

MECHANICAL ABBREVIATIONS

AFF	ABOVE FINISH FLOOR	ID	INSIDE DIAMETER
AC	AIR COMPRESSOR	I.E.	INVERT ELEVATION
AHU	AIR HANDLING UNIT	IAH	INTAKE HOOD
AS	AIR SEPARATOR		
A.T.C.	ARCHITECTURAL TRADES CONTRACTOR	LAT	LEAVING AIR TEMPERATURE
		LH	LATENT HEAT (MBH)
B	BOILER	LWT	LEAVING WATER TEMPERATURE
B.A.S.	BUILDING AUTOMATION SYSTEM		
		MAX	MAXIMUM
CAF	COMBUSTION AIR FAN	MBH	BTU PER HOUR (THOUSAND)
CC	COOLING COIL	MIN	MINIMUM
CFM	CUBIC FEET PER MINUTE	M.T.C.	MECHANICAL TRADES CONTRACTOR
CHLR	CHILLER		
CHP	CONSOLE HEAT PUMP	N.C.	NOISE CRITERIA
CONV	CONVECTOR	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
CT	COOLING TOWER	NTS	NOT TO SCALE
CU	CONDENSING UNIT		
CUH	CABINET UNIT HEATER	P	PUMP
CV	CONTROL VALVE	PCR	PUMPED CONDENSATE RETURN
CWP	CHILLED WATER PUMP	PD	PRESSURE DROP
		PCP	RADIANT CEILING PANEL
DB	DRY BULB	REQ'D	REQUIRED
DFU	DUCT FURNACE	RG	RETURN GRILLE
DIA	DIAMETER	RH	RELATIVE HUMIDITY
DN	DOWN	RLH	RELIEF HOOD
DPR	DAMPER	RTU	ROOF TOP UNIT
DS	DUCT SILENCER		
		SD	SUPPLY DIFFUSER
EAT	ENTERING AIR TEMPERATURE	SF	SUPPLY FAN
EF	EXHAUST FAN	SG	SUPPLY GRILLE
EG	EXHAUST GRILLE	SH	SENSIBLE HEAT (MBH)
E.T.C.	ELECTRICAL TRADES CONTRACTOR	SM	SHEET METAL
EVR	EVAPORATOR	SQ. FT.	SQUARE FEET
EWI	ENTERING WATER TEMPERATURE	SST	SATURATED SUCTION TEMPERATURE
EXH	EXHAUST	STR	STRAINER
EXIST	EXISTING		
		TC	TOTAL COOLING (MBH)
FF	FINISH FLOOR	TCL	TEMPERATURE CONTROL
FFM	FEET PER MINUTE	T&P	TEMPERATURE & PRESSURE RELIEF VALVE
FT	FEET	TYP	TYPICAL
FTR	FINNED TUBE RADIATION		
FU	FURNACE	UH	UNIT HEATER
		VAV	VARIABLE AIR VOLUME BOX
GAL	GALLON	VRH	VARIABLE AIR VOLUME REHEAT BOX
GFRH	GAS FIRED RADIANT HEATER	FPVAV	FAN POWERED VARIABLE AIR VOLUME BOX
GR	GRILLE	V.F.D	VARIABLE FREQUENCY DRIVE
		ZD	ZONE DAMPER
H	HUMIDIFIER		
HC	HEATING COIL	X-SA	EXISTING ITEM (EXISTING SUPPLY AIR DUCT)
HD	HEAD (FT)		ITEM
HP	HORSE POWER		EXISTING
HHP	HORIZONTAL HEAT PUMP		
HTG	HEATING		
HVAC	HEATING, VENTILATION, & AIR CONDITIONING		
HWP	HEATING WATER PUMP		
HX	HEAT EXCHANGER		

GENERAL HVAC NOTES

- ALL WORK SHALL CONFORM TO MICHIGAN MECHANICAL CODE, LATEST APPLICABLE EDITION.
- LOCATE EXHAUST OUTLETS OF COMBUSTION EQUIPMENT STACKS, AT LEAST 10 FEET FROM OUTDOOR AIR INTAKES.
- INSTALL ALL EQUIPMENT, MATERIALS, AND ACCESSORIES PER MANUFACTURERS WRITTEN INSTRUCTIONS.
- NOTIFY OWNER OF ANY PIPING OR DUCTWORK DEMOLITION THAT MAY AFFECT NORMAL OPERATION OF OTHER AREAS.
- FIELD VERIFY LOCATIONS OF EXISTING PIPING THAT MAY CONFLICT WITH NEW CONSTRUCTION AND RELOCATE AS NEEDED.
- CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER DISCIPLINES PRIOR TO CONSTRUCTION TO AVOID CONFLICTS.
- PROVIDE MANUAL AIR VENTS WITH 3/4" HOSE CONNECTION AT ALL HIGH POINTS.
- OFFSET PIPING TO ACCOMMODATE LARGE DUCTWORK.
- THE CONTRACTOR SHALL FIELD VERIFY THE SIZES, LOCATION, ELEVATIONS, AND DETAILS OF ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ALL EQUIPMENT AND MATERIALS IN A "NEW" CONDITION DURING CONSTRUCTION.
- ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND SUBCONTRACTORS AS REQUIRED BY LAW.
- ALL CONDENSATE DRAIN PIPING SET @ MIN. 1% SLOPE.
- ALL CONDENSATE DRAIN PIPING TO TERMINATE TO DRAIN VIA AIR GAP.
- IF THERE IS CONFLICTING INFORMATION IN THE PLANS OR SPECIFICATIONS THE MORE STRINGENT AND GREATER COST ITEM SHALL BE USED.
- DRAWINGS INDICATE REQUIRED SIZES AND POINTS OF TERMINATION OF PIPES AND DUCTS AND SUGGESTED ROUTES. IT IS NOT INTENTION OF DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN MANNER TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. DO NOT SCALE FROM DRAWINGS.
- ANY INFORMATION FOUND ON THE DRAWINGS AND NOT IN THE SPECIFICATIONS, OR FOUND IN SPECIFICATIONS AND NOT IN THE DRAWINGS, SHALL BE CONSTRUED AS TO BE INCLUDED IN BOTH THE SPECIFICATIONS AND THE DRAWINGS. ANY CONFLICT BETWEEN THE PLANS AND THE SPECIFICATIONS WILL BE INTERPRETED BY THE ARCHITECT. IN THE EVENT OF CONFLICT, FOR THE PURPOSE OF BIDDING, THE CONTRACTOR SHALL PRESUME THE MOST EXPENSIVE COMBINATION OF QUALITY AND QUANTITY OF WORK SHALL PREVAIL.
- PERFORM WORK IN ACCORDANCE WITH THE LATEST EDITIONS, REVISIONS, AMENDMENTS, OR SUPPLEMENTS OF APPLICABLE STATUTES, ORDINANCES, CODES OR REGULATIONS OF FEDERAL, STATE, AND LOCAL AUTHORITIES HAVING JURISDICTION IN EFFECT ON THE DATE BIDS ARE RECEIVED.
- WHERE APPROVED STANDARDS HAVE BEEN ESTABLISHED BY OSHA, UNDERWRITERS, LABORATORIES, AMERICAN CODES, ASA, ASHRAE, ARI, NEC, STATE FIRE INSURANCE REGULATION BODY, NFPA OR OTHERS, THESE STANDARDS SHALL BE FOLLOWED WHETHER OR NOT INDICATED ON THE DRAWING AND SPECIFICATIONS.
- DUCT/PIPING LAYOUT IS SCHEMATIC. EXACT LOCATION OF DUCT/PIPING AND EQUIPMENT SHALL BE COORDINATED WITH BUILDING STRUCTURE. EQUIPMENT FURNISHED, ARCHITECTURAL DRAWINGS, AND ALL OTHER TRADES PRIOR TO INSTALLATION. ANY CONTRACTOR INSTALLING WORK WITHOUT PRIOR COORDINATION SHALL RELOCATE HIS WORK AT HIS EXPENSE TO ALLOW PROPER INSTALLATION OF ANY AND ALL TRADES WORK.
- UNLESS OTHERWISE NOTED, ALL DUCT/PIPING SHALL BE CONCEALED WHEREVER POSSIBLE. PROVIDE CHROME ESCUTCHEON OR ALUMINUM DUCT COLLAR AT EACH PENETRATION OF A FINISHED SURFACE.
- DUCT/PIPING SHALL NOT BE RUN ABOVE ELECTRICAL GEAR IN THE SERVICE SPACE REQUIRED BY THE NATIONAL ELECTRICAL CODE.
- ANY ADDITIONAL LOW VOLTAGE CONTROL WIRING THAT IS REQUIRED SHALL BE PROVIDED BY THE HVAC CONTRACTOR. CONTROL WIRING SHALL BE RUN IN CONDUIT IF REQUIRED BY LOCAL CODES OR THE SPECIFICATIONS. POWER SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
- PROVIDE TRAP FOR CONDENSATION DRAIN LINES.
- PROVIDE VIBRATION ISOLATION AT EACH CONNECTION TO A MOTORIZED PIECE OF EQUIPMENT BY THE HVAC CONTRACTOR.

