CONTROLS

- PG — AIR PRESSURE GAUGE
- S — AIR SAMPLING POINT
- CDB — CARBON DIOXIDE SENSOR
- CO — CARBON MONOXIDE SENSOR
- GS — COMBUSTIBLE GAS SENSOR
- CT — CURRENT SENSOR
- CT — CURRENT TRANSMITTER WITH LEAD
- D — DEWPOINT SENSOR
- DPS — DIFFERENTIAL PRESSURE SENSOR
- DPT — DIFFERENTIAL PRESSURE TRANSMITTER
- FM — FLOW METER
- FS — FLOW SWITCH
- FT — FLOW TRANSMITTER
- FZ — FREEZE STAT
- HOA — HAND SWITCH
- H — HUMIDITY SENSOR
- LC — LEVEL CONTROL
- LS — LIMIT SWITCH
- LPI — LOOP POWER INDICATOR
- NOx — NITROGEN OXIDE SENSOR
- O — OCCUPANCY SENSOR
- O2 — OXYGEN SENSOR
- PI — POSITION INDICATOR
- PS — PRESSURE SENSOR
- R — REFRIGERANT SENSOR
- RH — RELATIVE HUMIDITY SENSOR
- R — RELAY
- H — ROOM HUMIDITY SENSOR
- SP — STATIC PRESSURE SENSOR
- TS — TEMPERATURE SENSOR
- T — THERMOSTAT
- T — THERMOSTAT WITH GUARD
- TVS — TOTAL VOLATILE ORGANIC COMPOUND SENSOR
- VB — VIBRATION SENSOR
- AFS — AIR FLOW SWITCH
- I:P — CURRENT TO PRESSURE
- E:P — ELECTRIC / PNEUMATIC
- SCR — SILICON CONTROLLED RECTIFIER
- TCP — TEMPERATURE CONTROL PANEL
- TEC — TERMINAL EQUIPMENT CONTROLLER
- SENSOR WELL
- ALARM HORN
- ALARM BEACON
- AI — ANALOG INPUT
- AO — ANALOG OUTPUT
- DI — DIRECT INPUT
- DO — DIRECT OUTPUT
- STR — STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- NON MOTORIZED VALVE
- M — TWO WAY MOTORIZED VALVE
- M — THREE WAY MOTORIZED VALVE
- SOL — TWO WAY SOLENOID VALVE
- SOL — THREE WAY SOLENOID VALVE
- PNEU — TWO WAY PNEUMATIC VALVE
- PNEU — THREE WAY PNEUMATIC VALVE
- PUMP
- S — DUCT SMOKE DETECTOR
- H — DUCT SMOKE DETECTOR
- AIR VALVE

CONTROLS

- UNITARY HEATING COIL (H / C)
- UNITARY COOLING COIL (C / C)
- UNITARY HEAT RECOVERY COIL (H / HR)
- FILTER
- ENERGY WHEEL
- PLATE ENERGY RECOVERY COIL
- AIR FLOW MEASURING STATION
- AIR FLOW PROBE
- BACKDRAFT DAMPER
- REFRIGERANT HOT GAS
- REFRIGERANT SUCTION
- DAMPER ACTUATOR - ELECTRIC (NC)
- DAMPER ACTUATOR - ELECTRIC (NC)
- CENTRIFUGAL FAN
- PROP FAN
- PLENUM FAN
- HUMIDIFIER
- ENERGY CORE
- ETHERNET CONNECTION
- CONTACT
- DDC_XXX — DDC PANEL
- COMPUTER

FIRE PROTECTION

- F(AF) — FIRE - ANTIFREEZE
- F(CA) — FIRE - CLEAN AGENT
- F(DEL) — FIRE - DELUGE
- F(D) — FIRE - DRAIN
- F(DRY) — FIRE - DRY
- F(PA) — FIRE - PRE-ACTION
- F — FIRE - WET
- SPRINKLER GUARD FOR UPTICHT, PENDANT OR SIDEWALL SPRINKLER
- AC — ABBREVIATION FOR ANTICORROSION
- HT — ABBREVIATION FOR HIGH TEMPERATURE
- SPARE CABINET FOR 12 SPRINKLERS
- SAN — DRAINAGE PIPING
- FIRE EXTINGUISHER
- SIAMESE FIRE DEPARTMENT CONNECTION
- PRIVATE HYDRANT - ONE HOSE OUTLET
- PUBLIC HYDRANT - TWO HOSE OUTLETS
- PUBLIC HYDRANT - TWO HOSE OUTLETSAND PUMPER CONNECTION
- UPRIGHT SPRINKLER
- PENDANT SPRINKLER
- SIDEWALL SPRINKLER
- 0° DRY PENDANT SPRINKLER
- 0° DRY SIDEWALL SPRINKLER
- FCP — FIRE ALARM CONTROL PANEL
- FVC — FIRE VALVE CABINET
- SPCAB — SPRINKLER CABINET
- FIRE HOSE VALVE ASSEMBLY
- FIRE DAMPER
- SMOKE DAMPER
- FIRE SMOKE DAMPER
- DUCT MOUNTED SMOKE SENSOR
- SUPERVISED BUTTERFLY VALVE
- SUPERVISED BUTTERFLY VALVE NORMALLY CLOSED
- SUPERVISED GATE VALVE
- SUPERVISED OUSIDE SCREW AND YORK (OS&Y) VALVE
- SUPERVISED OS&Y VALVE
- SUPERVISED WATERFLOW SWITCH
- SUPERVISED BACKFLOW PREVENTER
- WET ALARM CHECK VALVE WITH TRIMING
- DELUGE ALARM CHECK WITH TRIMING
- AIR MENTENANCE DEVICE
- FLOOR AIR COMPRESSOR TANK
- MOUNTED AIR COMPRESSOR ASSEMBLY
- DRY ALARM CHCEK VALVE WITH TRIMING
- PREACTION ALARM CHECK VALVE WITH TRIMING
- BOSTER PUMP (ALBANY PUMP)
- TEST AND DRAIN VALVE
- PRESSURE REDUCING VALVE
- 1-1/2 FIRE CONNECTION ANGLE VALVE
- 2-1/2 FIRE CONNECTION ANGLE VALVE
- FLOOR CONTROL VALVE ASSEMBLY
- CHECK VALVE
- TREADED BALL VALVE
- GROOVED BALL VALVE
- HYDRAULIC GONG
- ELECTRIC BELL
- ELBOW WITH DRAIN 1 IN.
- GROOVE ELBOW
- GROOVE TEE
- FIRE DEPARTMENT CONNECTION AND BACKFLOW PREVENTER
- SIAMESE PROJECTING CONNECTION «Y»
- SIAMESE CONNECTION «Y» FREE STANDING
- BODY FOR FIRE DEPARTMENT CONNECTION AND BACKFLOW PREVENTER
- CONCENTRIC GROOVED MECHANICAL REDUCER
- GROOVED MECHANICAL TEE OR CAP
- REDUCING COUPLING
- THREADED MECHANICAL TEE OR CAP
- THREADED MECHANICAL CROSS
- THREADED MECHANICAL TEE
- HORIZONTAL SPLIT CASE FIRE PUMP
- END SUCTION FIRE PUMP
- VERTICAL INLINE FIRE PUMP
- FIRE PUMP ANGLE BODY 4 WAY
- JOCKEY PUMP
- PREACTION CABINET
- FIRE HOSE RACK
- SEISMIC EXPANSION LOOP
- WALL POST INDICATOR VALVE (PIV)
- HANGER
- HYDRANT VALVE CONTROL
- WALL HYDRANT
- WALL MOUNTED PORTABLE FIRE EXTINGUISHER
- SEMI RECESSED CABINET FOR PORTABLE EXTINGUISHER

PLUMBING SYSTEMS

- 2 1/2" — PIPE SIZE
- XX — PIPING ROUTED BELOW SLAB OR GRADE
- AV — ACID VENT
- AW — ACID WASTE
- BBD — BOILER BLOWDOWN
- CA(##) — COMPRESSED AIR (NOMINAL PRESSURE)
- CD(P) — CONDENSATE DISCHARGE PUMPED
- CD — CONDENSATE DRAIN
- DI — DIONIZED WATER
- DIR — DIONIZED WATER RECIRCULATING
- DW — DISTILLED WATER
- DCW — DOMESTIC COLD WATER
- DCW(S) — DOMESTIC COLD WATER SOFTENED
- DHW — DOMESTIC HOT WATER
- DHWR — DOMESTIC HOT WATER RECIRCULATION
- D — DRAIN
- GW — GREASE WASTE
- H — HUMIDIFICATION
- LV — LABORATORY VENT
- LW — LABORATORY WASTE
- G — NATURAL GAS (LOW PRESSURE)
- GD — GARAGE DRAINAGE
- GV — NATURAL GAS VENT
- MPG — MEDIUM PRESSURE GAS
- NPCW — NON-POTABLE COLD WATER
- NPCW(S) — NON-POTABLE COLD WATER SOFTENED
- NPHW — NON-POTABLE HOT WATER
- NPHW(S) — NON-POTABLE HOT WATER SOFTENED
- PTS — PNEUMATIC TRANSPORT
- PG — PROPANE GAS
- RO — REVERSE OSMOSIS
- ROR — REVERSE OSMOSIS RECIRCULATION
- SL — SAMPLING LINE
- SAN — SANITARY DRAIN
- SAN(O) — SANITARY DRAIN (OIL)
- SAN(P) — SANITARY PUMPED
- SAN(RAD) — SANITARY RADIOACTIVE
- ST — STORM DRAIN
- ST(O) — STORM DRAIN OVERFLOW
- ST(P) — STORM DRAIN PUMPED
- VAC — VACUUM (AIR)
- VAC(EX) — VACUUM PUMP EXHAUST
- V — VENT
- V(O) — VENT (OIL)
- V(SE) — VENT (SEWAGE EJECTOR)
- PIPE INSULATION
- FIXTURE TRAP
- CB — CATCH BASIN
- MH — MAN HOLE
- RD — ROOF DRAIN
- FD — FLOOR DRAIN
- FFD — FUNNEL FLOOR DRAIN
- TRAP PRIMER
- HOSE BIBB
- PLUMBING FIXTURES

LAB & MEDICAL GAS

- WAGD — ANESTHETIC EVACUATION
- CO2 — CARBON DIOXIDE
- DA — DENTAL COMPRESSED AIR
- DV — DENTAL VACUUM
- He — HELIUM
- H2 — HYDROGEN
- IA — INSTRUMENT AIR
- LCA — LABORATORY COMPRESSED AIR
- LVCA — LABORATORY VACUUM
- MA — MEDICAL AIR
- MV — MEDICAL VACUUM
- N2 — NITROGEN
- N2O — NITROUS OXIDE
- O2 — OXYGEN
- A — MEDICAL AIR OUTLET
- V — MEDICAL VACUUM OUTLET
- N — MEDICAL NITROGEN OUTLET
- MXO — MEDICAL NITROUS OXIDE OUTLET
- O — MEDICAL OXYGEN OUTLET
- A — LAB AIR SINGLE BENCH OUTLET
- V — LAB VACUUM SINGLE BENCH OUTLET
- N — LAB NITROGEN SINGLE BENCH OUTLET
- MXO — LAB NITROUS OXIDE SINGLE BENCH OUTLET
- O — LAB OXYGEN SINGLE BENCH OUTLET
- A — LAB DOUBLE 45 DEGREE BENCH OUTLET
- A / A — LAB DOUBLE BENCH OUTLET
- A / A — LAB QUAD 45 DEGREE BECNH OUTLET
- MEDICAL GAS MASTER ALARM PANEL
- MEDICAL GAS AREA ALARM PANEL
- MEDICAL GAS ZONE VALVE
- BALL VALVE
- CHECK VALVE

PIPING SYSTEMS (HVAC)

- 2 1/2" — PIPE SIZE
- BBD — BOILER BLOWDOWN
- BFW — BOILER FEED WATER
- BR — BRINE RETURN
- BS — BRINE SUPPLY
- CHWR — CHILLED WATER RETURN
- CHWR(G) — CHILLED WATER RETURN - GLYCOL
- CHWR(P) — CHILLED WATER RETURN - PROCESS
- CHWS — CHILLED WATER SUPPLY
- CHWS(G) — CHILLED WATER SUPPLY - GLYCOL
- CHWS(P) — CHILLED WATER SUPPLY - PROCESS
- CWR — CONDENSER WATER RETURN
- CWR(CT) — CONDENSER WATER RETURN - COOLING TOWER
- CSW — CONDENSER WATER SUPPLY
- CWS(CT) — CONDENSER WATER SUPPLY - COOLING TOWER
- DTR — DUAL TEMPERATURE RETURN (HOT OR CHILLED)
- DTS — DUAL TEMPERATURE SUPPLY (HOT OR CHILLED)
- FCFS — FLUID COOLER FILTRATION SUPPY
- FCFR — FLUID COOLER FILTRATION RETURN
- FOF — FUEL OIL FILL
- FOR — FUEL OIL RETURN
- FOS — FUEL OIL SUPPLY
- FOV — FUEL OIL VENT
- HPWR — HEAT RECOVERY LOOP RETURN
- HPWS — HEAT PUMP WATER SUPPLY
- HRR — HEAT RECOVERY LOOP RETURN
- HRS — HEAT RECOVERY LOOP SUPPLY
- HWR — HEATING WATER RETURN
- HWR(G) — HEATING WATER RETURN - GLYCOL
- HWS — HEATING WATER SUPPLY
- HWS(G) — HEATING WATER SUPPLY - GLYCOL
- G — NATURAL GAS
- GV — NATURAL GAS VENT
- RAD — RADON GAS
- REF(HG) — REFRIGERANT HOT GAS
- REF(L) — REFRIGERANT LIQUID
- REF(S) — REFRIGERANT SUCTION
- REF(V) — REFRIGERANT VENT
- RV — RELIEF VENT
- S(##) — STEAM (NOMINAL PRESSURE)
- CS(##) — STEAM - CLEAN (NOMINAL PRESSURE)
- C(##) — STEAM CONDENSATE (NOMINAL PRESSURE)
- PC(##) — STEAM PUMPED CONDENSATE (NOMINAL PRESSURE)
- SV — STEAM VENT
- PIPE INSULATION

PIPING COMPONENTS

REAL OBJECT	SYMBOL	
		ISOLATION VALVE (GENERIC)
		GATE VALVE
		GLOBE VALVE
		BUTTERFLY VALVE NPS 6 AND LESS
		BUTTERFLY VALVE NPS 8 AND MORE
		BALL VALVE
		PLUG VALVE
		NEEDLE VALVE
		CHECK VALVE (GENERIC)
		BALANCING VALVE
		FLOW LIMITING VALVE
		PRESSURE REDUCING VALVE
2-WAY		2-WAY CONTROL VALVE (GENERIC)
2-WAY		TWO-WAY ELECTRIC CONTROL VALVE, BUTTERFLY TYPE
3-WAY		3-WAY CONTROL VALVE (GENERIC)
3-WAY		THREE-WAY ELECTRIC CONTROL VALVE, BUTTERFLY TYPE
		SOLENOID 2-WAY CONTROL VALVE
		SOLENOID 3-WAY CONTROL VALVE
		FLOAT OPERATED VALVE ACTUATOR
		SAFETY OR RELIEF VALVE
		ANGLE VALVE
		BOILER STOP AND CHECK VALVE
		DOUBLE CHECK VALVE ASSEMBLY
		MULTI-PURPOSE VALVE (SHUT-OFF, BALANCING AND CHECK)
		REDUCE PRESSURE BACKFLOW PREVENTER
		SUCTION DIFFUSER
		PUMP (GENERIC)
		Y-STRAINER (GENERIC)
		STEAM TRAP (GENERIC)
		AUTOMATIC AIR VENT
		MANUAL AIR VENT
		VACUUM BREAKER
		SHOCK ABSORBER
		TEMPERATURE GAUGE
		PRESSURE GAUGE
		TEMPERATURE AND PRESSURE TRAP
		SIGHT FLOW GLASS
		FLEXIBLE CONNECTOR
		EXPANSION JOINT
		GUIDE
		ANCHOR
		FLOW ARROW
		PIPING SLOPE
		PIPE CAP
		PIPE BREAK
		PIPE CROSS
		PIPING ELBOW UP
		PIPING ELBOW DOWN
		PIPING TEE UP
		PIPING TEE DOWN
		UNION CONNECTION
		FLANGED CONNECTION
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER
		STANDARD CLEAN-OUT IN LINE END OF RUN
		STANDARD CLEAN-OUT THROUGH FLOOR END OF RUN
		STANDARD CLEAN-OUT THROUGH FLOOR IN LINE
		DIFFERENTIAL PRESSURE CONTROL VALVE
		Y-PATTERN MANUAL BALANCING/SHUT-OFF VALVE
		PRESSURE INDEPENDENT CONTROL VALVE

WORK DEFINITION

- NEW WORK (N)
- EXISTING (E)
- REMOVE EXISTING (D)
- REMOVE EXISTING EQUIPMENT (D)
- FUTURE
- TEMPORARY, AS NOTED
- RELOCATE (R)
- ### — KEY NOTE
- ### — EQUIPMENT IDENTIFICATION
- CONNECTION TO EXISTING
- DISCONNECT (CUT AND CAP)

(HVAC)

NOTE: ALL DUCT SIZES ARE INTERIOR, FREE DIMENSIONS ALWAYS WIDTH (HORIZONTAL DIM.) x HEIGHT (VERTICAL DIM.)

