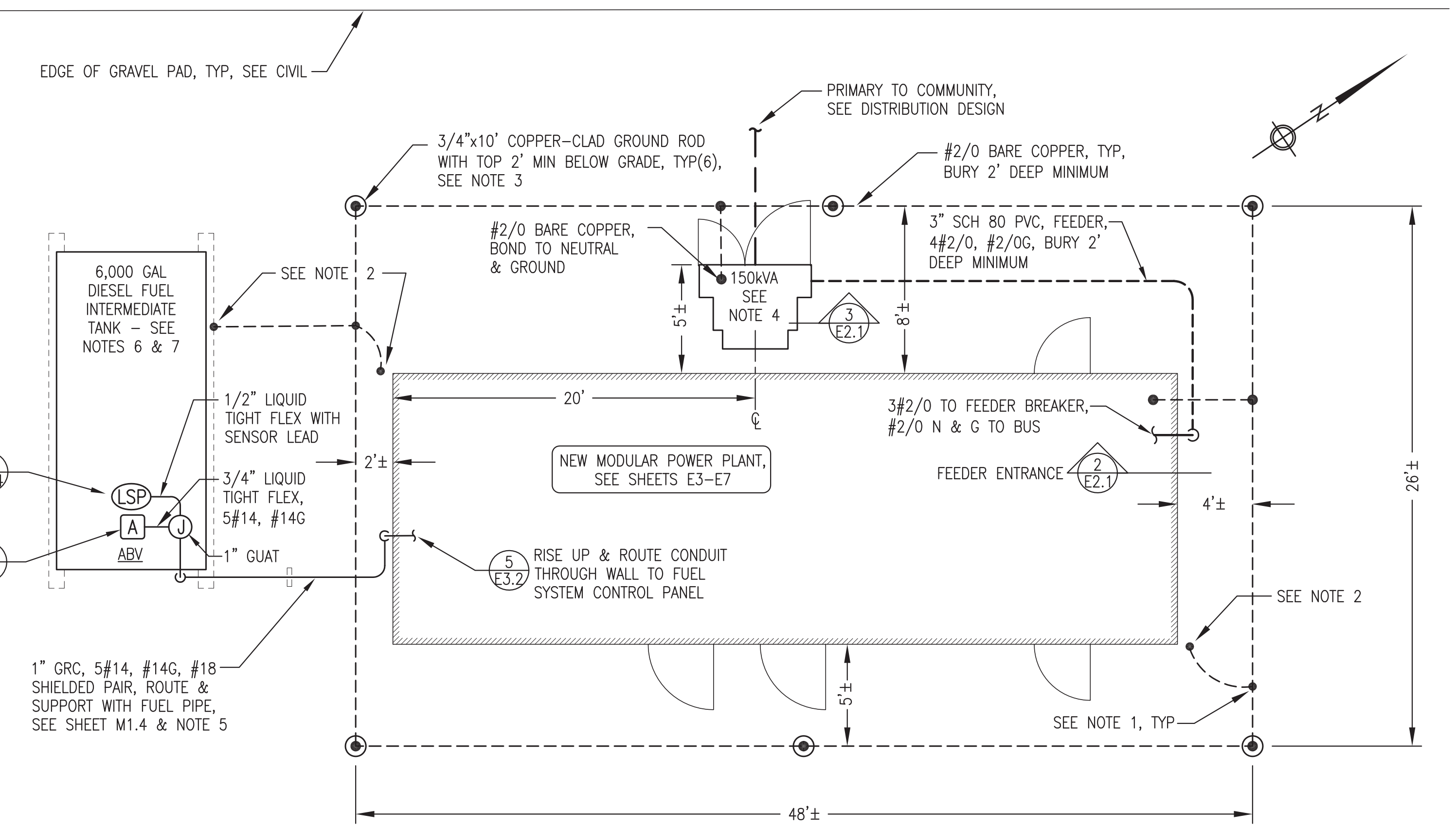
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20
1	ISSUED FOR ON SITE CONSTRUCTION	CWV	3/24/20

Plot Date 1/6/20 | Designed CWV/BCG | Drawn JTD | Approved CWV

Sheet No. E1

NOTES:

1) CAD-WELD ALL GROUNDING GRID CABLE AND GROUND ROD CONNECTIONS.
2) ROUTE BARE #2/0 UP ADJACENT TO SKID. DRILL & TAP SKID FOR 3/8" BOLT & BOND SKID TO GROUND WITH 3/8" STAINLESS STEEL BOLT & COMPRESSION LUG.
3) GROUND ROD TO BE DRIVEN WHERE POSSIBLE. IF ROCK IS ENCOUNTERED DRILL MINIMUM 2"ø HOLE AND SET GROUND RODS IN GROUT.
4) NEW PAD MOUNT 150kVA STEP-UP TRANSFORMER, 277/480V WYE TO 7200/12470 WYE. INSTALL ON FIBERGLASS GROUND SLEEVE. PROVIDE TRANSFORMER GROUNDING IN ACCORDANCE WITH RUS CONSTRUCTION UNIT UM48-2.
5) FOR ALL EXTERIOR GRC CLEAN & DE-GREASE THREADS AFTER CUTTING & SPRAY WITH COLD GALV PRIOR TO ASSEMBLY.
6) INTERMEDIATE TANK IS USED TO STORE DIESEL FUEL ONLY, NO CLASSIFIED AREAS.
7) ALL INTERMEDIATE TANK-MOUNTED DEVICES CONTROLLED FROM FUEL SYSTEM CONTROL PANEL, SEE SHEETS E7.1-E7.3 FOR WIRING.

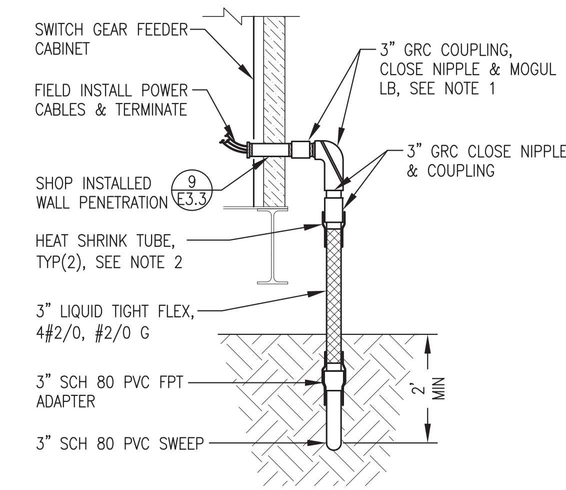


SCHOOL HEAT RECOVERY SYSTEM WIRING, SEE SHEET E8.1
CLINIC HEAT RECOVERY SYSTEM WIRING, SEE SHEET E8.2
SEE OVERALL PROJECT AREA PLAN SHEET M1.3 FOR LOCATION OF SCHOOL & CLINIC WORK AREAS.

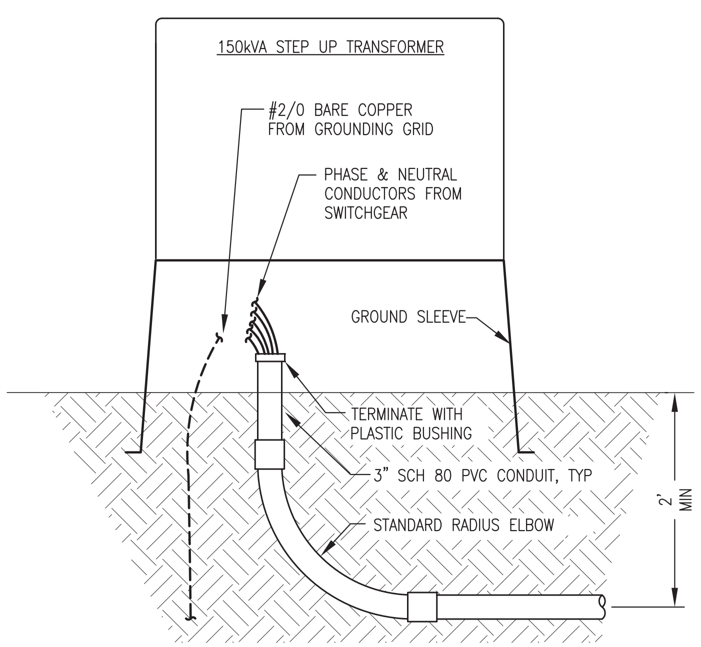
1 E2.1 POWER PLANT SITE - GROUNDING, FEEDER & INTERMEDAITE TANK PLAN
1"=5'

NOTES:

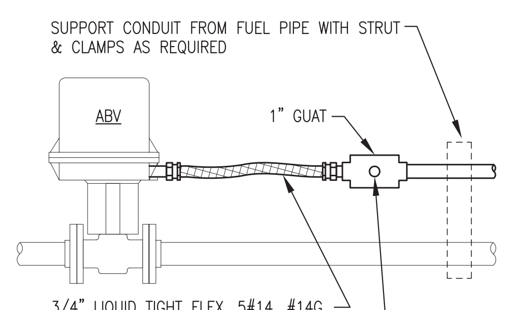
1) CONDUIT WALL PENETRATION INSTALLED AS PART OF MODULE SHOP FABRICATION. REMOVE CAP AND INSTALL EXTERIOR CONDUIT AS SHOWN.
2) INSTALL HEAT SHRINK TUBE TO FORM WATERTIGHT SEAL FROM LT FLEX ONTO GRC & PVC CONDUIT, RAYCHEM WCSM 130/36-1500/S OR APPROVED EQUAL.



2 E2.1 MAIN FEEDER BUILDING ENTRANCE
NO SCALE



3 E2.1 TRANSFORMER INSTALLATION
NO SCALE



NOTES:

1) ACTUATED BALL VALVE CONTROLLED FROM FUEL SYSTEM CONTROL PANEL IN POWER PLANT, SEE LOGIC DIAGRAM SHEET E7.1 FOR CONDUCTOR TERMINATIONS.
2) SEE MECHANICAL FOR ACTUATED BALL VALVE SPECIFICATIONS & INSTALLATION.

4 E2.1 ACTUATOR VALVE WIRING
NO SCALE

ELECTRICAL CONDUCTOR SCHEDULE

SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
480V COMMUNITY FEEDER	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, OMINI, OR APPROVED EQUAL	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 XHHW INSULATION, 600V AND 75C RATED.		
SHIELDED/TWISTED INSTRUMENT & CONTROL 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	SINGLE PAIR: #1120A FOUR PAIR: #1049A SINGLE TRIAD: #1121A	1) GROUND SHIELD DRAIN WIRE AT PANEL END ONLY. 2) BELDEN PART #'S LISTED. APPROVED EQUALS ACCEPTABLE.

ELECTRICAL INSTRUMENTATION SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
LSP	FUEL/OIL TANK LEVEL SENSOR PROBE	TOP-MOUNT TANK PROBE WITH INSTALLATION KIT FOR 2" NPT RISER, WATER TIGHT COMPRESSION GLAND FITTING FOR CABLE ENTRANCE. NOTE: EXACT MATCH REQUIRED TO COORDINATE WITH MONITORING SYSTEM PREVIOUSLY INSTALLED IN MODULE.	FRANKLIN FUEL SYSTEMS 8' TANK PROBE: FMP-LL3-101-I FLOAT: TSP-IDF2 2" FOR DIESEL INSTALLATION KIT: TSP-C2A

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC

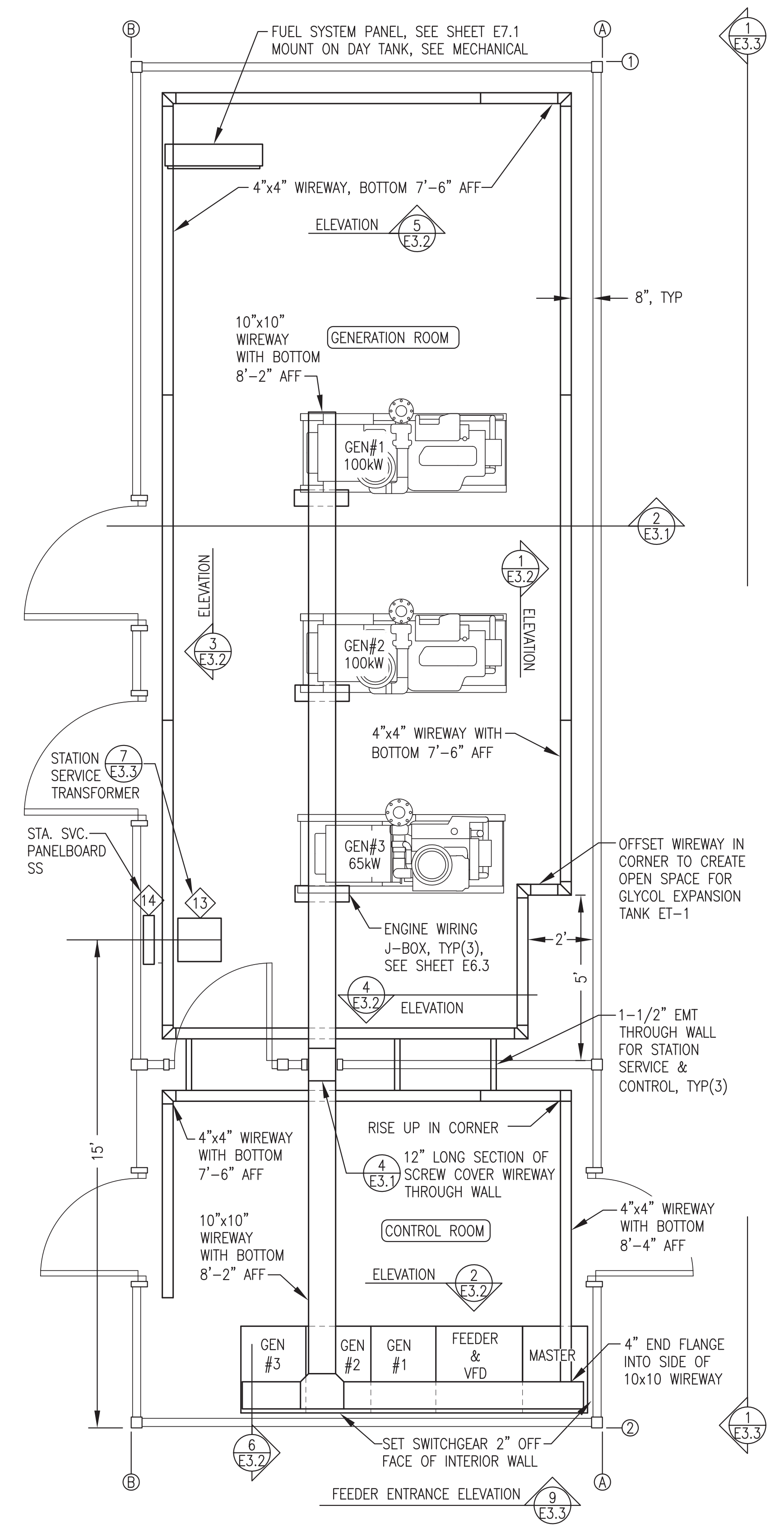
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
POWER PLANT SITE
GROUNDING, FEEDER, & INTERMEDIATE TANK PLAN & DETAILS

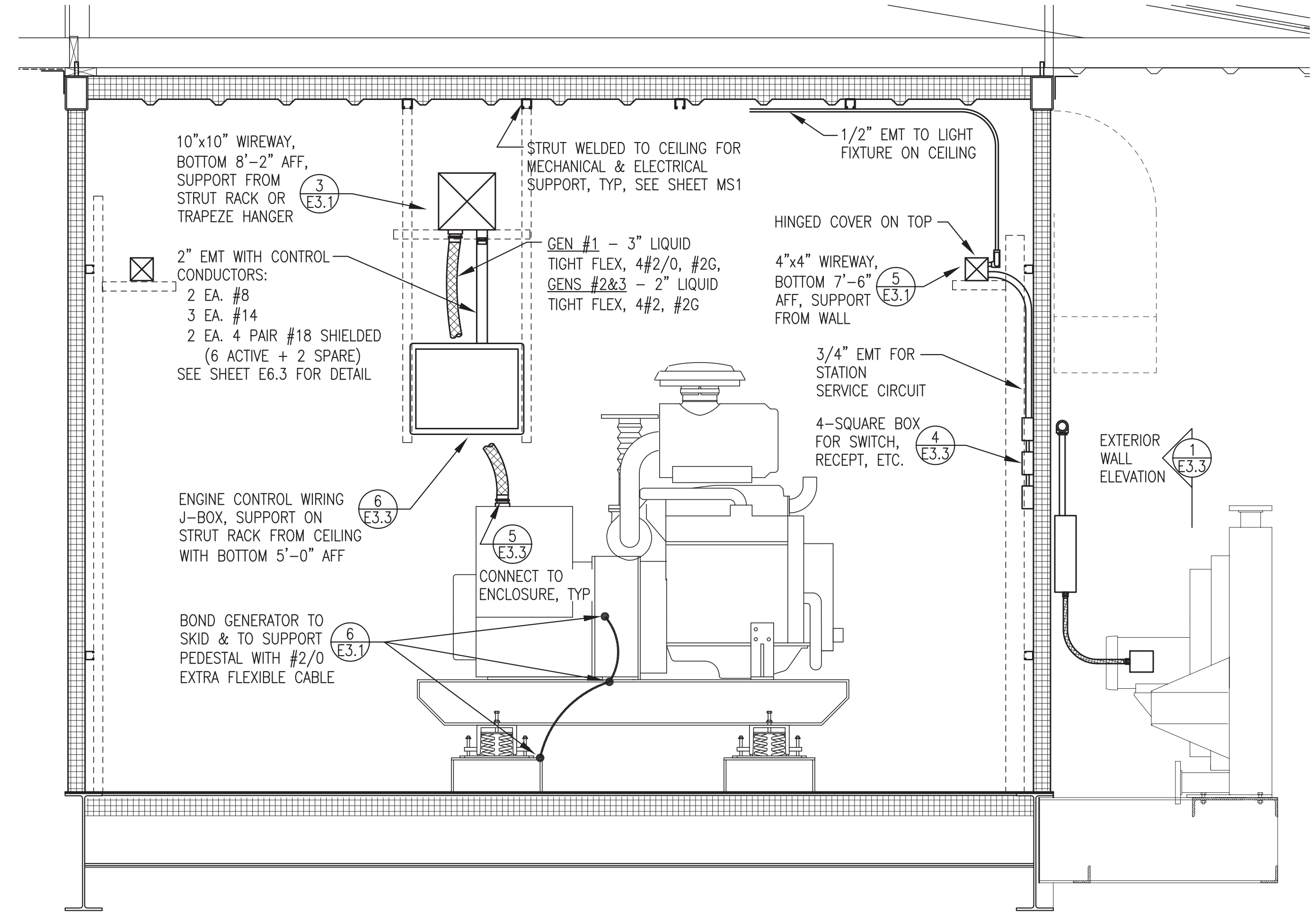
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	CWV	3/24/20

Plot Date 3/24/20
Designed CWV/BCG
Drawn JTD
Approved CWV

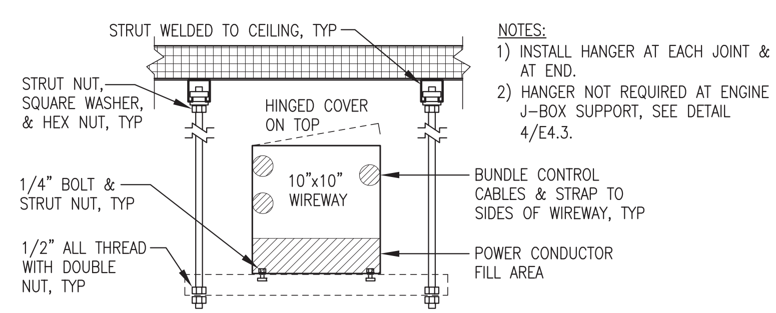
Sheet No. E2.1



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

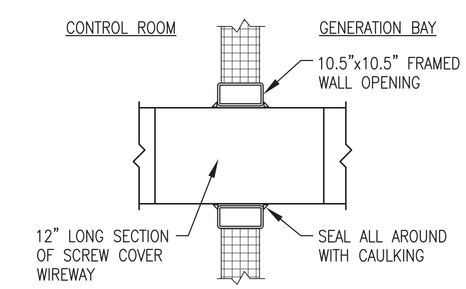


2 E3.1 TYPICAL MODULE SECTION
3/4"=1'-0"

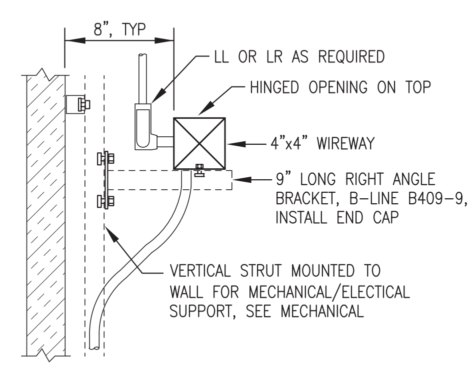


NOTES:
1) INSTALL HANGER AT EACH JOINT & AT END.
2) HANGER NOT REQUIRED AT ENGINE J-BOX SUPPORT, SEE DETAIL 4/E4.3.

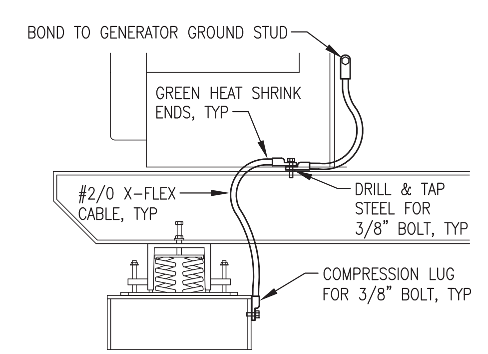
3 E3.1 10" WIREWAY TRAPEZE HANGER
NO SCALE



4 E3.1 WIREWAY WALL PENETRATION
NO SCALE



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



6 E3.1 GENERATOR GROUNDING
NO SCALE

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

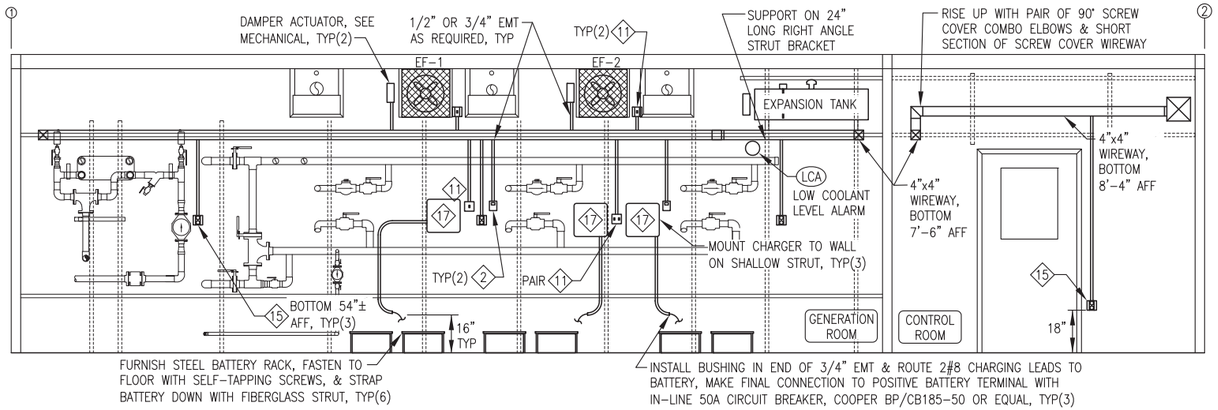
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
WIREWAY PLAN, MODULE SECTION, & DETAILS

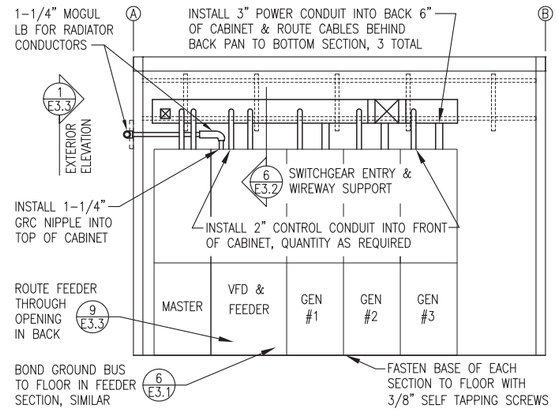
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20
Designed CWV/BCG
Drawn JTD
Approved CWV

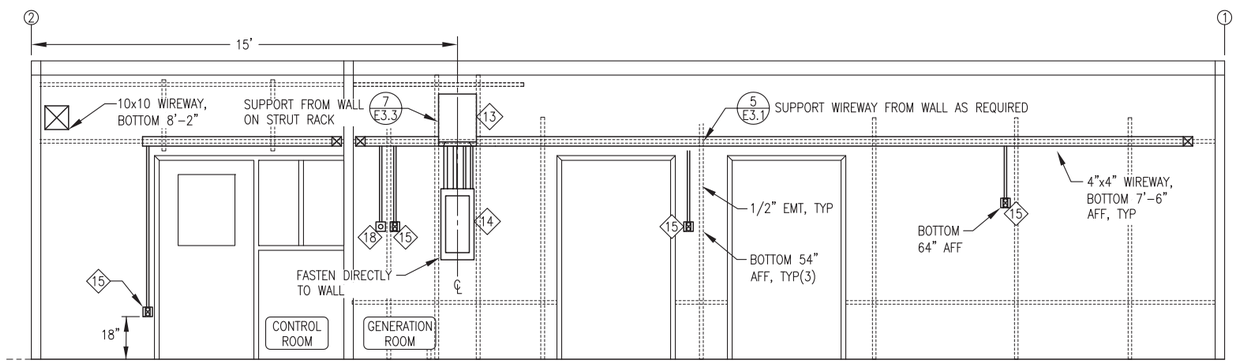
Sheet No. E3.1



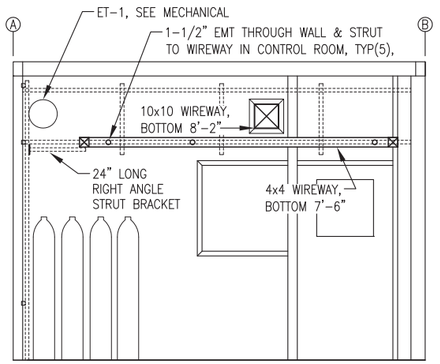
1 E3.2 WALL ELEVATION AT GRID A
3/8"=1'-0"



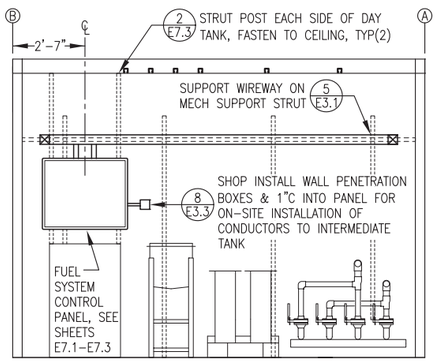
2 E3.2 WALL ELEVATION AT GRID 2
3/8"=1'-0"



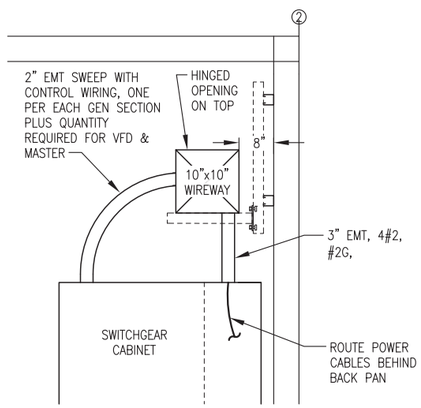
3 E3.2 WALL ELEVATION AT GRID B
3/8"=1'-0"



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



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



6 E3.2 SWITCHGEAR ENTRY & WIREWAY SUPPORT
NO SCALE

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC
PHONE: (907) 562-3252

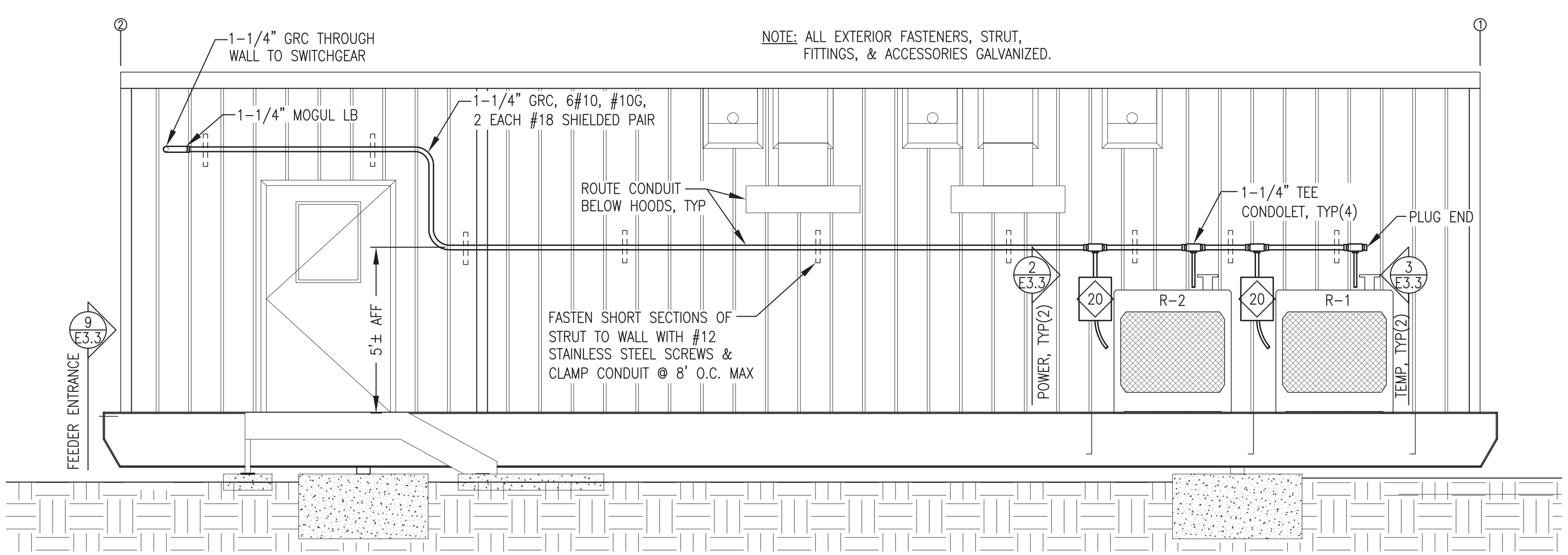
Gray Stassel Engineering, Inc.
PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
ELEVATIONS & DETAILS

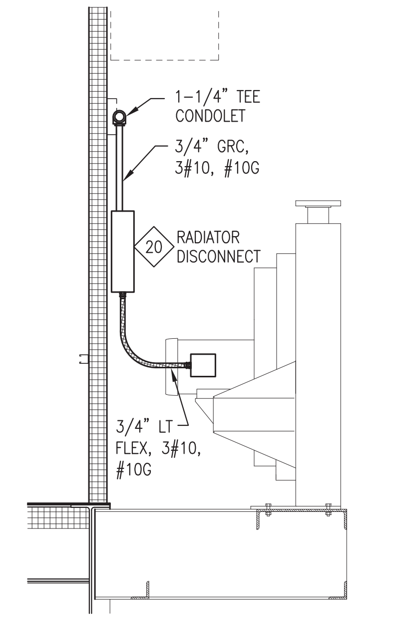
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20
Designed CWV/BCG
Drawn JTD
Approved CWV

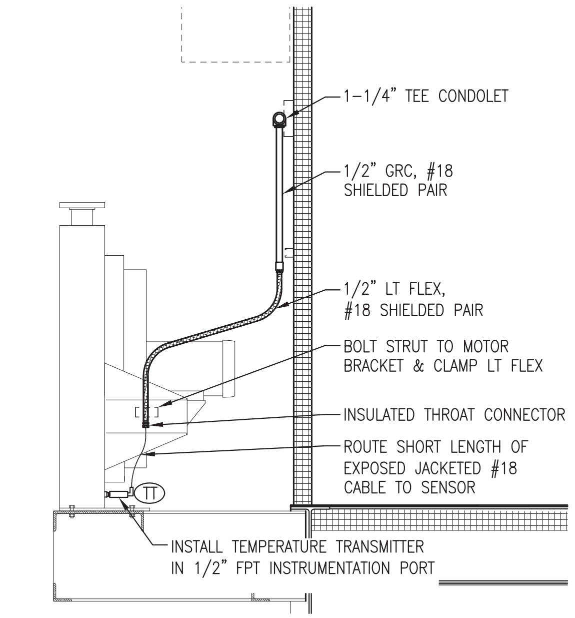
Sheet No. E3.2



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

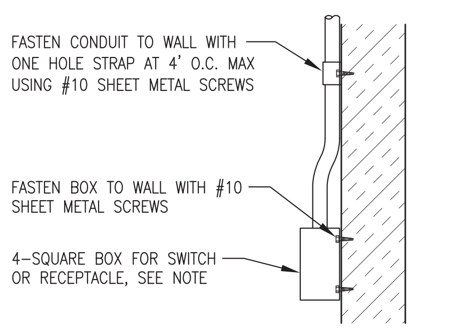


2 RADIATOR POWER CONNECTION
E3.3 3/4"=1'-0"



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

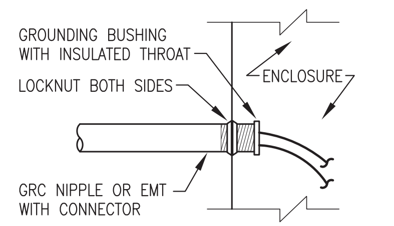
RADIATOR SHOP/ON-SITE NOTES:
1) DURING SHOP FABRICATION INSTALL ALL DEVICES AND RACEWAYS AS INDICATED.
2) AS PART OF ON-SITE WORK, IF RADIATORS ARE REMOVED FOR SHIPPING DISCONNECT LIQUID TIGHT FLEXES AND SEAL ENDS. COIL AND SECURE CONDUCTORS AND FLEXES FOR SHIPPING.
3) AS PART OF ON-SITE WORK REINSTALL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



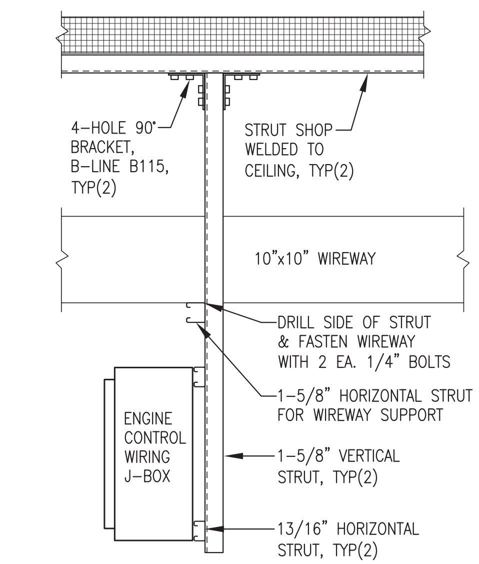
NOTE: INSTALL THERMOSTATS & TIMER SWITCHES IN DEEP SINGLE GANG BELL BOX INSTEAD OF 4-SQUARE BOX.