GENERAL DEMOLITION NOTES

- EXISTING EQUIPMENT LAYOUT IS SCHEMATIC. EXACT LOCATION OF EXISTING DUCT/PIPING AND EQUIPMENT SHALL BE COORDINATED WITH BUILDING STRUCTURE. EQUIPMENT FURNISHED, ARCHITECTURAL DRAWINGS AND ALL OTHER TRADES PRIOR TO DEMOLITION.
- PERFORM WORK IN ACCORDANCE WITH THE LATEST EDITIONS, REVISIONS, AMENDMENTS, OR SUPPLEMENTS OF APPLICABLE STATUTES, ORDINANCES, CODES OR REGULATIONS OF FEDERAL, STATE, AND LOCAL AUTHORITIES HAVING JURISDICTION IN EFFECT ON THE DATE BIDS ARE RECEIVED.
- WHERE APPROVED STANDARDS HAVE BEEN ESTABLISHED BY OSHA, UNDERWRITERS LABORATORIES, AMERICAN CODES, ASA, ASHRAE, ARI, NEC, STATE FIRE INSURANCE REGULATION BODY, NFPA OR OTHERS, THESE STANDARDS SHALL BE FOLLOWED WHETHER OR NOT INDICATED ON THE DRAWING AND SPECIFICATIONS.
- COORDINATE CUTTING AND PATCHING WITH GENERAL CONTRACTOR.
- ALL BOLD DASHED LINES INDICATE ITEMS TO BE REMOVED UNLESS NOTED BY KEYNOTE. ALL OTHER EXISTING SYSTEMS SHOWN FOR REFERENCE ONLY.
- PATCH AND REPAIR ALL FLOOR AND WALL SURFACES LEFT DAMAGED OR INCOMPLETE FROM REMOVAL OF EXISTING PARTITIONS, MILLWORK, CASEWORK, OR OTHER FIXED ACCESSORIES AND EQUIPMENT WITH MATERIALS TO MATCH EXISTING, AS ACCEPTABLE TO THE ARCHITECT.
- NOTATIONS ARE MADE IN VARIOUS PLACES ON THE DRAWINGS TO CALL ATTENTION TO DEMOLITION WHICH IS REQUIRED. HOWEVER, THESE DRAWINGS ARE NOT INTENDED TO SHOW EACH AND EVERY ITEM TO BE REMOVED. CONTRACTOR SHALL REMOVE ALL MATERIALS RELATED TO THEIR RESPECTIVE TRADES AS REQUIRED TO PERMIT THE CONSTRUCTION OF THE NEW WORK AS SHOWN.
- THE GENERAL CONTRACTOR SHALL COORDINATE THE EXTENT OF THE REQUIRED DEMOLITION OF THE EXISTING BUILDING AS REQUIRED TO FACILITATE THE CONSTRUCTION OF THE PROJECT AS SHOWN AS PART OF THIS WORK.
- ALL DEMOLITION SHALL BE APPROVED BY THE OWNER/TENANT PRIOR TO COMMENCEMENT AND SHALL BE PERFORMED UNDER REQUIREMENTS AND APPROVAL OF THE LOCAL CODE JURISDICTIONS.
- ASBESTOS ABATEMENT: CONTRACTOR SHALL NOTIFY BUILDING REPRESENTATIVE IMMEDIATELY WHEN AND IF ANY ITEMS ARE ENCOUNTERED THAT IN ANY WAY, SHAPE, OR FORM APPEAR TO BE HAZARDOUS OF NATURE. ASBESTOS ABATEMENT IS NOT PART OF THE SCOPE OF THE DESIGN PROFESSIONALS DOCUMENTATION OR RESPONSIBILITY TO SURVEY, IDENTIFY, OR FOR CONSULTATION OF PROPER DISPOSAL.
- PROTECT ALL EXISTING WORK WHICH IS TO REMAIN AND RESTORE IN AN APPROVED MANNER IF ANY SUCH WORK WHICH BECOMES DAMAGED.
- RUBBISH AND DEBRIS RESULTING FROM THE WORK SHALL BE REMOVED IMMEDIATELY FROM THE SITE IN A SAFE AND LEGAL MANNER BY THE CONTRACTOR.
- TEMPORARY LIGHTING AND POWER SHALL BE PART OF THE SCOPE OF THIS WORK; SEE ELECTRICAL.
- DEMOLITION CONTRACTOR SHALL BE RESPONSIBLE TO CONTACT BUILDING REPRESENTATIVE TO CLARIFY ANY ITEMS NOT SHOWN ON THESE DOCUMENTS OR SHOWN NOT MATCHING FIELD CONDITIONS.

MECHANICAL SYMBOLS LEGEND

HVAC DUCTWORK SYMBOLS	HVAC DUCTWORK & DIFFUSER TAGS

HVAC PIPING	
—CWS	CHILLED WATER SUPPLY
—CWR	CHILLED WATER RETURN
—CD	CONDENSATE DRAIN
—CS	CONDENSER WATER SUPPLY
—CR	CONDENSER WATER RETURN
—CTS	COOLING TOWER WATER SUPPLY
—CTR	COOLING TOWER WATER RETURN
—DX	DIRECT EXPANSION
—HPS	HEAT PUMP WATER SUPPLY
—HPR	HEAT PUMP WATER RETURN
—HS	HEATING WATER SUPPLY
—HR	HEATING WATER RETURN
—S	SUCTION (REFRIGERANT)
—L	LIQUID (REFRIGERANT)
—DXS	SUCTION (DIRECT EXPANSION)
—DXL	LIQUID (DIRECT EXPANSION)
—LPS	LOW PRESSURE STEAM (0-20 LBS.)
—MPS	MEDIUM PRESSURE STEAM (21-75 LBS.)
—HPS	HIGH PRESSURE STEAM (76 LBS. & ABV.)
—SC	STEAM CONDENSATE (GRAVITY)
—SCP	PUMPED STEAM CONDENSATE
—SC (BF)	STEAM CONDENSATE BOILER FEED
—G	GAS

HVAC DUCTWORK

	SUPPLY AIR DUCT
	EXIST SUPPLY AIR DUCT
	RETURN AIR DUCT
	EXIST RETURN AIR DUCT
	OUTSIDE AIR DUCT
	EXIST OUTSIDE AIR DUCT
	EXHAUST AIR DUCT
	EXIST EXHAUST AIR DUCT

HVAC PIPING VALVES

	GATE VALVE
	GAS COCK
	CHECK VALVE
	BALANCE COCK
	CIRCUIT SETTER
	TWO-WAY CONTROL VALVE
	THREE-WAY CONTROL VALVE
	GLOBE VALVE
	BALL VALVE
	SOLENOID VALVE
	EXPANSION VALVE WITH THERMOSTATIC BULB
	PLUG VALVE
	BUTTERFLY VALVE
	RELIEF VALVE
	HOSE & DRAIN END VALVE
	PRESSURE RELIEF VALVE
	PRESSURE REDUCING VALVE
	TRIPLE DUTY VALVE
	GAS PRESSURE REGULATOR
	STRAINER (BLOW-OFF)

TEMPERATURE CONTROL SYMBOLS

	THERMOSTAT
	PROGRAMMABLE THERMOSTAT
	THERMOSTAT (W/ NIGHT SETBACK)
	ROOM SENSOR
	HUMIDISTAT
	PRESSURE GAUGE
	DAMPER (ELECTRIC OPERATION)
	DAMPER (PNEUMATIC OPERATION)
	DAMPER BLADES

HVAC PIPING SYMBOLS

	FLOW DIRECTION
	PIPING DROP
	PIPING RISE
	INLINE PIPING DROP
	INLINE PIPING RISE
	PIPING TEE
	PIPING ELBOW
	THERMOMETER
	PUMP
	UNION
	PIPE ANCHOR
	PIPE GUIDE
	BACK FLOW PREVENTER
	PIPE CAP
	PIPE BREAK
	THERMOMETER WELL
	EXPANSION LOOP
	EXPANSION COMPENSATOR
	FLOAT & THERMOSTATIC STEAM TRAP
	INVERTED BUCKET STEAM TRAP

REVISIONS			
07/06/2026	CD SET		

DRAWN
LDT
APPROVED
CAT

MATRIX
CONSULTING ENGINEERS, INC.