- AIR FLOW ARROW
- 18"x12" — RECTANGULAR DUCT AND SIZE*
- 18"ø — ROUND DUCT AND SIZE*
- 18"x12"ø — FLAT OVAL DUCT AND SIZE*
- 18"x12" — EXTERIOR DUCT TREATMENT*
- 18"x12" — RECTANGULAR DUCT WITH ACOUSTIC LINING*
- 30"x12" — DUCT SECTION, SUPPLY AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, RETURN AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, EXHAUST AIR. APPLIES TO RECT., ROUND AND OVAL
- FLEXIBLE DUCT
- ELBOW TURN, SUPPLY DOWN. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- DUCT SECTION, OUTSIDE AIR. APPLIES TO RECT., ROUND AND OVAL
- UP — CHANGE IN DUCT ELEVATION RISING IN DIRECTION INDICATED
- DN — CHANGE IN DUCT ELEVATION DROPPING IN DIRECTION INDICATED
- END CAP
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITH SPLITTER VANES (0.25 R/W DEFAULT)
- ELBOW, RECTANGULAR, SMOOTH RADIUS WITHOUT VANES (1.5 R/W DEFAULT)
- ELBOW, ROUND, SMOOTH RADIUS (1.5 R/W DEFAULT)
- MITERED ELBOW, RECTANGULAR, WITHOUT VANES
- MITERED ELBOW, RECTANGULAR, WITH TURNING VANES
- RECTANGULAR TO ROUND TRANSITION
- DUCT ACCESS DOOR (TOP, SIDE, BOTTOM)
- FLEXIBLE CONNECTION
- BDD — BACKDRAFT DAMPER
- COD — CABLE OPERATED DAMPER
- MANUAL DAMPER
- M — MOTORIZED DAMPER
- CAR — PRESSURE INDEPENDENT REGULATOR
- FIRE DAMPER
- SMOKE DAMPER
- SMOKE AND FIRE DAMPER
- DUCT SILENCER/TRANSFER ELBOW
- T — CONTROL DEVICE (REFER TO CONTROLS LEGEND)
- AIR FLOW MEASURING STATION (REFER TO CONTROLS LEGEND)
- QUANTITY
- TYPE
- SIZE (IN.) — AIR OUTLET OR INLET TAG)REFER TO SCHEDULE)
- VOLUME (CFM)
- RECTANGULAR DIFFUSER, SUPPLY, OPTIONAL ARROWS SHOW THE FLOW DIRECTION.
- RECTANGULAR REGISTER OR GRILLE, RETURN
- RECTANGULAR REGISTER OR GRILLE, EXHAUST
- ROUND DIFFUSER, SUPPLY
- LINEAR DIFFUSER
- SIDEWALL REGISTER OR GRILLE, SUPPLY
- SIDEWALL GRILLE, RETURN OR EXHAUST
- UC — UNDERCUT DOOR
- DOOR GRILLE OR LOUVER
- TRANSFER GRILLE OR LOUVER
- COIL (REFER TO CONTROLS LEGEND)
- QUANTITY
- TYPE
- LENGTH (FT.) RADIATION HEATING TAG (REFER TO SCHEDULE)
- CAPACITY (MBH)

ABBREVIATIONS

A/C	AIR CONDITIONING UNIT
AAV	AUTOMATIC AIR VENT
ADA	AMERICANS WITH DISABILITIES ACT
ADJ	ADJUSTABLE
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AFR	ABOVE FINISH ROOF
AHJ	AUTHORITY HAVING JURISDICTION
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
AVG	AVERGAGE
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BHP	BRAKE HORSEPOWER
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C/W	COMPLETE WITH
CAV	CONSTANT AIR VOLUME
CBV	CIRCUIT BALANCING VALVE
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB TEMEPRATURE
dB	DECIBEL(S)
dBA	A-WEIGHTED DECIBLES
DDC	DIRECT DIGITAL CONTROL
DEG	DEGREE
DIA,Ø	DIAMETER
DIFF	DIFFERENTIAL
DIV	DIVISION
DN	DOWN
DWG	DRAWING
EA	EXHAUST AIR
EA (D)	EXHAUST AIR, DISHWASH
EA (G)	EXHAUST AIR, GENERAL
EA (K)	EXHAUST AIR, KITCHEN
EA (LAB)	EXHAUST AIR, LABORATORY
EA (LD)	EXHAUST AIR, LAUNDRY/DRYER
EA (W)	EXHAUST AIR, WASHROOM
EAT	ENTERING AIR TEMPERATURE
EAV	EXHAUST AIR VALVE
ECM	ELECTRONICALLY COMMUNICATED MOTOR
ED	EXISTING TO BE DEMOLISHED (DEMOLITION PLANS)
EER	ENERGY EFFICIENCY RATIO
EG	ETHELYENE GLYCOL
EMCS	ENERGY MANAGMENT CONTROL SYSTEM
ER	EXISTING RELOCATED (NEW CONSTRUCTION PLANS)
ERL	EXISTING TO BE RELOCATED (DEMOLITION PLANS)
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXIST / E	EXISTING (DEMOLITION PLANS)
FC	FAIL CLOSED
FLA	FULL LOAD AMPERAGE
FO	FAIL OPEN
FP	FIRE PROTECTION
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FOOT/FEET
GA	GAUGE
GAL	GALLON (US)
GC	GENERAL CONTRACTOR
GEO	GEODETIC
GPM	GALLONS PER MINUTE
HEPA	HIGH EFFICIENCY PARTICULATE AIR (FILTER)
HP	HORSEPOWER
HR	HOUR
HVAC	HEATING / VENTILATING / AIR CONDITIONING
HZ	HERTZ
IE	INVERT ELEVATION
IEER	INTEGRATED ENERGY EFFECIENCY RATIO
IN	INCHES
IN WG	INCHES WATER GAUGE
IPLV	INTEGRATED PART LOAD VALUE
kW	KILOWATT
kWh	KILOWATT HOUR
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LF	LINEAR FEET
LWT	LEAVING WATER TEMPERATURE
M	METER
MAX	MAXIMUM
MBH	THOUSAND OF BTUH
MCA	MINIMUM CIRCUIT AMPS
MERV	MINIMUM EFFECIENCY REPORTING VALUES
MFR	MANUFACTURER
MIN	MINIMUM
MOP	MAXIMUM OVERCURRENT PROTECTION
MWT	MEAN WATER TEMPERATURE
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NPS	NOMINAL PIPE SIZE
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFE	OWNER FURNISHED EQUIPMENT
OFOI	OWNER FURNISHED / OWNER INSTALLED
PG	PROPYLENE GLYCOL
POE	POINT OF ENTRANCE
POS	POINT OF SERVICE
PPM	PARTS PER MILLION
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH, ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAGE
PTS	PNEUMATIC TUBE STATION
PVC	POLYVINYL CHLORIDE
RA	RETURN AIR
RELA	RELIEF AIR
REQD	REQUIRED
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
SA	SUPPLY AIR
SEER	SEASONAL ENERGY EFFICIENCY RATION
SP	STATIC PRESSURE
SP	STAIR PRESSURIZATION AIR (*)
SRV	SAFETY RELIEF VALVE
TA	TRANSFER AIR
TEMP	TEMPERATURE
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL
UC	UNDER CUT (DOOR)
UG	UNDERGROUND
UP	UP
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
VTR	VENT-THRU-ROOF
W/	WITH
W/O	WITHOUT
WB	WET BULB TEMPERATURE
WG	WATER GAUGE
ZN-#	ZONE
°C	CELSIUS
°F	FAHRENHEIT

EQUIPMENT IDENTIFICATION

AB-#	AIR BLENDER
AC-#	AIR COMPRESSOR
ACU-#	AIR CONDITIONING UNIT
ADS-#	AIR AND DIRT SEPARATOR
AF-#	AIR FILTER
AHU-#	AIR HANDLING UNIT
AS-#	AIR SEPARATOR
ATU-#	AIR TERMINAL UNIT
B-#	BOILER
BCU-#	BLOWER COIL UNIT
BT-#	BATH TUB
CB-#	CHILLED BEAM
CC-#	COOLING COIL
CH-#	CHILLER
CONV-#	CONVECTOR
CRU-#	CONDENSATE RETURN UNIT
CT-#	COOLING TOWER
CU-#	CONDENSING UNIT
CUH-#	CABINET UNIT HEATER
CV-#	CONTROL VALVE
DAC-#	DOOR AIR CURTAIN
DC-#	DUST COLLECTOR
DCT-#	DECONTAMINATION TANK
DCVA-#	DOUBLE CHECK VALVE ASSEMBLY
DF-#	DRINKING FOUNTAIN
DG-#	DOOR GRILLE
DS-#	DUCT SILENCER
DU-#	DEHUMIDIFICATION UNIT
DWH-#	DOMESTIC WATER HEATER
E-#	EXHAUST GRILLE / REGISTER / DIFFUSER
EL-#	EXPANSION LOOP
ERC-#	ENERGY RECOVERY COIL
ERU-#	ENERGY RECOVERY UNIT
ES-#	EMERGENCY SHOWER
ETU-#	EXHAUST TERMINAL UNIT
EWC-#	ELECTRIC WATER COOLER
EWS-#	EYE WASH STATION
F(C)-#	FAN CEILING
F(E)-#	FAN EXHAUST
F(LE)-#	FAN LABORATORY EXHAUST
F(R)-#	FAN RETURN
F(S)-#	FAN SUPPLY
F(T)-#	FAN TRANSFER
F-#	FAN
FCU-#	FAN COIL UNIT
FD-#	FLOOR DRAIN
FFU-#	FAN FILTER UNIT
FPP-#	FIRE PROTECTION PUMP
FPTU-#	FAN POWERED TERMINAL UNIT
FTR-#	FINNED TUBE RADIATOR
FUR-#	FURNACE
GFS-#	GLYCOL FEED SYSTEM
GSG-#	GAS-FIRED STEAM GENERATOR(*)
H(C)-#	HOOD (CANOPY)
H(HC)-#	HOOD (HEAT AND CONDENSATE)
H(I)-#	HOOD (INTAKE)
H(K)-#	HOOD (KITCHEN)
H(R)-#	HOOD (RELIEF)
H(RH)-#	HOOD (RANGE)
H-#	HUMIDIFIER
HC-#	HEATING COIL
HP-#	HEAT PUMP
HRU-#	HEAT RECOVERY UNIT
HT-#	HYDROPNEUMATIC TANK
HX-#	HEAT EXCHANGER
LATU-#	LAB AIR TERMINAL UNIT
LAV-#	LAVATORY
MAC-#	MEDICAL AIR COMPRESSOR
MAU-#	MAKEUP AIR UNIT
MD-#	MOTORIZED DAMPER
MSK-#	MOP SINK
MV-#	MIXING VALVE
MVP-#	MEDICAL VACUUM PUMP
P-#	PUMP
PDU-#	POOL DEHUMIDIFICATION UNIT
PRV-#	PRESSURE REDUCING VALVE
PTAC-#	PACKAGED TERMINAL AIR CONDITIONER
R-#	RETURN AIR GRILLE / REGISTER / DIFFUSER
RD-#	ROOF DRAIN
RH-#	RANGE HOOD
RP-#	RADIANT PANEL
RPBP-#	REDUCED PRESSURE BACKFLOW PREVENTER
RTU-#	ROOFTOP UNIT
S-#	SUPPLY GRILLE / REGISTER / DIFFUSER
SH-#	SHOWER
SK-#	SINK
SPC-#	SOLAR PANEL COLLECTOR
SSF-#	SIDE STREAM FILTER
T(B)-#	TANK (BUFFER TANK)
T(E)-#	TANK (EXPANSION TANK)
T(H)-#	TANK (HYDRO PNEUMATIC TANK)
T(S)-#	TANK (STORAGE TANK)
T-#	TRANSFER AIR GRILLE
UH-#	UNIT HEATER
UR-#	URINAL
USG-#	UNFIRED STEAM GENERATOR
UV-#	UNIT VENTILATOR
VA-#	VALVE
VFD-#	VARIABLE FREQUENCY DRIVE
WC-#	WATER CLOSET
WS-#	WATER SOFTENER
L-#	LOUVER

DRAWING INDEX

NOTE: NOT ALL SYMBOLS, SYSTEMS, AND ABBREVIATIONS MAY BE USED ON THIS PROJECT

PRCTI20241387

centeris

Stantec

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MECHANICAL DRAWINGS

CENTERIS
FUTURE TENANT
1019 39th AVENUE SE
PUYALLUP, WA 98374

JEFFREY M. LYNCH — STATE OF WASHINGTON — 43975 — REGISTERED PROFESSIONAL ENGINEER — 2024-10-01

Revision No.	Description	Date
1	FUTURE TENANT PERMIT	8/30/2024

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

City of Puyallup
Building
REVIEWED FOR COMPLIANCE
BSnowden
1/01/2024
8:03:06 AM

Approval of submitted plans is not an approval of omissions or oversights by this office or non compliance with any applicable regulations of local government. The contractor is responsible for making sure that the building complies with all applicable codes and regulations of the local government.

The approved construction plans, documents, and all engineering must be posted on the job at all inspections in a visible and readily accessible location.

Full sized legible color plans are required to be provided by the permitee on site for inspection.

Drawn By: JLV
Checked By: BO

Title: MECHANICAL LEGEND AND ABBREVIATIONS

Sheet: M.FT.001

DEMO NOTES

1. NOT ALL EXISTING CONDITIONS HAVE BEEN SHOWN. CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO DEMO.
2. CONTRACTOR SHALL PROTECT ALL WORK AND EXISTING CONDITIONS ASSOCIATED WITH THIS CONTRACT FROM DAMAGE, COVER ENDS OF PIPING AND DUCTWORK. NOT ACTIVELY BEING WORKED ON. IT IS THE CONTRACTOR RESPONSIBILITY TO REPAIR OR REPLACE ANY DAMAGED ITEMS THAT OCCURS DURING THIS CONSTRUCTION PROJECT AT NO COST TO THE OWNER.
3. DEMOLISH ALL REQUIRED EQUIPMENT, DUCTWORK, PIPING, HANGERS, CONTROLS AND ALL ASSOCIATED EXISTING SYSTEMS AS REQUIRED. TO REPLACE EACH SYSTEM, CONTRACTOR SHALL COORDINATE DEMOLITION WITH EXISTING SYSTEMS AND COMPONENTS TO REMAIN PRIOR TO WORK COMMENCING.
4. IT IS THE CONTRACTOR RESPONSIBILITY TO CLEAN UP ALL DEBRIS FROM SITE AT THE END OF EACH WORK DAY AND DISPOSE OFF EITHER IN LAY DOWN RECYCLE BINS PROVIDED BY THE CONTRACTOR OR OFFSITE ALL TOGETHER.
5. ALL DEMOLISHED EQUIPMENT SHALL BE TURNED OVER TO THE OWNER UNLESS DIRECTED OTHERWISE. IF NOT REQUIRED BY OWNER, DISPOSE AS REQUIRED.

