IF SHEET IS LESS THAN 30"x42" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY

ABBREVIATIONS

A	AIR, AMP
ABV	ABOVE
AFF	ABOVE FINISHED FLOOR
AMB	AMBIENT
ATM	ATMOSPHERE
AVG	AVERAGE
BF	BLIND FLANGE
BFF	BELOW FINISHED FLOOR
BHD	BOTTOM HORIZONTAL DISCHARGE
BHP	BRAKE HORSEPOWER
BLW	BELOW
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STEEL
BTUH	BRITISH THERMAL UNIT PER HOUR
C	COMMON
CAP	CAPACITY
CC	COOLING COIL
CHLR	CHILLER
CHP	CHILLED WATER PUMP
CLG	CEILING, COOLING
CNTFGL	CENTRIFUGAL
CNDS	CONDENSATE
CO	CLEANOUT
COND	CONDENSER
CONT	CONTINUE, CONTINUATION
CONTR	CONTRACTOR
COP	COEFFICIENT OF PERFORMANCE
CP	CIRCULATING PUMP, CONDENSATE PUMP
CPRSR	CONDENSATE RECEIVER AND PUMPS
CU FT	CUBIC FOOT
Cv	VALVE SIZE (GPM AT 1 PSID)
CWP	CONDENSER WATER PUMP
dB	DECIBLES
DB	DRY BULB
DBD	DOWN BURST DISCHARGE
DCVA	DOUBLE CHECK VALVE ASSEMBLY
DDC	DIRECT DIGITAL CONTROL
DIA	DIAMETER
DISCH	DISCHARGE
DN	DOWN
DWG	DRAWING
(E)	EXISTING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EDB	ENTERING DRY BULB TEMPERATURE
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EFF	EFFICIENCY
EL	ELEVATION
ELEC	ELECTRICAL
EWB	ENTERING WET BULB TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXP	EXPANSION
EXT	EXTERIOR/EXTERNAL
(F)	FUTURE
F	FAHRENHEIT
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FHC	FIRE HOSE CABINET
FLR	FLOOR
FLTR	FILTER
FOIC	FURNISHED BY OWNER, INSTALLED BY CONTRACTOR
FPF	FINS PER FOOT
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FS	FLOOR SINK
FT	FEET
FV	FACE VELOCITY
GA	GAGE
GAL	GALLONS
GALV	GALVANIZED
GCO	GRADE CLEANOUT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
HB	HOSE BIBB
HD	HEAD
HMI	HUMAN MACHINE INTERFACE
HOA	HAND-OFF AUTOMATIC
HP	HORSEPOWER, HEAT PUMP
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCHES
INT	INTERIOR
IPLV	INTEGRATED PART LOAD VALVE
IW	INDIRECT WASTE
KW	KILOWATT
KWH	KILOWATT HOUR
LAT	LEAVING AIR TEMPERATURE
LB	POUND
LDB	LEAVING DRY BULB TEMPERATURE
LS	LOCKSHIELD
LWB	LEAVING WET BULB TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MCA	MINIMUM CIRCUIT AMPACITY
MECH	MECHANICAL
MFR	MANUFACTURER
MIN	MINIMUM
MOD	MODULATING
MTD	MOUNTED
MTR	MOTOR
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NUMBER, NORMALLY OPEN
NPLV	NON-STANDARD PART LOAD VALUE
NTS	NOT TO SCALE
OA	OUTDOOR AIR
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OPNG	OPENING
OV	OUTLET VELOCITY
PD	PRESSURE DROP
POC	POINT OF CONNECTION
PP	POLYPROPYLENE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GUAGE
PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
PVC	POLYVINYL CHLORIDE
PRV	PRESSURE REDUCING VALVE
RH	RELATIVE HUMIDITY
RIO	ROUGH-IN-ONLY
RPBA	REDUCED PRESSURE BACKFLOW ASSEMBLY
RPM	REVOLUTIONS PER MINUTE
SEER	SEASONAL ENERGY EFFICIENCY RATING
SP	STATIC PRESSURE, SUMP PUMP
SS	STAINLESS STEEL, SANITARY SEWER
S/S	START/STOP
STRUC	STRUCTURAL
THD	TOP HORIZONTAL DISCHARGE
TOP	TOP OF PIPE
TOS	TOP OF STEEL
TP	TOTAL PRESSURE
TYP	TYPICAL
V	VENT, VOLT
VA	VALVE
VP	VELOCITY PRESSURE
VSD	VARIABLE SPEED DRIVE
VTR	VENT THRU ROOF
VV	VARIABLE VOLUME
W	WASTE, WATT
WB	WET BULB
WCO	WALL CLEANOUT
WG	WATER GAGE
WSEC	WASHINGTON STATE ENERGY CODE

GENERAL NOTES:

1. THE FOLLOWING NOTES APPLY TO ALL MECHANICAL DRAWINGS. ADDITIONAL NOTES MAY BE INDICATED ON INDIVIDUAL DRAWINGS.
2. DRAWINGS INDICATE CONNECTIONS FOR EQUIPMENT TO BE FURNISHED BY THE OWNER OR AS THE WORK OF OTHER TRADES. VERIFY LOCATION OF EQUIPMENT, ROUGH-IN LOCATIONS, AND TYPE OF CONNECTIONS PRIOR TO PREPARATION OF SHOP DRAWINGS OR SUBMITTALS, AND PRIOR TO INSTALLATION OF SERVICE CONNECTIONS. DO NOT INTERFERE WITH ACCESS FOR MAINTENANCE AND REMOVAL OR REPLACEMENT OF EQUIPMENT.
3. COORDINATE THE PHASING AND INSTALLATION OF NEW WORK WITH THE WORK OF ALL OTHER TRADES. BEAR THE TOTAL EXPENSE FOR ANY ADDITIONAL WORK WHICH MAY BE CAUSED BY IMPROPER SEQUENCING OF CONSTRUCTION ACTIVITIES.
4. LOCATE MECHANICAL DEVICES (E.G. TEMPERATURE AND HUMIDITY SENSORS, PANELS, AND SWITCHES), SO THAT THEY DO NOT CONFLICT WITH GENERAL CONSTRUCTION (E.G. WAINSCOT, DOOR HARDWARE), ELECTRICAL DEVICES (E.G. LIGHT SWITCHES, SPEAKERS, OUTLETS), AND THE WORK OF OTHER TRADES.
5. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR GENERAL CONSTRUCTION INCLUDING, BUT NOT LIMITED TO, PENETRATION DETAILS, FLASHING AND SEALING DETAILS, AND OTHER ELEMENTS OF GENERAL CONSTRUCTION. COORDINATE THE SIZE AND LOCATION OF EQUIPMENT HOUSEKEEPING PADS WITH APPROVED EQUIPMENT SO THAT HOUSEKEEPING PADS ARE NOMINALLY 4" HIGH UNLESS INDICATED OTHERWISE, AND EXTEND 6" MINIMUM IN ALL DIRECTIONS FROM THE HORIZONTAL LIMITS OF THE EQUIPMENT WHICH THEY SUPPORT.
6. MECHANICAL DRAWINGS SHOW APPROXIMATE LOCATIONS FOR FLOOR DRAINS. IN MECHANICAL EQUIPMENT AREAS, COORDINATE THE LOCATIONS OF FLOOR DRAINS WITH THE ACTUAL COORDINATED HOUSEKEEPING PAD LOCATIONS AND MECHANICAL EQUIPMENT DRAIN LOCATIONS. MECHANICAL EQUIPMENT SUPPORTS SHALL CONFORM TO SEISMIC RESTRAINT REQUIREMENTS AND SHALL MEET ALL SEISMIC DESIGN AND CODE REQUIREMENTS.
7. COORDINATE EQUIPMENT POWER CONNECTION REQUIREMENTS AND ELECTRICAL CHARACTERISTICS WITH ELECTRICAL DRAWINGS AND CONNECTION REQUIREMENTS. COORDINATE VARIATION IN ELECTRICAL CHARACTERISTICS FROM SCHEDULED VALUES. CHANGES TO ELECTRICAL CHARACTERISTICS (E.G. VOLTAGE, AMPS, HORSEPOWER, ETC.) SHALL BE SUBJECT TO APPROVAL. BEAR THE TOTAL EXPENSE FOR REQUIRED REVISION TO THE ELECTRICAL SCOPE OF WORK CAUSED BY VARIATION FROM THE SCHEDULED REQUIREMENTS.
8. EQUIPMENT SHORT CIRCUIT CURRENT RATINGS (SCCR) SHALL BE NOT LESS THAN THE INTERRUPTING RATING OF THE BRANCH CIRCUIT OVER CURRENT PROTECTIVE DEVICE SUPPLYING POWER TO THE EQUIPMENT. REFER TO ELECTRICAL SCHEDULES FOR BRANCH CIRCUIT OVER CURRENT DEVICE INTERRUPTING RATINGS.
9. COORDINATE THE LOCATION OF WORK TO PROVIDE CLEARANCES OVER LIGHTING FIXTURES AND OTHER CEILING MOUNTED DEVICES AS REQUIRED TO ALLOW FOR REMOVAL AND MAINTENANCE ACCESS.
10. DO NOT RESTRICT ACCESS TO ELECTRICAL CABLE TRAYS. AT A MINIMUM, ALLOW 18" CLEAR ON ONE SIDE OF CABLE TRAYS UP TO AN ELEVATION OF 6" ABOVE THE TOP OF THE CABLE TRAY. MAINTAIN 12" MINIMUM CLEARANCE OVER TOP OF CABLE TRAYS EXCEPT WHERE PIPING OR CONDUIT CROSS PERPENDICULAR TO CABLE TRAY. THIS CLEARANCE MAY BE REDUCED TO 6" OVER A DISTANCE OF NO MORE THAN 36" ALONG THE CABLE TRAY. PROVIDE NO LESS THAN 36" BETWEEN AREAS OF REDUCED CLEARANCE AND MAINTAIN INDICATED ACCESS ON THE SAME SIDE OF THE CABLE TRAY EXCEPT WHERE OTHERWISE APPROVED. DO NOT CONNECT OTHER TRADE ITEMS TO CABLE TRAYS, CABLE TRAY SUPPORTS OR CABLE TRAY SEISMIC RESTRAINTS.
11. PROVIDE SUPPORTS AND SEISMIC RESTRAINTS FOR PIPES AND EQUIPMENT AS SPECIFIED, AS REQUIRED, AND AS SHOWN ON THE DRAWINGS. IF REQUIRED FOR INSTALLATION OF PIPES AND EQUIPMENT, DESIGN AND PROVIDE ADDITIONAL STRUCTURAL MEMBERS BETWEEN COLUMNS, JOISTS, AND STRUCTURAL FRAME TO MEET SUPPORT AND SEISMIC RESTRAINT REACTIONS (FORCES, MOMENTS, DEFLECTIONS). STRUCTURAL MEMBERS AND ANCHORAGES SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE IN WHICH THE PROJECT IS LOCATED. REFER TO STRUCTURAL DRAWINGS FOR DESIGN CRITERIA. SUBMIT STRUCTURAL MEMBER SHOP DRAWINGS AND CALCULATIONS FOR REVIEW. STRUCTURAL MEMBERS, BOLTS, AND WELDS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS SHOWN ON THE STRUCTURAL DRAWINGS AND INDICATED IN THE SPECIFICATIONS. NO WELDING, BOLTING, OR OTHER MEANS OF ATTACHMENT TO THE STRUCTURAL MEMBERS SHALL BE MADE ON PORTIONS OF STRUCTURAL MEMBERS AT OR NEAR CONNECTIONS BETWEEN STRUCTURAL MEMBERS ON ANY ELEMENTS DESIGNATED IN THE SEISMIC LOAD RESISTING SYSTEMS UNLESS APPROVED BY THE STRUCTURAL ENGINEER. SUPPORTS SHALL NOT INDUCE TORSIONAL LOADS INTO SUPPORTING STRUCTURAL FRAMING.
12. DO NOT CORE DRILL OR DRILL THROUGH BEAMS, COLUMNS OR SHEAR WALLS UNLESS INDICATED ON STRUCTURAL DRAWINGS OR AS APPROVED BY THE STRUCTURAL ENGINEER.
13. PROVIDE PIPE SLEEVES AND PENETRATION SEALS AS REQUIRED FOR THE INSTALLATION OF PIPING SYSTEMS. REFER TO SPECIFICATIONS FOR REQUIREMENTS.
14. COORDINATE THE LAYOUT OF EQUIPMENT, PIPING, AND APPURTENANCES SO THAT IT FITS INTO THE SPACE ALLOTTED. PROVIDE SERVICE ACCESS AND CLEARANCES AS INDICATED ON DRAWINGS, AS REQUIRED BY CODES, AND AS RECOMMENDED BY THE MANUFACTURER FOR THE INSTALLATION, REMOVAL, ENTRY, SERVICING, AND MAINTENANCE OF EQUIPMENT. PRIOR TO INSTALLATION, COORDINATE LAYOUT OF EQUIPMENT, PIPING, AND APPURTENANCES WITH ALL OTHER TRADES TO AVOID BLOCKING SERVICE OR REPLACEMENT ACCESS FOR NEW AND EXISTING EQUIPMENT AND EQUIPMENT INSTALLED BY OTHERS.
15. DRAWINGS ARE DIAGRAMMATIC AND SHOW APPROXIMATE LOCATIONS OF EQUIPMENT, PIPING, AND APPURTENANCES. DRAWINGS DO NOT SHOW REQUIRED TRANSITIONS, OFFSETS, FITTINGS, AND DEVICES. REFER TO DETAILS, DIAGRAMS, AND SPECIFICATIONS FOR REQUIRED SYSTEM APPURTENANCES, CONTROL DEVICES, ETC. INSTALL DEVICES IN ACCORDANCE WITH DEVICE MANUFACTURER RECOMMENDATIONS. CAREFULLY INVESTIGATE ELEMENTS OF CONSTRUCTION THAT COULD AFFECT THE WORK TO BE PERFORMED AND ARRANGE NEW WORK ACCORDINGLY. PREPARE COORDINATION DRAWINGS FOR NEW WORK, WHICH ARE COORDINATED WITH THE APPROVED AND INSTALLED WORK OF OTHER TRADES. PROVIDE REQUIRED OFFSETS, FITTINGS, TRANSITIONS, SUPPORTS AND OTHER APPURTENANCES AS REQUIRED. BEAR THE TOTAL EXPENSE OF RE-WORK THAT IS CAUSED BY FAILURE TO COORDINATE.
16. PROVIDE MAXIMUM HEADROOM AND CLEARANCE BELOW PIPING AND EQUIPMENT AND ASSOCIATED SUPPORTS AND RESTRAINTS. UNLESS OTHERWISE INDICATED, INSTALL TIGHT TO STRUCTURAL SYSTEMS ABOVE. WHERE WALL MOUNTED, INSTALL AS CLOSE TO WALL AS POSSIBLE. PROVIDE ADDITIONAL FITTINGS AND OFFSETS AS REQUIRED.
17. REFER TO EQUIPMENT SCHEDULES FOR DESIGN CAPACITIES. SCHEDULED VALUES SHALL BE CONSIDERED DESIGN CAPACITIES. PROVIDE EQUIPMENT WHICH MEETS OR EXCEEDS THE SCHEDULED VALUES. MARK THE CONTRACT DRAWING EQUIPMENT SCHEDULES TO INDICATE THE MANUFACTURER, MODEL AND CAPACITY OF THE ACTUAL APPROVED EQUIPMENT PROVIDED AND SUBMIT THIS INFORMATION WITH RECORD DRAWINGS AS PART OF PROJECT CLOSEOUT.
18. TO ENHANCE THE CLARITY OF PLAN DRAWINGS, AND WHERE NOT NECESSARY TO DESCRIBE THE REQUIRED SIZE, INDIVIDUAL SEGMENTS OF PIPE BETWEEN CONNECTIONS MAY BE SHOWN WITHOUT A SIZE INDICATED. WHERE SIZE IS NOT SHOWN ON PLANS, THAT SEGMENT SHALL BE THE SAME SIZE AS THE NEXT UPSTREAM SEGMENT WITH A SIZE INDICATED.
19. WHERE NOT INDICATED ON PLANS, REFER TO EQUIPMENT SCHEDULES AND DETAILS FOR INLET AND OUTLET PIPE SIZES. WHERE INDICATED ON PLANS, PLAN SIZES SHALL TAKE PRECEDENCE.
20. INSTALL DRAINS AT ALL LOW POINTS IN PIPING, INCLUDING ANY TRAPPED PORTIONS OF PIPING. PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS IN CLOSED LOOP (MECHANICAL) PIPING SYSTEMS. IN GENERAL, THESE DEVICES ARE NOT INDICATED ON DRAWINGS. WHERE AUTOMATIC AIR VENTS ARE INDICATED ON DRAWINGS, EXTEND AUTOMATIC AIR VENT (AAV) DISCHARGE TO NEAREST FLOOR DRAIN USING INDIRECT DRAIN PIPING OF SAME SIZE AS AAV DISCHARGE. INDICATE THE ACTUAL LOCATION OF FIELD-LOCATED DRAINS, VENTS AND DRAIN PIPING ON THE RECORD DRAWINGS.
21. INSULATE ALL CHILLED WATER AND CONDENSER WATER PIPING WITH 1-INCH CLOSED CELL FOAM IN ACCORDANCE WITH TABLE C403.10.3 OF THE 2018 WASHINGTON STATE ENERGY CODE (WSEC).
22. THE FOLLOWING IS A LIST OF DEFERRED SUBMITTALS ITEMS. DO NOT INSTALL DEFERRED SUBMITTAL ITEMS UNTIL THE DEFERRED SUBMITTAL DOCUMENTS HAVE BEEN APPROVED BY THE BUILDING OFFICIAL.