544 Cheaburg Drive
Lansing, MI 48917

PHONE (517) 487-2511
administrator@matrixinc.com
Fax: (517) 487-2510

PROJECT

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

SHEET DESCRIPTION

MECHANICAL SYMBOLS, NOTES, AND ABBREV.

DATE

04/08/2026

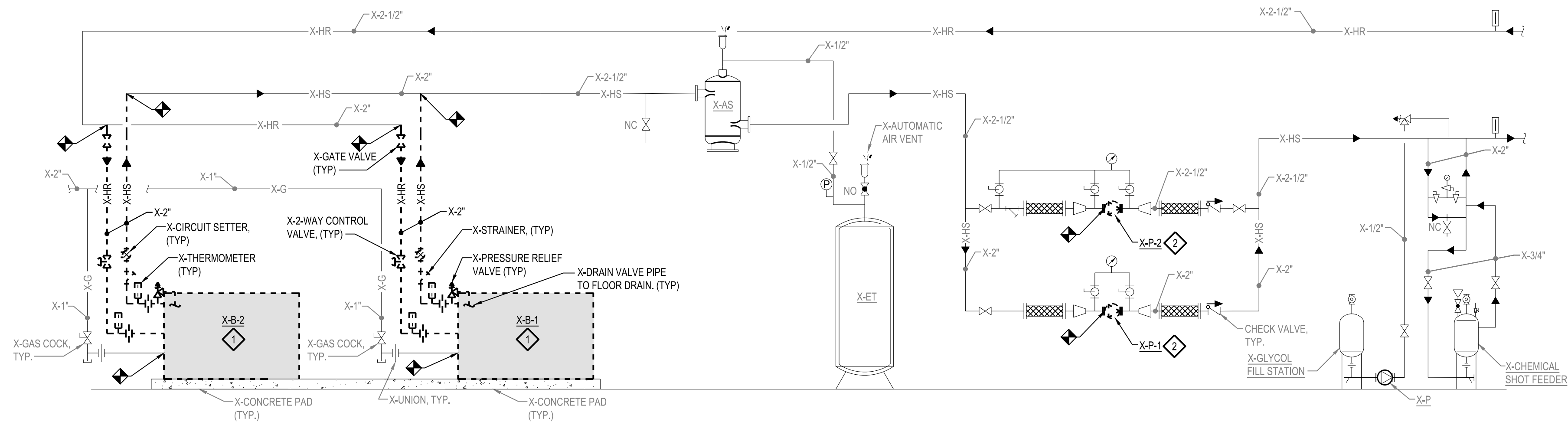
PROJECT NUMBER

250963.00

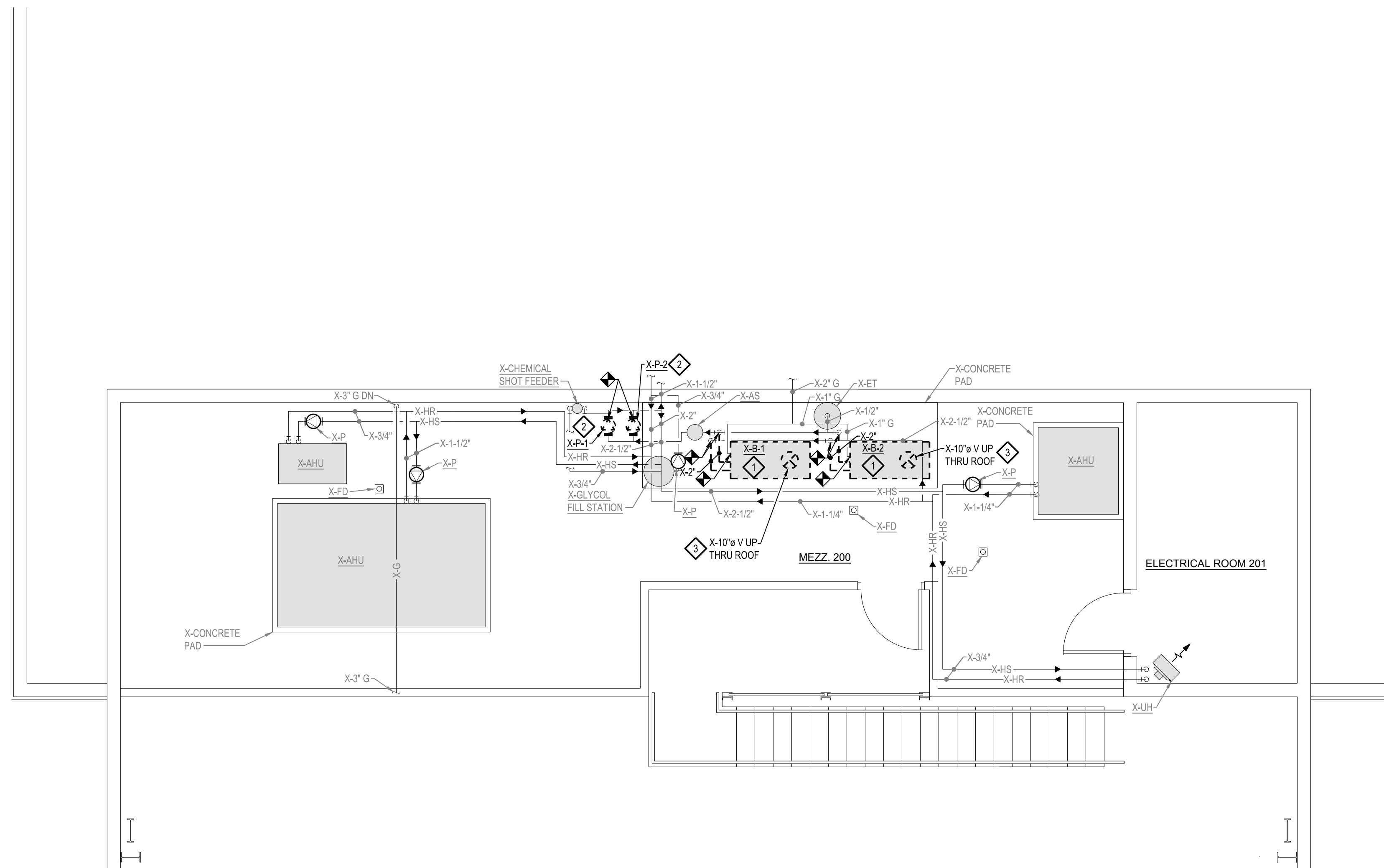
SHEET NUMBER

M-100

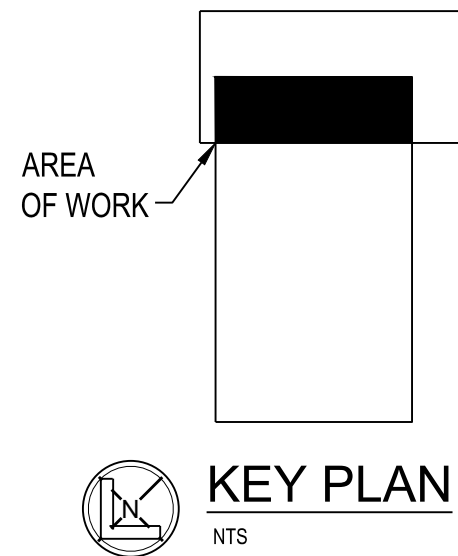




1 BOILER PIPING DIAGRAM - DEMOLITION
SCALE: NTS



MECHANICAL ROOM FLOOR PLAN - MECHANICAL DEMOLITION
SCALE: 1/4" = 1'-0"



DEMOLITION NOTES

- DISCONNECT, REMOVE, AND DEMOLISH EXISTING BOILER AND ASSOCIATED HEATING SUPPLY/RETURN PIPING TO EXTENTS SHOWN AND CAP. DEMO GAS PIPING AS NEEDED TO CONNECT TO NEW BOILER. EXISTING CONCRETE PAD TO REMAIN.
- DISCONNECT, REMOVE, AND DEMOLISH EXISTING HEATING SUPPLY CIRCULATING PUMP AND ASSOCIATED PIPING TO EXTENTS SHOWN.
- DISCONNECT, REMOVE, AND DEMOLISH EXISTING 10" FLUE VENT UP TO ROOF. REUSE EXISTING PENETRATION FOR 4" VENT AND 4" COMBUSTION AIR PIPING SHOWN ON NEW PLANS.