SCOPE OF WORK

1. THE MECHANICAL PLANS INCLUDE THE ADDITION OF (5) 500 TON AIR-COOLED CHILLERS, AND (6) 536 TON FLUID COOLERS. EACH OF THE (5) CHILLERS IS FED WITH A PRIMARY CHILLED WATER PUMP, COOLING TOWER ARE FED WITH (4) PUMPS, (2) FOR (4) CELLS, AND (2) FOR (2). CHILLED WATER SYSTEMS SERVE ONLY PROCESS LOADS FOR WATER COOLED SERVER EQUIPMENT FURNISHED BY THE OWNER. (4) 1500 GPM SECONDARY CHILLED WATER PUMPS. PROCESS EQUIPMENT BEING INSTALLED INCLUDE A FILTER PUMP, BASIN HEATERS AND HEAT TRACE. A BUILDING AUTOMATION CONTROL SYSTEM SHALL PROVIDE CONTROL AND MONITORING OF THE NEW SYSTEMS, AND BE INTERGRATED INTO THE EXISTING.

GENERAL NOTES

1. THE MECHANICAL PLANS ARE DIAGRAMMATIC IN NATURE AND ARE BASED ON ONE MANUFACTURER'S EQUIPMENT. THEY ARE NOT INTENDED TO SHOW EVERY ITEM IN ITS EXACT LOCATION, THE EXACT DIMENSIONS, OR ALL OF THE DETAILS FOR THE EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL VERIFY THE ACTUAL DIMENSIONS OF THE EQUIPMENT AND ENSURE THAT IT WILL FIT IN THE AVAILABLE SPACE.
2. MECHANICAL CONTRACTOR RESPONSIBLE FOR INSTALLATION OF COMPLETED AND OPERATIONAL SYSTEMS WITH DUE RESPECT TO ALL APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION.
3. IT IS THE CONTRACTOR RESPONSIBILITY TO FIELD VERIFY ALL CONNECTION POINTS PRIOR TO INSTALL. NOT ALL CONNECTION SIZES ARE SHOWN, BUT THOSE THAT ARE APPROXIMATE AND TAKEN FROM EXISTING AS-BUILTS AND FIELD OBSERVATIONS.
4. COORDINATE PIPE ROUTING WITH DUCTWORK, SPRINKLER PIPING AND ELECTRICAL POWER/LIGHTING CIRCUITING AND STRUCTURAL MEMBERS PRIOR TO INSTALLATION.
5. CONTRACTORS TO VERIFY ALL GRADES, DIMENSIONS AND EXISTING CONDITIONS AT THE SITE BEFORE PROCEEDING WITH WORK. NOTIFY PRIME CONSULTANT OF ANY DISCREPANCIES BETWEEN DRAWINGS AND ACTUAL CONDITIONS BEFORE INSTALLATION.
6. EQUIPMENT AND SYSTEMS SHALL COMPLY WITH 2021 WASHINGTON STATE ENERGY AND MECHANICAL CODES.
7. COORDINATE INSTALLATION OF PIPING AND DUCTWORK WITH ELECTRICAL CONTRACTOR AND OTHER TRADES.
8. CONTRACTOR IS RESPONSIBLE FOR ALL PERMITS NEEDED TO CONSTRUCT WORK SHOULD IN THE CONSTRUCTION DOCUMENTS AND ACCOMPANYING SPECIFICATIONS.
9. IF THERE IS A CONFLICT BETWEEN THE CONSTRUCTION DOCUMENTS AND SPECIFICATIONS, THE MOST STRINGENT WILL APPLY.
10. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE EQUIPMENT MANUFACTURERS. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, DAMPERS, VALVES, AND OTHER DEVICES REQUIRED FOR A COMPLETE WORKABLE INSTALLATION.
11. SYSTEMS ADHERE TO 2021 WSEC SECTION C403.2.4 VARIABLE FLOW CAPACITY: FOR FAN AND PUMP MOTORS 5 HP AND GREATER, INCLUDING MOTORS IN OR SERVING CUSTOM AND PACKAGED AIR HANDLERS SERVING VARIABLE AIR VOLUME SYSTEMS, CONSTANT VOLUME FANS, HEATING AND COOLING HYDRONIC PUMPING SYSTEMS, AND OTHER PUMP OR FAN MOTORS WHERE VARIABLE FLOWS ARE REQUIRED SHALL BE EQUIPPED WITH VARIABLE SPEED DRIVES.
12. SYSTEMS ADHERE TO SECTION C403.3.2 HVAC EQUIPMENT PERFORMANCE REQUIREMENTS: EQUIPMENT SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS OF TABLES C403.3.2(1) THROUGH C403.3.2(12) WHEN TESTED AND RATED IN ACCORDANCE WITH THE APPLICABLE TEST PROCEDURE.
13. SYSTEMS ADHERE TO C405.8 ELECTRIC MOTOR EFFICIENCY:
    A: ALL ELECTRIC MOTORS, FRACTIONAL OR OTHERWISE, SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS OF TABLES C405.8(1) THOUGH C405.8(4) WHEN TESTED IN ACCORDANCE WITH DOE 10 CFR UNLESS OTHER EXCEPTIONS ARE QUALIFIED AND MET BY THIS SECTION.
    B: FRACTIONAL HP FAN MOTORS THAT ARE 1/12 HP OR GREATER AND LESS THAN 1 HP (BASED ON THE OUTPUT POWER) WHICH ARE NOT COVERED IN TABLES C405.8(3) AND C405.8(4) SHALL BE ELECTRONICALLY COMMUTATED MOTORS OR SHALL HAVE A MINIMUM MOTOR EFFICIENCY OF 70 PERCENT WHEN RATED IN ACCORDANCE WITH DOE 10 CFR 431.
14. PENETRATIONS OF DUCTS, PIPES, CONDUITS, ETC IN WALLS REQUIRING PROTECTED OPENINGS SHALL BE FIRE STOPPED, FIRE STOP MATERIAL SHALL BE A UL/ULC-LISTED ASSEMBLY APPROPRIATE FOR FIRE OR SMOKE PENETRATIONS AS APPLICABLE AND AS APPROVED BY THE FIRE MARSHAL.
15. THE MECHANICAL CONTRACTOR SHALL PROVIDE FIRE RATED PENETRATIONS FOR PIPING TO COMMENSURATE WITH THE RATING OF THE WALL IN ALL PENETRATIONS OF FIRE WALLS, FIRE BARRIERS, FIRE PARTITIONS, SMOKE BARRIERS AND SMOKE PARTITION IN ALL PIPING THAT PENETRATES A HORIZONTAL OR VERTICAL FIRE PARTITION, OR AS OTHERWISE SHOWN ON THE DRAWINGS.
16. ALL PIPE SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE IN A NEAT AND WORKMANLIKE MANNER. THE USE OF WIRE OR METAL STRAPS TO SUPPORT PIPES WILL NOT BE PERMITTED. REFER TO SPECIFICATIONS FOR MINUMUM SPACING OF PIPE SUPPORTS.
17. ALL EQUIPMENT TO BE INSTALLED ON MIN 6" THICK CONCRETE HOUSEKEEPING PADS.
18. ALL EQUIPMENT, DUCTS PIPING, AND OTHER DEVICES AND MATERIALS INSTALLED OUTSIDE OF THE BUILDING OR OTHERWISE EXPOSED TO THE WEATHER SHALL BE COMPLETELY WEATHERPROOFED.
19. MECHANICAL EQUIPMENT, DUCTS AND PIPING ARE TO BE COORDINATED WITH STRUCTURAL JOISTS AND CROSS BRACING.
20. ALL EXPOSED PIPING IN OCCUPIED SPACES SUBJECT TO ARCHITECTURAL APPROVAL PRIOR TO INSTALLATION.
21. THE HVAC SYSTEMS SHALL BE TESTED AND BALANCED BY AN INDEPENDENT AGENCY, UNDER THE SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER PRIOR TO COMMISSIONING. A SEALED TYPE WRITTEN REPORT SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER.
22. A BUILDING COMMISSIONING PROCESS AND FUNCTIONAL TESTING OF MECHANICAL SYSTEMS SHALL BE CARRIED OUT BY A CERTIFIED COMMISSIONING PROFESSIONAL IN ACCORDANCE WITH 2018 WSEC SECTION C408. THE MECHANICAL, ELECTRICAL, PLUMBING, AND CONTROL CONTRACTORS ARE REQUIRED TO PERFORM FUNCTIONAL PERFORMANCE TESTING OF ALL EQUIPMENT PRIOR TO TESTING BY THE COMMISSIONING AGENT. CONTRACTORS SHALL PROVIDE THE NECESSARY ASSISTANCE TO THE COMMISSIONING AGENT TO PERFORM COMMISSIONING DUTIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING CORRECTIVE ACTION IF ANY DEFICIENCIES ARE FOUND DURING COMMISSIONING.
23. SYSTEMS ADHERE TO 2021 WSEC SECTION C408 SYSTEM COMMISSIONING:
    A. A CERTIFIED COMMISSIONING PROFESSIONAL (CCP) SHALL LEAD THE COMMISSIONING PROCESS. A CCP IS AN INDIVIDUAL WHO IS CERTIFIED BY AN ANSI/ISO/IEC 17024:2012 ACCREDITED ORGANIZATION TO LEAD, PLAN, COORDINATE, AND MANAGE COMMISSIONING TEAMS AND IMPLEMENT THE COMMISSIONING PROCESS.
    B. A CERTIFIED COMMISSIONING PROFESSIONAL SHALL PERFORM THE FOLLOWING:
        a. DEVELOP A COMMISSIONING PLAN.
        b. REVIEW BUILDING DOCUMENTATION AND CLOSE-OUT SUBMITTALS.
        c. PROVIDE A COMMISSIONING REPORT.
        d. LIST SPECIFIC EQUIPMENT, APPLIANCES AND SYSTEMS COMMISSIONED.
    C. FUNCTIONAL TESTING SHALL BE COMPLETED FOR THE FOLLOWING SYSTEMS AND THEIR ASSOCIATED CONTROL SYSTEMS:
        a. MECHANICAL SYSTEMS
        b. SERVICE WATER HEATING SYSTEMS
        c. CONTROLLED RECEPTACLE AND LIGHTING SYSTEMS
        d. EQUIPMENT APPLIANCE AND SYSTEMS
        e. ENERGY METERING
        f. REFRIGERATION SYSTEMS
    D. A COMMISSIONING REPORT SHALL BE DELIVERED TO THE BUILDING OWNER AND INCLUDE:
        a. RESULTS OF THE FUNCTIONAL PERFORMANCE TESTS
        b. LIST OF DEFICIENCIES AND CORRECTIVE MEASURES IMPLEMENTED OR PROPOSED.
        c. FUNCTIONAL PERFORMANCE TEST PROCEDURES.
        d. COMMISSIONING PLAN.
        e. TAB REPORT.
24. TESTING AND BALANCING: ALL HVAC SYSTEMS SHALL BE BALANCED BY A LICENSED CONTRACTOR IN ACCORDANCE WITH ACCEPTED ENGINEERING STANDARDS AND SPECIFICATIONS PRIOR TO COMMISSIONING.
25. OWNER TRAINING BY CONTRACTORS FOR EACH PIECE OF EQUIPMENT OR SYSTEM SHALL INCLUDE: SYSTEM/EQUIPMENT OVERVIEW (WHAT IT IS, WHAT IT DOES, AND WHICH OTHER SYSTEMS OR EQUIPMENT DOES IT INTERFACE WITH). REVIEW OF THE AVAILABLE O&M MATERIALS. REVIEW OF THE RECORD DRAWINGS ON THE SUBJECT SYSTEM/EQUIPMENT. HANDS-ON DEMONSTRATION OF ALL NORMAL MAINTENANCE PROCEDURES, NORMAL OPERATING MODES, AND ALL EMERGENCY SHUTDOWN AND START-UP PROCEDURES.
26. MECHANICAL DESIGN IS IN COMPLIANCE WITH WASHINGTON STATE ENERGY CODE FOR THE GENERAL PRESCRIPTIVE COMPLIANCE PATH. BUILDING SYTSTEMS FOR THIS PROJECT SERVE A DATA CENTER. PRESCRIPTIVE ENERGY CODE COMPLIANCE IS DEMONSTATED WITH MECHANICAL LOAD COEFFICIENT (MLC) CALCULATION SEE SHEET ON M.FT.012 PER C403.1.3 COMPLYING WITH SECTION 6 AND 8 OF ASHRAE STANDARD 90.4, AND ARE EXEMPT FROM SECTIONS C403.4 AND C403.5 PER EXCEPTION 2 TO C403.1. MINIMUM COMPLIANCE IS 0.14 FOR ZONE 4C, WHICH IS THE COMPLIANCE TARGET FOR THE MAXIMUM ANNUALIZED MLC. THIS PROJECT ATTAINS AN ANNUALIZED MLC OF 0.1354 WHICH USES LESS ENERGY AND THEREFORE COMPLIES.
27. NO ADDITIONAL C406 ENERGY EFFICIENCY CREDITS ARE REQUIRED FOR ALTERATIONS THAT DO NOT ADD MORE THAN 1,000 SQUARE FEET PER EXCEPTION 2 TO C401.3.3.

PRCTI20241387

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MECHANICAL DRAWINGS

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FUTURE TENANT
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JEFFREY M. LINDOW — STATE OF WASHINGTON — 43975 — REGISTERED PROFESSIONAL ENGINEER
2024-10-01

Revision No.	Description	Date
1	FUTURE TENANT PERMIT	8/30/2024

City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL GENERAL NOTES

Sheet: **M.FT.002**

HVAC CIRCULATION PUMP SCHEDULE

UNIT IDENTIFICATION							PERFORMANCE						PUMP MOTOR			ELECTRICAL					
MARK	NUMBER	SYSTEM SERVED	REDUNDANT	PUMP TYPE	COUPLING TYPE	CONTROL	FLUID TYPE	FLUID TEMP (F)	FLOW (GPM)	PUMP HEAD (FT)	MIN EFFICIENCY (%)	PUMP MIN FLOW (GPM)	BHP	HP	SPEED (RPM)	VOLTS	PHASE	OPERATING WEIGHT (LBS.)	MANUFACTURER	MODEL NUMBER	NOTES
CHWP-FT	1	SECONDARY CHILLED WATER LOOP	N+1	END SUCTION	CLOSE	VFD	WATER	60	1,490.0	126	83	34	58.6	60	3,500	460	3	1520	TACO	FI 5007D	1,2,3
CHWP-FT	2	SECONDARY CHILLED WATER LOOP	N+1	END SUCTION	CLOSE	VFD	WATER	60	1,490.0	126	83	34	58.6	60	3,500	460	3	1520	TACO	FI 5007D	1,2,3
CHWP-FT	3	SECONDARY CHILLED WATER LOOP	N+1	END SUCTION	CLOSE	VFD	WATER	60	1,490.0	126	83	34	58.6	60	3,500	460	3	1520	TACO	FI 5007D	1,2,3
CHWP-FT	4	SECONDARY CHILLED WATER LOOP	N+1	END SUCTION	CLOSE	VFD	WATER	60	1,490.0	126	83	34	58.6	60	3,500	460	3	1520	TACO	FI 5007D	1,2,3
CHWP-FT	5	PRIMARY CHILLED WATER - CHILLER	N+1	IN-LINE	SPLIT	VFD	WATER	60	1,050.0	45	75	6.9	17.0	20	1,760	460	3	796	TACO	KV 6011D	2
CHWP-FT	6	PRIMARY CHILLED WATER - CHILLER	N+1	IN-LINE	SPLIT	VFD	WATER	60	1,050.0	45	75	6.9	17.0	20	1,760	460	3	796	TACO	KV 6011D	2
CHWP-FT	7	PRIMARY CHILLED WATER - CHILLER	N+1	IN-LINE	SPLIT	VFD	WATER	60	1,050.0	45	75	6.9	17.0	20	1,760	460	3	796	TACO	KV 6011D	2
CHWP-FT	8	PRIMARY CHILLED WATER - CHILLER	N+1	IN-LINE	SPLIT	VFD	WATER	60	1,050.0	45	75	6.9	17.0	20	1,760	460	3	796	TACO	KV 6011D	2
CHWP-FT	9	PRIMARY CHILLED WATER - CHILLER	N+1	IN-LINE	SPLIT	VFD	WATER	60	1,050.0	45	75	6.9	17.0	20	1,760	460	3	796	TACO	KV 6011D	2
CHWP-FT	10	PRIMARY CHILLED WATER - FLUID COOLER	PER (2) FLUID COOLERS	IN-LINE	SPLIT	VFD	WATER	60	1,340.0	45	80	6.9	19.1	20	1,160	460	3	1220	TACO	KS 8013D	2
CHWP-FT	11	PRIMARY CHILLED WATER - FLUID COOLER	PER (2) FLUID COOLERS	IN-LINE	SPLIT	VFD	WATER	60	1,340.0	45	80	6.9	19.1	20	1,160	460	3	1220	TACO	KS 8013D	2
CHWP-FT	12	PRIMARY CHILLED WATER - FLUID COOLER	PER FLUID COOLER	IN-LINE	SPLIT	VFD	WATER	60	670.0	45	83	3.4	8.7	10	1,760	460	3	905	TACO	KS 6011D	2
CHWP-FT	13	PRIMARY CHILLED WATER - FLUID COOLER	PER FLUID COOLER	IN-LINE	SPLIT	VFD	WATER	60	670.0	45	83	3.4	8.7	10	1,760	460	3	905	TACO	KS 6011D	2
FP-FT	1	FLUID COOLER FILTER PUMP	N/A	SKID	CLOSE	VFD	WATER	60	220.0	10				7.5		460	3		PUROFLUX	PF-64-030-AP	1,2

NOTES:
1. PROVIDE WITH INERTIA BASE.
2. PROVIDE WITH TEFC MOTOR.
3. PROVIDE WITH SHAFT GROUNDING RING.

