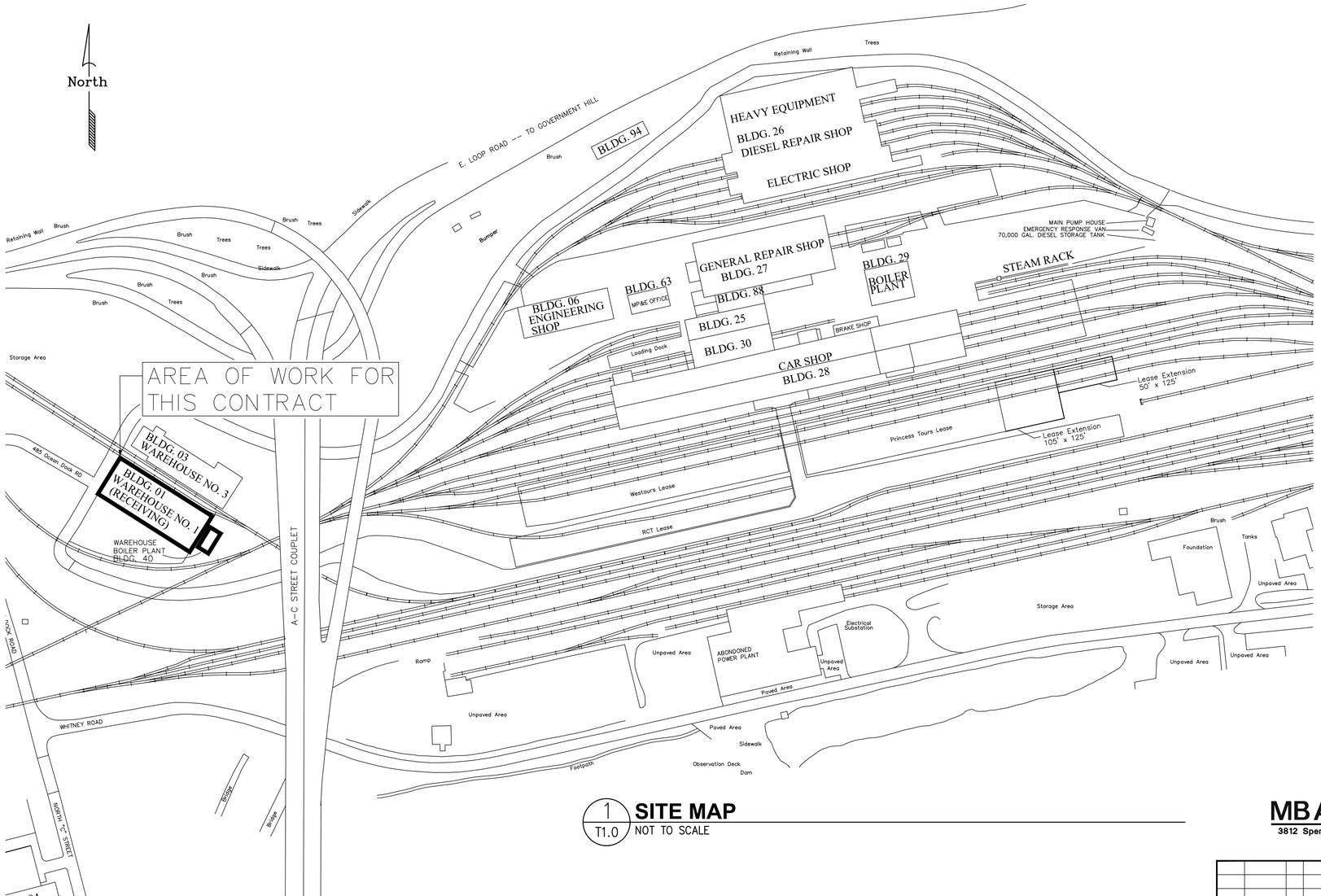
Alaska Railroad Corporation

2023 WAREHOUSE #1 HEATING RENOVATION
100% CONSTRUCTION DOCUMENTS



1 / T1.0 **SITE MAP**
NOT TO SCALE

DRAWING INDEX:	
DRAWING NO.	DESCRIPTION
T1.0	TITLE SHEET
A1.0	ARCHITECTURAL ROOF PLAN
A2.0	ARCHITECTURAL ROOF DETAILS
M0.1	MECHANICAL LEGEND AND SCHEDULES
M1.0	MECHANICAL DEMOLITION PLAN
M2.0	MECHANICAL HEATING PLAN
M3.0	MECHANICAL BOILER BUILDING PLANS
M4.0	MECHANICAL DETAILS
M5.0	MECHANICAL SPECIFICATIONS
M5.1	MECHANICAL SPECIFICATIONS
E1.0	ELECTRICAL LEGEND AND SCHEDULES
E2.0	ELECTRICAL WAREHOUSE DEMOLITION PLAN
E2.1	ELECTRICAL BOILER BUILDING PLANS
E3.0	ELECTRICAL PLAN
E4.0	ELECTRICAL ONE LINE DIAGRAM
E5.0	ELECTRICAL SPECIFICATIONS

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REV.	DATE	BY	REVISION

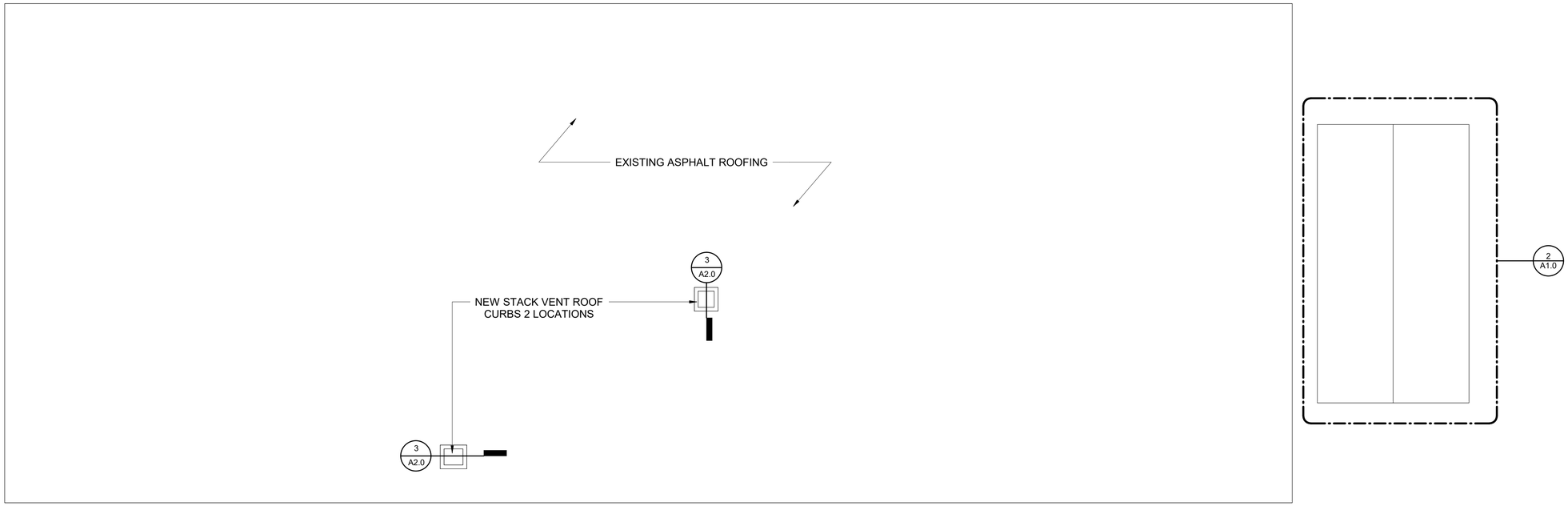
ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT: **ALASKA RAILROAD CORPORATION**
WAREHOUSE #1 HEATING RENOVATION

TITLE: **TITLE SHEET**

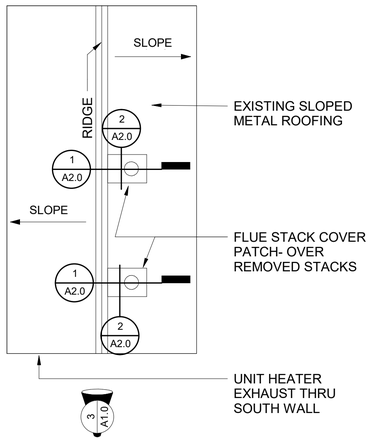
DESIGNED BY:	BS/KR	SCALE: AS NOTED	T1.0
DRAWN BY:	JHE/KRR		
CHECKED BY:	SH	DATE: 12/14/2023	
APPROVED BY:	SH		

AFE NO.:
ACAD FILE:
DWG NO. 1 OF 16



1 A1.0 WAREHOUSE #1 - ROOF PLAN - NEW STACK LOCATIONS

3/32" = 1'-0"



2 A1.0 BOILER ROOM - ROOF PLAN - STACK COVER LOCATIONS

3/32" = 1'-0"

3 A1.0 EXISTING BOILER STACKS

1 1/2" = 1'-0"

STATE OF ALASKA
49th
John E. McCool
No. 3534-A
REGISTERED PROFESSIONAL ENGINEER
12.14.23

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ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ARCHITECTURAL ROOF PLANS

DESIGNED BY: JEM
DRAWN BY: ABW/BDN
CHECKED BY:
APPROVED BY:
SCALE:
DATE: 12.14.23
A1.0
AFE NO.:
ACAD FILE:
DWG NO.
2 OF 16

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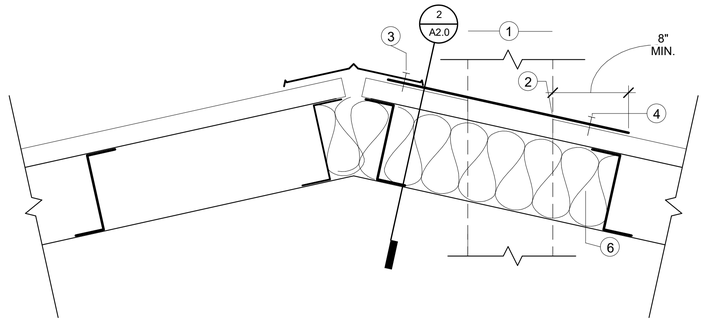
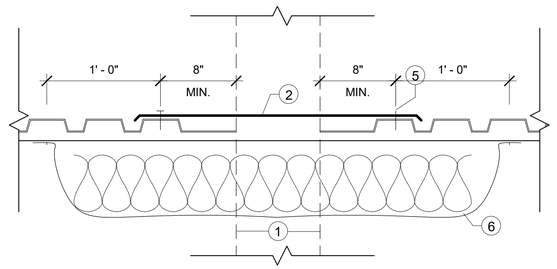
NOTES - BOILER VENT

1. TWO EXISTING BOILER STACKS - TO BE REMOVED
2. 20 GAGE GALVANIZED SHEET STEEL COVER PLATE
3. LOOSEN EXISTING RIDGE FLASHING TO SLIDE COVER PLATE UNDER - ADD #10 SEAL HEAD SCREWS 6' OC MAX THROUGH RIDGE CAP & COVER PLATE
4. LAP COVER PLATE OVER EXISTING METAL ROOFING & ADD #12 SEAL HEAD SCREWS 6" OC MAX - SPRAY FOAM INSULATION BETWEEN PLATE & EXISTING ROOFING
5. LAP COVER PLATE OVER EXISTING ROOFING HIGH RIBS - BEND DOWN 3/4" & ADD #12 SEAL HEAD SCREWS 6" OC - PLATE CONTINUOUS SILICONE SEALANT BETWEEN PLATE & METAL ROOFING
6. FILL VOIDS BETWEEN ROOF FRAMING WITH UNFACED FIBERGLASS BATT INSULATION - INSTALL 10 MIL FIRE RETARDANT FOIL LAMINATE VAPOR BARRIER TO LAP 8" OVER FRAMING - TAPE EDGES WITH VAPOR BARRIER TAPE



1 BOILER STACK COVER PATCH

1 A2.0 — 1 1/2" = 1'-0"

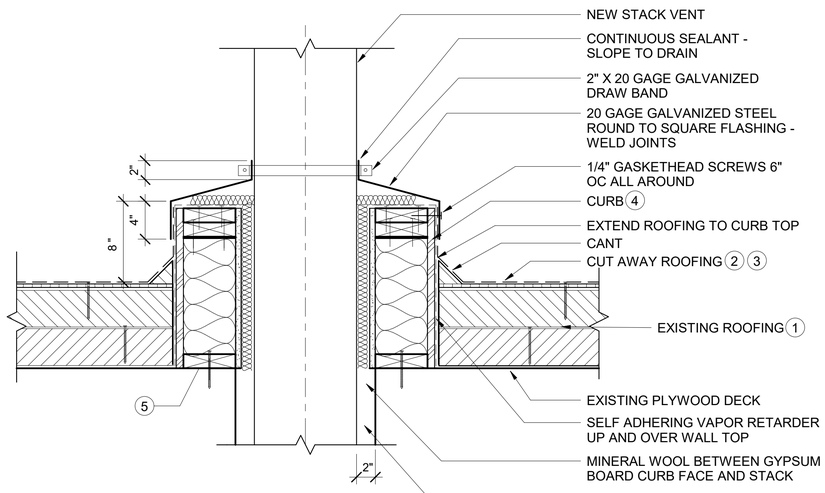


2 BOILER STACK COVER PATCH 2

2 A2.0 — 1 1/2" = 1'-0"

NOTES - WAREHOUSE

1. OWNER RECORDS SHOW EXISTING ROOFING AS MALARKEY MODIFIED ASPHALT 3 PLY SYSTEM WITH 1/2" FIBERBOARD COVER ON INSULATION & HOT MOPPED ASPHALT VAPOR RETARDER ON 3/4" PLYWOOD DECK
2. CUT AWAY - REMOVE EXISTING ROOFING DOWN TO TOP OF STRUCTURE ROOF DECK AS NECESSARY TO INSTALL NEW CURB & TO OVERLAP ROOFING 6" MINIMUM ONTO EXISTING ROOFING. LAP TOP PLYS OVER LOWER PLYS. MATCH EXISTING INSULATION THICKNESS AT CURB.
3. INSTALL 3-PLY HOT MOPPED BITUMINOS ROOFING AROUND NEW CURB. ROOING ASSEMBLY, FROM DECK UP AS FOLLOWS: VAPOR RETARDER: HOT MOP OVERLAP SPLICE 1-PLY ASPHALT SATURATED TYPE IV GLASS FIBER ROOFING FELT PER ASTM D2178
   RIGID INSULATION: EPS PER ASTM C578: CONTINUOUS URETHANE ADHESIVE ADHERE 2 LAYERS, JOINTS OFFSET, MATCH ADJACENT EXISTING TOTAL INSULATION THICKNESS.
   COVERBOARD: 1/2" HIGH DENSITY ASPHALT COATED FIBERBOARD PER ASTM C208. CANTS; 3" PERLITE PER ASTM C208.
   BASE SHEET: 30 LB ASPHALT IMPREGNATED GLASS FIBER SHEET PER ASTM D4601.
   PLY SHEET: 75 LB ASPHALT IMPREGNATED GLASS FIBER SHEET PER ASTM D4601.
   CAP SHEET: 100 LB SBS MODIFIED BITUMINOUS ASPHALT IMPREGNATED GLASS FIBER SHEET PER ASTM D6163 SUFACED WITH WHITE MINERAL GRANULES.
   ASPHALT: CONTINUOUS HOT MOP EACH PLY IN PLACE WITH 25 POUNDS SEBS RUBBER POLYMER ASPHALT PER ASTM D6152
4. CURB: 2 X 6 STUDS AT 24" OC MAX WITH TWO TOP PLATES WITH 3/4" PLYWOOD EXTERIOR SIDE & 5/8 GYP BOARD INSIDE-10 D NAILS 8" OC - FILL VOIDS WITH UNFACED FIBERGLASS INSULATION.
5. ATTACH CURB ONTO EXISTING STRUCTURAL DECK WITH 1/4" X4" SCREWS 8' OC STAGGERED 1' ALONG OPPOSITE SIDES OF CURB BOTTOM PLATE.