792 LOS DRIVE, SUN PRAIRIE, WI 53590

REVISIONS	
07/06/2026	CD SET

DRAWN	LDT
APPROVED	CAT

MATRIX
CONSULTING ENGINEERS, INC.

544 Chesburg Drive
Lansing, MI 48917
PHONE (517) 487-2511
administrator@matrixinc.com
Fax: (517) 487-2511

PROJECT

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

SHEET DESCRIPTION

MECHANICAL ROOM FLOOR PLAN - MECH. DEMOLITION

DATE

04/08/2026

PROJECT NUMBER

250963.00

SHEET NUMBER

M-300



DRAWN
LDT
APPROVED
CAT

**544 Cherbourg Drive
Lansing, MI 48917**

PHONE: (517) 487-2511

administrator@matrixinc.com
Matrix Project No. 250963.00



PROJECT

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

**MECHANICAL
ROOM FLOOR
PLAN - MECH.
NEW**

DATE
04/08/2026

PROJECT NUMBER
250963.00

SHEET NUMBER

M-400



MECHANICAL ROOM FLOOR PLAN - MECHANICAL NEW

0 1 5 10
SCALE: 1/4" = 1'-0"



KEY PLAN

ALTERNATES

- 1 ADD ALTERNATE #1: PROVIDE AND INSTALL SIDE STREAM FILTER AND PUMP. MODIFY EXISTING HEATING SUPPLY PIPING AS REQUIRED TO CONNECT TO NEW HEATING SUPPLY PIPING.

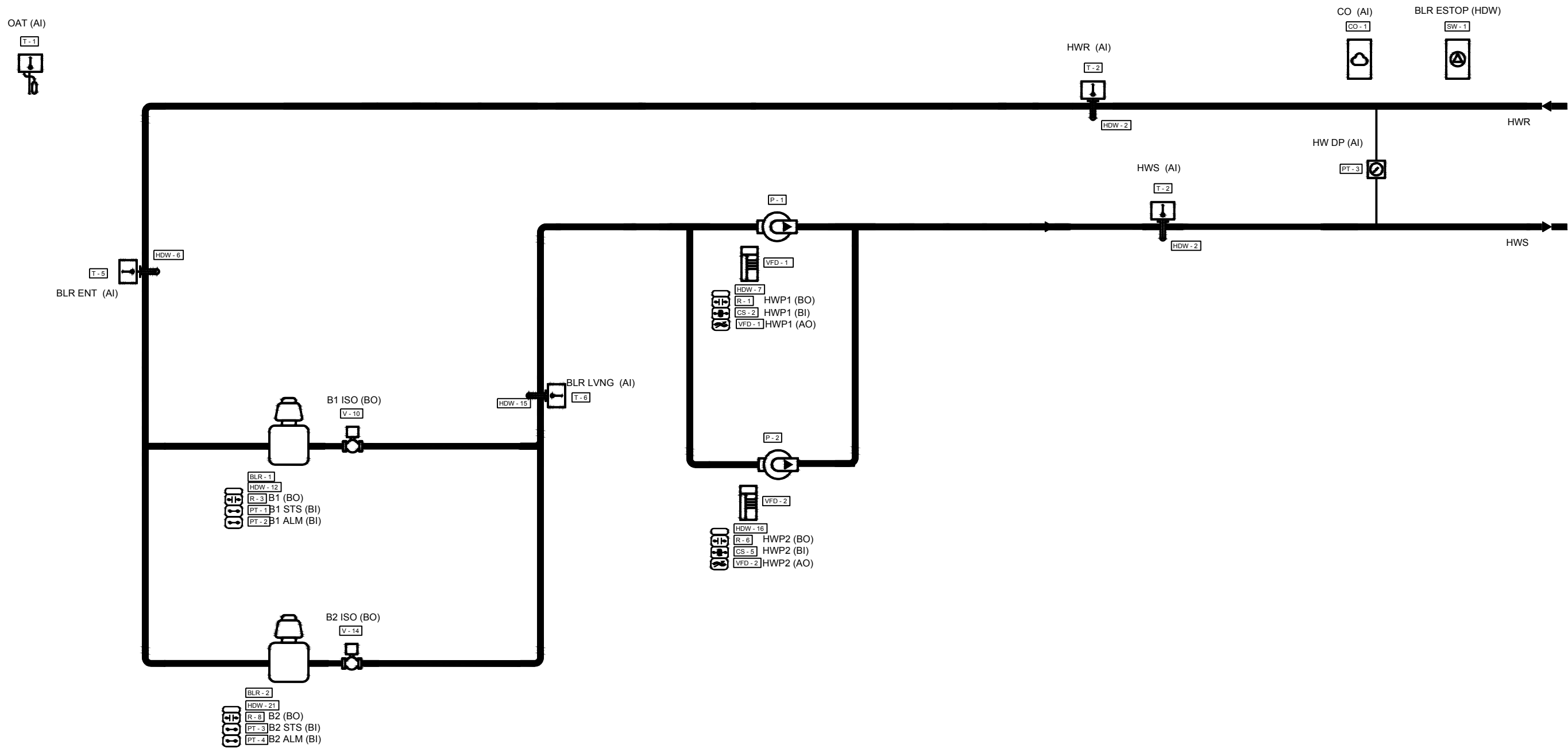
GENERAL MECHANICAL NOTES

1. FURNISH AND INSTALL CARBON MONOXIDE SENSOR FOR BOILER SYSTEM. CONNECT TO BAS.

MECHANICAL KEY NOTES

1. INSTALL BOILER ON EXISTING CONCRETE PAD. MODIFY EXISTING HEATING SUPPLY/RETURN PIPING AS REQUIRED TO CONNECT TO NEW HEATING SUPPLY/RETURN PIPING. MODIFY GAS PIPING TO CONNECT TO NEW BOILER. ROUTE 4" COMBUSTION AIR AND 4" VENT UP THROUGH ROOF THROUGH EXISTING PLUMBING. PROVIDE GAS AS REQUIRED TO BE WATERTIGHT AND MAINTAIN EXISTING ROOF WARRANTY. PATCH TO MATCH EXISTING. ROUTE PRESSURE RELIEF AND DRAIN PIPING TO NEAREST FLOOR DRAIN.
2. INSTALL PUMP AT LOCATION SHOWN. MODIFY ASSOCIATED EXISTING HEATING SUPPLY PIPING AS REQUIRED. PROVIDE VARIABLE FREQUENCY DRIVE FOR EACH OF THE TWO (2) SYSTEM PUMPS.
3. INSTALL BOILER E-STOP. COORDINATE EXACT LOCATION WITH ELECTRICAL TRADES. PROVIDE BY ELECTRICAL CONTRACTOR.

FLOW DIAGRAM: HEATING PLANT SYSTEM - VARIABLE PRIMARY



SEQUENCE OF OPERATION: HEATING PLANT SYSTEM - VARIABLE-PRIMARY

EQUIPMENT CONTROLLED: B-1, B-2, P-1, P-2

SYSTEM GENERAL DESCRIPTION:

THE HEATING PLANT SYSTEM CONTROLLER PROVIDES STAND-ALONE CONTROL OR CONTROL FROM AN OPTIONAL HIGHER LEVEL BUILDING AUTOMATION SYSTEM (BAS) .

