HVAC ABBREVIATIONS AND LEGEND

SYMBOL	ABBREV	DESCRIPTION
	AD	ACCESS DOOR
	AFF	ABOVE FINISHED FLOOR
	AHU	AIR HANDLING UNIT
	AP	ACCESS PANEL
	APD	AIR PRESSURE DROP
	APPROX	APPROXIMATE
	ARCH	ARCHITECT
	ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AV	AV	AIR VENT (AUTOMATIC)
	AV	AIR VENT (MANUAL)
		BALL VALVE
	B	BOILER
	BDD	BACK-DRAFT DAMPER
	BFV	BUTTERFLY VALVE
	BHP	BRAKE HORSEPOWER
	BLDG	BUILDING
	BOT	BOTTOM
	BTU	BRITISH THERMAL UNIT
	BTUH	BRITISH THERMAL UNIT PER HOUR
		CONTROL VALVE,3 WAY
		CONTROL VALVE,2 WAY
		PIPE CAP
	CAP	CAPACITY
		CHECK VALVE
CD	CD	CONDENSATE DRAIN
	CFM	CUBIC FEET/MINUTE
	CLG	CEILING
	COMB	COMBINATION
	CONC	CONCRETE
	CONN	CONNECTION

SYMBOL	ABBREV	DESCRIPTION
	CONT	CONTINUOUS
	CONTR	CONTRACTOR
	CORR	CORRIDOR
	CU FT	CUBIC FEET
	CUH	CABINET UNIT HEATER
	D-( )	DIFFUSER
	DB	DRY BULB
	DEG	DEGREE(S)
	DIA	DIAMETER
		DIRECTION OF FLOW
	DISC	DISCONNECT
	DN	DOWN
	DWG	DRAWING
DN		DROP IN DUCTWORK
AXB		DUCT - SIDE SHOWN X SIDE NOT SHOWN
		DUCTWORK SUPPLY DOWN
		DUCTWORK SUPPLY UP
		DUCTWORK EXHAUST OR RETURN DOWN
		DUCTWORK EXHAUST OR RETURN UP
	EA	EXHAUST AIR
	EAT	ENTERING AIR TEMPERATURE
	EF	EXHAUST FAN
		ELBOW DOWN
		ELBOW UP
	ELEC	ELECTRIC(AL)

SYMBOL	ABBREV	DESCRIPTION
	ER	EXHAUST AIR REGISTER
	ESP	EXTERNAL STATIC PRESSURE
	EC	EXPANSION COMPENSATOR
	EL	EXPANSION LOOP
	ET	EXPANSION TANK
	EXH	EXHAUST
	EXIST	EXISTING
	F	FAHRENHEIT
	(F)	FUTURE
— HWR —	FC	FLEXIBLE CONNECTION OR FLEX CONN
— HWS —	FCU	FAN COIL UNIT
	FD	FIRE DAMPER
	FDB	DEGREES FAHRENHEIT DRY BULB
	FIN FLR	FINISHED FLOOR
	FLEX	FLEXIBLE
		FLANGED CONNECTION
		FLEXIBLE DUCT
		FLEXIBLE PIPING CONNECTION
	FMO	FLOWMETER (ORIFICE)
	FMV	FLOWMETER (VENTURI)
— FOR —	FOR	FUEL OIL RETURN
— FOS —	FOS	FUEL OIL SUPPLY
	FPM	FEET PER MINUTE
	FT	FOOT OR FEET
	FWB	DEGREES FARENHEIT WET BULB
	GA	GAUGE
	GC	GENERAL CONTRACTOR
		GLOBE VALVE
		GATE VALVE
	GPM	GALLONS PER MINUTE
	GRV	GRAVITY RELIEF VENT

SYMBOL	ABBREV	DESCRIPTION
	HE	HEAT EXCHANGER
	HOA	HAND-OFF-AUTOMATIC
	HP	HORSE POWER
	HTG	HEATING
	HTR	HEATER
	HVAC	HEATING VENTILATION/ AIR CONDITIONING
	HWR	HOT WATER RETURN
	HWS	HOT WATER SUPPLY
	ID	INSIDE DIAMETER
	IN	INCH, INCHES
	INSUL	INSULATE(D), INSULATION
	KW	KILOWATTS
	L	LENGTH
	LAT	LEAVING AIR TEMPERATURE
	LBS	POUNDS
	MAG	MAGNETIC
	MAINT	MAINTENANCE
	MAX	MAXIMUM
	MBH	1,000 BTUH
	MECH	MECHANICAL
	MFR	MANUFACTURER
	MIN	MINIMUM
	MISC	MISCELLANEOUS
	MOD	MOTOR OPERATED DAMPER
	NC	NORMALLY CLOSED
	NIC	NOT IN CONTRACT
	NO	NUMBER; NORMALLY OPEN
	NTS	NOT TO SCALE

SYMBOL	ABBREV	DESCRIPTION
	OA	OUTSIDE AIR
	OD	OUTSIDE DIAMETER
	OED	OPEN END DUCT
	PCFV (X.X GPM)	PRESS COMPENSATING FLOW CONTROL VALVE (GPM)
	PH	PHASE
		PIPE ANCHOR
		PIPE GUIDE
		PITCH DOWN
	PLBG	PLUMBING
	PRESS	PRESSURE
		PRESSURE GAGE W/PET COCK
		PRESSURE RELIEF VALVE
	PSI	POUNDS PER SQUARE INCH
	PSIG	PSI(GAUGE)
	RA	RETURN AIR
		RETURN AIR GRILLE
		RETURN AIR REGISTER
	REQ'D	REQUIRED
		REDUCER
	RH	RELATIVE HUMIDITY
	RM	ROOM
	RPM	REVOLUTIONS PER MINUTE
UP		RISE IN DUCTWORK
S	S	STARTER (EQUIPMENT SERVED)
S		SENSOR (ARROW POINTS TO CONTROLLED DEVICE)
		SCREWED CONNECTION
	SA	SUPPLY AIR
		SUPPLY AIR DIFFUSER
		SUPPLY AIR REGISTER
SD	SD	SMOKE DETECTOR
	SP	STATIC PRESSURE (INCHES OF WATER)

SYMBOL	ABBREV	DESCRIPTION
	SPECS	SPECIFICATIONS
		SPLITTER DAMPER
	SQ	SQUARE
		STRAINER WITH BLOW DOWN
	STRUC	STRUCTURAL
	SV	SOLENOID VALVE
$	SW	SWITCH
		TEE UP
		TEE DOWN
	TEMP	TEMPERATURE
	THERM	THERMOMETER
	T'STAT	THERMOSTAT (ARROW POINTS TO CONTROLLED DEVICE)
		TURNING VANES
	TYP	TYPICAL
	UH	UNIT HEATER
	VAV	VARIABLE AIR VOLUME BOX
	VD	VOLUME DAMPER
	VEL	VELOCITY
	VENT	VENTILATION OR VENTILATOR
	VERT	VERTICAL
	VOL	VOLUME
	W/	WITH
	WB	WET BULB
	WG	WATER GAUGE
	W/O	WITHOUT
	XFER	TRANSFER

A — REGISTER OR DIFFUSER TYPE (SEE SPECIFICATIONS)

100 — AIRFLOW (CFM)

GENERAL NOTES

1. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
2. CONTRACT DOCUMENT DRAWINGS FOR HVAC WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
3. INSTALL ALL HVAC EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS AND APPLICABLE CODES AND REGULATIONS.
4. PROVIDE VIBRATION ISOLATION FOR ALL HVAC EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
5. PROVIDE VIBRATION ISOLATORS FOR ALL PIPING SUPPORTS CONNECTED TO AND WITHIN 50 FEET OF ISOLATED EQUIPMENT AND THROUGHOUT MECHANICAL EQUIPMENT ROOMS. (EXCEPT AT BASE ELBOW SUPPORTS AND ANCHOR POINTS)
6. THE LOCATION OF EXISTING UNDERGROUND UTILITIES IS SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL PAY FOR AND REPAIR ALL DAMAGES CAUSED BY FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES UNLESS OTHERWISE INDICATED.
7. COORDINATE CONSTRUCTION OF ALL HVAC WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, PLUMBING, FIRE PROTECTION, ELECTRICAL WORK ETC. SHOWN ON OTHER CONTRACT DOCUMENT DRAWINGS.
8. MAINTAIN A MINIMUM OF 6'-8" CLEARANCE TO UNDERSIDE OF PIPES, DUCTS, CONDUITS, SUSPENDED EQUIPMENT, ETC., THROUGHOUT ACCESS ROUTES IN MECHANICAL ROOMS.
9. ALL TESTS SHALL BE COMPLETED BEFORE ANY MECHANICAL EQUIPMENT OR PIPING INSULATION IS APPLIED.
10. LOCATE ALL TEMPERATURE, PRESSURE AND FLOW MEASURING DEVICES IN ACCESSIBLE LOCATIONS WITH A STRAIGHT SECTION OF PIPE OR DUCT UPSTREAM AND DOWNSTREAM, AS RECOMMENDED BY THE MANUFACTURER FOR ACCURACY.
11. REINFORCEMENT, DETAILING AND PLACEMENT OF CONCRETE SHALL CONFORM TO ASTM 315 AND ACI 318. CONCRETE SHALL CONFORM TO ASTM C94. CONCRETE WORK SHALL CONFORM TO ACI 318, PART ENTITLED "CONSTRUCTION REQUIREMENTS". COMPRESSIVE STRENGTH IN 28 DAYS SHALL BE 3000 PSI. TOTAL AIR CONTENT OF EXTERIOR CONCRETE SHALL BE BETWEEN 5 AND 7 PERCENT BY VOLUME. SLUMP SHALL BE BETWEEN 3 AND 4 INCHES. CONCRETE SHALL BE CURED FOR 7 DAYS AFTER PLACEMENT.
12. COORDINATE ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. COORDINATE AND PROVIDE ALL DUCT AND PIPING TRANSITIONS REQUIRED FOR FINAL EQUIPMENT CONNECTIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DUCT AND PIPING DIMENSIONS BEFORE FABRICATION.
13. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH THE NATIONAL ELECTRIC CODE AND DIVISION 16 OF THE SPECIFICATIONS.
14. CONCRETE HOUSEKEEPING PADS TO SUIT MECHANICAL EQUIPMENT SHALL BE PROVIDED BY THE HVAC CONTRACTOR. MINIMUM CONCRETE PAD THICKNESS SHALL BE 6 INCHES. PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 6 INCHES ON EACH SIDE.
15. WHERE BEAMS ARE INDICATED TO BE PENETRATED WITH DUCTWORK OR PIPING, COORDINATE DUCTWORK AND PIPING LAYOUT WITH BEAM OPENING SIZE AND OPENING LOCATIONS. COORDINATION SHALL BE DONE PRIOR TO FABRICATION OF DUCTWORK, CUTTING PIPING OR FABRICATION OF BEAMS.
16. THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE PROFESSIONAL BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
17. ALL MISCELLANEOUS STEEL REQUIRED TO ENSURE PROPER INSTALLATION AND AS SHOWN IN DETAILS FOR PIPING, DUCTWORK AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR.
18. PROVIDE ACCESS PANELS FOR INSTALLATION IN WALLS AND CEILINGS, WHERE REQUIRED, TO SERVICE DAMPERS, VALVES, SMOKE DETECTORS AND OTHER CONCEALED HVAC EQUIPMENT. ACCESS PANELS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR FOR INSTALLATION.
19. ALL EQUIPMENT, PIPING, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED, SPECIFIED AND AS REQUIRED TO PROVIDE A VIBRATION FREE INSTALLATION.
20. ALL DUCTWORK, PIPING AND EQUIPMENT SUPPORTED FROM STRUCTURAL STEEL SHALL BE COORDINATED WITH GENERAL CONTRACTOR. ALL ATTACHMENTS TO STEEL BAR JOISTS, TRUSSES OR JOIST GIRDERS SHALL BE AT PANEL POINTS. PROVIDE BEAM CLAMPS MEETING MSS STANDARDS. WELDING TO STRUCTURAL MEMBERS SHALL NOT BE PERMITTED. THE USE OF C-CLAMPS SHALL NOT BE PERMITTED.
21. HVAC EQUIPMENT, DUCTWORK AND PIPING SHALL NOT BE SUPPORTED FROM THE METAL DECK.
22. ALL ROOF MOUNTED EQUIPMENT CURBS FOR EQUIPMENT PROVIDED BY THE HVAC CONTRACTOR SHALL BE FURNISHED AND INSTALLED BY THE HVAC CONTRACTOR AND FLASHED BY THE GENERAL CONTRACTOR.
23. LOCATIONS AND SIZES OF ALL FLOOR, WALL AND ROOF OPENINGS SHALL BE COORDINATED WITH ALL OTHER TRADES INVOLVED.
24. ALL OPENINGS IN FIRE WALLS DUE TO DUCTWORK, PIPING CONDUIT, ETC., SHALL BE FIRESTOPPED WITH AN APPROVED MATERIAL.
25. ALL CONDENSATE DRAIN LINES FROM ROOFTOP UNITS SHALL BE PIPED FULL SIZE OF THE UNIT DRAIN OUTLET, WITH "P" TRAP, AND DISCHARGED ONTO SPLASH BLOCK. SEE DETAILS OR SPECIFICATIONS FOR DEPTH OF TRAP.
26. REFER TO TYPICAL DETAILS FOR DUCTWORK, PIPING AND EQUIPMENT INSTALLATION.
27. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR THE LOCATIONS OF MASONRY WALL OPENINGS WHICH HAVE BEEN PROVIDED, IN SOME PLACES, FOR THE INSTALLATION OF DUCTWORK AND PIPING.
28. CONTRACTOR SHALL SLEEVE PIPES THROUGH MASONRY WALLS WHERE WALL OPENINGS ARE NOT PROVIDED.
29. CONTRACTOR MAY FIELD CORE DRILL (5" DIA. MAX.) HOLES IN PRECAST PLANKS. HOLE SIZES AND LOCATIONS MUST BE COORDINATED WITH G.C. AND PRECAST PLANK MANUFACTURER.
30. ELEVATIONS AS SHOWN ON THE DRAWINGS ARE TO THE CENTER LINE OF ALL PRESSURE PIPING AND TO THE INVERT OF ALL GRAVITY PIPING.
31. MAINTAIN A MINIMUM OF 3'-6" COVER OVER ALL UNDERGROUND HVAC PIPING.
32. PROVIDE AN AIR VENT AT THE HIGH POINT OF EACH DROP IN THE HEATING WATER PIPING SYSTEM. ALL PIPING SHALL GRADE TO LOW POINTS. PROVIDE HOSE END DRAIN VALVES AT THE BOTTOM OF ALL RISERS AND LOW POINTS.
33. UNLESS OTHERWISE NOTED, ALL PIPING IS OVERHEAD, TIGHT TO UNDERSIDE OF STRUCTURE OR SLAB, WITH SPACE FOR INSULATION IF REQUIRED.
34. INSTALL PIPING SO THAT ALL VALVES, STRAINERS, UNIONS, TRAPS, FLANGES, AND OTHER APPURTENANCES REQUIRING ACCESS ARE ACCESSIBLE.
35. ALL VALVES SHALL BE INSTALLED SO THAT VALVE REMAINS IN SERVICE WHEN EQUIPMENT OR PIPING ON EQUIPMENT SIDE OF VALVE IS REMOVED.
36. ALL BALANCING VALVES AND BUTTERFLY VALVES SHALL BE PROVIDED WITH POSITION INDICATORS AND MAXIMUM ADJUSTABLE STOPS (MEMORY STOPS).
37. PROVIDE CHAINWHEEL OPERATORS FOR ALL VALVES IN EQUIPMENT ROOMS MOUNTED GREATER THAN 7'-0" ABOVE FLOOR LEVEL; CHAIN SHALL EXTEND TO 7'-0" ABOVE FLOOR LEVEL.
38. ALL VALVES (EXCEPT CONTROL VALVES) AND STRAINERS SHALL BE FULL SIZE OF PIPE BEFORE REDUCING SIZE TO MAKE CONNECTIONS TO EQUIPMENT AND CONTROLS.
39. UNIONS AND/OR FLANGES SHALL BE INSTALLED AT EACH PIECE OF EQUIPMENT, IN BYPASSES AND IN LONG PIPE RUNS (100 FEET OR MORE) TO PERMIT DISASSEMBLY FOR ALTERATION AND REPAIRS.
40. INSTALL ALL PIPING WITHOUT FORCING OR SPRINGING.
41. ALL PIPING SHALL CLEAR DOORS AND WINDOWS.
42. ALL VALVES SHALL BE ADJUSTED FOR SMOOTH AND EASY OPERATION.
43. ALL PIPING WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
44. PROVIDE FLEXIBLE CONNECTIONS IN ALL PIPING SYSTEMS CONNECTED TO PUMPS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AS CLOSE TO THE EQUIPMENT AS POSSIBLE OR AS INDICATED ON THE DRAWINGS.
45. CERTAIN ITEMS SUCH AS RISES AND DROPS IN DUCTWORK, ACCESS DOORS, VOLUME DAMPERS, ETC., ARE INDICATED ON THE CONTRACT DOCUMENT DRAWINGS FOR CLARITY FOR A SPECIFIC LOCATION REQUIREMENT AND SHALL NOT BE INTERPRETED AS THE EXTENT OF THE REQUIREMENTS FOR THESE ITEMS.
46. UNLESS OTHERWISE SHOWN, LOCATE ALL ROOM THERMOSTATS AND HUMIDISTATS 4'-0" (CENTER LINE) ABOVE FINISHED FLOOR. NOTIFY THE PROFESSIONAL OF ANY ROOMS WHERE THE ABOVE LOCATION CAN NOT BE MAINTAINED OR WHERE THERE IS A QUESTION ON LOCATION.
47. ALL DUCTWORK SHALL CLEAR DOORS AND WINDOWS.
48. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS AND DUCT SIZE SHALL BE INCREASED TO COMPENSATE FOR LINING THICKNESS WHERE REQUIRED.
49. PROVIDE ALL 90 DEGREE SQUARE ELBOWS WITH DOUBLE RADIUS TURNING VANES UNLESS OTHERWISE INDICATED. ELBOWS IN DISHWASHER, KITCHEN AND LAUNDRY EXHAUST SHALL BE UNVANED SMOOTH RADIUS CONSTRUCTION WITH A RADIUS EQUAL TO 1-1/2 TIMES THE WIDTH OF THE DUCT. PROVIDE ACCESS DOORS UPSTREAM OF ALL ELBOWS WITH TURNING VANES.
50. COORDINATE DIFFUSER, REGISTER AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
51. FIELD ERECTED AND FACTORY ASSEMBLED AIR HANDLING UNIT COILS SHALL BE ARRANGED FOR REMOVAL FROM THE UPSTREAM SIDE WITHOUT DISMANTLING SUPPORTS.
52. ALL AIR HANDLING UNITS SHALL OPERATE WITHOUT MOISTURE CARRYOVER.
53. LOCATE ALL MECHANICAL EQUIPMENT FOR UNOBSTRUCTED ACCESS TO UNIT ACCESS PANELS, CONTROLS AND VALVING.
54. PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN AND EXHAUST) CONNECTED TO AIR HANDLING UNITS, FANS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT UNLESS OTHERWISE INDICATED.
55. UNLESS OTHERWISE NOTED, ALL DUCTWORK IS OVERHEAD, TIGHT TO THE UNDERSIDE OF THE STRUCTURE, WITH SPACE FOR INSULATION IF REQUIRED.
56. RUNS OF FLEXIBLE DUCT SHALL NOT EXCEED 5 FEET.
57. ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING DIVIDED DUCTS AND TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
58. PROVIDE ACCESS DOORS IN DUCTWORK TO PROVIDE ACCESS TO ALL SMOKE DETECTORS, FIRE DAMPERS, VOLUME DAMPERS, COILS AND OTHER ITEMS LOCATED IN THE DUCTWORK WHICH REQUIRE SERVICE AND / OR INSPECTION.
59. PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL FANS, VALVES AND MECHANICAL EQUIPMENT.
60. ALL DUCTS SHALL BE GROUNDED ACROSS FLEXIBLE CONNECTIONS WITH FLEXIBLE COPPER GROUNDING STRAPS. GROUNDING STRAPS SHALL BE BOLTED OR SOLDERED TO BOTH THE EQUIPMENT AND THE DUCT.
61. SMOKE DETECTORS SHALL BE FURNISHED AND WIRED BY THE ELECTRICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MOUNTING THE SMOKE DETECTOR IN DUCTWORK AS SHOWN ON THE DRAWINGS AND IN ACCORDANCE WITH MANUFACTURER'S PRINTED INSTRUCTIONS.
62. SEE SPECIFICATIONS FOR DUCTWORK GAUGES, BRACING, HANGERS AND OTHER REQUIREMENTS.
63. EXTERIOR LOUVERS ARE INDICATED FOR INFORMATION ONLY. DETAILED DESCRIPTIONS ARE PROVIDED IN THE ARCHITECTURAL SPECIFICATIONS.
64. ALL ROOF MOUNTED EQUIPMENT CURBS, SUPPORT RAILS, AND PIPE OR DUCT PENETRATION CURBS SHALL BE FURNISHED AND INSTALLED BY H.C. W/ FLASHING BY G.C.
65. ALL PIPE AND DUCT PENETRATIONS OF FIRE RATED WALL OR FLOOR SLAB ASSEMBLIES SHALL BE FIRE-STOPPED BY G.C.