3 STACK VENT - ROOF DETAIL

3 A2.0 — 1 1/2" = 1'-0"

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PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ARCHITECTURAL ROOF DETAILS

DESIGNED BY: JEM	SCALE:	**A2.0**	AFE NO.:
DRAWN BY: ABW			ACAD FILE:
CHECKED BY:	DATE: 12.14.23		DWG NO. 3 OF 16
APPROVED BY:			

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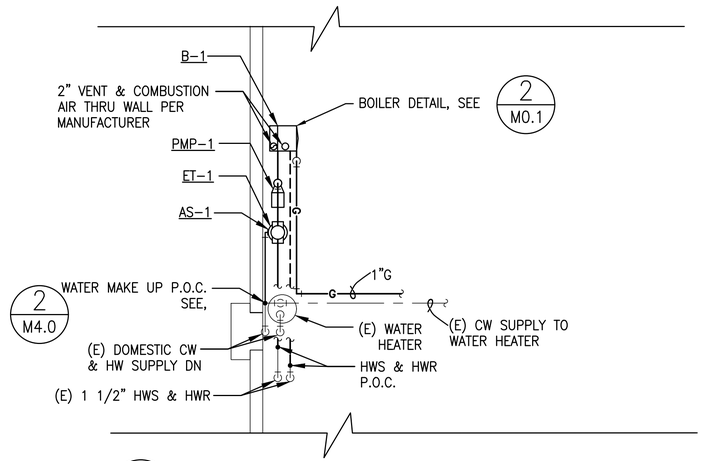
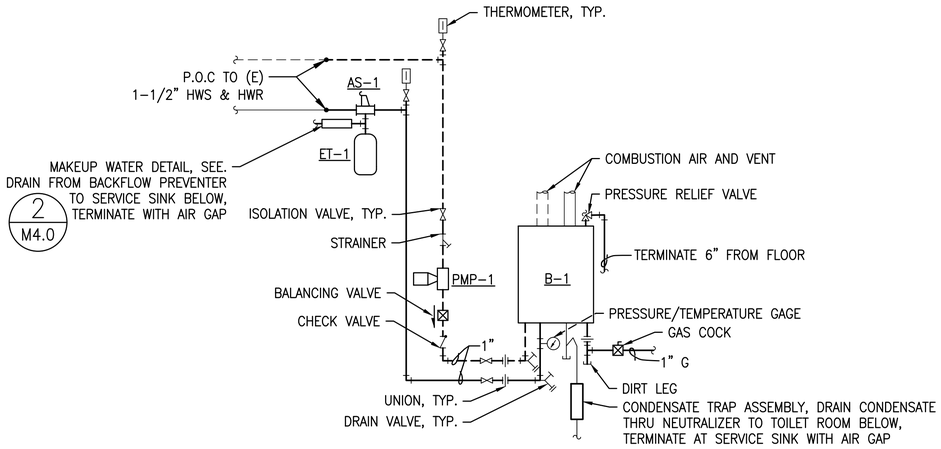
LEGEND & ABBREVIATIONS

ABBR.	EXPLANATION	SYMBOL
A	AIR – COMPRESSED	— A —
	AIR EXTRACTOR	
	AIR FLOW MEASURING DEVICE	
	AIR FOIL TURNING VANES	
AAV	AUTOMATIC AIR VENT	
AFF	ABOVE FINISHED FLOOR	
BDD	BACKDRAFT DAMPER	
BD	BALANCING DAMPER	
	BALANCING/ISOLATION VALVE	
	BALL VALVE	
CC	COOLING COIL	
CFM	CUBIC FEET/MINUTE	
CO	CLEANOUT	
CV	CHECK VALVE	
CW	COLD WATER	
DD	DUCT DETECTOR	DD
	DUCT IDENTIFICATION SYMBOL	②
(E)	EXISTING	
E/A	EXHAUST AIR	
	EXPANSION COMPENSATOR	
F	FIRE	— F —
FCO	FLOOR CLEANOUT	
FD	FIRE DAMPER	
FDC	FIRE DEPARTMENT CONNECTION	
FD	FLOOR DRAIN	
	FLEXIBLE CONNECTION	
	FLEXIBLE DUCT	
	FLOW CONTROL VALVE	
FOS	FUEL OIL SUPPLY	—FOS—
FOR	FUEL OIL RETURN	—FOR—
G	GAS	— G —
	GLOBE VALVE	
GS	GLYCOL SUPPLY	—GS—
GR	GLYCOL RETURN	—GR—
HB	HOSE BIBB	
HC	HEATING COIL	
HW	HOT WATER	
HWC	HOT WATER CIRCULATION	
HWR	HEATING WATER RETURN	—HWR—
HWS	HEATING WATER SUPPLY	—HWS—
MOD	MOTOR OPERATED DAMPER	
MOV	2-WAY MOTOR OPERATED VALVE	
MOV	3-WAY MOTOR OPERATED VALVE	
NIC	NOT IN CONTRACT	
O/A	OUTSIDE AIR	
	PIPE ANCHOR	
	PIPE GUIDE	
POC	POINT OF CONNECTION	
	PRESSURE GAGE	
PRV	PRESSURE RELIEF VALVE	
PW	PUMPED WASTE	—PW—
R/A	RETURN AIR	
RD	ROOF DRAIN	
RL	RAIN LEADER	—RL—
RV	RELIEF VALVE	
	RETURN AIR SLOT	
	RETURN/EXHAUST AIR REG. OR GRILLE	
S	SANITARY SOIL	
S/A	SUPPLY AIR	
	SQUARE HEAD COCK	
	STRAINER WITH DRAIN VALVE	
SD	STORM DRAIN	—SD—
SL	ACOUSTICALLY LINED DUCT	
SP	SPRINKLER	—SP—
	STATIC PRESSURE SENSOR	SP
	SUPPLY AIR SLOT W/FLEX DUCT	
	SUPPLY AIR REG. GRILLE, OR DIFFUSER	
TW	TEMPERED WATER	—TW—
	THERMALLY INSULATED DUCT OR PIPE	
	THERMOMETER	
T'STAT	THERMOSTAT	T
T'STAT	RETURN AIR THERMOSTAT	T
	UNION	
V	VENT	— — V — —
VTR	VENT THRU ROOF	
WCO	WALL CLEANOUT	
W	WASTE	

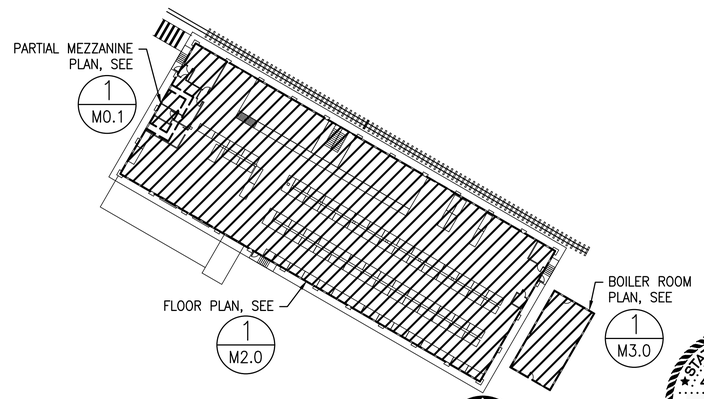
THIS IS A STANDARD LEGEND, SOME SYMBOLS SHOWN ON LEGEND ARE NOT NECESSARILY ON THE DRAWING.



1 M0.1 PARTIAL MEZZANINE PLAN
SCALE = 1/4" = 1'-0"



2 M0.1 BOILER PIPING SCHEMATIC
NOT TO SCALE



KEY PLAN
SCALE: 1/4" = 10'

BOILER SCHEDULE

SYMBOL	TYPE	FLUID (%)	FUEL	AGA INPUT MBH	GROSS OUTPUT MBH	BURNER HP	BURNER VOLTS/PH	DESIGN BASIS PRODUCT
B-1	HIGH EFFICIENCY RESIDENTIAL	WATER	NAT. GAS	55	51	–	115V/1ø	LOCHINVAR WHB055N, OUTDOOR AIR SENSOR, CONDENSATE NEUTRALIZER KIT.

HEATING UNIT SCHEDULE

SYMBOL	TYPE	GLYCOL (%)	FLUID (°F) IN	FLUID (°F) OUT	MBH	GPM	CFM	RPM	ELECTRICAL HP/VOLTS/PH	DESIGN BASIS PRODUCT
UH-1	UNIT HEATER	–	–	–	103	–	1980	1625	1/8 /115V/1ø	MODINE MODEL HDS, GAS FIRED, 125 MBH INPUT WITH THERMOSTAT AND HORIZONTAL CONCENTRIC SIDEWALL VENT KIT

PUMP SCHEDULE

SYMBOL	LOCATION	SERVICE	FLUID TYPE	FLUID TEMP	GPM	HEAD FT.	RPM	ELECTRICAL KW/VOLTS/PH	DESIGN BASIS PRODUCT
PMP-1	WARE-HOUSE 1	PRIMARY HEATING	WATER	180	5	15'	–	1/2 /115V/1ø	FACTORY PROVIDED UPML ECM VARIABLE SPEED CIRCULATOR

INFRARED HEATER SCHEDULE

SYMBOL	MODEL	GAS CONN.	ZONE #	MBH	ELECTRICAL HP/VOLTS/PH	DESIGN BASIS PRODUCT
IRH-01	CTHN-125	1/2"	1	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,3,4,5]
IRH-02	CTHN-125	1/2"	1	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,3,4,5]
IRH-03	CTHN-125	1/2"	1	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,3,4,5]
IRH-04	CTHN-125	1/2"	2	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,10]
IRH-05	CTHN-125	1/2"	2	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,10]
IRH-06	CTHN-125	1/2"	3	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,6]
IRH-07	CTHN-125	1/2"	3	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,6]
IRH-08	CTHN-125	1/2"	3	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,6]
IRH-09	CTHN-125	1/2"	3	125	–	ROBERTS-GORDON, VANTAGE TUBE HEATER, CTHN-125 [1,2,4,5,6]
VP-01	EP-100	–	1	–	.33/110/1	ROBERTS-GORDON, VACUUM PUMP, EP-100 [7,9]
VP-02	EP-301	–	2,3	–	2/208/1	ROBERTS-GORDON, VACUUM PUMP, EP-301 [8,9]
CP-01	–	N/A	1,2,3	–	20A/120V/1ø	ROBERTS GORDON SYSTEM CONTROL, NON-MODULATION

-ALL BURNER POWER COMES FROM RELAY.
1. PROVIDE WITH REGULATOR, FLEXIBLE GAS CONNECTOR, AND SHUT-OFF VALVE.
2. COVER 50' LENGTH OF HEATER WITH HIGH EFFICIENCY REFLECTOR, RATED UNDER AHRI-1330 AT IF-14 OR BETTER.
3. U-TUBE KIT (NO REFLECTOR OVER U-BEND).
4. HEATERS OPERATE UNDER NEGATIVE PRESSURE, NO FAN IN HEATER.
5. MANIFOLD TUBE BETWEEN HEATERS AND VACUUM PUMPS, .065 WALL ALUMINIZED HOT ROLLED STEEL, 4" DIA.
6. MANIFOLD TUBE BETWEEN HEATERS AND VACUUM PUMPS, .065 WALL ALUMINIZED HOT ROLLED STEEL, 4" DIA OR 06" DIA.
7. 4" VENT THRU ROOF, 100 CFM.
8. 6" VENT THRU ROOF, 300 CFM.
9. 3,450 RPM MAX.
10. PROVIDE 25' ONE SIDE REFLECTOR.

MISCELLANEOUS EQUIPMENT:

AS-1 AIR SEPARATOR, BELL AND GOSSETT MODEL EASB-1 JR, BRASS BODY, STAINLESS STEEL MEDIUM, BUILT-IN AUTOMATIC AIR VENT, 150 PSI WORKING PRESSURE, AT 250 DEGREES F.

ET-1 EXPANSION TANK, BELL AND GOSSETT MODEL HFT-15, 2 GAL TANK VOLUME, 1.0 GAL ACCEPTANCE, CARBON STEEL SHELL, HEAVY DUTY BUTYL RUBBER DIAPHRAM, 100 PSI WORKING PRESSURE, 240 DEGREES F TEMPERATURE.

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STATE OF ALASKA 49 TH — SCOTT C. HALA 12/14/2023 ME-11405 — REGISTERED PROFESSIONAL ENGINEER

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ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:
ALASKA RAILROAD CORPORATION WAREHOUSE #1 HEATING RENOVATION

TITLE:
MECHANICAL LEGEND AND SCHEDULES

DESIGNED BY:	BS/KR
DRAWN BY:	APS/KRR
CHECKED BY:	SH
APPROVED BY:	SH
SCALE: AS NOTED	
DATE: 12/14/2023	

M0.1

AFE NO.:
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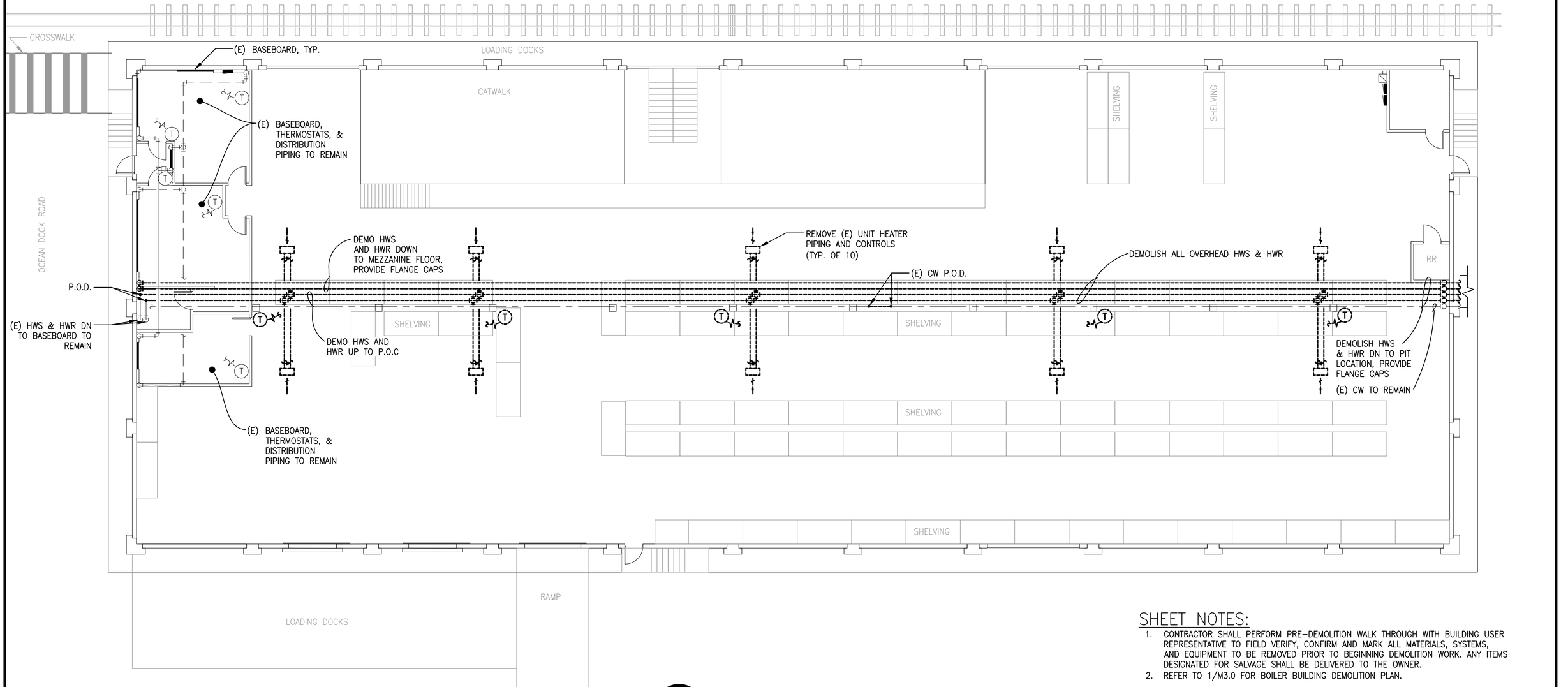
DWG NO. 4 OF 16



SHEET NOTES:

1. CONTRACTOR SHALL PERFORM PRE-DEMOLITION WALK THROUGH WITH BUILDING USER REPRESENTATIVE TO FIELD VERIFY, CONFIRM AND MARK ALL MATERIALS, SYSTEMS, AND EQUIPMENT TO BE REMOVED PRIOR TO BEGINNING DEMOLITION WORK. ANY ITEMS DESIGNATED FOR SALVAGE SHALL BE DELIVERED TO THE OWNER.
2. REFER TO 1/M3.0 FOR BOILER BUILDING DEMOLITION PLAN.