THE HEATING PLANT SYSTEM CONSISTS OF HOT WATER BOILER(S) WITH ITS PIPING CONFIGURATION ARRANGED AS A VARIABLE PRIMARY LOOP SUPPLYING HOT WATER TO THE FACILITY.

THE MANIFOLDED HOT WATER DISTRIBUTION PUMPS ARE CONFIGURED AS LEAD / LAG CONTROL. THE FACTORY BOILER SYSTEM CONTROLLER SHALL PROVIDE STAND-ALONE CONTROL OR BAS WORKSTATION CONTROL OF THE SUPPLY HEATING WATER TEMPERATURE SETPOINT (ADJ.).

HEATING SYSTEM ENABLE/DISABLE:

THE HEATING SYSTEM SHALL BE ENABLED BY THE BAS WHEN THE OUTSIDE AIR TEMPERATURE FALLS BELOW 60.0 DEG. F (ADJ.). THE HEATING PLANT IS DISABLED WHEN ALL BOILERS ARE DISABLED AND THERE IS NOT AN ACTIVE HOT WATER DISTRIBUTION PUMP REQUEST. WHEN THE PLANT IS DISABLED THE HOT WATER PUMP SHALL BE COMMANDED OFF AND THE BOILER ISOLATION VALVES SHALL BE CLOSED.

HOT WATER RESET:

THE BAS SHALL MONITOR THE HOT WATER SUPPLY TEMPERATURE SETPOINT AND LINEARLY RESET FROM 120.0 DEG. F (ADJ.) TO 180.0 DEG. F (ADJ.) AS THE OUTSIDE AIR TEMPERATURE FALLS FROM 60.0 DEG. F (ADJ.) TO 0.0 DEG. F (ADJ.)

BOILER CONTROL:

THE BOILERS SHALL BE CONTROLLED BY THE MANUFACTURER BOILER SEQUENCE VIA SIGNAL FROM THE LEAD BOILER. THE LEAD BOILER SHALL BE ROTATED ON A WEEKLY BASIS.

HOT WATER DISTRIBUTION PUMP START/STOP:

THE SYSTEM SHALL START A HOT WATER PUMP THROUGH A CONTACT CLOSURE OF THE PUMP'S VARIABLE FREQUENCY DRIVE (VARIABLE SPEED DRIVE) RUN-ENABLE CONTACTS.

HOT WATER DISTRIBUTION PUMP LEAD/LAG:

THE HOT WATER PUMP LEAD/LAG SEQUENCE SHALL BE BASED ON A WEEKLY SCHEDULE. FROM THE BAS CONTROLLER OR A BAS WORKSTATION, AN OPERATOR SHALL BE ABLE TO MANUALLY CHANGE THE LEAD/LAG SEQUENCE.

HOT WATER DISTRIBUTION PUMP FAILURE:

IF THE LEAD START/STOP RELAY IS ENABLED AND THE CURRENT SWITCH STATUS IS OFF FOR MORE THAN 30 SECONDS (ADJ.), THE SYSTEM SHALL ANNUNCIATE A HOT WATER PUMP FAILURE ALARM TO THE BAS WORKSTATION AND START THE LAG PUMP. WHEN A PUMP FAILURE EXISTS, LEAD/LAG AUTOMATION SHALL BE DISABLED AND THE CURRENTLY RUNNING PUMP BECOMES THE LEAD PUMP. ONCE THE PROBLEM HAS BEEN CORRECTED, THE OPERATOR SHALL BE ABLE TO CLEAR THE ALARM FAILURE FROM THE BAS CONTROLLER OR BAS WORKSTATION. THIS ACTION SHALL RE-ENABLE THE LEAD/LAG SEQUENCE.

HOT WATER DISTRIBUTION PUMP SPEED:

THE SYSTEM SHALL MONITOR THE HOT WATER SYSTEM DIFFERENTIAL PRESSURE SENSOR. WHEN THE PUMP VARIABLE SPEED DRIVE IS ENABLED, THE SYSTEM SHALL CONTROL THE ANALOG SPEED SIGNAL SENT TO THE PUMP VARIABLE SPEED DRIVE TO MAINTAIN A HOT WATER DIFFERENTIAL PRESSURE SETPOINT OF 5.0 PSID (ADJ.).

LEAD/LAG: IF THE LEAD PUMP SPEED FALLS BELOW 65% (ADJ.) FOR MORE THAN 5 MINUTES (ADJ.) THE LAST OPERATING PUMP IN THE SEQUENCE SHALL BE DISABLED.

PUMP OPTIMIZATION:

THE BAS SHALL CONTINUALLY MONITOR THE HOT WATER CONTROL VALVE POSITION OF ALL AHU'S IN THE HOT WATER SYSTEM.

AT HOT WATER SYSTEM STARTUP, THE HOT WATER PRESSURE SETPOINT IS 100% OF THE MAXIMUM PRESSURE SETPOINT. WHEN ALL HOT WATER VALVES ARE LESS THAN 85% OPEN, THE HOT WATER DIFFERENTIAL PRESSURE SETPOINT SHALL BE LOWERED BY 0.1 PSIG (ADJ.) OF THE CURRENT HOT WATER DIFFERENTIAL PRESSURE SETPOINT. THIS OCCURS EVERY 5 MINUTES UNTIL AT LEAST ONE VALVE IS MORE THAN 85% OPEN, OR IF THE SETPOINT IS EQUAL TO THE MINIMUM HOT WATER DIFFERENTIAL PRESSURE SETPOINT, OR IF THE PUMP VARIABLE SPEED DRIVE'S ARE AT A MINIMUM SPEED SETTING (22 HZ).

WHEN ANY HOT WATER VALVE IS MORE THAN 95% OPEN, THE HOT WATER PRESSURE SETPOINT SHALL INCREASES BY 0.1 PSIG (ADJ.) OF THE CURRENT HOT WATER DIFFERENTIAL SETPOINT. THIS OCCURS EVERY 5 MINUTES UNTIL NO VALVE IS MORE THAN 95% OPEN, OR IF THE HOT WATER DIFFERENTIAL PRESSURE SETPOINT HAS RISEN TO THE SYSTEM'S MAXIMUM SETTING, OR IF THE PUMP VARIABLE SPEED DRIVE'S ARE AT THE MAXIMUM SETTING (60 HZ).

FREEZE PROTECTION:

WHEN THE OUTDOOR AIR TEMPERATURE FALLS BELOW 35.0 DEG. F (ADJ.), THE HOT WATER DISTRIBUTION PUMP SHALL OPERATE CONTINUOUSLY TO PROVIDE HOT WATER CIRCULATION TO ALL ASSOCIATED HOT WATER COILS. IF THE HOT WATER SUPPLY TEMPERATURE FALLS BELOW 130.0 DEG. F (ADJ.) DURING UNOCCUPIED PERIODS, THE BOILER SEQUENCE SHALL BE ENABLED TO SAFEGUARD AGAINST LOW WATER TEMPERATURE AND BOILER CONDENSATION.

IN THE EVENT THAT A HYDRONIC AIRSIDE TYPE EQUIPMENT INITIATES A LOW LIMIT ALARM, THE HEATING SYSTEM SHALL ENABLE, IF DISABLED, AND PROVIDE HEATING MEDIUM CIRCULATION TO THE EQUIPMENT.

CARBON MONOXIDE DETECTOR:

THE CARBON MONOXIDE DETECTOR SHALL MONITOR THE BOILER ROOM FOR HIGH LEVELS OF CO. IF THE CO LEVEL RISES ABOVE 50 PPM (ADJ.), THEN AN ALARM SHALL BE SIGNALLED TO THE HEATING SYSTEM CONTROLLER OR BAS WORKSTATION.

BOILER EMERGENCY SHUTDOWN SWITCH:

IF THE BOILER EMERGENCY SHUTDOWN SWITCH HAS BEEN ACTIVATED, THE BOILERS ARE TO SHUT DOWN IMMEDIATELY AND AN ALARM SHALL BE SIGNALLED TO THE HEATING SYSTEM CONTROLLER OR BAS WORKSTATION.