4 TYPICAL INTERIOR DEVICE MOUNTING
E3.3 NO SCALE

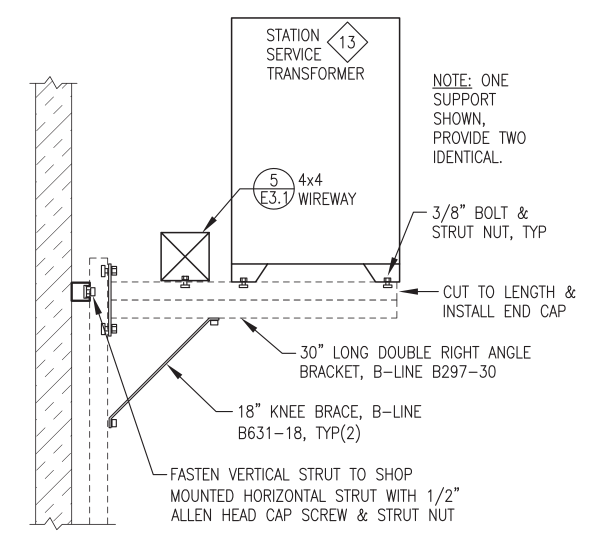
NOTES:
1) THIS DETAIL APPLIES TO CONNECTIONS TO WIREWAY, GENERATOR ENCLOSURES, SWITCHGEAR, AND PANELS.
2) AT A MINIMUM INSTALL GROUNDING BUSHING ON ALL GENERATOR POWER CONDUIT, COMMUNITY FEEDER CONDUIT, STATION SERVICE FEEDERS, AND WHERE OTHERWISE INDICATED OR REQUIRED. BOND GROUNDING BUSHING TO EQUIPMENT GROUNDING CONDUCTOR.
3) INSTALL PLASTIC BUSHING WHERE GROUNDING BUSHING IS NOT REQUIRED.
4) ON GENERATOR ENCLOSURES MAKE ALL CONNECTIONS AS TIGHT AS POSSIBLE.



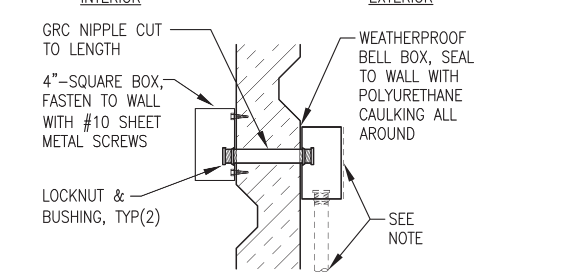
5 TYP ENCLOSURE CONNECTION
E3.3 NO SCALE



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

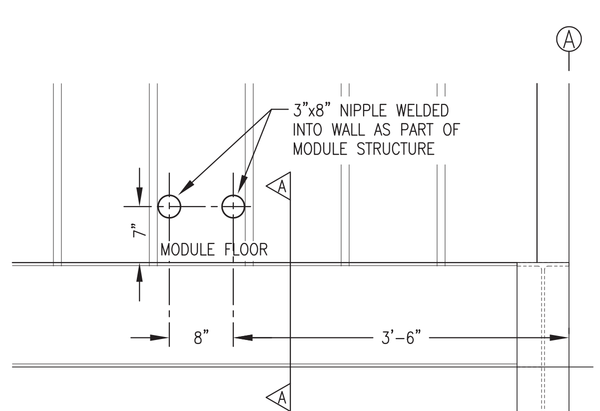


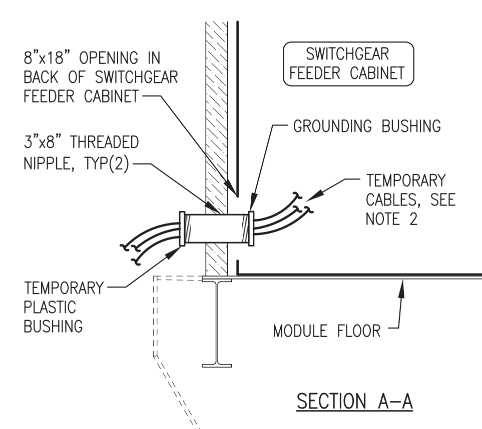
7 STATION SERVICE TRANSFORMER SUPPORT
E3.3 NO SCALE



NOTE: FOR CONDUIT PENETRATIONS WITHOUT BELL BOX SEAL ALL AROUND CONDUIT WITH POLYURETHANE CAULK.

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





SECTION A-A

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 E2 FOR CONTINUATION.

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

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ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
ELEVATIONS & DETAILS

NO.	REVISION	BY	DATE
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Plot Date 1/6/20
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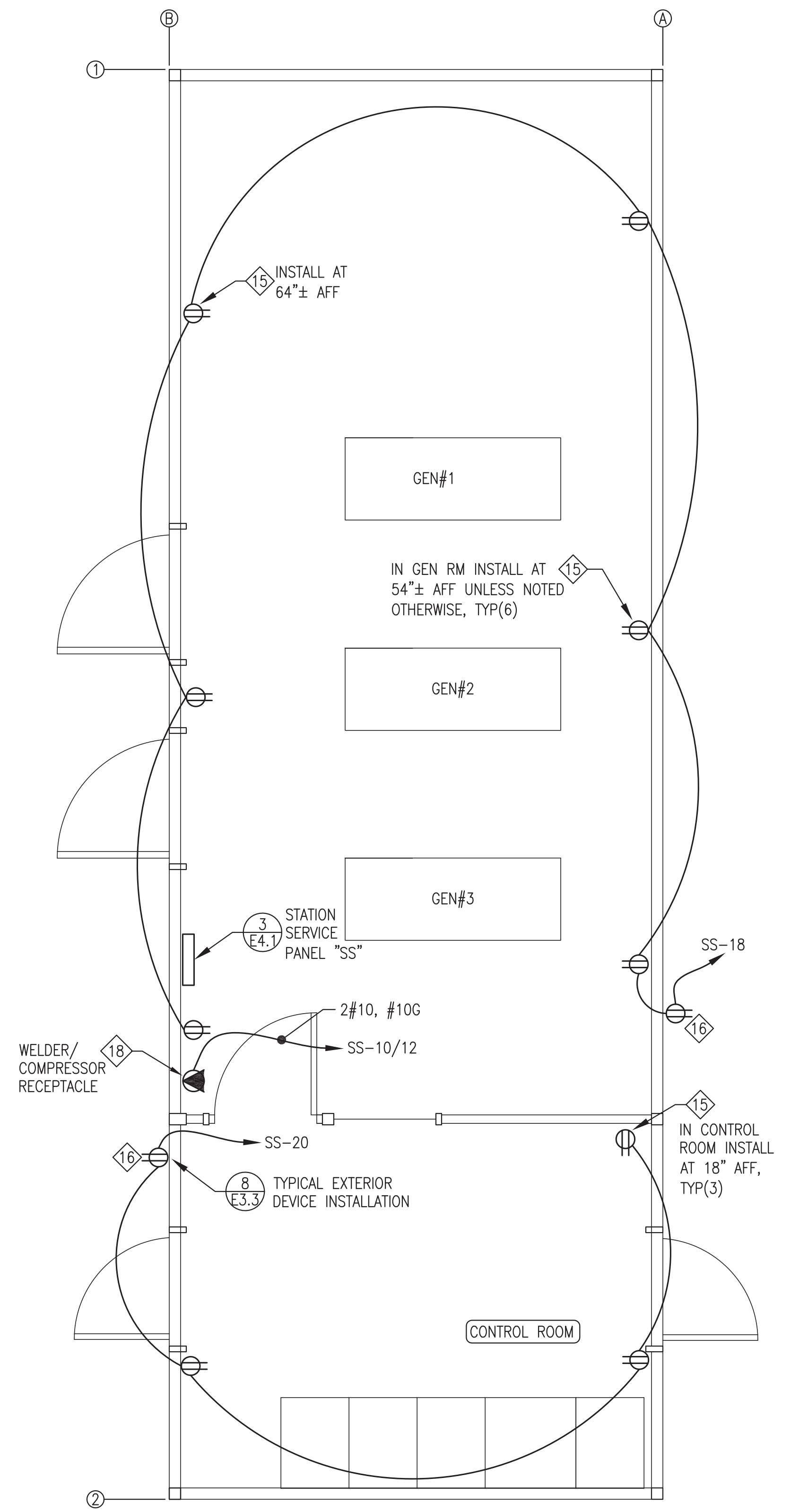
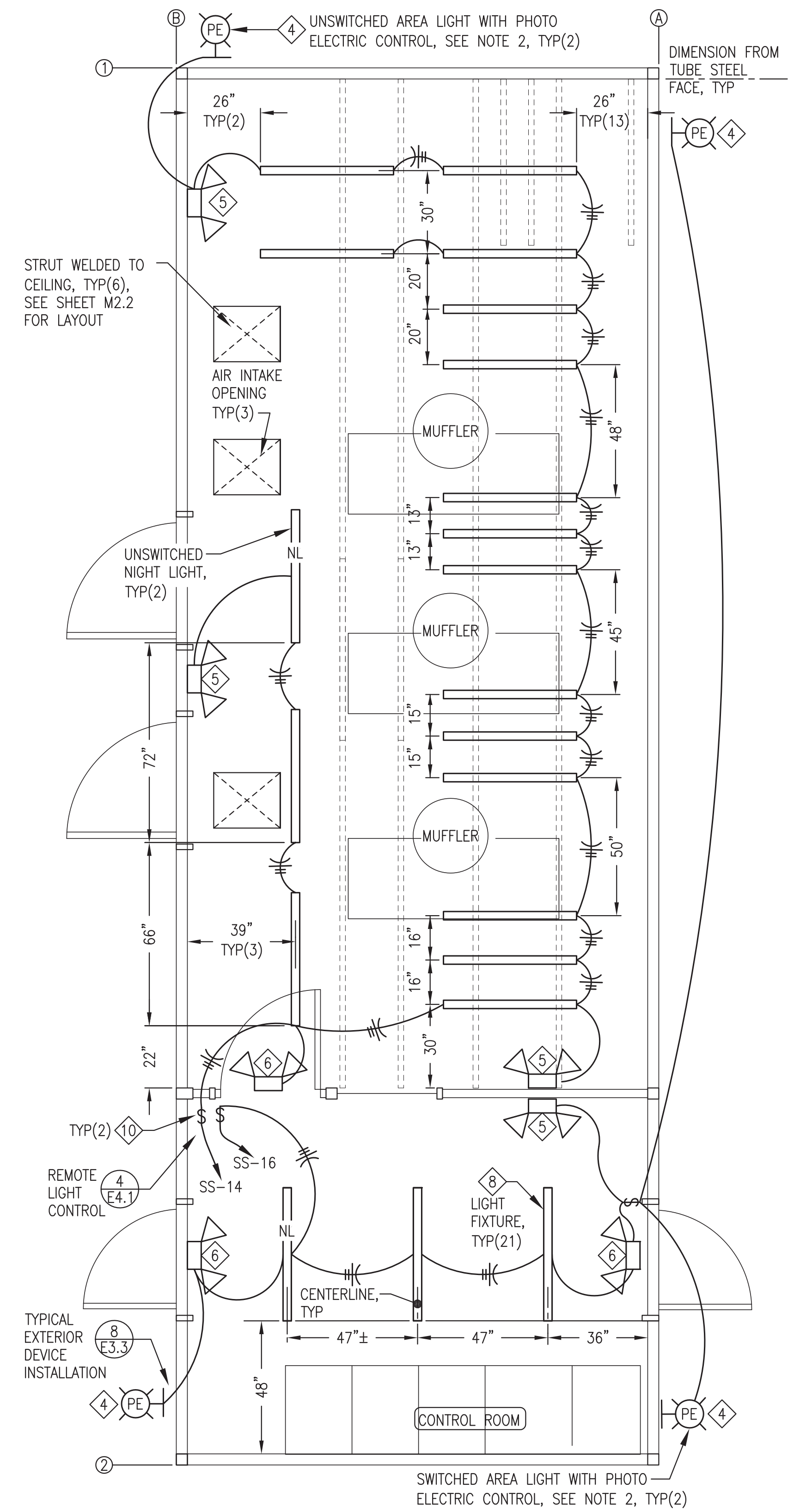
Drawn JTD
Approved CWV

Sheet No. E3.3



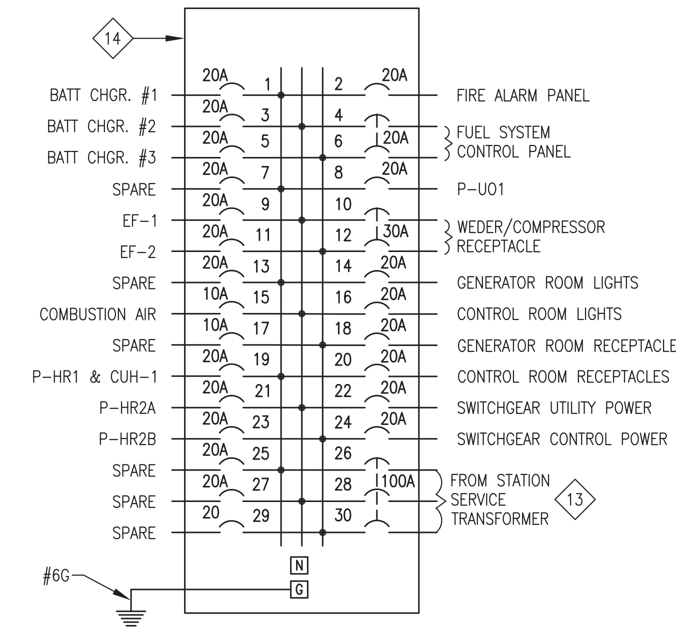
NOTES:
1) ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.

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

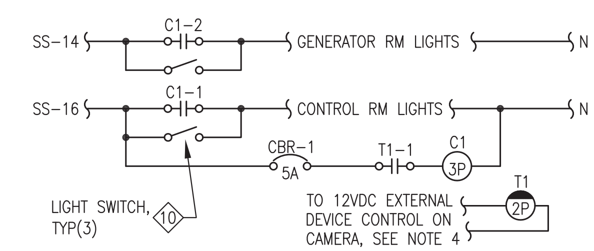


NOTES:
1) ALL WIRING RUNS 2#12, #12G UNLESS SPECIFICALLY NOTED OTHERWISE.
2) MOUNT EXTERIOR AREA LIGHTS WITH TOP 9'-0" AFF.
3) FASTEN INTERIOR LIGHTS TO CEILING WITH #12 SHEET METAL SCREWS EXCEPT WHERE LIGHTS CROSS STRUT USE 1/4" BOLTS & STRUT NUTS, TYP

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



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



NOTES:
1) INSTALL CONTACTOR, TIMER RELAY, AND CIRCUIT BREAKER IN 12"x12"x6" NEMA 1 JUNCTION BOX ON WALL ABOVE LIGHT SWITCHES.
2) ALL LIGHTING CIRCUIT WIRING MIN #12 AWG. ALL 5A CONTROL CIRCUIT WIRING MIN #16AWG.
3) SET TIMER FOR 5 MINUTES, SINGLE SHOT MODE.
4) CONNECT TO CONFIGURABLE OUTPUT PINS ON CAMERA AND PROGRAM TO POWER RELAY ON CAMERA OPERATION.

BILL OF MATERIALS:
CBR1: 5A, 1P, RAIL MOUNT CIRCUIT BREAKER. ALLEN BRADLEY 1489-A1-050.
C1: 23A, 3P CONTACTOR, 120V COIL. ALLEN BRADLEY 100-C23D10.
T1: 10A, DPDT RELAY, 12VDC COIL, WITH SOCKET BASE AND TIMING MODULE. ALLEN BRADLEY 700-HA32Z12 RELAY WITH 700HN204 BASE AND 700HT3 SERIES B TIMING MODULE.

4 E4.1 LIGHTING REMOTE CONTROL SCHEMATIC
NO SCALE

BUILDING PLANS 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 ON SHEET E6		SNAP SWITCH / SMALL MOTOR DISCONNECT
1/4	MOTOR (HORSEPOWER INDICATED)	T$	TIMER SWITCH
MD	MOTORIZED DAMPER – SEE MECHANICAL		GROUND

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
RECEPTACLE & LIGHTING PLANS, & STATION SERVICE PANEL

NO.	REVISION	BY	DATE
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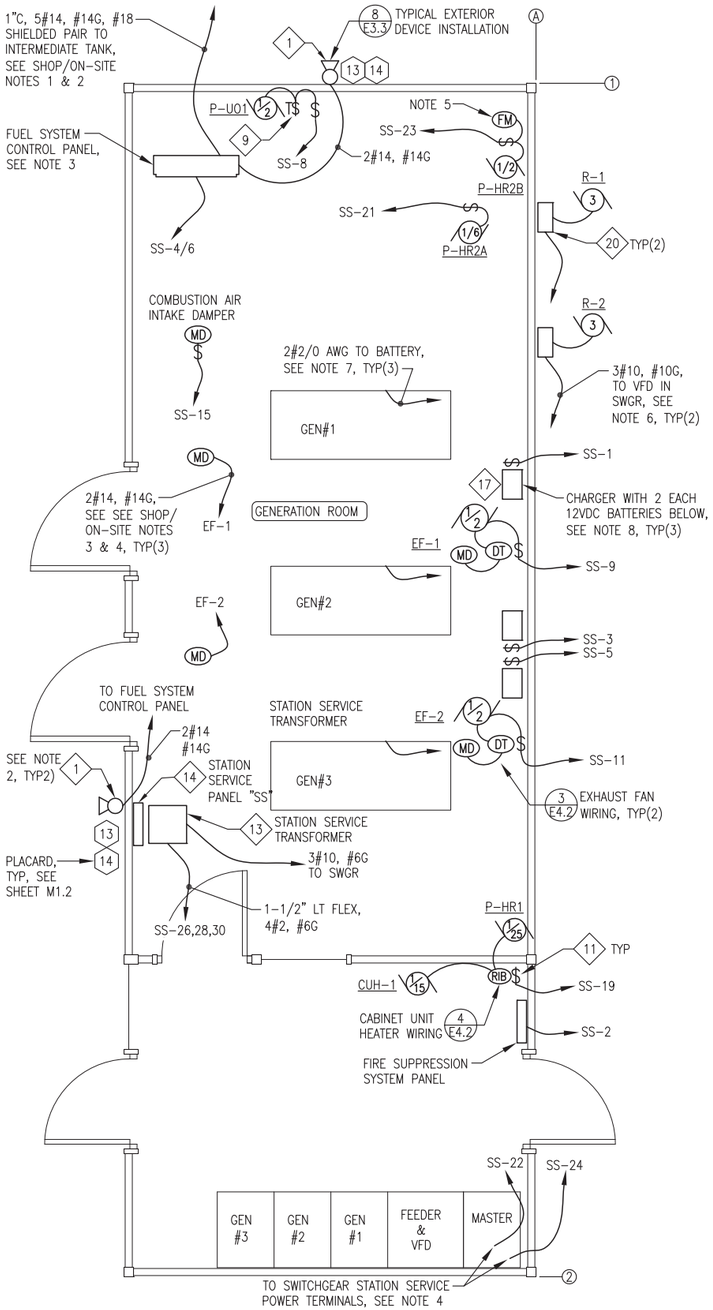
Approved CWV

Sheet No. E4.1



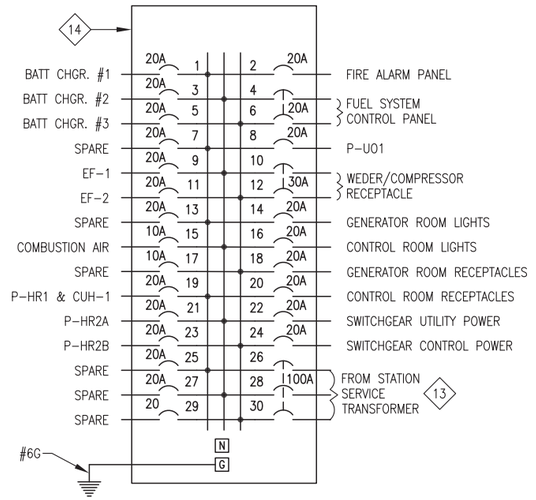
1 E4.2 STATION SERVICE PLAN
3/8"=1'-0"

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-E7.3 FOR DAY TANK CONTROL PANEL DESIGN. 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) INSTALL FLOW METER FOR HEAT RECOVERY MONITORING WHERE SHOWN ON HEAT RECOVERY PIPING ISOMETRIC. PROVIDE POWER FROM P-HR2B DISCONNECT.
6) RADIATOR VFD POWER CONDUCTORS OVERSIZED FOR 80% DE-RATE. DO NOT ROUTE IN WIREWAY. ROUTE IN SEPARATE EXTERIOR CONDUIT, SEE ELEVATION 1/E3.3.
7) ROUTE BATTERY CABLES TO FRONT OF SKID SUPPORTED WITH CUSHIONED CLAMPS, SEE SHEET M3.3. ROUTE FROM SKID DIRECTLY UNDER FUEL HOSES TO WALL AND TYWRAP CABLES TO FUEL PIPES ALONG WALL. CUT TO PROVIDE 6"± SERVICE LOOP FOR FINAL TERMINATION ON BATTERIES.
8) MOUNT BATTERY CHARGER TO WALL ON SHALLOW STRUT AND INSTALL BATTERIES ON FLOOR BELOW, SEE ELEVATION 1/E3.2.

STATION SERVICE SHOP/ON-SITE NOTES:

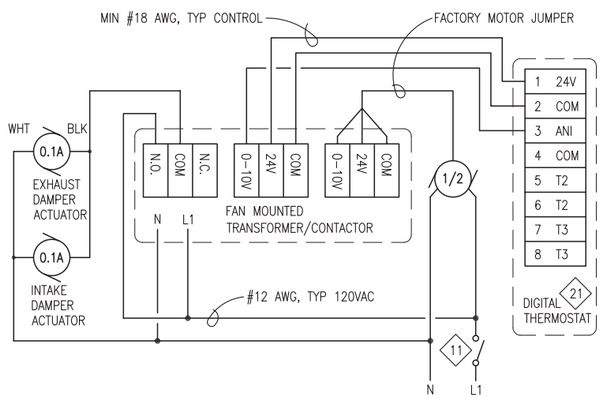
1) DURING SHOP FABRICATION INSTALL WALL PENETRATION AND CONDUIT INTO DAY TANK PANEL. SEE ELEVATION 5/E3.2.
2) AS PART OF ON-SITE WORK INSTALL CONDUIT AND CONDUCTORS TO TANK FARM, SEE SHEET E2.
3) DURING SHOP FABRICATION INSTALL CEILING MOUNTED BOX ADJACENT TO DAMPER ACTUATOR AND TEMPORARILY CONNECT DAMPER TO VERIFY OPERATION.
4) AS PART OF ON-SITE WORK INSTALL CONDUIT AND CONDUCTORS TO DAMPER ACTUATOR. SEE SHEET M7.



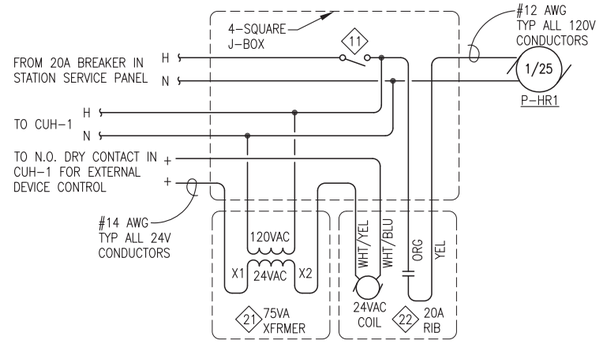
2 E4.2 STATION SERVICE PANEL "SS"
NO SCALE

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. WORK INCLUDED IN THE ON SITE CONTRACT IS NOTED WITHIN THE CLOUDED AREAS.