FINAL DESIGN

NO.	DESCRIPTION	DATE
	REVISIONS	

Professional's Signature Date

COMMONWEALTH OF PENNSYLVANIA
DEPT. OF MILITARY & VETERAN'S AFFAIRS
ANNVILLE, PENNSYLVANIA 17003

DESIGN PROFESSIONALS:

OFFICE OF FACILITIES AND ENGINEERING
BUREAU OF DESIGN AND PROJECT MANAGEMENT
BLDG. 0-10, FORT INDIANTOWN GAP
ANNVILLE, LEBANON COUNTY, PENNSYLVANIA

PROJECT NO.: 420591(88821)

BLDG. 11-89 TISA ENERGY UPGRADES

AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

SYMBOLS & NOTES

VERIFY SCALE

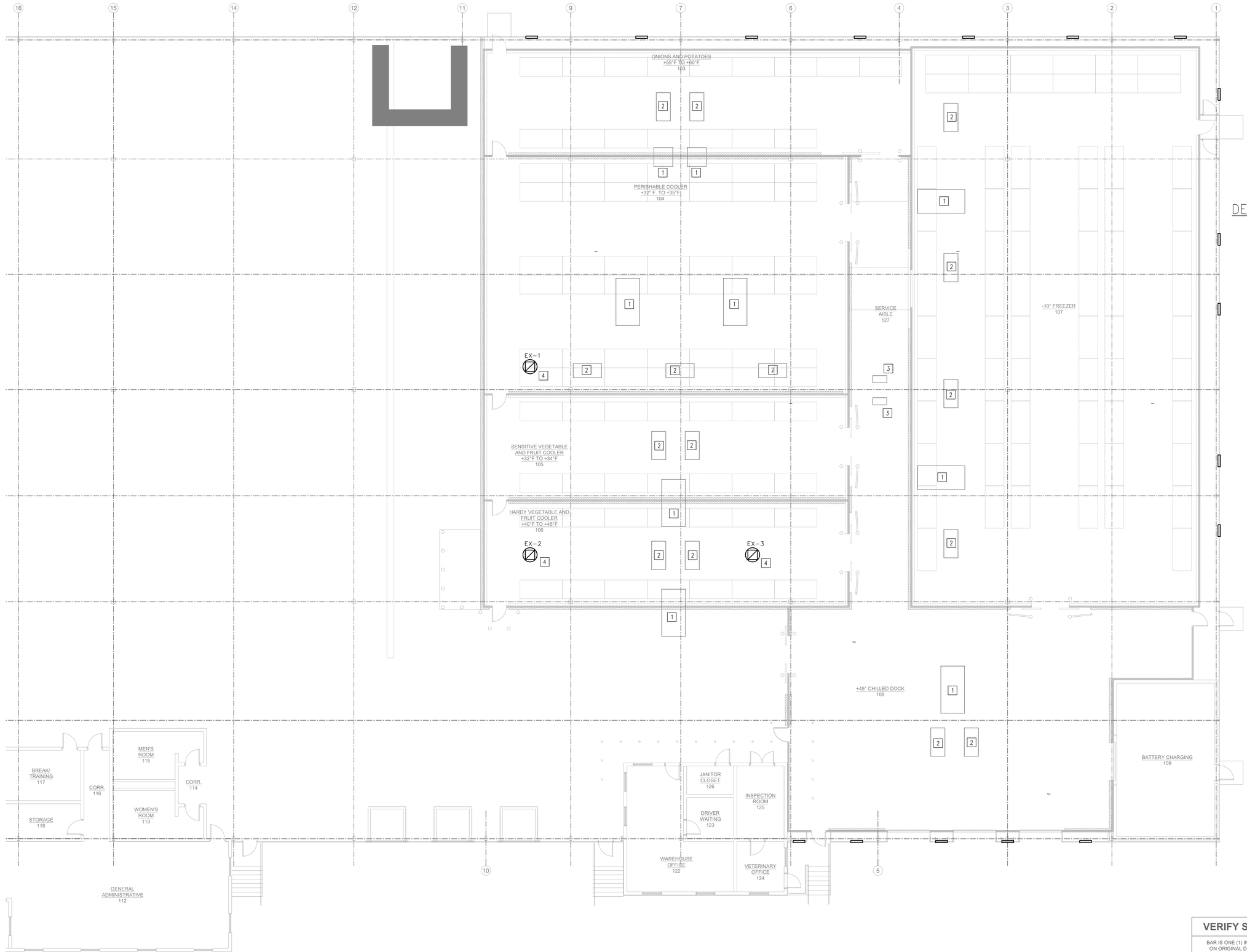
BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:

0 — 1

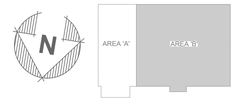
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. VARIANCE FROM CONTRACT DOCUMENTS NOT PERMITTED WITHOUT BUREAU OF ENGINEERING AND ARCHITECTURE APPROVAL.

DRAWN BY	DATE	DRAWING NO.
B. TOEVS	29 APR 2024	H.0.1
CHECKED BY	SCALE	
-	AS NOTED	



FLOOR PLAN - AREA 'B' MECHANICAL DEMO
SCALE: 1/8" = 1'-0"



KEY PLAN
NOT TO SCALE

DEMOLITION PLAN NOTES:

1. EXISTING CONDENSING UNIT (CU) ON ROOF TO BE REMOVED.
2. EXISTING EVAPORATOR TO BE REMOVED. REMOVE ALL REFRIGERANT AND CONDENSATE PIPING, HANGERS, AND SUPPORTS ASSOCIATED CONDENSING UNIT AND EVAPORATOR.
3. FANS SHALL BE REMOVED AND RETAINED FOR RE-INSTALLATION
4. EXISTING EXHAUST FANS TO REMAIN

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AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
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DEMO PLAN - MECHANICAL

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:
0 — 1
IF BAR IS NOT ONE (1) INCH LONG, ADJUST SCALE ACCORDINGLY

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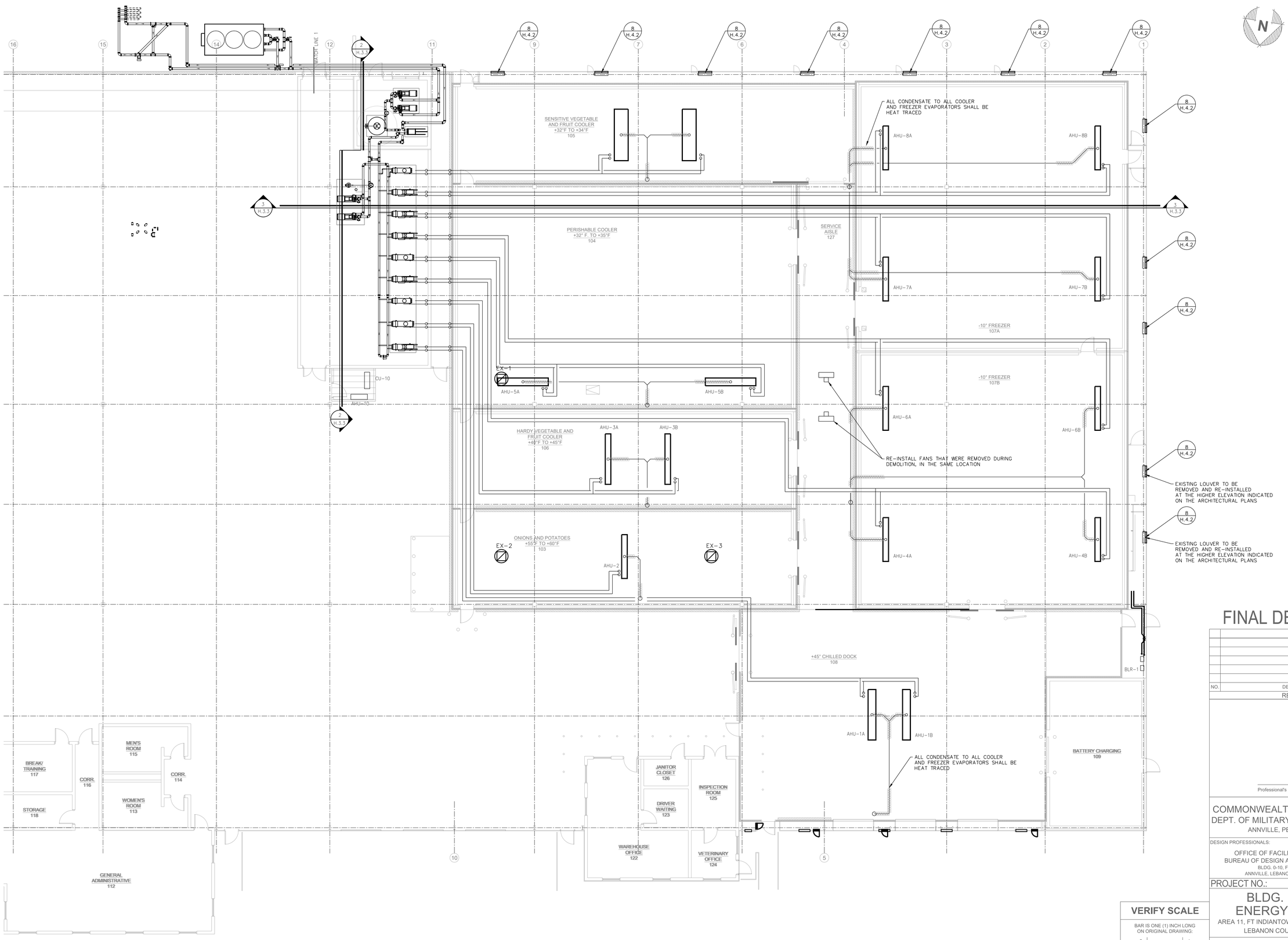
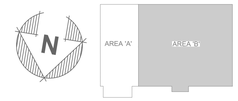
-	AS NOTED	



FLOOR PLAN - AREA 'B' MECHANICAL
SCALE: 1/8" = 1'-0"



KEY PLAN
NOT TO SCALE

FINAL DESIGN

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PROJECT NO.: 420591(88821)

BLDG. 11-89 TISA
ENERGY UPGRADES
AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

FLOOR PLAN - MECHANICAL

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 BUREAU OF ENGINEERING AND ARCHITECTURE APPROVAL.

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CHECKED BY	SCALE	
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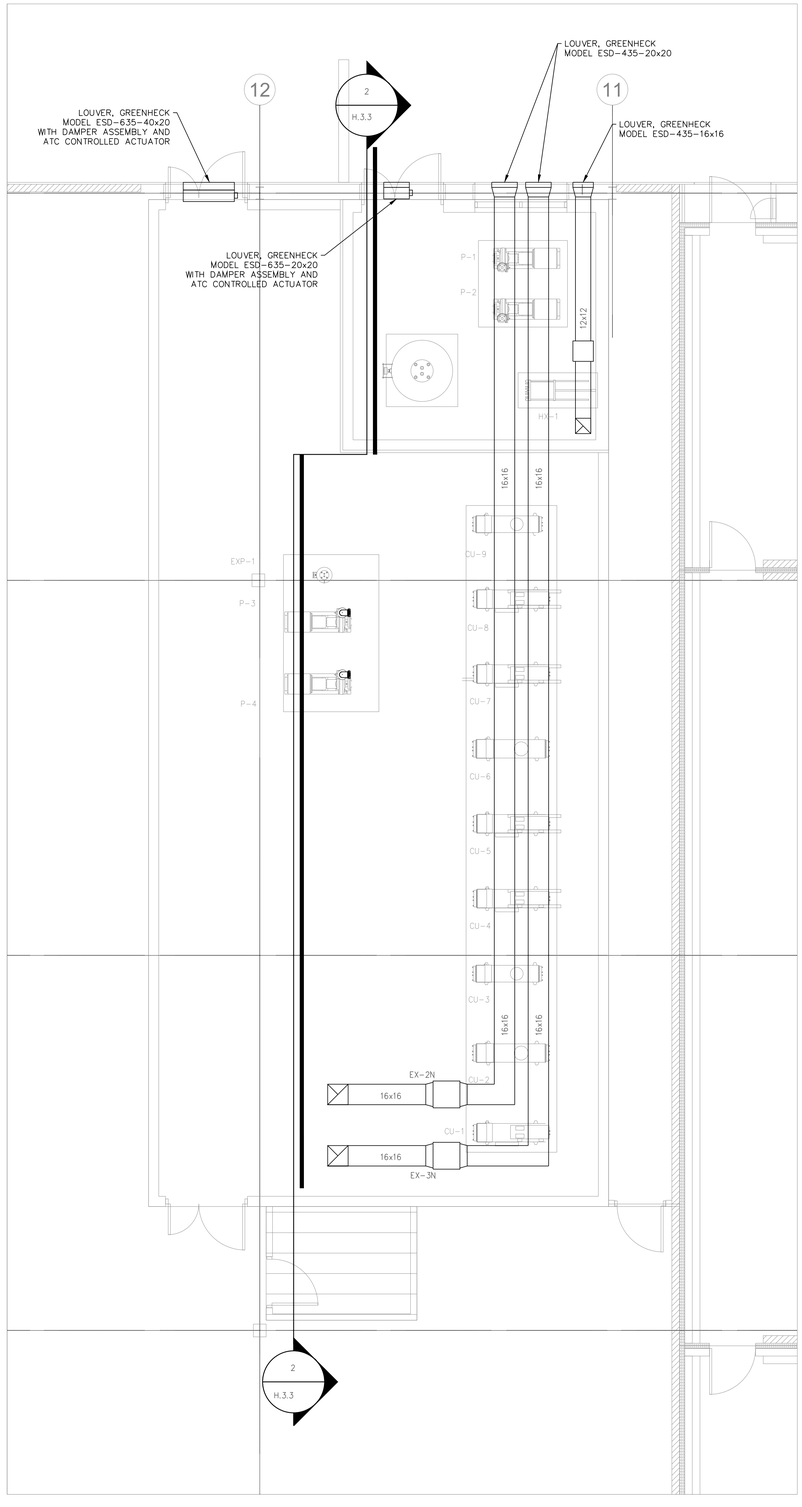
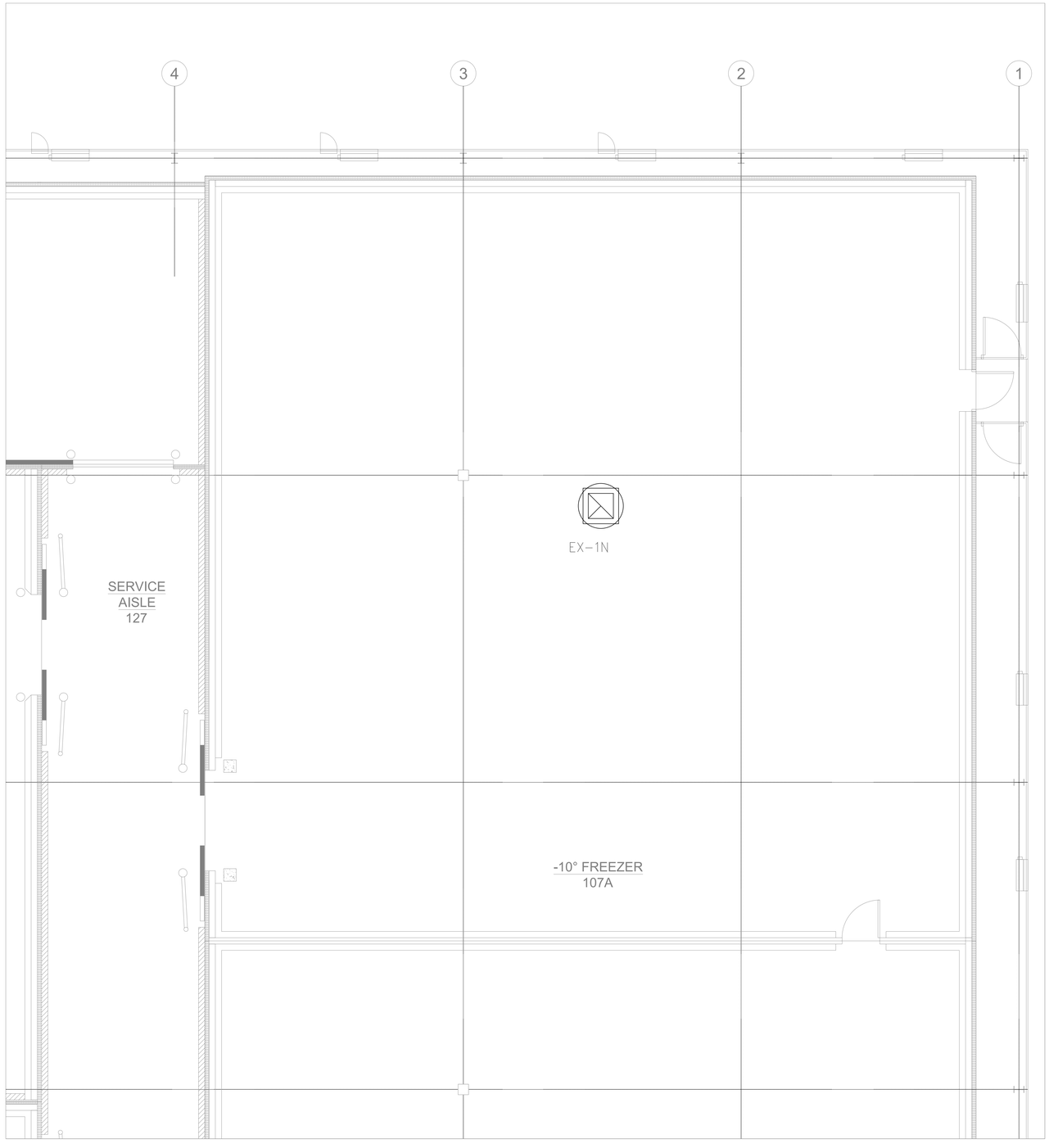
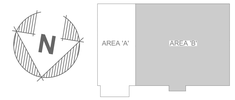


