MECHANICAL ABBREVIATIONS

(A)	ABANDONED
A/E	ARCHITECT / ENGINEER
AB	AIR BLENDER
ACC	AIR COOLED CONDENSER
ACCH	AIR COOLED CHILLER
ACCU	AIR-COOLED CONDENSING UNIT
ACU	AIR CONDITIONING UNIT
AD	ACCESS DOOR
AF	AFTER FILTER
AFF	ABOVE FINISHED FLOOR
AFMD	AIR FLOW MEASURING DEVICE
AHU	AIR-HANDLING UNIT
AMP	AMPERAGE
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AIR CONDITIONING AND REFRIGERATION INSTITUTE
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
AV	AUTOMATIC AIR VENT
AXF	AXIAL FLOW
B	BOILER
BAS	BUILDING AUTOMATION SYSTEM
BD	BLOWDOWN
BDD	BACKDRAFT DAMPER
BBR	BASE BOARD RADIATOR
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BIW	BACKWARD INCLINED WHEEL (FAN)
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BSC	BIOLOGICAL SAFETY CABINETS
BT	BLOWOFF TANK
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
C	CONNECTOR
CC	COOLING COIL
CD	CEILING DIFFUSER
CENT	CENTRIFUGAL
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CU FT	CUBIC FEET
CFP	CHEMICAL FEED PUMP
CG	CEILING GRILLE
CH	CHILLER
CHP	CHILLED WATER PUMP
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CI	CAST IRON
CO	CARBON MONOXIDE
CO	CLEAN OUT
CO_2	CARBON DIOXIDE
COMP	COMPRESSOR UNIT
COR	CONTRACTING OFFICER REPRESENTATIVE
COP	COEFFICIENT OF PERFORMANCE
CP	CONDENSATE PUMP
CS	CONDENSATE STORAGE TANK
CSG	CLEAN STEAM GENERATOR
CT	COOLING TOWER
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME
CW	COLD WATER (POTABLE)
CWCC	CHILLED WATER COOLING COIL
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN (TO COOLING TOWER)
CWS	CONDENSER WATER SUPPLY (FROM COOLING TOWER)
(D)	DEMOLISH
Db	DECIBELS
DB	DRY-BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROLS
DC	DRY COOLER
DCP	DRY COOLER PUMP
DEG	DEGREE
DIA	DIAMETER
DMPR	DAMPER
DP	DEW POINT TEMPERATURE
DPS	DIFFERENTIAL PRESSURE SENSOR
DX	DIRECT EXPANSION
DXCC	DIRECT EXPANSION COOLING COIL
(E)	EXISTING
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EAV	EXHAUST AIR VALVE
EC	EVAPORATIVE COOLER
ECC	ENGINEERING CONTROL CENTER
ECM	ELECTRICALLY COMMUTATED MOTOR
ECU	EVAPORATIVE CONDENSER UNIT
EDH	ELECTRIC DUCT HEATER
EER	ENERGY EFFICIENCY RATIO
EF	EXHAUST FAN
EG	EXHAUST GRILLE
EGS	EMERGENCY GAS SHUTOFF
EGT	ENTERING GLYCOL TEMPERATURE
EH	EXHAUST HOOD
EJ	EXPANSION JOINT
EL	EQUIPMENT LIFT
ENT	ENTERING
ER	EXHAUST REGISTER
ERC	ELECTRIC REHEAT COIL
ERP	ELECTRIC RADIANT PANEL
ESP	EXTERNAL STATIC PRESSURE
ET	EXPANSION TANK
ETO	ETHYLENE OXIDE
EUH	ELECTRIC UNIT HEATER
EWC	EVAPORATIVE WATER COOLER
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXH	EXHAUST
F	FAHRENHEIT
F&T	FLOAT AND THERMOSTATIC