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



4 E4.2 CUH-1 WIRING DIAGRAM
NO SCALE

ALASKA ENERGY AUTHORITY

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
STATION SERVICE PLAN, DETAILS, & PANEL

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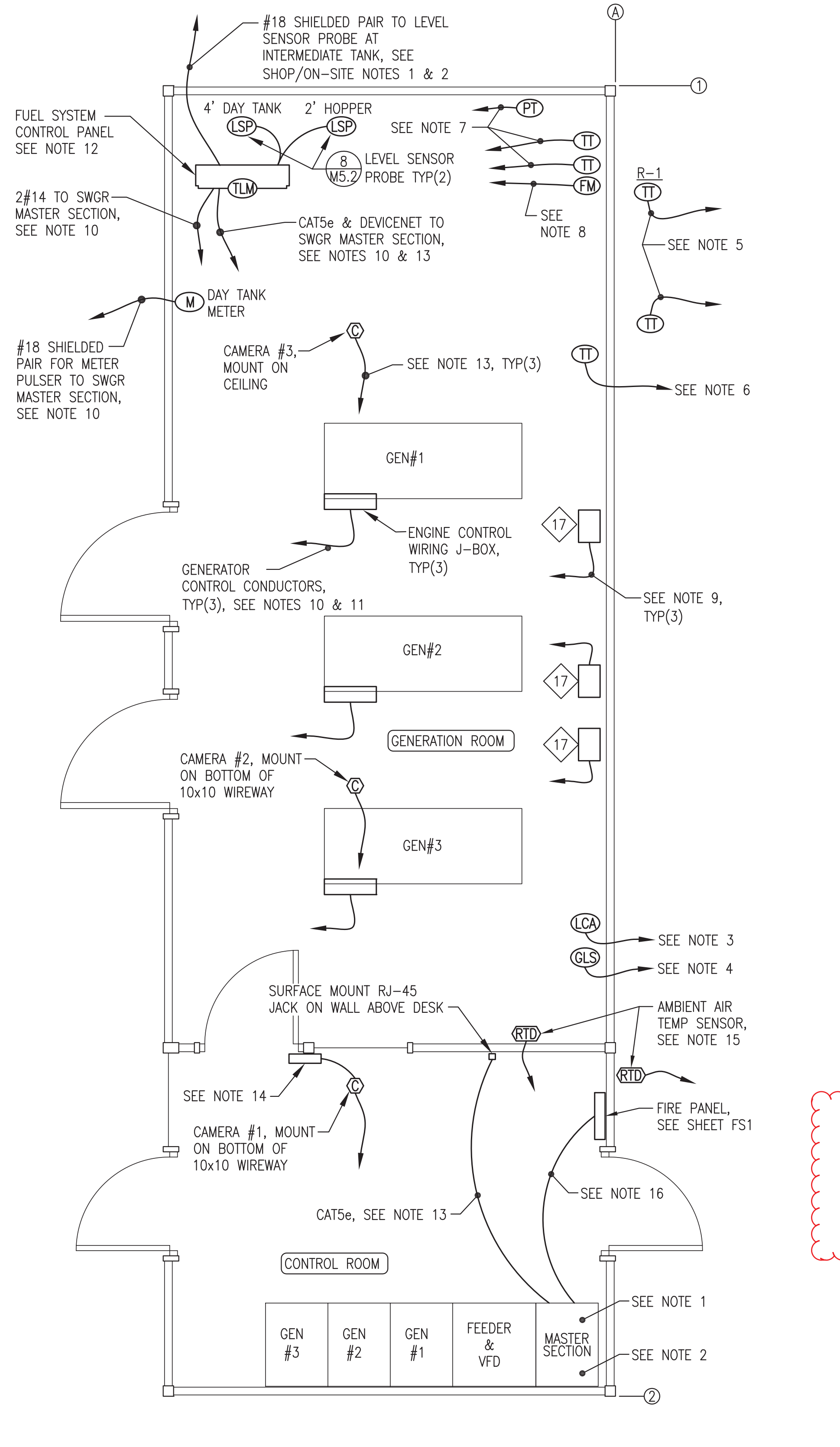


1 / E5 INSTRUMENTATION & DATA PLAN
3/8"=1'-0"

INSTRUMENTATION & DATA INSTALLATION & WIRING NOTES:

1. INSTALL CAMERA POE+ SWITCH INSIDE MASTER SECTION. CONNECT TO 120VAC CONTROL POWER AND TO ETHERNET SWITCH, SEE NOTE 10.
2. INSTALL ROUTER ON TOP OF MASTER SECTION IN RACK OR CABINET. CONNECT TO 120VAC UPS AND TO ETHERNET SWITCH, SEE NOTE 10.
3. LOW COOLANT LEVEL ALARM SWITCH INSTALLED AT EXPANSION TANK, SEE MECHANICAL. CONNECT TO N.C. SWITCH (WHITE & RED) AND ROUTE 2#14 TO SWITCHGEAR MASTER SECTION. SEE NOTE 10.
4. GLYCOL LEVEL SENSOR 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 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 TWO TEMP TRANSMITTERS 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. INSTALL FLOW METER FOR HEAT RECOVERY MONITORING WHERE SHOWN ON HEAT RECOVERY PIPING ISOMETRIC. PROVIDE POWER FROM P-HR2B DISCONNECT. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR MASTER SECTION. SEE NOTE 10.
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 GENERATOR CONTROL CONDUCTORS TO SWITCHGEAR IN 10x10 WIREWAY WITH POWER CONDUCTORS. SEE SHEETS E3.1, E6.3, AND NOTE 10.
12. SEE SHEETS E7.1-E7.3 FOR FUEL SYSTEM CONTROL PANEL DESIGN. ALL ACCESSORIES NOT SHOWN ON PLANS. SEE LOGIC DIAGRAMS FOR ADDITIONAL DETAIL.
13. ROUTE CAT5e CONDUCTORS FROM EACH CAMERA TO POE+ SWITCH IN MASTER SECTION. ROUTE CAT5e AND DEVICENET CONDUCTORS FROM FUEL SYSTEM PANEL TO ETHERNET SWITCH AND PLC IN MASTER SECTION. ROUTE CAT5e FROM RJ-45 JACK TO ETHERNET SWITCH IN MASTER SECTION. SEE NOTE 10. INSTALL ALL 300V CAT5e AND DEVICENET CONDUCTORS IN SEPARATE DEDICATED RACEWAYS – DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.
14. INSTALL CONTACTOR WITH TIMER RELAY FOR REMOTE LIGHTING CONTROL. OPERATE FROM DRY CONTACT ON CAMERA #1. TIMER TO TURN LIGHTS ON FOR 5 MINUTES EACH TIME CAMERA IS OPERATED. SEE SCHEMATIC 4/E4.1.
15. RTD TEMPERATURE SENSOR PROVIDED WITH SWITCHGEAR. ROUTE #18 SHIELDED PAIR TO SWITCHGEAR MASTER SECTION. SEE DETAIL 3/E5 AND NOTE 10.
16. ROUTE CAT5e FOR DATA AND 2#14 FOR GENERATOR SHUT DOWN FROM FIRE PANEL TO SWITCHGEAR MASTER SECTION, SEE NOTE 10. INSTALL IN SEPARATE DEDICATED RACEWAY – DO NOT ROUTE WITH STATION SERVICE OR POWER CONDUCTORS.

INSTRUMENTATION & DATA EQUIPMENT PROGRAMMING NOTES:

1. THE AUTHORITY WILL PROVIDE PROGRAMMING FOR THE CAMERAS FROM A RECENT PROJECT. UPLOAD PROGRAMMING AND REVISE AS REQUIRED TO PROVIDE FULL CAMERA FUNCTION.
2. THE AUTHORITY WILL PROVIDE PROGRAMMING FOR THE TANK LEVEL MONITOR (TLM) FROM A RECENT PROJECT. UPLOAD PROGRAMMING AND REVISE AS REQUIRED TO PROVIDE FULL LEVEL MONITORING FUNCTION.

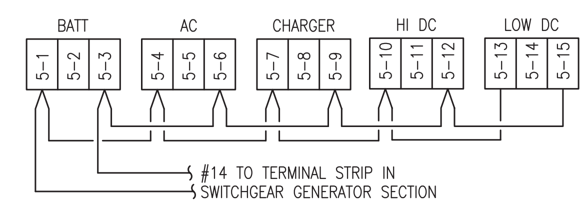
INSTRUMENTATION & DATA SHOP/ON-SITE NOTES:

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 TANK FARM, SEE SHEET E2.

DATA DEVICE SCHEDULE

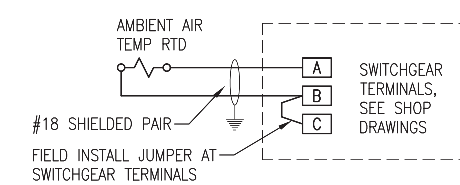
DEVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
ROUTER – HIGH SPEED INTERNET	4-PORT GIGABIT ROUTER, DUAL 2.4 AND 5 GHz WIFI WITH ADJUSTABLE ANTENNAS, 4 GIGABIT LAN, 1 GIGBIT WAN, USB 2.0 AND USB 4.0, MINIMUM 256 MB RAM	ASUS RT-ACI-900P OR APPROVED EQUAL
POE+ – POWER OVER ETHERNET CAMERA SWITCH	MINIMUM 4 PORT MANAGED GIGABIT SWITCH, MINIMUM 14 GBPS THROUGHPUT, MINIMUM 30W POWER OVER ETHERNET PER PORT, MINIMUM 130W TOTAL, 120VAC POWER	AXIS T8508 POE+ OR APPROVED EQUAL
CAMERAS	NETWORK CAMERA, HDTV 1080P RESOLUTION, 360 DEGREE PAN, MINIMUM 90 DEGREE TILT, 10X ZOOM, AUTO FOCUS, POWER OVER ETHERNET, WITH PROGRAMMABLE OUTPUT CONNECTIONS FOR EXTERNAL CONTROL OF LIGHTING	AXIS M5525-E PTZ OR APPROVED EQUAL

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.



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

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ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
INSTRUMENTATION & DATA PLAN & DETAILS

NO.	REVISION	BY	DATE
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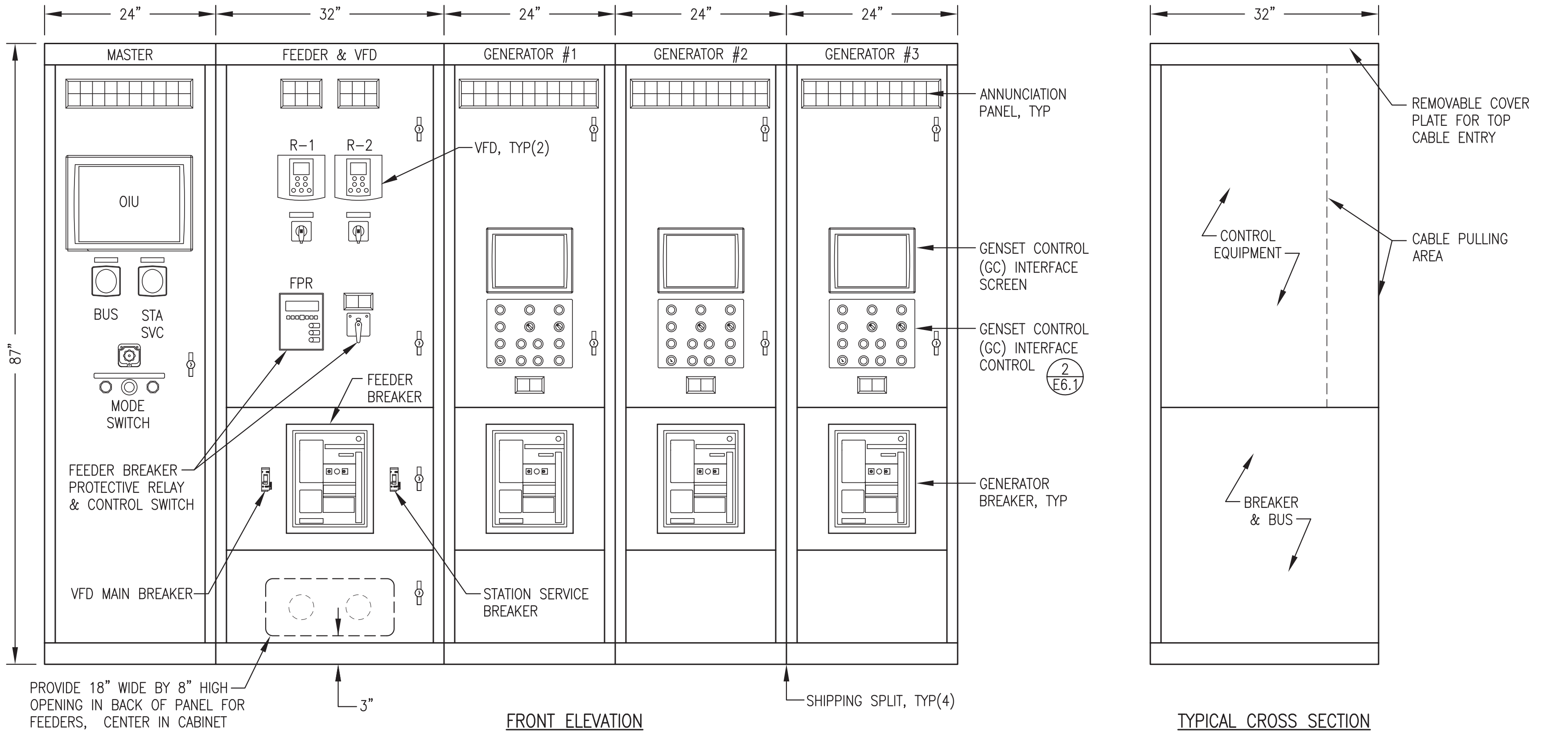
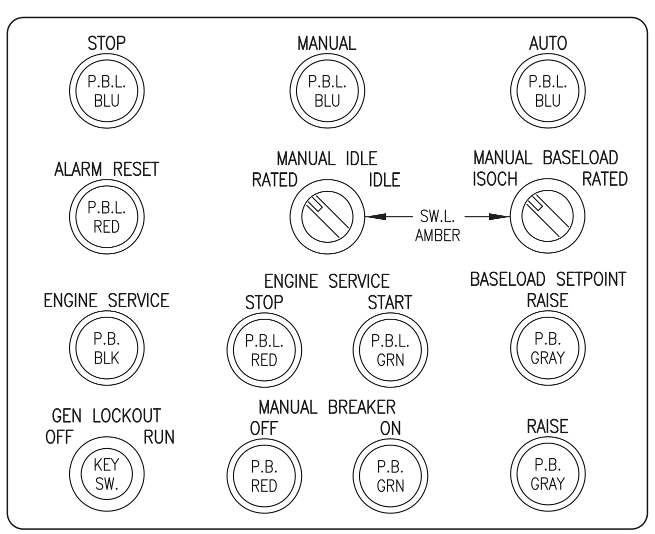
Sheet No. E5



1 E6.1 SWITCHGEAR ENCLOSURE LAYOUT
NO SCALE



INTERFACE CONTROLS LEGEND:

P.B.	PUSH BUTTON
P.B.L.	PUSH BUTTON WITH LIGHT
SW.L.	KNOB OPERATED SWITCH WITH LIGHT
KEY SW.	KEY OPERATED LOCKABLE SWITCH

2 E6.1 GENSET CONTROL (GC) INTERFACE CONTROLS
NO SCALE

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
SWITCHGEAR ENCLOSURE LAYOUT

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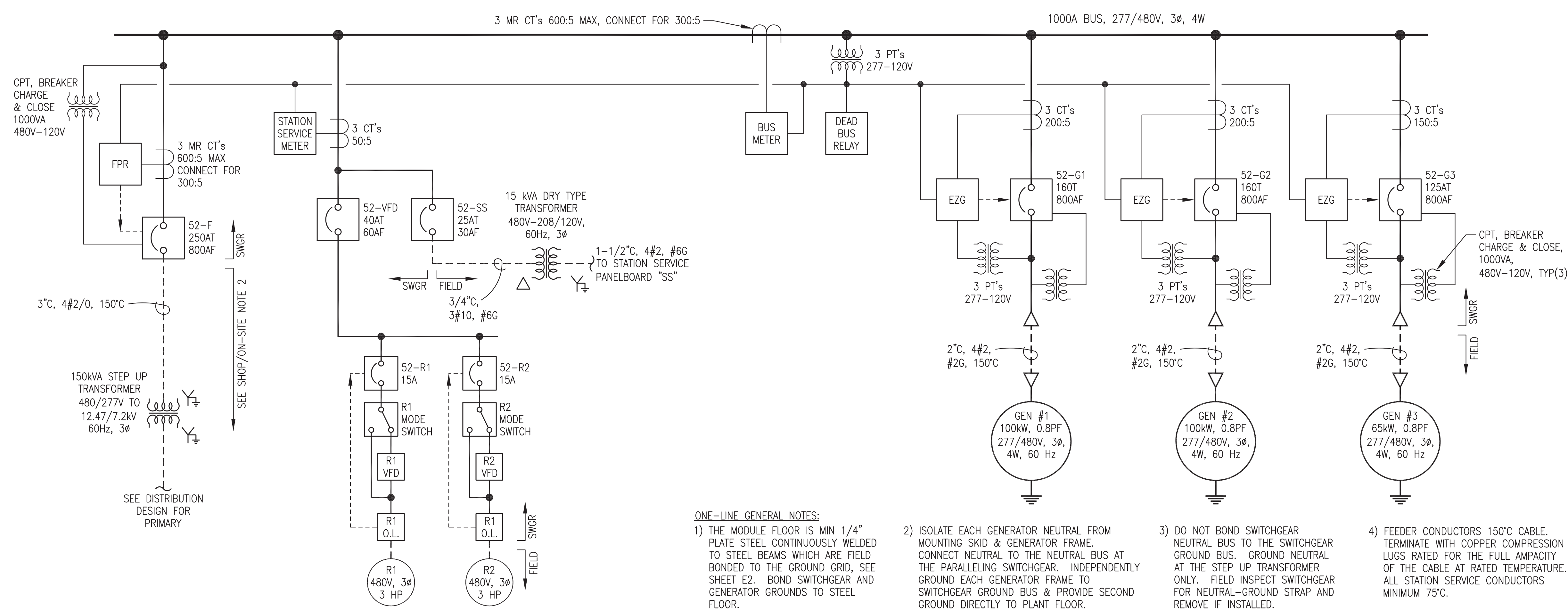


ONE–LINE GENERAL NOTES:

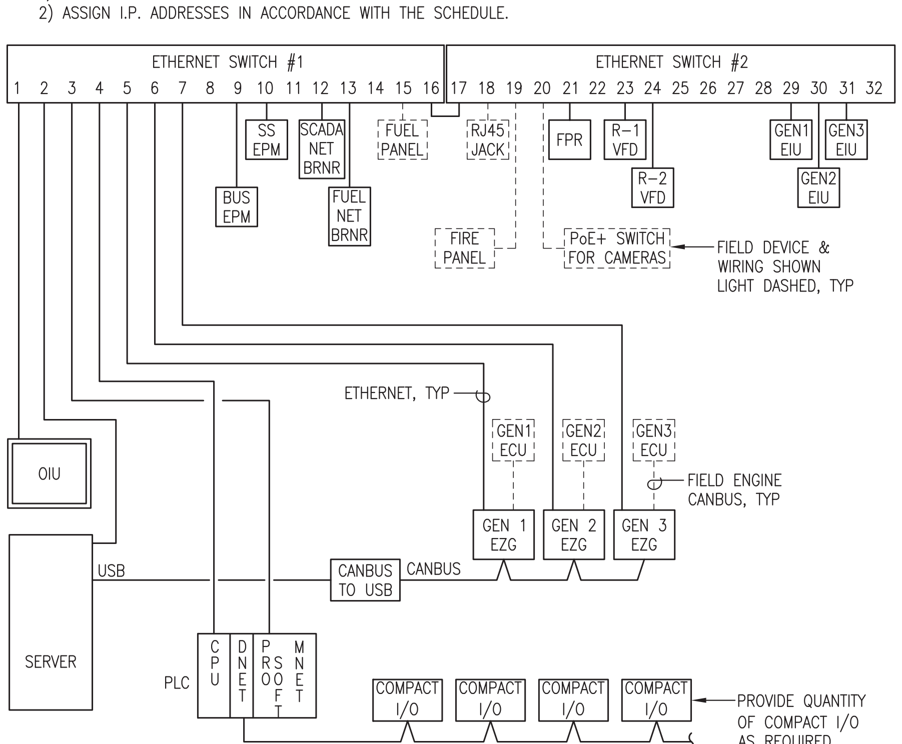
1) THE MODULE FLOOR IS MIN 1/4" PLATE STEEL CONTINUOUSLY WELDED TO STEEL BEAMS WHICH ARE FIELD BONDED TO THE GROUND GRID, SEE SHEET E2. BOND SWITCHGEAR AND GENERATOR GROUNDS TO STEEL FLOOR.
2) ISOLATE EACH GENERATOR NEUTRAL FROM MOUNTING SKID & GENERATOR FRAME. CONNECT NEUTRAL TO THE NEUTRAL BUS AT THE PARALLELING SWITCHGEAR. INDEPENDENTLY GROUND EACH GENERATOR FRAME TO SWITCHGEAR GROUND BUS & PROVIDE SECOND GROUND DIRECTLY TO PLANT FLOOR.
3) DO NOT BOND SWITCHGEAR NEUTRAL BUS TO THE SWITCHGEAR GROUND BUS. GROUND NEUTRAL AT THE STEP UP TRANSFORMER ONLY. FIELD INSPECT SWITCHGEAR FOR NEUTRAL–GROUND STRAP AND REMOVE IF INSTALLED.
4) FEEDER CONDUCTORS 150°C CABLE. TERMINATE WITH COPPER COMPRESSION LUGS RATED FOR THE FULL AMPACITY OF THE CABLE AT RATED TEMPERATURE. ALL STATION SERVICE CONDUCTORS MINIMUM 75°C.

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. WORK INCLUDED IN THE ON SITE CONTRACT IS NOTED WITHIN THE CLOUDED AREAS.

1 / E6.2 SWITCHGEAR ONE–LINE DIAGRAM
NO SCALE

NOTES:

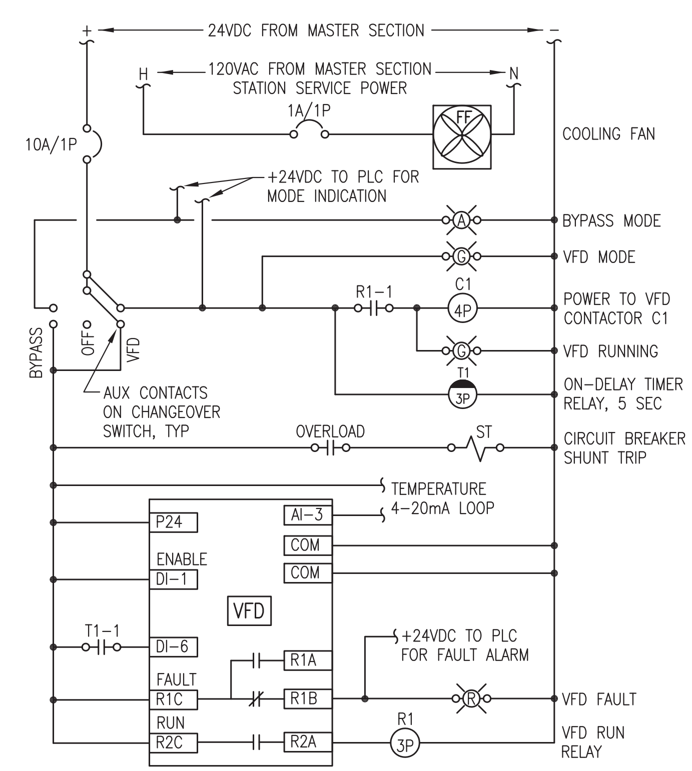
1) PROVIDE 120VAC POWER FOR SERVER FROM UPS. ALL OTHER DEVICES 24VDC.
2) ASSIGN I.P. ADDRESSES IN ACCORDANCE WITH THE SCHEDULE.



2 / E6.2 COMMUNICATION SCHEMATIC
NO SCALE

I.P. ADDRESS SCHEDULE

DEVICE	I.P. ADDRESS
SERVER	192.168.1.142
FPR	192.168.1.155
R1 VFD	192.168.1.171
R2 VFD	192.168.1.172
OIU	192.168.1.182
PLC CPU	192.168.1.183
PLC PROSOFT	192.168.1.187
BUS EPM	192.168.1.190
SS EPM	192.168.1.191
G1 EASYGEN XT	192.168.1.161
G2 EASYGEN XT	192.168.1.162
G3 EASYGEN XT	192.168.1.163
G1 EIU	192.168.1.151
G2 EIU	192.168.1.152
G3 EIU	192.168.1.153
ROUTER	192.168.1.1
CONTROL RM. CAMERA	192.168.1.104
GEN RM. CAMERA #1	192.168.1.105
GEN RM. CAMERA #2	192.168.1.106
SCADA NETBURNER	192.168.1.185
FUEL NETBURNER	192.168.1.199
FUEL PANEL	192.168.1.198
FIRE PANEL	192.168.1.110

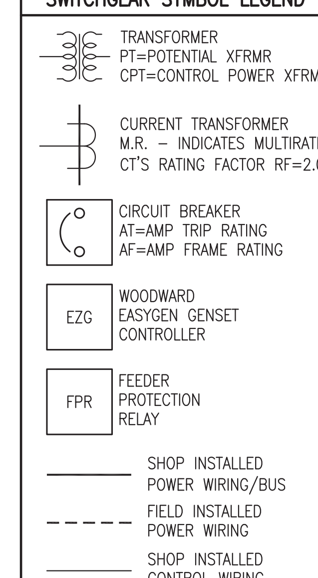


3 / E6.2 TYPICAL RADIATOR VFD LOGIC DIAGRAM
NO SCALE

SWITCHGEAR SHOP/ON–SITE NOTES:

1) DEVICES AND WIRING NOTED AS FIELD ARE EXTERNAL TO THE SWITCHGEAR BUT ARE INCLUDED IN THE MODULE SHOP FABRICATION WORK.
2) THE FEEDER, STEP UP TRANSFORMER, AND DISTRIBUTION ARE TO BE INSTALLED AS PART OF THE ON–SITE WORK AND ARE NOT PART OF THE MODULE SHOP FABRICATION WORK.

SWITCHGEAR SYMBOL LEGEND



ALASKA ENERGY AUTHORITY

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

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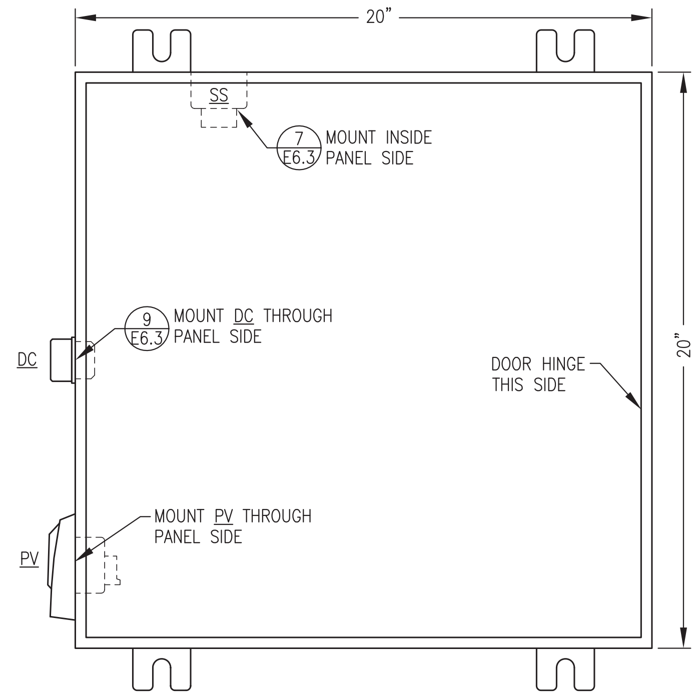
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
SWITCHGEAR ONE–LINE & SCHEMATICS

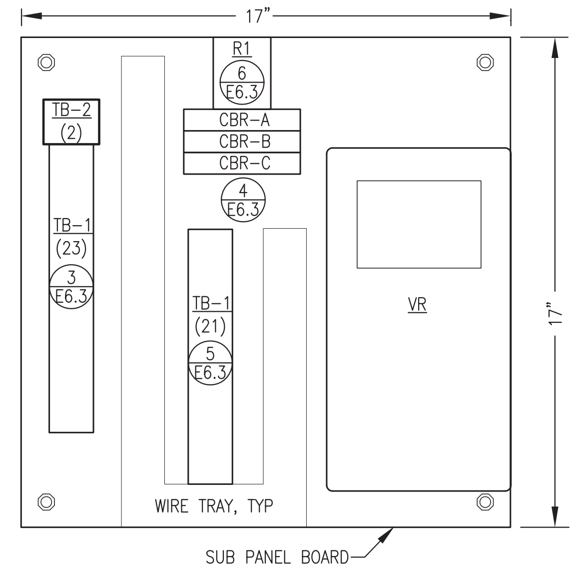
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20 | Designed CWV/BCG | Drawn JTD | Approved CWV

Sheet No. E6.2



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
ENCL.	HOFFMAN	A20H20ALP	20x20x8" NEMA 12
	HOFFMAN	A20P20	BACK PANEL
VR	BASLER	DECS-150 5NS1V1N1S	DIGITAL VOLTAGE REGULATOR
CBR	ALLEN-BRADLEY	1489-M1-C010	RAIL MOUNT CIRCUIT BREAKER, 1-POLE, 1A
DC	JOHN DEERE	57M7919	DIAGNOSTIC CONNECTOR, 9-PIN, CAN-BUS
	DEUTSCH	HD18-009	CONNECTOR STRAIN RELIEF
	DEUTSCH	HDC16-9	CONNECTOR PROTECTIVE DUST CAP
	DEUTSCH	HD10-9-GKT	CONNECTOR GASKET
	DEUTSCH	JDL062397	CONNECTOR LANYARD
PV	MURPHY	PV101-C-MSTD	POWER VIEW W/HARNESS
R1	ALLEN-BRADLEY	700HAB2Z24	DPDT RELAY, 24VDC COIL
	ALLEN-BRADLEY	700HN101	8 PIN SOCKET BASE
SS	CATERPILLAR	9X-8124	STARTER AUXILIARY SOLENOID, 24V
TB-1	IDEC	BNH15LW	15A DIN RAIL-MOUNT TERMINAL BLOCK
TB-2	IDEC	BNH50W	50A DIN RAIL-MOUNT TERMINAL BLOCK

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.

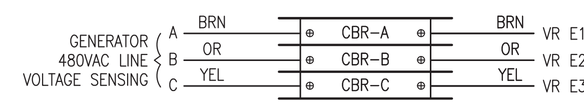
SHOP FABRICATION NOTES:

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 PANEL END 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 ENGINE-GENERATOR WITH ASSOCIATED JUNCTION BOX PERMANENTLY CONNECTED. UPON COMPLETION OF TESTING, COIL WIRING HARNESSES AND SECURE JUNCTION BOX TO GENERATOR FOR SHIPPING.

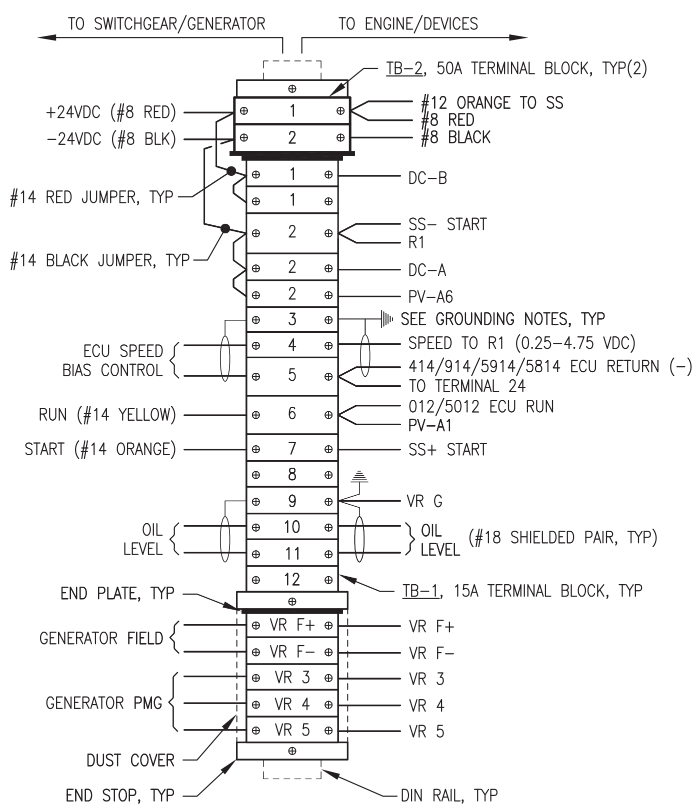
FIELD INSTALLATION NOTES:

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 TO LUGS AT PANEL END ONLY.