FLOOR PLAN - AREA 'B' NEW MECHANICAL / PUMP ROOM
SCALE: 1/4" = 1'-0"



FLOOR PLAN - AREA 'B' ROOF SPACE OVER FREEZER
SCALE: 1/4" = 1'-0"



KEY PLAN
NOT TO SCALE

FINAL DESIGN

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DEPT. OF MILITARY & VETERAN'S AFFAIRS
ANNVILLE, PENNSYLVANIA 17003

DESIGN PROFESSIONALS:

OFFICE OF FACILITIES AND ENGINEERING
BUREAU OF DESIGN AND PROJECT MANAGEMENT
BLDG. 0-10, FORT INDIANTOWN GAP
ANNVILLE, LEBANON COUNTY, PENNSYLVANIA

PROJECT NO.: 420591(88821)

BLDG. 11-89 TISA ENERGY UPGRADES

AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

PART PLAN - MECHANICAL

VERIFY SCALE

BAR IS ONE (1) INCH LONG
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0 1
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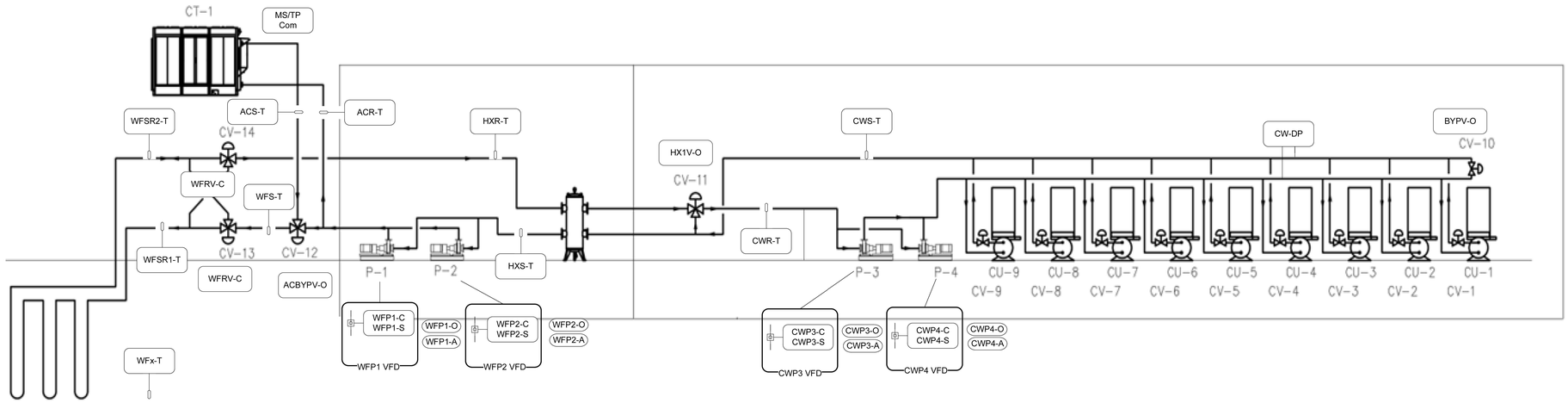
DRAWN BY	DATE	DRAWING NO.
B. TOEVS	29 APR 2024	H.1.2
CHECKED BY	SCALE	
-	AS NOTED	



CONTROL FLOW DIAGRAM
NOT TO SCALE

CONTROL SEQUENCE OF OPERATIONS:

Roof Exhausters and Louver Dampers

Open all perimeter MODs and enable QTY-4 exhaust fans when EX-1, EX-2, EX-3, and EF-1N continuously (24/7 operation)

Refrigeration System

System to operate under KE2 packaged controls. JCI shall integrate into KE2 system for monitoring, alarming, and adjusting setpoints.

Geothermal Water System

SYSTEM ENABLE:

The system will always be enabled while the system enable (SYSTEM-EN) is "ON". When the system enable (SYSTEM-EN) is "OFF", the system will be disabled.

CONDENSER LOOP PUMP CONTROL (P-3 and P-4):

When the system is enabled, the first pump will be started. When an additional pump is required, the second pump be enabled to run. If the pump status does not match the command, an alarm will be generated and the pump will be stopped. Upon loss of status, the pump will restart after the system reset (SYS-RESET) is manually activated. After the system is commanded off, the pump will continue to run for a short time to dissipate the heat. Pumps will rotate to achieve equal runtime.

CONDENSER LOOP PRESSURE CONTROL:

When a pump status is verified, the pump will modulated to maintain the system differential pressure (HW-DP) of the system. The system bypass valve (BYPV-O) will modulate open if the pump VFDs are at minimum speed and HW-DP is above setpoint to maintain minimum flow.

CONDENSER LOOP TEMPERATURE CONTROL:

The heat exchanger control valve (HX1V-O) will modulate to maintain the condenser water supply temperature (CWS-T) setpoint **(65 deg, adjustable).**

CONDENSER CONTROL:

The Condensers will operate under their packaged controls. They will modulate their factory water regulating valves to maintain head pressure**.**

GEOTHERMAL WATER PUMP CONTROL (P-1 and P-2):

When the system is enabled, the first pump will be started. When an additional pump is required, the second pump be enabled to run. If the pump status does not match the command, an alarm will be generated and the pump will be stopped. Upon loss of status, the pump will restart after the system reset (SYS-RESET) is manually activated. After the system is commanded off, the pump will continue to run for a short time to dissipate the heat. Pumps will rotate to achieve equal runtime.

The pumps will operate at a fixed speed set by the balancer. VFDs are provided for soft start.

GEOTHERMAL LOOP TEMPERATURE CONTROL:

On a rise in temperature above the well field return temp temp (HXR-T) setpoint **(90 deg f adj.)** The BMS will open the adiabatic cooler bypass valve (ACBYPV-O), and start the cooler for additional heat rejection. The cooler will operate under packaged controls to maintain leaving water temp. The cooler will be disabled when the well field return temp temp (HXR-T)is below the setpoint plus deadband **(5 degrees, adjustable)**

WELL FIELD FLOW CONTROL AND CHARGING:

The water flow through the wellfield will be reversed through commanding the well field reversing valves (WFRV-C), the adiabatic cooler bypass valve (ACBYPV-O) will be commanded open, and the adiabatic cooler will provide max cooling. This will occur if the well field becomes saturated (well field supply / return temp within 2 degrees adjustable) and outside temperature is below **XXX.** This mode will be de-activated when the well field is charged / saturated. (well field supply / return temp within 2 degrees adjustable)

ADDITIONAL POINTS MONITORED BY THE FMS:

- BACnet Integration to adiabatic cooler
  - Enable / Disable
  - Setpoint
  - Alarm
- Adiabatic cooler supply temperature (ACS-T)
- Adiabatic cooler return Temperature (ACR-T)
- Well Field Sensors (WFx-T)
- Well Field Supply Return Sensor (WFSRx-T)
- Heat Exchanger Supply Temp (HXS-T)
- Heat Exchanger Return Temp (HXR-T)
- Condenser Water Return Temp (CWR-T)

BUILDING MANAGEMENT SYSTEM - CONTROLS

1. PROVIDE BUILDING MANAGEMENT SYSTEM (BMS) CONTROL PANEL. SYSTEM SHALL BE JOHNSON CONTROLS METASYS AND BE AN EXTENSION OF THE EXISTING BASE-WIDE BUILDING MANAGEMENT SYSTEM.
2. CONTACT CHRISTOPHER BARLOW AT JCI, 717-712-1871
   BMS WILL INTERFACE TO AC SYSTEMS FOR REMOTE MONITORING.
   BMS CONTRACTOR WILL FURNISH GAS SUBMETER MODEL AL-800 AND IMAC PULSIMATIC TRANSMITTER (WATER SUBMETER). CONNECT ELECTRIC SMART METER TO BMS.

FINAL DESIGN

NO.	DESCRIPTION	DATE

REVISIONS

Professional's Signature Date

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SCHEMATIC PIPING

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B. TOEVS	29 APR 2024	H.3.1
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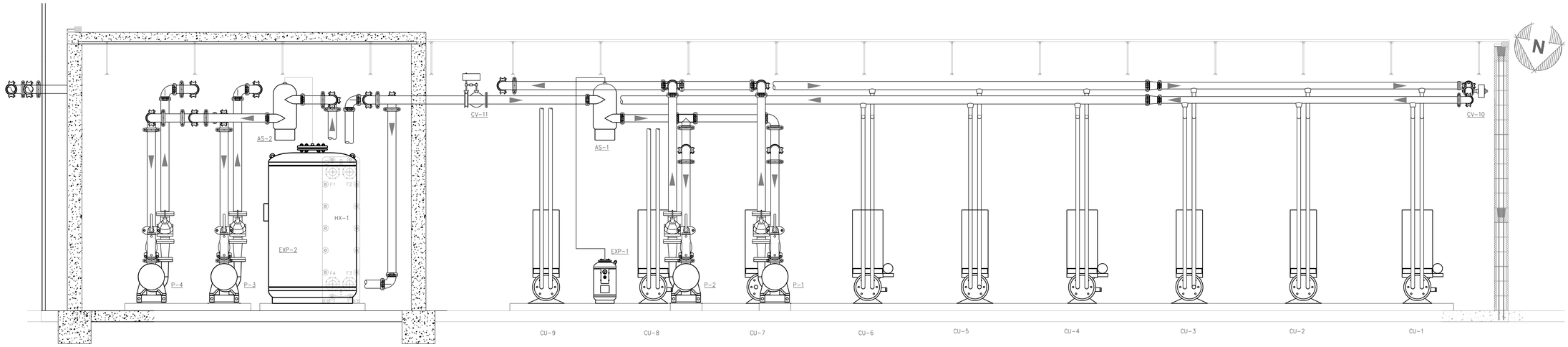
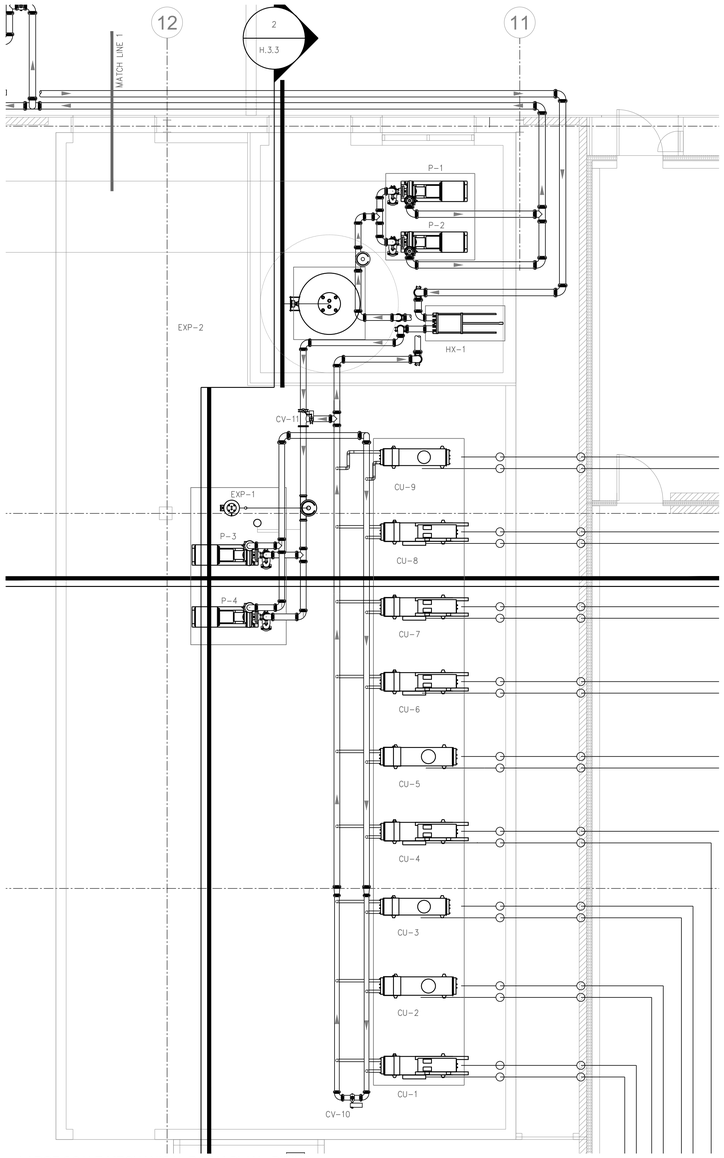
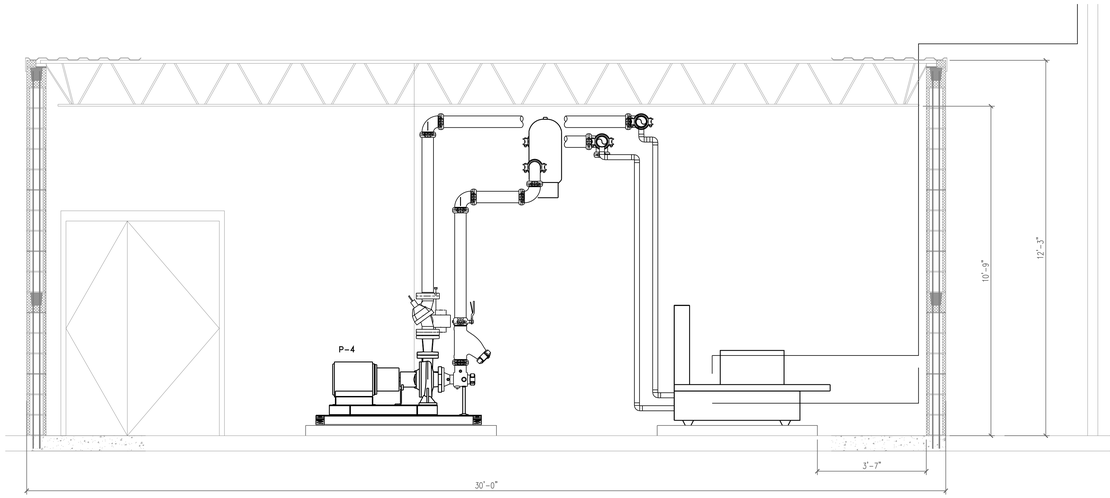
-	AS NOTED	