F/SD	COMBINATION FIRE SMOKE DAMPER
FA	FIRE ALARM
FA	FREE AREA
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT (4 PIPE)
FCW	FORWARD CURVED WHEEL (FAN)
FD	FLOOR DRAIN
FD	FIRE DAMPER
FF	FINAL FILTER
FWX	FLUE GAS/FEEDWATER HEAT EXCHANGER
FOP	FUEL OIL PUMP
FOT	FUEL OIL TANK
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FPTU	FAN POWERED TERMINAL UNIT
FRP	FIBER REINFORCED POLYESTER
FS	FLOW SWITCH
FSTAT	FREEZESTAT
FT	FEET
FT-LB	FOOT-POUND
FTR	FIN TUBE RADIATION
FV	FACE VELOCITY
GA	GAUGE
GAL	GALLONS
GHR	GLYCOL HOT RETURN
GHS	GLYCOL HOT SUPPLY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPR	GAS PRESSURE REGULATOR
GS	GALVANIZED STEEL
H	HUMIDIFIER
HAC	HOUSEKEEPING AID CLOSET
HB	HOSE BIBB
HC	HEATING COIL
HD	HEAD
HOA	HAND/OFF/AUTOMATIC
HP	HEAT PUMP
HP	HORSEPOWER
HPR	HIGH PRESSURE RETURN (STEAM CONDENSATE)
HPS	HIGH PRESSURE SUPPLY (STEAM)
HRC	HEAT RECOVERY COIL
HRP	HYDRONIC RADIANT (CEILING) PANEL
HRW	HEAT RECOVERY WHEEL
HSTAT	HUMIDISTAT
HUM	HUMIDIFIER
HVU	HEATING AND VENTILATING UNIT
HW	HOT WATER COIL
HWC	HOT WATER COIL
HWP	HEATING HOT WATER PUMP
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
HWUH	HOT WATER UNIT HEATER
HX	HEAT EXCHANGER
HZ	HERTZ
I/O	INPUT/OUTPUT
IAQ	INDOOR AIR QUALITY
IBT	INVERTED BUCKET TRAP
ICF	IN-LINE CENTRIFUGAL FAN
ICU	INTENSIVE CARE UNIT
ID	INSIDE DIAMETER
IFB	INTEGRAL FACE AND BYPASS
IN	INCHES
IN HG	HG INCHES OF MERCURY
IN WC	INCH WATER COLUMN
IN WG	INCH WATER GAUGE
IN-LB	INCH-POUND
IPLV	INTEGRATED PART LOAD VALUE
IRH	INFRARED HEATER
IS	INSECT SCREEN
IU	INDUCTION UNIT
kW	KILOWATT
kWH	KILOWATT HOUR
LAT	LEAVING AIR TEMPERATURE
LBS/HR	POUNDS PER HOUR
LF	LINEAR FOOT (FEET)
LGT	LEAVING GLYCOL TEMPERATURE
LH	LATENT HEAT
LPG	LIQUID PROPANE GAS
LPR	LOW PRESSURE RETURN (STEAM CONDENSATE)
LPRC	LOW PRESSURE STEAM RETURN (CLEAN)
LPS	LOW PRESSURE STEAM
LPSC	LOW PRESSURE STEAM (CLEAN)
LSD	LINEAR SLOT DIFFUSER
LVG	LEAVING
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
MA	MIXED AIR
MAT	MIXED AIR TEMPERATURE
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MB	MIXING BOX
MBH	1000 BTUH
MCA	MINIMUM BRANCH CIRCUIT AMPACITY
MER	MECHANICAL EQUIPMENT ROOM
MERV	MINIMUM EFFICIENCY REPORTING VALUE
MHP	MOTOR HORSEPOWER
MIN	MINIMUM
MOD	MOTOR OPERATED DAMPER
MOV	MOTOR OPERATED VALVE
MPR	MEDIUM PRESSURE RETURN (STEAM CONDENSATE)
MPS	MEDIUM PRESSURE STEAM
MRI	MAGNETIC RESONANCE IMAGING
MTD	MEAN TEMPERATURE DIFFERENCE
MV	MANUAL AIR VENT
MVD	MANUAL VOLUME DAMPER
(N)	NEW
NA	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NG	NATURAL GAS
NO	NORMALLY OPEN
NOM	NOMINAL
NPLV	NON-STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