N

1 / M1.0

MECHANICAL DEMOLITION PLAN

SCALE = 1/8" = 1'-0"

GRAPHIC SCALE

8' 0 8' 16' 24'

GRAPHIC SCALE: 1/8" = 1'-0"

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STATE OF ALASKA 49 TH
SCOTT C. HALA
12/14/2023
ME-11405
REGISTERED PROFESSIONAL ENGINEER

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
MECHANICAL DEMOLITION PLAN

REV.	DATE	BY	REVISION

DESIGNED BY: BS/KR
DRAWN BY: APS/KRR
CHECKED BY: SH
APPROVED BY: SH

SCALE: AS NOTED
DATE: 12/14/2023

M1.0

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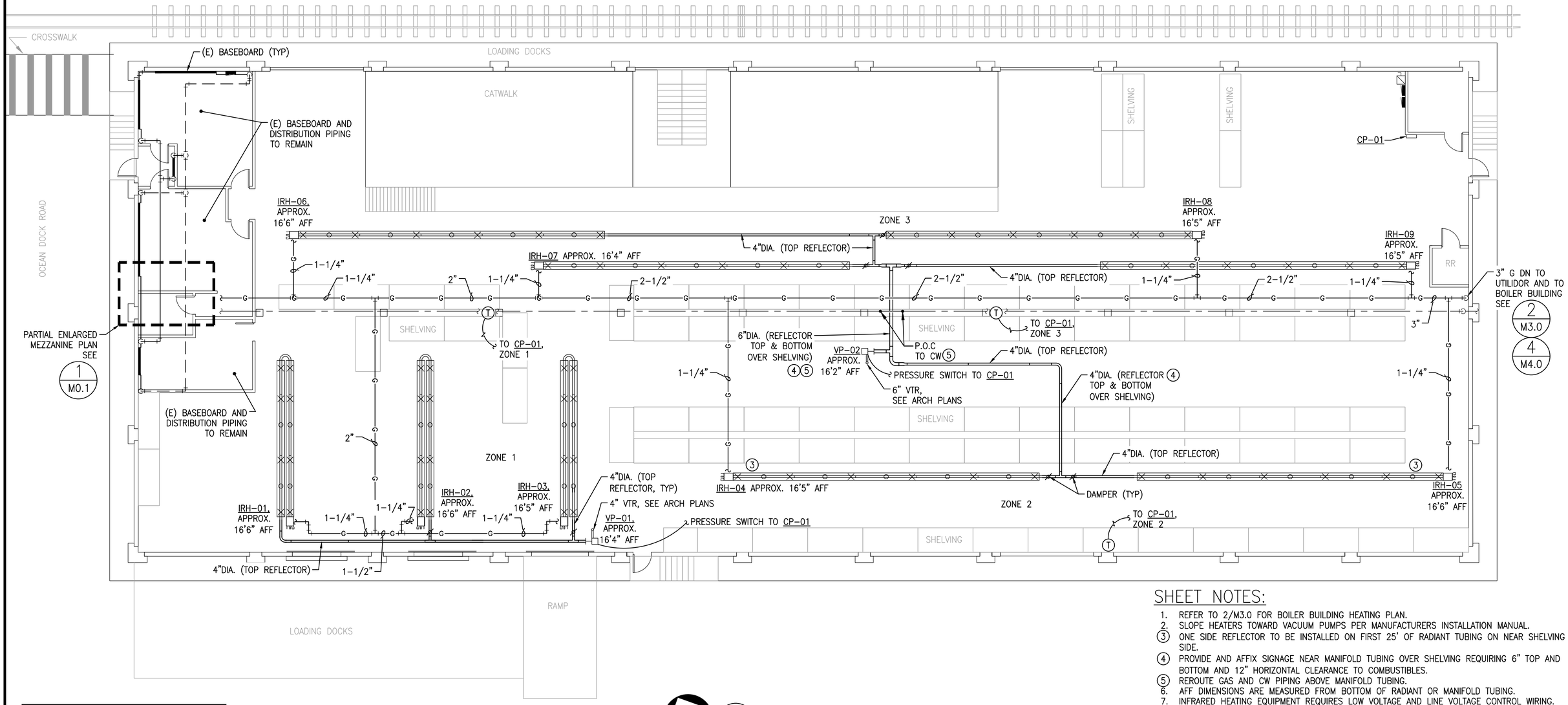

MECHANICAL HEATING PLAN

N

1 / M2.0 SCALE = 1/8" = 1'-0"

INFRARED HEATER LEGEND		
ABBR.	EXPLANATION	SYMBOL
BRN	BURNERS	
VP	VACUUM PUMPS	
	HANGING POINT	
	REFLECTOR SUPPORT	
CP	CONTROLLER	

CODE SUMMARY

COMBUSTION AIR PROVIDED IN ACCORDANCE WITH IFGC 304, INDOOR COMBUSTION AIR, STANDARD METHOD. BUILDING IS EXISTING WAREHOUSE AND NOT UNUSUALLY TIGHT ENVELOPE.

TOTAL EQUIP. INPUT: 1,180,000 BTUH
REQUIRED VOLUME: 59,000 CUBIC FEET
WAREHOUSE VOLUME: 286,578 CUBIC FEET (APPROXIMATE)

PROVIDE STRUCTURAL AND SEISMIC CALCULATIONS PLUS FASTENING DETAILS FOR IRH-01 THRU 09 (BURNERS, PIPING, & ACCESSORIES), VP-01, VP-02, AND UH-1 TO INCLUDE THE ENGINEER'S STAMP AND SIGNATURE, FOR STRUCTURAL REVIEW ON A DEFERRED SUBMITTAL BASIS.

SHEET NOTES:

1. REFER TO 2/M3.0 FOR BOILER BUILDING HEATING PLAN.
2. SLOPE HEATERS TOWARD VACUUM PUMPS PER MANUFACTURERS INSTALLATION MANUAL.
3. ONE SIDE REFLECTOR TO BE INSTALLED ON FIRST 25' OF RADIANT TUBING ON NEAR SHELVING SIDE.
4. PROVIDE AND AFFIX SIGNAGE NEAR MANIFOLD TUBING OVER SHELVING REQUIRING 6" TOP AND BOTTOM AND 12" HORIZONTAL CLEARANCE TO COMBUSTIBLES.
5. REROUTE GAS AND CW PIPING ABOVE MANIFOLD TUBING.
6. AFF DIMENSIONS ARE MEASURED FROM BOTTOM OF RADIANT OR MANIFOLD TUBING.
7. INFRARED HEATING EQUIPMENT REQUIRES LOW VOLTAGE AND LINE VOLTAGE CONTROL WIRING. COORDINATE CAREFULLY WITH EQUIPMENT MFG'S REQUIREMENTS AND ELECTRICAL DRAWINGS TO PROVIDE FOR A COMPLETE AND OPERABLE SYSTEM.
8. PROVIDE BRIDGING BETWEEN TRUSSES OR PURLINS WITH UNISTRUT AS REQUIRED TO MAINTAIN RADIANT HEATERS LAYOUT AS SHOWN. ALL DEVIATIONS TO RADIANT HEATER LAYOUT SHALL BE APPROVED BY MANUFACTURER AND ENGINEER.

GRAPHIC SCALE

8' 0 8' 16' 24'

GRAPHIC SCALE: 1/8" = 1'-0"

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12/14/2023
ME-11405
REGISTERED PROFESSIONAL ENGINEER

PROJECT:
ALASKA RAILROAD CORPORATION WAREHOUSE #1 HEATING RENOVATION

TITLE:
MECHANICAL HEATING PLAN

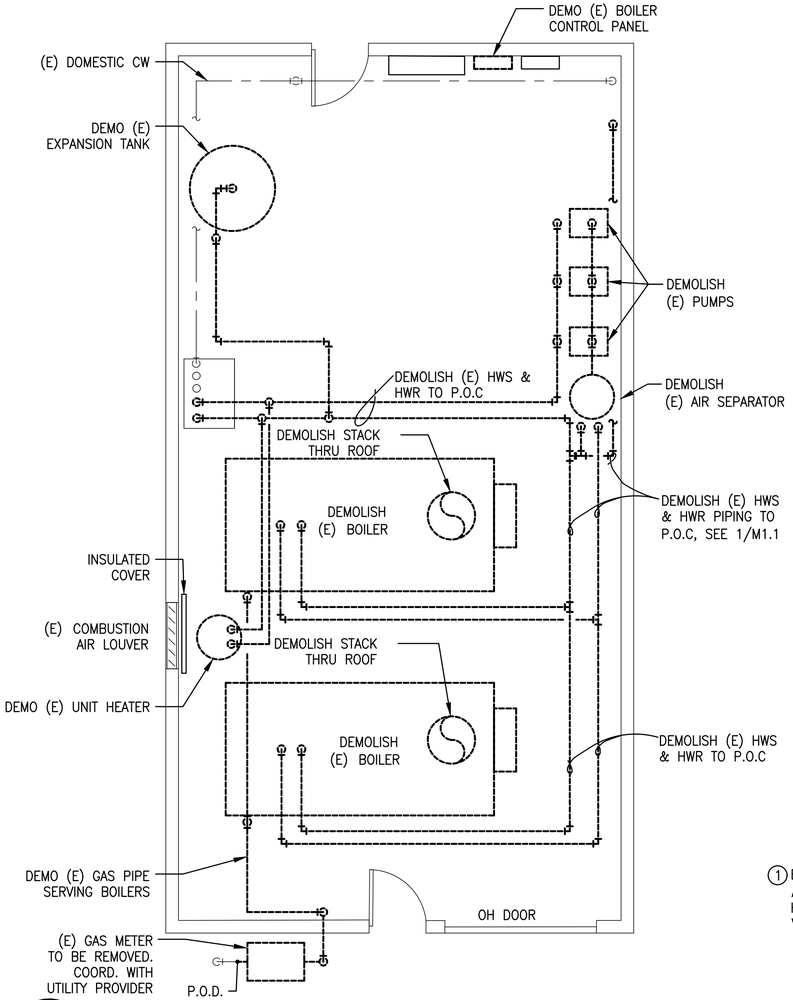
REV.	DATE	BY	REVISION

DESIGNED BY: BS/KR
DRAWN BY: APS/KRR
CHECKED BY: SH
APPROVED BY: SH

SCALE: AS NOTED
DATE: 12/14/2023

M2.0

AFE NO.:
ACAD FILE:
DWG NO. 6 OF 16



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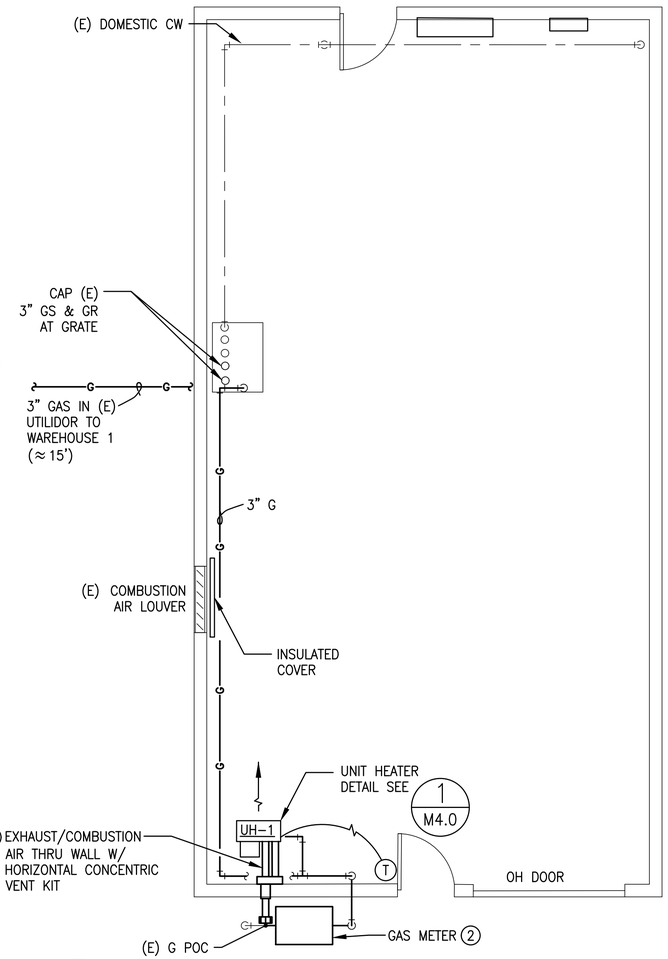
1 M3.0 **BOILER BUILDING - DEMOLITION PLAN**

SCALE = 1/4" = 1'-0"



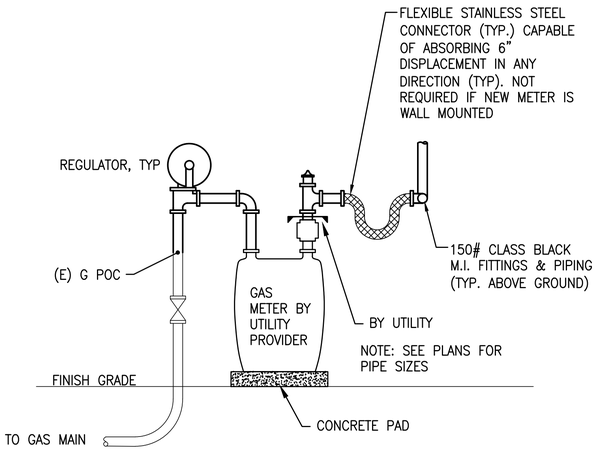
N

2 M3.0 **BOILER BUILDING HEATING PLAN**

SCALE = 1/4" = 1'-0"

SHEET NOTES:

1. TERMINATE MECHANICALLY DRIVEN INTAKES 10' FROM GAS METER. TERMINATE MECHANICAL VENTS MINIMUM 6 FEET VERTICAL FROM GAS METER.
2. COORDINATE NEW GAS METER SIZING AND INSTALLATION WITH UTILITY PROVIDER. FOR GAS METER DETAIL, SEE 3/M3.0.