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

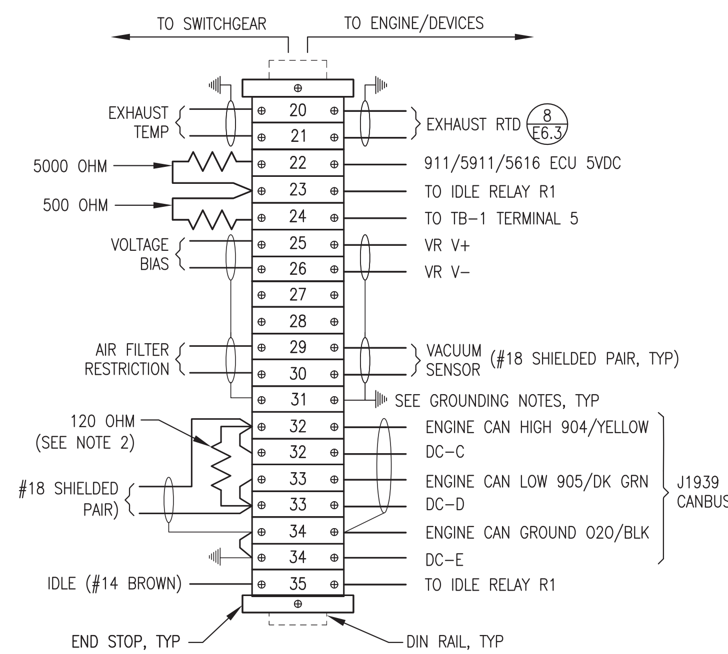


4 E6.3 CIRCUIT BREAKER CONNECTIONS
NO SCALE



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

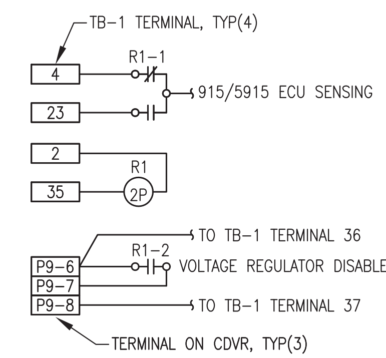
3 E6.3 TERMINAL STRIP CONNECTIONS
NO SCALE



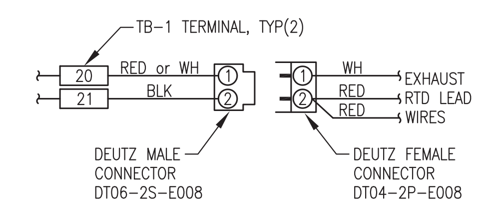
NOTES: 1) ALL RESISTORS 0.25W.
2) REMOVE RESISTOR IF ENGINE WIRING HARNESS HAS 120 OHM END OF LINE RESISTOR.

5 E6.3 TERMINAL STRIP CONNECTIONS
NO SCALE

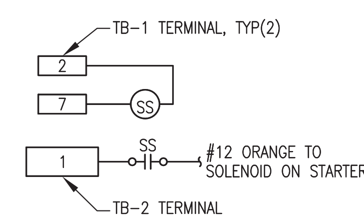
DC-B



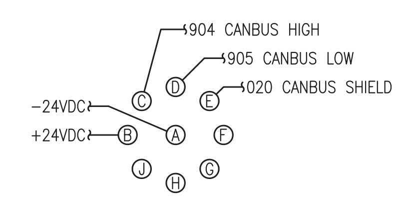
6 E6.3 IDLE RELAY R1 WIRING DIAGRAM
NO SCALE



8 E6.3 EXHAUST RTD CONNECTOR
NO SCALE



7 E6.3 STARTER AUX SOLENOID SS WIRING
NO SCALE



9 E6.3 DIAGNOSTIC CONNECTOR WIRING
NO SCALE

ALASKA ENERGY AUTHORITY

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AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
24VDC ENGINE WIRING JUNCTION BOX

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

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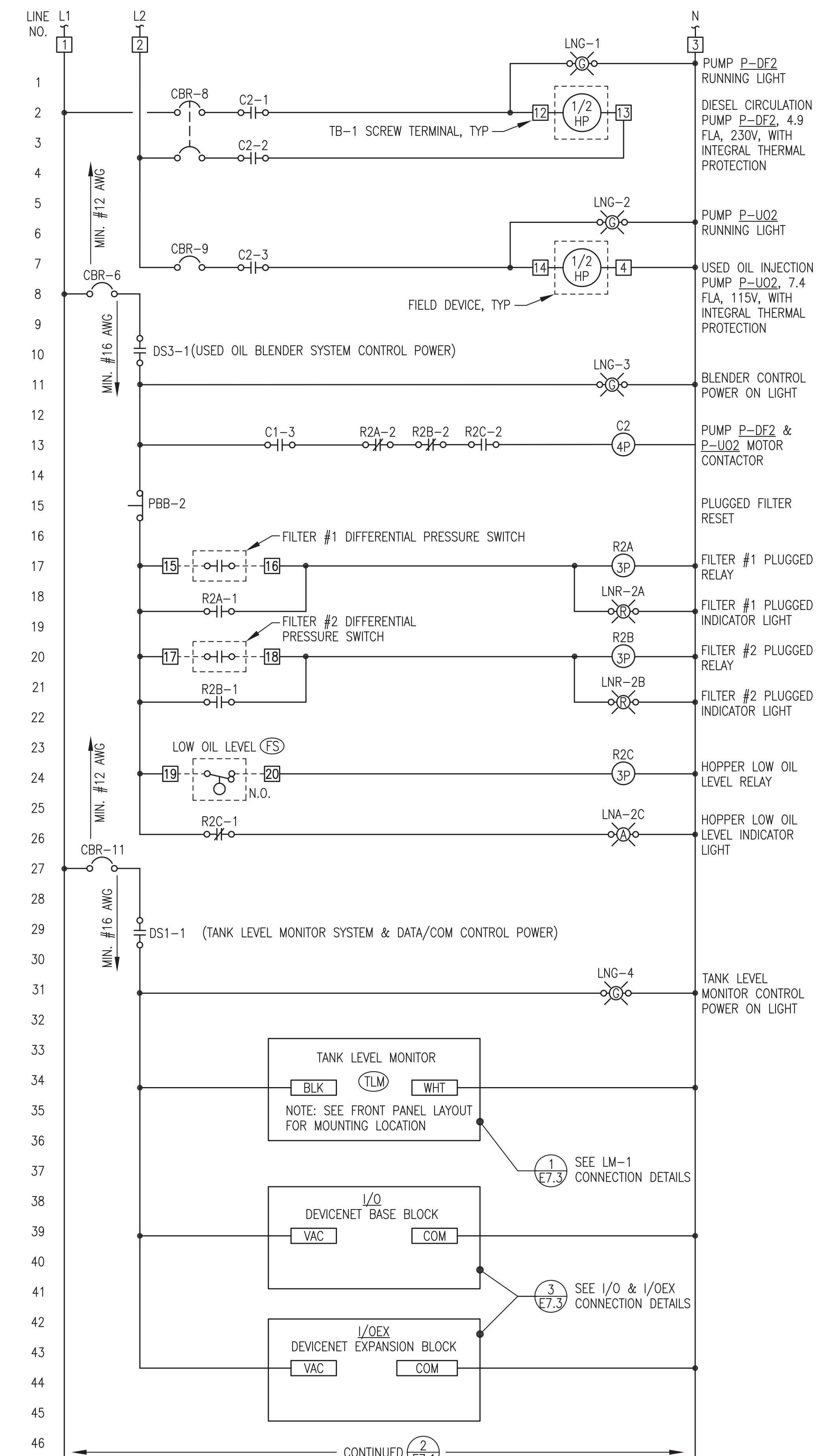
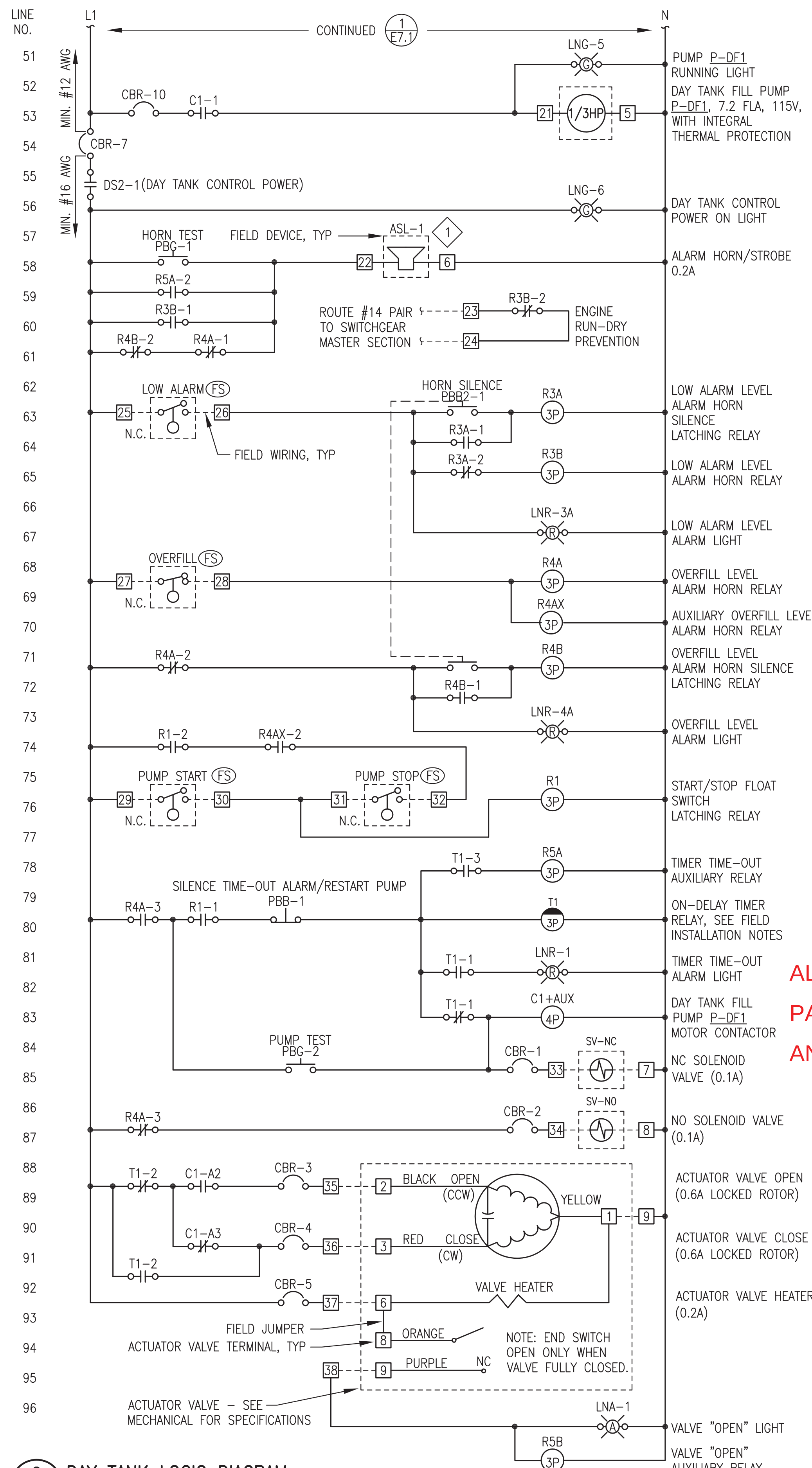
Approved CWV

Sheet No. E6.3



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



2 E7.1 DAY TANK LOGIC DIAGRAM
NO SCALE

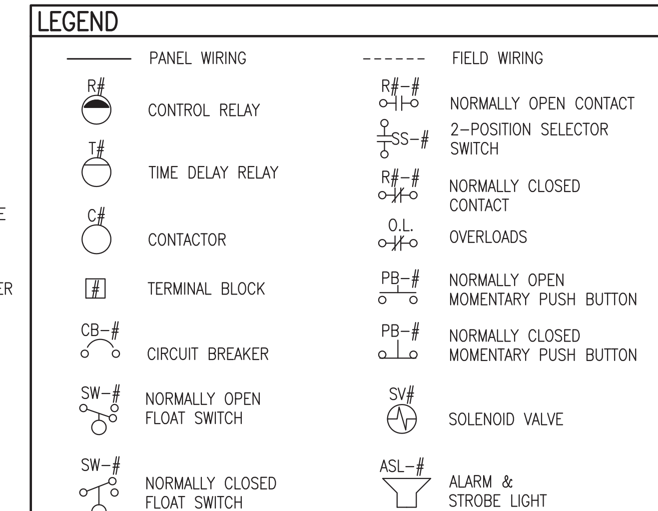
BILL OF MATERIALS

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.

TAG	MANUFACTURER	MODEL	DESCRIPTION
AUX	ALLEN-BRADLEY	100SA11	AUXILIARY CONTACT FOR CONTACTOR, 2 POLE, NO, NC
C	ALLEN-BRADLEY	100C23D10	CONTACTOR, 120V COIL, 23A, 3 POLE WITH 1 NO AUX
CBR-1,2,3,4,5	ALLEN-BRADLEY	1489-M1-C010	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 1A
CBR-6,7,11	ALLEN-BRADLEY	1489-M1-C050	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 5A
CBR-8	ALLEN-BRADLEY	1489-M2-C150	RAIL-MOUNT CIRCUIT BREAKER, 2 POLE, 15A
CBR-9,10	ALLEN-BRADLEY	1489-M1-C150	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 15A
DS	ALLEN-BRADLEY	194LE201753	DISCONNECT, 2 POSITION, 3 N.O., 20A, FACE MOUNT
	ALLEN-BRADLEY	194LHC4E1751	KNOB ACTUATOR FOR LOAD SWITCH, ON/OFF, LOCKABLE
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
I/O	ALLEN-BRADLEY	1790D-T8A0	120VAC DEVICENET 8 INPUT BASE TERM. BLOCK
I/OEX	ALLEN-BRADLEY	1790D-T8A0X	120VAC DEVICENET 8 INPUT EXPANSION TERM. BLOCK
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
R	ALLEN-BRADLEY ALLEN-BRADLEY	700HA33A1 700HN101	3PDT RELAY 11 PIN SOCKET BASE
T	ALLEN-BRADLEY ALLEN-BRADLEY ALLEN-BRADLEY	700HT3 700HA33A1 700HN205	SERIES B TIMING MODULE 3PDT RELAY 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 E1.1		

ALL WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY.

LEGEND



ALASKA ENERGY AUTHORITY

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Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

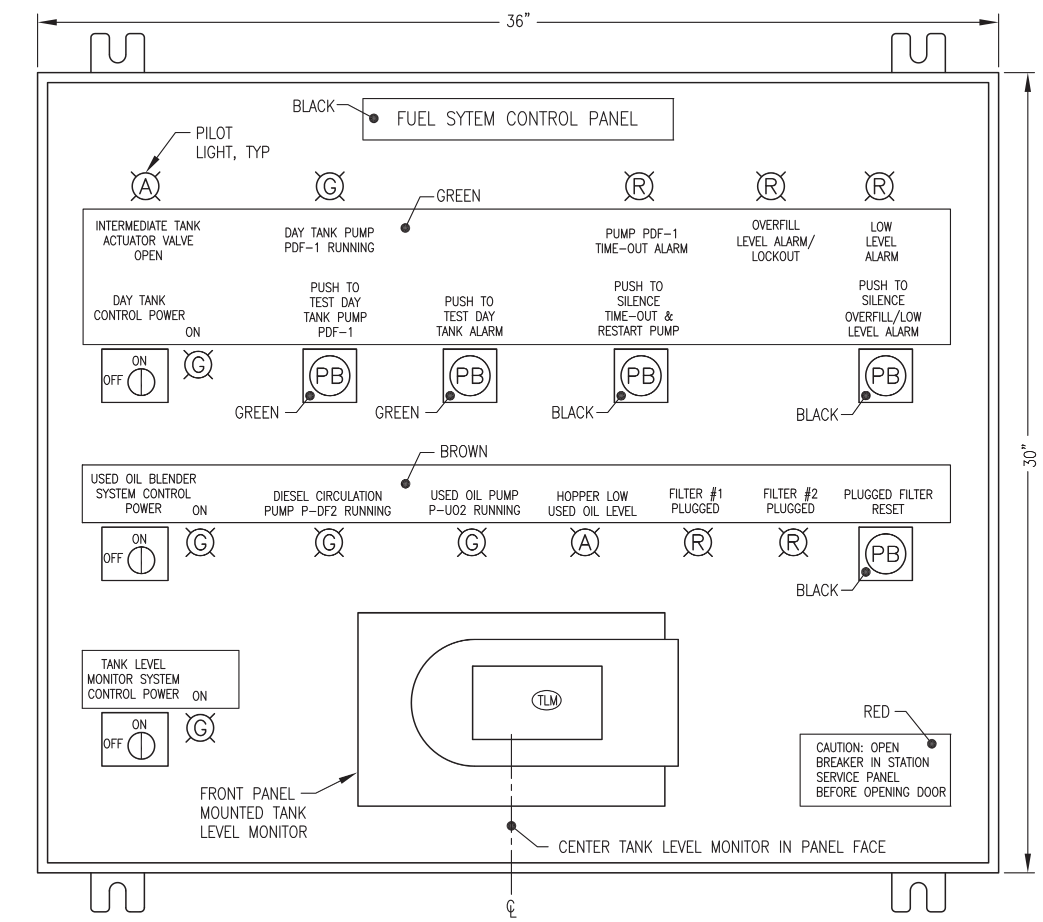
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

FUEL SYSTEM CONTROL PANEL
LOGIC DIAGRAM & BILL OF MATERIALS

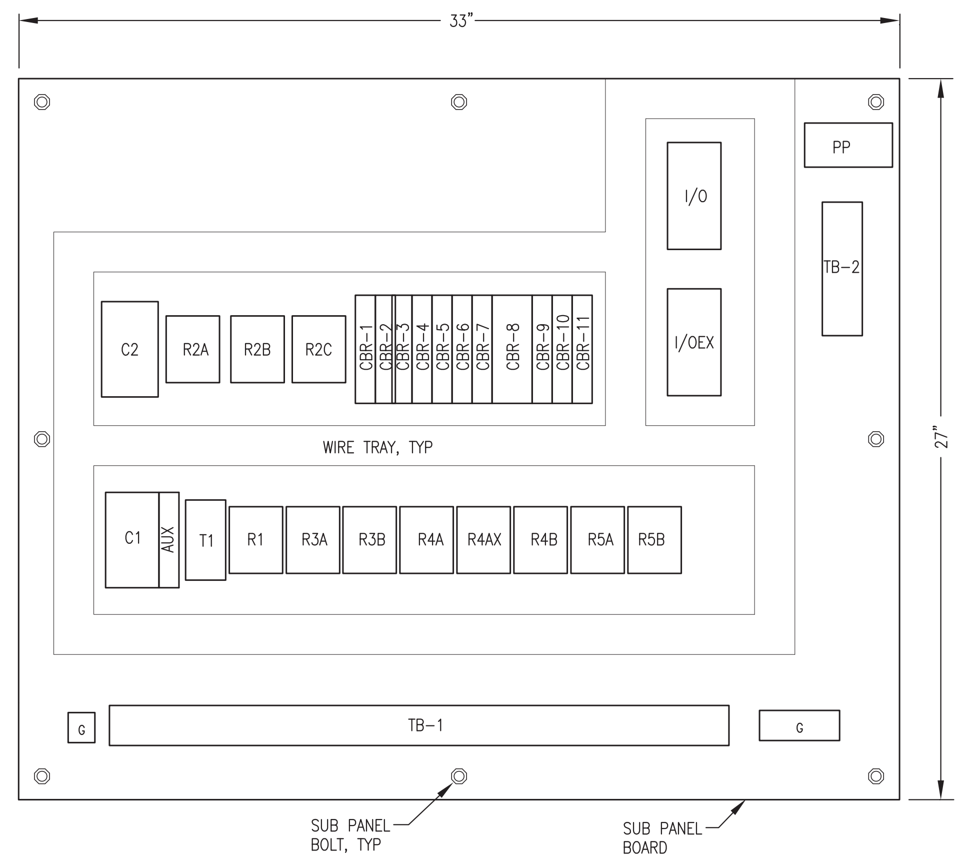
NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20 | Designed CWV/BCG | Drawn JTD | Approved CWV

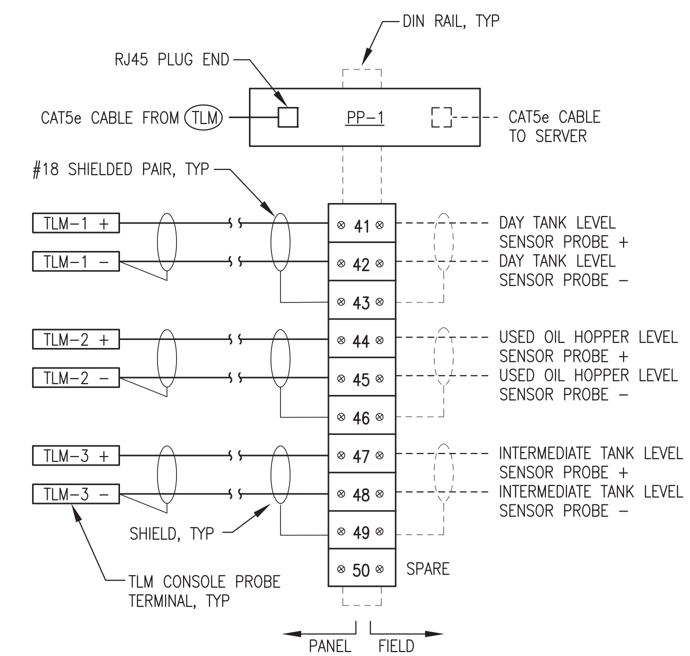
Sheet No. E7.1



1 E7.2 FRONT PANEL LAYOUT
NO SCALE



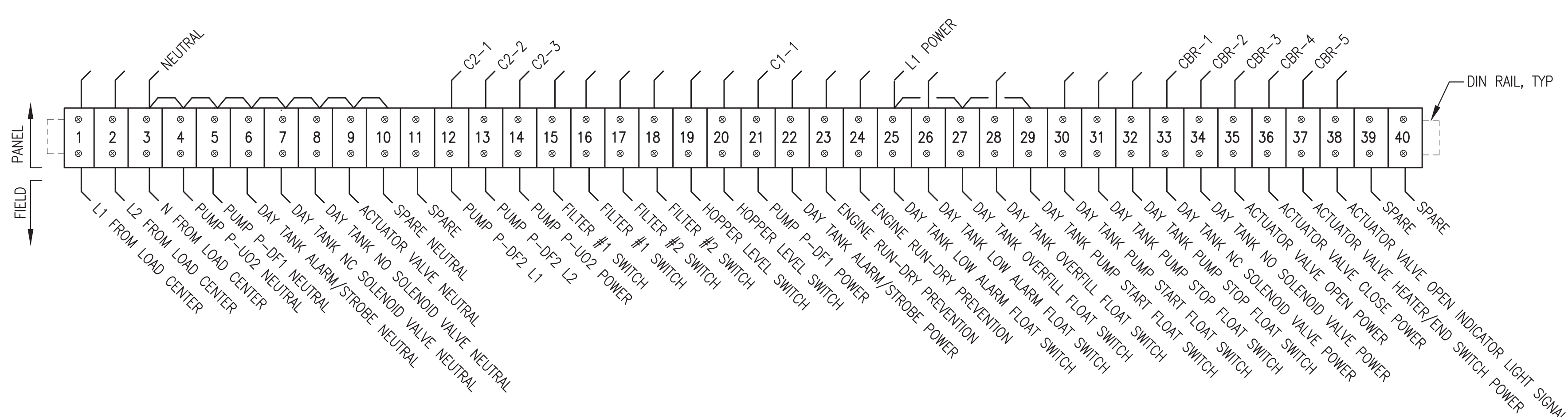
2 E7.2 SUB PANEL LAYOUT
NO SCALE



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 & PP-1 ENTHERNET PANEL 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

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. TERMINATION AT THE PANEL OF EXTERIOR FIELD CONDUCTORS SHOWN ON SHEET E2.1 IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

FUEL SYSTEM CONTROL PANEL LAYOUT & TERMINAL STRIPS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20
Designed CWV/BCG
Drawn JTD
Approved CWV

Sheet No. E7.2

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.

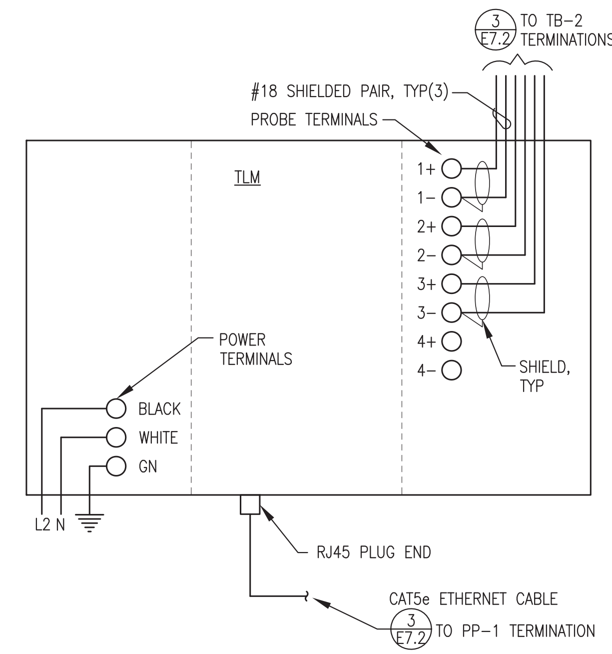
USED OIL BLENDER SYSTEM SEQUENCE OF OPERATIONS:

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.

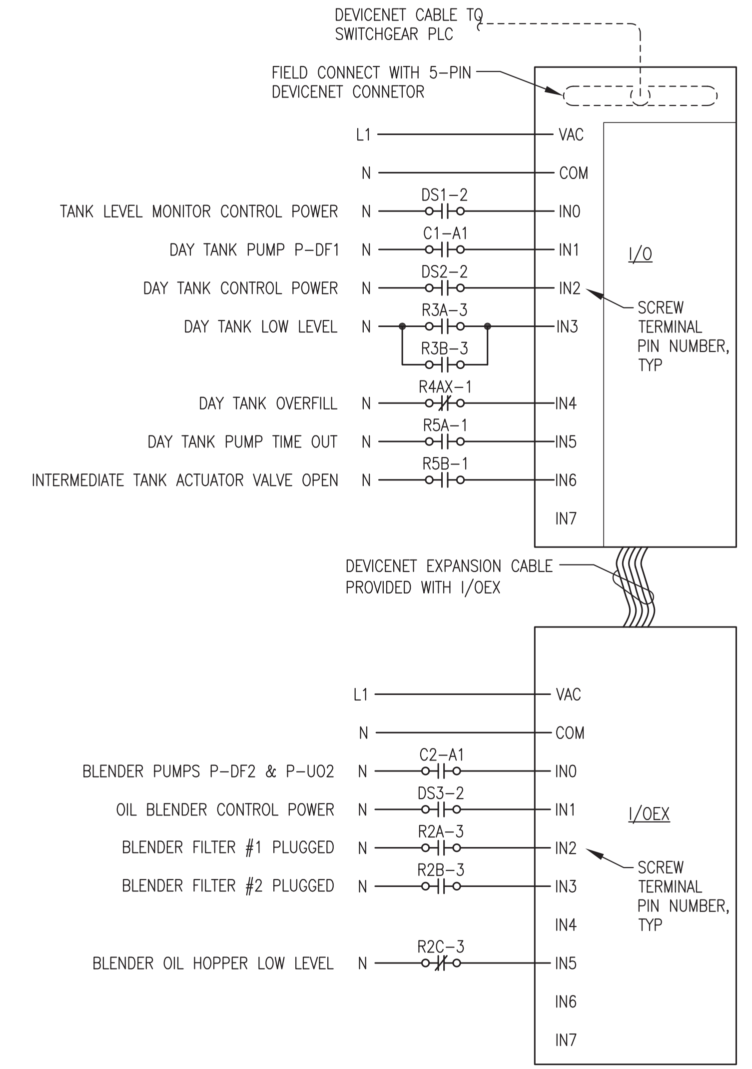
2) NORMAL OPERATION – WHENEVER THE DAY TANK FILL SEQUENCE IS INITIATED, BOTH THE DIESEL CIRCULATING PUMP P-DF2 AND THE USED OIL INJECTION PUMP P-UO2 RUN AND THE ASSOCIATED GREEN PUMP RUNNING LIGHTS ARE ON.

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.

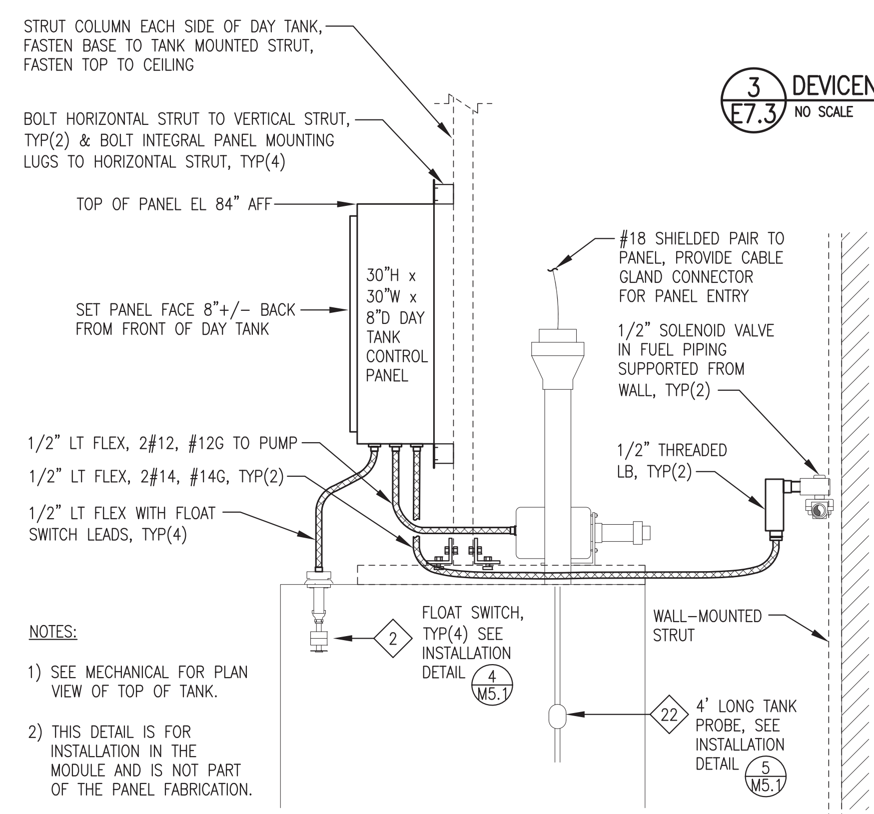
4) HOPPER LOW OIL LEVEL – WHEN THE OIL LEVEL FALLS BELOW THE LOW LEVEL FLOAT SWITCH, BOTH PUMPS STOP RUNNING AND THE AMBER HOPPER LOW OIL LEVEL LIGHT TURNS ON. THE SYSTEM WILL NOT OPERATE UNTIL THE USED OIL LEVEL IN THE HOPPER RISES ABOVE THE LOW LEVEL. RESET IS NOT REQUIRED.