    A. SEISMIC AND WIND RESTRAINT

22. CONTROLS CONTRACTOR TO PROVIDE UPDATED SEQUENCE OF OPERATION TO INCORPORATE NEW EQUIPMENT. DIRECT DIGITAL CONTROLS SEQUENCES SHALL COMPLY WITH THE REQUIREMENTS OF THE 2018 WSEC FOR WATERSIDE ECONOMIZER AND VARIABLE SPEED FAN/PUMP CONTROL.
23. PROVIDE COMMISSIONING IN ACCORDANCE WITH THE REQUIREMENTS OF THE 2018 WSEC.
24. REFER TO THE WSEC COMPLIANCE FORMS FOR ADDITIONAL MECHANICAL REQUIREMENTS.

GENERAL SYMBOLS

- LIGHT LINE INDICATES BACKGROUND
- LIGHT LINE INDICATES EXISTING WORK
- HEAVY LINE INDICATES NEW WORK
- MATCHLINE OR PROPERTY LINE
- FUTURE WORK
- POINT OF CONNECTION
- SHEET NOTE

REFERENCE CALLOUTS

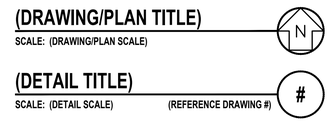
DETAIL IDENTIFICATION

- NUMBER INDICATES DETAIL
- SHEET NUMBER WHERE DETAIL IS DRAWN

DRAWING REVISION DESIGNATOR

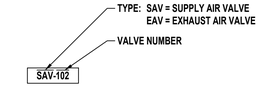
- REVISION NO.

PLAN AND DETAIL TITLE CALLOUT



EQUIPMENT CALLOUTS

LABORATORY SUPPLY / EXHAUST AIR VALVE CALLOUTS



PIPING DIAGRAMS

- PIPING AIRFLOW
- PNEUMATIC CONTROL AIR
- CAPILLARY
- ELECTRICAL CONNECTION
- XXXX FLOW CONTINUATION ARROW
- COMPLEX INTERLOCK (ELEC., PNEUMATIC, ETC.)
- CONNECTION TO CENTRAL MONITORING AND CONTROL SYSTEM (CMCS)
- FLEXIBLE TEMPERATURE PROBE
- CENTER LINE
- M ELECTRIC MOTOR/STARTER ASSEMBLY
- HANDWHEEL / PNEUMATIC OPERATOR (VALVES AND DAMPERS)
- M ELECTRIC MOTOR OPERATOR
- S SOLENOID OPERATOR
- P-TRAP
- FILTER
- VFD VARIABLE FREQUENCY DRIVE
- PRESSURE / TEMPERATURE TAP
- XX COIL
- PUMP

PIPING SUPPORTS

- PIPE ANCHOR (PA)
- PIPE GUIDE (PG)
- PIPE HANGER (PH)
- PIPE ROLLER (PR)
- PIPE SLIDE (PS)
- FLOOR STANCHION SUPPORT (FSS)
- RPS ROOF PIPE SUPPORT
- SLOPE DIRECTION