POINTS LIST: HEATING PLANT SYSTEM - VARIABLE-PRIMARY

NOTE: CONTROLS CONTRACTOR SHALL PROVIDE ALL POINTS, HARDWARE, AND SOFTWARE AS REQUIRED TO SATISFY THE SEQUENCE OF OPERATION, THE DESIGN INTENT, AND TO INTEGRATE WITH EXISTING BUILDING OPERATIONS.	POINTS										ALARMS				
	GRAPHIC	ANALOG HARDWARE INPUT (AI)	BINARY HARDWARE INPUT (BI)	ANALOG HARDWARE OUTPUT (AO)	BINARY HARDWARE OUTPUT (BO)	SOFTWARE POINT (SFT)	HARDWARE INTERLOCK (HDW)	WIRELESS (WLS)	NETWORK (NET)	HIGH ANALOG LIMIT	LOW ANALOG LIMIT	BINARY	LATCH DIAGNOSTIC	SENSOR FAIL	COMMUNICATION FAIL
BOILER EMERGENCY SHUTDOWN SWITCH BLR ESTOP	X					X						X			
BOILER 1 ALARM B1 ALM	X	X										X			
BOILER 1 ENABLE COMMAND B1	X			X											
BOILER 1 ISOLATION VALVE B1 ISO	X			X											
BOILER 1 STATUS B1 STS	X	X													
BOILER 2 ALARM B2 ALM	X	X										X			
BOILER 2 ENABLE COMMAND B2	X			X											
BOILER 2 ISOLATION VALVE B2 ISO	X			X											
BOILER 2 STATUS B2 STS	X	X													
BOILER LOOP ENTERING TEMPERATURE LOCAL BLR ENT	X	X							X	X			X		
BOILER LOOP LEAVING TEMPERATURE LOCAL BLR LVNG	X	X							X	X			X		
CARBON MONOXIDE SENSOR CO	X	X							X				X		
HOT WATER DIFFERENTIAL PRESSURE HW DP	X	X											X		
HOT WATER PUMP 1 SPEED OUTPUT HWP1	X		X												
HOT WATER PUMP 1 START STOP OUTPUT HWP1	X			X											
HOT WATER PUMP 1 STATUS HWP1	X	X													
HOT WATER PUMP 2 SPEED OUTPUT HWP2	X		X												
HOT WATER PUMP 2 START STOP OUTPUT HWP2	X			X											
HOT WATER PUMP 2 STATUS HWP2	X	X													
HOT WATER RETURN TEMPERATURE LOCAL HWR	X	X							X	X					
HOT WATER SUPPLY TEMPERATURE LOCAL HWS	X	X							X	X					
OUTDOOR AIR TEMPERATURE LOCAL OAT	X	X												X	
BAS COMMUNICATION STATE BAS COM					X										
BOILER LEAD B LEAD	X			X											
HOT WATER PUMP 1 FAILURE HWP1 FAIL	X			X								X			
HOT WATER PUMP 2 FAILURE HWP2 FAIL	X			X								X			
HOT WATER PUMP LEAD HWP LEAD	X			X											
HOT WATER RESET HIGH LIMIT HW RES HL	X			X											
HOT WATER RESET LOW LIMIT HW RES LL	X			X											
HOT WATER DISTRIBUTION SUPPLY TEMP SETPOINT HWS SP	X			X											
OUTSIDE AIR TEMPERATURE ENABLE SETPOINT OAT ENA SP	X			X											



792 LOIS DRIVE, SUN PRARIE, WI 53590

REVISIONS			
07/06/2026	CD SET		

DRAWN	LDT
APPROVED	CAT

544 Chebourg Drive
Lansing, MI 48917
PHONE (617) 487-2511
administrator@matrixinc.com
Matrix Project No. 250963.00

MATRIX
CONSULTING ENGINEERS, INC.

PROJECT

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

SHEET DESCRIPTION

MECHANICAL
POINTS LIST +
SEQUENCE OF
OPERATION

DATE

04/08/2026

PROJECT NUMBER

250963.00

SHEET NUMBER

M-800



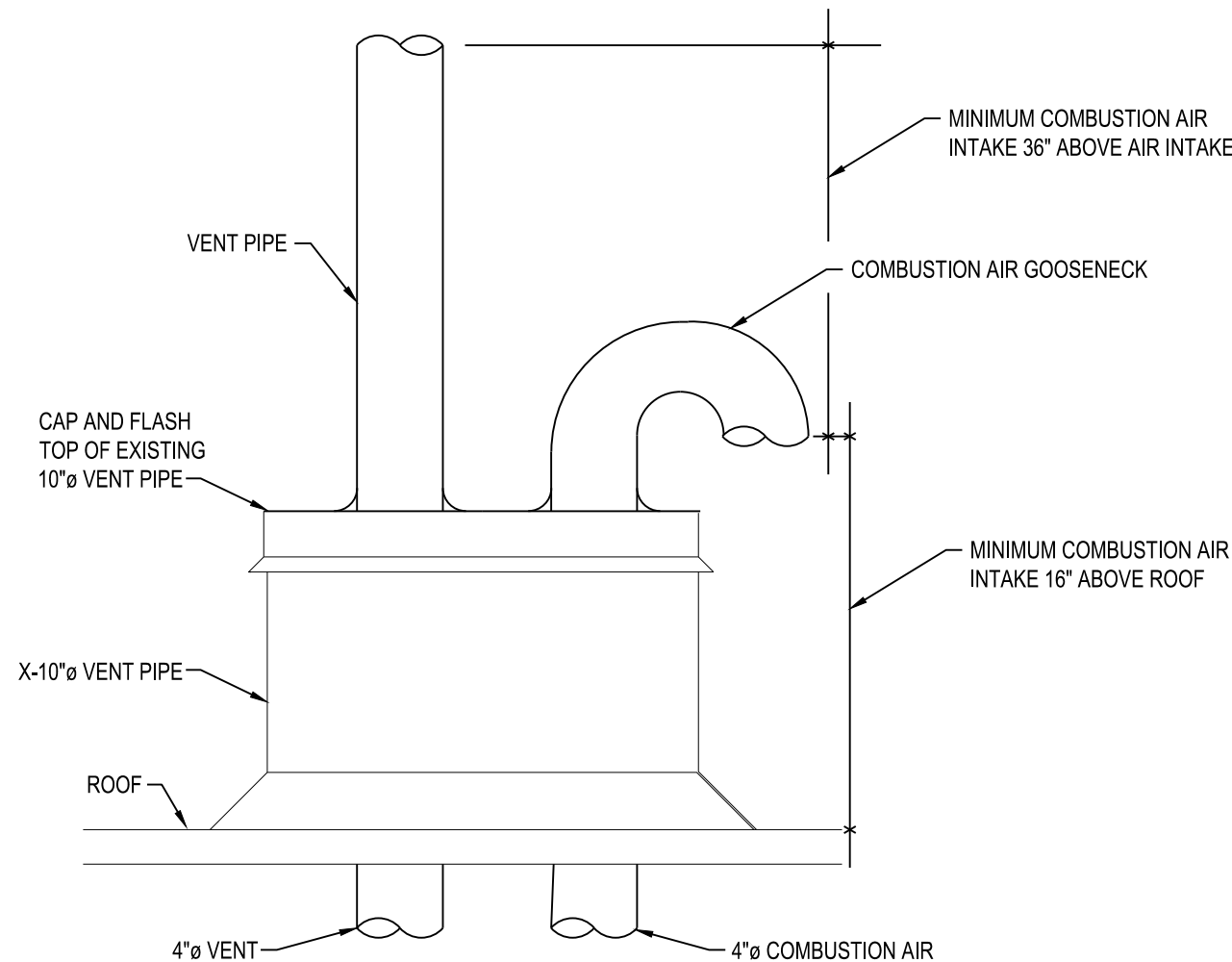
792 LOIS DRIVE, SUN PRAIRIE, WI 53590

REVISIONS				
07/06/2026	CD SET			

DRAWN	LDT
APPROVED	CAT

**MATRIX**
CONSULTING ENGINEERS, INC

544 Chertburg Drive
Lansing, MI 48917
PHONE (617) 487-2511
administrator@matrixinc.com
Main Project No. 250963.00



1 COMBUSTION AIR AND VENT DETAIL
SCALE: NTS

PUMP SCHEDULE																		
TAG	SERVES	LOCATION	MODEL	SERIES	TYPE	FLUID			PUMP				MOTOR					COMMENTS
						TYPE	% CONC.	TEMP. °F	GPM	HEAD (FT)	IMP. DIA.	% EFF	RPM	HP	VOLT	PHASE	DISC BY	
P-1	BUILDING	MEZZ. 200	1.5x1.5x6.25	E-60 STOCK	IN-LINE	ETHL	30%	180	25	31	5.75	49.8	1685	3/4	208	3	EC	1,2
P-2	BUILDING	MEZZ. 200	1.5x1.5x6.25	E-60 STOCK	IN-LINE	ETHL	30%	180	25	31	5.75	49.8	1685	3/4	208	3	EC	1,2
NOTES: 1. BASED ON: BELL GOSSETT 2. PROVIDE WITH VFD ABBREVIATIONS: EC - ELECTRICAL CONTRACTOR ETHL - ETHL - ETHELEYLENE GLYCOL																		