3 M3.0 **GAS METER DETAIL**

NOT TO SCALE

GRAPHIC SCALE

4' 0 4' 8' 12'

GRAPHIC SCALE: 1/4" = 1'-0"

IF SHEET IS LESS THAN 22" X 34" IT IS A REDUCED PRINT – SCALE REDUCED ACCORDINGLY

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STATE OF ALASKA 49 TH
SCOTT C. HALA
12/14/2023
ME-11405
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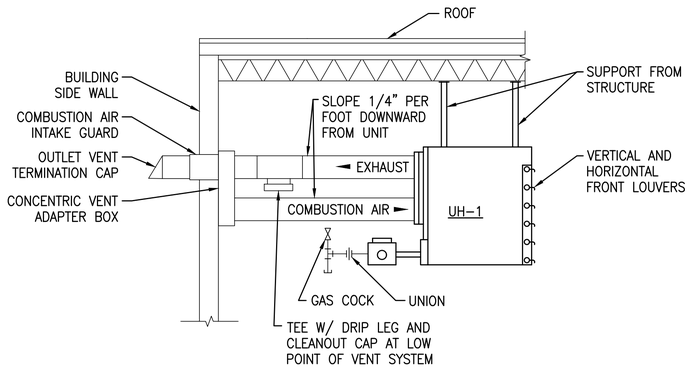
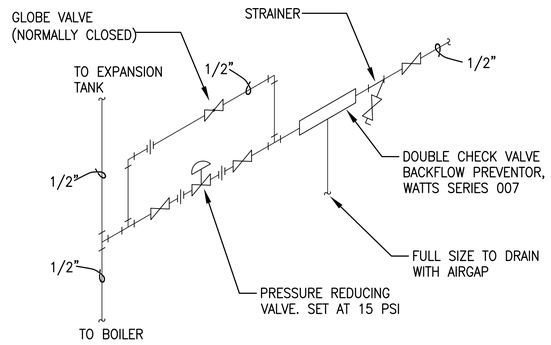


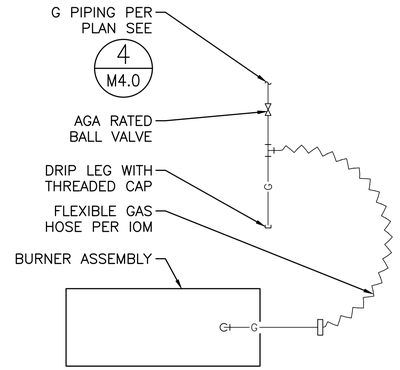
1 M4.0 GAS FIRED UNIT HEATER

NOT TO SCALE



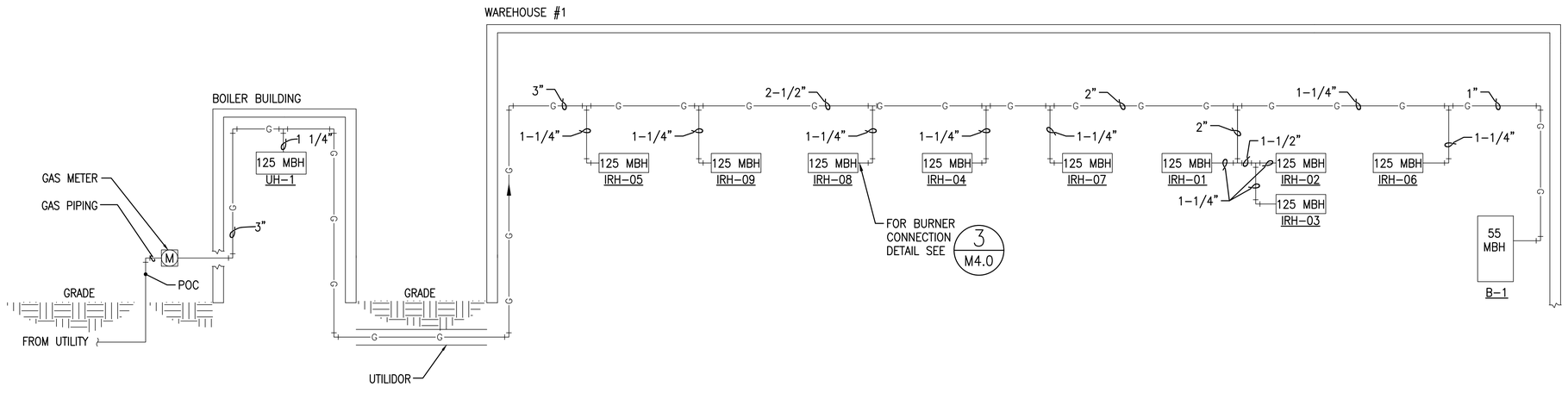
2 M4.0 BOILER MAKE-UP WATER DETAIL

NOT TO SCALE



3 M4.0 IRH BURNER GAS CONNECTION DETAIL

NOT TO SCALE



4 M4.0 NATURAL GAS PIPING SCHEMATIC

NOT TO SCALE

NEW GAS PIPING SERVING UH-1, IRH-1 THRU 9, AND B-1

NATURAL GAS PIPING SIZED IN ACCORDANCE WITH 2018 IFGC LESS THAN 2 PSI, TABLE 404.4(2)

TOTAL LENGTH:	350'
PIPE SIZE:	3"
NEW LOAD:	1,305 CFH
ALLOWED LOAD:	1,650 CFH
EXISTING LOAD:	10,460 CFH

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STATE OF ALASKA 49TH SCOTT C. HALA 12/14/2023 ME-11405 REGISTERED PROFESSIONAL ENGINEER

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PROJECT:
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DIVISION 15 – MECHANICAL

PART 1 – GENERAL

1.1 WORK INCLUDED

A. WORK CONSISTS OF PROVIDING LABOR, PRODUCTS, AND IN PERFORMING ALL OPERATIONS REQUIRED FOR THE COMPLETE OPERATING INSTALLATION OF ALL MECHANICAL SYSTEMS AS SHOWN AND SPECIFIED, IN STRICT ACCORDANCE WITH SPECIFICATIONS, APPLICABLE DRAWINGS, TERMS, AND CONDITIONS OF THE CONTRACT AND ALL APPLICABLE CODES AND ORDINANCES GOVERNING INSTALLATION OF THE VARIOUS MECHANICAL SYSTEMS. CORRELATE ALL WORK FULLY WITH THE WORK OF OTHER CRAFTS. PROVIDE ALL SYSTEMS COMPLETE AND IN PROPER OPERATING ORDER.

1.2 REGULATORY REQUIREMENTS

A. COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND NATIONAL CODES, ORDINANCES AND REGULATIONS IN EXISTENCE AT BID DATE AFFECTING MATERIALS AND METHODS OF INSTALLATION OF THE MECHANICAL SYSTEMS. FOLLOW RECOMMENDED PRACTICES AS SET DOWN BY ASME, SMACNA, INTERNATIONAL BUILDING CODE, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL FUEL GAS CODE, UNIFORM PLUMBING CODE, INTERNATIONAL FIRE CODE, NATIONAL ELECTRICAL CODE, AGA, AND OSHA AS THEY APPLY TO THIS PROJECT EXCEPT IN CASES WHERE STATUTES GOVERN.

1.3 MANUFACTURER'S WARRANTIES

A. IN THE EVENT OF EQUIPMENT OR COMPONENT FAILURE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO REPAIR OR REPLACE SUCH DEFECTIVE EQUIPMENT OR COMPONENTS AND BEAR ALL ASSOCIATED COSTS. THE CONTRACTOR SHALL PURSUE MANUFACTURER'S WRITTEN IMPLIED WARRANTIES TO THE EXTENT NECESSARY TO OBTAIN REPLACEMENT EQUIPMENT OR COMPONENTS PRIOR TO ANY OTHER ACTION BEING INITIATED.

1.4 ELECTRICAL WORK

A. ALL WIRING SHALL BE IN ACCORDANCE WITH NEC, STATE, AND LOCAL CODES.

1.5 TESTS AND INSPECTIONS

A. SCHEDULE, OBTAIN, AND PAY ALL FEES AND/OR SERVICES REQUIRED BY LOCAL AUTHORITIES AND BY THESE SPECIFICATIONS, TO TEST THE MECHANICAL SYSTEMS AS SPECIFIED.

B. DEFICIENCIES: IMMEDIATELY CORRECT ALL DEFICIENCIES, WHICH ARE EVIDENCED DURING THE TESTS AND REPEAT TESTS UNTIL SYSTEM IS APPROVED. DO NOT COVER OR CONCEAL PIPING, EQUIPMENT, OR OTHER PORTIONS OF THE MECHANICAL INSTALLATIONS UNTIL SATISFACTORY TESTS ARE MADE AND APPROVED.

C. COMPLETION: UPON COMPLETION OF THE MECHANICAL INSTALLATION, DEMONSTRATE TO THE CONTRACTING AGENCY'S SATISFACTION THAT THE SYSTEMS HAVE BEEN INSTALLED IN A SATISFACTORY MANNER IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS, AND APPLICABLE CODES. DEMONSTRATE DYNAMIC OPERATION OF ALL SYSTEMS. SHOW THAT ALL CONTROLS ARE OPERABLE AND ARE PROPERLY ADJUSTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE FINAL SYSTEMS BALANCE, THAT ALL SYSTEMS ARE PROPERLY BALANCED, THAT ALL EQUIPMENT OPERATES PROPERLY, THAT FILTERS AND STRAINERS ARE CLEAN, AND THAT ALL COMPONENTS OF ALL SYSTEMS ARE INSTALLED AND ADJUSTED FOR PROPER OPERATION.

1.6 PROJECT/SITE CONDITIONS

A. INSTALL WORK IN LOCATIONS SHOWN ON DRAWINGS, UNLESS PREVENTED BY PROJECT CONDITIONS.

B. PROVIDE INFORMATION SHOWING PROPOSED REARRANGEMENT OF WORK TO MEET PROJECT CONDITIONS, INCLUDING CHANGES TO WORK SPECIFIED IN OTHER SECTIONS OR INTERFERENCE WITH SITE CONDITIONS NOT IN THE CONTRACT. OBTAIN PERMISSION OF OWNER BEFORE PROCEEDING.

1.7 SUBMITTALS

A. SUBMITTAL REVIEW IS FOR GENERAL DESIGN AND ARRANGEMENT ONLY AND DOES NOT RELIEVE THE CONTRACTOR FROM ANY REQUIREMENTS OF CONTRACT DOCUMENTS. PROVISION OF A COMPLETE AND SATISFACTORY WORKING INSTALLATION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

B. SUBMITTALS SHALL BE MADE IN ACCORDANCE WITH DIVISION 1 REQUIREMENTS.

1.8 OPERATION AND MAINTENANCE MANUALS

A. PROVIDE OPERATION AND MAINTENANCE (O&M) MANUALS FOR TRAINING OF AND FUTURE REFERENCE BY, OWNER'S PERSONNEL IN OPERATION AND MAINTENANCE OF SYSTEMS AND RELATED EQUIPMENT. BIND EACH MANUAL IN A HARD–BACKED, LOOSE–LEAF, THREE–RING BINDER. USE 8–1/2" X 11" WHITE PAPER.

B. SUBMITTAL OF O&M MANUALS SHALL BE MADE IN ACCORDANCE WITH DIVISION 1 REQUIREMENTS.

1.9 SEISMIC RESTRAINT

A. CONTRACTOR SHALL SUBMIT STRUCTURAL CALCULATIONS AND STRUCTURALLY ENGINEERED SHOP DRAWINGS FOR SEISMIC RESTRAINT OF ALL NEW MECHANICAL COMPONENTS AND EQUIPMENT, INCLUDING DUCTWORK AND PIPING. CALCULATIONS TO BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF CHAPTER 16 OF THE 2018 INTERNATIONAL BUILDING CODE AND DRAWINGS ARE TO BE STAMPED BY A REGISTERED PROFESSIONAL STRUCTURAL ENGINEER LICENSED IN THE STATE OF ALASKA.

B. SEISMIC RESTRAINT DESIGN TO BE BASED ON SEISMIC RISK CATEGORY II, SEISMIC DESIGN CATEGORY D, AND IMPORTANCE FACTOR 1.0 FOR MECHANICAL EQUIPMENT.

PART 2 – PRODUCTS

2.1 SUPPORTS AND ANCHORS

A. PIPE HANGERS AND SUPPORTS

1. HANGERS FOR PIPE SIZES 1/2 TO 1–1/2 INCH: ADJUSTABLE SWIVEL, LOOP HANGER.

2. HANGERS FOR PIPE SIZES 2 TO 4 INCHES: ADJUSTABLE, SWIVEL.

3. MICHIGAN HANGER CO. MODEL NO. 100 FOR STEEL AND PLASTIC AND MODEL #101 FOR COPPER PIPE.

4. PIPING SUPPORT SPACING PER UNIFORM PLUMBING CODE.

5. INSTALL HANGERS TO PROVIDE MINIMUM 1/2 INCH SPACE BETWEEN FINISHED COVERING AND ADJACENT WORK. PLACE A HANGER WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW. USE HANGERS WITH 1–1/2 INCH MINIMUM VERTICAL ADJUSTMENTS.

B. HANGER RODS

1. STEEL HANGER RODS: THREADED BOTH ENDS, THREADED ONE END, OR CONTINUOUS THREADED.

C. SLEEVES

1. SLEEVES FOR PIPING AND DUCTWORK THROUGH NON–FIRE RATED FLOORS, BEAMS, WALLS, FOOTINGS, AND POTENTIALLY WET FLOORS: FORM WITH STEEL PIPE OR 18 GAUGE GALVANIZED STEEL. EXTEND SLEEVES THROUGH FLOORS ONE INCH ABOVE FINISHED FLOOR LEVEL. CAULK SLEEVES FULL DEPTH AND PROVIDE FLOOR PLATE. WHERE PIPING OR DUCTWORK PENETRATES CEILING OR WALL, CLOSE OFF SPACE BETWEEN PIPE OR DUCT AND ADJACENT WORK WITH FIRE–STOPPING INSULATION AND CAULK SEAL AIRTIGHT. PROVIDE CLOSE FITTING METAL COLLAR OR ESCUTCHEON COVERS AT BOTH SIDES OF PENETRATION. FIRE STOPPING INSULATION: GLASS FIBER TYPE, NON–COMBUSTIBLE. CAULK: ACRYLIC SEALANT.

2. SLEEVES FOR PIPES THROUGH FIRE RATED AND FIRE RESISTIVE FLOORS AND WALLS, AND FIREPROOFING: PREFABRICATED FIRE RATED SLEEVES INCLUDING SEALS, UL LISTED.

3. SIZE SLEEVES LARGE ENOUGH TO ALLOW FOR MOVEMENT DUE TO EXPANSION AND CONTRACTION. PROVIDE FOR CONTINUOUS INSULATION WRAPPING.

4. INSTALL CHROME–PLATED STEEL ESCUTCHEONS AT FINISHED SURFACES.

D. DUCTWORK HANGERS AND SUPPORTS

1. DUCTS 24 INCHES AND LESS: PROVIDE WITH ONE INCH X 18 GAUGE STRAPS FASTENED TO DUCTWORK AND TO BUILDING CONSTRUCTION. SPACE NOT MORE THAN EIGHT FEET ON CENTER.

2. RECOMMENDED METHODS OF FASTENING BRACING TO DUCTWORK, INCLUDE RIVETING, BOLTING, AND TACK WELDING.

2.2 MECHANICAL IDENTIFICATION

A. EQUIPMENT

1. PLASTIC NAMEPLATES: LAMINATED THREE–LAYER PLASTIC WITH ENGRAVED WHITE LETTERS ON DARK CONTRASTING BACKGROUND COLOR.

B. VALVES AND PUMPS

1. PLASTIC TAGS: LAMINATED THREE–LAYER PLASTIC WITH ENGRAVED WHITE LETTERS ON DARK CONTRASTING COLOR. TAG SIZE MINIMUM OF 1–1/2 INCH DIAMETER.

2. METAL TAGS: BRASS WITH STAMPED LETTERS; TAG SIZE MINIMUM 1–1/2 INCH DIAMETER WITH SMOOTH EDGES.

C. PIPING

1. PLASTIC PIPE MARKERS: FACTORY FABRICATED, FLEXIBLE, SEMI–RIGID PLASTIC, PREFORMED TO FIT AROUND PIPE OR PIPE COVERING, AND INDICATING FLOW DIRECTION ARROW AND FLUID BEING CONVEYED. BRADY STRAP–ON, SETON OR APPROVED.

2. PLASTIC TAPE PIPE MARKERS: FLEXIBLE, VINYL FILM TAPE WITH PRESSURE SENSITIVE ADHESIVE BACKING AND PRINTED MARKINGS. BRADY STRAP–ON, CRAFTMARK, SETON OR APPROVED.