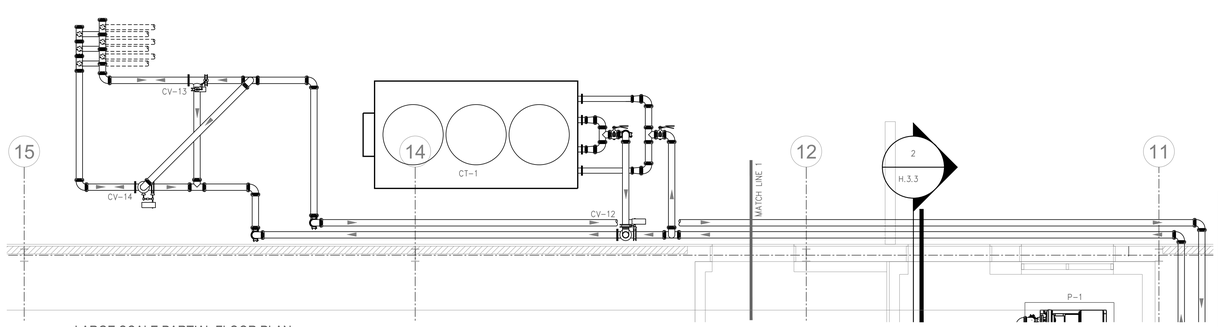
MECHANICAL BUILDING SECTION 2-2 - PIPING
SCALE: 1/2" = 1'-0"



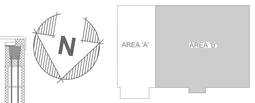
LARGE SCALE MECHANICAL ROOM PLAN - PIPING
SCALE: 1/4" = 1'-0"



MECHANICAL BUILDING SECTION 3-3 - PIPING
SCALE: 1/2" = 1'-0"



LARGE SCALE PARTIAL FLOOR PLAN
SCALE: 1/4" = 1'-0"



KEY PLAN
NOT TO SCALE

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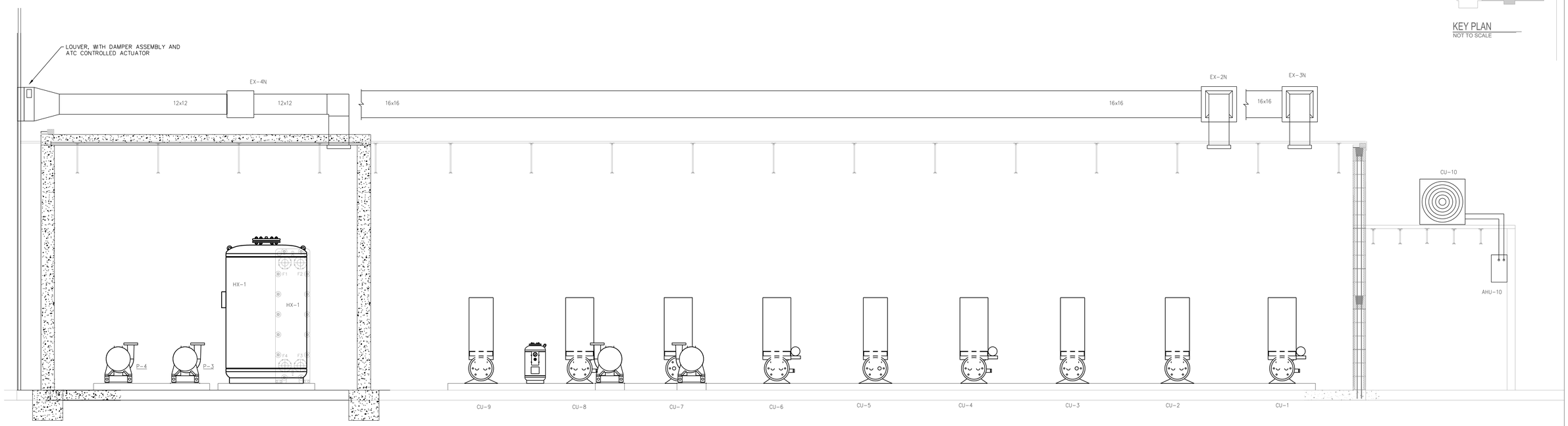
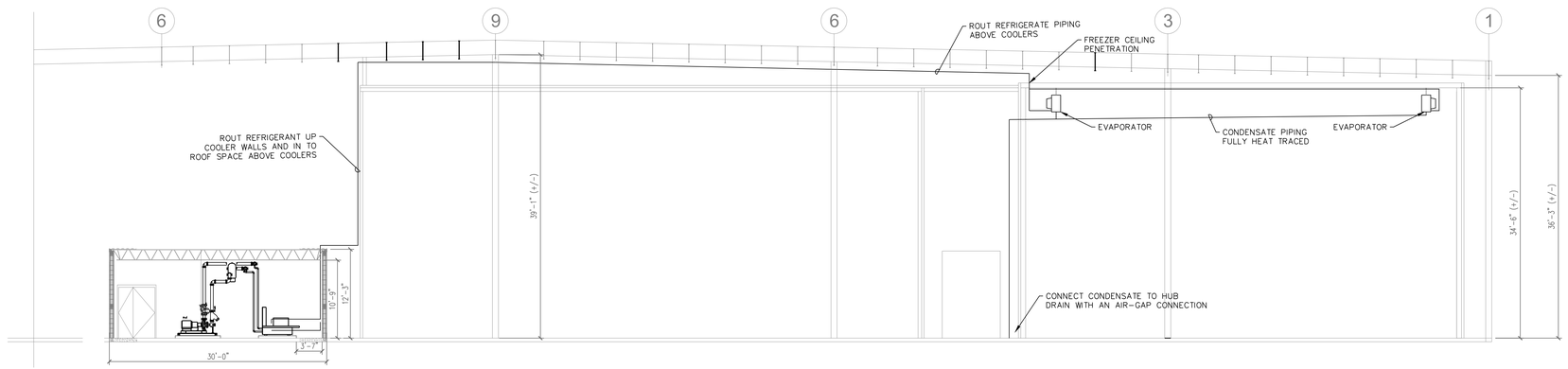
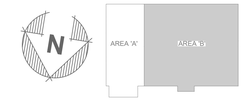


MECHANICAL BUILDING SECTION 2-2 - DUCTWORK
SCALE: 1/2" = 1'-0"



MECHANICAL BUILDING SECTION 1-1
SCALE: 1/8" = 1'-0"



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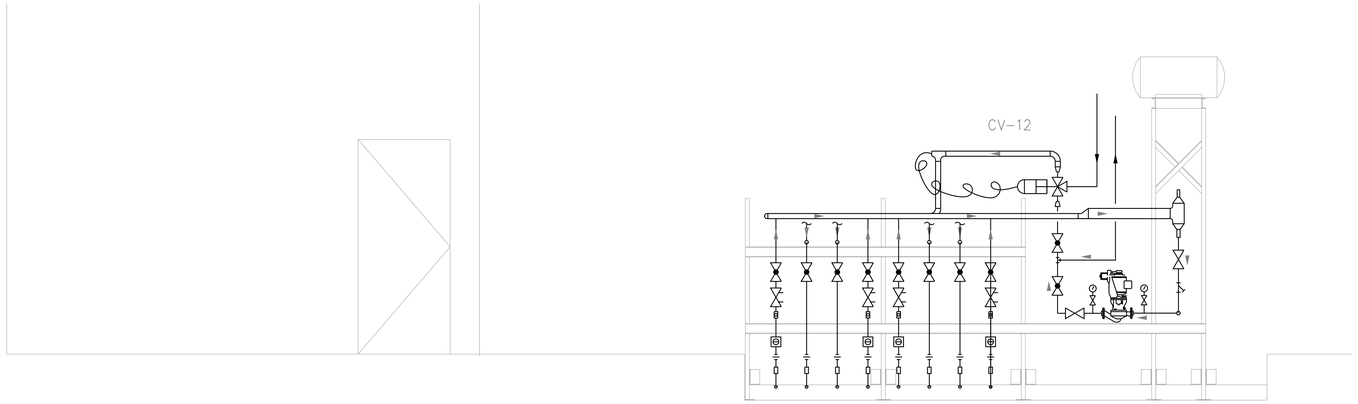
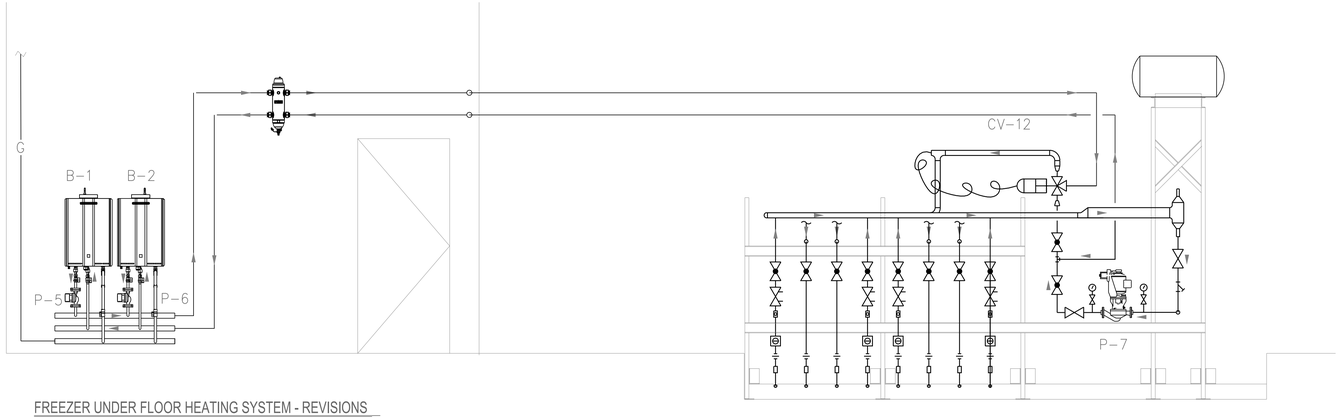
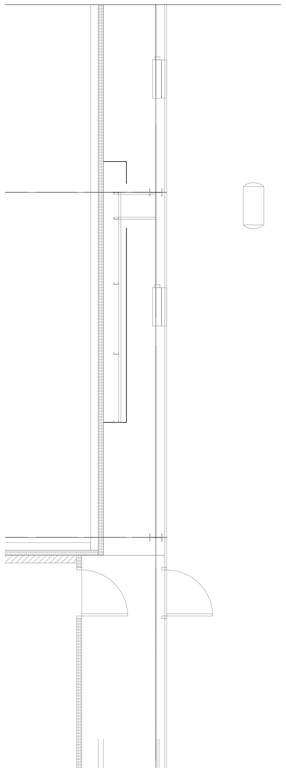


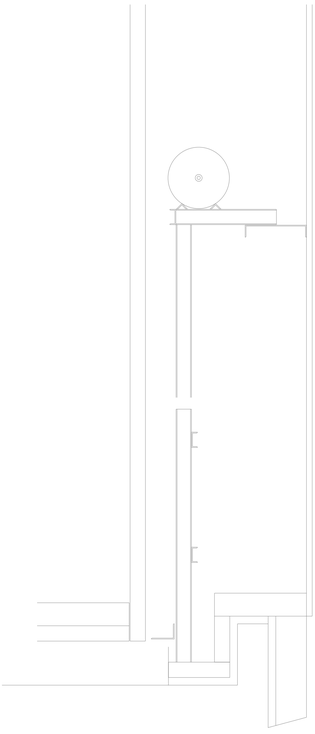
FREEZER UNDER FLOOR HEATING SYSTEM - EXISTING CONDITIONS
SCALE: 1/2" = 1'-0"



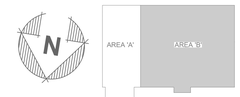
FREEZER UNDER FLOOR HEATING SYSTEM - REVISIONS
SCALE: 1/2" = 1'-0"



FREEZER UNDER FLOOR - PLAN
SCALE: 1/8" = 1'-0"



FREEZER UNDER FLOOR - SECTION
SCALE: 1/8" = 1'-0"



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EVAPORATOR UNIT SCHEDULE

SYMBOL	SERVING	BASIS OF DESIGN		SUPPLY FAN CAPACITY	COOLING COIL DATA			ELECTRICAL CHARACTERISTICS							REMARKS
								SUPPLY FAN				POWER SUPPLY			
		MFG.	MODEL NO.	TOTAL C.F.M.	TOTAL M.B.H.	EVAP TEMP.	BOX TEMP.	(QTY) TYPE	HP	F.L.A. (EACH)	F.L.A. (TOTAL)	M.C.A.	M.O.P.	VOLTAGE	
AHU-1A	CHILLED DOCK	TRENTON	TEP135HA-S4D	13,600	140,104	35.2	45	(4) FAN	1,400W	2.5	10.0	10.6	15	460/1/60	①
AHU-1B	CHILLED DOCK	TRENTON	TEP135HA-S4D	13,600	140,104	35.2	45	(4) FAN	1,400W	2.5	10.0	10.6	15	460/1/60	①
AHU-2	ONIONS & POTATOES	TRENTON	TMP360MA-S4D	91,00	66,162	39.4	50	(3) FAN	630W	1.6	4.8	5.2	15	460/1/60	①
AHU-3A	HARDY VEG 40F	TRENTON	THP068ME-T4A-SN	16,800	68,189	29.8	40	(2) FAN	1 HP	2.4	4.8	5.4	15	460/3/60	①
								(1) DEFROST	17,150W	23.2	23.2	29	30	460/3/60	
AHU-3B	HARDY VEG 40F	TRENTON	THP068ME-T4A-SN	16,800	68,189	29.8	40	(2) FAN	1 HP	2.4	4.8	5.4	15	460/3/60	①
								(1) DEFROST	17,150W	23.2	23.2	29	30	460/3/60	
AHU-4A	FRONT FREEZER	TRENTON	TMP239LE-T4D	5,730	39,237	-18.9	-10	(2) FAN	420W	1.6	3.2	3.6	15	460/3/60	①
								(1) DEFROST	6,190W	9.2	9.2	11	15	460/3/60	
AHU-4B	FRONT FREEZER	TRENTON	TMP239LE-T4D	5,730	39,237	-18.9	-10	(2) FAN	420W	1.6	3.2	3.6	15	460/3/60	①
								(1) DEFROST	6,190W	9.2	9.2	11	15	460/3/60	
AHU-5A	PERISHABLE COOLER 32F	TRENTON	THP068ME-IT4A-SN	16,800	67,088	23.1	32	(2) FAN	1 HP	2.4	4.8	5.4	15	460/3/60	①
								(1) DEFROST	17,150	23.2	23.2	29	30	460/3/60	
AHU-5B	PERISHABLE COOLER 32F	TRENTON	THP068ME-IT4A	16,800	67,088	23.1	32	(2) FAN	1 HP	2.4	4.8	5.4	15	460/3/60	①
								(1) DEFROST	17,150	23.2	23.2	29	30	460/3/60	
AHU-6A	FRONT FREEZER	TRENTON	TMP239LE-T4D	5,730	39,237	-18.9	-10	(2) FAN	420W	1.6	3.2	3.6	15	460/3/60	①
								(1) DEFROST	6,190W	9.2	9.2	11	15	460/3/60	
AHU-6B	FRONT FREEZER	TRENTON	TMP239LE-T4D	5,730	39,237	-18.9	-10	(2) FAN	420W	1.6	3.2	3.6	15	460/3/60	①
								(1) DEFROST	6,190W	9.2	9.2	11	15	460/3/60	
AHU-7A	REAR FREEZER	TRENTON	TMP355LE-T4D	8,590	54,735	-16.7	-10	(3) FAN	630W	1.6	4.8	5.2	15	460/3/60	①
								(1) DEFROST	9,040W	13.4	13.4	17	20	460/3/60	
AHU-7B	REAR FREEZER	TRENTON	TMP355LE-T4D	8,590	54,735	-16.7	-10	(3) FAN	630W	1.6	4.8	5.2	15	460/3/60	①
								(1) DEFROST	9,040W	13.4	13.4	17	20	460/3/60	
AHU-8A	REAR FREEZER	TRENTON	TMP355LE-T4D	8,590	54,735	-16.7	-10	(3) FAN	630W	1.6	4.8	5.2	15	460/3/60	①
								(1) DEFROST	9,040W	13.4	13.4	17	20	460/3/60	
AHU-8B	REAR FREEZER	TRENTON	TMP355LE-T4D	8,590	54,735	-16.7	-10	(3) FAN	630W	1.6	4.8	5.2	15	460/3/60	①
								(1) DEFROST	9,040W	13.4	13.4	17	20	460/3/60	
AHU-9A	VEG FRUIT COOLER 32F	TRENTON	TMP240MA-S4D	6,070	41,774	24.9	32	(2) FAN	420W	1.6	3.2	3.6	15	460/1/60	①
AHU-9B	VEG FRUIT COOLER 32F	TRENTON	TMP240MA-S4D	6,070	41,774	24.9	32	(2) FAN	420W	1.6	3.2	3.6	15	460/1/60	①

REMARKS

① PROVIDE THE FOLLOWING FACTORY OPTIONS:
1. PRE-ASSEMBLED EVAP ESP+ ELECTRONIC PACKAGE
2. 115V CONTROL CIRCUIT
3. SENSORS FOR CPC BOARDS:
3.1. COIL TEMP SENSOR
3.2. RETURN AIR TEMP SENSOR
3.3. SUCTION PRESSURE TRANSDUCER
4. ELECTRONIC CONTROLLER: ESP+ CONTROL BOARD AND DISPLAY
5. EXPANSION VALVE: EEV FOR ESP+
6. LIQUID LINE SOLENOID VALVE: SPORLAN
7.