BOILER SCHEDULE																									
TAG	MODEL	LOCATION	AIR INLET SIZE (in.)	VENT SIZE (in.)	INPUT ENERGY (MBH)	HEAT OUTPUT (MBH)	TURNDOWN	MIN. WATER FLOW RATE (GPM)	MAX. WATER FLOW RATE (GPM)	WATER SIDE PRESSURE DROP	OUTPUT EFFICIENCY (%)	BOILER WATER VOLUME (GAL)	FLUID	EWT (°F)	LWT (°F)	DIMENSIONS			ELECTRICAL					SHIPPING WEIGHT	COMMENTS
																LENGTH	WIDTH	HEIGHT	VOLTS	PHASE	FLA	DISC.	STARTER		
B-1	KBX400N	MEZZ. 200	4	4	399	387	10 : 1	22	38	4	96.9	4.4	30% ETHL.	150	180	33-1/2"	24"	45"	120	1	3	EC	EC	365	1,2,3,4,5,6,7,8,9,10
B-2	KBX400N	MEZZ. 200	4	4	399	387	10 : 1	22	38	4	96.9	4.4	30% ETHL.	150	180	33-1/2"	24"	45"	120	1	3	EC	EC	365	1,2,3,4,5,6,7,8,9
NOTES: 1. BASED ON: LOCHINVAR 2. NATURAL GAS CONDENSING BOILER 3. CONDENSATE NEUTRALIZATION KIT 4. RE-USE EXISTING BOILER FLUE PENETRATION FOR NEW COMBUSTION AIR AND FLUE PIPES 5. CONNECT TO EXISTING AUTOMATED LOGIC BUILDING AUTOMATION SYSTEM 6. MANUFACTURER BOILER SEQUENCE 7. BACNET CARD 8. E-STOP BY EC 9. 2-POSITION CONTROL VALVE BY MANUFACTURER ADD ALTERNATE #1: 10. PROVIDE SIDE STREAM FILTER (SSE-1) BASED ON SHELCO FILTERS, MODEL FOS-80-8 AND PUMP (P-3) BASED ON B&G, MODEL: PL-36. 10 GPM, 25 FT HEAD ABBREVIATIONS: EC - ELECTRICAL CONTRACTOR MC - MECHANICAL CONTRACTOR ETHL - ETHYLENE GLYCOL																									

PROJECT

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

SHEET DESCRIPTION

MECHANICAL SCHEDULES AND DETAILS

DATE

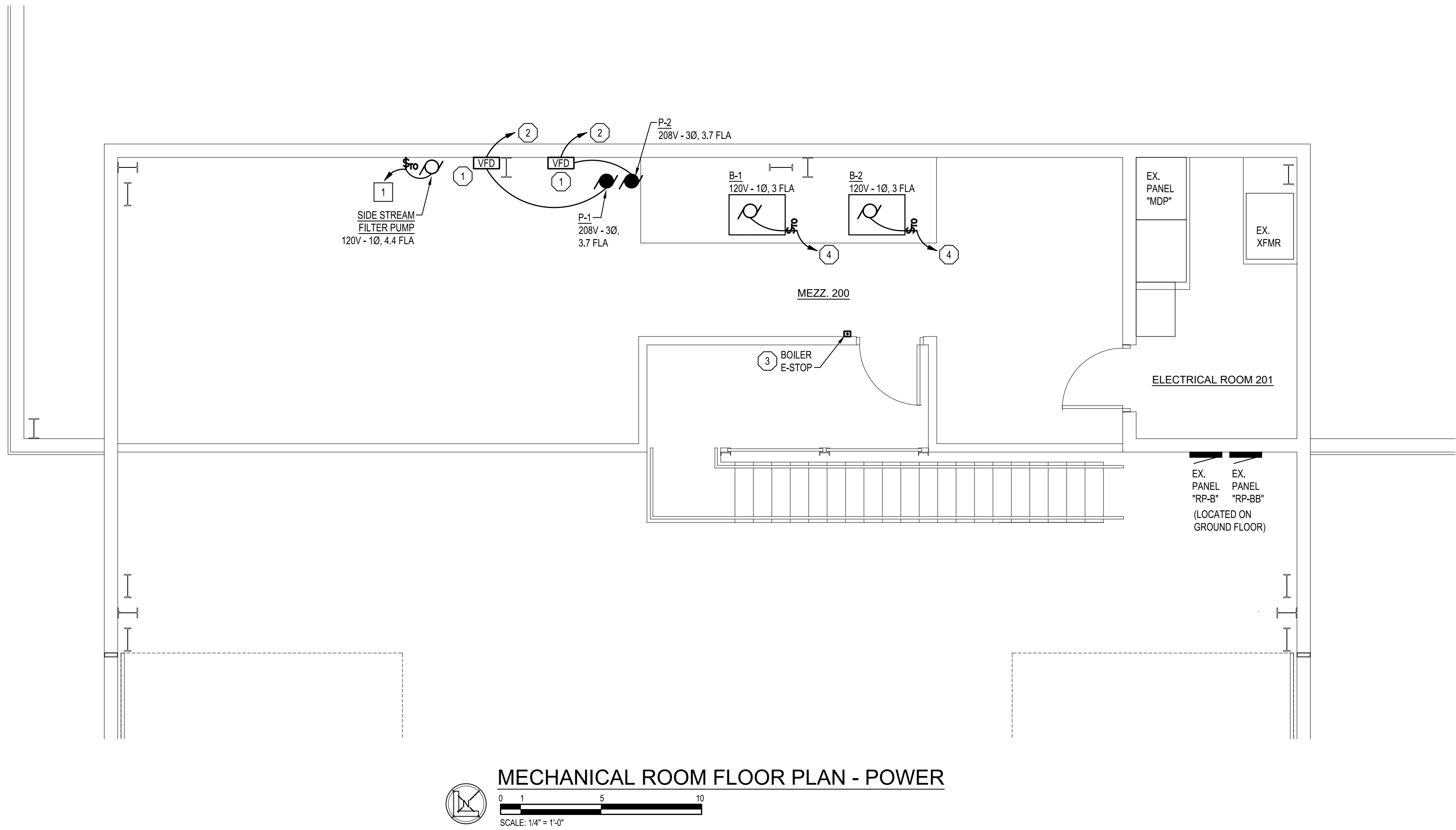
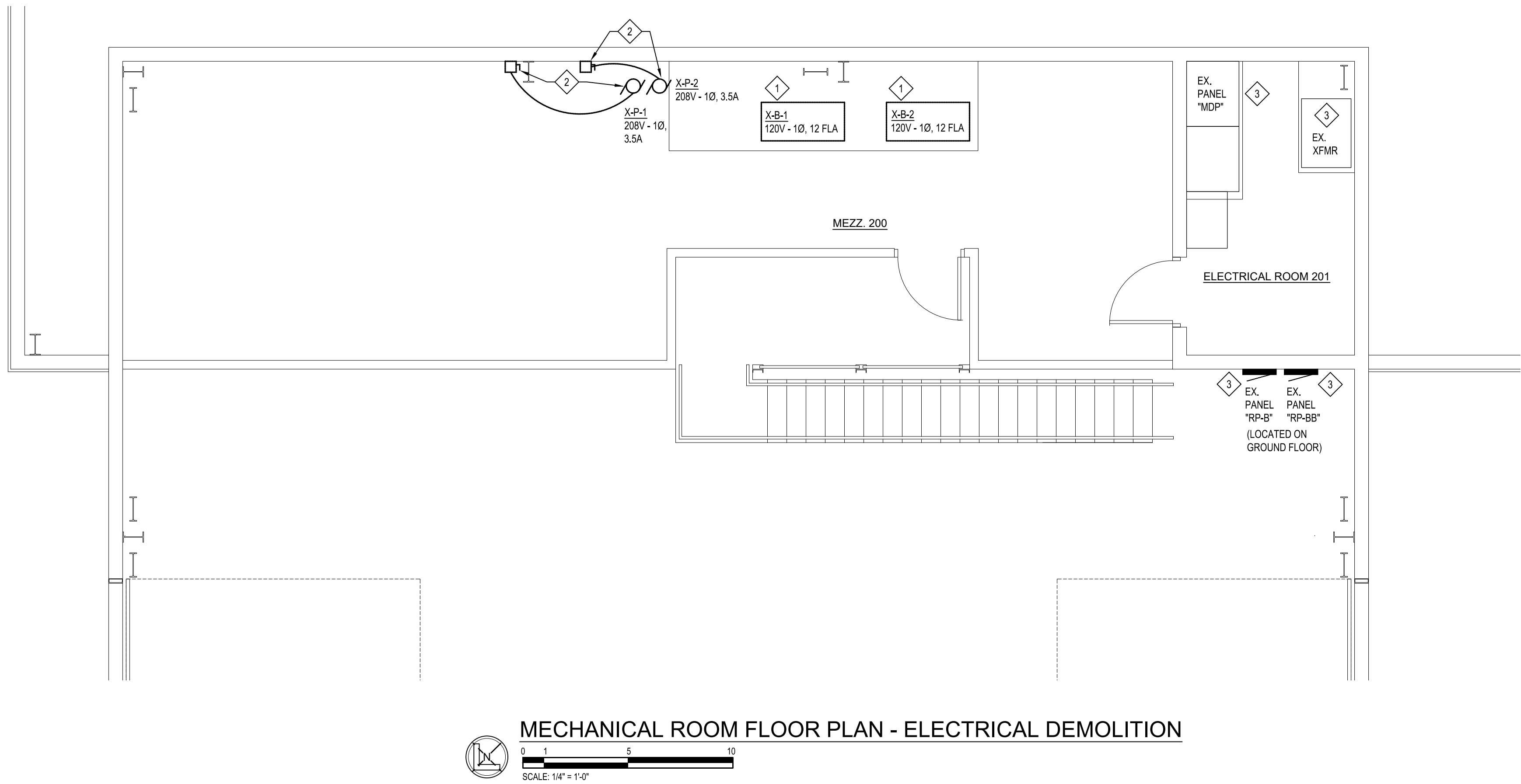
04/08/2026