1 E7.3 TANK LEVEL MONITOR (TLM) CONSOLE CONNECTIONS
NO SCALE



3 E7.3 DEVICENET TERMINAL BLOCKS (I/O & I/OEX) CONNECTIONS
NO SCALE



NOTES:

1) SEE MECHANICAL FOR PLAN VIEW OF TOP OF TANK.

2) THIS DETAIL IS FOR INSTALLATION IN THE MODULE AND IS NOT PART OF THE PANEL FABRICATION.

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

THE MAJORITY OF WORK ON THIS SHEET WAS PERFORMED AS PART OF THE PRIOR MODULE ASSEMBLY CONTRACT AND IS SHOWN HERE FOR REFERENCE ONLY. TERMINATION AT THE PANEL OF EXTERIOR FIELD CONDUCTORS SHOWN ON SHEET E2.1 IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

FUEL SYSTEM CONTROL PANEL SEQUENCE OF OPERATIONS & DETAILS

NO.	REVISION	BY	DATE
0	ISSUED FOR CONSTRUCTION	CWV	1/6/20

Plot Date 1/6/20
Designed CWV/BCG
Drawn JTD
Approved CWV

Sheet No. E7.3

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 CONDUCTOR SCHEDULE

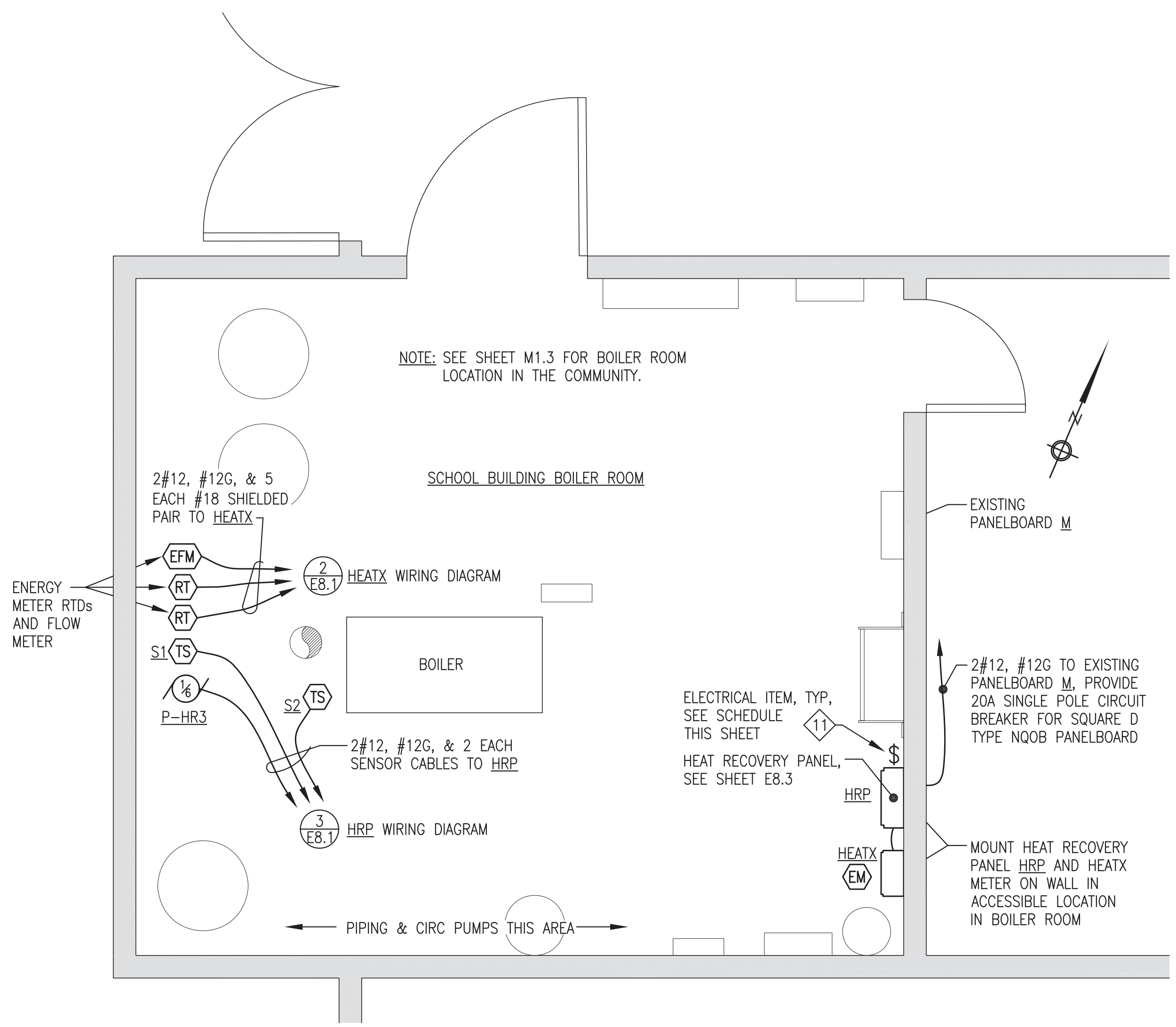
SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL	NOTES:
GENERAL USE CONDUCTORS	CLASS B CONCENTRIC STRANDED, SOFT DRAWN COPPER. TYPE XHHW INSULATION, 600V AND 75C RATED.		
SHIELDED/TWISTED INSTRUMENT & CONTROL CONDUCTORS	#18 AWG STRANDED TINNED COPPER CONDUCTORS, 600V POLYETHYLENE INSULATION, 100% COVERAGE 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.

ELECTRICAL EQUIPMENT SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
11	1ø SMALL MOTOR DISCONNECT	SINGLE POLE SNAP SWITCH WITH RED PILOT LIGHT, 120V, 20A, 1-1/2HP RATED, INSTALL IN 4"x4" STEEL BOX WITH METAL COVER	HUBBELL 1221-PL

ELECTRICAL INSTRUMENTATION SCHEDULE

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
TS	HRP TEMPERATURE SENSOR	TEMPERATURE SENSOR PROVIDED WITH HEAT RECOVERY PANEL, SEE SHEET E8.3	TEKMAR

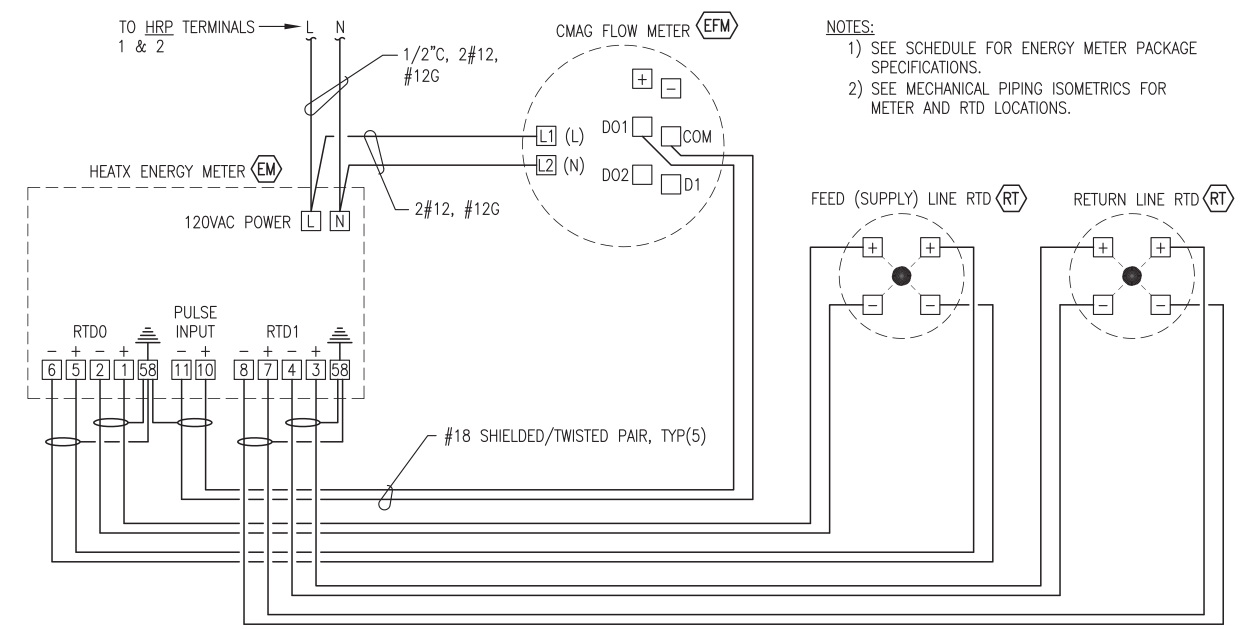


1 E8.1 SCHOOL BUILDING BOILER ROOM PLAN
1/2"=1'-0"

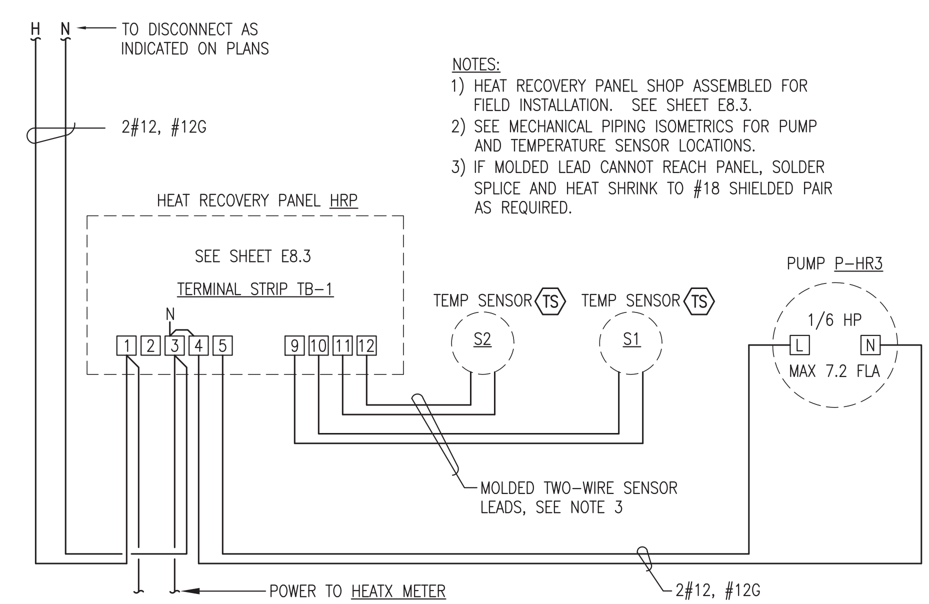
HEAT RECOVERY ENERGY MEASUREMENT SYSTEM SCHEDULE

PROVIDE A COMPLETE THERMAL ENERGY MEASUREMENT SYSTEM INCLUDING ENERGY (BTU) METER, MAGNETIC FLOW METER AND TWO IMPEDANCE MATCHED RTD's WITH PIPING WELLS. ALL SYSTEM COMPONENTS TO BE SUPPLIED AND CALIBRATED BY A SINGLE MANUFACTURER AND PROVIDED WITH A CERTIFICATE OF NIST TRACEABLE CALIBRATION FOR UTILITY GRADE METERING. CENTRAL STATION STEAM OR APPROVED EQUAL.

SYMBOL	SERVICE/FUNCTION	DESCRIPTION	MANUFACTURER/MODEL
EM	ENERGY METER	BTU METER FOR USE WITH FLOW METER AND RTD's SPECIFIED BELOW. WALL MOUNT, 120VAC, PROGRAMMABLE FOR WATER AND GLYCOL. DISPLAY TO INCLUDE TOTAL ENERGY, PERIODIC ENERGY (RESET), POSITIVE ENERGY (CHARGE), NEGATIVE ENERGY (DISCHARGE), VOLUME FLOW RATE, ENERGY RATE, SUPPLY TEMPERATURE AND RETURN TREMPERATURE.	CENTRAL STATION STEAM HEATX-W-0-AC-3.5-S
EFM	FLOW METER	FLOW METER FOR USE WITH ENERGY METER ABOVE. 2" ANSI 150# FLANGED CONNECTION, 120VAC, PFA LINER, HASTELLOY C ELECTRODES, 316 SS GROUND RINGS, INTEGRAL MOUNTED TRANSMITTER, RATED FOR 210F OPERATION.	CENTRAL STATION STEAM CADILLAC METER CMAG D-II-F-150-H-C-S-FM
RT	RTD	RESISTANCE TEMPERATURE DEVICE (RTD's) FOR USE WITH ENERGY METER ABOVE. PROVIDE TWO PRECISION IMPEDANCE MATCHED 4-WIRE RTD's WITH 3/4" NPT THERMAL WELLS.	CENTRAL STATION STEAM CADILLAC



2 E8.1 SCHOOL BUILDING ENERGY METER WIRING DIAGRAM
NO SCALE



3 E8.1 SCHOOL BUILDING HEAT RECOVERY PANEL (HRP) WIRING DIAGRAM
NO SCALE

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

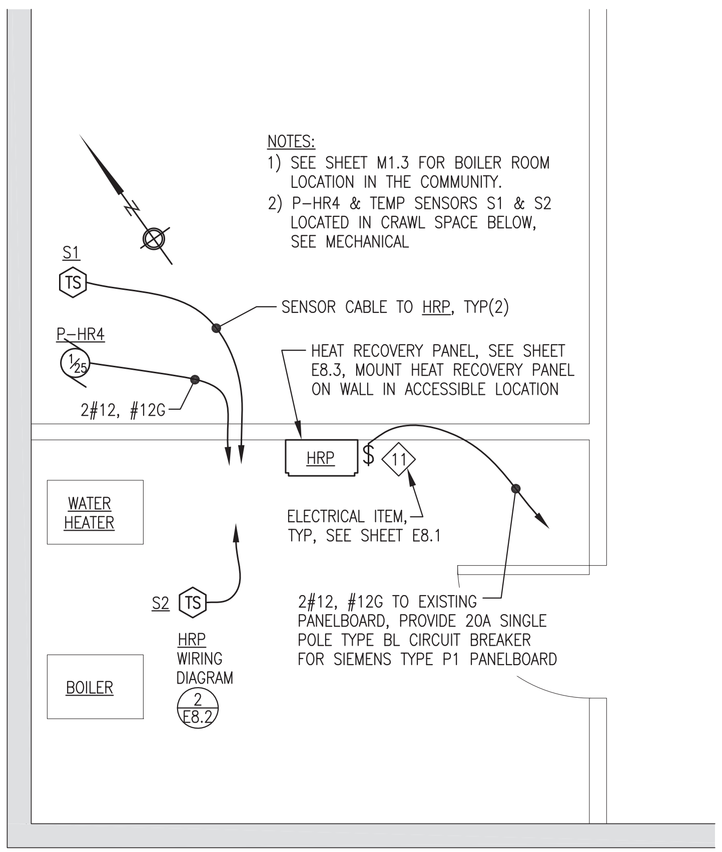
CRW ENGINEERING GROUP LLC
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
HEAT RECOVERY SYSTEM
SCHEDULES AND SCHOOL BUILDING PLAN & DETAILS

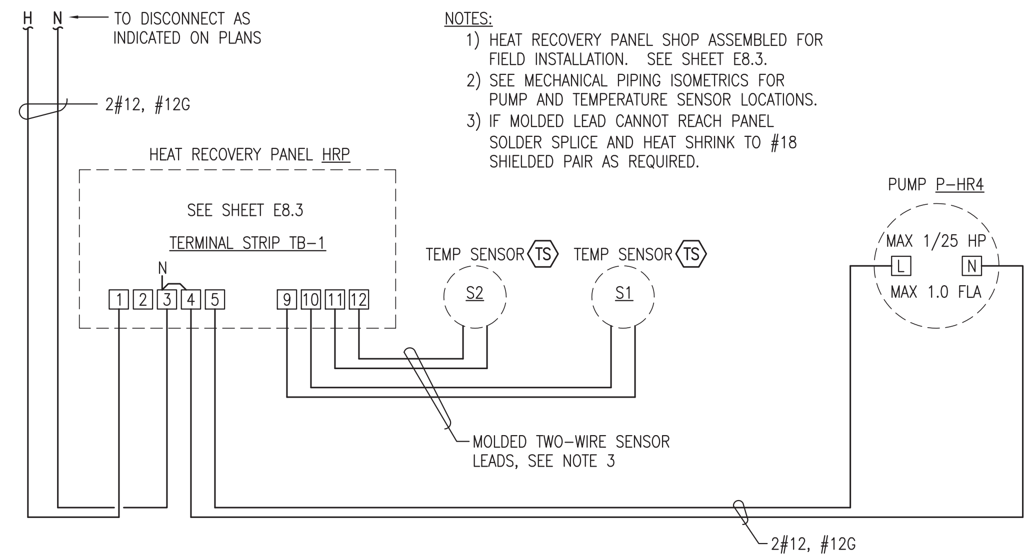
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	CWV	3/24/20

Plot Date 3/24/20
Designed CWV/BCG
Drawn JTD
Approved CWV

Sheet No. E8.1



1 E8.2 CLINIC BOILER ROOM & CRAWL SPACE PLAN
1/2"=1'-0"



NOTES:
1) HEAT RECOVERY PANEL SHOP ASSEMBLED FOR FIELD INSTALLATION. SEE SHEET E8.3.
2) SEE MECHANICAL PIPING ISOMETRICS FOR PUMP AND TEMPERATURE SENSOR LOCATIONS.
3) IF MOLDED LEAD CANNOT REACH PANEL SOLDER SPLICE AND HEAT SHRINK TO #18 SHIELDED PAIR AS REQUIRED.

2 E8.2 CLINIC HEAT RECOVERY PANEL (HRP) WIRING DIAGRAM
NO SCALE

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

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

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

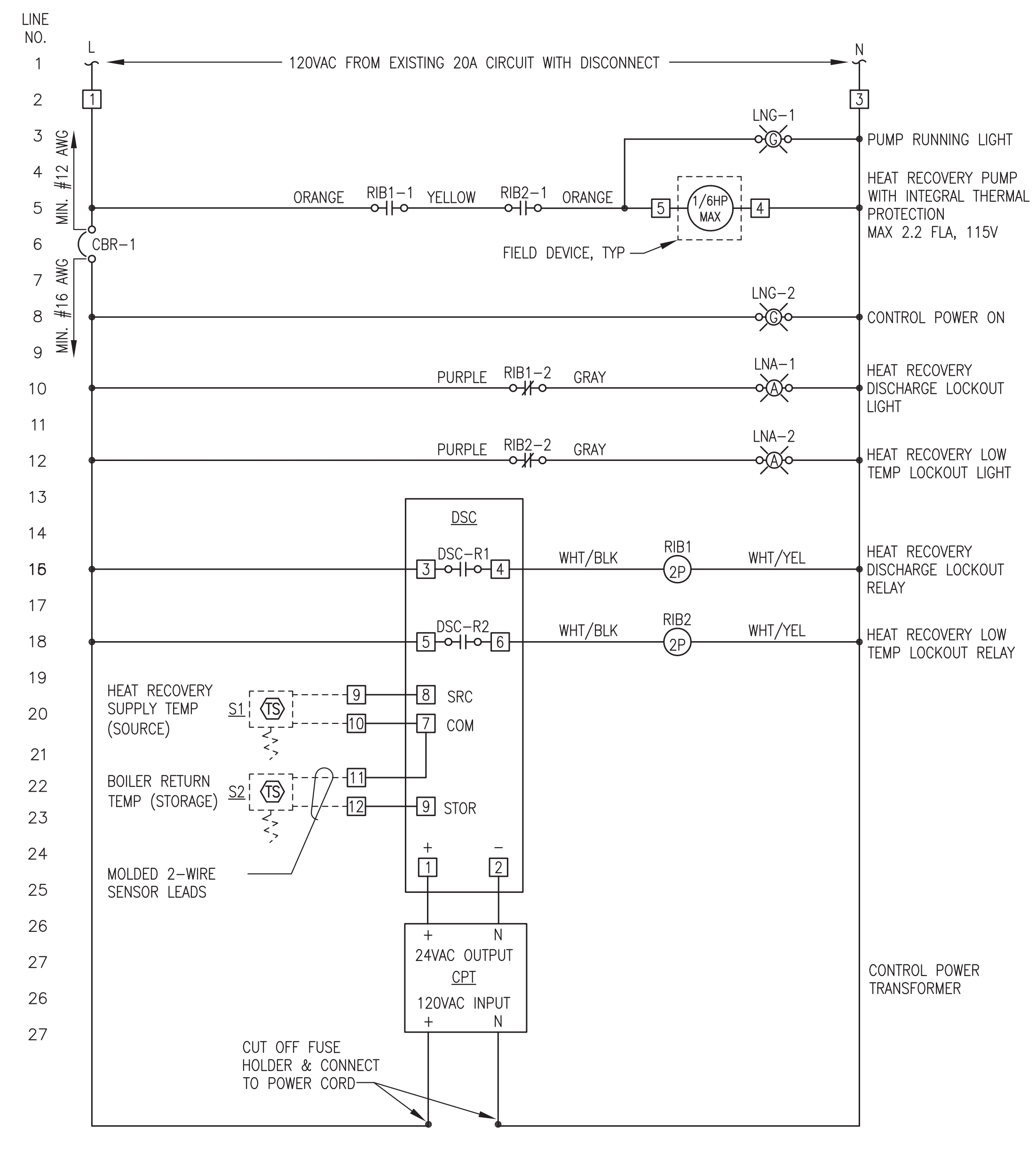
Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT
HEAT RECOVERY SYSTEM CLINIC PLAN & DETAILS

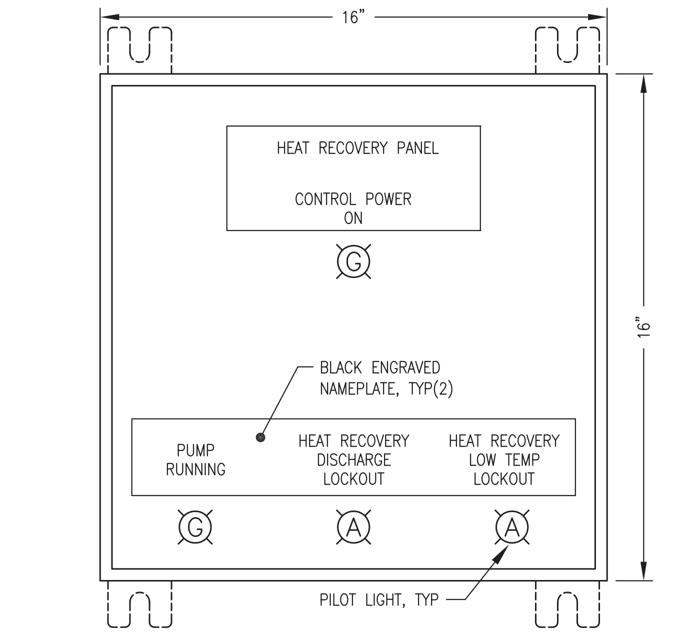
NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	CWV	3/24/20

Plot Date 3/24/20
Designed CWV/BCG
Drawn JTD
Approved CWV

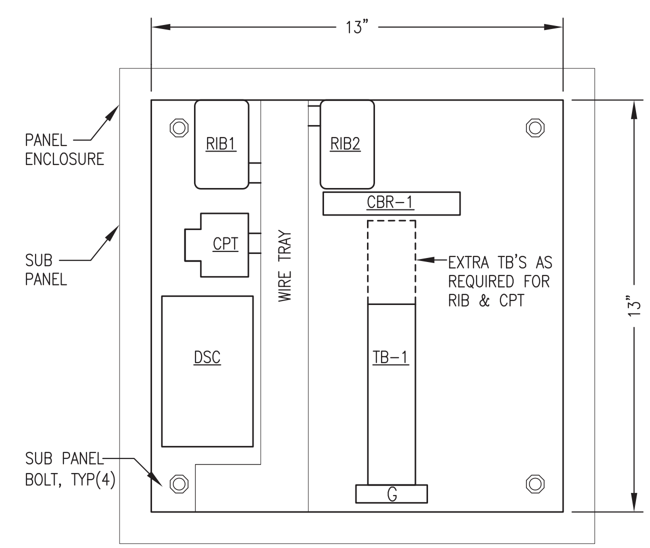
Sheet No. E8.2



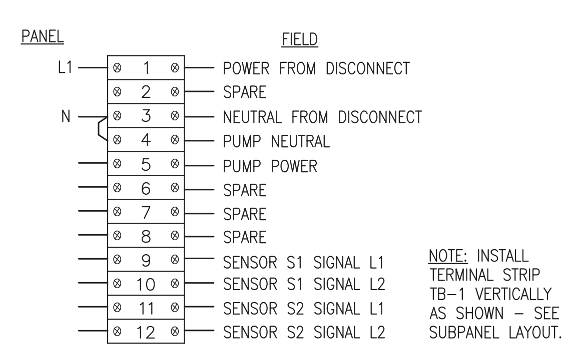
1 HEAT RECOVERY PANEL LOGIC DIAGRAM
E8.3 NO SCALE



2 FRONT PANEL LAYOUT
E8.3 NO SCALE



3 SUB PANEL LAYOUT
E8.3 NO SCALE



4 TERMINAL STRIP TB-1
E8.2 NO SCALE

LEGEND

R# CONTROL RELAY	R#-# NORMALLY OPEN CONTACT	CB-# CIRCUIT BREAKER
# TERMINAL BLOCK	R#-# NORMALLY CLOSED CONTACT	FIELD WIRING (dashed)
		PANEL WIRING (solid)

BILL OF MATERIALS

TAG	QTY	MANUFACTURER	MODEL	DESCRIPTION
CBR	1	ALLEN-BRADLEY	1489-A1-C050	RAIL-MOUNT CIRCUIT BREAKER, 1 POLE, 5A
CPT	1	TEKMAR	MODEL 009	40VA, 24VAC CONTROL POWER TRANSFORMER
DSC	1	TEKMAR	MODEL 155	DIFFERENTIAL SETPOINT CONTROLLER, 24VAC, 2 EACH N.O. RELAYS RATED 240V, 10A, 1/3HP
LNG	2	ALLEN-BRADLEY	800HQRH10G	GREEN LED PILOT LIGHT, 120V, NEMA 4X
LNA	2	ALLEN-BRADLEY	800HQRH10A	AMBER LED PILOT LIGHT, 120V, NEMA 4X
RIB1,2	2	FUNCTIONAL DEVICES	RIB2401D	2PDT RELAY, 120VAC COIL, 10A, 1/3HP N.C. RATED
S1,2	2	TEKMAR	MODEL 078	UNIVERSAL SENSOR, 10K THERMISTOR, 3/8" DIA x 3/4" LONG, 15' LEADS
TB		ALLEN-BRADLEY	1492CAM1L	35A, 600V, LARGE-HEAD SCREW TERMINALS

EQUIPMENT REQUIREMENTS FOR APPROVED EQUALS (APPLIES TO BILL OF MATERIALS): 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.

HEAT RECOVERY PANEL SEQUENCE OF OPERATION:

CONTROL POWER: WHEN THE CIRCUIT BREAKER IN THE LOAD CENTER IS CLOSED, THE WALL-MOUNT DISCONNECT IS CLOSED, AND THE INTERNAL CIRCUIT BREAKER CBR-1 IS CLOSED, POWER IS PROVIDED TO CONTROL DEVICES AND THE "CONTROL POWER ON" LIGHT IS ON.

NORMAL OPERATION: WHEN THE DIFFERENCE BETWEEN SENSOR S1 (HEAT RECOVERY SUPPLY TEMPERATURE "SOURCE") AND SENSOR S2 (BOILER RETURN TEMPERATURE "STORAGE") IS GREATER THAN THE DELTA-T SETPOINT (7 DEG F, ADJUSTABLE) AND; THE HEAT RECOVERY SUPPLY SENSOR S1 TEMPERATURE IS GREATER THAN THE MINIMUM SOURCE SETPOINT (150 DEG F, ADJUSTABLE) THE PUMP WILL RUN AND THE "PUMP RUNNING" LIGHT WILL BE ON.

DISCHARGE LOCKOUT OPERATION: WHEN THE DIFFERENCE BETWEEN SENSOR S1 AND SENSOR S2 BECOMES LESS THAN THE DELTA-T SETPOINT (7 DEG F, ADJUSTABLE) MINUS THE DELTA-T DIFFERENTIAL (5 DEG F, ADJUSTABLE), THE DSC-R1 RELAY WILL OPEN, THE RIB1 COIL WILL BE DE-ENERGIZED, THE AMBER "DISCHARGE LOCKOUT" LIGHT WILL TURN ON, AND THE PUMP WILL STOP. WHEN THE DIFFERENCE BETWEEN S1 AND S2 BECOMES GREATER THAN THE DELTA-T SETPOINT: THE DSC-R1 RELAY WILL CLOSE, THE RIB1 COIL WILL BE ENERGIZED, THE AMBER "DISCHARGE LOCKOUT" LIGHT WILL TURN OFF, AND THE PUMP WILL RUN.

DISTRICT HEAT LOW TEMPERATURE LOCKOUT OPERATION: IF THE HEAT RECOVERY SUPPLY TEMPERATURE (SENSOR S1 "SOURCE") FALLS TO LESS THAN THE MINIMUM SOURCE SETPOINT (150 DEG F, ADJUSTABLE): THE DSC-R2 RELAY WILL OPEN, THE RIB2 COIL WILL BE DE-ENERGIZED, THE AMBER "LOW HEAT RECOVERY TEMP LOCKOUT" LIGHT WILL TURN ON AND THE PUMP WILL STOP. WHEN THE HEAT RECOVERY SUPPLY TEMPERATURE (S1) RECOVERS AND BECOMES EQUAL TO THE MINIMUM SOURCE SETPOINT (150 DEG F, ADJUSTABLE) PLUS THE MINIMUM SOURCE DIFFERENTIAL (5 DEG F, ADJUSTABLE); THE DSC-R2 RELAY WILL CLOSE, THE RIB2 COIL WILL BE ENERGIZED, THE AMBER "LOW HEAT RECOVERY TEMP LOCKOUT" LIGHT WILL TURN OFF, AND THE PUMP WILL RUN.