OA	OUTDOOR AIR
OAG	OUTDOOR AIR GRILLE
OAI	OUTDOOR AIR INTAKE
OD	OUTSIDE DIAMETER
OED	OPEN END DUCT
OFM	OIL FLOWMETER
OR	OPERATING ROOM
P	PUMP
PCHP	PRIMARY CHILLED WATER PUMP
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT (FEET)
PD	PRESSURE DROP
PF	PRE-FILTER
PG	PRESSURE GAGE
PGW	PROPYLENE GLYCOL-WATER (SOLUTION)
PHC	PREHEAT COIL
PPM	PARTS PER MILLION
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH – ABSOLUTE
PSIG	POUNDS PER SQUARE INCH – GAGE
PTAC	PACKAGED TERMINAL AIR CONDITIONER
(R)	RELOCATE(D)
RA	RETURN AIR
RAD	REFRIGERANT AIR DRYER
RAHX	ROTARY AIR HEAT EXCHANGER
RAT	RETURN AIR TEMPERATURE
RAV	RETURN AIR VALVE
RDS	ROOM DATA SHEETS
REA	RELIEF AIR
RF	RETURN FAN
RG	RETURN GRILLE
RH	RELATIVE HUMIDITY
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RL	REFRIGERANT LIQUID LINE
RLA	RUN LOAD AMPERE
RO	REVERSE OSMOSIS
RPM	REVOLUTIONS PER MINUTE
RR	RETURN REGISTER
RS	REFRIGERANT SUCTION
RTU	ROOF TOP UNIT
RV	RELIEF VALVE
SA	SUPPLY AIR
SCHP	SECONDARY CHILLED WATER PUMP
SAT	SUPPLY AIR TEMPERATURE
SAV	SUPPLY AIR VALVE
SC	SHADING COEFFICIENT
SCFM	STANDARD CUBIC FEET PER MINUTE
SCI	SPINAL CORD INJURY
SCR	SILICON CONTROLLED RECTIFIER
SD	SMOKE DETECTOR
SD	SUPPLY AIR DIFFUSER
SDPR	SMOKE DAMPER
SEN	SENSIBLE HEAT
SF	SUPPLY FAN
SG	SUPPLY AIR GRILLE
SH	STEAM HUMIDIFIER
SHC	STEAM HEATING COIL
SP	STATIC PRESSURE
SP GR	SPECIFIC GRAVITY
SPD	STERILE PROCESS AND DISTRIBUTION
SPS	STATIC PRESSURE SENSOR
SQ FT	SQUARE FOOT (FEET)
SQ IN	SQUARE INCH(ES)
SR	SUPPLY AIR REGISTER
SRV	SAFETY RELIEF VALVE
SS	STAINLESS STEEL
SSF	SIDE STREAM FILTER
ST	STEAM TRAP
SUH	STEAM UNIT HEATER
SVS	STEAM VENT SILENCER
SWHX	STEAM TO WATER HEAT EXCHANGER
TAB	TESTING, ADJUSTING & BALANCING
TCW	TEMPERED COLD WATER (DOMESTIC WATER)
TD	TEMPERATURE DIFFERENCE
TDH	TOTAL DYNAMIC HEAD
TDS	TOTAL DISSOLVED SOLIDS
TG	TRANSFER GRILLE
TP	TRAP
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TU	TERMINAL UNIT
TWU	THRU-WALL UNIT
UC	UNDER CUT
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORY
V	VALVE
VAF	VANE-AXIAL FAN
VAV	VARIABLE AIR VOLUME
VD	VOLUME DAMPER (MANUAL BALANCING)
VFD	VARIABLE FREQUENCY DRIVE
VHA	VETERANS HEALTH ADMINISTRATION
VI	VIBRATION ISOLATOR
VIF	VERIFY IN FIELD
VP	VACUUM PUMP
VPS	VARIABLE PRIMARY SYSTEM
VUH	VERTICAL UNIT HEATER
W	WATTS
WAC	WASTE ANESTHESIA GAS
WB	WET-BULB (TEMPERATURE)
WC	WATER COLUMN
WCCH	WATER COOLED CHILLER
WCCU	WATER COOLED CONDENSING UNIT
WCHP	WATER COOLED HEAT PUMPS
WCPU	WATER COOLED PACKAGED UNIT
WEF	WALL EXHAUST FAN
WF	WATER FILTER
WFM	WATER FLOWMETER
WG	WATER GAGE
WMS	WIRE MESH SCREEN
WPD	WATER SIDE PRESSURE DROP

