MECHANICAL ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS ARE USED ON DRAWINGS

AC	ALTERNATING CURRENT	ELEV	ELEVATION	OBD	OPPOSED BLADE DAMPER
ACC	AIR COOLED CONDENSER	ESP	EXTERNAL STATIC PRESSURE	OZ	OUNCE
ACU	AIR CONDITIONING UNIT				
AD	ACCESS DOOR	F	FILTER	P	PUMP
ADJ	ADJUSTABLE	FA	FACE AREA	PC	PLUMBING CONTRACTOR
AF	AIR FOIL	FC	FORWARD CURVED	PD	PRESSURE DROP
AFF	ABOVE FINISHED FLOOR	FCU	FAN COIL UNIT	PH	PHASE
AHU	AIR HANDLING UNIT	FD	FLOOR DRAIN	PHC	PREHEAT COIL
AP	ACCESS PANEL	FLR	FLOOR	PROP	PROPELLER
ARCH	ARCHITECTURE	FP	FIRE PROTECTION	PSI	POUNDS PER SQUARE INCH
ATC	AUTOMATIC TEMPERATURE CONTROL	FPM	FEET PER MINUTE	PSIG	PSI, GAUGE
ATM	ATMOSPHERE	FR	FINNED RADIATION	P+F	PITCH AND FLOW
AUX	AUXILIARY	FT	FEET		
AVG	AVERAGE	FVEL	FACE VELOCITY	QTY	QUANTITY
AWG	AMERICAN WIRE GAUGE	F&T	FLOAT AND THERMOSTATIC		
				R	REGISTER
B	BOILER	GA	GAUGE OR GAGE	RA	RETURN AIR
BDD	BACKDRAFT DAMPER	GAL	GALLON	RC	ROOM CRITERIA, dB RE 20 uPa
BHP	BRAKE HORSEPOWER	GALV	GALVANIZED	RF	RETURN/RELIEF AIR FAN
BOD	BOTTOM OF DUCT	GC	GENERAL CONTRACTOR	RH	RELATIVE HUMIDITY
BOS	BOTTOM OF STEEL	GH	GRAVITY HOOD	RHC	REHEAT COIL
BTU	BRITISH THERMAL UNIT	GPM	GALLONS PER MINUTE	RPM	REVOLUTIONS PER MINUTE
BTUH	BTU PER HOUR				
		HC	HEATING COIL	S	SMOKE DETECTOR
CAV	CONSTANT AIR VOLUME	HOA	HAND–OFF–AUTOMATIC	SA	SUPPLY AIR
CC	COOLING COIL	HP	HORSEPOWER	SEER	SEASONAL ENERGY EFFICIENCY RATIO
CFM	CUBIC FEET PER MINUTE	HR	HOUR	SENS	SENSIBLE
CH	CHILLER	HVU	HEATING & VENTILATING UNIT	SF	SQUARE FEET
C&I	CONTROLS & INSTRUMENTATION	HWST	HOT WATER SUPPLY TEMPERATURE	SP	STATIC PRESSURE (IN. WG.)
CLG	CEILING	HX	HEAT EXCHANGER	SPEC	SPECIFICATION
CMU	CONCRETE MASONRY UNIT			SQ	SQUARE
CO	CARBON MONOXIDE	IB	INVERTED BUCKET TRAP	SS	STAINLESS STEEL
CO2	CARBON DIOXIDE	IFB	INTEGRAL FACE & BYPASS	SV	SOLENOID VALVE
COND	CONDENSATE	IN	INCH		
CONN	CONNECTION	IPS	IRON PIPE SIZE	T	THERMOSTAT
CONT.	CONTINUATION			TEMP	TEMPERATURE (°F)
CORR	CORRIDOR	LBS/#	POUNDS	TOD	TOP OF DUCT
CT	COOLING TOWER	LD	LINEAR DIFFUSER	TOP	TOP OF PIPE
CU	CONDENSING UNIT	LF	LINEAR FEET	TOS	TOP OF STEEL
CUH	CABINET UNIT HEATER	LWT	LEAVING WATER TEMPERATURE (°F)	TSP	TOTAL STATIC PRESSURE
CV	CONTROL VALVE			TSTAT	THERMOSTAT
CU FT	CUBIC FEET	MOD	MOTOR OPERATED DAMPER	TxD	TRANSFER DUCT
CVS	CONTROL VALVE STATION	MAU	MAKEUP AIR UNIT	TYP	TYPICAL
		MAX	MAXIMUM		
D	DIFFUSER OR REGISTER	MB	MIXING BOX	UC	UNDERCUT
dB	DECIBEL, RE 10 WATT	MBH	1000 BTUH	UH	UNIT HEATER
DBT	DRY BULB TEMPERATURE (°F)	MC	MECHANICAL CONTRACTOR	UL	UNDERWRITERS LABORATORY
DDC	DIRECT DIGITAL CONTROL	MCC	MOTOR CONTROL CENTER	UV	UNIT VENTILATOR
DEG	DEGREE FAHRENHEIT (°F)	MFR	MANUFACTURER	UVL	ULTRA VIOLET LIGHT
DIA	DIAMETER	MIN	MINIMUM		
DIM	DIMENSION	MISC	MISCELLANEOUS	V	VALVE, VOLT
DN	DOWN	MMBH	1,000,000 BTUH	VA	VOLT–AMPERE
DP	DEW POINT TEMPERATURE (°F)			VD	VOLUME DAMPER
DX	DIRECT EXPANSION	NA	NOT APPLICABLE	VEL	VELOCITY
DWG	DRAWING	NC	NOISE CRITERIA, dB RE 20 uPa	VFD	VARIABLE FREQUENCY DRIVE
		NC	NORMALLY CLOSED	VFV	VAV, WITH FAN
E	EXHAUST	NIC	NOT IN CONTRACT	VOL	VOLUME
EA	EXHAUST AIR	NO	NORMALLY OPEN		
EAT	ENTERING AIR TEMPERATURE (°F)	NTS	NOT TO SCALE	W	WATT
EC	ELECTRICAL CONTRACTOR			WB	WET BULB TEMPERATURE (°F)
EER	ENERGY EFFICIENCY RATIO	OA	OUTSIDE AIR	WC	WATER COLUMN
EF	EXHAUST FAN	OAT	OUTSIDE AIR TEMPERATURE	WG	WATER GAUGE
EFF	EFFICIENCY	OAD	OUTSIDE AIR DAMPER	WMS	WIRE MESH SCREEN