D. VALVE CHART AND SCHEDULE

1. PROVIDE VALVE CHART AND SCHEDULE. INCLUDE IN OPERATION AND MAINTENANCE MANUAL.

2.3 MECHANICAL INSULATION

A. INSULATION

1. ACCEPTABLE MANUFACTURERS: ARMSTRONG, CERTAINTEED, MANVILLE, KNAUF, PITTSBURGH CORNING.

2. GLASS FIBER INSULATION: ASTM C547, "K" VALUE OF 0.24 AT 75 DEGREES F, NONCOMBUSTIBLE, MINIMUM SERVICE TEMPERATURE –20, MAXIMUM SERVICE TEMPERATURE 300 DEGREES F, MAXIMUM MOISTURE ABSORPTION 0.20 PERCENT BY VOLUME, VAPOR RETARDER JACKET COMPOSED OF WHITE KRAFT PAPER AND ALUMINUM FOIL LAMINATE. FLAME SPREAD/SMOKE DEVELOPED RATING OF 25/50 OR LESS IN ACCORDANCE WITH UL 723.

B. HOT PIPING REQUIREMENTS

1. INSULATION AND JACKET

a. ON PIPING CONVEYING FLUIDS 140 DEGREES F OR LESS, DO NOT INSULATE FLANGES AND UNIONS AT EQUIPMENT, BUT BEVEL AND SEAL ENDS OF INSULATION AT SUCH LOCATIONS. INSULATE FLANGES AND UNIONS AT EQUIPMENT WHEN FLUID TEMPERATURES EXCEED 140 DEGREES F. INSULATE FITTINGS, JOINTS, AND VALVES WITH SAME INSULATION AND THICKNESS AS SCHEDULED. STAPLES MAY BE USED TO SEAL JACKETS.

b. COVER INSULATION ON FITTINGS WITH PRE–MOLDED PVC FITTINGS COVERS.

c. INDOOR, EXPOSED APPLICATIONS: SIZE FOR FINISH PAINT APPLICATION.

2. INSULATE HEATING WATER OR GLYCOL SUPPLY AND RETURN LINES THRU 2 INCHES WITH 1 INCH THICK GLASS FIBER INSULATION, AND LINES OVER 2 INCHES WITH 1–1/2 INCH INSULATION.

2.4 HYDRONIC PIPING

A. MATERIALS

1. HEATING PIPING.

a. STEEL PIPE: ASTM A53, SCHEDULE 40, BLACK. FITTINGS: ASTM B16.3, MALLEABLE IRON OR ASTM A234, FORGED STEEL WELDING TYPE FITTINGS. JOINTS: AWS D1.1, WELDED.

b. COPPER TUBING: ASTM B88, TYPE L, HARD DRAWN. FITTINGS: ANSI/ASME B16.18 CAST BRASS OR ASME B16.22 SOLDER WROUGHT COPPER. JOINTS: ASTM B32, SOLDER, ENGELHARD "SILVABRITE 100" OR OTHER APPROVED LEAD–FREE SOLDER. COMPATIBLE WITH GLYCOL.

c. COPPER TUBING: ASTM B88, TYPE L DRAWN.

1) FITTINGS AND JOINTS: ASME B16.51, COPPER AND COPPER ALLOY PRESS FITTINGS SHALL CONFORM TO MATERIAL REQUIREMENTS OF ASME B16.18 OR ASME B 16.22 AND PERFORMANCE CRITERIA OF IAPMO PS117.EPDM SEALING ELEMENTS.

2. NATURAL GAS PIPING, ABOVE GROUND.

a. STEEL PIPE: ASTM A53 SCHEDULE 40 BLACK. FITTINGS: ASME B16.3, MALLEABLE IRON, OR ASTM A234, FORGED STEEL WELDING TYPE. JOINTS: NFPA 54, THREADED OR WELDED TO ASME B31.1, ASME B31.2, ASME B31.9 AND ASME SEC. 1. GAS PRESSURE OF 2 LBS. OR MORE TO BE WELDED FITTINGS AND WELDED JOINTS ONLY.

B. EQUIPMENT DRAINS AND OVERFLOWS

1. STEEL PIPE: ASTM A53 OR A120, SCHEDULE 40, GALVANIZED.

a. FITTINGS: ASME B16.3, MALLEABLE IRON OR ASME B16.4, GALVANIZED CAST IRON.

b. JOINTS: THREADED FOR PIPE 2 INCH AND SMALLER; FLANGED FOR PIPE 2–1/2 INCHES AND LARGER.

2. COPPER TUBING: ASTM B88, TYPE L, DRAWN.

a. FITTINGS: ASME B16.18, CAST BRASS, OR ASME B16.22, SOLDER WROUGHT COPPER.

b. JOINTS: ASTM B32, ALLOY GRADE SB5 TIN–ANTIMONY, OR ALLOY GRADE SN95 TIN–SILVER, LEAD FREE SOLDER.

C. FLANGES, UNIONS, AND COUPLINGS

1. PIPE SIZE 2 INCHES AND UNDER: PIPING: BRONZE UNIONS FOR COPPER PIPE, SOLDERED JOINTS.

2. PIPE SIZE OVER 2 INCHES: FERROUS PIPE: CLASS 150 MALLEABLE IRON THREADED OR FORGED STEEL SLIP–ON FLANGES, PREFORMED NEOPRENE GASKETS. COPPER TUBE AND PIPE: CLASS 150 SLIP–ON BRONZE FLANGES, PREFORMED NEOPRENE GASKETS.

3. DIELECTRIC CONNECTIONS: UNION WITH GALVANIZED OR PLATED STEEL THREADED END, COPPER SOLDER END, WATER IMPERVIOUS ISOLATION BARRIER.

4. DIELECTRIC WATERWAY FITTINGS: 150 PSIG ELECTROPLATED STEEL OR BRASS NIPPLE WITH AN INERT AND NON–CORROSIVE THERMOPLASTIC LINING; PPP INC., CLEARFLOW, OR APPROVED EQUAL.

D. VALVES

1. SELECT VALVES OF THE BEST QUALITY AND TYPE SUITED FOR THE SPECIFIC SERVICE AND PIPING SYSTEM USED. MINIMUM WORKING PRESSURE RATING 125 PSIG STEAM OR 150 PSIG W.O.G. BALL VALVES ARE TO BE USED IN LIEU OF GATE VALVES FOR SHUT– OFF AND ISOLATION SERVICE.

2. BALL VALVES: UP TO AND INCLUDING 3 INCHES: BRONZE OR STAINLESS STEEL BODY, 400 PSI W.O.G. – 150 S.W. P., STANDARD PORT, STAINLESS STEEL OR BRONZE BALL, TEFLON SEATS, AND STUFFING BOX RING, LEVER HANDLE, SOLDER OR THREADED ENDS. SEAT MATERIAL TO BE COMPATIBLE WITH FLUID HANDLED.

3. GATE VALVES: MSS SP 80, CLASS 150, BRONZE BODY, BRONZE TRIM, THREADED BONNET, NON–RISING STEM, HAND–WHEEL, INSIDE SCREW WITH BACK–SEATING STEM, SOLID WEDGE DISC, SOLDER OR THREADED ENDS.

4. DRAIN VALVE: QUARTER TURN, BRASS CONSTRUCTION, NPT TO 3/4" MGHT, MAX. TEMP. 180 DEGREES F, MAX. PRESS. 125 PSI.

5. SWING CHECK VALVES

a. 2–1/2 INCHES AND SMALLER: BRONZE BODY, BRONZE TRIM, HORIZONTAL SWING DISC, SOLDER OR THREADED ENDS.

6. SPRING LOADED CHECK VALVES

a. 2 INCHES AND SMALLER: BRONZE BODY, SPRING ACTUATED, STAINLESS STEEL SPRING, RENEWABLE SEAT AND DISC, SOLDER OR THREADED ENDS.

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2.5 PIPING EXECUTION

A. INSTALLATION

1. REAM PIPE AND TUBE ENDS. REMOVE BURRS. BEVEL PLAIN END FERROUS PIPE.
2. REMOVE SCALE AND DIRT, ON INSIDE AND OUTSIDE OF PIPE, BEFORE ASSEMBLY.
3. PREPARE PIPING CONNECTIONS TO EQUIPMENT WITH FLANGES OR UNIONS.
4. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
5. PROVIDE NON–CONDUCTING DIELECTRIC CONNECTIONS WHEREVER JOINTING DISSIMILAR METALS.
6. ROUTE PIPING IN ORDERLY MANNER AND MAINTAIN GRADIENT.
7. SLEEVE PIPE PASSING THROUGH PARTITIONS, WALLS, AND FLOORS.
8. INSTALL PIPING TO CONSERVE BUILDING SPACE AND NOT INTERFERE WITH USE OF SPACE.
9. GROUP PIPING WHENEVER PRACTICAL AT COMMON ELEVATIONS.
10. INSTALL PIPING TO ALLOW FOR EXPANSION AND CONTRACTION WITHOUT STRESSING PIPE, JOINTS, OR CONNECTED EQUIPMENT.
11. INSTALL VALVES WITH STEMS UPRIGHT OR HORIZONTAL, NOT INVERTED.
12. PROTECT PIPING SYSTEMS FROM ENTRY OF FOREIGN MATERIALS BY TEMPORARY COVERS, COMPLETING SECTIONS OF THE WORK, AND ISOLATING PARTS OF COMPLETED SYSTEM.
13. PROVIDE CLEARANCE FOR INSTALLATION OF INSULATION AND ACCESS TO VALVES AND FITTINGS. PROVIDE ACCESS DOORS WHERE VALVES AND FITTINGS ARE NOT EXPOSED.
14. WHERE PIPE SUPPORT MEMBERS ARE WELDED TO STRUCTURAL BUILDING FRAMING, SCRAPE, BRUSH CLEAN, AND APPLY ONE COAT OF ZINC RICH PRIMER TO WELDING.
15. PREPARE UNFINISHED PIPE, FITTINGS, SUPPORTS, AND ACCESSORIES FOR FINISHED PAINTING.
16. USE BALL VALVES OR GATE VALVES FOR SHUT–OFF AND TO ISOLATE EQUIPMENT, PART OF SYSTEMS, OR VERTICAL RISERS.

B. TESTING

1. HEATING PIPING SYSTEMS
   a. TEST ALL WATER PIPING HYDROSTATICALLY AT 100 PSIG OR 150% OF WORKING PRESSURE, WHICHEVER IS GREATER, FOR A PERIOD OF FOUR HOURS. OBSERVE PIPING DURING THIS PERIOD AND REPAIR ALL LEAKS.
   b. AIR TEST:
      1) IN GENERAL, AIR TESTING IS NOT ACCEPTABLE. IN THE EVENT OF CONDITIONS THAT WOULD SUBJECT THE PIPE TO FREEZING, HOWEVER, AN EQUIVALENT AIR PRESSURE TEST MAY BE USED AFTER OBTAINING APPROVAL FROM THE CONTRACTING AGENCY.
      2) MAKE THE AIR TEST BY ATTACHING AN AIR COMPRESSOR TESTING APPARATUS TO ANY SUITABLE OPENING, AND AFTER CLOSING ALL OTHER INLETS AND OUTLETS TO THE SYSTEM, FORCE AIR INTO THE SYSTEM UNTIL THERE IS UNIFORM GAUGE PRESSURE OF 100 POUNDS PER SQUARE INCH, OR 150% OF WORKING PRESSURE, BUT NOT MORE THAN 150 PSIG. THE AIR PRESSURE SHALL BE HELD WITHOUT INTRODUCTION OF ADDITIONAL AIR FOR A PERIOD OF AT LEAST EIGHT HOURS. LOCATE ALL LEAKS BY APPLYING SOAP SOLUTION TO ALL JOINTS. REPAIR ALL LEAKS.
   c. PROVIDE CERTIFICATION THAT TESTING HAS BEEN ACCOMPLISHED. TESTING CERTIFICATION TO BE INCLUDED IN OPERATION AND MAINTENANCE MANUALS.
2. NATURAL GAS
   a. TEST ALL GAS PIPING BEFORE CONNECTION TO GAS SOURCE. DO NOT ENCLOSE OR CONCEAL ANY UNTESTED PORTION OF THE GAS SYSTEM.
   b. TEST ALL PIPING IN ACCORDANCE WITH CHAPTER 4 OF THE INTERNATIONAL FUEL GAS CODE AND AS AMENDED BY THE MUNICIPALITY OF ANCHORAGE.
   c. OBTAIN A CERTIFICATE OF FINAL INSPECTION FROM THE ADMINISTRATIVE AUTHORITY AND INCLUDE IN OPERATION AND MAINTENANCE MANUALS.

2.6 TEMPERATURE CONTROLS

A. PROVIDE ELECTRIC/ELECTRONIC TEMPERATURE CONTROLS FOR ALL EQUIPMENT AND SYSTEMS SPECIFIED INCLUDING BUT NOT LIMITED TO THE FOLLOWING.
   1. BOILERS
   2. PUMPS
   3. UNIT HEATERS
   4. BASEBOARD RADIATION

B. PROVIDE NECESSARY WIRING, CONDUIT AND TERMINAL UNIT CONTROLS FOR A COMPLETE AND FUNCTIONAL CONTROL SYSTEM.

C. MANUFACTURER SHALL BE COMPANY SPECIALIZING IN MANUFACTURING PRODUCTS REQUIRED FOR SYSTEM CONTROL WITH MINIMUM FIVE YEARS EXPERIENCE.

D. INSTALLER: COMPANY SPECIALIZING IN APPLYING THE WORK WITH MINIMUM FIVE YEARS EXPERIENCE.

E. SEQUENCE OF OPERATION

1. BOILER
   a. BOILER CIRCULATOR PUMP IS ENERGIZED BY ZONE THERMOSTAT, WHEN FLOW IS PROVED THROUGH BOILER FLOW SWITCH, BOILER FIRES TO MAINTAIN SYSTEM SETPOINT.
   b. PROVIDE MANUFACTURERS OUTDOOR AIR SENSOR FOR HOT WATER RESET FEATURE.
   c. PROVIDE MANUFACTURERS SUPPLY TEMPERATURE SENSOR.
2. GAS FIRED RADIANT HEATERS
   a. FACTORY CONTROLS MAINTAIN ZONE TEMPERATURE OF 65 DEGREES F. (ADJ) WITH NIGHT SETBACK OF 55 DEGREES F. (ADJ)
3. GAS FIRED UNIT HEATER
   a. ROOM THERMOSTAT CYCLES BURNER TO MAINTAIN 65 DEGREE F. (ADJ) ROOM TEMPERATURE SETTING.

2.7 TESTING, ADJUSTING, AND BALANCING

A. EXAMINATION

1. BEFORE COMMENCING WORK, VERIFY THAT SYSTEMS ARE COMPLETE AND OPERABLE. ENSURE THE FOLLOWING:
   a. EQUIPMENT IS OPERABLE AND IN A SAFE AND NORMAL CONDITION.
   b. TEMPERATURE CONTROL SYSTEMS ARE INSTALLED COMPLETE AND OPERABLE.
   c. PROPER THERMAL OVERLOAD PROTECTION IS IN PLACE FOR ELECTRICAL EQUIPMENT.
   d. HYDRONIC SYSTEMS HAVE BEEN FLUSHED, FILLED, AND VENTED.
   e. CORRECT PUMP ROTATION.
   f. PROPER STRAINER BASKETS ARE CLEAN AND IN PLACE.
   g. SERVICE AND BALANCE VALVES ARE OPEN.
2. REPORT ANY DEFECTS OR DEFICIENCIES NOTED DURING PERFORMANCE OF SERVICES TO ARCHITECT/ENGINEER.
3. PROMPTLY REPORT ABNORMAL CONDITIONS IN MECHANICAL SYSTEMS OR CONDITIONS WHICH PREVENT SYSTEM BALANCE.
4. IF, FOR DESIGN REASONS, SYSTEM CANNOT BE PROPERLY BALANCED, REPORT AS SOON AS OBSERVED.
5. BEGINNING OF WORK MEANS ACCEPTANCE OF EXISTING CONDITIONS.