SITE WORK

- THRUST BLOCK
- FIRE HYDRANT
- SHUT-OFF VALVE (SITE)
- ELEVATION SYMBOL

PIPING VALVES / FITTINGS

- PRESSURE RELIEF VALVE
- GATE VALVE
- GLOBE VALVE
- CHECK VALVE, SWING TYPE
- CHECK VALVE, NON-SLAM TYPE
- BALL VALVE
- BUTTERFLY VALVE
- ANGLE BALANCING VALVE
- COMBINATION SHUT-OFF / BALANCING / FLOW MEASURING VALVE
- PLUG BALANCING VALVE
- NEEDLE VALVE
- PRESSURE REDUCING VALVE, PILOT OPERATED
- PRESSURE REDUCING VALVE, SPRING OPERATED
- AUTOMATIC CONTROL VALVE - TWO WAY (PNEUMATIC OPERATOR SHOWN)
- M AUTOMATIC CONTROL VALVE - THREE WAY GLOBE (ELECTRIC OPERATOR SHOWN)
- M AUTOMATIC CONTROL VALVE - TWO WAY GLOBE ELECTRIC OPERATOR SHOWN)
- M AUTOMATIC CONTROL VALVE - TWO WAY BUTTERFLY ELECTRIC OPERATOR SHOWN)
- S SOLENOID VALVE (SHOWN WITH ELECTRIC MOTOR OPERATOR)
- RPBA
- DCVA VALVE ASSEMBLY
- REDUCER, ECCENTRIC, STRAIGHT INVERT
- REDUCER, ECCENTRIC, STRAIGHT CROWN
- REDUCER, CONCENTRIC
- WYE STRAINER
- WYE STRAINER WITH CAPPED HOSE END BLOWDOWN VALVE
- FIXED AIR GAP
- SD SUCTION DIFFUSER
- 300 VENTURI FLOW MEASURING ELEMENT (NO. INDICATES GPM)
- 5/2-32 AUTOMATIC FLOW CONTROL VALVE (NUMBERS INDICATE GPM & PSID SPRING RANGE)
- FLEXIBLE PIPE CONNECTION
- HOSE
- AUTOMATIC AIR VENT (AAV)
- MANUAL AIR VENT (MAV)
- PRESSURE GAGE
- THERMOMETER
- QUICK DISCONNECT
- PIPE DOWN
- PIPE UP
- TEE DOWN
- TEE
- SCO SURFACE CLEANOUT
- FCO FLOOR CLEANOUT
- CO CLEANOUT
- WCO WALL CLEANOUT
- PIPE CAP
- PIPE PLUG
- BLIND FLANGE
- FLANGE
- UNION
- THREADOLET OR WELDOLET
- THERMOWELL

PIPING TYPES

- CWR CONDENSER WATER RETURN
- CWS CONDENSER WATER SUPPLY
- CHR CHILLED WATER RETURN
- CHS CHILLED WATER SUPPLY
- HWS HEATING WATER SUPPLY
- HWR HEATING WATER RETURN
- D DRAIN (INDIRECT)
- SANITARY WASTE
- SANITARY VENT
- COLD WATER (CW)
- NPW NON-POTABLE WATER
- CF CHEMICAL FEED
- RV REFRIGERANT VENT

CONTROLS

- DB DRY BULB TEMPERATURE SENSOR
- DP DEW POINT TEMPERATURE SENSOR
- T TEMPERATURE SENSOR
- F FLOW SENSOR, INSERTION MAGMETER
- FLOW SENSOR, IN-LINE ULTRASONIC
- FLOW METER, MAGNETIC DRIVE VERTICAL TURBINE
- BTU BTU METER
- DP DIFFERENTIAL PRESSURE SENSOR

FULL SIZED LEDGIBLE **COLOR** PLANS ARE REQUIRED TO BE PROVIDED BY THE PERMITTEE ON SITE FOR ALL INSPECTIONS **(MIN. PLAN SIZE 24" X 36")**

PROJECT DESCRIPTION:

THIS PROJECT IS AN EXPANSION OF THE ORIGINAL PROJECT BUILD-OUT FOR A WATER-COOLED DATA CENTER INSTALLATION. WATER COOLED-CHILLERS, COOLING TOWERS, HEAT EXCHANGERS FOR WATERSIDE ECONOMIZER, AND PUMPS PROVIDE CHILLED WATER DIRECTLY TO SELF-CONTAINED SERVER RACK WITH BUILT-IN COOLING COILS. THE ORIGINAL SYSTEM CONSISTED OF TWO CHILLERS WITH DEDICATED PRIMARY CHILLED WATER PUMPS, TWO COOLING TOWERS WITH DEDICATED CONDENSER WATER PUMPS, AND A PLATE-AND-FRAME HEAT EXCHANGER ALONG WITH MANY OTHER SYSTEM COMPONENTS. THE ORIGINAL SYSTEM WAS BUILT WITH FUTURE CAPACITY FOR EXPANSION OF THIS WATER-COOLED SYSTEM.

THE SYSTEM IS SIZED FOR THE CUSTOMER'S ALLOTTED ALLOWANCE OF 4-MEGAWATTS OF SERVER CAPACITY. THE COOLING SYSTEM IS DESIGNED WITH N+1 REDUNDANCY TO PROVIDE THE TOTAL CAPACITY WITH ONE CHILLER AND COOLING TOWER ALONG WITH THEIR PUMPS AS A BACKUP IF ANY COMPONENT FAILS. HOWEVER, THE CONTROLS SEQUENCE WAS DEVELOPED TO ALLOW FOR ALL CHILLERS/TOWERS/PUMPS TO RUN AT A REDUCED LOAD TO OPTIMIZE EFFICIENCY AND REDUCE ENERGY CONSUMPTION.

ISSUE FOR CONSTRUCTION 2-27-24

REVISION	BY

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Bellevue WA 98004
425.628.6000
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PRMH20240593

City of Puyallup Development & Permitting Services ISSUED PERMIT
Building | Planning | Engineering | Public Works | Fire | Traffic

City of Puyallup Building ACCEPTED
JMontgomery
04/19/2024
9:09:21 AM
CITY OF PUYALLUP STATE OF WASHINGTON

centeris
Centers for Information Systems

CENTERIS DATA CENTERS
DATA CENTER EXPANSION 2023
1223 39TH AVENUE SE, PUYALLUP, WA 98374

SHEET TITLE
GENERAL NOTES, ABBREVIATIONS, LEGEND, AND SYMBOLS

DATE	2/27/24
SCALE	NONE
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-0.01

SHEET 1 OF 8

IF SHEET IS LESS THAN 30"x42" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY

WATER COOLED CHILLER

EQUIPMENT NUMBER	(E)CH-1 [1]	(E)CH-2	CH-3
LOCATION	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM
TYPE	CENTRIFUGAL	CENTRIFUGAL	CENTRIFUGAL
EVAPORATOR			
CAPACITY-TONS	575	575	575
FLUID	WATER	WATER	WATER
REFRIGERANT TYPE	R-134A	R-134A	R-134A
CAPACITY-GPM	587.7	587.7	587.7
ENT WATER TEMP-DEG F	78.5	78.5	78.5
LVG WATER TEMP-DEG F	55	55	55
MAX PRESS DROP-FT H20	15.9	15.9	15.9
FOULING FACTOR	0.0001	0.0001	0.0001
TUBE PASSES	3	3	3
CONNECTION SIZE-INCHES	8	8	8
CONDENSER-WATER COOLED			
FLUID	WATER	WATER	WATER
CAPACITY-GPM	1725	1725	1725
ENT WATER TEMP-DEG F	75	75	75
LVG WATER TEMP-DEG F	83.74	83.74	83.74
MAX PRESS DROP-FT H20	20.1	20.1	20.1
FOULING FACTOR	0.00025	0.00025	0.00025
TUBE PASSES	2	2	2
CONNECTION SIZE-INCHES	10	10	10
PERFORMANCE CRITERIA			
EFFICIENCY-KW/TON	0.343	0.343	0.343
NPLV-KW/TON	0.2111	0.2111	0.2111
SPEED CONTROL	VARIABLE	VARIABLE	VARIABLE
ELECTRICAL			
MAX RATED LOAD AMP-RLA	600	600	600
MAX LOCKED ROTOR AMP-LRA	1950	1950	1950
MIN CIRCUIT AMPACITY-AMPERES	316	316	316
VOLTS-PHASE-HERTZ	460-3-60	460-3-60	460-3-60
STANDARD OF ACCEPTANCE			
MAKE	YORK	YORK	YORK
MODEL	YKE3EQ7-EKG	YKE3EQ7-EKG	YKE3EQ7-EKG
MAX OPERATING WEIGHT-LBS	21882	21882	21882

REMARKS
[1] FURNISH w/ HOT GAS BYPASS.