AIR COOLED CHILLER SCHEDULE

UNIT IDENTIFICATION			CAPACITY AND PERFORMANCE							EVAPORATOR						COMPRESSOR				CONDENSERS					ELECTRICAL				PHYSICAL CHARACTERISTICS						
																														DIMENSIONS					
MARK	NUMBER	AREA/UNIT SERVED	UNIT CAPACITY (TONS)	EER	2018 WSCEC REQUIRED EER	IPLV	2018 WSCEC REQUIRED IPLV	REFRIG TYPE	REFRIG CHARGE (LBS)	FLUID TYPE	FLUID (GPM)	EWT (F)	LWT (F)	MAX WPD (FT)	FOULING FACTOR	TYPE	NO OF COMP	NO OF CIRCUITS	NO OF STAGES	NO OF FANS	AIRFLOW PER FAN (CFM)	HP PER FAN	AMBIENT DESIGN TEMP (F)	MIN AMBIENT TEMP (F)	VOLTS	PHASE	MCA	MOP	OPERATING WEIGHT (LBS)	HEIGHT (IN)	WIDTH (IN)	LENGTH (IN)	MANUFACTURER	MODEL NUMBER	NOTES
ACC-FT	1	CHILLED WATER	500.0	12.5	10.1	19.99	14	R-513A	353	WATER	1,002	72.0	60.0	10.1	0.0001	SCREW	2	2	VSD	26	12,866	4	95	4	460	3	872.0	1,200	31,665	94	90	600	YORK	YVAA0523JPK46BHVTXX	1,2,3,4,5,6
ACC-FT	2	CHILLED WATER	500.0	12.5	10.1	19.99	14	R-513A	353	WATER	1,002	72.0	60.0	10.1	0.0001	SCREW	2	2	VSD	26	12,866	4	95	4	460	3	872.0	1,200	31,665	94	90	600	YORK	YVAA0523JPK46BHVTXX	1,2,3,4,5,6
ACC-FT	3	CHILLED WATER	500.0	12.5	10.1	19.99	14	R-513A	353	WATER	1,002	72.0	60.0	10.1	0.0001	SCREW	2	2	VSD	26	12,866	4	95	4	460	3	872.0	1,200	31,665	94	90	600	YORK	YVAA0523JPK46BHVTXX	1,2,3,4,5,6
ACC-FT	4	CHILLED WATER	500.0	12.5	10.1	19.99	14	R-513A	353	WATER	1,002	72.0	60.0	10.1	0.0001	SCREW	2	2	VSD	26	12,866	4	95	4	460	3	872.0	1,200	31,665	94	90	600	YORK	YVAA0523JPK46BHVTXX	1,2,3,4,5,6
ACC-FT	5	CHILLED WATER	500.0	12.5	10.1	19.99	14	R-513A	353	WATER	1,002	72.0	60.0	10.1	0.0001	SCREW	2	2	VSD	26	12,866	4	95	4	460	3	872.0	1,200	32,308	94	90	600	YORK	YVAA0523JPK46BHVTXX	2,3,4,5,6

NOTES:
1. OFCI.
2. PERFORMANCE BASED ON WATER.
3. PROVIDE SINGLE POINT ELECTRICAL CONNECTION, AND 65 kA SHORT CIRCUIT RATING.
4. PROVIDE WITH BACNET MSTP CONNECTION, OPTIVIEW CONTROL PANEL AND DISPLAY, AND CONDENSER FAN MONITORING PACKAGE.
5. PROVIDE WITH FLOW SWITCH.
6. PROVIDE WITH NEOPRENE PADS AS REQUIRED FOR INSTALLATION BY CONTRACTOR, NOTE OFCI CHILLERS ARE FURNISHED WITH PADS.

CLOSED CIRCUIT FLUID COOLERS SCHEDULE

				CONDENSER WATER			AMBIENT AIR		FAN MOTOR			PUMP				HEATERS		UNIT SIZE						
TAG	MANUFACTURER	MODEL NUMBER	NOMINAL CAPACITY (TONS)	FLOW (GPM)	EWT (°F)	LWT (°F)	FLOW (CFM)	WB (°F)	QTY	HP	V/Ø/HZ	QTY	HP	FLOW (GPM)	V/Ø/HZ	QTY	KW	HEIGHT	WIDTH	LENGTH	SPRAY PRESS. (PSI)	EVAP. RATE (GPM)	OPER WEIGHT (LBS)	NOTES
FC-FT-1	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4
FC-FT-2	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4
FC-FT-3	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4
FC-FT-4	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4
FC-FT-5	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4
FC-FT-6	EVAPCO	ESW4 12-44O18-SF	536	670	72	60	155,600	53	1	50	460/3/60	2	5	506	460/3/60	2	9	242 IN	131 IN	216 IN.	2.7	4.04	44,310	1,2,3,4

NOTES:
1. PROVIDE FLUID COOLER WITH STAINLESS STEEL BASIN, SUMP SWEEPER PIPING, AND 5-PROBE WATER LEVEL CONTRL. FANS SHALL BE PROVIDED WITH VFD AND A NEMA 3R ENCLOSURE.
2. MANUFACTURER SHALL FURNISH THE FOLLOWING ACCESSORIES: BASIN IMMERSION HEATER COMPONENTS & CONTROLS; BASIN WATER LEVEL COMPONENTS & CONTROLS; VIBRATION CUT-OUT SWITCH; VFD'S; MAKE-UP WATER SOLENOID VALVES.
~~3. INSTALLATION OF CONDUIT & WIRING OF THE FOLLOWING ACCESSORIES FROM THE CONTROL ENCOSURE SHALL BE PROVIDED BY THE EC: (2) BASIN IMMERSION HEATERS, (2)~~ PUMPS, (1) FAN.
4. FLUID COOLERS SHALL COMPLY WITH 2021 WSEC TABLE C403.3.2(7) FOR REQUIRED COOLING TOWER INSTITUTE (CTI ATC-105S AND CTI STD-201 RS) RATING CONDITIONS.

AIR AND DIRT SEPARATOR SCHEDULE

UNIT IDENTIFICATION												
MARK	NUMBER	SYSTEM SERVED	TYPE	CONNECTION SIZE (IN)	DIAMETER (IN)	HEIGHT (IN)	WEIGHT (LBS)	FLOW (GPM)	MAX WPD (FT)	MANUFACTURER	MODEL NUMBER	NOTES
AS-FT	1	CHILLED WATER	IN-LINE	14	28	140	1,890	4,470.0	9.0	SPIROTHERM	VHDT1400FA	

NOTES:

HVAC EXPANSION TANK SCHEDULE

UNIT IDENTIFICATION			TANK							SYSTEM								
												OPERATING TEMPERATURE		OPERATING PRESSURE				
MARK	NUMBER	SYSTEM SERVED	TYPE	ASME CONSTRUCTION	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	DIAMETER (IN)	HEIGHT (IN)	WEIGHT (LBS)	ESTIMATED SYSTEM VOLUME (GAL)	FLUID TYPE	MIN TEMP (F)	MAX TEMP (F)	MIN PRESS (PSIG)	MAX PRESS (PSIG)	MANUFACTURER	MODEL NUMBER	NOTES
ET-FT	1	CHILLED WATER	BLADDER	STEEL	160.0	61.0	30	68	515	15,000	WATER	40	85	5.0	125.0	TACO	CBX600-125	1
ET-FT	2	CHILLED WATER	BLADDER	STEEL	160.0	61.0	30	68	515	15,000	WATER	40	85	5.0	125.0	TACO	CBX600-125	1

NOTES:
1. PROVIDE ASME RATED TANK.

PIPING SYSTEM APPLICATION SCHEDULE

		DESIGN		CONSTRUCTION						MATERIAL								JOINTS						HEAT TRACE		INSULATION			FACTORY JACKET				FIELD JACKET					
SYSTEM	PIPE SIZE (IN)	MAX VELOCITY (FPS)	MAX FRICTION (FT/100')	OPERATING TEMP (F)	MIN WORKING PRESSURE (PSIG)	MIN TEMP RATING (F)	TEST PRESSURE (PSIG)	TES DURATION (HRS)	LOCATION	COPPER TYPE K	COPPER TYPE L	A53 BS ERW SCH 40	A53 BS ERW STD	SCH 10 TYPE 316 STAINLESS STEEL	SCH 10 TYPE 304 STAINLESS STEEL	HDPE	PEX-A	SOLDERED	BRAZED	THREADED	WELDED	PRESSURE FITTINGS	GROOVED	QUANTITY OF WIRES	MIN WATTS PER LINEAR FT	MINERAL FIBER, PREFORMED	FLEXIBLE ELASTOMERIC	THICKNESS (IN)	ASJ	ASJ-SS	FSK	VINYL	PVC - ALL	PVC - FITTINGS	PVC - TO 10 FEET AFF	ALUMINUM	STAINLESS STEEL	NOTES
CHILLED WATER & FLUID COOLER BASIN SWEEPER WATER	2 AND LESS	4	4.0	44-56	125	200	125	2.5	CONCEALED		X							X	X								X	1		X				X				1
									EXPOSED		X							X	X								X	1		X				X	X			1
									MECHANICAL ROOM		X							X	X								X	1		X				X	X			1
									OUTDOOR		X							X	X					1	5		X	1		X						X		1,2
									UNDERGROUND		X							X	X								X	1		X							X	1
	2-1/2 - 8	8	4.0	44-56	125	200	125	2.5	CONCEALED			X									X						X	1		X				X				1
									EXPOSED			X									X						X	1		X				X	X			1
									MECHANICAL ROOM			X									X						X	1		X				X	X			1
									OUTDOOR			X									X			1	8		X	1		X						X		1,2
									UNDERGROUND			X									X						X	1		X							X	1
	9 - 10	8	4.0	44-56	125	200	125	2.5	CONCEALED			X									X						X	1		X				X				1
									EXPOSED			X									X						X	1		X				X	X			1
									MECHANICAL ROOM			X									X						X	1		X				X	X			1
									OUTDOOR			X									X			1	10		X	1		X						X		1,2
									UNDERGROUND			X									X						X	1		X							X	1
	12 - 16	8	4.0	44-56	125	200	125	2.5	CONCEALED			X									X						X	1		X				X				1
									EXPOSED			X									X						X	1		X				X	X			1
									MECHANICAL ROOM			X									X						X	1		X				X	X			1
									OUTDOOR			X									X			2	5		X	1		X						X		1,2
									UNDERGROUND			X									X						X	1		X							X	1

NOTES:
1. PIPE INSULATION THICKNESS BASED ON 2021 WSEC
2. PROVIDE WITH SELF REGULATING HEAT TRACE CABLE MONITORED BY THE BAS.

PRCTI20241387

centeris

Stantec
720 3rd Avenue Suite 1500
Seattle Washington 98104-1878
(206) 667-0555

MECHANICAL DRAWINGS

CENTERIS
FUTURE TENANT
1019 39th AVENUE SE
PUYALLUP, WA 98374

JEFFREY M. LYNCH, STATE OF WASHINGTON, 42872, REGISTERED PROFESSIONAL ENGINEER
2024-10-01

Revision No.	Description	Date
1	FUTURE TENANT PERMIT	8/30/2024
2	FUTURE TENANT PERMIT COMMENTS	10/01/2024