MECHANICAL SYMBOLS

- UP DN — SUPPLY DUCT (UP & DOWN)
- UP DN — EXHAUST DUCT (UP & DOWN)
- UP DN — RETURN DUCT (UP & DOWN)
- SQUARE 1–WAY CEILING DIFFUSERS
- SQUARE 2–WAY CEILING DIFFUSERS
- SQUARE 3–WAY CEILING DIFFUSERS
- ROUND AND SQUARE 4–WAY CEILING DIFFUSERS
- LINEAR SLOT DIFFUSER
- SUPPLY REGISTER OR GRILLE (WALL TYPE)
- EXHAUST/RETURN CEILING REGISTER OR GRILLE
- EXHAUST/RETURN REGISTER OR GRILLE (WALL TYPE)
- VANED ELBOW & AIR SPLIT TYPE DUCT TAKE–OFF
- CONNECT NEW DUCT TO EXISTING DUCT
- INCLINED RISE, IN DIRECTION OF AIR FLOW
- INCLINED DROP, IN DIRECTION OF AIR FLOW
- LIMIT OF DEMOLITION
- FLEXIBLE CONNECTION, EQUIPMENT, VIBRATION, OR SEISMIC
- VANED ELBOW (PROVIDE ALL SQUARE OR RECTANGULAR ELBOWS WITH VANES, EVEN IF SYMBOL IS MISSING)
- VANED ELBOW (SHORT RADIUS)
- STANDARD RADIUS ELBOW (LONG RADIUS)
- 10x8 NEW DUCT (INSIDE DIMENSIONS: WIDTH x DEPTH)
- EXISTING DUCT TO REMAIN
- EXISTING DUCT TO BE REMOVED
- LOUVER (LOUVER SPECIFIED IN ARCHITECTURAL SECTION.)
- FLEXIBLE DUCTWORK (INSULATED)
- DUCT WITH SOUND LINING
- VD MANUAL VOLUME DAMPER

MECHANICAL SYMBOLS (CONTINUED)

- FD FIRE DAMPER
- BDD BACK DRAFT DAMPER
- F/S DPR COMBINATION FIRE/SMOKE DAMPER
- 4 D N POINT OF CHANGE IN DUCT CONSTRUCTION BY STATIC PRESSURE CLASS. THE NUMBER ASSIGNS PRESSURE CLASS (IN. OF WATER) WHICH SHALL ACCOMMODATE MAXIMUM OPERATING PRESSURE IN THE DUCT SUBSECTION. THE SYMBOL CONTINUES THE ASSIGNMENT UNTIL THE DUCT TERMINATES OR ANOTHER SYMBOL APPEARS. A "N" SUPERSCRIPT INDICATES NEGATIVE PRESSURE.
- AUTOMATIC CONTROL DAMPER MODULATING
- AUTOMATIC CONTROL DAMPER TWO POSITION
- STAINLESS STEEL DUCT
- PRESSURE GAGE
- MANUAL SPLITTER DAMPER
- FE FLOW ELEMENT
- REFRIGERANT SIGHT GLASS
- TP TEST PLUG (PRESSURE/TEMPERATURE)
- 45° SUPPLY STANDARD BRANCH SUPPLY, NO SPLITTER (45° TAP)
- AV AUTOMATIC AIR VENT
- 45° RETURN STANDARD BRANCH RETURN, NO SPLITTER (45° TAP)
- MV MANUAL AIR VENT
- GATE VALVE WITH 3/4" HOSE ADAPTER
- CV CHECK VALVE
- WYE STRAINER w/BALL VALVE AND HOSE CONNECTOR
- FLEXIBLE CONNECTION
- ANGLE GLOBE VALVE
- TERMINAL UNIT
- TERMINAL UNIT WITH REHEAT COIL
- BUTTERFLY VALVE
- BALL VALVE
- DOUBLE DUCT MIXING BOX
- MODULATING CONTROL VALVE
- MODULATING CONTROL BUTTERFLY VALVE
- FAN POWERED VARIABLE VOLUME TERMINAL UNIT WITH HEATING COIL
- TWO POSITION CONTROL VALVE
- CONVECTOR OR RADIATOR (RECESSED)
- TWO POSITION CONTROL BUTTERFLY VALVE
- CONVECTOR OR RADIATOR (WALL HUNG)
- THREE–WAY MODULATING CONTROL VALVE
- A FCU FLOOR MOUNTED VERTICAL RECESSED FAN COIL UNIT. LETTER INDICATES UNIT SIZE.
- THREE–WAY TWO POSITION CONTROL VALVE
- A FCU
- PRESSURE REGULATING VALVE
- FLOOR MOUNTED VERTICAL CABINET FAN COIL UNIT. LETTER INDICATES UNIT SIZE.
- PRESSURE SAFETY VALVE
- A TWU THRU WALL AIR CONDITIONING UNIT. LETTER INDICATES UNIT SIZE.
- AUTOMATIC BALANCING CONTROL VALVE
- BALANCING VALVE
- A PTAC WINDOW TYPE AIR CONDITIONING UNIT. LETTER INDICATES UNIT SIZE.
- CIRCUIT SETTER VALVE
- PLUG VALVE
- A PTAC FLOOR MOUNTED HEAT PUMP. LETTER INDICATES UNIT SIZE.
- CONTROL VALVE (CV) – FLOAT–OPERATED
- PRESSURE REDUCING VALVE (PRV)
- AIR CURTAIN
- MULTI FUNCTION VALVE (ISOLATION, BALANCING & NON–RETURN VALVE)
- M UNIT HEATER (HORIZONTAL)
- WATER METER
- A COMPRESSED AIR
- BO BOILER BLOWOFF
- BWS BOILER WATER SAMPLE
- CBD CONTINUOUS BLOWDOWN
- CF CHEMICAL FEED
- CHR CHILLED WATER RETURN
- CHS CHILLED WATER SUPPLY
- CTPD CONDENSATE TRANSFER PUMP DISCHARGE
- CTPS CONDENSATE TRANSFER PUMP SUCTION
- CW COLD WATER (CITY WATER)
- CWS CONDENSER WATER SUPPLY (FROM TOWER)
- CWR CONDENSER WATER RETURN (TO TOWER)
- D DRAIN LINE
- FOS FUEL OIL SUPPLY
- FOR FUEL OIL RETURN
- FWPD FEEDWATER PUMP DISCHARGE
- FWPS FEEDWATER PUMP SUCTION
- FWS FEEDWATER SAMPLE (FROM DEAERATOR)
- NG NATURAL GAS MAIN FUEL
- NGS NATURAL GAS IGNITER FUEL
- GCR CHILLED GLYCOL–WATER RETURN
- GCS CHILLED GLYCOL–WATER SUPPLY
- 2 x 2 2'x2' RADIANT CEILING PANEL
- 2 x 4 2'x4' RADIANT CEILING PANEL