SHOP FABRICATION NOTES:

1) FURNISH COMPLETE PANEL ASSEMBLY WITH ALL DEVICES INDICATED IN LOGIC DIAGRAM AND BILL OF MATERIALS ALONG WITH ALL PANEL DEVICE ACCESSORIES REQUIRED FOR COMPLETE INSTALLATION. FURNISH TEMPERATURE SENSORS LOOSE SHIP WITH PANEL FOR FIELD INSTALLATION.

2) INSTALL IN A 16"x16"x6" NEMA 12 ENCLOSURE, MIN 14 GAUGE STEEL CONSTRUCTION WITH 4 EACH INTEGRAL MOUNTING LUGS AT BACK, A MIN 14 GAUGE INTERIOR BACK PANEL, AND HINGED LOCKABLE DOOR. PAINT ENCLOSURE ANSI 61 GRAY AND PAINT BACK PANEL WHITE.

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

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

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

6) PROGRAM THE DIFFERENTIAL SETPOINT CONTROLLER (DSC) WITH THE FOLLOWING SETTINGS:
SET THE DRAINDOWN/DRAINBACK DIP SWITCH TO DRAINDOWN.
ΔT SETPOINT=7; ΔT DIFFERENTIAL=5; MINIMUM SOURCE SETPOINT=150; MINIMUM SOURCE DIFFERENTIAL=5; MAXIMUM STORAGE SETPOINT=200; MAXIMUM STORAGE DIFFERENTIAL=10. SET DISPLAY TO °F.

6) 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.

FIELD INSTALLATION NOTES:

1) PERFORM ALL FIELD WIRING IN ACCORDANCE WITH ELECTRICAL SPECIFICATIONS. FIELD WIRING TO MOTORS MIN #12 AWG. LABEL BOTH ENDS OF ALL CONDUCTORS WITH PANEL TERMINAL BLOCK TERMINATION NUMBERS.

ALL WORK ON THIS SHEET IS INCLUDED IN THE ON SITE CONTRACT.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP, LLC
PHONE: (907) 562-3252
Gray Stassel Engineering, Inc.
PHONE: (907) 349-0100

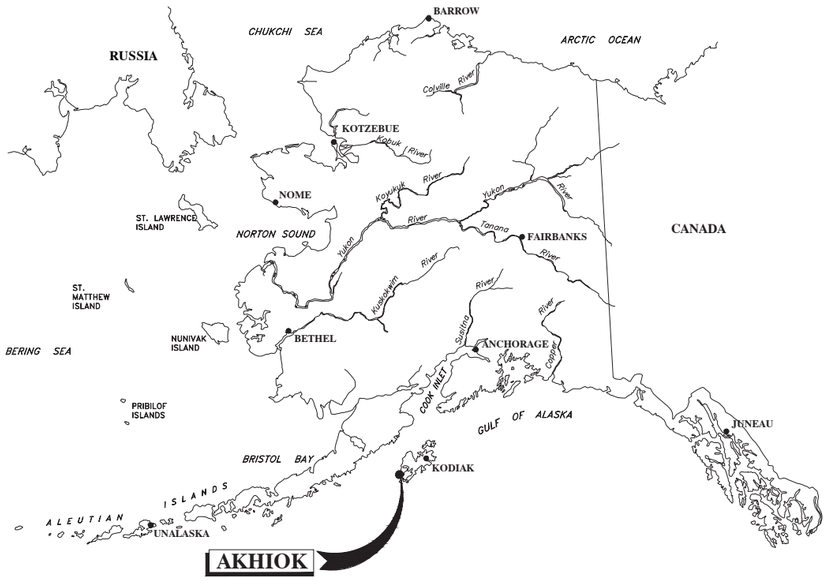
AKHIOK, ALASKA
POWER SYSTEM UPGRADE PROJECT

HEAT RECOVERY SYSTEM
TYPICAL HEAT RECOVERY PANEL "HRP"

NO.	REVISION	BY	DATE
0	ISSUED FOR ON SITE CONSTRUCTION	CWV	3/24/20

Plot Date 3/24/20
Designed CWV/BCG
Drawn JTD
Approved CWV

Sheet No. E8.3



ALASKA ENERGY AUTHORITY

813 West Northern Lights Blvd.
Anchorage, Alaska 99503

AKHIOK, ALASKA

ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT ISSUED FOR CONSTRUCTION MARCH 2020

Project Number (Consultant) 30412.00 (AEA) 20048

AEA Project Manager REBECCA GARRETT

Construction Manager _____

Final Design (Date) _____

Fire Marshal Approval (Date) _____

Construction Period (From) _____ (To) _____

As-Builts (Date) _____

CRW ENGINEERING GROUP, LLC
3940 Arctic Blvd. Suite 300
Anchorage, Alaska 99503
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#AKCL882-AK

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

SHEET INDEX

STATE OF ALASKA
49 TH
Tyler R. Keene
EE-14401
3/26/2020
REGISTERED PROFESSIONAL ENGINEER

Sheet No. G0.1

HORIZONTAL & VERTICAL CONTROL STATEMENT

CRW ENGINEERING GROUP LLC. CREATED A CUSTOM LOCAL LOW DISTORTION PROJECTION (LDP) SURFACE GRID COORDINATE SYSTEM FOR THE VILLAGE OF AKHIOK.

CRW ESTABLISHED THE BASIS OF COORDINATES BY AVERAGING 3 DAYS OF STATIC GPS THAT WAS PROCESSED BY NGS – ONLINE POSITION USER SERVICE (OPUS), FOR POINT NO. 601, A 3 1/4" DOMED TOP BRASS CAP, 0.5' BELOW NATURAL GROUND COVER, AND MARKED WITH ORANGE CARSONITE POST APPROXIMATE 1 FOOT NORTH. PROCESSED AVERAGED OPUS VALUES ARE LATITUDE 56° 56' 28.43956" N LONGITUDE 154° 10' 41.09088" W (NAD83(2011)), AND NAVD88 ELEVATION IS 31.67' AS COMPUTED BY GEOID12B.

NGS BASE STATIONS USED FOR OPUS PROCESSING

PID	DESIGNATION	LATITUDE	LONGITUDE
DM7499	AC45 SITKINAKISAK2006 CORS ARP	56° 33' 52.037" N	154° 10' 51.383" W
DL7659	AC26 CAPE_GULL_AK2008 CORS ARP	58° 12' 52.403" N	154° 09' 00.968" W
DL7662	AC38 QUARTZ_CRKAK2005 CORS ARP	57° 45' 13.269" N	153° 20' 30.658" W

CRW POINT NO. 601 IS THE BASIS OF COORDINATES WITH GRID COORDINATES OF NORTHING 10044.6097, EASTING 29994.9587.

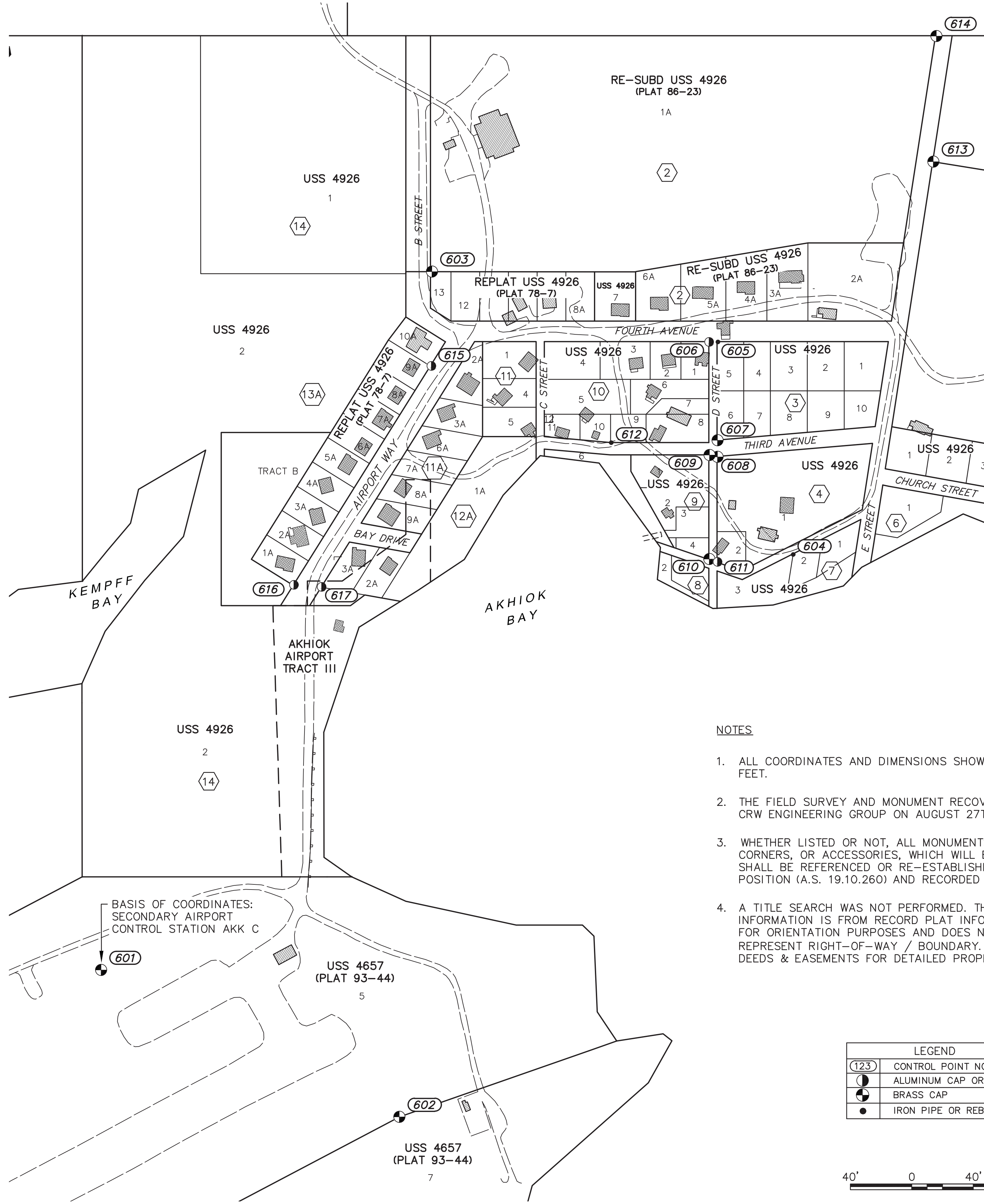
CRW LOCAL COORDINATE SYSTEM INFORMATION AND LDP PARAMETERS:
- NAME: AK83 AKHIOK TM LDP
- LINEAR UNIT: US SURVEY FEET
- GEODETIC DATUM: NAD83(2011)
- ELLIPSOID: GRS80
- PROJECTION: TRANSVERSE MERCATOR
- LATITUDE OF ORIGIN: 56° 56' 28.00" N
- CENTRAL MERIDIAN: 154° 10' 41.00" W
- FALSE NORTHING = 10000.00
- FALSE EASTING = 300000.00
- SCALE FACTOR = 1.0000033 (EXACT)

NO. 601
AK DOT
AKK C
LS 7222 2007

ALL DISTANCES AND BEARINGS SHOWN HEREON ARE PROJECTED (GRID) VALUES BASED ON THE PRECEDING PROJECTION DEFINITION. THE PROJECTION WAS DEFINED TO MINIMIZE THE DIFFERENCE BETWEEN PROJECTED (GRID) DISTANCES AND HORIZONTAL ("GROUND") DISTANCES AT THE TOPOGRAPHIC SURFACE WITHIN THE DESIGN AREA OF THIS COORDINATE SYSTEM. THE BASIS OF BEARINGS IS GEODETIC NORTH. NOTE THAT THE GRID BEARINGS SHOWN HEREON (OR IMPLIED BY GRID COORDINATES) DO NOT EQUAL GEODETIC BEARINGS DUE TO MERIDIAN CONVERGENCE.

HORIZONTAL CONTROL

POINT NO.	NORTHING	EASTING	DESCRIPTION
601	10044.61	29994.96	FOUND 3 1/4" BRASS CAP – S.A.C.S. AKK C – AK DOT
602	9686.53	30721.98	FOUND 3 1/4" BRASS CAP ON 2 1/2" POST – ANCSA 14(C) LOT 5, COR. 6 –BLM
603	11746.57	30801.44	FOUND 2" BRASS CAP – USS 4926 BLK. 2, LOT 11 – BLM
604	11057.05	31681.60	FOUND 5/8" REBAR – NO CAP
605	11575.03	31498.23	FOUND 5/8" REBAR – NO CAP
606	11574.94	31476.77	FOUND 2" ALUM. CAP ON 5/8" ALUM. ROD
607	11335.26	31497.49	FOUND 2" BRASS CAP – USS 4926 BLK. 3, LOT 6 – BLM
608	11295.11	31497.58	FOUND 2" BRASS CAP – USS 4926 BLK. 4, LOT 1 – BLM
609	11299.31	31477.80	FOUND 2" BRASS CAP – USS 4926 BLK. 9, LOT 1 – BLM
610	11045.89	31477.13	FOUND 2" BRASS CAP – USS 4926 BLK. 9, LOT 4 – BLM
611	11039.04	31497.25	FOUND 2" ALUM. CAP – BLK. 4, LOT 2
612	11329.56	31238.23	FOUND 5/8" REBAR – NO CAP
613	12014.36	32023.41	FOUND 3 1/4" BRASS CAP ON 2 1/2" POST – USS COR. 10 –BLM
614	12320.41	32030.76	FOUND 2" BRASS CAP – USS 4926 BLK. 2, LOT 1 – BLM
615	11516.40	30799.94	FOUND 2" ALUM. CAP ON 5/8" REBAR – BLK. 13A, LOT 9A
616	10983.26	30465.18	FOUND 2" ALUM. CAP ON 5/8" REBAR – BLK. 13A, LOT 1A
617	10978.18	30532.40	FOUND 1 1/2" ALUM. CAP ON 5/8" REBAR – BLK. 12A, LOT 3A



NOTES

1. ALL COORDINATES AND DIMENSIONS SHOWN ARE IN U.S. SURVEY FEET.
2. THE FIELD SURVEY AND MONUMENT RECOVERY WAS CONDUCTED BY CRW ENGINEERING GROUP ON AUGUST 27TH THROUGH 29TH, 2019.
3. WHETHER LISTED OR NOT, ALL MONUMENTS OR PROPERTY MARKERS, CORNERS, OR ACCESSORIES, WHICH WILL BE DISTURBED OR BURIED, SHALL BE REFERENCED OR RE-ESTABLISHED IN THEIR ORIGINAL POSITION (A.S. 19.10.260) AND RECORDED (A.S. 34.65.040).
4. A TITLE SEARCH WAS NOT PERFORMED. THE BACKGROUND LOT INFORMATION IS FROM RECORD PLAT INFORMATION AND IS SHOWN FOR ORIENTATION PURPOSES AND DOES NOT NECESSARILY REPRESENT RIGHT-OF-WAY / BOUNDARY. SEE RECORDED PLATS, DEEDS & EASEMENTS FOR DETAILED PROPERTY INFORMATION.

LEGEND

(123)	CONTROL POINT NO.
◐	ALUMINUM CAP OR PLCAP
◕	BRASS CAP
●	IRON PIPE OR REBAR

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP LLC

Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

SURVEY CONTROL
(1 of 1)

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Plot Date MARCH 2020
Designed TRK
Drawn BWW
Approved KMH

Sheet No. V0.1

PLAN SYMBOL LEGEND

- PADMOUNT TRANSFORMER ID AND KVA INDICATED (KVA / ID)
- PRIMARY SECTIONALIZING CABINET, THREE–PHASE OR SINGLE PHASE AS SHOWN ON ONE–LINE DIAGRAM
- 600 VAC PADMOUNT REACTOR, KVAR INDICATED
- SECONDARY SERVICE PEDESTAL
- EXISTING METER
- GROUND
- STREET LIGHT
- 3φ BURIED 15KV PRIMARY JCN CIC
- 1φ BURIED 15KV PRIMARY JCN CIC
- BURIED 600V SECONDARY UD CIC

ONE–LINE SYMBOL LEGEND

- 200A 15KV LOAD BREAK ELBOW INSTALLED ON LOAD BREAK BUSHING INSERT
- 200A 15KV LOAD BREAK ELBOW INSERT
- SC–X (3φ): FIBERGLASS SECTIONALIZING CABINET WITH 200A, 15KV RATED LOAD BREAK JUNCTIONS, THREE–PHASE OR SINGLE–PHASE AS INDICATED. INSTALL ON FIBERGLASS SLEEVE AS SPECIFIED. UNLESS OTHERWISE NOTED, INSTALL A MINIMUM OF 15' BACK FROM TRAVELED WAY.
- TR–X: PAD MOUNTED, OIL–FILLED TRANSFORMER WITH LOOP FEED LOAD BREAK INSERTS. KVA RATING, PRIMARY VOLTAGE, SECONDARY VOLTAGE, AND PHASE AS SHOWN IN THE TRANSFORMER SCHEDULE. INSTALL ON FIBERGLASS GROUND SLEEVE AS SPECIFIED. UNLESS OTHERWISE NOTED, INSTALL A MINIMUM OF 15' BACK FROM TRAVELED WAY.

CALL BEFORE YOU DIG!!!!

WATER AND SEWER UTILITY	CITY OF AKHIOK 907–836–2229
ELECTRIC UTILITY	CITY OF AKHIOK 907–836–2229

GENERAL DEMOLITION NOTES

1. COORDINATE ALL DEMOLITION WITH NEW WORK TO MINIMIZE OUTAGES, SEE SPECIFICATIONS.
2. ALL EXISTING PRIMARY CONDUCTORS, TRANSFORMERS, SECONDARY CONDUCTORS, AND ALL OTHER DISTRIBUTION EQUIPMENT SHALL BE REMOVED FROM SERVICE UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. ALL ABOVE GRADE EQUIPMENT REMOVED FROM SERVICE SHALL BE TAKEN FROM THE SITE AND DISPOSED OF PER STATE AND FEDERAL LAWS. EXISTING BURIED CONDUCTORS TAKEN OUT OF SERVICE AS A RESULT OF THIS PROJECT SHALL BE DEMOLISHED (WHEN ENCOUNTERED) AND DISPOSED OF OFF SITE.
4. UNLESS OTHERWISE NOTED ALL DEMOLITION WORK SHOW ON THE PLANS IS PART OF THE ELECTRICAL DISTRIBUTION UPGRADE BASE BID.

GENERAL NEW WORK NOTES

1. SEE ONE–LINE DIAGRAM, SHEET E10.4 FOR CABLE SIZES.
2. EXISTING SERVICE LINES SHALL REMAIN ENERGIZED UNTIL NEW SYSTEM AND SERVICE LINES ARE IN PLACE. LIMIT OUTAGE DURING SERVICE LINE CONNECTIONS TO 1 HOUR.
3. ALL EXISTING METER BASES ARE TO REMAIN.
4. VISIBLE POWER AND TELEPHONE UTILITY EQUIPMENT HAS BEEN FIELD SURVEYED. UNDERGROUND UTILITIES HAVE NOT BEEN LOCATED.
5. REPAIR ALL ROADS AND DRIVEWAYS AFFECTED BY THE INSTALLATION OF THE NEW BURIED CABLE. PLACE 2" MINUS NFS FILL IN MAX. 8" LIFTS AND COMPACT TO 95% OF MAXIMUM DENSITY. TOP 6" OF ROAD/DRIVEWAY FILL TO BE 1" MINUS NFS SUITABLE FOR ROAD CONSTRUCTION. BLEND TOP OF FILL WITH EXISTING ROAD/DRIVEWAY SURFACE AND SLOPE FOR PROPER DRAINAGE.
6. ALL DISTRIBUTION EQUIPMENT TO BE LOCATED WITHIN EXISTING ROAD RIGHT–OF–WAY OR UTILITY EASEMENT AND AS SHOWN IN DETAILS.
7. CONTRACTOR SHALL CLEARLY LABEL EACH CIRCUIT COMING INTO EACH SECTIONALIZING CABINET TO ENSURE THAT THE CIRCUITS OR PHASES WILL NOT BE CROSSED. SEE SPECIFICAITONS.
8. WHERE IT IS NECESSARY TO CROSS IN–SERVICE POWER CABLES, IF EXISTING CABLE IS BURIED A MINIMUM 5' DEEP. CROSS THE NEW POWER CABLES ABOVE (4' MINIMUM BURIAL DEPTH PLUS 1' CLEAR). IF EXISTING BURIED CABLE IS LESS THAN 5' BELOW GRADE, TRENCH AND INSTALL NEW CABLES BELOW EXISTING.
9. PRIMARY AND SECONDARY CONDUCTOR ROUTINGS SHOWN DIAGRAMMATIC AND DO NOT INDICATE ACTUAL BURIED ROUTING. FIELD ROUTE AS REQUIRED TO MINIMIZE TRENCHING AND AVOID OTHER UTILITIES AND OBSTACLES. BURY SECONDARY CONDUCTORS IN SAME TRENCH AS PRIMARY CONDUCTORS WHERE EVER POSSIBLE TO ELIMINATE UNNECESSARY TRENCHING.
10. ALL EXISTING STREET LIGHTS TO REMAIN. RE–SERVE WITH NEW SYSTEM.
11. CONTACT LOCAL ELECTRIC UTILITY TO CONFIRM THAT SERVICE TO EACH BUILDING IS REQUIRED PRIOR TO RESERVING. ABANDON EXISTING SERVICE CONDUCTORS BELOW GRADE. OBTAIN WRITTEN CONFIRMATION FROM LOCAL UTILITY FOR ANY STRUCTURES NOT RE–SERVED BY THE NEW SYSTEM.
12. UNLESS OTHERWISE NOTED ALL NEW WORK SHOW ON THE PLANS IS PART OF THE ELECTRICAL DISTRIBUTION UPGRADE BASE BID.

ABBREVIATIONS

(E)	EXISTING
A	AMPERE
AC	ALTERNATING CURRENT
AIC	AMPERES INTERRUPTING CAPACITY
AWG	AMERICA WIRE GAGE
BCu	BARE COPPER
C	CONDUCTOR
C	CONDUIT
CB	CIRCUIT BREAKER
CIC	CABLE IN CONDUIT
CT	CURRENT TRANSFORMER
DIA	DIAMETER
DISC	DISCONNECT
DWG	DRAWING
EA	EACH
EL	ELEVATION
F	FAHRENHEIT
FT	FEET
FU	FUSE
G,GND	GROUND
H	HOT CONDUCTOR
HDPE	HIGH DENSITY POLYETHYLENE
HPS	HIGH PRESSURE SODIUM
HZ	HERTZ
JCN	JACKETED CONCENTRIC NEUTRAL
KVA	KILOVOLT–AMPERES
KW	KILOWATT
LFMC	LIQUID–TIGHT FLEXIBLE METAL CONDUIT
LFNC	LIQUID–TIGHT FLEXIBLE NON–METALLIC CONDUIT
LTG	LIGHTING
M	METER
MAX	MAXIMUM
MCM	THOUSAND CIRCULAR MILLS
MFR	MANUFACTURER
MIN	MINIMUM
N	NEUTRAL CONDUCTOR
NTS	NOT TO SCALE
P	POLE
PED	SECONDARY SERVICE PEDESTAL
PDS	PRIMARY DISTRIBUTION SWITCHGEAR
PH	PHASE
PVC	POLYVINYL CHLORIDE
R	SHUNT REACTOR
RMC	RIGID METAL CONDUIT, GALVANIZED
TR	TRANSFORMER
TYP	TYPICAL
UD	UNDERGROUND DISTRIBUTION
U/G	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
USGS	UNITED STATES GEOLOGICAL SURVEY
V	VOLTS
VA	VOLT–AMPERES
VAC	VOLTS–ALTERNATING CURRENT
W	WATTS
WP	WEATHERPROOF
XFMR	TRANSFORMER
XLP	CROSS LINKED POLYETHYLENE

TRANSFORMER SCHEDULE

TRANSFORMER NUMBER	CAPACITY	PRIMARY VOLTAGE	PH	SECONDARY VOLTAGE	PH
TR–1	75kVA	12.47kV/7.2kV	3φ	208Y120V	3φ
TR–2A	25kVA	7.2kV	1φ	240/120V	1φ
TR–2B	15kVA	7.2kV	1φ	240/120V	1φ
TR–3A	15kVA	7.2kV	1φ	240/120V	1φ
TR–3B	15kVA	7.2kV	1φ	240/120V	1φ
TR–4A	15kVA	7.2kV	1φ	240/120V	1φ
TR–4B	25kVA	7.2kV	1φ	240/120V	1φ
TR–5A	15kVA	7.2kV	1φ	240/120V	1φ
TR–5B	15kVA	7.2kV	1φ	240/120V	1φ
TR–5C	15kVA	7.2kV	1φ	240/120V	1φ
TR–6A	15kVA	7.2kV	1φ	240/120V	1φ
TR–6B	15kVA	7.2kV	1φ	240/120V	1φ
TR–7	15kVA	7.2kV	1φ	240/120V	1φ
TR–9	15kVA	7.2kV	1φ	240/120V	1φ

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP, LLC PHONE: (907) 562–3252

Gray Stassel Engineering, Inc. PHONE: (907) 349–0100

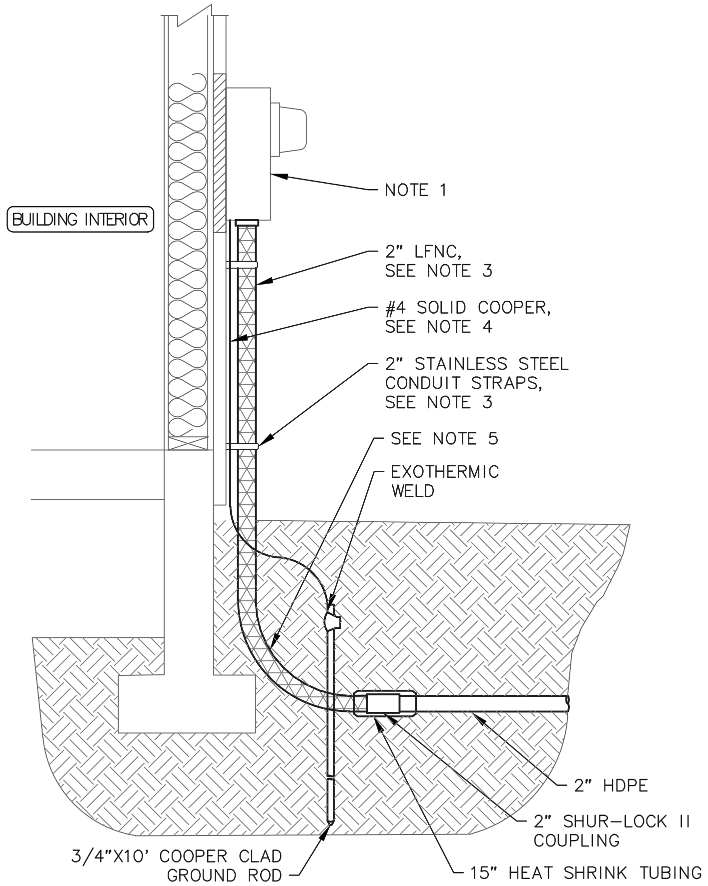
AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

DISTRIBUTION LEGEND, ABBREVIATIONS, SCHEDULES, & NOTES

NO.	REVISION	BY	DATE

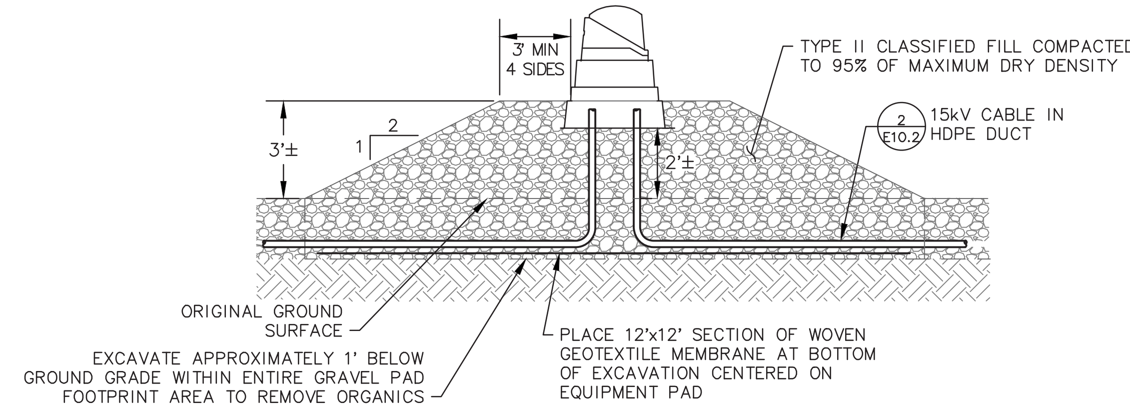
Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E10.1

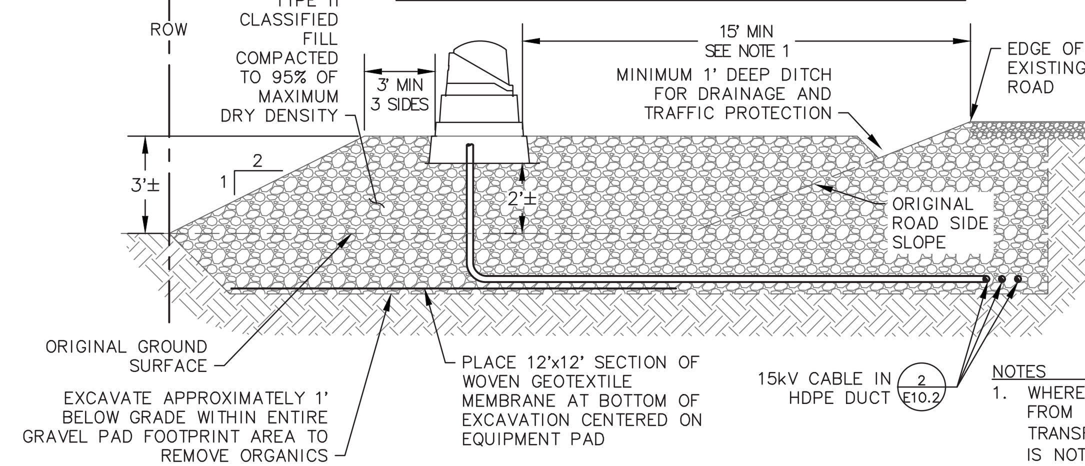


NOTES
1. EXISTING METER BASE TO REMAIN.
2. INSTALL WATERTIGHT HUB ON SERVICE RISER METER BASE PENETRATION. TERMINATE LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT (LFNC) WITH A GASKETED STRAIGHT CONNECTOR.
3. INSTALL 2-HOLE STAINLESS STEEL CONDUIT STRAPS WITH STAINLESS STEEL BOLTS. ON WOOD SIDING OR WOOD LIGHT POLES USE LAG BOLTS. ON BRICK OR MASONRY USE PLASTIC INSERTS.
4. ATTACH NEW GROUND WIRE TO BUILDING WITH PVC STRAPS.
5. CURVE LFNC CONDUIT UP AS REQUIRED TO MAKE SERVICE CONNECTION. KEEP RADIUS OF CURVE BELOW GRADE AND DO NOT BEND CONDUIT SMALLER THAN A 12" RADIUS.