CONDENSING UNIT SCHEDULE

(ARI CAPACITIES)

SYMBOL	SERVING	BASIS OF DESIGN		COOLING CAPACITY				WATER FLOW		ELECTRICAL CHARACTERISTICS					REMARKS
										COMPRESSOR		POWER SUPPLY			
		MFG.	MODEL	TOTAL M.B.H.	COND. TEMP. °F	HP RATING	SUCTION TEMP °F	GPM	dP PSIG	R.L.A.	L.R.A.	M.C.A.	M.O.P.	VOLTAGE	
CU-1	CHILLED DOCK +45F	TRENTON	TWSA250M8-IT4A	260,775	105	25	+34.7	60.5	2.1	41.1	214	51.4	90	460/3/60	①
CU-2	ONIONS & POTATOES +50F	TRENTON	TWZA050M8-IT4A	63,610	105	5.0	+38.9	14.0	7.5	9.6	63	12.0	20	460/3/60	①
CU-3	HARDY VEG. & FRUIT COOLER +40F	TRENTON	TWZA110M8-IT4A	132,645	105	11	+29.3	30.0	0.75	25.0	150	31.3	50	460/3/60	①
CU-4	FRONT FREEZER -10F	TRENTON	TWSA150L8-IT4A	67,630	105	15	-19.4	30.0	1.6	26.3	139	33.3	50	460/3/60	①
CU-5	PERISHABLE COOLER +32F	TRENTON	TWZA110M8-IT4A	110,314	105	11	+22.6	34.0	0.9	25	150	31.3	50	460/3/60	①
CU-6	FRONT FREEZER -10F	TRENTON	TWSA150L8-IT4A	67,630	105	15	-19.4	30.0	1.6	26.3	139	33.3	50	460/3/60	①
CU-7	REAR FREEZER -10F	TRENTON	TWSA150L8-IT4A	67,630	105	15	-17.2	35.0	2.5	26.3	139	33.3	50	460/3/60	①
CU-8	REAR FREEZER -10F	TRENTON	TWSA150L8-IT4A	67,630	105	15	-17.2	35.0	2.5	26.3	139	33.3	50	460/3/60	①
CU-9	SENSITIVE VEG. & FRUIT COOLER +32F	TRENTON	TWZA060M8-IT4A	52,439	105	6.0	+24.4	14.0	0.5	11.5	75	14.4	25	460/3/60	①
				TOTAL MBH 1,058,846				TOTAL GPM 282.5	7.5						

REMARKS

① PROVIDE THE FOLLOWING FACTORY OPTIONS:
1. 115V CONTROL CIRCUIT (FACTORY INSTALLED)
2. LIQUID LINE AND SUCTION LINE BALL VALVES (FACTORY INSTALLED)
3. FUSED DISCONNECT SWITCH (FACTORY INSTALLED)
4. POWER DISTRIBUTION TERMINAL BLOCK (FACTORY INSTALLED)
7. DH1 DEFROST HEATER CONTACTOR (FACTORY INSTALLED)
8. EF1 EVAPORATOR FAN MOTOR CONTACTOR (FACTORY INSTALLED)
9. COMPRESSOR CIRCUIT BREAKER (FACTORY INSTALLED)
10. REPLACEABLE LIQUID LINE FILTER + SITE GLASS (FACTORY INSTALLED)
11. LIQUID LINE SOLENOID VALVE - MANUAL STEM 115V COIL (FACTORY SUPPLIED FIELD INSTALLED BY CONTRACTOR)
12. OIL SEPARATOR WITH OIL FILTER AND SOLENOID (FACTORY INSTALLED)
13. PHASE/VOLTAGE MONITOR (FACTORY INSTALLED)
13.1. 6-LEAD (MOTORSAVER455)
13.2. PUMP DOWN TOGGLE SWITCH
13.3. SINGLE POINT ELECTRICAL
14. SUCTION ACCUMULATOR WITH REPLACEABLE CORE (FACTORY INSTALLED)
15. TIME CLOCK 115V PARAGON 8145 STYLE (FACTORY SUPPLIED FIELD INSTALLED BY CONTRACTOR)
16. STANDARD DUTY WATER REGULATING VALVE (FACTORY SUPPLIED, FIELD INSTALLED BY CONTRACTOR)

AIR SEPARATOR SCHEDULE

SYMBOL	LOCATION	SERVICE	TYPE	GPM	HW SYSTEM CONN. SIZE	COMP. TANK CONN. SIZE	NOTES
AS-1	PUMP ROOM	GEO LOOP	CENTRIFUGAL	300	4"	--	
AS-2	MECH. ROOM	COND. LOOP	CENTRIFUGAL	300	4"	--	
AS-3	FREEZER WALL	UNDER FLOOR	CENTRIFUGAL	--	3/4"	--	

EXPANSION TANK SCHEDULE

SYMBOL	LOCATION	SERVICE	TYPE	SIZE	CONNECTION SIZE	VOLUME GALLON		CHARGING PRESSURE PSI	NOTES
						TANK	ACCEPTANCE		
ET-1	PUMP ROOM	GEO LOOP	VERTICAL						
ET-2	MECH. ROOM	COND. LOOP	VERTICAL						
ET-3	FREEZER WALL	UNDER FLOOR	VERTICAL						

HEAT EXCHANGER

SYMBOL	MFG.	MODEL	COOL SIDE					HOT SIDE					NOTES
			FLOW	FLUID	ENTERING TEMP	LEAVING TEMP	MAXIMUM PD	FLOW	FLUID	ENTERING TEMP	LEAVING TEMP	MAXIMUM PD	
			GPM		DEG. F	DEG. F	FT. H2O	GPM		DEG. F	DEG. F	FT. H2O	
HX-1	HX-1	B&G	300	50% ETHANOL	52	107.5	10	300	WATER	110	70	10	①②③

① WATER PROPERTIES:
DENSITY = 62.05 lb/cf
VISCOSITY = 0.82 cp
SPECIFIC HEAT = 1.00 Btu/ft,h,°F
SPECIFIC FOULING FACTOR = 0.00000hr,sf,°F/Btu

② 50% ETHANOL PROPERTIES:
DENSITY = 55.56 lb/cf
VISCOSITY = 0.99 cp
SPECIFIC HEAT = 0.81 Btu/ft,h,°F
SPECIFIC FOULING FACTOR = 0.00000hr,sf,°F/Btu

③ TOTAL HEAT EXCHANGE = 5,982,113.69 Btu/h
LMTD = 7.85 °F
OVERALL HEAT TRANSFER COEFFICIENT, CLEAN/DIRTY = 631.31/631.31 Btu/hr,sf,°F
OVERALL HEAT TRANSFER COEFFICIENT, SERVICE = 619.86 Btu/hr,sf,°F
EFFECTIVE SURFACE AREA = 1,227.95 sf
EXCESS SURFACE = 1.83%

EXHAUST FAN SCHEDULE

SYMBOL	SERVING	BASIS OF DESIGN		C.F.M.	E.S.P.	FAN RPM	DRIVE	SONES	WHEEL		ELECTRICAL DATA				REMARKS
									TYPE (REMARK 1)	CONST. (REMARK 1)	FAN MOTOR			VOLTAGE	
		MFG.	MODEL NO.								M.O.P.	M.C.A.	F.L.A.		
EX-1N	ROOF/WALL CAVITY EXHAUST	GREENHECK	GB-240	5,000	0.25	648	BELT	11.2	BI	ALUM	15	2.6	2.1	460/60/3	1, 2
EX-2N	MECHANICAL ROOM GENERAL EXH	GREENHECK	SQ-130	884	0.61	1,140	DIRECT	5.3	BI	ALUM	15	1.4	1.1	460/60/3	1, 2
EX-3N	MECHANICAL ROOM EMERGENCY EXH	GREENHECK	SQ-130	884	0.61	1,140	DIRECT	5.3	BI	ALUM	15	1.4	1.1	460/60/3	1, 2
EX-4N	PUMP ROOM GENERAL EXH	GREENHECK	GB-240	5,000	0.25	648	DIRECT	11.2	BI	ALUM	15	2.6	2.1	460/60/3	1, 2, 3

REMARKS
1. WHEEL TYPES: BACKWARD INCLINED (BI), FORWARD CURVE (FC), CONSTRUCTION: ALUMINUM (ALUM)
2. CONTROL IS TIED INTO EXISTING EXHAUST FANS EX-1, EX-2, AND EX-3
3. EXPLOSION PROOF MOTOR, SPARK RESISTANT CONSTRUCTION

DUCTLESS A/C FAN COIL UNIT SCHEDULE (ARI CAPACITIES)

SYMBOL	BASIS OF DESIGN		SUPPLY FAN	COOLING CAPACITY DATA			HEATING CAPACITY DATA			ELECTRICAL CHARACTERISTICS		REMARKS
	MFG.	MODEL NO.	TOTAL C.F.M.	TOTAL M.B.H.	E.A.T. D.B.	E.A.T. W.B.	TOTAL M.B.H.	E.A.T. D.B.	E.A.T. W.B.	POWER SUPPLY RATED CURRENT	VOLTAGE	
CU-10 / AHU-10	YORK	DHP18NWB21S	471	20.0	80	67	23.4	70	70	11.54	208/60/1	1, 2

REMARKS
1. PROVIDE LITTLE GIANT VCMA-15 SERIES CONDENSATE PUMP
2. POWER FOR AHU IS FED THROUGH THE CONDENSING UNIT. WIRING SHALL BE PROVIDED WITH REFRIGERANT LINE SET THE REFRIGERANT LINE SET AND INDOOR POWER WIRING SHALL BE ROUTED TOGETHER

PUMP SCHEDULE

SYMBOL	BASIS OF DESIGN		SYSTEM	G.P.M.	MIN. G.P.M.	PUMP HD. (FT. H_2O)	EFF.	CIRCULATING FLUID					ELECTRICAL DATA			MOUNTING	REMARKS
	MFG.	MODEL NO.						FLUID	SUCTION SIZE (IN)	DISCHARGE SIZE (IN)	IMPELLER DIA. (IN)	TEMP (° F)	MOTOR H.P.	MOTOR R.P.M.	VOLTAGE		
P-1	B&G	E-1510-2BD	GEO-LOOP	300	58.2	186	69.5	50% ETHANOL	2.5	2	7.375	60	25	3477	460/3/30	BASE	①②
P-2	B&G	E-1510-2BD	GEO-LOOP	300	58.2	186	69.5	50% ETHANOL	2.5	2	7.375	60	25	3477	460/3/30	BASE	①②
P-3	B&G	E-1510-3EB	COND. LOOP	300	91.1	100	74.2	WATER	4	3	10.75	75	15	1650	460/3/30	BASE	③
P-4	B&G	E-1510-3EB	COND. LOOP	300	91.1	100	74.2	WATER	4	3	10.75	75	15	1650	460/3/30	BASE	③
P-5	B&G	---	UNDER FLR	30	---	40		50% ETHYLENE GLYCOL							120/1/30	IN-LINE	
P-6	B&G	---	UNDER FLR	30	---	40		50% ETHYLENE GLYCOL							120/1/30	IN-LINE	
P-7	B&G	---	UNDER FLR	30	---	40		50% ETHYLENE GLYCOL							460/1/30	IN-LINE	

① PUMP AND MOTOR ASSEMBLY SHALL BE CLASS 1, DIVISION 2, GROUP D, EXPLOSION PROOF
② DUTY POINT POWER = 20.3 BHP
③ DUTY POINT POWER = 8.77 BHP

ADIABATIC FLUID COOLER

SYMBOL	MFG.	MODEL	AIRFLOW	FAN POWER	PUMP POWER	COOLER FLOW	GEOTHERMAL FLUID				ELECTRICAL DATA					NOTES
							CAPACITY	WET BULB TEMP	EWT TEMP	LWT TEMP	VOLTS	PHASE	HERTZ	MOP	MCA	
			CFM	HP	HP	GPM	MBH	DEG. F	DEG. F	DEG. F						
CT-1	NIMBUS	1XVRGA013-EC-1	56,653	3 @5HP	NA	300	1,571,032		110	100	460	3	60	19.06A	13.91A	①②

① DRY WEIGHT = 3,722 lbs, OPERATING WEIGHT = 4,249lbs
COIL VOLUME = 59.1 gal., CONNECTION SIZE = 3"
SOUND POWER LEVEL = 91.8 dB(A)
SOUND PRESSURE LEVEL = 74.1 dB(A)
SPRAY CONNECTION = 3/4"

② PROVIDE WITH:
1. SELF CONTAINED CONTROLS WITH CONTROL PANEL, BACnet COMPATIBLE CONTROLLER
2. FAN MOTOR VFDs
3. AIR DEBRIS SCREEN

BOILER SCHEDULE

SYMBOL	LOCATION	SERVICE	BASIS OF DESIGN		MINIMUM INPUT (MBH)	MAXIMUM INPUT (MBH)	GPM @ 70° RISE	GPM @ 50° RISE	MAXIMUM GPM.	WATER CONN.	GAS CONN.	THERMAL EFF. (%)	ELECTRICAL		REMARKS
			MANUFACTURER	MODEL									VOLTS	AMPS	
BLR-1,2	FREEZER WALL	UNDER FLOOR	RINNAI	RL75IN	10.3	180.0	4.8	6.7	7.5	3/4"	3/4"	82	120	2	①

REMARKS

① PROVIDE AND INSTALL WITH SERVICE VALVES AND CONCENTRIC WALL TERMINATION KIT.

PIPING RUNOUT SCHEDULE

FLOW RANGE GPM	PIPE SIZE
0.5-3.9	3/4"
4.0-6.9	1"
7.0-15.9	1-1/4"
16.0-23.9	1-1/2"
24.0-45.9	2"
46.0-75.0	2-1/2"

FINAL DESIGN

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PROJECT NO.: 420591(88821)

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AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

SCHEDULES - MECHANICAL

VERIFY SCALE

BAR IS ONE (1) INCH LONG ON ORIGINAL DRAWING:
0 — 1
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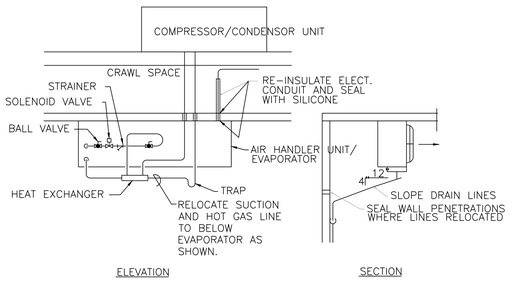
DRAWN BY	DATE	DRAWING NO.
B. TOEVS	29 APR 2024	H.4.1
CHECKED BY	SCALE	
-	AS NOTED	



1 H.4.2 EVAPORATOR DETAIL
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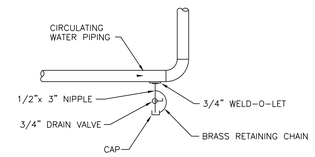

2 H.4.2 TYPICAL LOW POINT DRAIN
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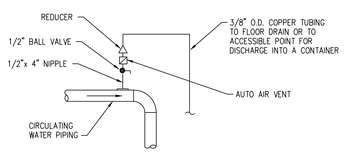

3 H.4.2 TYPICAL HIGH POINT AIR VENT
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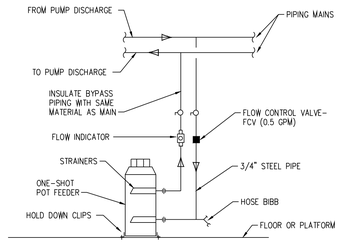

4 H.4.2 CHEMICAL FEEDER
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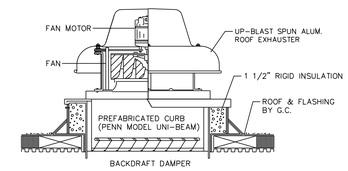

5 H.4.2 POWER ROOF EXHAUST FAN DETAIL
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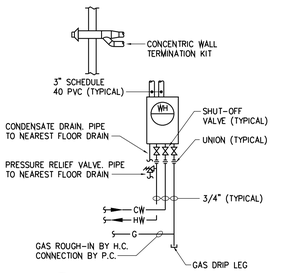

6 H.4.2 CONDENSING BOILER
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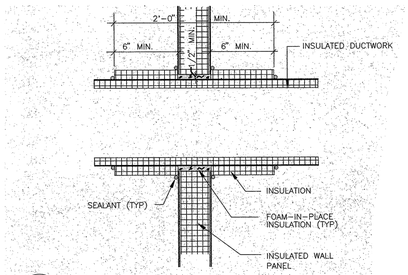
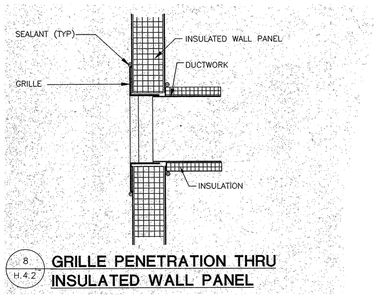
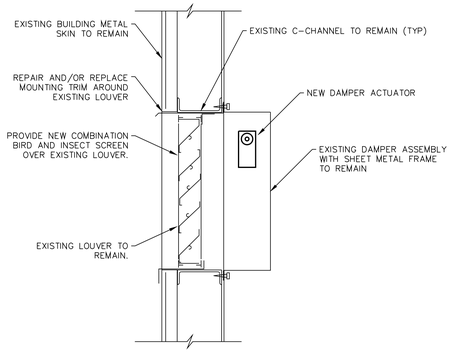


7 H.4.2 **INSULATED DUCTWORK THRU INSULATED WALL PANEL**



8 H.4.2 **GRILLE PENETRATION THRU INSULATED WALL PANEL**



9 H.4.2 BUILDING WALL LOUVER DETAIL
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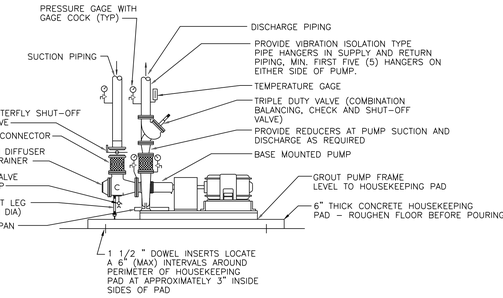