B. PREPARATION

1. PROVIDE INSTRUMENTS REQUIRED FOR TESTING, ADJUSTING, AND BALANCING OPERATIONS.
2. PROVIDE ADDITIONAL BALANCING DEVICES AS REQUIRED.

C. INSTALLATION TOLERANCES

1. ADJUST HYDRONIC SYSTEMS TO PLUS OR MINUS 10 PERCENT OF DESIGN.

D. ADJUSTING

1. RECORDED DATA SHALL REPRESENT ACTUALLY MEASURED, OR OBSERVED CONDITION.
2. PERMANENTLY MARK SETTINGS OF VALVES AND OTHER ADJUSTMENT DEVICES ALLOWING SETTINGS TO BE RESTORED. SET AND LOCK MEMORY STOPS.
3. AFTER ADJUSTMENT, TAKE MEASUREMENTS TO VERIFY BALANCE HAS NOT BEEN DISRUPTED OR THAT SUCH DISRUPTION HAS BEEN RECTIFIED.
4. LEAVE SYSTEMS IN PROPER WORKING ORDER, REPLACING BELT GUARDS, CLOSING ACCESS DOORS, CLOSING DOORS TO ELECTRICAL SWITCH BOXES, AND RESTORING THERMOSTATS TO SPECIFIED SETTINGS.

E. WATER SYSTEM PROCEDURE

1. ADJUST WATER SYSTEMS TO PROVIDE REQUIRED OR DESIGN QUANTITIES.
2. USE CALIBRATED VENTURI TUBES, ORIFICES, OR OTHER METERED FITTINGS AND PRESSURE GAUGES TO DETERMINE FLOW RATES FOR SYSTEM BALANCE. WHERE FLOW METERING DEVICES ARE NOT INSTALLED, BASE FLOW BALANCE ON TEMPERATURE DIFFERENCE ACROSS VARIOUS HEAT TRANSFER ELEMENTS IN THE SYSTEM.
3. ADJUST SYSTEMS TO PROVIDE SPECIFIED PRESSURE DROPS AND FLOWS THROUGH HEAT TRANSFER ELEMENTS PRIOR TO THERMAL TESTING. PERFORM BALANCING BY MEASUREMENT OF TEMPERATURE DIFFERENTIAL IN CONJUNCTION WITH AIR BALANCING.
4. EFFECT SYSTEM BALANCE WITH AUTOMATIC CONTROL VALVES FULLY OPEN TO HEAT TRANSFER ELEMENTS.
5. EFFECT ADJUSTMENT OF WATER DISTRIBUTION SYSTEMS BY MEANS OF BALANCING COCKS, VALVES, AND FITTINGS. DO NOT USE SERVICE OR SHUT–OFF VALVES FOR BALANCING UNLESS INDEXED FOR BALANCE POINT.
6. WHERE AVAILABLE PUMP CAPACITY IS LESS THAN TOTAL FLOW REQUIREMENTS OR INDIVIDUAL SYSTEM PARTS, FULL FLOW IN ONE PART MAY BE SIMULATED BY TEMPORARY RESTRICTION OF FLOW TO OTHER PARTS.

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STATE OF ALASKA
49 TH
SCOTT C. HALA
12/14/2023
ME-11405
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	BY	REVISION

ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510–7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
MECHANICAL SPECIFICATIONS

DESIGNED BY:	BS/KR	SCALE: AS NOTED	AFE NO.:
DRAWN BY:	APS/KRR		ACAD FILE:
CHECKED BY:	SH	DATE: 12/14/2023	DWG NO. M5.1
APPROVED BY:	SH		10 OF 16

PANEL: 2A

MOUNTING: ☒ SURFACE ☒ FLUSH | MAINS: ☒ LUGS ☐ CB | OPTIONS: ☐ FEEDTHRU ☐ SHUNT TRIP ☐ ISO GND BAR ☐ SUBFEED LUG ☐ SUBFEED BRKR ☐ SOLID NEUTRAL

PROJECT: **ARRC WAREHOUSE 1**
LOCATION: WAREHOUSE BUILDING
VOLTAGE: 208Y/120 VOLT — 3 PHASE 4 WIRE — 400 A MLO — 10k AIC

CIRCUIT DESCRIPTION	KVA	AMP	P	CKT	CKT	AMP	P	KVA	CIRCUIT DESCRIPTION
PANEL C		100	3	1	2	50	3		BOILER PLANT
				3	4				
				5	6				
VACUUM PUMP, VP-02	**2.0**	**15**	**2**	7	8	30	2		DRYER
				9	10				
MEZZ / XFMR ROOM LIGHT / OUTLET		20	1	11	12	20	1		WATER HEATER
FIRE ALARM PANEL		20	1	13	14	60	3		BATTERY CHARGER #1 & #2
BACK MAN DOOR EXIT		20	1	15	16				
WAREHOUSE LIGHTS		20	1	17	18				
WAREHOUSE LIGHTS		20	1	19	20	20	1		MEZZANINE CEILING OUTLETS
WAREHOUSE LIGHTS		20	1	21	22	20	1		LAVATORY HEATER
WAREHOUSE LIGHTS CONTROL		20	1	23	24	20	1		LAVATORY LIGHTS / OUTLETS
LOWER SHELF OUTLETS		20	1	25	26	20	1		DISHWASHER
MEZZANINE SHELF OUTLETS		20	1	27	28	20	1		WAREHOUSE OUTLETS
LOWER SHELF OUTLETS		20	1	29	30	20	1		WRAPPING MAHCINE / OUTLETS
LOWER SHELF OUTLETS		20	1	31	32	20	1		MEZZANINE / WAREHOUSE OUTLETS
UNKNOWN		20	1	33	34	20	1		WAREHOUSE OUTLETS
FRONT LOWER SHELF OUTLETS		20	1	35	36	20	1		WAREHOUSE COMPUTER
UNKNOWN		20	1	37	38	20	1		EXTERIOR LIGHTING CONTROL
UNKNOWN		20	1	39	40	20	1	**1.0**	**CONTROL PANEL, CP-01**
LOW SHELF OUTLETS / DOOR 3 LIGHTS		20	1	41	42	20	1		**SPARE**
UNKNOWN		20	1	43	44	20	1		SHELVING LIGHTING
VACUUM PUMP, VP-01	**0.8**	20	1	45	46	20	1		SHELVING LIGHTING
FIRE ALARM CELLULAR OUTLET		20	1	47	48	20	1		SHELVING LIGHTING
EXTERIOR LIGHTS		30	2	49	50	20	1	**0.5**	**IRH-01, IRH-02, IRH-03, IRH-04**
				51	52	20	1		120 VOLT BATTERY CHARGER OUTLET
IRH-06, IRH-07	**0.2**	20	1	53	54	20	1	**0.4**	**IRH-05, IRH-08, IRH-09**

CONNECTED LOAD: 4.9 KVA 13.6 A
DEMAND LOAD: 5.4 KVA 15.0 A
REMARKS: SQUARE D NQ TYPE PANELBOARD
DATE:
REV:

(2)

PANEL: A (BOILER)

MOUNTING: ☒ SURFACE ☒ FLUSH | MAINS: ☒ LUGS ☐ CB | OPTIONS: ☐ FEEDTHRU ☐ SHUNT TRIP ☐ ISO GND BAR ☐ SUBFEED LUG ☐ SUBFEED BRKR ☐ SOLID NEUTRAL

PROJECT: **ARRC WAREHOUSE 1**
LOCATION: BOILER BUILDING
VOLTAGE: 208Y/120 VOLT — 3 PHASE 4 WIRE — 60 A MLO — 10k AIC

CIRCUIT DESCRIPTION	KVA	AMP	P	CKT	CKT	AMP	P	KVA	CIRCUIT DESCRIPTION
RECP		20	1	1	2	20	1		LIGHTS
FUEL OIL PUMP		20	1	3	4	20	1		ALARM PANEL
SPARE		20	1	5	6	20	1		RECP
AIR DRYER		20	1	7	8	**15**	**1**	**0.5**	**UNIT HEATER**
SUMP PUMP		15	1	9	10	20	1		SPARE
GLYCOL PUMP		15	1	11	12	20	1		BOILER #1 CONTROL POWER
BOILER #2 CONTROL POWER		20	1	13	14	-	1		SPACE
SPACE		-	1	15	16	-	1		SPACE
SPACE		-	1	17	18	-	1		SPACE
SPACE		-	1	19	20	-	1		SPACE
SPACE		-	1	21	22	-	1		SPACE
SPACE		-	1	23	24	-	1		SPACE

CONNECTED LOAD: 0.5 KVA 1.5 A
DEMAND LOAD: 0.7 KVA 1.8 A
REMARKS: REUSE EXISTING CIRCUIT BREAKER FOR REVISED LOADS
DATE:
REV:

(1)

WIRING DEVICES LEGEND

- PUSH BUTTON
- JUNCTION BOX
- GFCI
- RECEPTACLE – QUAD
- OR — EQUIPMENT CONNECTION

POWER LEGEND

- ELECTRICAL POWER PANEL
- MOTOR CONTROL CENTER
- METER
- CONTROLLER/DISCONNECT
- UNFUSED DISCONNECT
- FUSED DISCONNECT
- MOTOR SINGLE PHASE
- MOTOR 3PH
- FRACTIONAL HORSEPOWER MOTOR STARTER

LIGHTING LEGEND

- 4' STRIP LIGHT FIXTURE
- CEILING MOUNTED EGRESS LIGHT FIXTURE

LINE TYPE LEGEND

- EXISTING
- NEW
- DEMOLITION

NOTES:

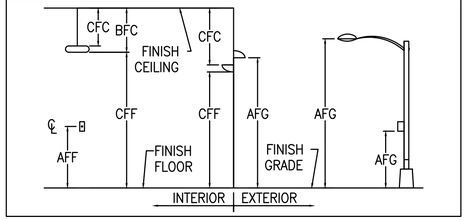
(1) EXISTING BREAKER MARKED AS SPARE TO BE USED FOR NEW LOAD. FIELD VERIFY AVAILABILITY PRIOR TO CONNECTION.

(2) DEMOLISH SPARE 20A/1P BREAKERS. PROVIDE NEW 15A/2P BREAKER FOR VACUUM PUMP.

ABBREVIATIONS LEGEND

ABBR.	EXPLANATION
AB	ABOVE BASEBOARD
AC	ABOVE COUNTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFCI	ARC FAULT CIRCUIT INTERRUPTER
ATS	AUTOMATIC TRANSFER SWITCH
BFC	BELOW FINISHED CEILING
CFC	CLEARANCE FROM CEILING
CFF	CLEARANCE FROM FLOOR
CT	CURRENT TRANSFORMER
DDC	DIRECT DIGITAL CONTROL
E	EMERGENCY LIGHT, CIRCUIT, PANEL
ETR	EXISTING TO REMAIN
GDP	GENERATOR DISTRIBUTION PANEL
GFCI	GROUND FAULT CURRENT INTERRUPTER
HACR	HEATING AIR-CONDITIONING REFRIGERATION
HBH	HEAD BOLT HEATER
HDPE	HIGH DENSITY POLYETHYLENE
HEA	HOMER ELECTRIC ASSOCIATION
HOA	HANDS OFF AUTO
MCC	MOTOR CONTROL CENTER
MC	METAL CLAD CABLE
MDP	MAIN DISTRIBUTION PANEL
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PA	PUBLIC ADDRESS
PVC	POLYVINYL CHLORIDE
RSC	RIGID STEEL CONDUIT
SPD	SURGE PROTECTION DEVICE
ST	SHUNT TRIP CIRCUIT BREAKER
STBY	STANDBY CIRCUIT
TC	TIMECLOCK
TMCB	THERMO MAGNETIC CIRCUIT BREAKER
TP	TAMPER RESISTANT
TVSS	TRANSIT VOLTAGE SURGE SUPPRESSION
UON	UNLESS OTHERWISE NOTED
VFD	VARIABLE FREQUENCY DRIVE
W	WALL MOUNT +60" AFF
WP	WEATHERPROOF
XFMR	TRANSFORMER

MOUNTING LEGEND



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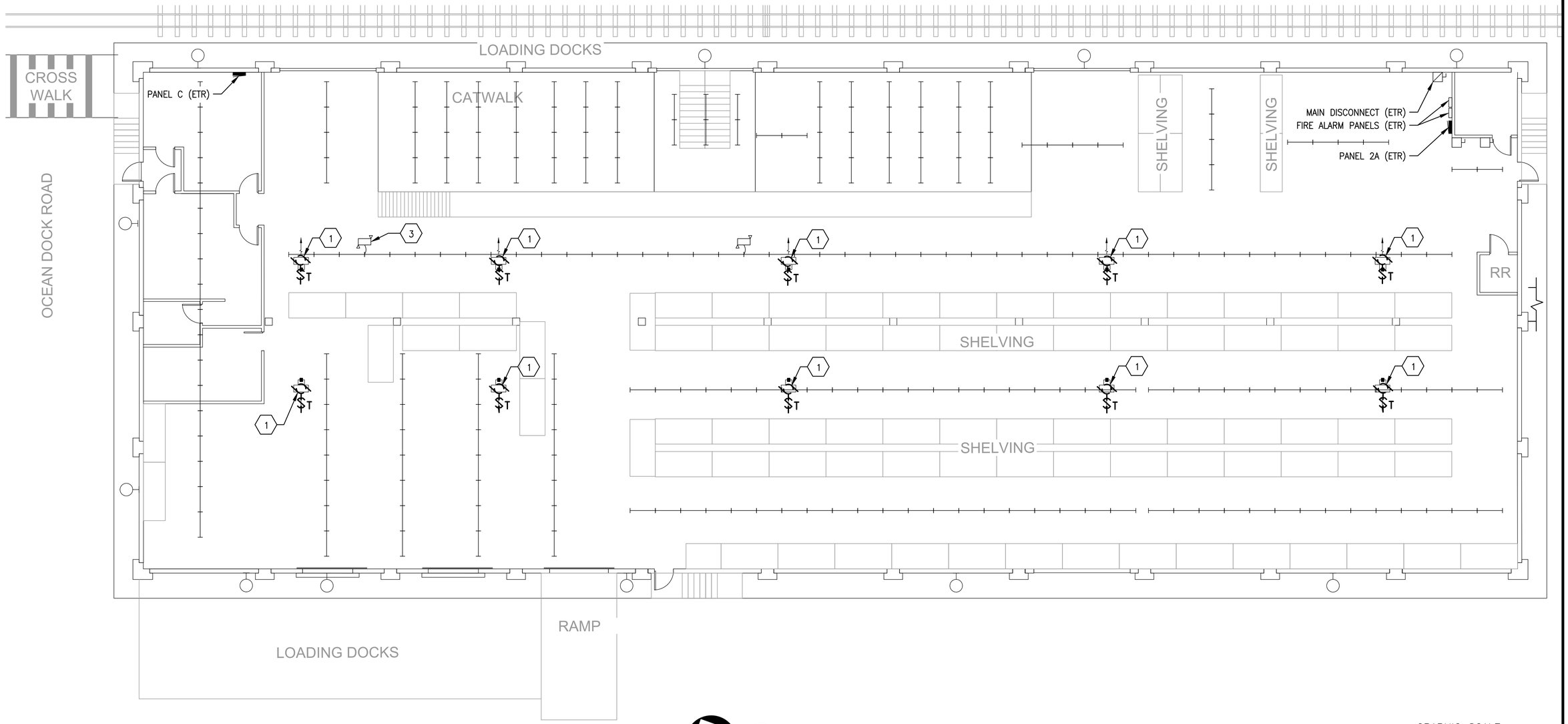
STATE OF ALASKA 49TH
EDWARD W. CARLSON
12/14/2023
EE-9354
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	BY	REVISION

PROJECT: **ALASKA RAILROAD CORPORATION WAREHOUSE #1 HEATING RENOVATION**

TITLE: **ELECTRICAL LEGEND AND SCHEDULES**

DESIGNED BY: EWC	SCALE: AS NOTED	**E1.0**	AFE NO.:
DRAWN BY: PDO/JAB	DATE: 12/14/2023		ACAD FILE:
CHECKED BY: EWC			DWG NO. 11 OF 16
APPROVED BY: EWC			



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1 E2.0 ELECTRICAL DEMO PLAN
SCALE = 1/8" = 1'-0"

GRAPHIC SCALE
8' 0 8' 16' 24'
GRAPHIC SCALE: 1/8" = 1'-0"

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NOTES:

1. DEMOLISH UNIT HEATERS. DEMOLISH CONDUCTORS BACK TO PANEL. EXISTING CONDUIT AND CIRCUIT BREAKER MAY BE REUSED AT THE CONTRACTOR'S DISCRETION.
2. EXISTING LIGHT FIXTURES TO REMAIN UNLESS OTHERWISE NOTED.
3. REMOVE AND RELOCATE EMERGENCY LIGHT FIXTURE. SEE SHEET E3.0 FOR ADDITIONAL INFORMATION.