PIPING SYMBOLS

- DIRECTION OF PIPE PITCH (DOWN)
- DIRECTION OF FLOW
- ANCHOR
- REDUCER OR INCREASER
- ECCENTRIC REDUCER
- TOP CONNECTION, 45° OR 90°
- BOTTOM CONNECTION, 45° OR 90°

PIPING SYMBOLS (CONTINUED)

- SIDE CONNECTION
- CAPPED OUTLET
- RISE OR DROP IN PIPE
- UNION
- PIPE UP OR RISE
- PIPE DOWN OR DROP
- C QUICK–COUPLE HOSE CONNECTOR
- INVERTED BUCKET TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- FLOAT & THERMOSTATIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- THERMODYNAMIC TRAP SET INCLUDING PIPING ACCESSORIES SEE DETAIL
- THERMOMETER
- PRESSURE GAGE
- FE FLOW ELEMENT
- REFRIGERANT SIGHT GLASS
- TP TEST PLUG (PRESSURE/TEMPERATURE)
- AV AUTOMATIC AIR VENT
- MV MANUAL AIR VENT
- GATE VALVE WITH 3/4" HOSE ADAPTER
- CHECK VALVE
- WYE STRAINER w/BALL VALVE AND HOSE CONNECTOR
- FLEXIBLE CONNECTION
- ANGLE GLOBE VALVE
- BUTTERFLY VALVE
- BALL VALVE
- MODULATING CONTROL VALVE
- MODULATING CONTROL BUTTERFLY VALVE
- TWO POSITION CONTROL VALVE
- TWO POSITION CONTROL BUTTERFLY VALVE
- THREE–WAY MODULATING CONTROL VALVE
- THREE–WAY TWO POSITION CONTROL VALVE
- PRESSURE REGULATING VALVE
- PRESSURE SAFETY VALVE
- AUTOMATIC BALANCING CONTROL VALVE
- BALANCING VALVE
- CIRCUIT SETTER VALVE
- PLUG VALVE
- CONTROL VALVE (CV) – FLOAT–OPERATED
- PRESSURE REDUCING VALVE (PRV)
- MULTI FUNCTION VALVE (ISOLATION, BALANCING & NON–RETURN VALVE)
- WATER METER
- COMPRESSED AIR
- BOILER BLOWOFF
- BOILER WATER SAMPLE
- CONTINUOUS BLOWDOWN
- CHEMICAL FEED
- CHILLED WATER RETURN
- CHILLED WATER SUPPLY
- CONDENSATE TRANSFER PUMP DISCHARGE
- CONDENSATE TRANSFER PUMP SUCTION
- COLD WATER (CITY WATER)
- CONDENSER WATER SUPPLY (FROM TOWER)
- CONDENSER WATER RETURN (TO TOWER)
- DRAIN LINE
- FUEL OIL SUPPLY
- FUEL OIL RETURN
- FEEDWATER PUMP DISCHARGE
- FEEDWATER PUMP SUCTION
- FEEDWATER SAMPLE (FROM DEAERATOR)
- NATURAL GAS MAIN FUEL
- NATURAL GAS IGNITER FUEL
- CHILLED GLYCOL–WATER RETURN
- CHILLED GLYCOL–WATER SUPPLY