10 H.4.2 END SUCTION PUMP
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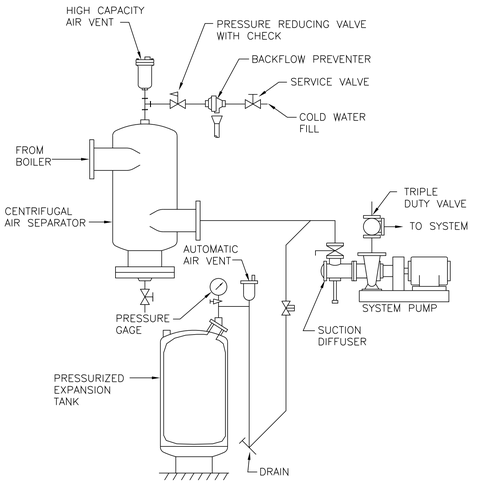

11 H.4.2 AIR SEPARATOR & EXPANSION TANK
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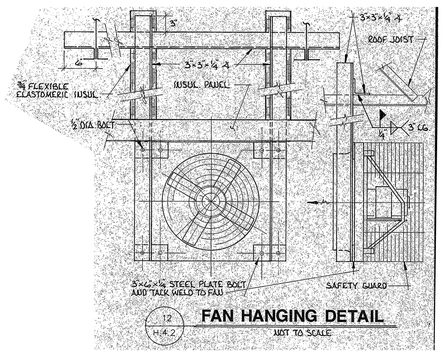
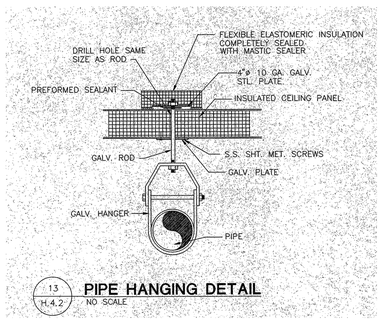


12 H.4.2 **FAN HANGING DETAIL**
NOT TO SCALE



13 H.4.2 **PIPE HANGING DETAIL**
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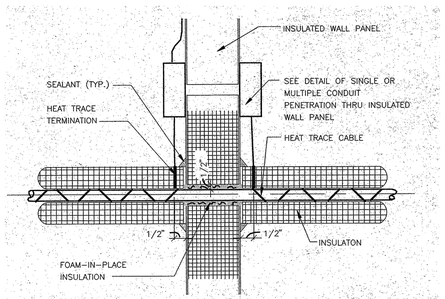
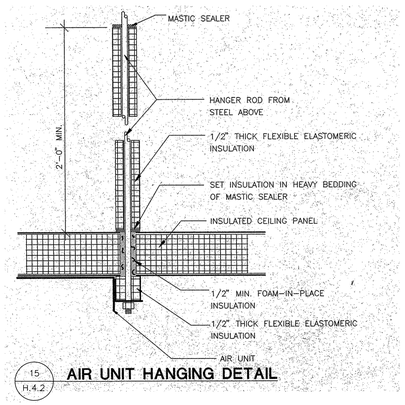
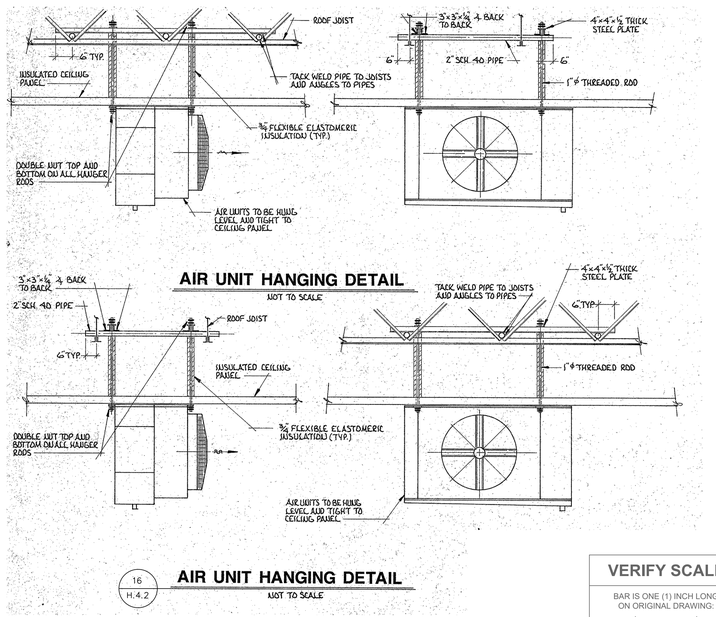


14 H.4.2 **INSULATED PIPE THRU INSULATED WALL PANEL W/ HEAT TRACE BOTH SIDES**



15 H.4.2 AIR UNIT HANGING DETAIL



AIR UNIT HANGING DETAIL
NOT TO SCALE

16 H.4.2 **AIR UNIT HANGING DETAIL**
NOT TO SCALE

FINAL DESIGN

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B. TOEVS	29 APR 2024	H.4.2
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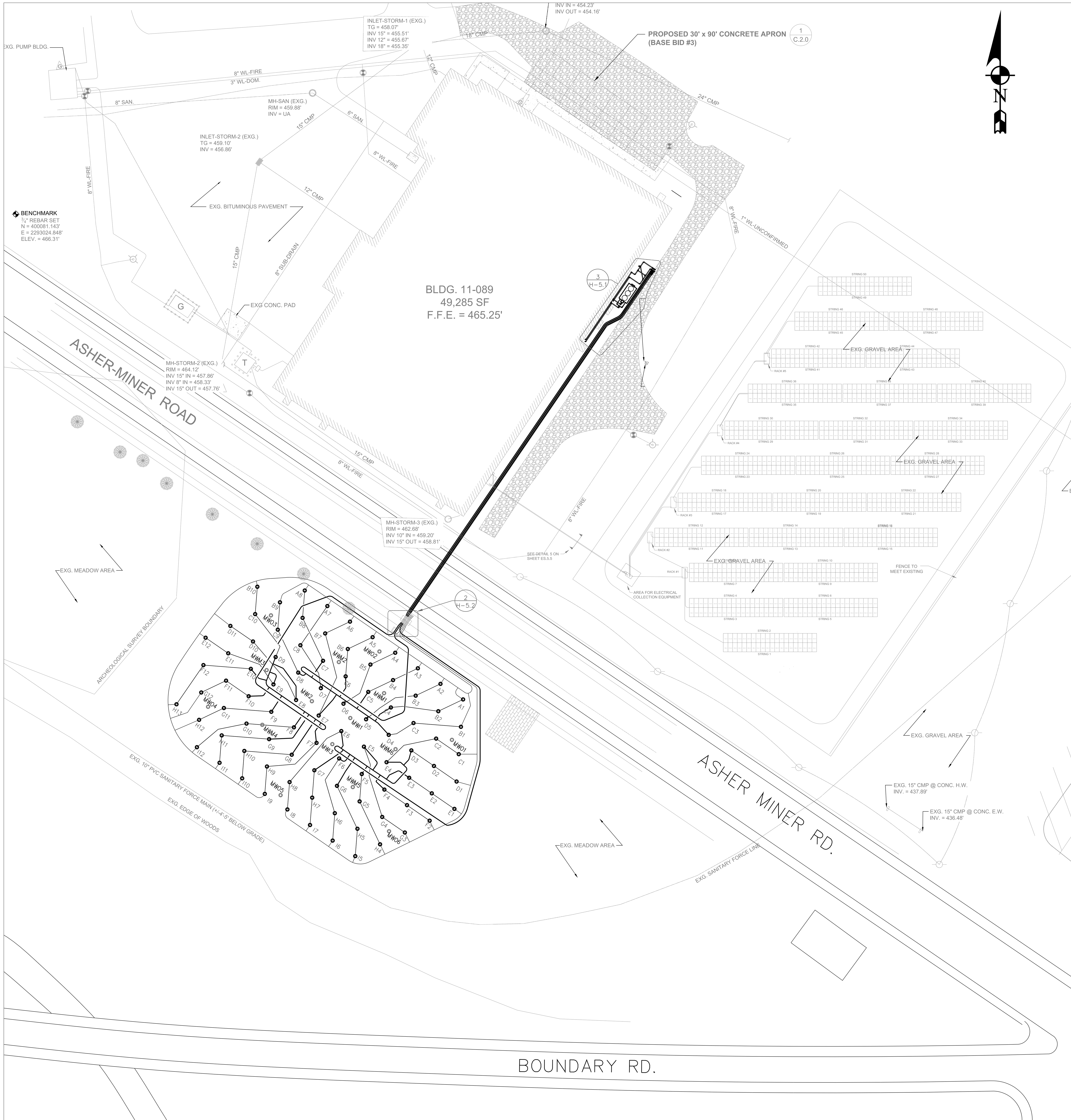
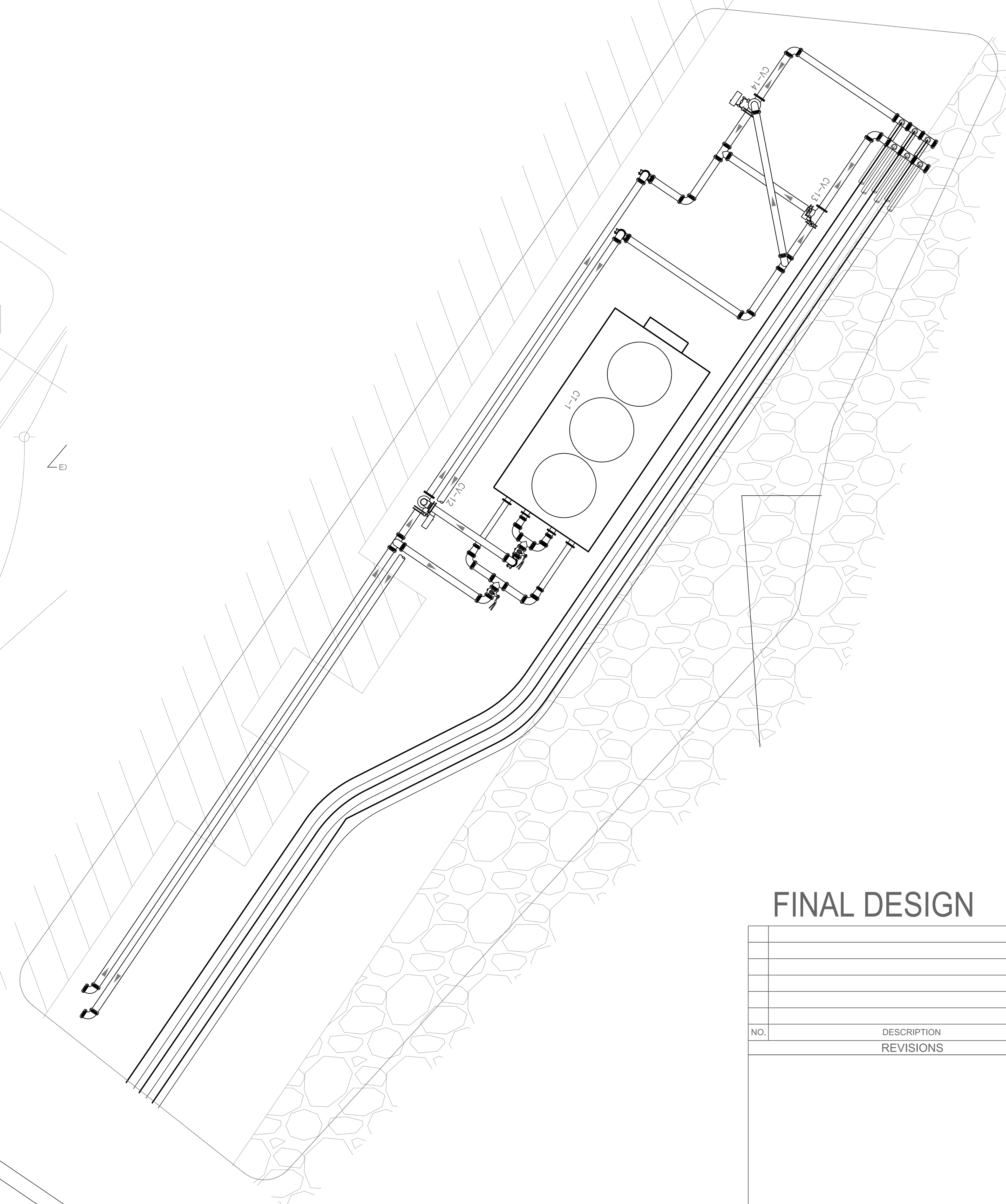
-	AS NOTED	



1 SITE PLAN - MECHANICAL
SCALE: 1/32" = 1'-0"



2 LARGE SCALE WELL FIELD MAIN PIPING LAYOUT
SCALE: 1/4" = 1'-0"

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SITE PLAN - MECHANICAL

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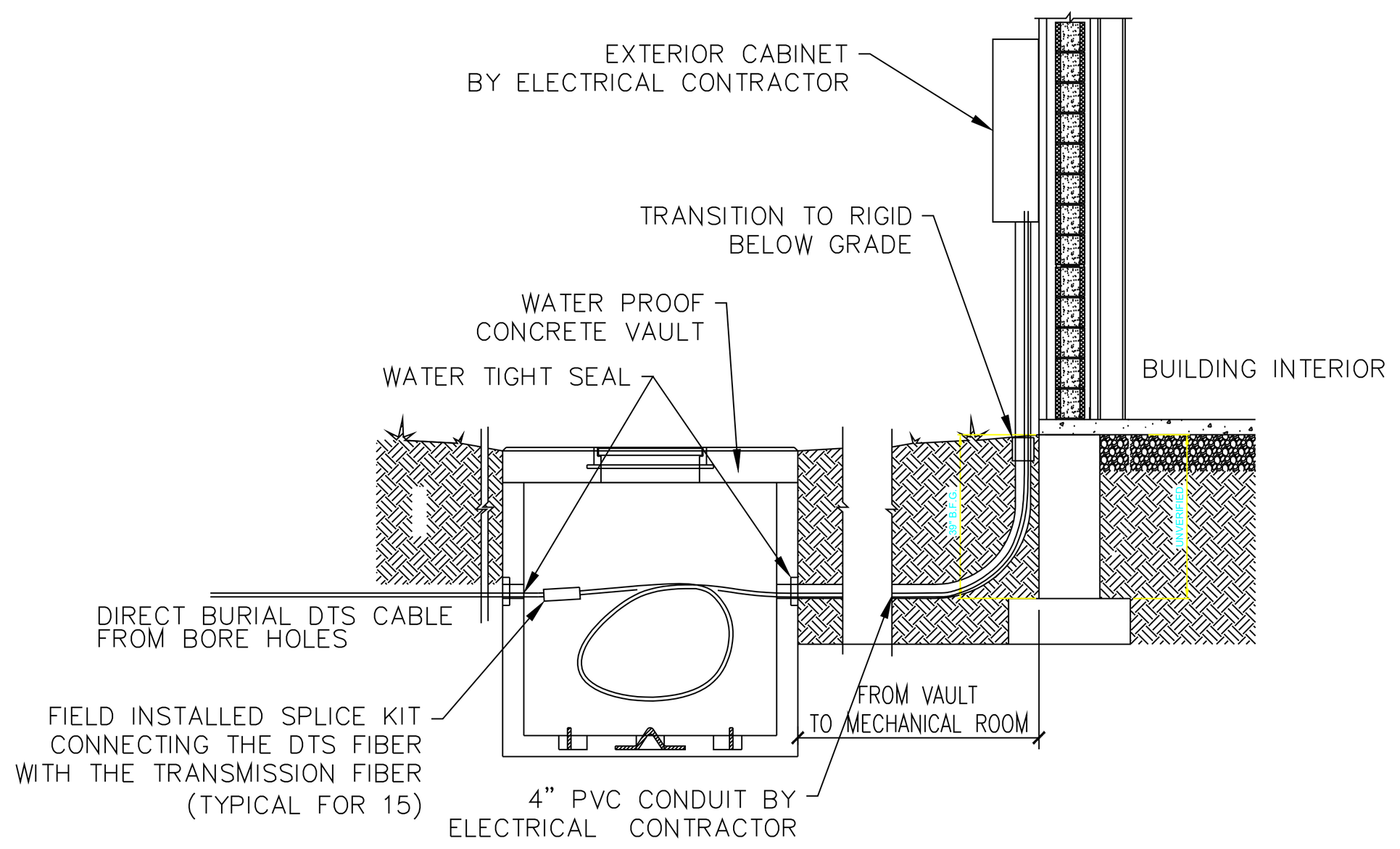
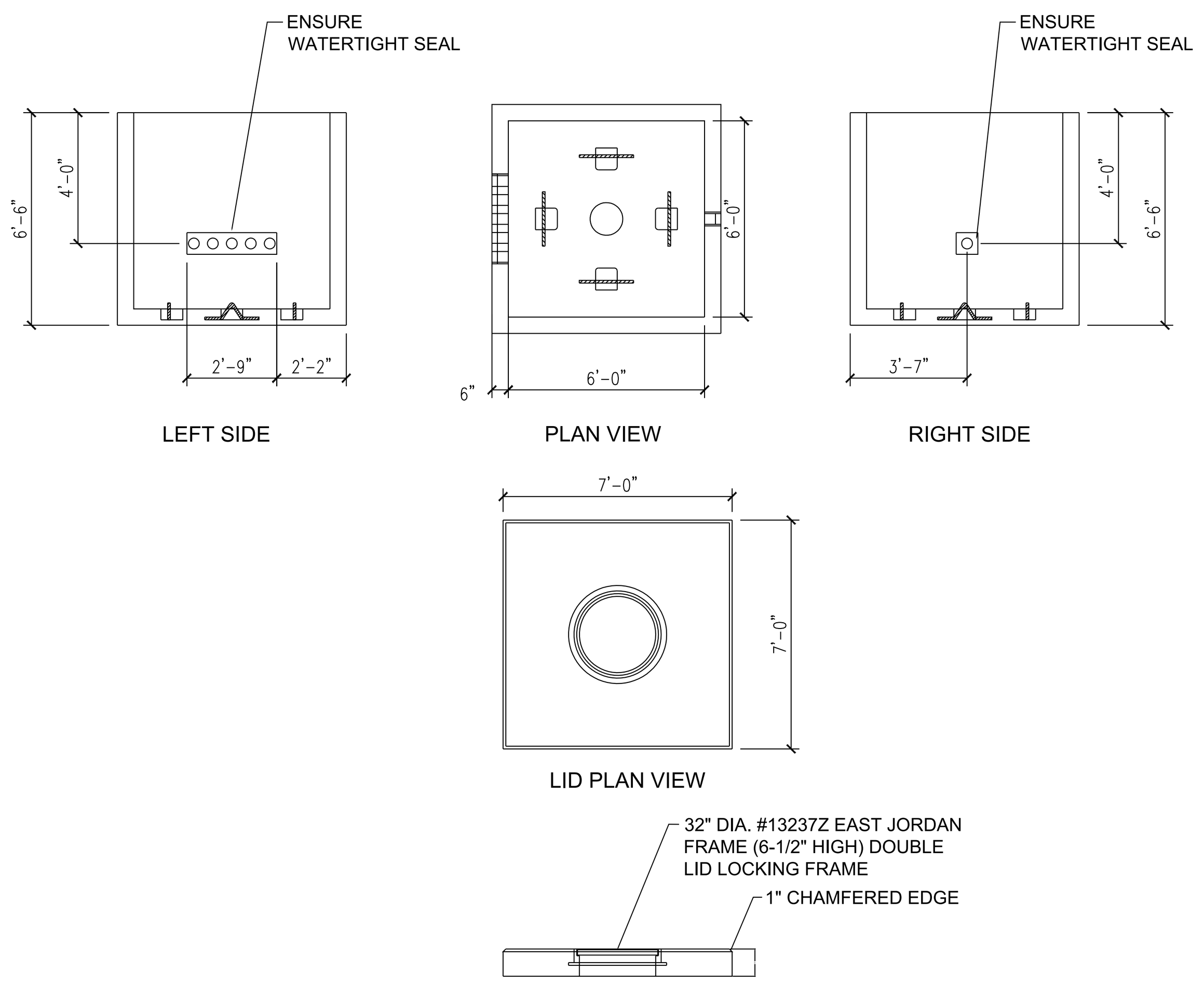
B. TOEVS	29 APR 2024	H.5.1
CHECKED BY	SCALE	
-	AS NOTED	