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EDWARD W. CARLSON
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REV.	DATE	BY	REVISION

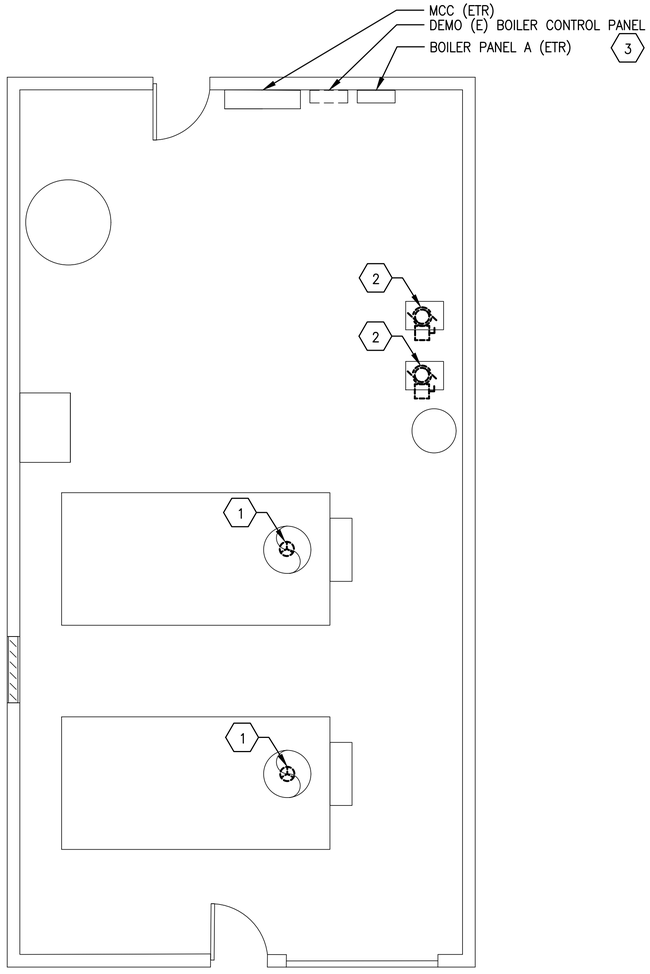
ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ELECTRICAL WAREHOUSE DEMOLITION PLAN

DESIGNED BY:	EWC	SCALE: AS NOTED	E2.0
DRAWN BY:	SNS/JAB	DATE: 12/14/2023	
CHECKED BY:	EWC		
APPROVED BY:	EWC		

AFE NO.:
ACAD FILE:
DWG NO. 12 OF 16



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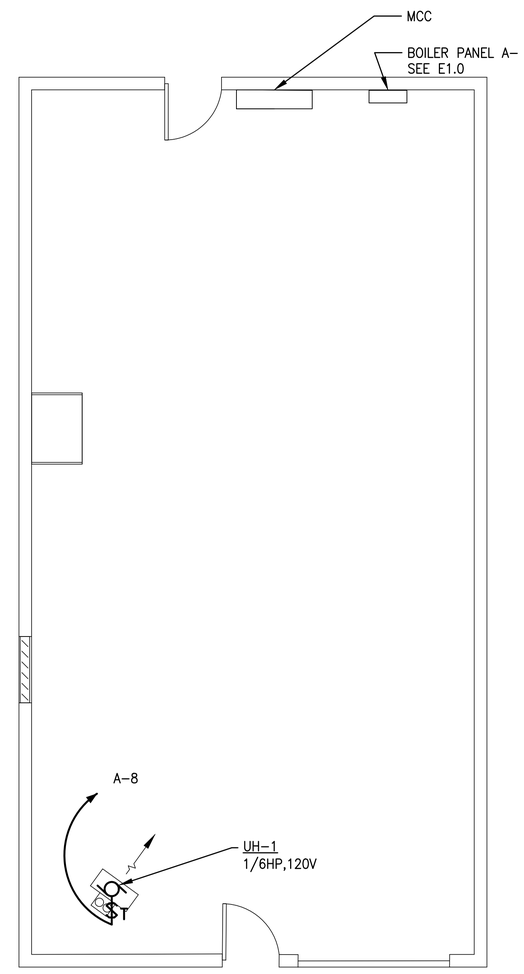
1 E2.1 BOILER BUILDING – DEMOLITION PLAN

SCALE = 1/4" = 1'-0"



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2 E2.1 BOILER BUILDING – REMODEL PLAN

SCALE = 1/4" = 1'-0"

GRAPHIC SCALE

4' 0 4' 8' 12'

GRAPHIC SCALE: 1/4" = 1'-0"

DEMOLITION NOTES:

1. DEMOLISH BOILERS AND ASSOCIATED EQUIPMENT. DEMOLISH CONDUIT AND CONDUCTORS BACK TO MCC. MARK ASSOCIATED MCC DISCONNECTS AS SPARE.
2. DEMOLISH CIRCULATING PUMPS AND ASSOCIATED EQUIPMENT. DEMOLISH CONDUIT AND CONDUCTORS BACK TO MCC. MARK ASSOCIATED MCC DISCONNECTS AS SPARE.
3. FIELD VERIFY ALL ABANDONED LOADS IN PANEL UNDER THIS CONTRACT AND UPDATE SCHEDULE AS REQUIRED.

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REV.	DATE	BY	REVISION

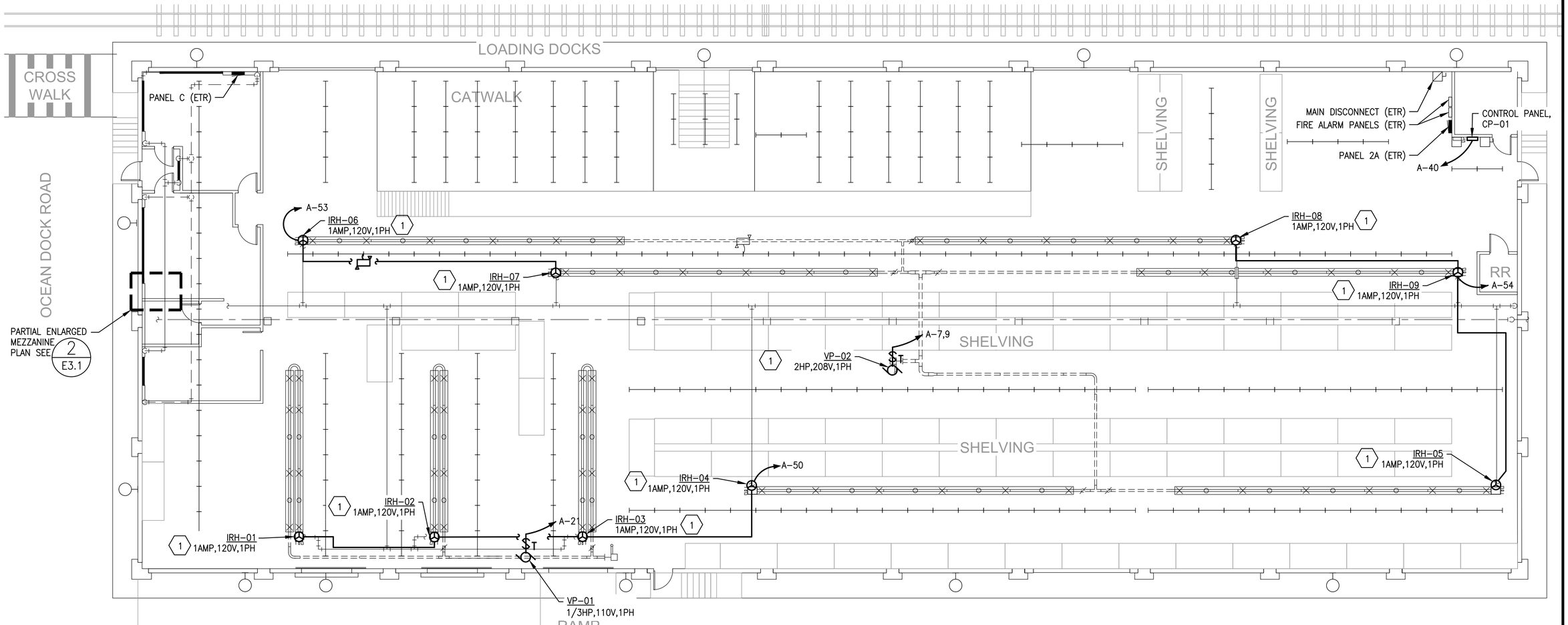
ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ELECTRICAL
BOILER BUILDING PLANS

DESIGNED BY:	EWC	SCALE: AS NOTED	E2.1
DRAWN BY:	SNS	DATE: 12/14/2023	
CHECKED BY:	EWC		
APPROVED BY:	EWC		

AFE NO.:
ACAD FILE:
DWG NO. 13 OF 16



N

1 E3.1 ELECTRICAL PLAN

SCALE = 1/8" = 1'-0"

GRAPHIC SCALE

8' 0 8' 16' 24'

GRAPHIC SCALE: 1/8" = 1'-0"

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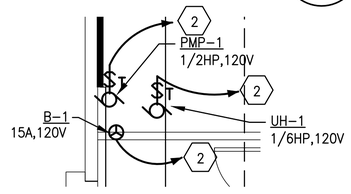

N

2 E3.1 PARTIAL MEZZANINE PLAN – ELECTRICAL

SCALE = 1/4" = 1'-0"

GRAPHIC SCALE

4' 0 4' 8' 12'

GRAPHIC SCALE: 1/4" = 1'-0"

NOTES:

1. INSTALL RADIANT HEATER CONTROLS AND SAFETIES IN ACCORDANCE WITH MANUFACTURES INSTRUCTIONS. CONNECT TO CIRCUIT INDICATED.
2. PROVIDE 1/2"C, 2#12, 1#12 GND TO AVAILABLE POLE SPACE IN PANEL 'C'. REUSE EXISTING IF PRACTICAL OR PROVIDE NEW 20A/1P BREAKER LISTED FOR USE IN EXISTING PANEL AS REQUIRED FOR NEW LOAD.

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EDWARD W. CARLSON
12/14/2023
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REV.	DATE	BY	REVISION

ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:

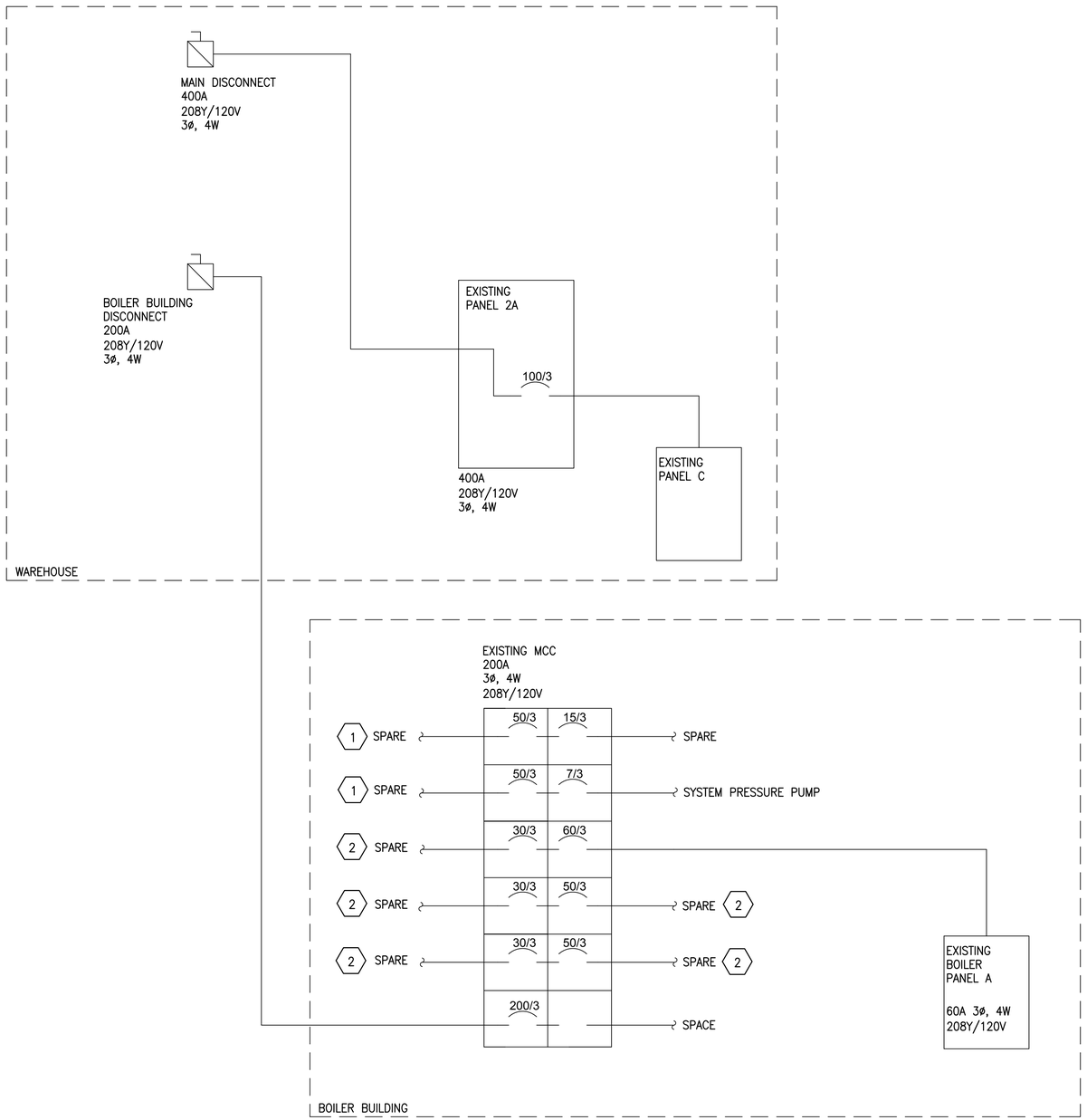
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:

ELECTRICAL PLAN

DESIGNED BY:	EWC	SCALE: AS NOTED	E3.0
DRAWN BY:	SNS/JAB	DATE: 12/14/2023	
CHECKED BY:	EWC		
APPROVED BY:	EWC		

AFE NO.:
ACAD FILE:
DWG NO. 14 OF 16



1 / E4.0 POWER ONE LINE DIAGRAM
NTS

NOTES:

1. MARK BOILER DISCONNECT AS SPARE.
2. MARK CIRCULATION PUMP DISCONNECT AS SPARE.
3. PROVIDE UPDATED PANEL SCHEDULES TO REFLECT ALL MODIFICATIONS MADE UNDER THIS CONTRACT. FURNISH A SPARE COPY TO ARRC MAINTENANCE WITH THE RECORD DRAWING SUBMITTAL.