PIPING SYMBOLS (CONTINUED)

- GHR GLYCOL–WATER HEATING RETURN
- GHS GLYCOL–WATER HEATING SUPPLY
- GRR GLYCOL–WATER RUN AROUND RETURN
- GRS GLYCOL–WATER RUN AROUND SUPPLY
- HPR HIGH PRESSURE STEAM CONDENSATE RETURN
- HPS HIGH PRESSURE STEAM (60 PSIG AND ABOVE)
- HWR HOT WATER HEATING RETURN
- HWS HOT WATER HEATING SUPPLY
- LPR LOW PRESSURE STEAM CONDENSATE RETURN
- LPS LOW PRESSURE STEAM (15 PSIG AND BELOW)
- MPR MEDIUM PRESSURE STEAM CONDENSATE RETURN
- MPS MEDIUM PRESSURE STEAM (16 PSIG THRU 59 PSIG)
- MW MAKE–UP WATER
- OFL OVERFLOW
- PC PUMPED CONDENSATE
- RHG REFRIGERANT HOT GAS
- RL REFRIGERANT LIQUID
- RS REFRIGERANT SUCTION
- SW SOFTENED WATER
- V VENT LINE
- NEW PIPE
- EXISTING PIPE TO REMAIN
- DEMOLISH PIPE
- TEMPORARY PIPE

DRAWING SYMBOLS

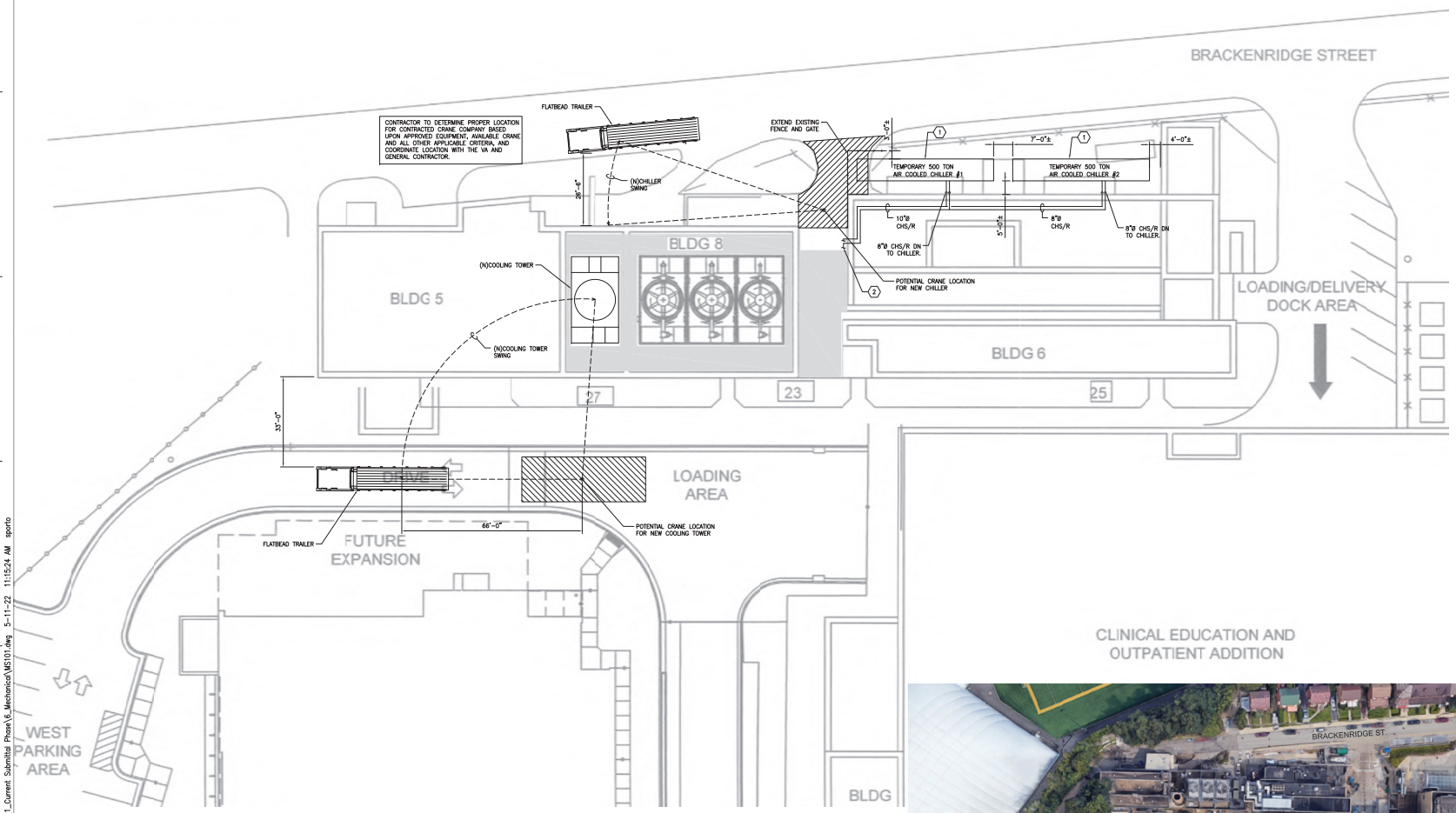
- 2 / H4 — DETAIL NUMBER / DRAWING NUMBER WHERE SHOWN
- A / H7 — SECTION LETTER / DRAWING NUMBER WHERE SHOWN
- 26–SF 3 — BUILDING NO. WHERE EQUIPMENT IS LOCATED; EQUIPMENT ABBREVIATION (SUPPLY FAN); SUPPLY FAN NO. 3 IN BUILDING NO. 26; TYPICAL UNIT NO.
- 26–TU–1–1 — BUILDING NO. WHERE EQUIPMENT IS LOCATED; ITEM (TERMINAL UNIT SHOWN); ITEM NUMBER (TERMINAL UNIT NO. 1); SERVED BY AIR HANDLER UNIT NO. 1