1 / E10.2 **METER BASE RISER DETAIL**
Scale: NTS



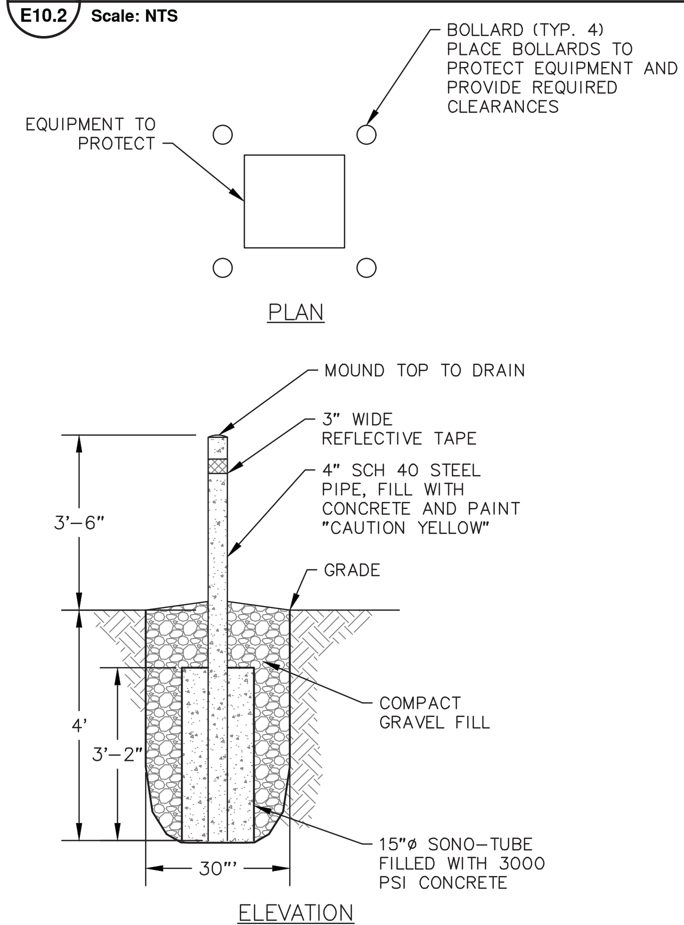
TYPICAL REMOTE CROSS-COUNTRY INSTALLATION



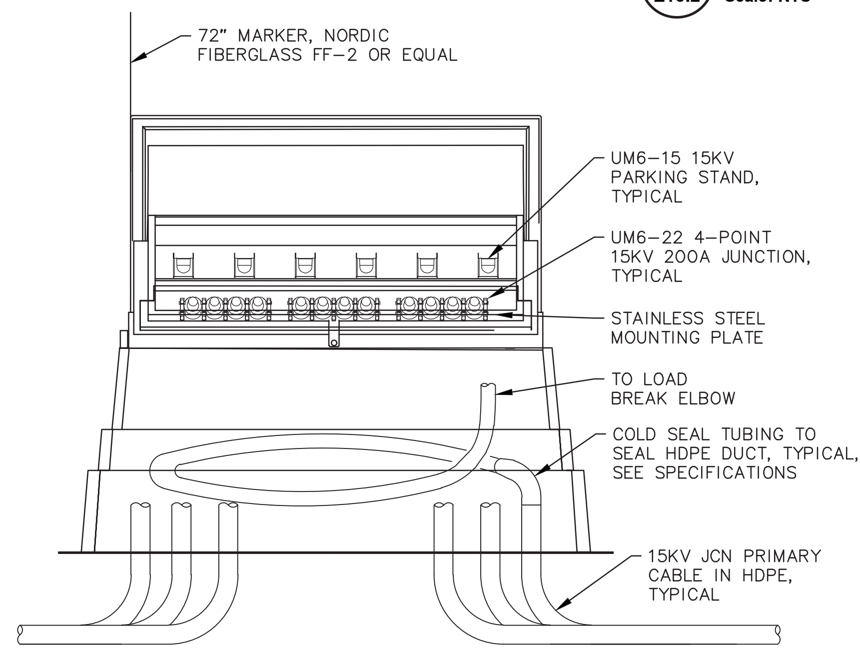
TYPICAL ROADSIDE INSTALLATION

NOTES
1. WHERE 15' MIN CLEARANCE FROM ROAD EDGE TO TRANSFORMER/SECTIONALIZING IS NOT POSSIBLE, PROVIDE (4) BOLLARDS TO PROTECT EQUIPMENT.

2 / E10.2 **TYPICAL TRANSFORMER/SECTIONALIZING CABINET INSTALLATION**
Scale: NTS

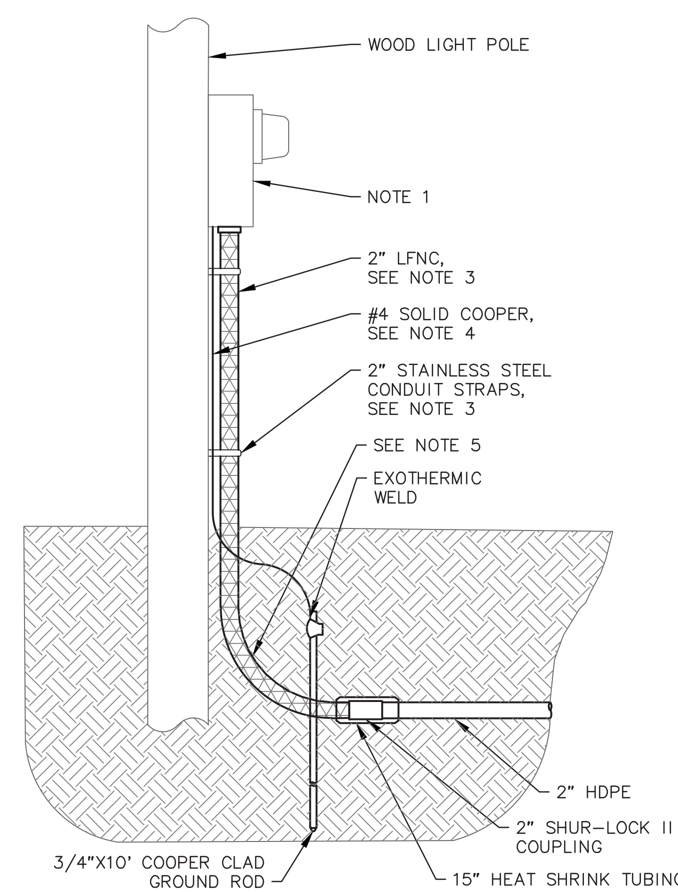


3 / E10.2 **BOLLARD DETAIL**
Scale: NTS



NOTES
1. INSTALL GROUNDING LUG, HUBBELL/FARGO CC-207P ON MOUNTING BOARD AND CONNECT TO GROUND.
2. SEE UM33 FOR ADDITIONAL GROUNDING NOTES.
3. INSTALL DRAIN WIRE ON EACH UM6-10.
4. ENSURE THAT ALL METAL COMPONENTS ARE GROUNDED.
5. PROVIDE SLACK IN THE CABLE TO THE MAXIMUM EXTENT PRACTICABLE. IF POSSIBLE, PROVIDE ONE FULL LOOP AROUND THE BASE OF THE GROUND SLEEVE OR SECTIONALIZING CABINET FOR EACH CABLE.

4 / E10.2 **SECTIONALIZING CABINET SPECIFIC REQUIREMENTS**
Scale: NTS



NOTES
1. EXISTING METER BASE TO REMAIN.
2. INSTALL WATERTIGHT HUB ON SERVICE RISER METER BASE PENETRATION. TERMINATE LIQUID-TIGHT FLEXIBLE NON-METALLIC CONDUIT (LFNC) WITH A GASKETED STRAIGHT CONNECTOR.
3. INSTALL 2-HOLE STAINLESS STEEL CONDUIT STRAPS WITH STAINLESS STEEL LAG BOLTS.
4. ATTACH NEW GROUND WIRE TO WOOD POLE WITH STAPLES.
5. CURVE LFNC CONDUIT UP AS REQUIRED TO MAKE SERVICE CONNECTION. KEEP RADIUS OF CURVE BELOW GRADE AND DO NOT BEND CONDUIT SMALLER THAN A 12" RADIUS.

1 / E10.2 **LIGHTING METER BASE RISER DETAIL**
Scale: NTS

ALASKA ENERGY AUTHORITY

STATE OF ALASKA — 49 TH — Kyle R. Keene — EE-14401 — 3/26/2020 — REGISTERED PROFESSIONAL ENGINEER

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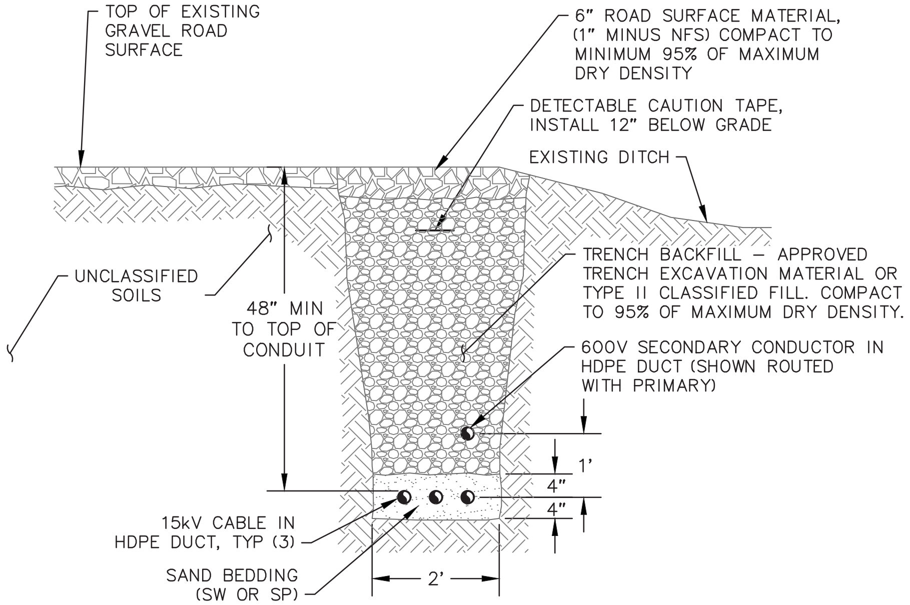
Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT
DETAILS

NO.	REVISION	BY	DATE

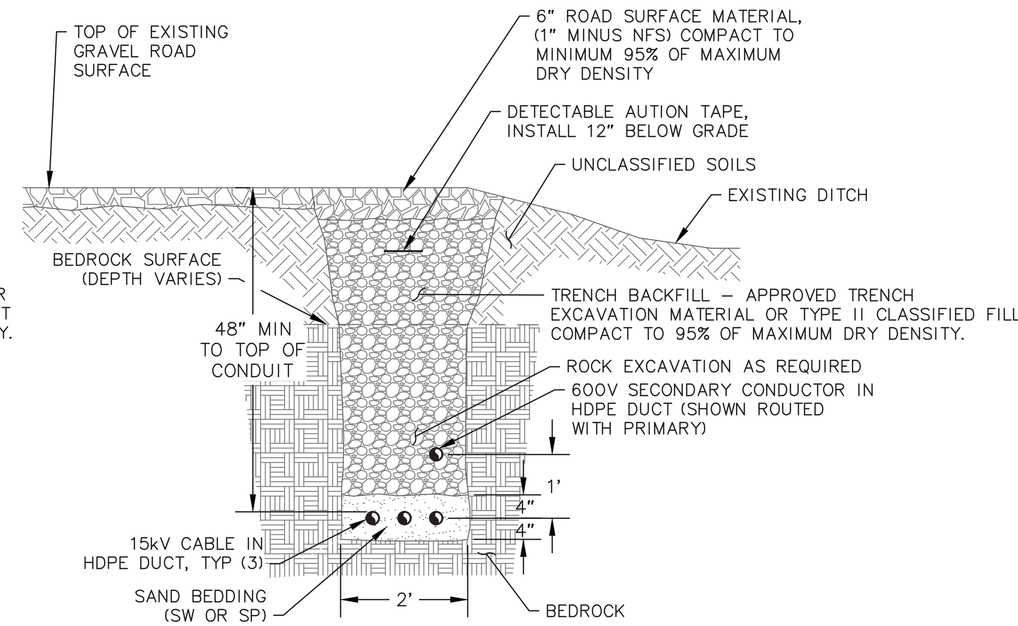
Plot Date: MARCH 2020
Designed: TRK
Drawn: TRK
Approved: KMH

Sheet No. E10.2



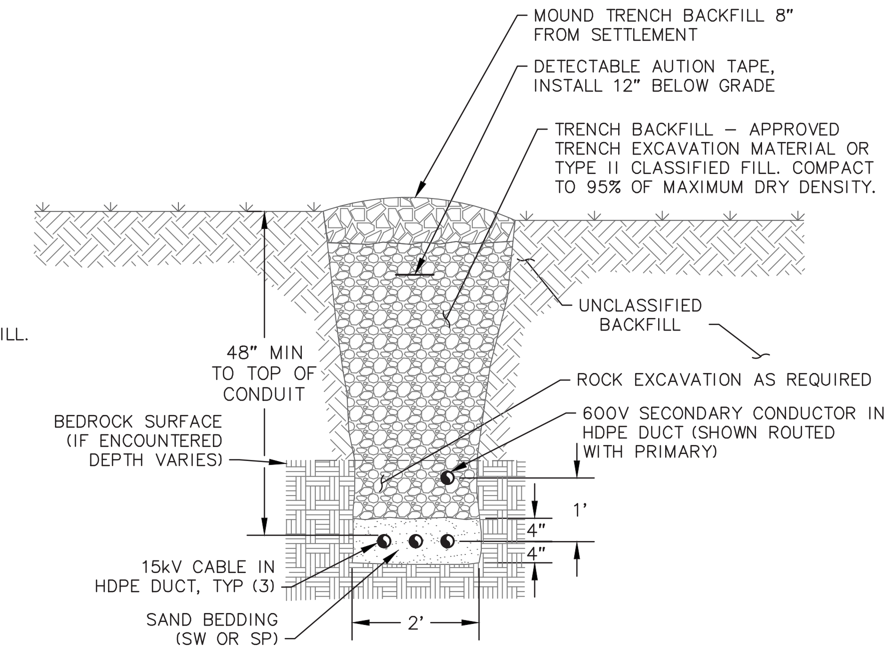
NOTES
1. MAINTAIN MINIMUM 12 INCHES OF SEPARATION BETWEEN 600V AND 15kV CABLE AT ALL TIMES. SEPARATION CAN BE VERTICAL OR HORIZONTAL.
2. 600V CABLE SHALL HAVE A MINIMUM OF 36" COVER AT ALL LOCATION.
3. ALL TRENCHING AND OTHER EXCAVATIONS SHALL BE SLOPED OR SHORED IN ACCORDANCE WITH OSHA STANDARDS.

1 / E10.3 **CABLE INSTALLATION IN ROAD, NO BEDROCK**
Scale: NTS



NOTES
1. MAINTAIN MINIMUM 12 INCHES OF SEPARATION BETWEEN 600V AND 15kV CABLE AT ALL TIMES. SEPARATION CAN BE VERTICAL OR HORIZONTAL.
2. 600V CABLE SHALL HAVE A MINIMUM OF 36" COVER AT ALL LOCATION.
3. ALL TRENCHING AND OTHER EXCAVATIONS SHALL BE SLOPED OR SHORED IN ACCORDANCE WITH OSHA STANDARDS.

2 / E10.3 **CABLE INSTALLATION IN ROAD WITH BEDROCK**
Scale: NTS



NOTES
1. MAINTAIN MINIMUM 12 INCHES OF SEPARATION BETWEEN 600V AND 15kV CABLE AT ALL TIMES. SEPARATION CAN BE VERTICAL OR HORIZONTAL.
2. 600V CABLE SHALL HAVE A MINIMUM OF 36" COVER AT ALL LOCATION.
3. ALL TRENCHING AND OTHER EXCAVATIONS SHALL BE SLOPED OR SHORED IN ACCORDANCE WITH OSHA STANDARDS.

3 / E10.3 **CABLE INSTALLATION OFF ROAD**
Scale: NTS

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP, LLC
Gray Stassel Engineering, Inc.

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

TRENCH DETAILS

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Plot Date MARCH 2020
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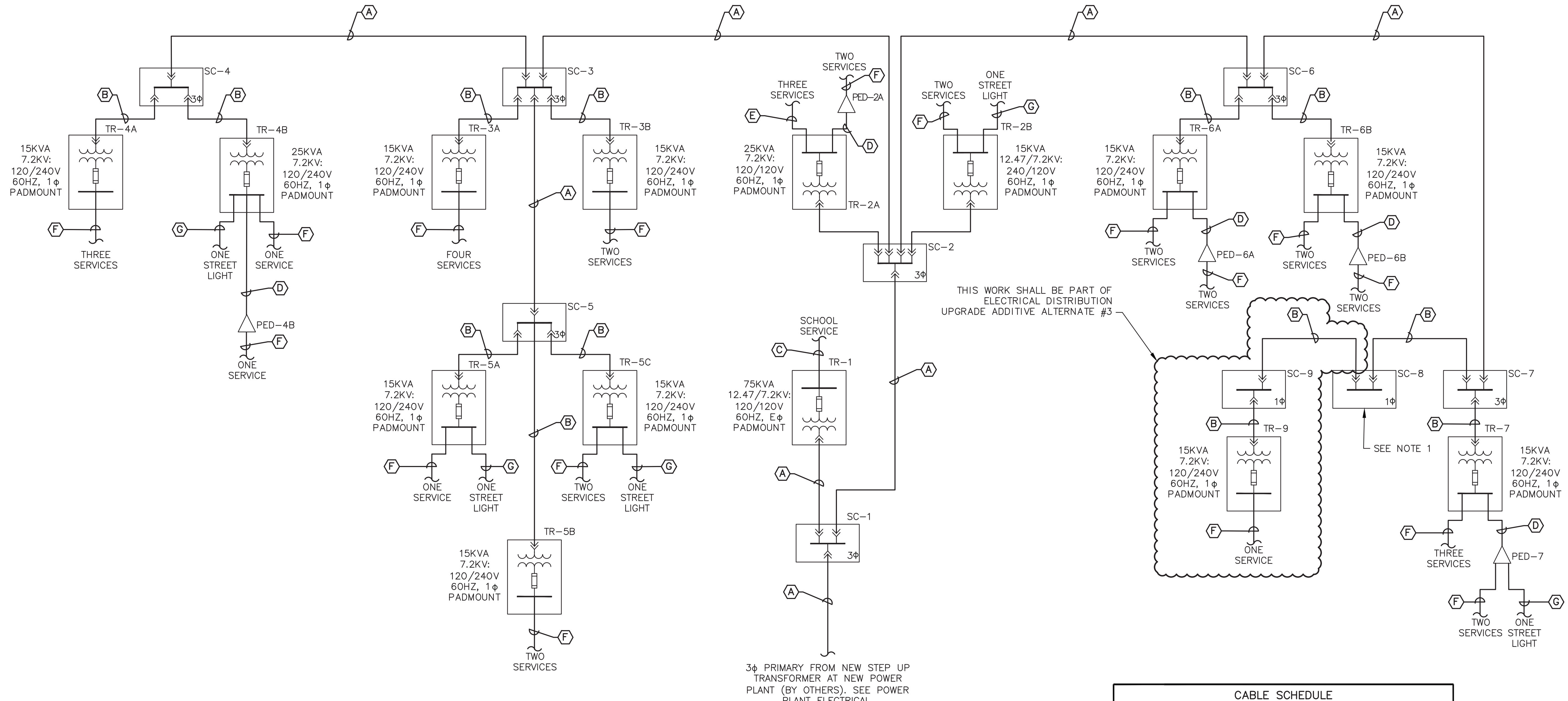


CABLE SCHEDULE

TYPE	DESCRIPTION
(A)	NEW (3) #1/O AWG, ALUMINUM, 15KV JACKETED CONCENTRIC NEUTRAL, STRAND-FILLED, EACH FACTORY INSTALLED IN 1-1/2" HDPE CONDUIT, 2500' SPOOL LENGTH.
(B)	NEW (1) #1/O AWG, ALUMINUM, 15KV JACKETED CONCENTRIC NEUTRAL, STRAND-FILLED, EACH FACTORY INSTALLED IN 1-1/2" HDPE CONDUIT, 2500' SPOOL LENGTH.
(C)	#4/O AWG, QUADRUPLEX, ALUMINUM, 600 VOLT XLP, UNDERGROUND DISTRIBUTION IN 3" HDPE.
(D)	#4/O AWG, TRI-PLEX, ALUMINUM, 600 VOLT XLP, UNDERGROUND DISTRIBUTION IN 2" HDPE.
(E)	#2/O AWG, TRI-PLEX, ALUMINUM, 600 VOLT XLP, UNDERGROUND DISTRIBUTION IN 2" HDPE.
(F)	#2 AWG, TRI-PLEX, ALUMINUM, 600 VOLT XLP, UNDERGROUND DISTRIBUTION IN 2" HDPE.
(G)	#6 AWG, DUPLEX, ALUMINUM, 600 VOLT XLP, UNDERGROUND DISTRIBUTION IN 2" HDPE.

NOTES

1. IF DISTRIBUTION UPGRADE ADDITIVE ALTERNATIVE #3 IS NOT AWARDED, LOCATE EXISTING BURIED 15KV PRIMARY CONDUCTORS FEEDING EXISTING TRANSFORMER FOR FAA EQUIPMENT AND PLACE NEW SECTIONALIZING CABINET SC8 ABOVE TO FEED EXISTING TRANSFORMER FROM THE NEW DISTRIBUTION SYSTEM.

ALASKA ENERGY AUTHORITY

CRW ENGINEERING GROUP, LLC

Gray Stassel Engineering, Inc.

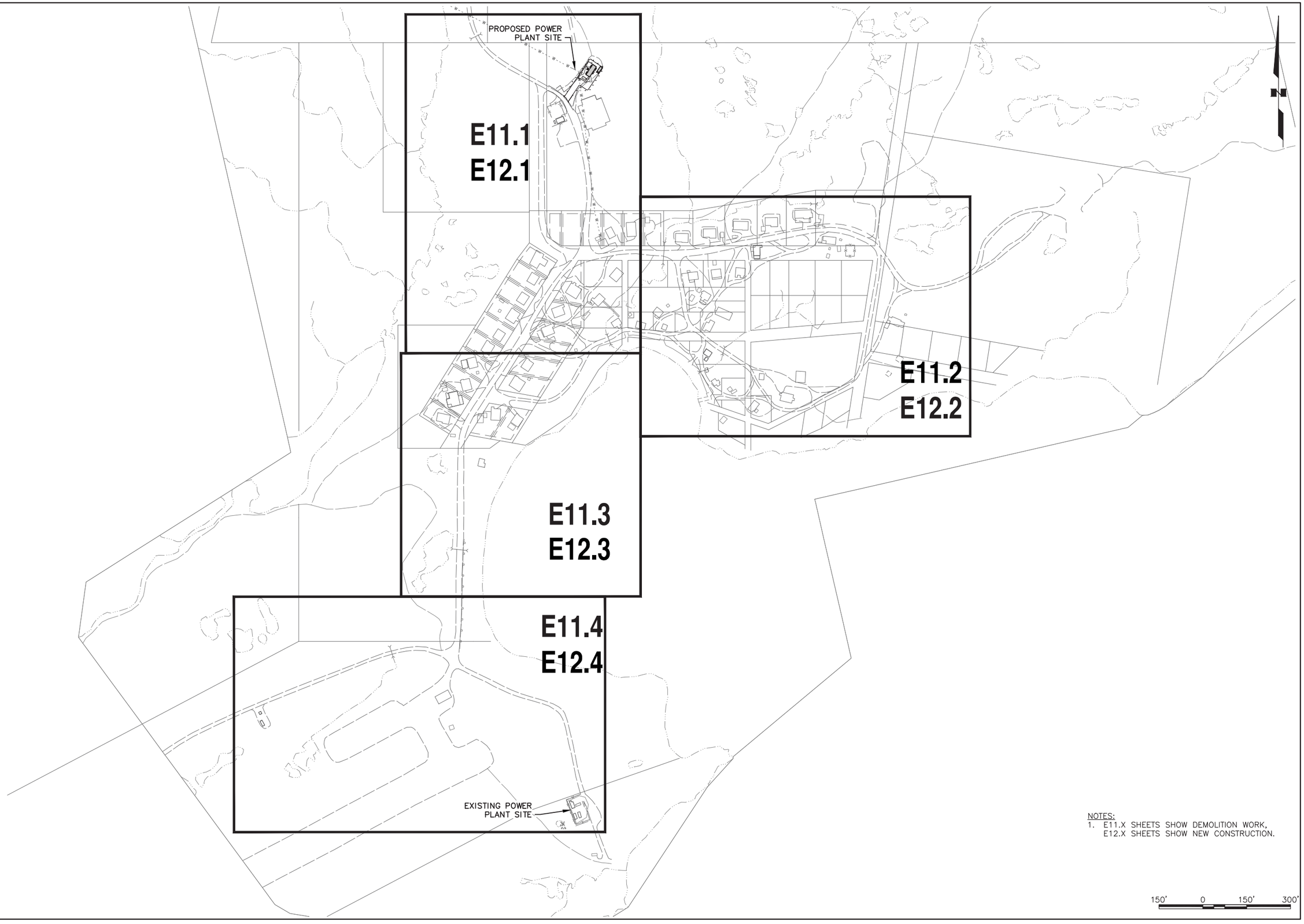
AKHIOK, ALASKA ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT

ONE-LINE DIAGRAM (1 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E10.4



NOTES:
1. E11.X SHEETS SHOW DEMOLITION WORK, E12.X SHEETS SHOW NEW CONSTRUCTION.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH R. Keene EE-14401 12/26/2020 REGISTERED PROFESSIONAL ENGINEER

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Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

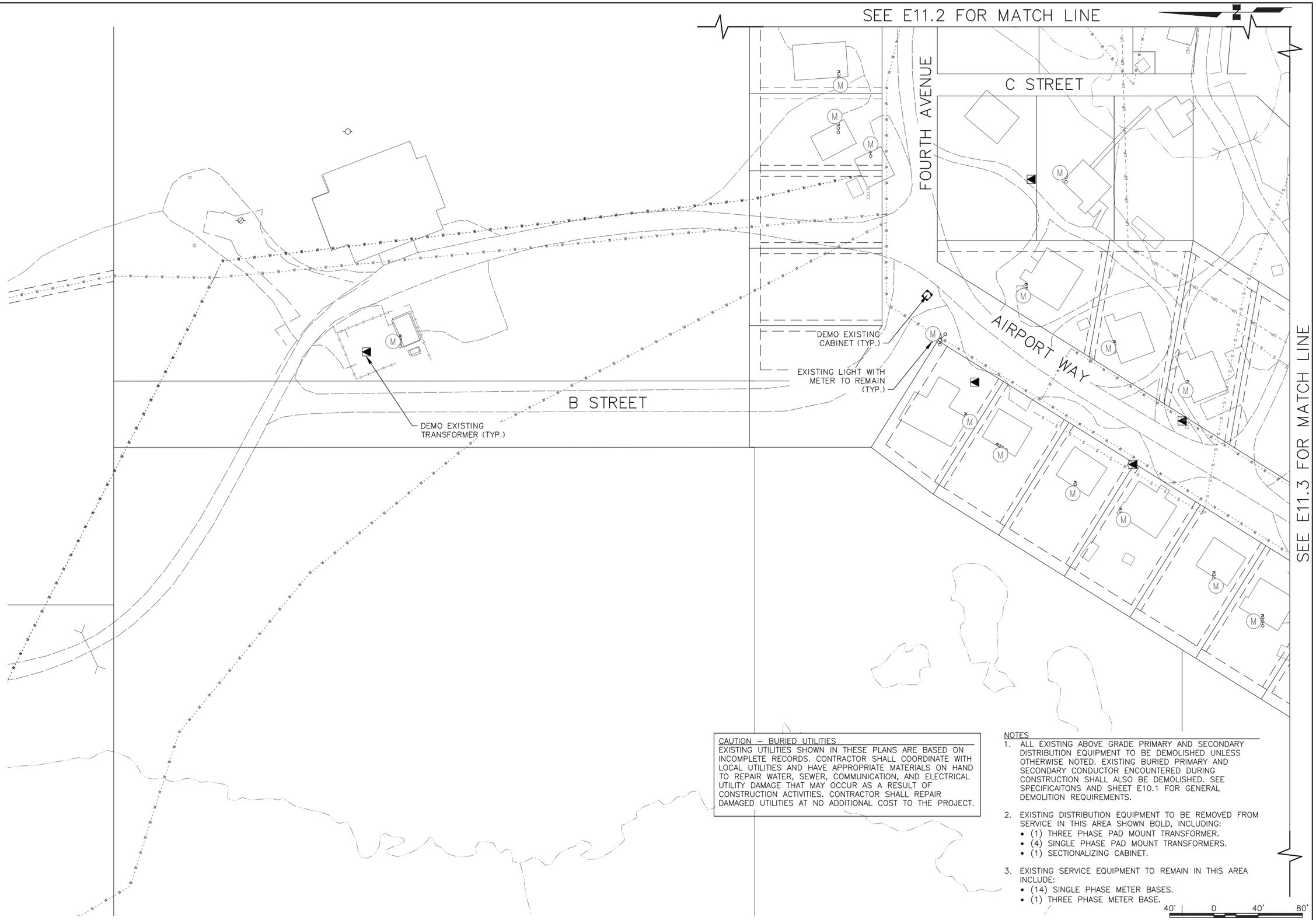
AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

ELECTRICAL SITE PLAN

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No.
E11.0



CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

NOTES

1. ALL EXISTING ABOVE GRADE PRIMARY AND SECONDARY DISTRIBUTION EQUIPMENT TO BE DEMOLISHED UNLESS OTHERWISE NOTED. EXISTING BURIED PRIMARY AND SECONDARY CONDUCTOR ENCOUNTERED DURING CONSTRUCTION SHALL ALSO BE DEMOLISHED. SEE SPECIFICAITONS AND SHEET E10.1 FOR GENERAL DEMOLITION REQUIREMENTS.
2. EXISTING DISTRIBUTION EQUIPMENT TO BE REMOVED FROM SERVICE IN THIS AREA SHOWN BOLD, INCLUDING:
   - (1) THREE PHASE PAD MOUNT TRANSFORMER.
   - (4) SINGLE PHASE PAD MOUNT TRANSFORMERS.
   - (1) SECTIONALIZING CABINET.
3. EXISTING SERVICE EQUIPMENT TO REMAIN IN THIS AREA INCLUDE:
   - (14) SINGLE PHASE METER BASES.
   - (1) THREE PHASE METER BASE.