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

Drawn By: JLV
Checked By: BO

Title: MECHANICAL SCHEDULES

Sheet: M.FT.010

MECHANICAL ENERGY AT 25% ITE LOAD CALCULATION

AMBIENT TEMPERATURE WB (°F)	AMBIENT MEAN COINCIDENT DB (°F)	ASHRAE TMY HOURS	NUMBER OF OPERATING CHILLERS	CHILLER CAPACITY (TONS)	CHILLER ENERGY (KW)	CHILLER ENERGY USAGE (KWH)	NUMBER OF OPERATING FLUID COOLERS	FLUID COOLER OPERATING CAPACITY (%)	FLUID COOLER FAN (HP)	FLUID COOLER FAN MOTOR EFFICIENCY (%)	FLUID COOLER FAN DRIVE EFFICIENCY (%)	FLUID COOLER FAN VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER FAN ENERGY (KW)	FLUID COOLER FAN (KWH)	FLUID COOLER PUMP (HP)	FLUID COOLER PUMP WATER FLOW (GPM)	NUMBER OF FLUID COOLER PUMPS PER FLUID COOLER	FLUID COOLER PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER PUMP TOTAL (KW)	FLUID COOLER PUMP TOTAL (KWH)	FLUID COOLER CHILLED WATER PRIMARY PUMP FLOW (GPM)	FLUID COOLER CHILLED WATER PRIMARY PUMPS POWER (HP)	FLUID COOLER PRIMARY PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENC...	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KW)	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KWH)	TOTAL AIR HANDLER FAN ENERGY (KW)	TOTAL AIR HANDLER FAN ENERGY (KWH)	NUMBER OF CHILLER PRIMARY PUMPS	CHILLER PRIMARY PUMP CAPACITY (%)	CHILLER PRIMARY PUMP FLOW (GPM)	CHILLER PRIMARY PUMP BRAKE POWER (BHP)	CHILLER PRIMARY PUMP MOTOR EFFICIENCY (%)	CHILLER PRIMARY PUMP DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP ENERGY (KW)	CHILLER PRIMARY PUMP ENERGY (KWH)	NUMBER OF SECONDARY PUMPS	SECONDARY PUMP CAPACITY (%)	SECONDARY PUMP FLOW (GPM)	SECONDARY PUMP BRAKE POWER (HP)	SECONDARY PUMP MOTOR EFFICIENCY (%)	SECONDARY PUMP DRIVE EFFICIENCY (%)	SECONDARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	SECONDARY PUMP ENERGY (KW)	SECONDARY PUMP ENERGY (KWH)
74	82.2	1	1	440	312.2	312																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	20	1	80%	1780	41.27	0.902	0.83	0.98	41.94	42
72	89.6	27	1	440	365.1	9,858																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	545	1	80%	1780	41.27	0.902	0.83	0.98	41.94	1,132
70	84.6	41	1	440	322.5	13,223																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	827	1	80%	1780	41.27	0.902	0.83	0.98	41.94	1,720
68	81.9	105	1	440	312.2	32,781																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	2,118	1	80%	1780	41.27	0.902	0.83	0.98	41.94	4,404
66	78.2	148	1	440	294	43,512																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	2,986	1	80%	1780	41.27	0.902	0.83	0.98	41.94	6,208
64	74.7	191	1	440	275	52,525																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	3,853	1	80%	1780	41.27	0.902	0.83	0.98	41.94	8,011
62	71.9	256	1	440	266.5	68,224																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	5,164	1	80%	1780	41.27	0.902	0.83	0.98	41.94	10,737
60	67.8	293	1	440	251.3	73,631																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	5,911	1	80%	1780	41.27	0.902	0.83	0.98	41.94	12,289
58	65.4	426	1	440	246.2	104,881																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	8,593	1	80%	1780	41.27	0.902	0.83	0.98	41.94	17,868
56	62.4	440	1	440	239.4	105,336																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	8,876	1	80%	1780	41.27	0.902	0.83	0.98	41.94	18,455
54	60.6	588	1	440	237.1	139,415																								0	0	1.0	100%	1,050	17	0.855	0.75	0.98	20.17	11,861	1	80%	1780	41.27	0.902	0.83	0.98	41.94	24,662
52	57.4	530					2	100%	50	0.945	0.97	0.97	83.87	44,449	5	505	2	0.875	0.97	0.97	18.12	9,601	670	8.7	0.84	0.83	0.98	18.99	20,130	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	22,230
50	54.7	498					2	100%	50	0.945	0.97	0.97	83.87	41,766	5	505	2	0.875	0.97	0.97	18.12	9,021	670	8.7	0.84	0.83	0.98	18.99	18,914	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	20,888
48	52.3	517					2	100%	50	0.945	0.97	0.97	83.87	43,359	5	505	2	0.875	0.97	0.97	18.12	9,366	670	8.7	0.84	0.83	0.98	18.99	19,636	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	21,684
46	50.3	557					2	100%	50	0.945	0.97	0.97	83.87	46,714	5	505	2	0.875	0.97	0.97	18.12	10,090	670	8.7	0.84	0.83	0.98	18.99	21,155	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	23,362
44	48.1	468					2	100%	50	0.945	0.97	0.97	83.87	39,250	5	505	2	0.875	0.97	0.97	18.12	8,478	670	8.7	0.84	0.83	0.98	18.99	17,775	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	19,629
42	45.7	698					2	100%	50	0.945	0.97	0.97	83.87	58,539	5	505	2	0.875	0.97	0.97	18.12	12,644	670	8.7	0.84	0.83	0.98	18.99	26,510	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	29,276
40	43.3	771					2	100%	50	0.945	0.97	0.97	83.87	64,661	5	505	2	0.875	0.97	0.97	18.12	13,967	670	8.7	0.84	0.83	0.98	18.99	29,283	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	32,338
38	41.2	674					2	100%	50	0.945	0.97	0.97	83.87	56,526	5	505	2	0.875	0.97	0.97	18.12	12,210	670	8.7	0.84	0.83	0.98	18.99	25,599	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	28,270
36	39.3	518					2	100%	50	0.945	0.97	0.97	83.87	43,443	5	505	2	0.875	0.97	0.97	18.12	9,384	670	8.7	0.84	0.83	0.98	18.99	19,674	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	21,726
34	37.2	465					2	100%	50	0.945	0.97	0.97	83.87	38,998	5	505	2	0.875	0.97	0.97	18.12	8,424	670	8.7	0.84	0.83	0.98	18.99	17,661	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	19,503
32	35.3	228					2	100%	50	0.945	0.97	0.97	83.87	19,122	5	505	2	0.875	0.97	0.97	18.12	4,130	670	8.7	0.84	0.83	0.98	18.99	8,660	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	9,563
30	33.3	118					2	100%	50	0.945	0.97	0.97	83.87	9,896	5	505	2	0.875	0.97	0.97	18.12	2,138	670	8.7	0.84	0.83	0.98	18.99	4,482	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	4,949
28	31.6	99					2	100%	50	0.945	0.97	0.97	83.87	8,303	5	505	2	0.875	0.97	0.97	18.12	1,793	670	8.7	0.84	0.83	0.98	18.99	3,760	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	4,152
26	29.4	46					2	100%	50	0.945	0.97	0.97	83.87	3,858	5	505	2	0.875	0.97	0.97	18.12	833	670	8.7	0.84	0.83	0.98	18.99	1,747	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	1,929
24	27.6	29					2	100%	50	0.945	0.97	0.97	83.87	2,432	5	505	2	0.875	0.97	0.97	18.12	525	670	8.7	0.84	0.83	0.98	18.99	1,101	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	1,216
22	25.9	13					2	100%	50	0.945	0.97	0.97	83.87	1,090	5	505	2	0.875	0.97	0.97	18.12	235	670	8.7	0.84	0.83	0.98	18.99	494	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	545
20	24.2	15					2	100%	50	0.945	0.97	0.97	83.87	1,258	5	505	2	0.875	0.97	0.97	18.12	272	670	8.7	0.84	0.83	0.98	18.99	570	0	0										1	80%	1780	41.27	0.902	0.83	0.98	41.94	629

MECHANICAL ENERGY AT 50% ITE LOAD CALCULATION

AMBIENT TEMPERATURE WB (°F)	AMBIENT MEAN COINCIDENT DB (°F)	ASHRAE TMY HOURS	NUMBER OF OPERATING CHILLERS	CHILLER CAPACITY (TONS)	CHILLER ENERGY (KW)	CHILLER ENERGY USAGE (KWH)	NUMBER OF OPERATING FLUID COOLERS	FLUID COOLER OPERATING CAPACITY (%)	FLUID COOLER FAN (HP)	FLUID COOLER FAN MOTOR EFFICIENCY (%)	FLUID COOLER FAN DRIVE EFFICIENCY (%)	FLUID COOLER FAN VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER FAN ENERGY (KW)	FLUID COOLER FAN (KWH)	FLUID COOLER PUMP (HP)	FLUID COOLER PUMP WATER FLOW (GPM)	NUMBER OF FLUID COOLER PUMPS PER FLUID COOLER	FLUID COOLER PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER PUMP TOTAL (KW)	FLUID COOLER PUMP TOTAL (KWH)	FLUID COOLER CHILLED WATER PRIMARY PUMP FLOW (GPM)	FLUID COOLER CHILLED WATER PRIMARY PUMPS POWER (HP)	FLUID COOLER PRIMARY PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENC...	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KW)	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KWH)	TOTAL AIR HANDLER FAN ENERGY (KW)	TOTAL AIR HANDLER FAN ENERGY (KWH)	NUMBER OF CHILLER PRIMARY PUMPS	CHILLER PRIMARY PUMP CAPACITY (%)	CHILLER PRIMARY PUMP FLOW (GPM)	CHILLER PRIMARY PUMP BRAKE POWER (BHP)	CHILLER PRIMARY PUMP MOTOR EFFICIENCY (%)	CHILLER PRIMARY PUMP DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP ENERGY (KW)	CHILLER PRIMARY PUMP ENERGY (KWH)	NUMBER OF SECONDARY PUMPS	SECONDARY PUMP CAPACITY (%)	SECONDARY PUMP FLOW (GPM)	SECONDARY PUMP BRAKE POWER (HP)	SECONDARY PUMP MOTOR EFFICIENCY (%)	SECONDARY PUMP DRIVE EFFICIENCY (%)	SECONDARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	SECONDARY PUMP ENERGY (KW)	SECONDARY PUMP ENERGY (KWH)
74	82.2	1	2	440	312.2	624																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	40	2	60%	1335	17.41	0.902	0.83	0.98	35.39	35
72	89.6	27	2	440	365.1	19,715																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	1,089	2	60%	1335	17.41	0.902	0.83	0.98	35.39	956
70	84.6	41	2	440	322.5	26,445																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	1,654	2	60%	1335	17.41	0.902	0.83	0.98	35.39	1,451
68	81.9	105	2	440	312.2	65,562																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	4,236	2	60%	1335	17.41	0.902	0.83	0.98	35.39	3,716
66	78.2	148	2	440	294	87,024																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	5,971	2	60%	1335	17.41	0.902	0.83	0.98	35.39	5,238
64	74.7	191	2	440	275	105,050																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	7,706	2	60%	1335	17.41	0.902	0.83	0.98	35.39	6,759
62	71.9	256	2	440	266.5	136,448																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	10,328	2	60%	1335	17.41	0.902	0.83	0.98	35.39	9,060
60	67.8	293	2	440	251.3	147,262																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	11,821	2	60%	1335	17.41	0.902	0.83	0.98	35.39	10,369
58	65.4	426	2	440	246.2	209,762																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	17,187	2	60%	1335	17.41	0.902	0.83	0.98	35.39	15,076
56	62.4	440	2	440	239.4	210,672																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	17,752	2	60%	1335	17.41	0.902	0.83	0.98	35.39	15,571
54	60.6	588	2	440	237.1	278,830																								0	0	2.0	100%	1,050	17	0.855	0.75	0.98	40.34	23,723	2	60%	1335	17.41	0.902	0.83	0.98	35.39	20,809
52	57.4	530					3	100%	50	0.945	0.97	0.97	125.80	66,674	5	505	2	0.875	0.97	0.97	27.17	14,402	670	8.7	0.84	0.83	0.98	28.49	45,292	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	18,756
50	54.7	498					3	100%	50	0.945	0.97	0.97	125.80	62,648	5	505	2	0.875	0.97	0.97	27.17	13,532	670	8.7	0.84	0.83	0.98	28.49	42,557	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	17,624
48	52.3	517					3	100%	50	0.945	0.97	0.97	125.80	65,039	5	505	2	0.875	0.97	0.97	27.17	14,048	670	8.7	0.84	0.83	0.98	28.49	44,181	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	18,296
46	50.3	557					3	100%	50	0.945	0.97	0.97	125.80	70,071	5	505	2	0.875	0.97	0.97	27.17	15,135	670	8.7	0.84	0.83	0.98	28.49	47,599	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	19,712
44	48.1	468					3	100%	50	0.945	0.97	0.97	125.80	58,874	5	505	2	0.875	0.97	0.97	27.17	12,717	670	8.7	0.84	0.83	0.98	28.49	39,993	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	16,562
42	45.7	698					3	100%	50	0.945	0.97	0.97	125.80	87,808	5	505	2	0.875	0.97	0.97	27.17	18,967	670	8.7	0.84	0.83	0.98	28.49	59,648	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	24,702
40	43.3	771					3	100%	50	0.945	0.97	0.97	125.80	96,992	5	505	2	0.875	0.97	0.97	27.17	20,950	670	8.7	0.84	0.83	0.98	28.49	65,887	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	27,285
38	41.2	674					3	100%	50	0.945	0.97	0.97	125.80	84,789	5	505	2	0.875	0.97	0.97	27.17	18,314	670	8.7	0.84	0.83	0.98	28.49	57,597	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	23,852
36	39.3	518					3	100%	50	0.945	0.97	0.97	125.80	65,164	5	505	2	0.875	0.97	0.97	27.17	14,075	670	8.7	0.84	0.83	0.98	28.49	44,266	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	18,332
34	37.2	465					3	100%	50	0.945	0.97	0.97	125.80	58,497	5	505	2	0.875	0.97	0.97	27.17	12,635	670	8.7	0.84	0.83	0.98	28.49	39,737	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	16,456
32	35.3	228					3	100%	50	0.945	0.97	0.97	125.80	28,682	5	505	2	0.875	0.97	0.97	27.17	6,195	670	8.7	0.84	0.83	0.98	28.49	19,484	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	8,069
30	33.3	118					3	100%	50	0.945	0.97	0.97	125.80	14,844	5	505	2	0.875	0.97	0.97	27.17	3,206	670	8.7	0.84	0.83	0.98	28.49	10,084	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	4,176
28	31.6	99					3	100%	50	0.945	0.97	0.97	125.80	12,454	5	505	2	0.875	0.97	0.97	27.17	2,690	670	8.7	0.84	0.83	0.98	28.49	8,460	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	3,504
26	29.4	46					3	100%	50	0.945	0.97	0.97	125.80	5,787	5	505	2	0.875	0.97	0.97	27.17	1,250	670	8.7	0.84	0.83	0.98	28.49	3,931	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	1,628
24	27.6	29					3	100%	50	0.945	0.97	0.97	125.80	3,648	5	505	2	0.875	0.97	0.97	27.17	788	670	8.7	0.84	0.83	0.98	28.49	2,478	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	1,026
22	25.9	13					3	100%	50	0.945	0.97	0.97	125.80	1,635	5	505	2	0.875	0.97	0.97	27.17	353	670	8.7	0.84	0.83	0.98	28.49	1,111	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	460
20	24.2	15					3	100%	50	0.945	0.97	0.97	125.80	1,887	5	505	2	0.875	0.97	0.97	27.17	408	670	8.7	0.84	0.83	0.98	28.49	1,282	0	0										2	60%	1335	17.41	0.902	0.83	0.98	35.39	531