PIPING SYMBOLS

GENERAL

- (NAME) E — EXISTING PIPE
- (NAME) — EXISTING PIPE TO BE REMOVED

HEATING

- A — COMPRESSED AIR
- ATV — ATMOSPHERIC VENT
- PC — PUMPED CONDENSATE
- BFW — BOILER FEED WATER
- VAC — VACUUM AIR
- HPS — HIGH PRESSURE STEAM
- MPS — MEDIUM PRESSURE STEAM
- LPS — LOW PRESSURE STEAM
- HPC — HIGH PRESSURE CONDENSATE
- MPC — MEDIUM PRESSURE CONDENSATE
- LPC — LOW PRESSURE CONDENSATE

PIPING SPECIALTIES & FITTINGS

- AV — AUTOMATIC AIR VENT
- MV — MANUAL AIR VENT
- CONCENTRIC REDUCER OR INCREASER
- ECCENTRIC REDUCER OR INCREASER
- TOP CONNECTION, 45° OR 90°
- BOTTOM CONNECTION, 45° OR 90°
- SIDE CONNECTION OR TEE FITTING
- CAPPED OUTLET
- CHANGE IN ELEVATION OF PIPE
- PIPE RISE OR ELBOW TURNED UP
- PIPE DROP OR ELBOW TUNED DOWN
- UNION OR FLANGE
- STRAINER
- STRAINER W/ BLOWDOWN AND HOSE END CONNECTION
- THERMOMETER
- PRESSURE GAUGE
- THERMOMETER WELL
- NEEDLE VALVE
- FS — FLOW SWITCH
- PS — PRESSURE SWITCH
- FLOW METER
- P/T — TEST PLUG
- STEAM/FEEDWATER METER
- PUMP
- BLIND FLANGE
- HOSE END CONNECTION
- PIPE ANCHOR
- PIPE GUIDE
- INLINE EXPANSION JOINT
- FLOAT & THERMOSTATIC STEAM TRAP
- INVERTED BUCKET STEAM TRAP
- STM / FUEL / ELEC — HEAT TAPE (DIAGRAMMATIC: INSTALL PER MFR REQ., OR AS NOTED)