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REV.	DATE	BY	REVISION

ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510-7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ELECTRICAL ONE LINE DIAGRAM

DESIGNED BY:	EWC	SCALE: AS NOTED	E4.0
DRAWN BY:	PDO/AHD		
CHECKED BY:	EWC	DATE: 12/14/2023	
APPROVED BY:	EWC		

AFE NO.:
ACAD FILE:
DWG NO. 15 OF 16

DIVISION 16000 – ELECTRICAL SPECIFICATIONS

1.1 SCOPE

A. PROVIDE COMPLETE ELECTRICAL SYSTEMS AS SHOWN ON DRAWINGS AND SPECIFIED. FURNISH ALL LABOR, EQUIPMENT, APPLIANCES, MATERIALS, AND PERFORM OPERATIONS REQUIRED FOR COMPLETE INSTALLATION IN ACCORDANCE WITH ALL SECTIONS OF SPECIFICATIONS, DRAWINGS, CODES, AND CONDITIONS OF CONTRACT.

1.2 CODES, STANDARDS, FEES, PERMITS

A. COMPLY WITH LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, NATIONAL ELECTRICAL SAFETY CODE, LOCAL CODES, AMENDMENTS, ORDINANCES AND REQUIREMENTS OF UTILITY COMPANIES' FURNISHING SERVICES TO INSTALLATION. COMPLY WITH NEMA, UL, ANSI, ICEA AND OTHER INDUSTRY STANDARDS. COMPLY WITH REQUIREMENTS OF IBC, IMC, UPC, AND OTHER APPLICABLE CODES.

B. SECURE AND PAY FOR ALL INSPECTIONS, FEES, PERMITS, ETC., REQUIRED BY LOCAL AND STATE AGENCIES.

1.3 DRAWINGS

A. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND DO NOT SHOW ALL FEATURES OF WORK. INSTALL ELECTRICAL ITEMS TO PROVIDE SYMMETRICAL APPEARANCE. DO NOT SCALE DRAWINGS. REVIEW OTHER DRAWINGS AND ADJUST WORK TO CONFORM TO CONDITIONS SHOWN. VERIFY FIELD CONDITIONS. IMMEDIATELY CONTACT THE OWNER'S REPRESENTATIVE FOR CLARIFICATION OF QUESTIONABLE, OBSCURE ITEMS, OR APPARENT CONFLICTS. THE OWNER'S REPRESENTATIVE'S DECISION IS FINAL FOR ALL CLARIFICATIONS REQUESTED. EXTRA COST RESULTING FROM A CONDITION WHERE CLARIFICATION WAS NOT REQUESTED: MADE AT NO INCREASE IN CONTRACT AMOUNT UNLESS EXTRA COST IS APPROVED IN WRITING.

1.4 WORKMANSHIP

A. CONSIDERED AS IMPORTANT AS ELECTRICAL AND MECHANICAL EFFICIENCY AND SUBJECT TO APPROVAL. EMPLOY WORKMEN SKILLED IN TRADE AND FAMILIAR WITH PARTICULAR TECHNIQUES APPLICABLE TO VARIOUS SECTIONS OF WORK. INSTALL IN ACCORDANCE WITH NECA "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONTRACTING."

1.5 COORDINATION

A. COORDINATE WITH OTHER TRADES FOR PROPER INSTALLATION AND TIMELY EXECUTION. ANY CHANGES NECESSITATED BY FAILURE TO PROPERLY COORDINATE WORK: MADE AT NO INCREASE IN CONTRACT AMOUNT.

B. VERIFY INFORMATION SHOWN ON PLANS WITH EQUIPMENT ITEMS ACTUALLY FURNISHED WHERE EQUIPMENT IS FURNISHED OR INSTALLED BY OTHERS. NOTIFY OWNER'S REPRESENTATIVE OF ANY CONFLICTS.

C. COORDINATE WITH SERVING UTILITIES. PROVIDE ALL EQUIPMENT AND LABOR REQUIRED, INCLUDE ALL COSTS NECESSARY FOR COMPLETE ELECTRICAL SERVICES.

1.6 REMODEL WORK

A. EXISTING CONDITIONS NOTED ON THE DRAWINGS WERE PREPARED FROM PREVIOUS CONSTRUCTION DRAWINGS. VISIT SITE, VERIFY EXISTING CONDITIONS AND ALLOW ADEQUATE MONIES TO COVER ADDITIONAL WORK REQUIRED AS A RESULT OF AS–BUILT CONDITIONS. ASSUME THAT THE AS–BUILT INFORMATION DOES NOT INDICATE EXACT CONDUIT ROUTING OR CIRCUITING. INCLUDE NECESSARY WORK TO PROVIDE CIRCUIT CONTINUITY TO EXISTING CIRCUITS THAT MAY BE AFFECTED BY NEW WORK. CUT BACK EXISTING WORK BEING REMOVED OR ABANDONED BEYOND FINISHED SURFACES TO ALLOW REPAIR AND REFINISHING. ASSUME CONDITION OF WIRING IS SUITABLE FOR RECONNECTING.

B. NOTIFY OWNER'S REPRESENTATIVE OF ANY FIELD CONDITIONS WHERE CONTRACTOR CANNOT REUSE EXISTING MATERIAL OR EQUIPMENT BECAUSE OF DETERIORATED CONDITIONS. ALSO NOTIFY OWNER'S REPRESENTATIVE OF ANY EXISTING CONDITIONS WHICH MAY BE CONSIDERED UNSAFE OR IN NEED OF REPAIR.

1.7 GUARANTEE

A. GUARANTEE ALL MATERIAL TO BE NEW, ALL WORK TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR ONE YEAR FROM DATE OF FINAL ACCEPTANCE. REPAIR OR REPLACE ANY WORK OR MATERIAL DEEMED DEFECTIVE DURING THE GUARANTEE PERIOD AT NO COST TO THE OWNER.

PART 2 – PRODUCTS

2.1 RACEWAYS

A. GALVANIZED RIGID STEEL CONDUIT OR INTERMEDIATE METAL CONDUIT: USE IN DAMP OR WET LOCATIONS, UNDERGROUND, IN CONCRETE OR CMU, WHERE SUBJECT TO PHYSICAL DAMAGE, FOR SERVICE CONDUCTORS AND PANELBOARD FEEDERS.

B. ELECTRICAL METALLIC TUBING: USE IN ALL OTHER AREAS UNLESS OTHERWISE INDICATED. PROVIDE RAINTIGHT/CONCRETE–TIGHT COMPRESSION FITTINGS.

C. FLEXIBLE METALLIC CONDUIT: USE FOR FINAL CONNECTIONS TO LUMINAIRES AND EQUIPMENT TO ISOLATE VIBRATION OR ALLOW RELOCATION. PROVIDE FLEXIBLE WATERTIGHT CONDUIT IN DAMP OR WET LOCATIONS (PUMPS, KITCHEN EQUIPMENT, ETC.). WHERE USED OUTDOORS, USE LIQUIDTIGHT FLEXIBLE CONDUIT RATED FOR –60 DEGREES F AND LISTED FOR DIRECT BURY.

D. NO CONDUIT ALLOWED EMBEDDED IN SPRAY–APPLIED FIREPROOFING OR BETWEEN STRUCTURAL STEEL MEMBERS AND GYPSUM WALL BOARD.

E. LOCATE NEW RACEWAYS TO NOT ENDANGER STRENGTH OF STRUCTURAL MEMBERS, AND SIX INCHES MINIMUM FROM PARALLEL RUNS OF HEAT PIPING. DO NOT INSTALL RACEWAYS IN OR THROUGH STRUCTURAL MEMBERS UNLESS SPECIFICALLY APPROVED. CROSS EXPANSION JOINTS WITH EXPANSION FITTINGS AND BONDING CONDUCTOR.

F. WATERPROOF ALL ROOF AND EXTERIOR WALL PENETRATIONS AS APPROVED.

2.2 WIRE AND CABLE

A. INSTALL ALL NEW CONDUCTORS IN APPROVED RACEWAY SYSTEMS. ALL CONDUCTOR SIZES BASED ON COPPER. #12 AWG MINIMUM EXCEPT CONTROL WIRING MAY BE #14.

B. MINIMUM INSULATION RATING: 90 DEGREES C, 600 VOLT.

C. 120 VOLT BRANCH CIRCUIT LENGTHS FROM PANEL TO FIRST OUTLET EXCEEDING 75': NO. 10 AWG MINIMUM.

D. INCREASE CONDUCTOR SIZES TO #10 AWG OR USE 90 DEGREES C–RATED INSULATION TO OFFSET DERATING FACTOR, WHEN MORE THAN THREE 20 AMP CONDUCTORS ARE INSTALLED IN SINGLE RACEWAY.

E. COLOR CODE 120/208 VOLT SYSTEMS: BLACK, RED, BLUE AND WHITE.

F. INSTALL NO THERMOPLASTIC INSULATED CONDUCTORS WHEN TEMPERATURE IS BELOW 20 DEGREES F.

G. CONNECTIONS:

1. #6 AND LARGER: SOLDERLESS LUGS.

2. #8 AND SMALLER: INSULATED WIRE NUT CONNECTOR, IDEAL "WINGNUT" HARD SHELL.

2.3 BOXES

I. WHERE CONDUIT SYSTEMS ARE USED, PROVIDE GALVANIZED OR CADMIUM PLATED, ONE PIECE PRESSED OR WELDED STEEL WITH DEVICE FINISH RING AND GANG COVER. FOUR INCH SQUARE OR OCTAGONAL, 1–1/2" DEEP MINIMUM SIZE. PROVIDE STEEL SQUARE CORNER MASONRY BOXES AND FINISH RINGS IN MASONRY, CONCRETE OR CONCRETE BLOCK WALLS.

J. VERIFY LOCATION OF ALL OUTLETS. UNLESS NOTED, MOUNT OUTLETS AS FOLLOWS, FINISHED FLOOR TO CENTERLINE OF OUTLET:

WALL SWITCHES, PUBLIC TELEPHONE OUTLETS	4'–0"
WEATHERPROOF OUTLETS	2'–0"

K. PROVIDE ADDITIONAL PULL BOXES AS REQUIRED TO AVOID EXCESS PULLING TENSIONS AND TO FACILITATE WORK.

PANELBOARDS AND OVERCURRENT PROTECTION

A. EXISTING TO REMAIN UNLESS NOTED OTHERWISE.

B. PROVIDE CIRCUIT BREAKERS OF THERMAL MAGNETIC TYPE, QUICK–MAKE, QUICK–BREAK WITH A MINIMUM OF 10,000 AIC RATING AT 120, 208 VOLT. MEET NEMA STANDARD AB1. PROVIDE HIGH INTERRUPTING CAPACITY AND NON–FUSE TYPE CURRENT LIMITING CIRCUIT BREAKERS WHERE SHOWN. PROVIDE MULTI–POLE BREAKERS WITH INTERNAL COMMON TRIP.

C. PROVIDE "SWITCHING RATED" CIRCUIT BREAKERS FOR ALL HEATING CIRCUITS CONTROLLED AT THE PANELBOARD.

2.5 WIRING DEVICES

D. SWITCHES: 20 AMP, 120/277 VOLT, MEET FEDERAL SPECIFICATION W–S–896E, UL #20, SELF–GROUNDING. COLOR AS DIRECTED.

E. DEVICE PLATES: UL LISTED, ONE PIECE FLUSH PLATES STAINLESS STEEL USE GALVANIZED PLATES FOR EXPOSED WIRING, GASKETED CAST METAL SELF–CLOSING WEATHERPROOF PLATES OUTDOORS, U.L. LISTED FOR WET LOCATIONS WHILE IN USE.

2.6 GROUNDING

A. GROUND ALL NEW ELECTRICAL DEVICES, MOTORS, METALLIC PIPING, DUCTWORK, METAL FRAMING, ETC., IN ACCORDANCE WITH N.E.C. ARTICLE 250.

B. UTILIZE THE METALLIC RACEWAY SYSTEM AS THE SYSTEM GROUNDING PATH FOR ALL DEVICES UNLESS OTHERWISE NOTED AND AS OTHERWISE REQUIRED BY M.O.A. AMENDMENTS TO N.E.C. .

C. PROVIDE SEPARATE GREEN GROUNDING CONDUCTOR FOR ALL BRANCH CIRCUITS.

PART 3 – EXECUTION

3.1 GENERAL

A. INSTALL ALL NEW MATERIAL AND EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, INSTRUCTIONS AND INSTALLATION DRAWINGS, UNLESS OTHERWISE INDICATED AND IN ACCORDANCE WITH NECA'S "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONTRACTING".

B. SEAL PENETRATIONS WITH UL–LISTED FIREPROOFING MATERIALS TO MAINTAIN FIREPROOFING INTEGRITY AND WATERTIGHTNESS.

C. SEAL AIRTIGHT ALL PENETRATIONS THROUGH SMOKE PARTITIONING, FAN PLENUMS, DUCTWORK, AND VAPOR BARRIERS.

D. REPLACE OR REPAIR ANY SPRAY–APPLIED FIREPROOFING OR INSULATION DAMAGED BY INSTALLATION OF ELECTRICAL EQUIPMENT.

E. REPAIR ALL DAMAGE TO FINISHED SURFACES WHERE CAUSED BY INSTALLATION OF ELECTRICAL EQUIPMENT.

F. PROVIDE PROPER IDENTIFICATION FOR NEW PANELS, SWITCHES, OR ANY ITEM OF ELECTRICAL EQUIPMENT USED AS A CONTROL DEVICE OR DISCONNECTING MEANS FOR ANY EQUIPMENT. IDENTIFY BOXES CONTAINING EMERGENCY CIRCUITS PER N.E.C. ARTICLE 700.10(A).

3.2 SUPPORTS

A. SUPPORT NEW RACEWAYS ON APPROVED TYPES OF WALL BRACKETS, CEILING TRAPEZE HANGERS OR MALLEABLE IRON STRAPS. PLUMBERS PERFORATED STRAP NOT PERMITTED AS MEANS OF SUPPORT.

B. DO NOT SUSPEND NEW RACEWAYS OR EQUIPMENT FROM CEILING TIE WIRE OR T–BAR, FROM STEAM, WATER OR OTHER PIPING OR DUCTWORK, BUT SUPPORT INDEPENDENTLY.

C. ANCHOR NEW EQUIPMENT TO THE BUILDING STRUCTURE TO RESIST SEISMIC DESIGN CATEGORY D EARTHQUAKE FORCES. PROVIDE ADEQUATE BACKING AT STRUCTURAL ATTACHMENT POINTS TO ACCEPT THE FORCES INVOLVED. PROVIDE EQUIPMENT SUPPORTED BY FLEXIBLE ISOLATION MOUNTS WITH EARTHQUAKE RESTRAINING SUPPORTS.

D. SECURE NEW BOXES, WALL BRACKETS, CABINETS AND HANGERS BY MEANS OF TOGGLE BOLTS IN GYPBOARD; MACHINE SCREWS, BOLTS OR WELDING ON METAL SURFACES; AND WOOD SCREWS IN WOOD CONSTRUCTION.

3.3 AS–BUILT DRAWINGS

A. KEEP CLEAN SET OF PRINTS AT JOB SITE AND RECORD ALL ELECTRICAL CHANGES THAT OCCURRED DURING CONSTRUCTION. .

B. AT END OF CONSTRUCTION, PROVIDE ONE COMPLETE SET OF DRAWINGS INDICATING ALL FIELD CHANGES FOR RECORD PURPOSES TO THE OWNER'S REPRESENTATIVE.

END OF SECTION

IF SHEET IS LESS THAN
22" X 34"
IT IS A REDUCED PRINT –
SCALE REDUCED ACCORDINGLY

STATE OF ALASKA
49 TH
EDWARD W. CARLSON
12/14/2023
EE-9354
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REV.	DATE	BY	REVISION

ALASKA RAILROAD CORPORATION
ENGINEERING SERVICES
P.O. BOX 107500, ANCHORAGE, ALASKA 99510–7500

PROJECT:
ALASKA RAILROAD CORPORATION
WAREHOUSE #1 HEATING RENOVATION

TITLE:
ELECTRICAL SPECIFICATIONS

DESIGNED BY: EWC	SCALE: AS NOTED	**E5.0**	AFE NO.:
DRAWN BY: PDO/AHD			ACAD FILE:
CHECKED BY: EWC	DATE: 12/14/2023		DWG NO. 16 OF 16
APPROVED BY: EWC			