MECHANICAL ENERGY AT 75% ITE LOAD CALCULATION

AMBIENT TEMPERATURE WB (°F)	AMBIENT MEAN COINCIDENT DB (°F)	ASHRAE TMY HOURS	NUMBER OF OPERATING CHILLERS	CHILLER CAPACITY (TONS)	CHILLER ENERGY (KW)	CHILLER ENERGY USAGE (KWH)	NUMBER OF OPERATING FLUID COOLERS	FLUID COOLER OPERATING CAPACITY (%)	FLUID COOLER FAN (HP)	FLUID COOLER FAN MOTOR EFFICIENCY (%)	FLUID COOLER FAN DRIVE EFFICIENCY (%)	FLUID COOLER FAN VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER FAN ENERGY (KW)	FLUID COOLER FAN (KWH)	FLUID COOLER PUMP (HP)	FLUID COOLER PUMP WATER FLOW (GPM)	NUMBER OF FLUID COOLER PUMPS PER FLUID COOLER	FLUID COOLER PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER PUMP TOTAL (KW)	FLUID COOLER PUMP TOTAL (KWH)	FLUID COOLER CHILLED WATER PRIMARY PUMP FLOW (GPM)	FLUID COOLER CHILLED WATER PRIMARY PUMPS POWER (HP)	FLUID COOLER PRIMARY PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENC...	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KW)	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KWH)	TOTAL AIR HANDLER FAN ENERGY (KW)	TOTAL AIR HANDLER FAN ENERGY (KWH)	NUMBER OF CHILLER PRIMARY PUMPS	CHILLER PRIMARY PUMP CAPACITY (%)	CHILLER PRIMARY PUMP FLOW (GPM)	CHILLER PRIMARY PUMP BRAKE POWER (BHP)	CHILLER PRIMARY PUMP MOTOR EFFICIENCY (%)	CHILLER PRIMARY PUMP DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP ENERGY (KW)	CHILLER PRIMARY PUMP ENERGY (KWH)	NUMBER OF SECONDARY PUMPS	SECONDARY PUMP CAPACITY (%)	SECONDARY PUMP FLOW (GPM)	SECONDARY PUMP BRAKE POWER (HP)	SECONDARY PUMP MOTOR EFFICIENCY (%)	SECONDARY PUMP DRIVE EFFICIENCY (%)	SECONDARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	SECONDARY PUMP ENERGY (KW)	SECONDARY PUMP ENERGY (KWH)
74	82.2	1	3	440	312.2	937																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	61	2	80%	1780	41.27	0.902	0.83	0.98	83.89	84
72	89.6	27	3	440	365.1	29,573																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	1,634	2	80%	1780	41.27	0.902	0.83	0.98	83.89	2,265
70	84.6	41	3	440	322.5	39,668																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	2,481	2	80%	1780	41.27	0.902	0.83	0.98	83.89	3,439
68	81.9	105	3	440	312.2	98,343																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	6,354	2	80%	1780	41.27	0.902	0.83	0.98	83.89	8,808
66	78.2	148	3	440	294	130,536																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	8,957	2	80%	1780	41.27	0.902	0.83	0.98	83.89	12,415
64	74.7	191	3	440	275	157,575																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	11,559	2	80%	1780	41.27	0.902	0.83	0.98	83.89	16,022
62	71.9	256	3	440	266.5	204,672																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	15,492	2	80%	1780	41.27	0.902	0.83	0.98	83.89	21,475
60	67.8	293	3	440	251.3	220,893																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	17,732	2	80%	1780	41.27	0.902	0.83	0.98	83.89	24,579
58	65.4	426	3	440	246.2	314,644																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	25,780	2	80%	1780	41.27	0.902	0.83	0.98	83.89	35,735
56	62.4	440	3	440	239.4	316,008																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	26,628	2	80%	1780	41.27	0.902	0.83	0.98	83.89	36,910
54	60.6	588	3	440	237.1	418,244																								0	0	3.0	100%	1,050	17	0.855	0.75	0.98	60.52	35,584	2	80%	1780	41.27	0.902	0.83	0.98	83.89	49,325
52	57.4	530					5	100%	50	0.945	0.97	0.97	209.67	111,123	5	505	2	0.875	0.97	0.97	45.29	24,003	670	8.7	0.84	0.83	0.98	47.48	125,810	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	44,459
50	54.7	498					5	100%	50	0.945	0.97	0.97	209.67	104,414	5	505	2	0.875	0.97	0.97	45.29	22,553	670	8.7	0.84	0.83	0.98	47.48	118,214	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	41,775
48	52.3	517					5	100%	50	0.945	0.97	0.97	209.67	108,398	5	505	2	0.875	0.97	0.97	45.29	23,414	670	8.7	0.84	0.83	0.98	47.48	122,724	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	43,369
46	50.3	557					5	100%	50	0.945	0.97	0.97	209.67	116,784	5	505	2	0.875	0.97	0.97	45.29	25,225	670	8.7	0.84	0.83	0.98	47.48	132,219	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	46,724
44	48.1	468					5	100%	50	0.945	0.97	0.97	209.67	98,124	5	505	2	0.875	0.97	0.97	45.29	21,195	670	8.7	0.84	0.83	0.98	47.48	111,093	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	39,259
42	45.7	698					5	100%	50	0.945	0.97	0.97	209.67	146,347	5	505	2	0.875	0.97	0.97	45.29	31,611	670	8.7	0.84	0.83	0.98	47.48	165,690	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	58,552
40	43.3	771					5	100%	50	0.945	0.97	0.97	209.67	161,653	5	505	2	0.875	0.97	0.97	45.29	34,917	670	8.7	0.84	0.83	0.98	47.48	183,018	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	64,676
38	41.2	674					5	100%	50	0.945	0.97	0.97	209.67	141,315	5	505	2	0.875	0.97	0.97	45.29	30,524	670	8.7	0.84	0.83	0.98	47.48	159,993	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	56,539
36	39.3	518					5	100%	50	0.945	0.97	0.97	209.67	108,607	5	505	2	0.875	0.97	0.97	45.29	23,459	670	8.7	0.84	0.83	0.98	47.48	122,962	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	43,453
34	37.2	465					5	100%	50	0.945	0.97	0.97	209.67	97,495	5	505	2	0.875	0.97	0.97	45.29	21,059	670	8.7	0.84	0.83	0.98	47.48	110,381	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	39,007
32	35.3	228					5	100%	50	0.945	0.97	0.97	209.67	47,804	5	505	2	0.875	0.97	0.97	45.29	10,326	670	8.7	0.84	0.83	0.98	47.48	54,122	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	19,126
30	33.3	118					5	100%	50	0.945	0.97	0.97	209.67	24,741	5	505	2	0.875	0.97	0.97	45.29	5,344	670	8.7	0.84	0.83	0.98	47.48	28,011	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	9,899
28	31.6	99					5	100%	50	0.945	0.97	0.97	209.67	20,757	5	505	2	0.875	0.97	0.97	45.29	4,484	670	8.7	0.84	0.83	0.98	47.48	23,500	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	8,305
26	29.4	46					5	100%	50	0.945	0.97	0.97	209.67	9,645	5	505	2	0.875	0.97	0.97	45.29	2,083	670	8.7	0.84	0.83	0.98	47.48	10,919	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	3,859
24	27.6	29					5	100%	50	0.945	0.97	0.97	209.67	6,080	5	505	2	0.875	0.97	0.97	45.29	1,313	670	8.7	0.84	0.83	0.98	47.48	6,884	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	2,433
22	25.9	13					5	100%	50	0.945	0.97	0.97	209.67	2,726	5	505	2	0.875	0.97	0.97	45.29	589	670	8.7	0.84	0.83	0.98	47.48	3,086	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	1,091
20	24.2	15					5	100%	50	0.945	0.97	0.97	209.67	3,145	5	505	2	0.875	0.97	0.97	45.29	679	670	8.7	0.84	0.83	0.98	47.48	3,561	0	0										2	80%	1780	41.27	0.902	0.83	0.98	83.89	1,258

MECHANICAL ENERGY AT 100% ITE LOAD CALCULATION

AMBIENT TEMPERATURE WB (°F)	AMBIENT MEAN COINCIDENT DB (°F)	ASHRAE TMY HOURS	NUMBER OF OPERATING CHILLERS	CHILLER CAPACITY (TONS)	CHILLER ENERGY (KW)	CHILLER ENERGY USAGE (KWH)	NUMBER OF OPERATING FLUID COOLERS	FLUID COOLER OPERATING CAPACITY (%)	FLUID COOLER FAN (HP)	FLUID COOLER FAN MOTOR EFFICIENCY (%)	FLUID COOLER FAN DRIVE EFFICIENCY (%)	FLUID COOLER FAN VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER FAN ENERGY (KW)	FLUID COOLER FAN (KWH)	FLUID COOLER PUMP (HP)	FLUID COOLER PUMP WATER FLOW (GPM)	NUMBER OF FLUID COOLER PUMPS PER FLUID COOLER	FLUID COOLER PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER PUMP TOTAL (KW)	FLUID COOLER PUMP TOTAL (KWH)	FLUID COOLER CHILLED WATER PRIMARY PUMP FLOW (GPM)	FLUID COOLER CHILLED WATER PRIMARY PUMPS POWER (HP)	FLUID COOLER PRIMARY PUMP MOTOR EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP DRIVE EFFICIENCY (%)	FLUID COOLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KW)	FLUID COOLER CHILLED WATER PRIMARY PUMPS (KWH)	TOTAL AIR HANDLER FAN ENERGY (KW)	TOTAL AIR HANDLER FAN ENERGY (KWH)	NUMBER OF CHILLER PRIMARY PUMPS	CHILLER PRIMARY PUMP CAPACITY (%)	CHILLER PRIMARY PUMP FLOW (GPM)	CHILLER PRIMARY PUMP BRAKE POWER (BHP)	CHILLER PRIMARY PUMP MOTOR EFFICIENCY (%)	CHILLER PRIMARY PUMP DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	CHILLER PRIMARY PUMP ENERGY (KW)	CHILLER PRIMARY PUMP ENERGY (KWH)	NUMBER OF SECONDARY PUMPS	SECONDARY PUMP CAPACITY (%)	SECONDARY PUMP FLOW (GPM)	SECONDARY PUMP BRAKE POWER (HP)	SECONDARY PUMP MOTOR EFFICIENCY (%)	SECONDARY PUMP DRIVE EFFICIENCY (%)	SECONDARY PUMP VARIABLE SPEED DRIVE EFFICIENCY (%)	SECONDARY PUMP ENERGY (KW)	SECONDARY PUMP ENERGY (KWH)
74	82.2	1	4	440	312.2	1,249																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	81	2	100%	2225	80.60	0.902	0.83	0.98	163.84	164
72	89.6	27	4	440	365.1	39,431																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	2,179	2	100%	2225	80.60	0.902	0.83	0.98	163.84	4,424
70	84.6	41	4	440	322.5	52,890																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	3,308	2	100%	2225	80.60	0.902	0.83	0.98	163.84	6,717
68	81.9	105	4	440	312.2	131,124																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	8,472	2	100%	2225	80.60	0.902	0.83	0.98	163.84	17,203
66	78.2	148	4	440	294	174,048																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	11,942	2	100%	2225	80.60	0.902	0.83	0.98	163.84	24,248
64	74.7	191	4	440	275	210,100																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	15,412	2	100%	2225	80.60	0.902	0.83	0.98	163.84	31,293
62	71.9	256	4	440	266.5	272,896																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	20,657	2	100%	2225	80.60	0.902	0.83	0.98	163.84	41,943
60	67.8	293	4	440	251.3	294,524																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	23,642	2	100%	2225	80.60	0.902	0.83	0.98	163.84	48,005
58	65.4	426	4	440	246.2	419,525																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	34,374	2	100%	2225	80.60	0.902	0.83	0.98	163.84	69,796
56	62.4	440	4	440	239.4	421,344																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	35,504	2	100%	2225	80.60	0.902	0.83	0.98	163.84	72,089
54	60.6	588	4	440	237.1	557,659																								0	0	4.0	100%	1,050	17	0.855	0.75	0.98	80.69	47,446	2	100%	2225	80.60	0.902	0.83	0.98	163.84	96,338
52	57.4	530					6	100%	50	0.945	0.97	0.97	251.60	133,348	5	505	2	0.875	0.97	0.97	54.35	28,803	670	8.7	0.84	0.83	0.98	56.97	181,167	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	86,835
50	54.7	498					6	100%	50	0.945	0.97	0.97	251.60	125,297	5	505	2	0.875	0.97	0.97	54.35	27,064	670	8.7	0.84	0.83	0.98	56.97	170,228	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	81,592
48	52.3	517					6	100%	50	0.945	0.97	0.97	251.60	130,077	5	505	2	0.875	0.97	0.97	54.35	28,097	670	8.7	0.84	0.83	0.98	56.97	176,723	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	84,705
46	50.3	557					6	100%	50	0.945	0.97	0.97	251.60	140,141	5	505	2	0.875	0.97	0.97	54.35	30,270	670	8.7	0.84	0.83	0.98	56.97	190,396	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	91,259
44	48.1	468					6	100%	50	0.945	0.97	0.97	251.60	117,749	5	505	2	0.875	0.97	0.97	54.35	25,434	670	8.7	0.84	0.83	0.98	56.97	159,974	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	76,677
42	45.7	698					6	100%	50	0.945	0.97	0.97	251.60	175,617	5	505	2	0.875	0.97	0.97	54.35	37,933	670	8.7	0.84	0.83	0.98	56.97	238,593	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	114,360
40	43.3	771					6	100%	50	0.945	0.97	0.97	251.60	193,983	5	505	2	0.875	0.97	0.97	54.35	41,900	670	8.7	0.84	0.83	0.98	56.97	263,546	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	126,320
38	41.2	674					6	100%	50	0.945	0.97	0.97	251.60	169,578	5	505	2	0.875	0.97	0.97	54.35	36,629	670	8.7	0.84	0.83	0.98	56.97	230,389	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	110,428
36	39.3	518					6	100%	50	0.945	0.97	0.97	251.60	130,329	5	505	2	0.875	0.97	0.97	54.35	28,151	670	8.7	0.84	0.83	0.98	56.97	177,065	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	84,869
34	37.2	465					6	100%	50	0.945	0.97	0.97	251.60	116,994	5	505	2	0.875	0.97	0.97	54.35	25,271	670	8.7	0.84	0.83	0.98	56.97	158,948	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	76,185
32	35.3	228					6	100%	50	0.945	0.97	0.97	251.60	57,365	5	505	2	0.875	0.97	0.97	54.35	12,391	670	8.7	0.84	0.83	0.98	56.97	77,936	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	37,355
30	33.3	118					6	100%	50	0.945	0.97	0.97	251.60	29,689	5	505	2	0.875	0.97	0.97	54.35	6,413	670	8.7	0.84	0.83	0.98	56.97	40,335	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	19,333
28	31.6	99					6	100%	50	0.945	0.97	0.97	251.60	24,908	5	505	2	0.875	0.97	0.97	54.35	5,380	670	8.7	0.84	0.83	0.98	56.97	33,841	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	16,220
26	29.4	46					6	100%	50	0.945	0.97	0.97	251.60	11,574	5	505	2	0.875	0.97	0.97	54.35	2,500	670	8.7	0.84	0.83	0.98	56.97	15,724	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	7,537
24	27.6	29					6	100%	50	0.945	0.97	0.97	251.60	7,296	5	505	2	0.875	0.97	0.97	54.35	1,576	670	8.7	0.84	0.83	0.98	56.97	9,913	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	4,751
22	25.9	13					6	100%	50	0.945	0.97	0.97	251.60	3,271	5	505	2	0.875	0.97	0.97	54.35	706	670	8.7	0.84	0.83	0.98	56.97	4,444	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	2,130
20	24.2	15					6	100%	50	0.945	0.97	0.97	251.60	3,774	5	505	2	0.875	0.97	0.97	54.35	815	670	8.7	0.84	0.83	0.98	56.97	5,127	0	0										2	100%	2225	80.60	0.902	0.83	0.98	163.84	2,458

MECH ENERGY SUMMARY

	COOLING ENERGY (KWH)	AIR-HANDLER FAN ENERGY (KWH)	HEAT REJECTION FAN ENERGY (KWH)	PUMP ENERGY (KWH)	TOTAL (KWH)
25% ITE LOAD MECH ENERGY	643,697	-	523,663	768,435	1,935,795
50% ITE LOAD MECH ENERGY	1,287,395	-	785,494	1,114,772	3,187,661
75% ITE LOAD MECH ENERGY	1,931,092	-	1,309,157	2,652,066	5,892,315
100% ITE LOAD MECH ENERGY	2,574,789	-	1,570,989	4,111,932	8,257,709

MLC CHECK 100% = FULL CAPACITY

ITE LOAD (%)	ITE LOAD (KW)	ANNUALIZED ITE LOAD (KWH)	PROJECT ANNUALIZED MLC
25%	1625.0	14,235,000	
50%	3250.0	28,470,000	
75%	4875.0	42,705,000	
100%	6500.0	56,940,000	
TOTALS:		142,350,000	0.1353950

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42872
REGISTERED PROFESSIONAL ENGINEER
2024-10-01