HVAC NOTES AND CONDITIONS:

1. ALL DUCTWORK DIMENSIONS, AS SHOWN ON THE DRAWINGS, ARE INTERNAL CLEAR DIMENSIONS. CONTRACTOR SHALL INCREASE THE DUCT SIZE ACCORDINGLY TO COMPENSATE FOR ACOUSTICAL DUCT LINING THICKNESS (UNLESS OTHERWISE NOTED). CONTRACTOR MAY ADJUST DUCT SIZES ACCORDINGLY TO SUIT FIELD CONDITIONS AS LONG AS THE DUCT FREE AREA AND STATIC PRESSURE DROP ARE EQUAL TO THE PROJECT DOCUMENTS.
2. THE FIRST FIGURE OF DUCT SIZE INDICATES DIMENSION OF FACE SHOWN OR INDICATED. DUCT SIZES ARE NET INSIDE DIMENSIONS
3. ACCESS PANELS IN HARD SUSPENDED CEILINGS ARE REQUIRED FOR ALL VALVES, TRAPS, DAMPERS, CLEANOUTS, CONTROLS, ETC. AND ANY OTHER ITEMS THAT REQUIRE MECHANICAL MAINTENANCE. ACCESS PANELS SHALL BE FURNISHED AND INSTALLED UNDER THE ARCHITECTURAL SPECIFICATIONS.
4. DIFFUSER, REGISTER AND GRILLE SIZES SHOWN ON FLOOR PLANS ARE NECK SIZES.
5. WATER PIPE CONNECTIONS TO AIR HEATING AND COOLING COILS SHALL BE MADE TO PROVIDE COUNTER FLOW BETWEEN WATER AND AIR.
6. CONTRACTOR SHALL PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT AND MAINTENANCE OF ALL FANS, VALVES, COILS AND MECHANICAL EQUIPMENT.
7. ADEQUATELY SIZED ACCESS PANELS SHOULD BE PROVIDED AT SMOKE DETECTORS, FIRE DAMPERS, SMOKE DAMPERS, HUMIDIFIERS, COILS AND OTHER DEVICES LOCATED IN THE DUCTWORK WHICH REQUIRE INSPECTION AND/OR MAINTENANCE.
8. CONTRACTOR SHALL PROVIDE FLEXIBLE CONNECTIONS IN ALL DUCTWORK SYSTEMS (SUPPLY, RETURN, VENTILATION AIR AND EXHAUST) CONNECTED TO ALL AIR HANDLING UNITS, FANS AND OTHER EQUIPMENT WHICH REQUIRE VIBRATION ISOLATION. FLEXIBLE CONNECTIONS SHALL BE PROVIDED AT THE POINT OF CONNECTION TO THE EQUIPMENT (UNLESS NOTED OTHERWISE).
9. SMOOTH TURN RADIUS DUCTWORK OR TURNING VANES AND 45 DEGREE ENTRY OR CONICAL DUCT BRANCH CONNECTIONS SHALL BE USED THROUGHOUT.
10. ALL DUCTWORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN DUCTS, INCLUDING TRANSITIONS AROUND OBSTRUCTIONS, SHALL BE PROVIDED AT NO ADDITIONAL COST.
11. COORDINATE DIFFUSER, REGISTER, AND GRILLE LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS, LIGHTING AND OTHER CEILING ITEMS AND MAKE MINOR DUCT MODIFICATIONS TO SUIT.
12. ALL INTERIOR AND EXTERIOR WALL, CEILING AND ROOF OPENINGS AND DUCT AND PIPE THROUGH WALL PENETRATIONS, FRAMING, SLEEVES, WEATHERPROOFING AND FIRE SEALING SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR, UNLESS NOTED OTHERWISE.