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH R. Keene EE-14401 3/26/2020 REGISTERED PROFESSIONAL ENGINEER

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AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT

DEMOLITION PLAN
(1 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
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Drawn TRK
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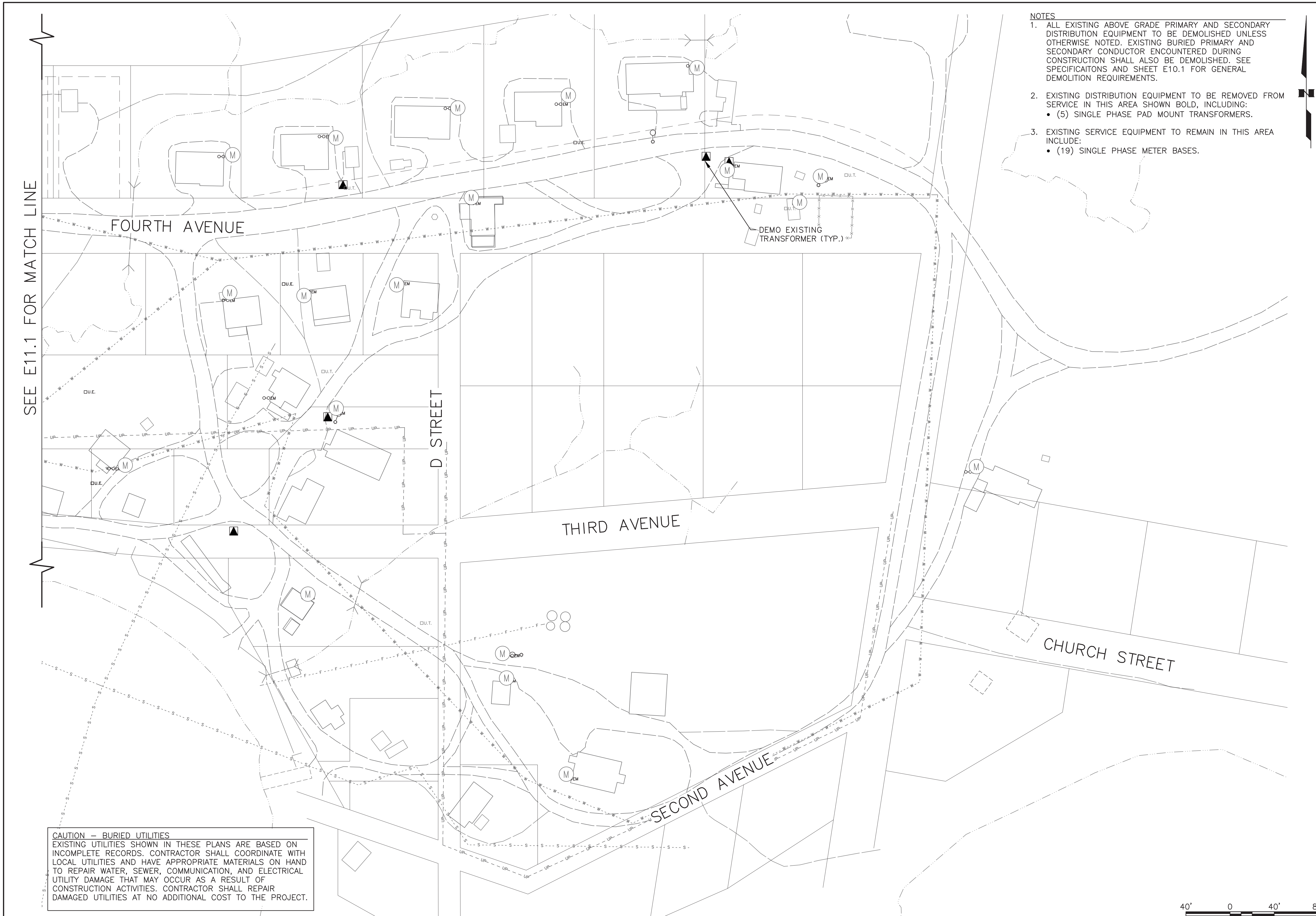
Sheet No.
E11.1



NOTES

1. ALL EXISTING ABOVE GRADE PRIMARY AND SECONDARY DISTRIBUTION EQUIPMENT TO BE DEMOLISHED UNLESS OTHERWISE NOTED. EXISTING BURIED PRIMARY AND SECONDARY CONDUCTOR ENCOUNTERED DURING CONSTRUCTION SHALL ALSO BE DEMOLISHED. SEE SPECIFICAITONS AND SHEET E10.1 FOR GENERAL DEMOLITION REQUIREMENTS.
2. EXISTING DISTRIBUTION EQUIPMENT TO BE REMOVED FROM SERVICE IN THIS AREA SHOWN BOLD, INCLUDING:
   - (5) SINGLE PHASE PAD MOUNT TRANSFORMERS.
3. EXISTING SERVICE EQUIPMENT TO REMAIN IN THIS AREA INCLUDE:
   - (19) SINGLE PHASE METER BASES.

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

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AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

DEMOLITION PLAN
(2 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E11.2

NOTES

1. ALL EXISTING ABOVE GRADE PRIMARY AND SECONDARY DISTRIBUTION EQUIPMENT TO BE DEMOLISHED UNLESS OTHERWISE NOTED. EXISTING BURIED PRIMARY AND SECONDARY CONDUCTOR ENCOUNTERED DURING CONSTRUCTION SHALL ALSO BE DEMOLISHED. SEE SPECIFICAITONS AND SHEET E10.1 FOR GENERAL DEMOLITION REQUIREMENTS.
2. EXISTING DISTRIBUTION EQUIPMENT TO BE REMOVED FROM SERVICE IN THIS AREA SHOWN BOLD, INCLUDING:
   - (2) SINGLE PHASE PAD MOUNT TRANSFORMERS.
   - (1) SECTIONALIZING CABINET.
3. EXISTING SERVICE EQUIPMENT TO REMAIN IN THIS AREA INCLUDE:
   - (9) SINGLE PHASE METER BASES.

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH REGISTERED PROFESSIONAL ENGINEER R. Keene EE-14401 4/26/2020

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AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT

DEMOLITION PLAN (3 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E11.3

SEE E11.3 FOR MATCH LINE

NOTES

1. ALL EXISTING ABOVE GRADE PRIMARY AND SECONDARY DISTRIBUTION EQUIPMENT TO BE DEMOLISHED UNLESS OTHERWISE NOTED. EXISTING BURIED PRIMARY AND SECONDARY CONDUCTOR ENCOUNTERED DURING CONSTRUCTION SHALL ALSO BE DEMOLISHED. SEE SPECIFICAITONS AND SHEET E10.1 FOR GENERAL DEMOLITION REQUIREMENTS.

2. EXISTING DISTRIBUTION EQUIPMENT TO BE REMOVED FROM SERVICE IN THIS AREA SHOWN BOLD, INCLUDING:

   ELECTRICAL DISTRIBUTION UPGRADE BASE BID
   - (3) PAD MOUNT STEP–UP TRANSFORMERS (AT POWER PLANT).

   ELECTRICAL DISTRIBUTION UPGRADE ADDITIVE ALTERNATIVE #3
   - (1) SINGLE PHASE PAD MOUNT TRANSFORMER. PRESERVE PRIMARY CONDUIT AND CONDUCTORS AS REQUIRED TO CONNECT TO NEW DISTRIBUTION SYSTEM.

3. EXISTING SERVICE EQUIPMENT TO REMAIN IN THIS AREA INCLUDE:
   - (1) SINGLE PHASE METER BASES.

4. EXISTING POWER PLANT: AT CONCLUSION OF PROJECT, WINTERIZE ALL EQUIPMENT WITHIN THE EXISTING POWER PLANT, SECURE BUILDING, AND ABANDON IN PLACE.

DEMO EXISTING TRANSFORMER (TYP.)

FAA EQUIPMENT

EXISTING POWER PLANT SITE (NOTE 4)

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH R. Keene EE-14401 12/31/2021 REGISTERED PROFESSIONAL ENGINEER

CRW ENGINEERING GROUP LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

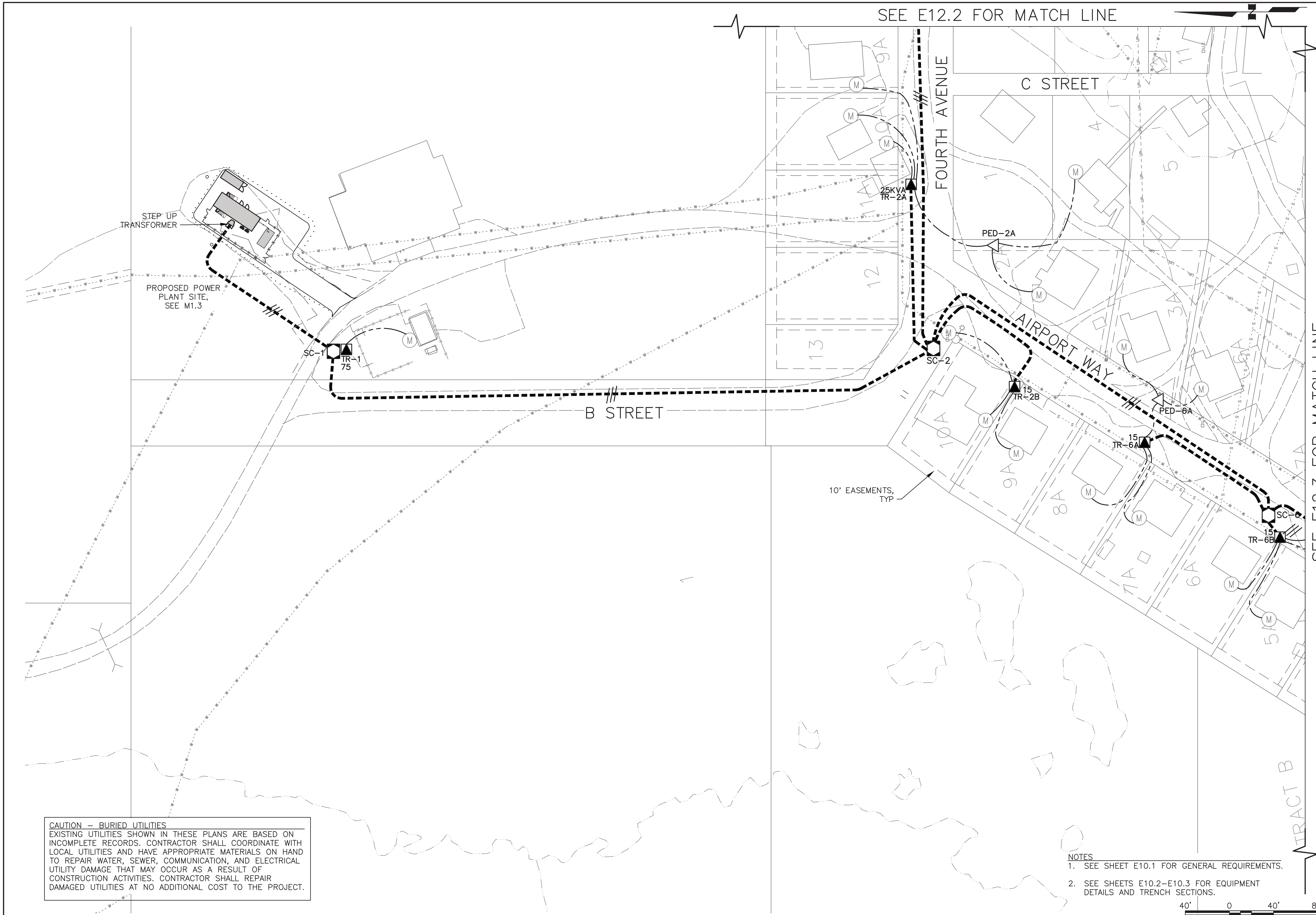
AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

DEMOLITION PLAN
(4 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No.
E11.4



CAUTION – BURIED UTILITIES
EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

NOTES
1. SEE SHEET E10.1 FOR GENERAL REQUIREMENTS.
2. SEE SHEETS E10.2–E10.3 FOR EQUIPMENT DETAILS AND TRENCH SECTIONS.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49 TH

CRW ENGINEERING GROUP, LLC PHONE: (907) 562-3252

Gray Stassel Engineering, Inc. PHONE: (907) 349-0100

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE PROJECT

DISTRIBUTION PLAN (1 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E12.1

SEE E12.1 FOR MATCH LINE

FOURTH AVENUE

D STREET

THIRD AVENUE

SECOND AVENUE

CHURCH STREET

SC-3

SC-4

SC-5

15 TR-3A

15 TR-3B

15 TR-4A

25 TR-4B

15 TR-5A

15 TR-5B

15 TR-5C

PED-4B

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

NOTES

1. SEE SHEET E10.1 FOR GENERAL REQUIREMENTS.
2. SEE SHEETS E10.2–E10.3 FOR EQUIPMENT DETAILS AND TRENCH SECTIONS.

40' 0 40' 80'

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH — R. Keene EE-14401 — 1/26/2020 — REGISTERED PROFESSIONAL ENGINEER

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Gray Stassel Engineering, Inc. — PHONE: (907) 349-0100

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

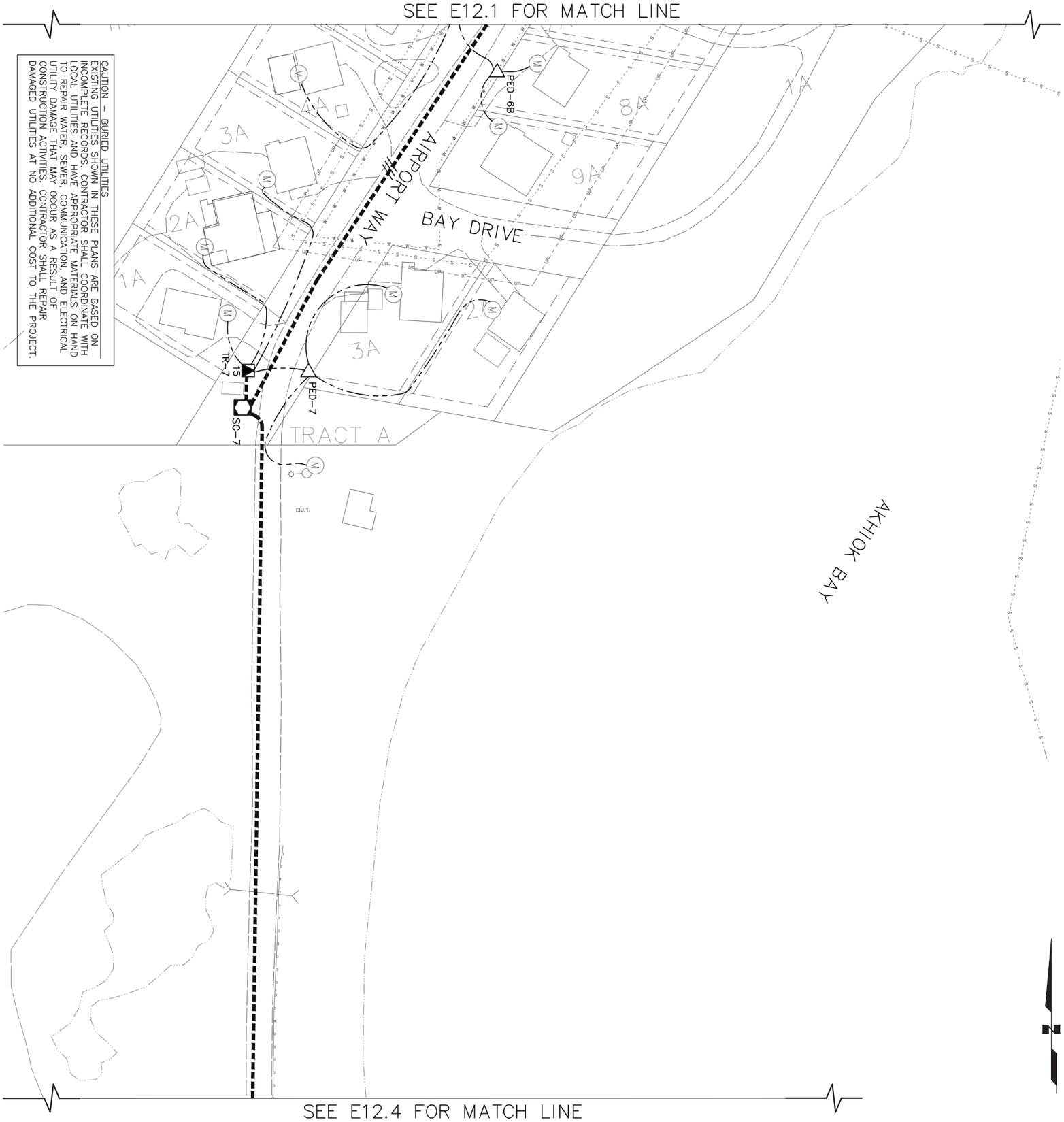
DISTRIBUTION PLAN
(2 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No. E12.2

SEE E12.1 FOR MATCH LINE



SEE E12.4 FOR MATCH LINE

CAUTION – BURIED UTILITIES

EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIONAL COST TO THE PROJECT.

NOTES

1. SEE SHEET E10.1 FOR GENERAL REQUIREMENTS.
2. SEE SHEETS E10.2–E10.3 FOR EQUIPMENT DETAILS AND TRENCH SECTIONS.

40' 0 40' 80'

Sheet No. E12.3

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

NO.	REVISION	BY	DATE

AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

DISTRIBUTION PLAN
(3 of 4)

CRW ENGINEERING GROUP, LLC
PHONE: (907) 562-3252

Gray Stassel Engineering, Inc.
PHONE: (907) 349-0100

STATE OF ALASKA
49 TH
R. Keene
EE-14401
3/26/2020
REGISTERED PROFESSIONAL ENGINEER

ALASKA ENERGY AUTHORITY

SEE E12.3 FOR MATCH LINE

NOTES
1. SEE SHEET E10.1 FOR GENERAL REQUIREMENTS.
2. SEE SHEETS E10.2–E10.3 FOR EQUIPMENT DETAILS AND TRENCH SECTIONS.
3. IF DISTRIBUTION UPGRADE ADDITIVE ALTERNATIVE #3 IS NOT AWARDED, LOCATE EXISTING BURIED 15KV PRIMARY CONDUCTORS FEEDING EXISTING TRANSFORMER FOR FAA EQUIPMENT AT ROAD 4–WAY INTERSECTION AND PLACE NEW SECTIONALIZING CABINET SC8 ABOVE TO FEED EXISTING TRANSFORMER FROM THE NEW DISTRIBUTION SYSTEM.

SEE NOTE 3

SC–8

ALL WORK IN THIS AREA SHALL BE PART OF ELECTRICAL DISTRIBUTION UPGRADE ADDITIVE ALTERNATE #3

SC–9

15 TR–9

FAA EQUIPMENT

U.T.

EXISTING POWER PLANT SITE

40' 0 40' 80'

CAUTION – BURIED UTILITIES
EXISTING UTILITIES SHOWN IN THESE PLANS ARE BASED ON INCOMPLETE RECORDS. CONTRACTOR SHALL COORDINATE WITH LOCAL UTILITIES AND HAVE APPROPRIATE MATERIALS ON HAND TO REPAIR WATER, SEWER, COMMUNICATION, AND ELECTRICAL UTILITY DAMAGE THAT MAY OCCUR AS A RESULT OF CONSTRUCTION ACTIVITIES. CONTRACTOR SHALL REPAIR DAMAGED UTILITIES AT NO ADDITIVE COST TO THE PROJECT.

ALASKA ENERGY AUTHORITY

STATE OF ALASKA 49TH R. Keene EE-14401 12/31/2020 REGISTERED PROFESSIONAL ENGINEER

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AKHIOK, ALASKA
ELECTRICAL DISTRIBUTION SYSTEM
UPGRADE PROJECT

DISTRIBUTION PLAN
(4 of 4)

NO.	REVISION	BY	DATE

Plot Date MARCH 2020
Designed TRK
Drawn TRK
Approved KMH

Sheet No.
E12.4

AKHIOK DISTRIBUTION SYSTEM UPGRADE PROJET

STAKING SHEETS

ISSUED FOR CONSTRUCTION
MARCH 2020

CRW ENGINEERING GROUP, LLC
3940 ARCTIC BLVD, STE. 300
ANCHORAGE, ALASKA 99503

CRW ENGINEERING GROUP, LLC
3740 ARCTIC BLVD, STE. 300
ANCHORAGE, ALASKA 99503
(907) 562-3252

AKHIOK DISTRIBUTION SYSTEM UPGRADE PROJECT AKHIOK, ALASKA

REV. NO.	DATE	BY	DESCRIPTION	DESIGNER	DATE
0	March 25, 2020	TRK	ISSUED FOR CONSTRUCTION.	TRK	March 25, 2020

LOCATION NUMBER	PRIMARY CONDUCTOR No.	PRIMARY CONDUCTOR SIZE/TYPE	PRIMARY CONDUCTOR Back Span	PRIMARY ASSEMBLY No.	PRIMARY ASSEMBLY Units	XFMRS No.	XFMRS Units	SECONDARY CONDUCTOR SERVICE No.	SECONDARY CONDUCTOR SERVICE SIZE/TYPE	SECONDARY CONDUCTOR BACKFEED Back Span	SECONDARY CONDUCTOR BACKFEED No.	SECONDARY CONDUCTOR BACKFEED SIZE/TYPE	SECONDARY SERVICE UNITS No.	SECONDARY SERVICE UNITS Units	MISCELLANEOUS CONSTRUCTION UNITS No.	MISCELLANEOUS CONSTRUCTION UNITS Units	REMARKS, COMMENTS, NOTES
BASE BID																	
STEP UP TRANSFORMER				1	UM1-7NC	1	UM17-2-150								1	UM48-2	SEE DETAIL ON PLAN SHEETS.
				3	UM6-1										3	UM6-10	
				3	UM6-15												
SC-1	3	#1/0 JCN, CIC	200	1	UM33										10	UM6-10	SEE DETAIL ON PLAN SHEETS.
				9	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-1	3	#1/0 JCN, CIC	15	1	UM1-7NC	1	UG-17-3-75	1	#4/0 QUAD	70					1	UM48-2	
				3	UM6-1										3	UM6-10	
SC-2	3	#1/0 JCN, CIC	660	1	UM33										4	UM6-10	SEE DETAIL ON PLAN SHEETS.
				11	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-2A	1	#1/0 JCN, CIC	165	1	UM1-7NC	1	UG7-25	3	#2/0 TRIPLEX	310			3	UJ2-6	1	UM48-1	THREE SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
PED-2A								2	#2 TRIPLEX	210	1	#4/0 TRI-PLEX	3	UJ1-4			TWO SINGLE-PHASE SERVICES.
													2	UM8			SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
													1	UK5			
TR-2B	1	#1/0 JCN, CIC	160	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	155			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1			1	#6 DUPLEX	65					1	UM6-10	ONE LIGHT POLE SERVICE
																	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
SC-3	3	#1/0 JCN, CIC	660	1	UM33										4	UM6-10	SEE DETAIL ON PLAN SHEETS.
				11	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-3A	1	#1/0 JCN, CIC	120	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	360			3	UJ2-6	1	UM48-1	FOUR SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.

AKHIOK DISTRIBUTION SYSTEM
UPGRADE PROJECT

LOCATION NUMBER	PRIMARY CONDUCTOR No.	PRIMARY CONDUCTOR SIZE/TYPE	PRIMARY CONDUCTOR Back Span	PRIMARY ASSEMBLY No.	PRIMARY ASSEMBLY Units	XFMRS No.	XFMRS Units	SECONDARY CONDUCTOR SERVICE No.	SECONDARY CONDUCTOR SERVICE SIZE/TYPE	SECONDARY CONDUCTOR SERVICE Back Span	SECONDARY CONDUCTOR BACKFEED No.	SECONDARY CONDUCTOR BACKFEED SIZE/TYPE	SECONDARY SERVICE UNITS No.	SECONDARY SERVICE UNITS Units	MISCELLANEOUS CONSTRUCTION UNITS No.	MISCELLANEOUS CONSTRUCTION UNITS Units	REMARKS, COMMENTS, NOTES
TR-3B	1	#1/0 JCN, CIC	115	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	120			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
SC-4	3	#1/0 JCN, CIC	390	1	UM33										10	UM6-10	SEE DETAIL ON PLAN SHEETS.
				5	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-4A	1	#1/0 JCN, CIC	155	1	UM1-7NC	1	UG7-15	3	#2 TRIPLEX	205			3	UJ2-4	1	UM48-1	THREE SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
TR-4B	1	#1/0 JCN, CIC	95	1	UM1-7NC	1	UG7-25	1	#2 TRIPLEX	80			3	UJ2-4	1	UM48-1	ONE SINGLE-PHASE SERVICES.
				1	UM6-1			1	#6 DUPLEX	50					1	UM6-10	ONE LIGHT POLE SERVICE
																	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
PED-4B								1	#2 TRIPLEX	80	1	#4/0 TRI-PLEX	3	UJ1-4			ONE SINGLE-PHASE SERVICE.
													2	UM8			SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
													1	UK5			
SC-5	3	#1/0 JCN, CIC	400	1	UM33										9	UM6-10	SEE DETAIL ON PLAN SHEETS.
				6	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-5A	1	#1/0 JCN, CIC	190	1	UM1-7NC	1	UG7-15	1	#2 TRIPLEX	100			3	UJ2-4	1	UM48-1	ONE SINGLE-PHASE SERVICES.
				1	UM6-1			1	#6 DUPLEX	120					1	UM6-10	ONE LIGHT POLE SERVICE
																	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
TR-5B	1	#1/0 JCN, CIC	200	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	290			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
TR-5C	1	#1/0 JCN, CIC	150	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	205			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1			1	#6 DUPLEX	65					1	UM6-10	ONE LIGHT POLE SERVICE
																	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
SC-6	3	#1/0 JCN, CIC	420	1	UM33										7	UM6-10	SEE DETAIL ON PLAN SHEETS.
				8	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-6A	1	#1/0 JCN, CIC	195	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	170			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
PED-6A								2	#2 TRIPLEX	120	1	#4/0 TRI-PLEX	3	UJ1-4			TWO SINGLE-PHASE SERVICES.
													2	UM8			SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
													1	UK5			
TR-6B	1	#1/0 JCN, CIC	30	1	UM1-7NC	1	UG7-15	2	#2 TRIPLEX	195			3	UJ2-4	1	UM48-1	TWO SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.

LOCATION NUMBER	PRIMARY CONDUCTOR No.	PRIMARY CONDUCTOR SIZE/TYPE	PRIMARY CONDUCTOR Back Span	PRIMARY ASSEMBLY No.	PRIMARY ASSEMBLY Units	XFMRS No.	XFMRS Units	SECONDARY CONDUCTOR SERVICE No.	SECONDARY CONDUCTOR SERVICE SIZE/TYPE	SECONDARY CONDUCTOR BACKFEED Back Span	SECONDARY CONDUCTOR BACKFEED No.	SECONDARY CONDUCTOR BACKFEED SIZE/TYPE	SECONDARY SERVICE UNITS No.	SECONDARY SERVICE UNITS Units	MISCELLANEOUS CONSTRUCTION UNITS No.	MISCELLANEOUS CONSTRUCTION UNITS Units	REMARKS, COMMENTS, NOTES
PED-6B								2	#2 TRIPLEX	100	1	#4/0 TRI-PLEX	3	UJ1-4			TWO SINGLE-PHASE SERVICES.
													2	UM8			SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
													1	UK5			
SC-7	3	#1/0 JCN, CIC	420	1	UM33										10	UM6-10	SEE DETAIL ON PLAN SHEETS.
				5	UM6-1												
				3	UM6-15												
				3	UM6-22												
TR-7	1	#1/0 JCN, CIC	35	1	UM1-7NC	1	UG7-15	3	#2 TRIPLEX	410			3	UJ2-6	1	UM48-1	THREE SINGLE-PHASE SERVICES.
				1	UM6-1										1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
PED-6A								2	#2 TRIPLEX	350	1	#4/0 TRI-PLEX	3	UJ1-4			TWO SINGLE-PHASE SERVICES.
								1	#6 DUPLEX	140			2	UM8			ONE LIGHT POLE SERVICE
													1	UK5			SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.
SC-8	1	#1/0 JCN, CIC	750	1	UM33										2	UM6-10	SEE DETAIL ON PLAN SHEETS.
				2	UM6-1												SINGLE-PHASE SECTIONALIZING CABINET.
				2	UM6-15												
				1	UM6-22												
ADDITIVE ALTERNATE 3																	
SC-9	1	#1/0 JCN, CIC	750	1	UM33										2	UM6-10	SEE DETAIL ON PLAN SHEETS.
				2	UM6-1												SINGLE-PHASE SECTIONALIZING CABINET.
				2	UM6-15												
				1	UM6-22												
TR-9	1	#1/0 JCN, CIC	25	1	UM1-7NC	1	UG7-15	1	#2 TRIPLEX	15			3	UJ2-4	1	UM48-1	ONE SINGLE-PHASE SERVICE.
				1	UM6-1								1	UM8	1	UM6-10	SEE PLAN SHEET FOR SERVICE CONNECTION REQUIREMENTS.

STAKING SHEET NOTES:

1. REFER TO THE DRAWINGS FOR PHYSICAL LAYOUT OF SYSTEM AND FOR ADDITIONAL NOTES OR ADDITIONALINFORMATION. DETAILS OF DEMOLITION MAY NOT BE SNCLUDED IN THE STAKING SHEETS. SEE PLAN DRAWINGS FOR ALL REQUIRED CONSTRUCTION ACTIVITIES AND COORDINATION.
2. RUS UNIT UK5 SHALL BE A SINGLE-PHASE SECONDARY PEDESTAL WITHOUT A STAKE. SEE SPECIFICATIONS.
3. ALL TRANSFORMERS SHALL HAVE GROUND SLEEVES. SEE SPECIFICATIONS.
4. QUAD - QUADRUPLEX UD CONDUCTOR. SEE SPECIFICATIONS.
   TRIPLEX - TRIPLEX UD CONDUCTOR. SEE SPECIFICATIONS.