PROJECT NUMBER

250963.00

SHEET NUMBER

M-900



DEMOLITION NOTES

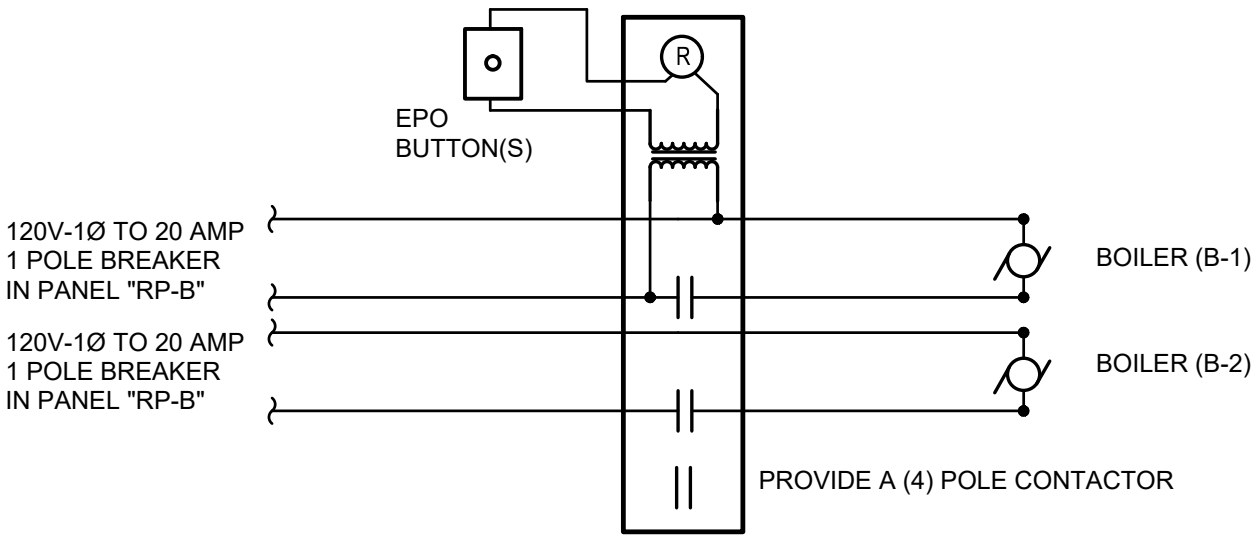
- 1 DISCONNECT MECHANICAL EQUIPMENT. CONDUIT AND WIRE TO REMAIN FOR CONNECTION TO NEW BOILER.
- 2 DISCONNECT MECHANICAL EQUIPMENT AND REMOVE MOTOR STARTER. MAINTAIN HOMERUN TO EXISTING PANEL FOR CONNECTION TO NEW VFD.
- 3 EXISTING EQUIPMENT TO REMAIN.

ELECTRICAL KEY NOTES

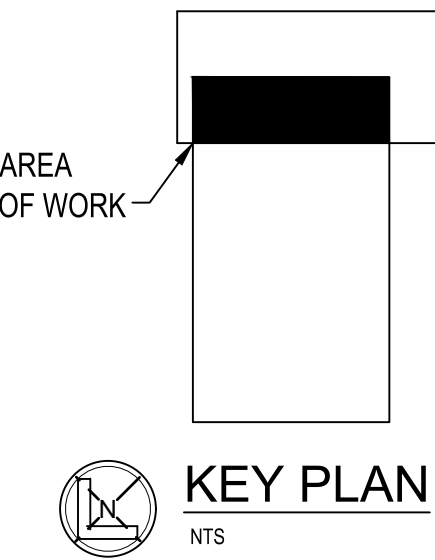
- 1 NEW VARIABLE FREQUENCY DRIVE WITH INTEGRATED OVERCURRENT PROTECTION. COORDINATE LOCATION FOR INSTALLATION.
- 2 CONTRACTOR SHALL CONNECT VFD TO EXISTING 20A MOTOR CIRCUIT.
- 3 PROVIDE ALL NECESSARY PARTS AND WIRING FOR COMPLETE INSTALLATION OF BOILER E-STOP SYSTEM. REFER TO DETAIL 1 ON SHEET E-500.
- 4 RECONNECT BOILER TO EXISTING CIRCUIT. EXTEND WIRE AND CONDUIT AS NECESSARY.

ALTERNATES

- 1 ADD ALTERNATE #1: PROVIDE THERMAL OVERLOAD SWITCH FOR SIDE STREAM FILTER PUMP. CONNECT TO SPARE 120V, 20A BREAKER IN PANEL RP-BB.



1 TYPICAL BOILER EMERGENCY OFF SWITCH
SCALE: N.T.S.



REVISIONS			
07/08/2026	CD SET		
DRAWN			
AGS			
APPROVED			
RCH			

544 Cheabourge Drive
Lansing, MI 48917
PHONE (517) 487-2511
administrator@matrixinc.com
Matrix Project No. 250963.00

MATRIX
CONSULTING ENGINEERS, INC.

TRANSPORTATION & GROUNDS BOILER AND PUMP UPGRADES

51880 WASHINGTON ST
NEW BALTIMORE, MI 48047

SHEET DESCRIPTION

MECHANICAL ROOM DEMO AND POWER PLANS

DATE

04/08/2026

PROJECT NUMBER

250963.00

SHEET NUMBER

E-500