COOLING TOWER

EQUIPMENT NUMBER	(E)CT-1	(E)CT-2	CT-3
SYSTEM	CHILLED WATER	CHILLED WATER	CHILLED WATER
LOCATION	MECHANICAL YARD	MECHANICAL YARD	MECHANICAL YARD
TYPE	OPEN TOWER	OPEN TOWER	OPEN TOWER
TOWER SECTION			
CAPACITY-GPM	1725	1725	1725
ENT WATER TEMP-DEG F	81.3	81.3	81.3
LVG WATER TEMP-DEG F	73.4	73.4	73.4
ENT AIR TEMP-DEG F DB	66.8	66.8	66.8
ENT AIR TEMP-DEG F WB	77.0	77.0	77.0
TOTAL CAPACITY-TONS	567.8	567.81	567.81
FAN SECTION			
FAN UNITS-NUMBER	1	1	1
CAPACITY-CFM PER FAN (MIN)	178,600	178,600	178,600
STATIC PRESS-INCHES WG	-	-	-
HORSEPOWER-PER FAN	50	50	50
SPEED-RPM	1800	1800	1800
SPEED CONTROL	VSD	VSD	VSD
SUMP HEATER			
ELECTRIC-KW (QTY. 2)	15	15	15
VOLTS-PHASE-HERTZ	460/3/60	460/3/60	460/3/60
MAXIMUMS			
DIMENSION (LxWxH)-FEET	12x21x12	12x21x12	12x21x12
STANDARD OF ACCEPTANCE			
MAKE	MARLEY	MARLEY	MARLEY
MODEL	NC8407UAN1	NC8407UAN1	NC8407UAN1
MAX OPERATING WEIGHT-LBS	24,430	24,430	24,430

REMARKS
[1] OPERATING RANGE FOR WATERSIDE ECONOMIZER AS FOLLOWS:
ENT WATER TEMP-DEG F: 60.5, LVG WATER TEMP-DEG F: 52.5, AMBIENT TEMP-DEG F WB: 45.7

HEAT EXCHANGERS

EQUIPMENT NUMBER	(E)HX-1	HX-2
SYSTEM	CHILLED WATER	CHILLED WATER
LOCATION	MECHANICAL ROOM	MECHANICAL ROOM
TYPE	PLATE AND FRAME	PLATE AND FRAME
HIGH TEMPERATURE SIDE		
FLUID	WATER	WATER
FLOW-GPM	590	590
EWT TEMP-DEG F	78.5	78.5
LWT TEMP-DEG F	55	55
MAX PD-PSIG	1.29	1.29
MIN SURFACE AREA - SQ. FT.	1791.4	1408.2
COLD TEMPERATURE SIDE		
FLUID	WATER	WATER
FLOW-GPM	1725	1725
EWT TEMP-DEG F	52.5	52.5
LWT TEMP-DEG F	60.5	60.5
MAX PD-PSIG	9.79	9.79
MIN SURFACE AREA - SQ. FT.	1791.4	1408.2
PERFORMANCE CONDITIONS		
TOTAL CAPACITY - MBH	6,922	6,922
DESIGN BASIS		
MAKE	ALFA LAVAL	ALFA LAVAL
MODEL	AQ8-P	AQ8-P
MAX OPERATING WEIGHT-LBS	6,110	6,110

EXPANSION TANK

EQUIPMENT NUMBER	(E)ET-1
SYSTEM	CHILLED WATER
UNIT LOCATION	MECHANICAL ROOM
TANK CONDITIONS	
CAPACITY-GALLONS	44
ACCEPTANCE-GALLONS	27
CHARGE-PSIG	12.0
CONFIGURATION	
RATING	ASME
TANK SIZE	
MAX DIAMETER-INCHES	24
MAX LENGTH-INCHES	82.5
DESIGN BASIS	
MAKE	B&G
MODEL	B-165LA
MAX OPERATING WEIGHT-LBS	503

REMARKS
[1]

SOLIDS SEPARATOR SCHEDULE

MARK NO	SS-1
TYPE	CENTRIFUGAL
SYSTEM	CONDENSER WATER
LOCATION	MECHANICAL ROOM
SERVICE CONDITIONS	
FLOW GPM	810
PUMP CONDITIONS	
MOTOR BRAKE HORSEPOWER	7.5
VOLTS-PHASE-HERTZ	460-3-60
SPEED CONTROL	CONSTANT
STANDARD OF ACCEPTANCE	
MAKE	LAKOS
MODEL	ETCX-0910-SRV
MAX OPERATING WEIGHT-LBS	2250

REMARKS
[1] FURNISH W/ SOLIDS RECOVERY VESSEL, BACNET INTERFACE, & ALARM CONTACTS
[2] PUMP SELECTION PROVIDED BY VENDOR

PUMPS

EQUIPMENT NUMBER	(E)CHP-1 [1]	(E)CHP-2 [1]	CHP-3 [1]	(E)CWP-1	(E)CWP-2	CWP-3	CP-1, CP-2	(E)CWTP-1
SYSTEM	CHILLED WATER	CHILLED WATER	CHILLED WATER	CHILLED WATER	CHILLED WATER	CHILLED WATER	CONDENSATE	CONDENSER WATER TREATMENT
LOOP SERVED	PRIMARY	PRIMARY	PRIMARY	CONDENSER	CONDENSER	CONDENSER	-	CONDENSER
LOCATION	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL ROOM	MECHANICAL YARD	MECHANICAL YARD	MECHANICAL YARD	MECHANICAL ROOM 105	MECHANICAL ROOM 105
TYPE	END SUCTION	END SUCTION	END SUCTION	END SUCTION	END SUCTION	END SUCTION	END SUCTION	END SUCTION
SERVICE CONDITIONS								
CAPACITY-GPM	593	593	593	1725	1725	1725	20	54
TOTAL HEAD-FT	92	92	92	103	103	103	15	20
FLUID	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
TEMPERATURE-DEG F	68	68	68	68	68	68	68	68
NPSH REQUIRED-FT MIN	7.6	7.6	7.6	12.1	12.1	12.1	-	-
PUMP CONDITIONS								
SPEED-RPM	1737	1737	1737	1757	1757	1757	1550	-
IMPELLER DIA-INCHES	10.375	10.375	10.375	11.25	11.25	11.25	-	-
BRAKE HORSEPOWER	17.1	17.1	17.1	53.8	53.8	53.8	-	420 WATTS
MINIMUM EFFICIENCY-%	72	72	72	82	82	82	-	-
ELECTRICAL								
MOTOR ENCLOSURE TYPE	ODP	ODP	ODP	ODP	ODP	ODP	ODP	ODP
HORSEPOWER-MINIMUM	20.0	20.0	20.0	60	60	60	3/10	1/2
VOLTS-PHASE-HERTZ	460-3-60	460-3-60	460-3-60	460-3-60	460-3-60	460-3-60	115-1-60	115-1-60
SPEED CONTROL	VARIABLE	VARIABLE	VARIABLE	VARIABLE	VARIABLE	VARIABLE	CONSTANT	VARIABLE
STANDARD OF ACCEPTANCE								
MAKE	B&G	B&G	B&G	B&G	B&G	B&G	ZOELLER	GRUNDFOS
MODEL	e-1510 4EB	e-1510 4EB	e-1510 4EB	e-1510 6G	e-1510 6G	e-1510 6G	MIGHTY-MATE 59	GEO-FLO MAGNA3
MAX OPERATING WEIGHT-LBS	600	600	600	1410	1410	1410	15	68

REMARKS
[1] PROVIDE WITH INERTIA BASE.