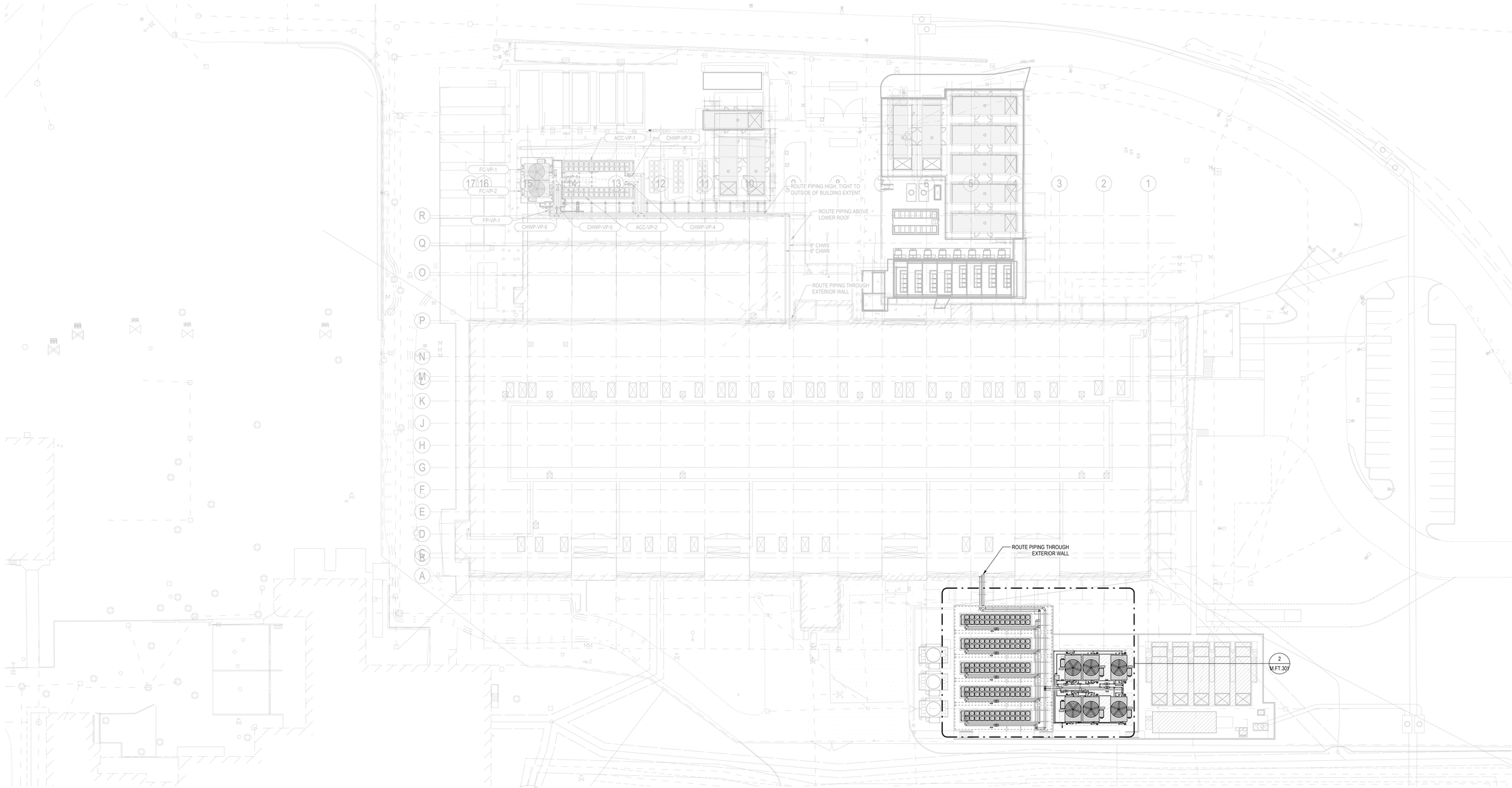
Revision No.	Description	Date
1	FUTURE TENANT PERMIT	8/30/2024

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

Drawn By: JLV
Checked By: BO

Title: MECHANICAL CALCULATIONS

Sheet: M.FT.012



1 MECHANICAL SITE PLAN

M.FT.101 1" = 30'-0"

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43571
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2024-10-01

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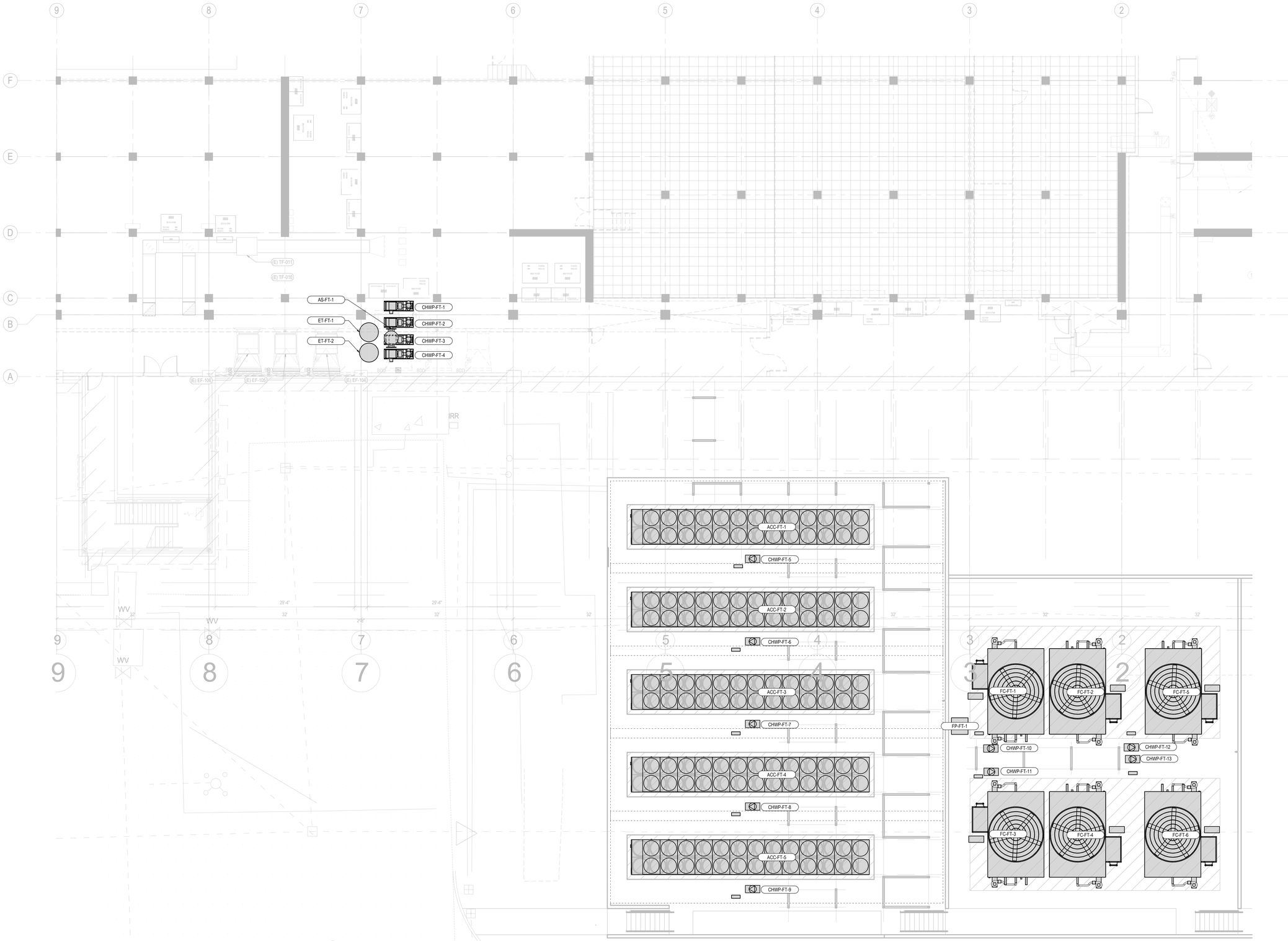
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL SITE PLAN

Sheet: **M.FT.101**



1 M.FT.102 **MECHANICAL LEVEL 1 PLAN**

1/8" = 1'-0"

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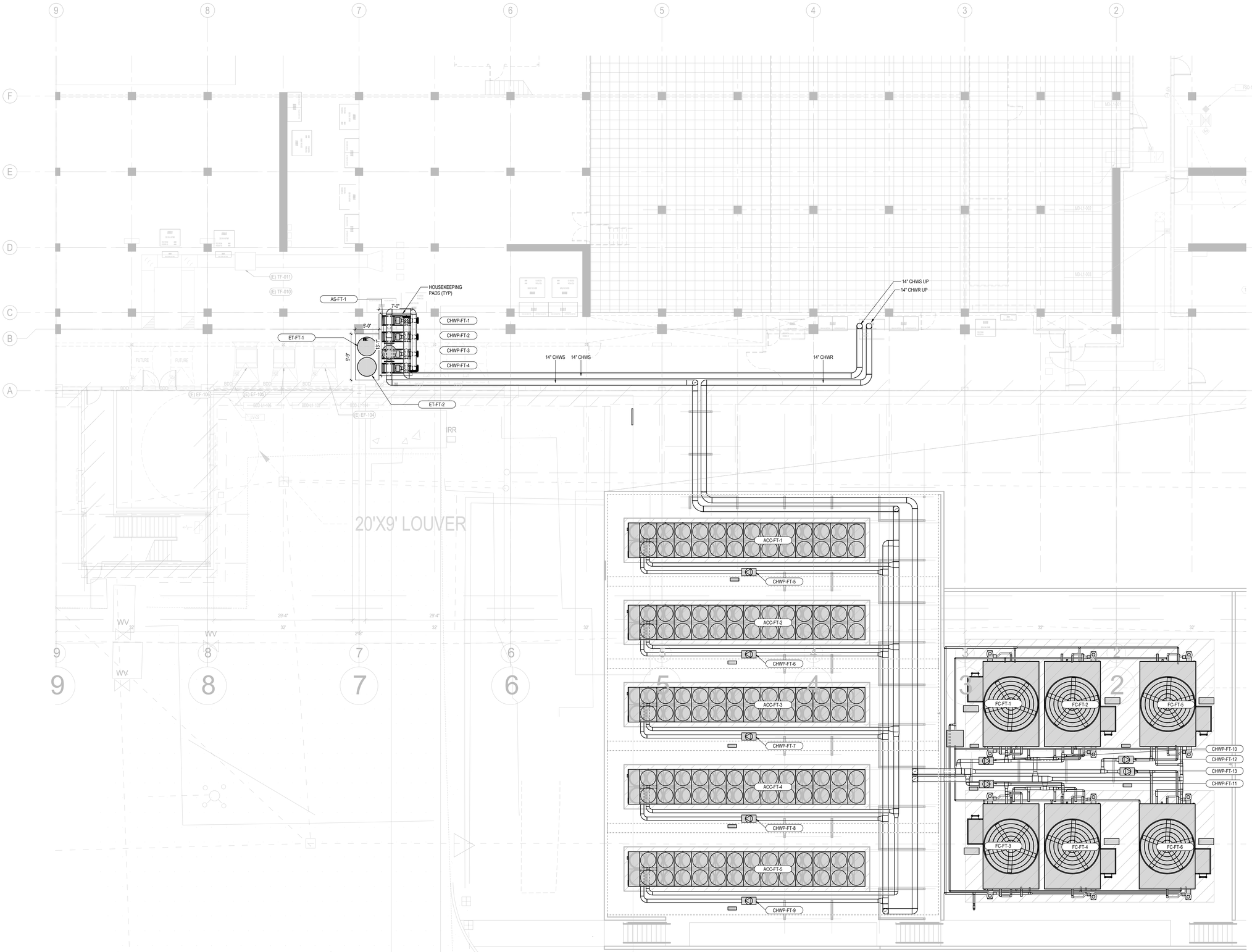
City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL LEVEL 1 PLAN

Sheet: **M.FT.102**



1 M.FT.202 **MECHANICAL LEVEL 1 PIPING PLAN**
1/8" = 1'-0"

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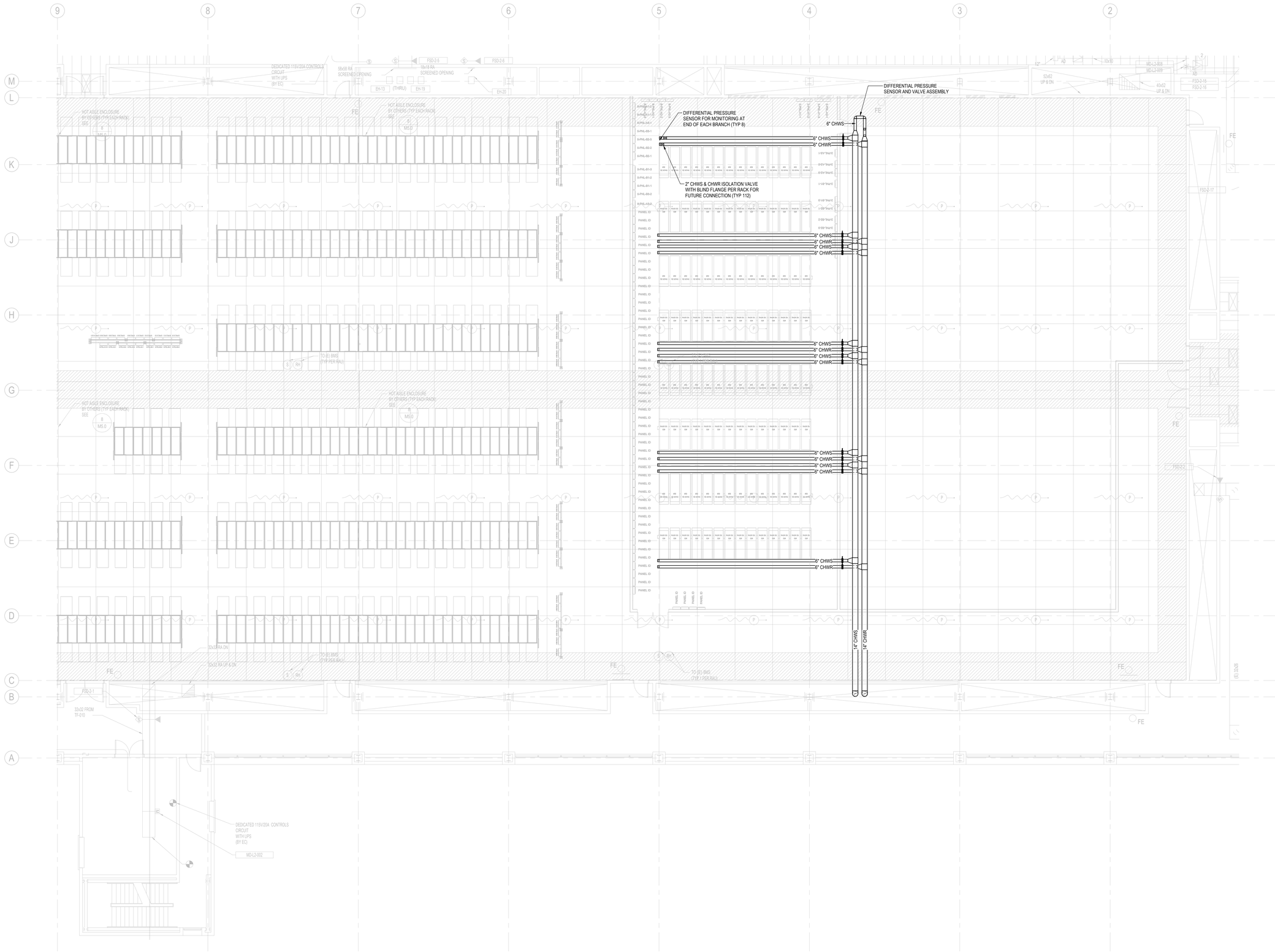
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL LEVEL 1 PIPING PLAN

Sheet: **M.FT.202**



1 MECHANICAL LEVEL 2 PIPING PLAN

M.FT.203 1/8" = 1'-0"