VALVES

- BALL
- BUTTERFLY
- GATE
- GLOBE
- PLUG
- CALIBRATED BALANCE/FLOW MEASURE
- PRESSURE REDUCING VALVE
- CHECK VALVE (ARROW INDICATES DIRECTION OF FLOW)
- RELIEF (R) OR SAFETY (S)
- DRAIN VALVE W/HOSE CONNECTION AND SEAL CAP
- TRIPLE DUTY VALVE
- SOLENOID
- PICV — PRESSURE INDEPENDENT CONTROL VALVE: TWO–WAY
- PICV — PRESSURE INDEPENDENT CONTROL VALVE: THREE–WAY
- ATC, TWO–WAY
- ATC, THREE–WAY
- F A — FLOW CONTROL VALVE (A=AUTOMATIC | M=MANUAL)

DUCTWORK SYMBOLS

GENERAL

- EXISTING DUCT AND ACCESSORIES TO BE REMOVED

DOUBLE LINE		SINGLE LINE
20x12 (E) 20/12 (E)	WIDTH (IN) x DEPTH (IN) (E=EXISTING)	20x12 (E) 20/12 (E)
20x12 20/12	DUCT WIDTH (IN) x DEPTH (IN)	20x12 20/12
10"ø	ROUND DUCT	10"ø
D	ELEVATION CHANGE IN DIRECTION OF AIRFLOW (D=DROP | R=RISE)	D
	FLEXIBLE DUCT CONNECTION	
M	MOTOR OPERATED DAMPER	M
BDD	BACKDRAFT DAMPER	BDD
	RUNOUT TO SQUARE SUPPLY DIFFUSER WITH FLEX DUCT	
	RUNOUT TO ROUND SUPPLY DIFFUSER WITH FLEX DUCT	
	RETURN GRILLE/REGISTER	
	SUPPLY REGISTER, DIFFUSER, OR GRILLE (WALL TYPE)	

MISCELLANEOUS

- SUPPLY DIFFUSER 4–WAY BLOW

DUCT SECTION		DUCT RISER
	SUPPLY	
	RETURN OR TRANSFER	
	EXHAUST	

EQUIPMENT SYMBOLS

GENERAL

- REQUIRED CLEARANCE PER CODE OR APPROVING AUTHORITY
- REQUIRED MAINTENANCE CLEARANCE PER MANUFACTURER
- EQUIPMENT HOUSEKEEPING PAD
- EXAMPLE EQUIPMENT: SYMBOLS VARY. SEE EQUIPMENT TAG.
- EXISTING EQUIPMENT AND ACCESSORIES TO BE REMOVED

DRAWING SYMBOLS

- 1/1 — DETAIL DESIGNATION OR ENLARGED PLAN
- HVAC DRAWING NUMBER WHERE DETAIL IS SHOWN
- 1/1 — SECTION DESIGNATION
- HVAC DRAWING NUMBER WHERE SECTION IS SHOWN
- EQUIPMENT TAG
- TAG NUMBER (E=EXISTING)
- POINT OF NEW CONNECTION
- POINT OF DISCONNECTION
- GRILLE/REGISTER/DIFFUSER
- GRILLE/REGISTER/DIFFUSER TAG (E=EXISTING)
- XXX — GRILLE/REGISTER/DIFFUSER NUMBER
- BALANCING CFM
- AIR FLOW DIRECTION

GENERAL H.V.A.C. NOTES:

1. CODES AND STANDARDS LISTED IN SPECIFICATIONS AND DRAWINGS ARE MINIMUM STANDARDS. WHERE REQUIREMENTS ON THE DRAWINGS OR SPECIFICATIONS EXCEED THE MINIMUM CODE REQUIREMENTS, THE DRAWINGS OR SPECIFICATIONS SHALL GOVERN.
2. THE POWER RATING OF MOTORS AND OTHER MECHANICAL EQUIPMENT AND THE ELECTRICAL CHARACTERISTICS OF ELECTRICAL SYSTEMS SERVING THEM HAVE BEEN ESTABLISHED AS MINIMUMS WHICH ALLOW THAT EQUIPMENT TO FUNCTION PROPERLY TO PRODUCE THE REQUIRED CAPACITIES. POWER RATINGS INCLUDE REASONABLE SAFETY FACTORS TO ACCOMMODATE COMMON DIFFERENCES BETWEEN DESIGN PARAMETERS AND FIELD CONSTRUCTION PRACTICES. EQUIPMENT WITH POWER RATINGS LESS THAN THOSE INDICATED ON THE DRAWINGS SHALL NOT BE PERMITTED.
3. REASONABLE EFFORTS HAVE BEEN MADE TO COORDINATE ELECTRICAL REQUIREMENTS OF MECHANICAL EQUIPMENT WITH THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. DIFFERENCES AMONG MANUFACTURERS OF MECHANICAL EQUIPMENT MAKE IT IMPOSSIBLE TO PRODUCE A SINGLE ELECTRICAL DESIGN WHICH WILL SATISFY THE VARYING ELECTRICAL REQUIREMENTS OF THE THOSE MANUFACTURERS. CONSEQUENTLY, THE CONTRACTOR SHALL COORDINATE THE ELECTRICAL REQUIREMENTS OF THE MECHANICAL EQUIPMENT ACTUALLY FURNISHED ON THIS PROJECT AND PROVIDE ELECTRICAL SYSTEMS REQUIRED BY THAT EQUIPMENT. THIS COORDINATION EFFORT SHALL BE COMPLETED PRIOR TO THE INSTALLATION OF EITHER THE MECHANICAL EQUIPMENT OR THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. ELECTRICAL SYSTEM REVISIONS REQUIRED TO COORDINATE WITH THE MECHANICAL EQUIPMENT ACTUALLY FURNISHED SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
4. ALL HVAC SYSTEMS SHALL BE TESTED AND BALANCED ACCORDING TO NEBB AND SMACNA STANDARDS.
5. DO NOT INSTALL DUCTWORK, PIPING, OR EQUIPMENT IN ELECTRICAL ROOMS, ELEVATOR ROOMS, OR ELEVATOR SHAFTS, UNLESS EXPLICITLY INDICATED ON THE DRAWINGS. PIPING, DUCTWORK, AND EQUIPMENT (SWITCHGEAR, SWITCHBOARDS, PANELS, MOTOR CONTROL CENTERS, VARIABLE FREQUENCY DRIVES, TRANSFORMERS, OR STARTERS) SHALL NOT BE INSTALLED DIRECTLY ABOVE OR 42" IN FRONT OF ELECTRICAL EQUIPMENT FROM THE FLOOR TO THE STRUCTURE ABOVE.
6. FOR EXISTING SYSTEMS, REMOVE EXPOSED PIPING AND DUCTWORK RENDERED USELESS DUE TO CHANGES.
7. AIR SYSTEMS SHALL OPERATE WITHOUT AERODYNAMIC NOISE GENERATED FROM FAULTY INSTALLATION OF DUCTWORK, DIFFUSERS, OR ANY PORTION OF THE AIR DISTRIBUTION SYSTEM.
8. SUPPORT PIPING INDEPENDENTLY OF EQUIPMENT. HANGER RODS SHALL BE SUSPENDED FROM THE STRUCTURE. DO NOT SUSPEND FROM OTHER PIPING, CONDUIT, EQUIPMENT, OR DUCTWORK.
9. DRAWINGS INDICATE DESIGN INTENT. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY ALL INSTALLATIONS. CONTRACTOR IS RESPONSIBLE FOR COORDINATION BETWEEN OTHER TRADES TO ASSURE THE PROPER INSTALLATION OF ALL EQUIPMENT.
10. ALL PIPING, DUCTWORK, INSULATION, CONDUITS, SUPPORTS AND HVAC EQUIPMENT EXPOSED TO VIEW SHALL BE PAINTED. COLOR SHALL BE SELECTED BY CLIENT.
11. WHERE DUCTWORK IS EXPOSED DUCT SEAMS SHALL BE MINIMIZED AND SHALL BE OF HIGH QUALITY WORKMANSHIP.

GENERAL PIPING NOTES:

1. INSTALL PIPING TO ALLOW ACCESS VALVES, AIR VENTS, EQUIPMENT REQUIRING ACCESS, AND TO PROVIDE MAXIMUM HEADROOM.
2. PROVIDE OFFSETS TO MAINTAIN CEILING HEIGHT AND TO COORDINATE WITH OTHER TRADES.
3. INSTALL VALVES IN HORIZONTAL PIPING WITH VALVE STEMS AT OR ABOVE THE PIPE CENTERLINE.
4. ARRANGE PIPING FOR VENTING OF AIR AND DRAINAGE OF ENTIRE SYSTEM.
5. INSTALL CONDENSATE DRAIN PIPING PITCHED AT 1/8" PER FOOT IN DIRECTION OF FLOW.
6. INSTALL DRIP LEGS AT LOW POINTS OF ALL STEAM LINES WITH STEAM TRAPS AND PIPE TO CONDENSATE RETURN UNIT OR DEAERATION TANK.
7. TIE STEAM AND FEEDWATER METERS INTO CAMPUS DDC CONTROL SYSTEM

BOILER PLANT GENERAL DEMOLITION NOTES:

1. ALL PIPE OPENINGS CREATED BY DEMOLITION SHALL BE SEALED WITH BLIND FLANGES OR WELDED CAPS.
2. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO EACH PIECE OF EQUIPMENT OR PIPING SLATED FOR RE–USE.
3. PRIOR TO COMMENCEMENT OF DEMOLITION, PROVIDE NECESSARY PROTECTIVE DEVICES WHERE REQUIRED, AND IN STRICT ACCORDANCE OF OSHA REGULATIONS AND USING AGENCY REQUIREMENTS.
4. PRIOR TO COMMENCEMENT OF DEMOLITION, PROVIDE NECESSARY BARRIERS OR PROTECTION TO PREVENT DUST, DIRT, AND DEBRIS FROM PROPOGATING THROUGHOUT THE FACILITY.
5. KEEP ALL ADJOINING WORK AREAS CLEAN AND FREE OF DEBRIS OR CONSTRUCTION MATERIALS DURING WORKING HOURS, AND MAINTAIN SAFE CONDITIONS FOR THE LABOR FORCE.
6. DEMOLISHED MATERIALS (PIPING, BOILER, INSULATION, WIRING, ETC.) NOT BEING RE–USED OR SALVAGED BY THE CLIENT, SHALL BECOME THE PROPERTY OF THE .2 CONTRACTOR AND SHALL BE DISPOSED OF OFF–SITE REGULARLY AND IN A LEGAL MANNER COMPLIANT WITH CODE REQUIREMENTS.
7. REPAIR OR REPLACE EXISTING ITEMS NOT NOTED TO BE DEMOLISHED OR REMOVED, BUT BECOME DAMAGED DURING THE PROGRESS OF WORK. MAKE ANY AND ALL SUCH REPAIRS, REPLACEMENTS, AND MODIFICATIONS TO RESTORE THE DAMAGED ITEMS TO THEIR ORIGINAL OPERATION AND CONDITION AT THE TIME OF DAMAGE, TO THE SATISFACTION OF, AND AT NO ADDITIONAL COST TO, THE CLIENT.
8. PATCH, FILL, AND REPAIR ALL SURFACES DISTURBED, CUT, DAMAGED, OR MADE IMPERFECT BY ALTERATIONS OR DEMOLITION, AND AS REQUIRED TO PREPARE SURFACES FOR NEW MATERIALS AND ARRANGEMENTS.

STEAM SYSTEM GENERAL INFORMATION

BOILER OPERATING PRESSURE:	125	PSIG NORMAL
BOILER STEAM SAFETY VALVE SETTING:	150	PSIG
HIGH PRESSURE STEAM:	110	PSIG

SEQUENCE OF CONSTRUCTION

1. ALL SEQUENCING NOTES SHOWN ON THESE PLANS ARE FOR REFERENCE ONLY. WORK SHALL BE SEQUENCED TO RELOCATE THE TRAILER MOUNTED BOILER FIRST INTO THE LOCATION SHOWN FOR THE NEW BOILER AND TO COMPLETE ALL OTHER WORK POSSIBLE PRIOR TO THE DELIVERY AND INSTALLATION OF THE NEW BOILER. THE NEW BOILER SHALL BE INSTALLED IN THE LOCATION SHOWN FOR THE INSTALLATION OF THE RELOCATED TRAILER MOUNTED BOILER.

REBID SUBMISSION
FEBRUARY 26, 2024

RECORD REVISIONS

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL ENGINEER — RICHARD SZATKOWSKI — ENGINEER No. 044414-E

02–26–2024
SIGNATURE DATE

ARRIS ENGINEERING GROUP, LTD.
667 SOUTH RIVER STREET
PLAINS, PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES
HARRISBURG, PENNSYLVANIA

D.G.S. PROJECT No.
C–0304–0015 PHASE 2

ELIZABETHTOWN TRAINING ACADEMY – RENOVATE BOILER PLANT AND DOMESTIC / FIRE PROTECTION PIPING
DEPARTMENT of CORRECTIONS
ELIZABETHTOWN, LANCASTER COUNTY, PA

GENERAL NOTES, SYMBOLS, AND ABBREVIATIONS

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING: 0 — 1

IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT PROFESSIONAL & BUREAU OF CONSTRUCTION APPROVAL.

DRAWN BY	DATE	DRAWING No.
MTD	FEB 2023	H–1
CHECKED BY	SCALE	
RS	AS NOTED	

FILE PATH: F:\1400.01 0304–0015 P2 Elizabethtown Boiler\Drawings\Ve Base Bid Drawings\3.Mechanical CD\H–1 General Notes, Symbols, and Abbreviations.dwg
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