BUFFER TANK

EQUIPMENT NUMBER.	BT-1
SYSTEM	CHILLED WATER
LOCATION	MECHANICAL ROOM
TYPE	
MATERIAL	STEEL
CAPACITY	
VOLUME-GALLONS	1040
OPERATING CONDITIONS	
FLUID	WATER
TEMPERATURE-DEG F	55
DIMENSIONS-INCHES	
DIAMETER	54
LENGTH	62
HEIGHT	110
CODE STAMP	
ASME	YES

REMARKS
[1] TWO 12-INCH CHILLED WATER CONNECTIONS

AIR SEPERATOR

EQUIPMENT NUMBER	(E)AS-1
SYSTEM	CHILLED WATER
LOCATION	MECHANICAL ROOM
TYPE	CENTRIFUGAL
SERVICE CONDITIONS	
DESIGN PRESSURE PSIG	125
FLOW GPM	1,180
MAX PD-FT HD	0.6
CONNECTION SIZE, IN.	
DIA.	10
STANDARD OF ACCEPTANCE	
MAKE	B&G
MODEL	RL-10
MAX OPERATING WEIGHT-LBS	2052

DATA CENTER DESIGN MLC CALCULATION

DESIGN MECHANICAL ENERGY CONSUMPTION - 100%	EACH	TOTAL
[1] COOLING DESIGN POWER (KW)	261.63	523.27
HEAT REJECTION PEAK FAN POWER (KW)	37.29	74.57
[2] AIR HANDLER UNIT FAN DESIGN POWER (KW)	0.18	25.67
TOTAL	299.10	623.50
DATA CENTER DESIGN ITE POWER - 100%		
IT LOAD (KW)	4000	4000
DESIGN MLC @ 100%	WSEC	ACTUAL
MECHANICAL LOAD / IT LOAD	0.22	0.16
DESIGN MECHANICAL ENERGY CONSUMPTION - 50%	EACH	TOTAL
[1] COOLING DESIGN POWER (KW) +	59.81	119.62
HEAT REJECTION PEAK FAN POWER (KW) +	6.25	12.50
[2] AIR HANDLER UNIT FAN DESIGN POWER (KW)	0.02	3.08
TOTAL	66.08	135.20
DATA CENTER DESIGN ITE POWER - 50%		
IT LOAD (KW)	2000	2000
DESIGN MLC @ 50%	WSEC	ACTUAL
MECHANICAL LOAD / IT LOAD	0.18	0.07

REMARKS
[1] COOLING DESIGN POWER INCLUDES CHILLERS, PRIMARY PUMPS, AND CONDENSER WATER PUMPS.
[2] SERVER RACK COOLING COIL FAN POWER

ISSUE FOR CONSTRUCTION 2-27-24

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DATA CENTER EXPANSION 2023
1023 39TH AVENUE SE, PUYALLUP, WA 98374

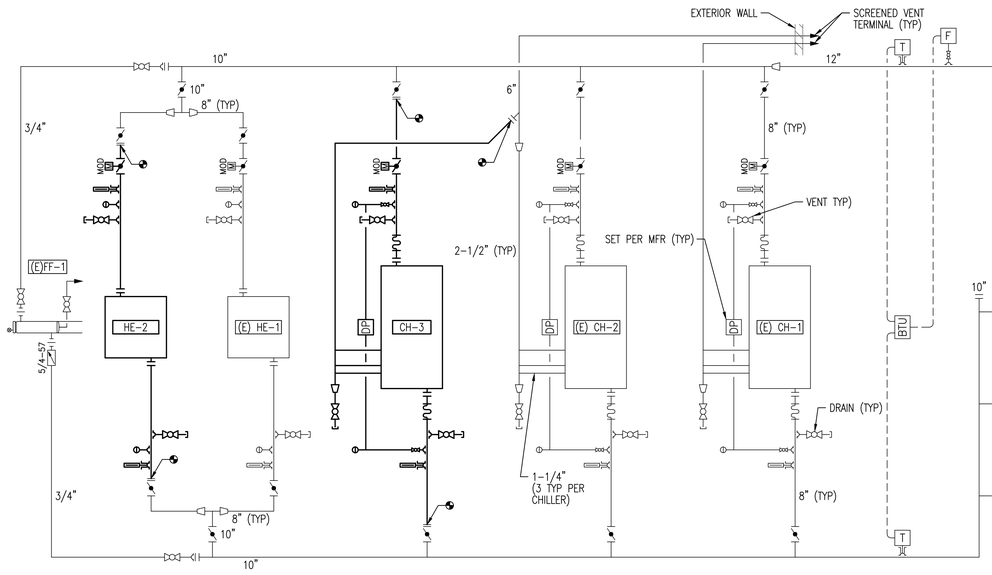
SHEET TITLE
MECHANICAL EQUIPMENT SCHEDULES

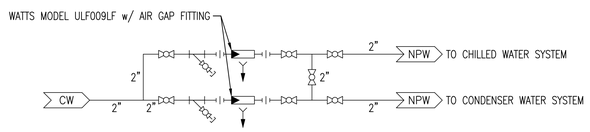
DATE	2/27/24
SCALE	NONE
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-0.02

SHEET 2 OF 8

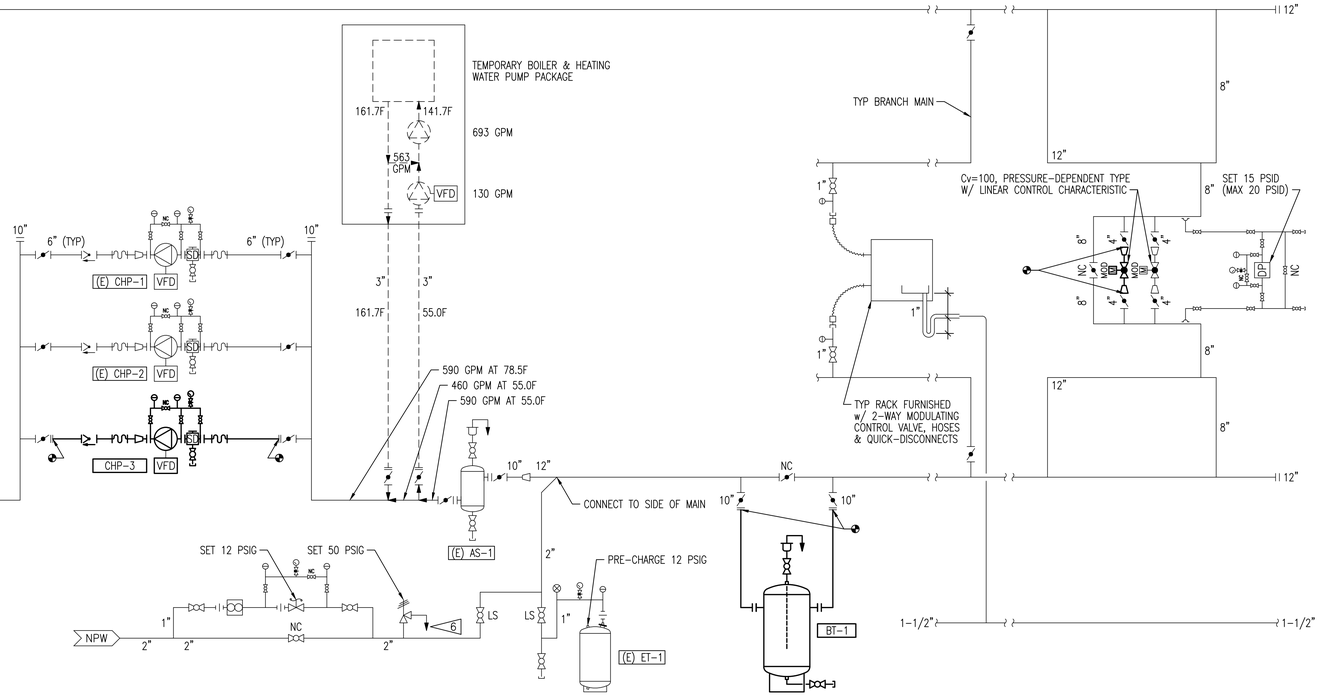
IF SHEET IS LESS THAN 30"x42" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY





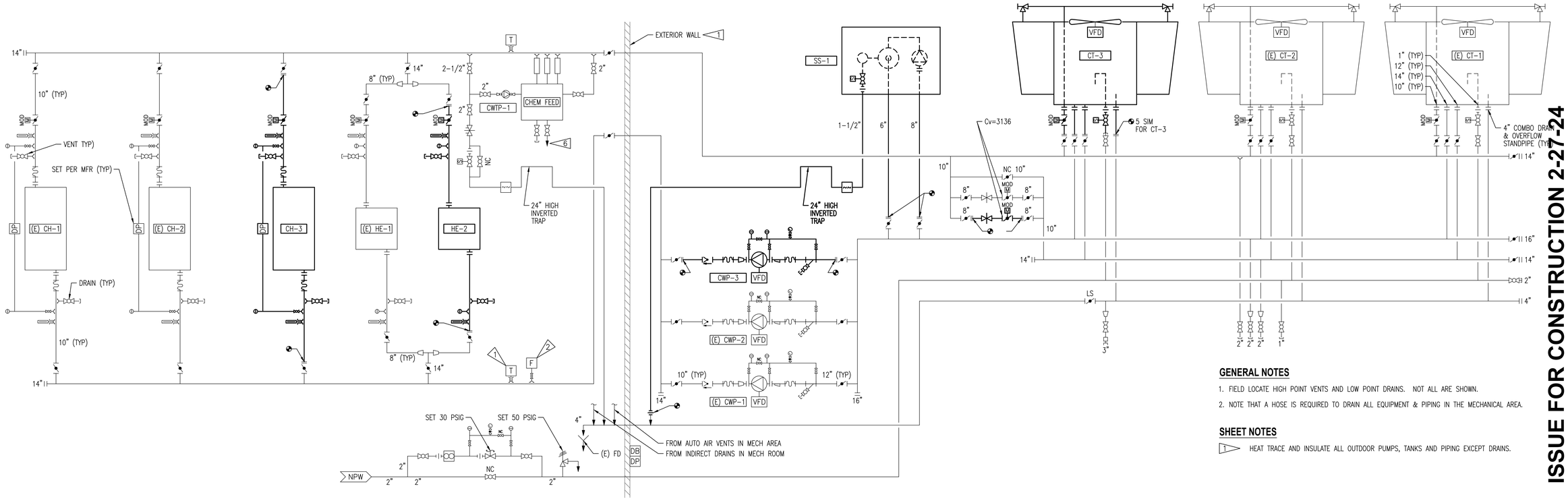
COLD WATER PIPING & INSTRUMENT DIAGRAM

NONE Mx.xx 1



CHILLED WATER PIPING & INSTRUMENT DIAGRAM

NONE Mx.xx 2



CONDENSER WATER PIPING & INSTRUMENT DIAGRAM

NONE Mx.xx 3

GENERAL NOTES

1. FIELD LOCATE HIGH POINT VENTS AND LOW POINT DRAINS. NOT ALL ARE SHOWN.
2. NOTE THAT A HOSE IS REQUIRED TO DRAIN ALL EQUIPMENT & PIPING IN THE MECHANICAL AREA.

SHEET NOTES

1. HEAT TRACE AND INSULATE ALL OUTDOOR PUMPS, TANKS AND PIPING EXCEPT DRAINS.

ISSUE FOR CONSTRUCTION 2-27-24

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1 – 05/04/18	BJH

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DATA CENTER EXPANSION 2023
1023 30TH AVENUE SE, PUYALLUP, WA 98374

SHEET TITLE
PIPING AND INSTRUMENT DIAGRAMS

DATE	2/27/24
SCALE	NONE
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-0.03

SHEET 3 OF 8

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CORRIDOR 115

ELEV EQUIP 129

MECHANICAL ROOM 114

EAST MEZZANINE 132

STORAGE 101

MECH AHU 004 130

CORRIDOR 103

IDF 102

CORRIDOR 104

MECHANICAL ROOM 105

STAIR 1

1-1/2"D

14'-2 7/8" BOP

14'-4" BOP

12'-0" BOP

12'-9 3/8" BOP

12"CHS

12"CHR

4"CHS

4"CHR

8"CHR

DIFFERENTIAL PRESSURE BYPASS, SEE DWG M-0.03

PIPE SUPPORT, SEE STRUCTURAL (TYP)

MATCHLINE, SEE DWG M-1.02

1 M-1.01 | M-1.03

FIRST FLOOR PIPING PLAN

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

0 2 4 8 16 24 feet

1/8"=1'-0"

ISSUE FOR CONSTRUCTION 2-27-24

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SHEET TITLE: FIRST FLOOR PIPING PLAN

DATE	2/27/24
SCALE	1/8" = 1'-0"
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-1.01

SHEET 5 OF 8

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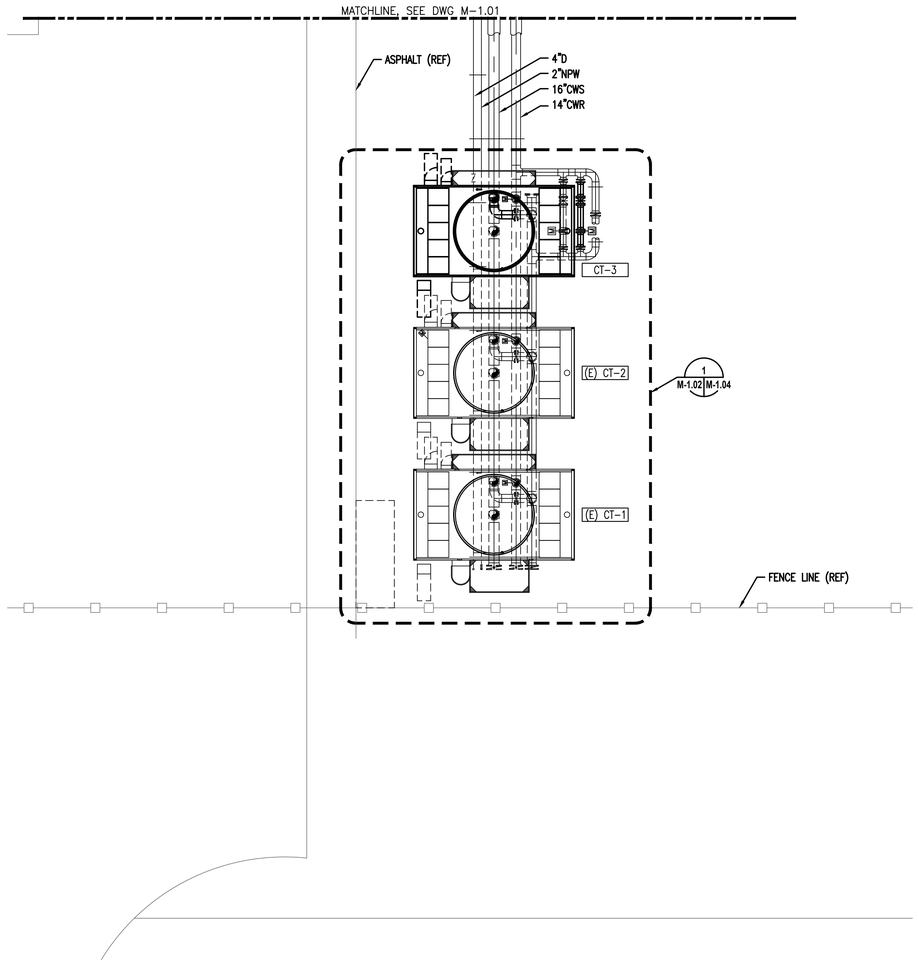