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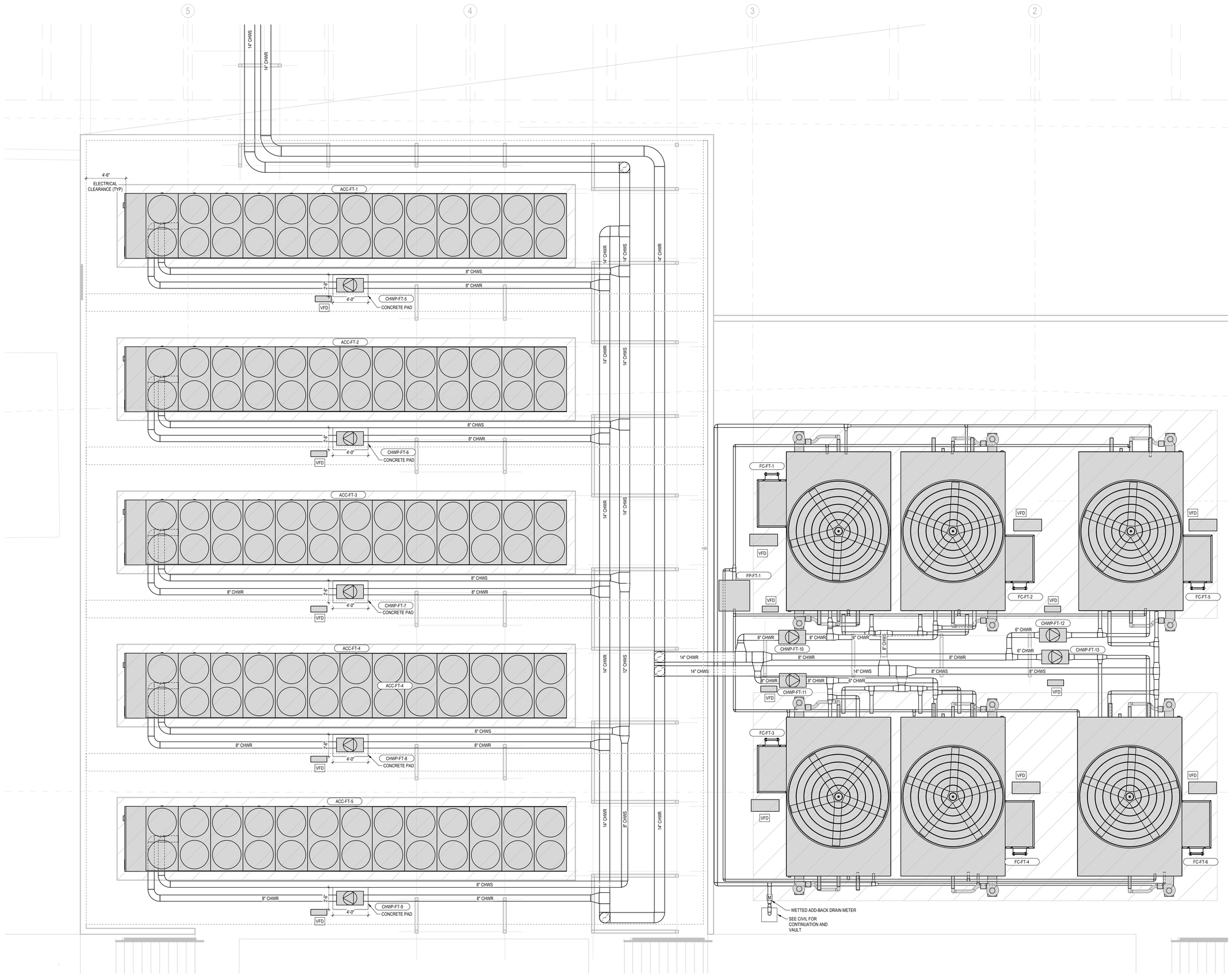
Building | Planning
Engineering | Public Works
Fire | Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL LEVEL 2 PIPING PLAN

Sheet: M.FT.203



2 FT MECHANICAL SITE PLAN

M.FT.301 1/4" = 1'-0"

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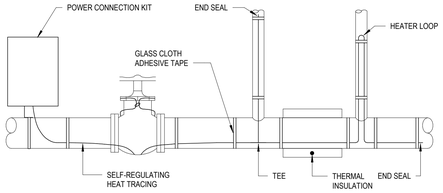
City of Puyallup
Development & Permitting Services
ISSUED PERMIT

Building	Planning
Engineering	Public Works
Fire	Traffic

Drawn By: JLV
Checked By: BO

Title: MECHANICAL ENLARGED PLANS

Sheet: **M.FT.301**

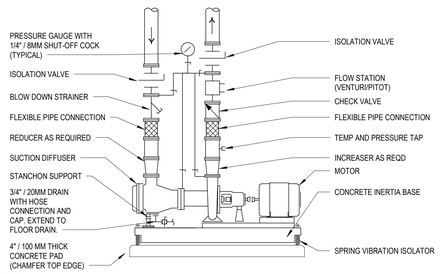


NOTES:

1. PROVIDE HEAT TRACE FOR ALL WATER PIPING LOCATED OUTDOORS
2. INSULATE THE PIPING.
3. REFER TO THE CONTRACT DOCUMENTS FOR PIPE MATERIAL AND INSULATION REQUIREMENTS.
4. FOLLOW MFRS INSTALLATION DETAILS FOR THE REQUIRED CABLE COVERAGE TO FULLY PROTECT THE SYSTEM.

5 M.FT.501 HEAT TRACE DETAIL FT

NTS

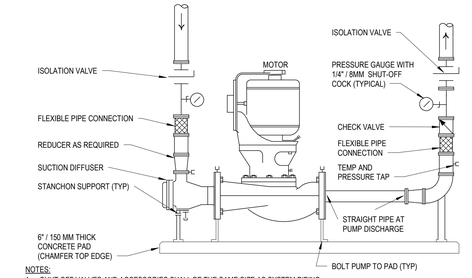


NOTES:

1. SHUT OFF VALVES AND ACCESSORIES SHALL BE THE SAME SIZE AS SYSTEM PIPING.
2. PROVIDE A SPOOL SECTION BETWEEN THE SUCTION DIFFUSER AND PUMP INLET AS REQUIRED.
3. AFTER START-UP AND THE COMPLETION OF THE SYSTEM FLUSHING, REMOVE THE START-UP STRAINER FROM THE SUCTION DIFFUSER.
4. PROVIDE REMOVABLE INSULATION FOR CHILLED WATER PUMPS TO PREVENT CONDENSATION.
5. ISOLATION VALVES ARE SHOWN AS BUTTERFLY VALVES, REFER TO THE SPECIFICATIONS FOR THE SPECIFIC VALVE TYPE BASED ON THE PIPE SIZE AND APPLICATION.
6. PIPING ASSOCIATED WITH THE PRESSURE GAUGES SHALL BE RUN SO AS TO NOT BLOCK THE REMOVAL OF THE PUMP OR BLOCK ACCESS TO ANY COMPONENT. PROVIDE ADDITIONAL SHUT OFF VALVES AS REQUIRED TO FACILITATE THE REMOVAL AND RE-INSTALLATION OF THE SENSING LINES AS NEEDED.

4 M.FT.501 BASE MOUNT PUMP DETAIL - VARIABLE SPEED FT

NTS



NOTES:

1. SHUT OFF VALVES AND ACCESSORIES SHALL BE THE SAME SIZE AS SYSTEM PIPING.
2. PROVIDE A SPOOL SECTION BETWEEN THE SUCTION DIFFUSER AND PUMP INLET AS REQUIRED.
3. AFTER START-UP AND THE COMPLETION OF THE SYSTEM FLUSHING, REMOVE THE START-UP STRAINER FROM THE SUCTION DIFFUSER. CLEAN THE STRAINER, AND THEN REINSTALL.
4. PROVIDE REMOVABLE INSULATION FOR CHILLED WATER PUMPS TO PREVENT CONDENSATION.
5. ISOLATION VALVES ARE SHOWN AS BUTTERFLY VALVES, REFER TO THE SPECIFICATIONS FOR THE SPECIFIC VALVE TYPE BASED ON THE PIPE SIZE AND APPLICATION.
6. SMALL BORE PIPING SHALL BE ENCASED IN INSULATION AND HEAT TRACE, PIPE LENGTHS SHALL BE LIMITED 2-3".
7. PROVIDE MINIMUM LENGTH OF STRAIGHT PIPE AT PUMP DISCHARGE AS PER MANUFACTURER'S RECOMMENDATIONS.

3 M.FT.501 LARGE INLINE PUMP DETAIL - VARIABLE SPEED FT

NTS

NOTES:

1. HEAT TRACE ALL EXTERIOR CHILLED WATER PIPING AND CHILLER BUNDLE.
2. LOCATE PIPING TO FACILITATE THE REQUIRED ACCESS AND REMOVAL OF CHILLER COMPONENTS.
3. COORDINATE THE COIL PULL SIDE WITH THE PIPING LAYOUT AND ALLOCATED ACCESS AREAS.
4. SHUT OFF VALVES AND ACCESSORIES SHALL BE THE SAME SIZE AS THE SYSTEM PIPING. TRANSITION TO THE CHILLER INLET/OUTLET SIZES AT THE CHILLER
5. QUICK CONNECT KITS ARE NOT TO BE USED. ALL VALVES SHALL BE INDEPENDENT COMPONENTS.
6. CHILLER AUXILIARY COOLING AND PUMPING SYSTEM SHALL BE FILLED WITH MIN GLYCOL FOR FREEZE-PROTECTION AS REQUIRED BY CHILLER MANUFACTURER.
7. CHILLER SHALL BE INSTALLED PER MANUFACTURERS INSTRUCTIONS, AND ALL CHILLER CHECKS MADE TO PREVENT VOID OF CHILLER WARRANTY BY MC.
8. SMALL BORE PIPING SHALL BE ENCASED IN INSULATION AND HEAT TRACE, PIPE LENGTHS SHALL BE LIMITED 2-3".

1 M.FT.501 AIR COOLED CHILLERS DETAIL FT

NTS

NOTES:

1. PROVIDE HEAT TRACE ON ALL OUTDOOR PIPING AS SPECIFIED, INCLUDING COLD WATER MAKE-UP, SPRAY PUMP AND SPRAY PIPING AND CONDENSER AND/OR CHILLED WATER PIPING.
2. LOCATE PIPING TO FACILITATE THE REQUIRED ACCESS AND REMOVAL OF COMPONENTS.
3. SHUT OFF VALVES AND ACCESSORIES SHALL BE THE SAME SIZE AS THE SYSTEM PIPING. TRANSITION TO THE COOLER INLET/OUTLET SIZES AT THE EQUIPMENT CONNECTION
4. ISOLATION VALVES ARE SHOWN AS BUTTERFLY VALVES, REFER TO THE SPECIFICATIONS FOR THE SPECIFIC VALVE TYPE BASED ON THE PIPE SIZE AND APPLICATION.
5. LOCATE THE COLD WATER MAKE-UP ASSEMBLY IN A HEATED SPACE UNLESS SHOWN OTHERWISE ON THE CONTRACT DOCUMENTS.
6. REFER TO THE CONTRACT DOCUMENTS FOR THE QUANTITY OF UNITS.
7. QUICK CONNECT KITS ARE NOT TO BE USED. ALL VALVES SHALL BE INDEPENDENT COMPONENTS.

2 M.FT.501 CLOSED CIRCUIT EVAPORATIVE COOLER DETAIL FT

NTS

NOTES:

1. PITCH ALL PIPING FOR PROPER DRAINAGE.
2. ISOLATION VALVES ARE SHOWN AS BALL VALVES, REFER TO THE SPECIFICATIONS FOR THE SPECIFIC VALVE TYPE BASED ON THE PIPE SIZE AND APPLICATION.
3. PROVIDE INSULATION FOR EXPANSION TANK FOR CHILLED WATER APPLICATIONS TO PREVENT CONDENSATION.
4. PROVIDE A 55 GALLON DRUM AND LOCATE UNDER THE DRAIN LINE. PROVIDE A SHORT HOSE TO EXTEND FROM THE HOSE CONNECTION TO THE DRUM.
5. IF IT IS NOT POSSIBLE TO EXTEND THE PRESSURE RELIEF PIPING TO THE GLYCOL FILL STATION, EXTEND IT TO THE DRAIN DRUM.
6. THE PIPING TO THE EXPANSION TANK SHALL BE A MINIMUM OF 1" / 25MM, REFER TO THE PIPE SIZE SHOWN IN THE CONTRACT DOCUMENTS.
7. PROVIDE A STAND FOR THE EXPANSION TANK AS REQUIRED TO ACHIEVE THE REQUIRED ELEVATIONS.
8. THE CONTRACTOR SHALL LEAVE (1) EMPTY 55 GALLON GLYCOL CONTAINER IN THE MECHANICAL ROOM TO USE TO CONTAIN ANY DRAINED GLYCOL SOLUTION.

6 M.FT.501 EXPANSION TANK W/ FILL FT

NTS

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2024-10-01

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Building	Planning
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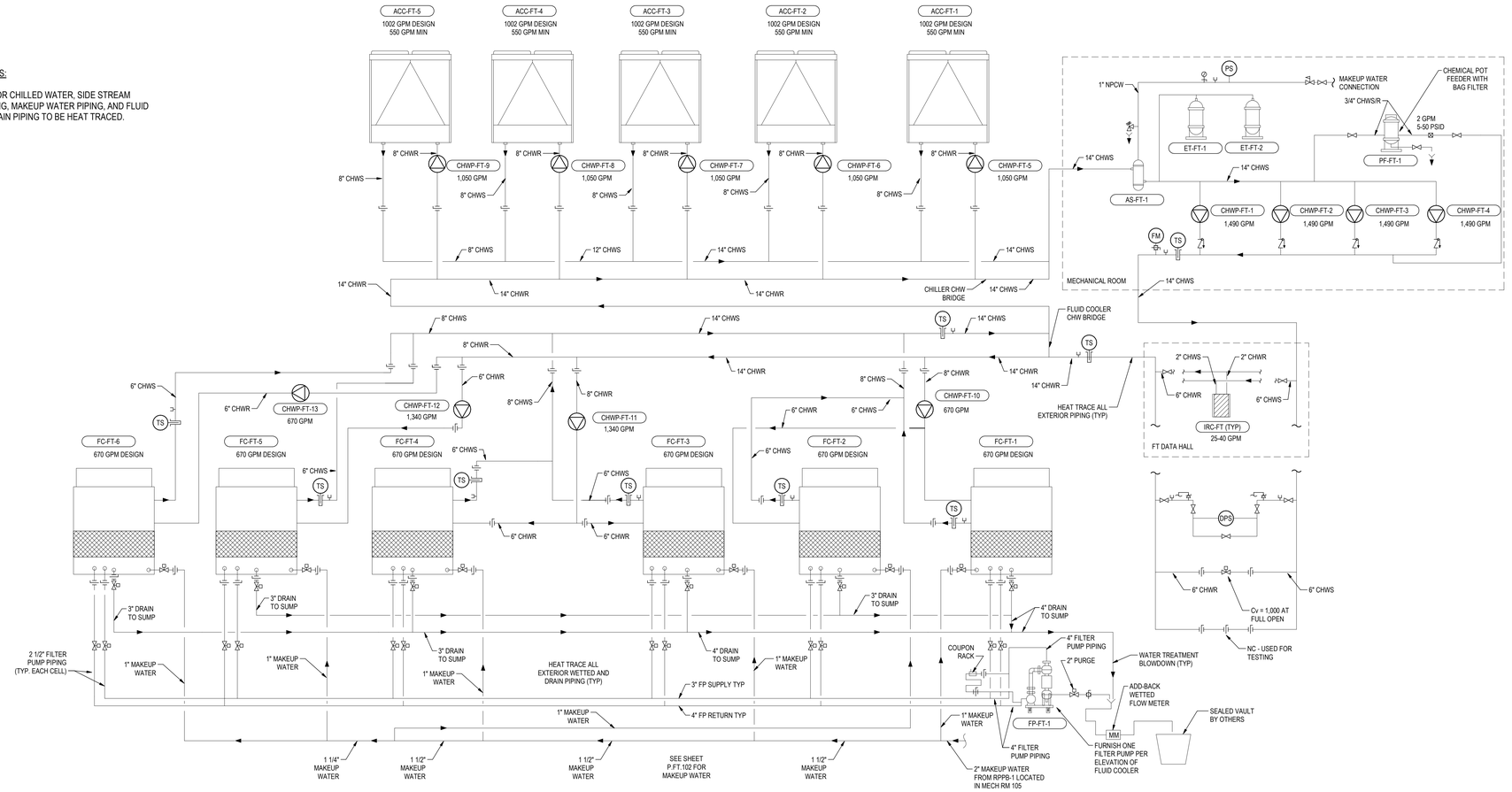
Drawn By:	Checked By:
JLV	BO

Title: MECHANICAL DETAILS

Sheet: M.FT.501

GENERAL NOTES:

1. ALL EXTERIOR CHILLED WATER, SIDE STREAM FILTER PIPING, MAKEUP WATER PIPING, AND FLUID COOLER DRAIN PIPING TO BE HEAT TRACED.



1 FT AIR-COOLED CHILLER PIPING DIAGRAM

M.FT.601 NTS

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City of Puyallup
Development & Permitting Services
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Drawn By: JLV
Checked By: BO

Title: MECHANICAL DIAGRAMS

Sheet: M.FT.601