2 FIBER SENSING CABLE PIT
NOT TO SCALE



3 FIBER SENSING CABLE PIT
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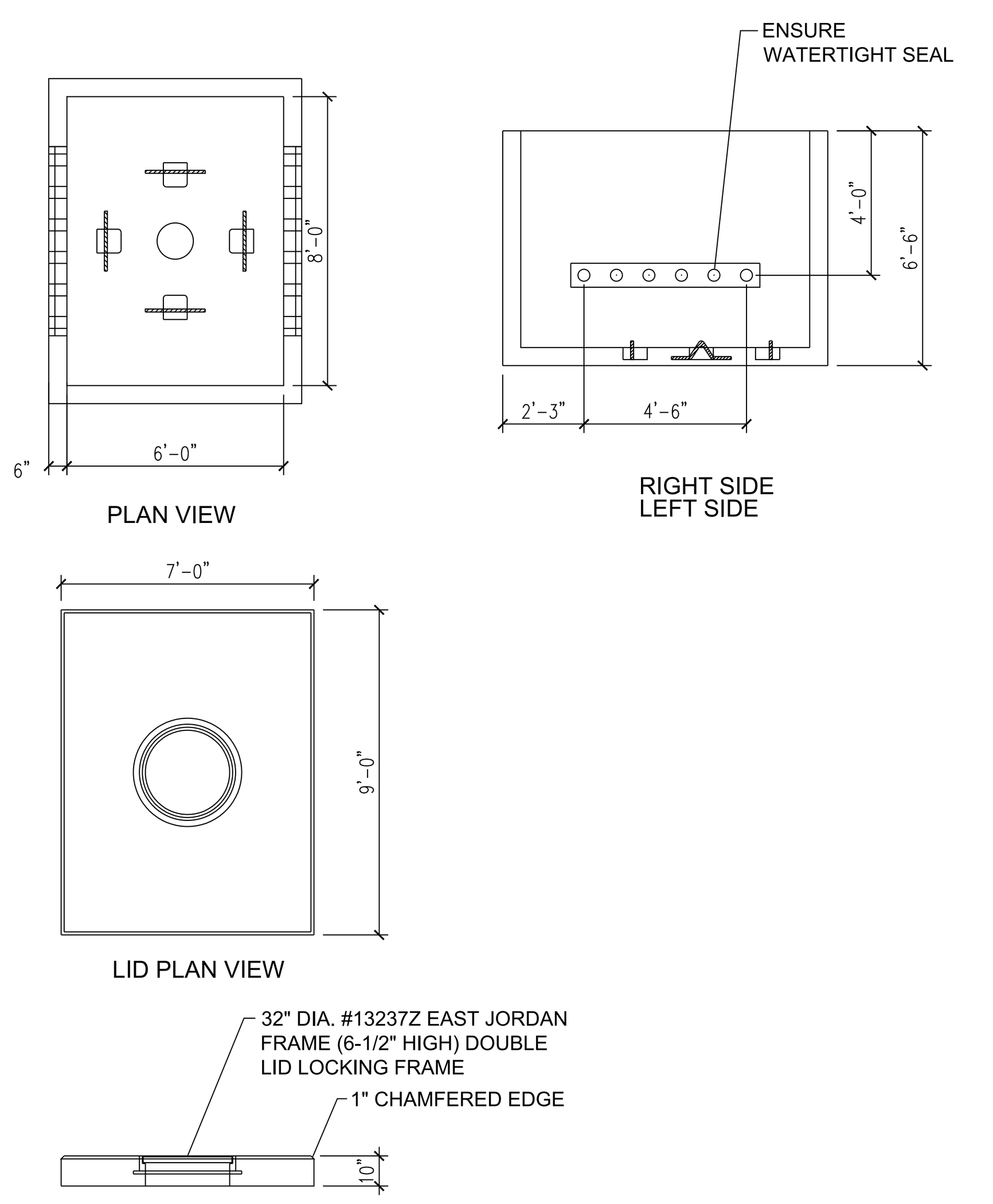
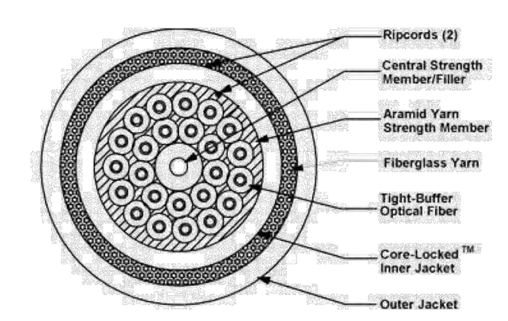


7 BORE HOLE MAIN - PIPING PIT
NOT TO SCALE

OCC OPTICAL CABLE CORPORATION
www.occfiber.com | 800-622-7711 | 540-265-0690

Part #: DX024CALS9KBF9

24 CHANNEL
D-Series Distribution - Field Broadcast Rodent Deterrent (FRP) Cables



Laser Ultra-Fox™ Fiber Performance	
Fiber Code	ALS
Industry Standard Designation	Laser Grade OM2 Bend Insensitive ISO/IEC 11801
Core/Cladding Diameter (µm)	50/125
Numerical Aperture	0.20
Wavelength (nm)	850/1310
Gigabit Ethernet Distance (m)	600/600
10-Gigabit Ethernet Distance (m)	82/300
Maximum Cabled Attenuation (dB/km)	3.5/1.5
Minimum Laser EMB Bandwidth (MHz-km)	510/500
Minimum OFL LED Bandwidth (MHz-km)	500/500
Primary Coating Diameter (µm)	245
Secondary Coating Diameter (µm)	900
Proof Test Level (kpsi)	100

Mechanical and Environmental	
Flex Resistance TIA-455-104	2,000 Cycles
Crush Resistance TIA-455-41	1,800 N/cm
Operating Temperature	-40°C to +85°C
Storage Temperature	-70°C to +85°C

Cable Characteristics	
Jacket Color	Black
Jacket Material	Polyurethane
Buffer Material	Hard Elastomeric
Cable Weight	156 kg/km (105 lbs/1000')
Cable Diameter	13.2 mm (0.52 in)

Installation and Operating Characteristics		
	Installation	Operating
Max Tensile Load	3,000 N * (670 lbs)	1,000 N (220 lbs)
Min Bend Radius	19.8 cm (7.8 in)	13.2 cm (5.2 in)

*Installation loads in excess of 2,700 N (600 lbs) are not recommended.

This specification is valid as of 7/12/2023. However, the specification is subject to change at any time.

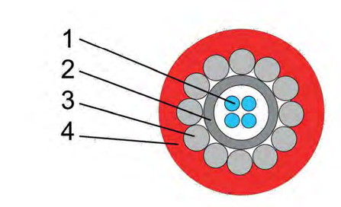
4 FIBER TRANSMISSION CABLE SPECIFICATION
NOT TO SCALE

BRUsens Temperature Sensing Cables

BRUsens DTS STL PA

3_50_1_001

LLK-BSTE 85°C 3.4 ...4.8 mm



Fiber optic temperature sensing cable, extra small, armored with stainless steel loose tube, stainless steel strength members and PA outer sheath, fast thermal response, for up to 8 fibers.

Description
- Compact design, low weight, high flexibility, small bending radius
- Loose tube, central, metal, gel filled, with up to 8 fibers, hermetically sealed, optimized fiber excess length
- Outer sheath, robust, abrasion resistant, halogen free
- High crush resistance
- High tensile strength
- Excellent rodent protection
- High chemical resistance
- Fast temperature response
- Easy deployment

Application
- Temperature
- Communication cable for sensing
- Temperature compensation for Brillouin
- Raman, Brillouin, FBG etc.
- Outdoors, harsh environment
- Direct burial in soil or in conduitsD

Remarks
- Standard fiber color code: 1 red, 2 green, 3 yellow, 4 blue, 5 white, 6 violet, 7 orange, 8 black
- For improved UV resistance, black cable sheath available upon request
- Other cable designs available
- Accessories such as mounting brackets, loops, fan-outs, splice enclosures, connectors, patch-panels, repair kits etc. are available
- Deployment training upon request

Technical data at 20°C

Type	Max. no. of fibres units	Cable ø mm	Weight kg/km	Max. crush resistance N/cm	Installation Max. tensile strength N	Operation Max. tensile strength N
1F	1	3.4	18	1200	800	600
2F	2	3.8	26	600	1500	1000
4F	4	3.8	26	600	1500	1000
8F	8	4.8	46	800	3000	2000

Type	with tensile load Min. bending radius mm	without tensile load Min. bending radius mm	Hydrostatic pressure resistance x 100 kPa (bar)
1F...8F	20xD	15xD	300

Optical fiber data (cabled) at 20°C

Fiber Type	Attenuation dB/km 850 nm	Attenuation dB/km 1300 / 1310 nm	Attenuation dB/km 1550 nm	Modal Bandwidth MHz x km 850 nm	Modal Bandwidth MHz x km 1300 nm
MMF 50/125	≤3.0	≤1.0	NA	700	500
MMF 62.5/125	≤3.5	≤1.0	NA	200	500
SMF	NA	≤0.36	≤0.25	NA	NA

Subject to change without notice
20191031-1

SOLIFOS FIBER OPTIC SYSTEMS Solifos AG
Phone +41 (0)56 461 8000 • www.solifos.com • contact@solifos.com

5 DTS FIBER SPECIFICATION
NOT TO SCALE

DTSX200 Distributed Temperature Sensor (DTS)

Specifications

DTSX200 Distributed Temperature Sensor

== Distance
Measurement distance range 1 to 6 km
Sampling resolution 10 cm to 1 m
Spatial resolution 1 m

== Temperature
Measurement temp. range -200 to 800 °C (depending on optical fiber characteristics)
Temperature resolution (°C , typical)

Time	1 km	3 km	6 km
10 min.	0.07	0.15	0.5

(Range)
(1 sigma, at 1m sampling resolution, Sensing fiber connected to DTSX200.)

== Optical conditions
Optical connector and fiber E2000/APC, 50/125GI optical fiber

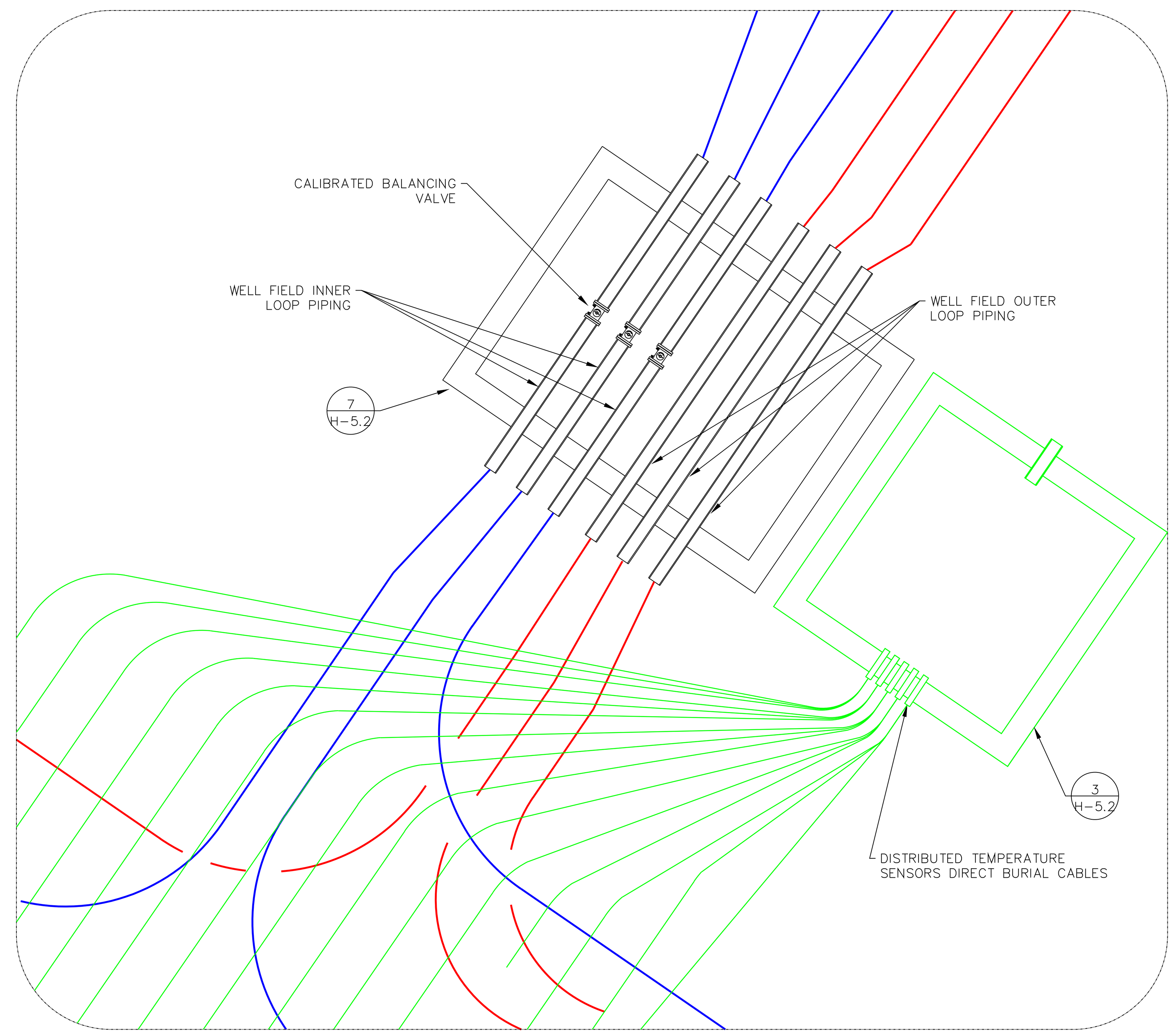
== Communication Interface
Modbus Serial, Modbus/TCP
LAN 10 BASE-T or 100 BASE-T

== General specifications
Operating temperature -40 to 65°C (-40 to 149°F)
Supply voltage selectable by Power Supply
Power consumption 10 W (All temperature range)
2 W (Power save mode)
Laser Safety IEC 60825-1 Class 1M,
FDA 21CFR Part 1040.10

Optical Switch module (option)
Channels 2ch DTOS2
4ch DTOS4
16ch DTOS16

== General specifications
Operating temperature
DTOS2 and DTOS4 -40 to 65°C (-40 to 149°F)
DTOS16 0 to 50°C (32 to 122°F)

6 DTS 16 CHANNEL MODULE SPECIFICATION
NOT TO SCALE



1 LARGE SCALE WELL FIELD PIT PIPING
SCALE: 1/2" = 1'-0"

FINAL DESIGN

NO.	DESCRIPTION	DATE

REVISIONS

Professional's Signature Date

COMMONWEALTH OF PENNSYLVANIA
DEPT. OF MILITARY & VETERAN'S AFFAIRS
ANNVILLE, PENNSYLVANIA 17003

DESIGN PROFESSIONALS:
OFFICE OF FACILITIES AND ENGINEERING
BUREAU OF DESIGN AND PROJECT MANAGEMENT
BLDG. 0-10, FORT INDIANTOWN GAP
ANNVILLE, LEBANON COUNTY, PENNSYLVANIA

PROJECT NO.: 420591(88821)

BLDG. 11-89 TISA
ENERGY UPGRADES
AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

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 BUREAU OF ENGINEERING AND ARCHITECTURE APPROVAL.