COOLING TOWER AREA PLAN

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

0 2 4 8 16 24 feet
1/8"=1'-0"

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SHEET TITLE
COOLING TOWER AREA PLAN

DATE	2/27/24
SCALE	1/8" = 1'-0"
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-1.02

SHEET 6 OF 8

IF SHEET IS LESS THAN 30"x42" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY

9 8 7 6 F E D C B A

CH-3 (E) CH-2 (E) CH-1 CH-4

12'-0" BOP

HOUSEKEEPING PAD, SEE STRUCTURAL (TYP)

10"CHR 10"CHR 12"CHS 12"CHR 8"CHS (TYP) 10"CHS 12"CHS

EAST MEZZANINE 132

12'-0" BOP

12"CHR (E)AS-1 10"CHR 8" CHR (TYP) 10"CWS (TYP) 10"CWR (TYP) (E)ET-1 10"CHR DDC PANEL

10"CHS 13'-11 5/8" BOP 8"CWS (TYP) 8"CWR (TYP) 12'-0" BOP 14"CWS 14"CWR 10"CHR 8"CHR (TYP) 8"CHS (TYP) (E) HE-1 13'-11 5/8" BOP 6" CHR (TYP) 10"CHR 10"CHR

CONNECTIONS FOR TEMPORARY BOILER & HEATING WATER PUMP

INERTIA BASE ANCHORED TO EXISTING SLAB, (TYP FOR CHP-X)

9'-9" BOP

CHP-3 (E) CHP-2 (E) CHP-1

VFD (TYP)

HE-2 14"CWS 14"CWR 10"CHR 10"CHS 2-1/2"V FROM CHILLERS (TYP 2) 2"NPW 1"D FROM AAV'S

12'-0" BOP 14"CWS 14"CWR

(2) 100' TEMPORARY HOSE

CORRIDOR 104

CL +24.098" AFF SLOPE MIN 1/4" PER FT DN TO DRAIN CL +41.022" AFF

CONDENSER WATER TREATMENT

(E) CW (E)FF-1 (E)CWTP-1 IN RISER

MECHANICAL ROOM 105

(E) FD MAKE-UP WATER ASSEMBLIES 4"D 2"CW DB DP BACKFLOW PREVENTER ASSEMBLIES 2-1/2" VTA AT 15' ABOVE GRADE (TYP 2)

VFD (TYP) 10"CWS (TYP) 14"CWS HOUSEKEEPING PAD, SEE STRUCTURAL (TYP) 12" CWS (TYP) 16"CWS CWP-3 (E) CWP-2 (E) CWP-1

PIPE SUPPORT, SEE STRUCTURAL (TYP)

14"CWS 14"CWR 1-1/2"D SS-1 8"CWS 6"CWS

MECHANICAL AREA ENLARGED PLAN

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

1 M-1.01 | M-1.03

0 1 2 4 8 12 feet
1/4"=1'-0"

ISSUE FOR CONSTRUCTION 2-27-24

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SHEET TITLE: ENLARGED PLAN

DATE	2/27/24
SCALE	1/4" = 1'-0"
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-1.03

SHEET 7 OF 8

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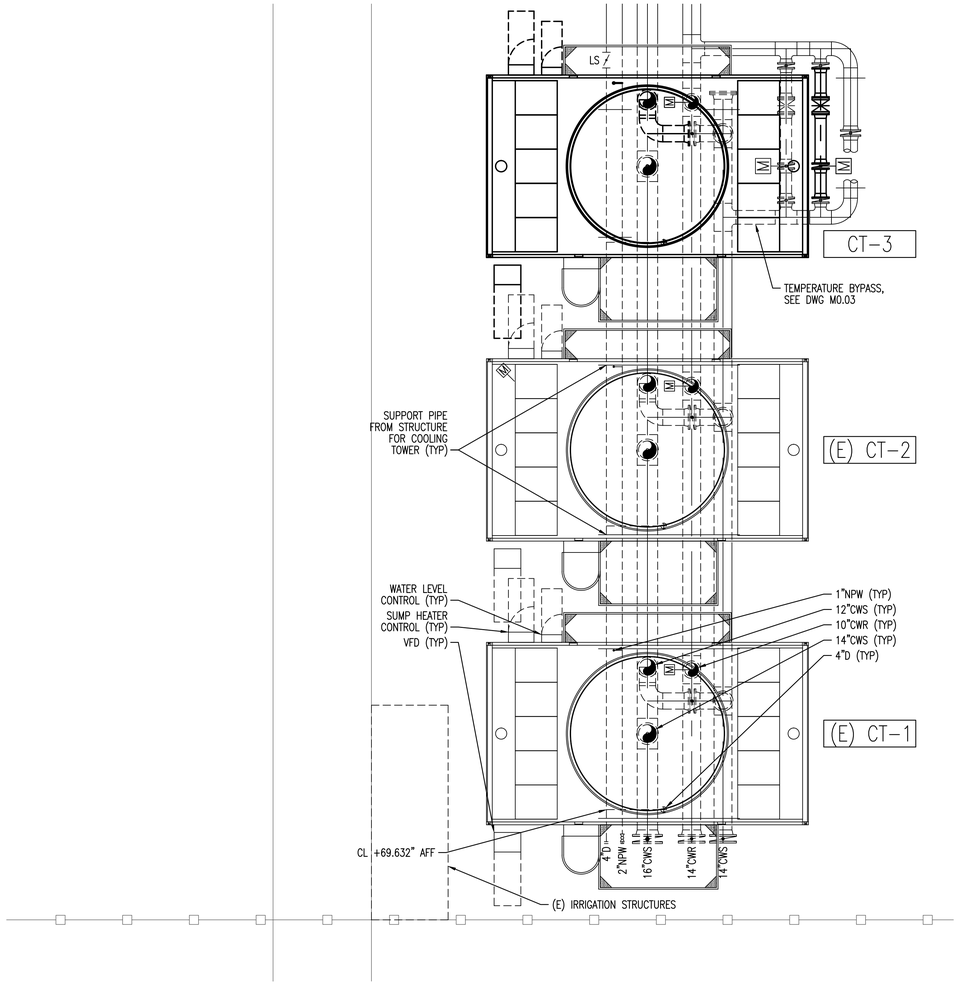

COOLING TOWER AREA ENLARGED PLAN

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

1 M-1.01 M-1.04

ISSUE FOR CONSTRUCTION 2-27-24

0 1 2 4 8 12
1/4"=1'-0" feet

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SHEET TITLE
ENLARGED PLAN

DATE	2/27/24
SCALE	1/4" = 1'-0"
ENGR	TJB
DRWN	TJB
CHKD	PMG
APPR	NRB
JOB	23025.00

M-1.04

SHEET 8 OF 8