SITE DETAILS - MECHANICAL

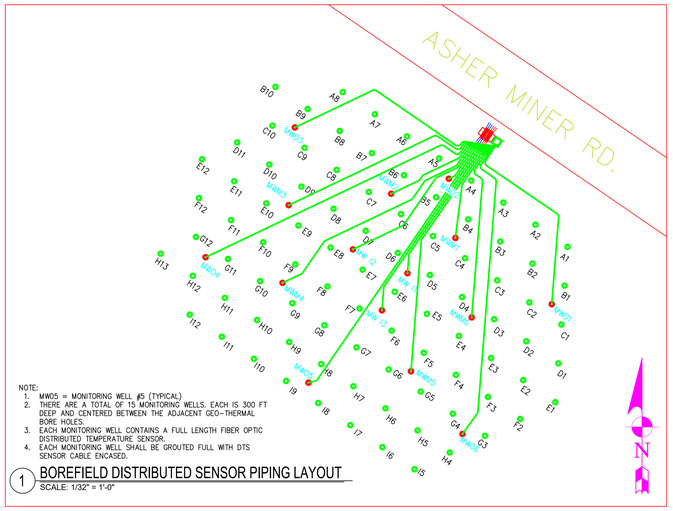
DRAWN BY	DATE	DRAWING NO.
B. TOEVS	29 APR 2024	H.5.2
CHECKED BY	SCALE	
-	AS NOTED	

WELL ID	NORTHING	EASTING	REMARKS	AS-BUILT NORTH.	AS-BUILT EAST.
A1	399713.16'	2293349.40'			
A2	399724.69'	2293332.65'			
A3	399736.22'	2293315.90'			
A4	399747.75'	2293299.14'	TEST WELL 7		
A5	399759.27'	2293282.39'	TEST WELL 8		
A6	399770.80'	2293265.64'			
A7	399782.33'	2293248.88'			
A8	399793.86'	2293232.13'			
B1	399692.89'	2293347.80'			
B2	399704.42'	2293331.04'			
B3	399715.95'	2293314.29'			
B4	399747.47'	2293297.54'	TEST WELL 6		
B5	399739.00'	2293290.78'	TEST WELL 11		
B6	399750.53'	2293264.03'	TEST WELL 9		
B7	399762.06'	2293247.28'			
B8	399773.60'	2293230.52'			
B9	399785.11'	2293213.77'			
B10	399796.64'	2293197.01'			
C1	399672.62'	2293346.19'			
C2	399684.14'	2293329.44'			
C3	399695.67'	2293312.68'			
C4	399707.20'	2293295.93'			
C5	399718.73'	2293279.18'	TEST WELL 5		
C6	399730.26'	2293262.42'	TEST WELL 10		
C7	399741.78'	2293245.67'			
C8	399753.31'	2293228.92'			
C9	399764.84'	2293212.16'			
C10	399776.37'	2293195.41'			
D1	399652.34'	2293344.58'			
D2	399663.87'	2293327.83'			
D3	399675.40'	2293311.08'			
D4	399686.93'	2293294.32'			
D5	399698.46'	2293277.57'			
D6	399709.98'	2293260.82'			
D7	399721.51'	2293244.06'			
D8	399733.04'	2293227.31'			
D9	399744.57'	2293210.56'			
D10	399756.10'	2293193.80'			
D11	399767.62'	2293177.05'			
E1	399632.07'	2293342.98'			
E2	399643.60'	2293326.22'			
E3	399655.13'	2293309.47'			
E4	399666.65'	2293292.72'			
E5	399678.18'	2293275.96'			
E6	399689.71'	2293259.21'			
E7	399701.24'	2293242.46'			
E8	399712.77'	2293225.70'			
E9	399724.29'	2293208.95'			
E10	399735.82'	2293192.19'			
E11	399747.35'	2293175.44'			
E12	399758.88'	2293158.69'	TEST WELL 4		
F2	399632.33'	2293324.62'			
F3	399634.85'	2293307.86'			
F4	399646.38'	2293291.11'			
F5	399657.91'	2293274.36'			
F6	399669.44'	2293257.60'			
F7	399680.97'	2293240.85'			
F8	399692.49'	2293224.10'			
F9	399704.02'	2293207.34'			
F10	399715.55'	2293190.59'			
F11	399727.08'	2293173.83'			
F12	399738.61'	2293157.08'			
G3	399614.58'	2293306.26'			
G4	399626.11'	2293289.50'			
G5	399637.64'	2293272.75'			
G6	399649.16'	2293256.00'			
G7	399660.69'	2293239.24'			
G8	399672.22'	2293222.49'			
G9	399683.75'	2293205.74'			
G10	399695.28'	2293188.98'			
G11	399706.80'	2293172.23'			
G12	399718.33'	2293155.47'			
H4	399605.84'	2293287.90'			
H5	399617.36'	2293271.14'			
H6	399628.89'	2293254.39'			
H7	399640.42'	2293237.64'			
H8	399651.95'	2293220.88'			
H9	399663.48'	2293204.13'			
H10	399675.00'	2293187.37'			
H11	399686.53'	2293170.62'			
H12	399698.06'	2293153.87'			
H13	399709.59'	2293137.11'	TEST WELL 3		
I5	399597.09'	2293269.54'			
I6	399608.62'	2293252.78'			
I7	399620.15'	2293236.03'			
I8	399631.67'	2293219.28'			
I9	399643.20'	2293202.52'			
I10	399654.73'	2293185.77'			
I11	399666.26'	2293169.01'	TEST WELL 1		
I12	399677.79'	2293152.26'	TEST WELL 2		
MWO-1	399683.22'	2293341.15'			
MWO-2	399748.67'	2293287.44'			
MWO-3	399775.44'	2293207.11'			
MWO-4	399707.73'	2293160.53'			
MWO-5	399642.27'	2293214.24'			
MWO-6	399615.51'	2293294.56'			
MWM-1	399717.80'	2293290.89'			
MWM-2	399740.86'	2293257.38'			
MWM-3	399734.89'	2293203.90'			
MWM-4	399694.35'	2293200.69'			
MWM-5	399648.24'	2293267.71'			
MWM-6	399676.33'	2293299.38'			
MWI-1	399699.38'	2293265.87'			
MWI-2	399711.84'	2293237.41'			
MWI-3	399680.04'	2293252.56'			

7 BORE HOLE GEOGRAPHIC COORDINATES TABLE
NO SCALE

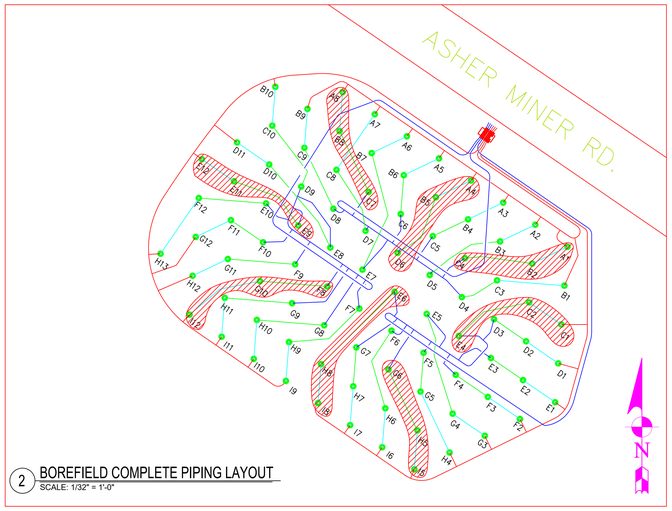
REMARKS

1. THE LISTED NORTHING AND EASTING COORDINATES HAVE BEEN PRECISELY IDENTIFIED. THE CONTRACTOR SHALL PROVIDE AS-BUILD LOCATIONS FOR ALL BORE HOLES IN THE SPACE PROVIDED IN THE ABOVE TABLE. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING PROFESSIONAL SERVICES TO INITIALLY LOCATE THE PRESCRIBED COORDINATES AND THE AS-BUILT COORDINATES. REFER TO CIVIL PLANS FOR BENCHMARK LOCATION.

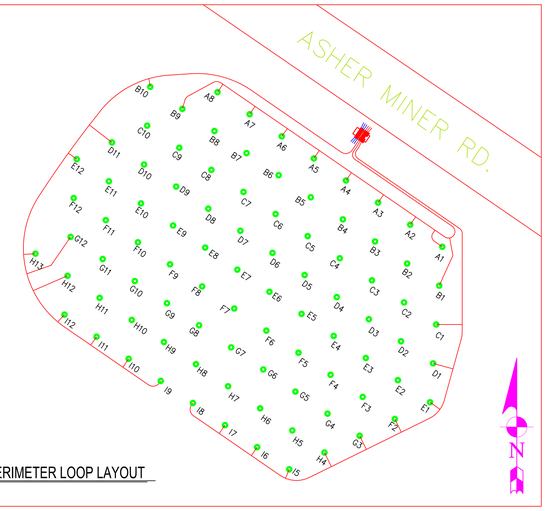


NOTE:
1. MWO5 = MONITORING WELL #5 (TYPICAL)
2. THERE ARE A TOTAL OF 15 MONITORING WELLS. EACH IS 300 FT DEEP AND CENTERED BETWEEN THE ADJACENT GEO-THERMAL BORE HOLES.
3. EACH MONITORING WELL CONTAINS A FULL LENGTH FIBER OPTIC DISTRIBUTED TEMPERATURE SENSOR.
4. EACH MONITORING WELL SHALL BE GROUTED FULL WITH DTS SENSOR CABLE ENCASED.

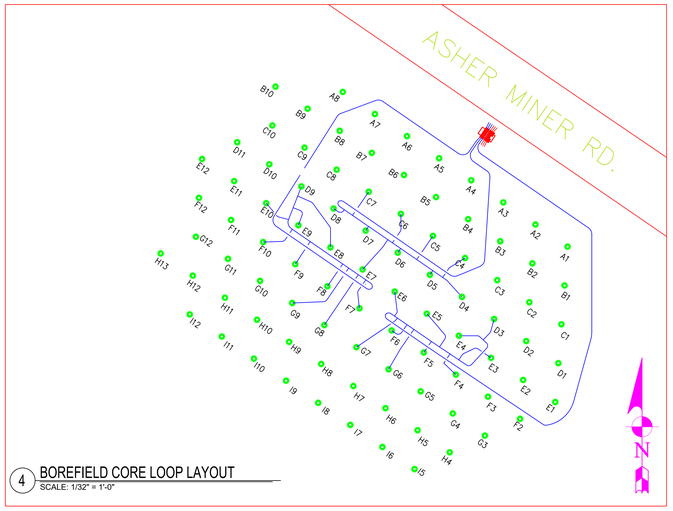
1 BOREFIELD DISTRIBUTED SENSOR PIPING LAYOUT
SCALE: 1/32" = 1'-0"



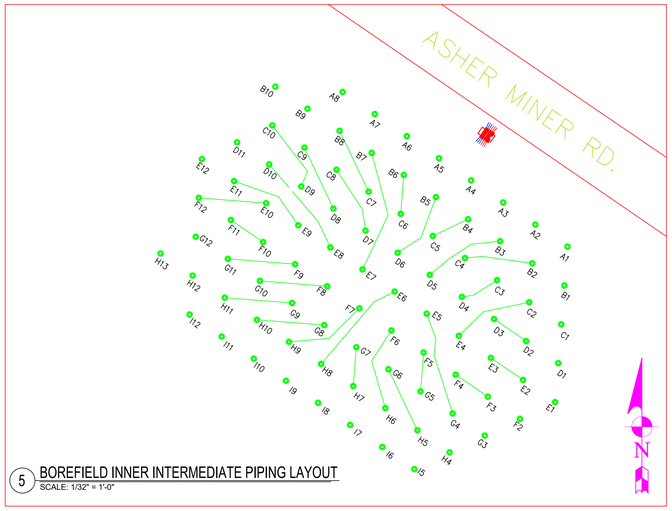
2 BOREFIELD COMPLETE PIPING LAYOUT
SCALE: 1/32" = 1'-0"



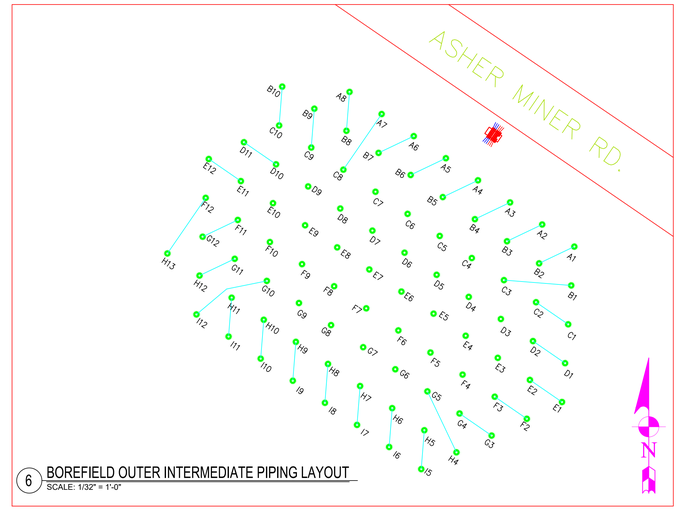
3 BOREFIELD PERIMETER LOOP LAYOUT
SCALE: 1/32" = 1'-0"



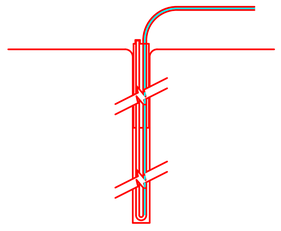
4 BOREFIELD CORE LOOP LAYOUT
SCALE: 1/32" = 1'-0"



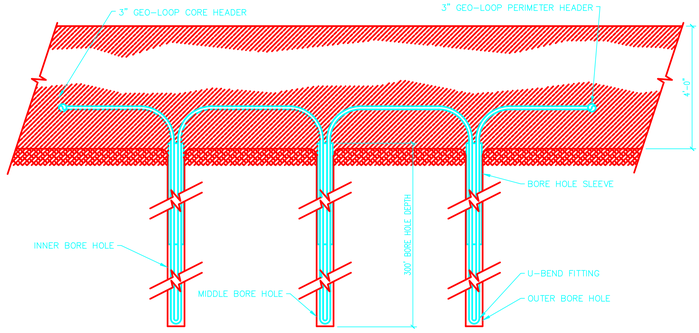
5 BOREFIELD INNER INTERMEDIATE PIPING LAYOUT
SCALE: 1/32" = 1'-0"



6 BOREFIELD OUTER INTERMEDIATE PIPING LAYOUT
SCALE: 1/32" = 1'-0"



8 DTS MONITORING WELL PROFILE
NOT TO SCALE



9 BORE HOLE PIPING PROFILE
NOT TO SCALE

OUTER LOOP #1		B1	A1	A2	A3	A4	A5	A6	A7	A8	B9
	CONNECTION #1-1	B1-C3	A1-B2	A2-B3	A3-B4	A4-B5	A5-B6	A6-B7	A7-C8	A8-B8	B9-C9
	CONNECTION #1-2	C3-D4	B2-C4	B3-D5	B4-C5	B5-D6	B6-C6	B7-E7	C8-D7	B8-C7	C9-D8
INNER LOOP #1		D4	C4	D5	C5	D6	C6	E7	D7	C7	D8
OUTER LOOP #2		C1	D1	E1	F2	G3	H4	I5	I6	I7	I8
	CONNECTION #2-1	C1-C2	D1-D2	E1-E2	F2-F3	G3-G4	H4-G5	I5-H5	I6-H6	I7-H7	I8-H8
	CONNECTION #2-2	C2-E4	D2-D3	E2-E3	F3-F4	G4-E5	G5-F5	H5-G6	H6-F6	H7-G7	H8-E6
INNER LOOP #2		E4	D3	E3	F4	E5	F5	G6	F6	G7	E6
OUTER LOOP #3		B10	D11	E12	H13	G12	H12	I12	I11	I10	I9
	CONNECTION #3-1	B10-C10	D11-D10	E12-E11	H13-F12	G12-F11	H12-G11	I12-G10	I11-H11	I10-H10	I9-H9
	CONNECTION #3-2	C10-D9	D10-E8	E11-E9	F12-E10	F11-F10	G11-F9	G10-F8	H11-G9	H10-G8	H9-F7
INNER LOOP #3		D9	E8	E9	E10	F10	F9	F8	G9	G8	F7

REMARKS

1. ROUT CONNECTION PIPING FROM BORE HOLE TO BORE HOLE AS INDICATED IN THIS TABLE.

BASE BID #2 — BASE BID #2 IS INDICATED AS ADDITIONAL BORE HOLES TO BE ADDED TO THE SCOPE OF WORK. THE HATCHING DISPLAYED ON THIS SCHEDULE AND ON THE DETAIL (2-BOREFIELD COMPLETE PIPING LAYOUT) ABOVE, SHOWS THE GROUPS OF BORE HOLES AND PIPING TO BE ADDED.

10 BORE HOLE CONNECTION PIPE ROUTING TABLE
NOT TO SCALE

FINAL DESIGN

NO.	DESCRIPTION	DATE
	REVISIONS	

Professional's Signature Date

COMMONWEALTH OF PENNSYLVANIA
DEPT. OF MILITARY & VETERAN'S AFFAIRS
ANNVILLE, PENNSYLVANIA 17003

DESIGN PROFESSIONALS:
OFFICE OF FACILITIES AND ENGINEERING
BUREAU OF DESIGN AND PROJECT MANAGEMENT
BLDG. 0-10, FORT INDIANTOWN GAP
ANNVILLE, LEBANON COUNTY, PENNSYLVANIA

PROJECT NO.: 420591(88821)

BLDG. 11-89 TISA ENERGY UPGRADES

AREA 11, FT INDIANTOWN GAP, EAST HANOVER TWP
LEBANON COUNTY, PENNSYLVANIA

WELL FIELD LAYOUT

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 BUREAU OF ENGINEERING AND ARCHITECTURE APPROVAL.

DRAWN BY	DATE	DRAWING NO.
B. TOEVS	29 APR 2024	H.5.3
CHECKED BY	SCALE	
-	AS NOTED	