13. CONTRACTOR SHALL PROVIDE AND INSTALL ALL FIRE DAMPERS IN ACCORDANCE WITH UL 555 AND MANUFACTURER'S REQUIREMENTS WHERE DUCTS PENETRATE FIRE RATED WALLS OR FLOORS. ALL FIRE DAMPERS SHALL BE UL LISTED AND LABELED CONSISTENT WITH THE WALLS OR FLOORS THAT ARE PENETRATED. PROVIDE ACCESS DOORS SIZED AND LOCATED TO FACILITATE TESTING AND RESETTING OF ALL FIRE DAMPERS.
14. CONTRACTOR SHALL TEST, ADJUST AND BALANCE THE COMPLETED SYSTEM. ALL BALANCING WORK SHALL BE DONE UNDER THE DIRECT SUPERVISION OF AN AABC OR NEBB–QUALIFIED SUPERVISOR WHO SHALL CERTIFY THE RESULTS.
15. TEST, ADJUST AND BALANCE WORK SHALL DEMONSTRATE THAT ALL SYSTEMS OPERATE AS THEY WERE INTENDED TO. UPON COMPLETION OF THE WORK, A WRITTEN TEST & BALANCE REPORT SHALL BE SUBMITTED TO THE OWNER. FORMS AND PROCEDURES UTILIZED FOR THIS WORK SHALL BE AS PROPOSED BY THE AABC OR OTHER NATIONALLY RECOGNIZED ORGANIZATION ACCEPTABLE TO THE OWNER.
16. ALL DUCTWORK, PIPING AND EQUIPMENT SHOWN ON NEW WORK PLANS AND DETAILS SHALL BE CONSIDERED AS NEW UNLESS IDENTIFIED AS EXISTING TO REMAIN.
17. AVOID INSTALLING ANY PIPING OVER ELECTRICAL EQUIPMENT. ANY PIPING THAT HAS TO BE INSTALLED, MUST RECEIVE APPROVAL FROM THE VA COR. IF APPROVED, PROVIDE DRIP PANS BELOW PIPING ABOVE ELECTRICAL EQUIPMENT OF LIGHT GAGE GALVANIZED STEEL WITH 1" SIDES AND APPROXIMATELY 2" WIDER THAN PIPE ON EACH SIDE AND EXTENDING 4" BEYOND ELECTRIC EQUIPMENT AND SLOPED TO A 1/4" INCH DRAIN HOLE FOR VISIBLE EVIDENCE OF PIPE LEAKS OR CONDENSATE ISSUES.

GENERAL NOTES AND CONDITIONS

1. THESE DRAWINGS WERE PREPARED FROM INFORMATION TAKEN FROM THE AVAILABLE BUILDING DRAWINGS, ARCHITECTURAL BACKGROUNDS PROVIDED BY THE OWNER AND FIELD SURVEY INFORMATION COMPILED BY THE ENGINEERING DESIGN TEAM FOR THE PURPOSE OF ENGINEERING DESIGN. EXISTING CONDITIONS ARE SHOWN AS ACCURATELY AS POSSIBLE. THERE IS THE POSSIBILITY THAT CONDITIONS SHOWN ARE NOT EXACTLY AS EXISTING. CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, LOCATIONS, SIZES AND CONDITIONS AT THE SITE AND REPORT ANY DISCREPANCIES TO THE OWNER PRIOR TO BEGINNING INSTALLATION OR FABRICATION WORK.
   - 1.1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW THE PLANS AND SPECIFICATIONS, AS WELL AS ALL RELATED PROJECT PLANS AND SPECIFICATIONS FROM OTHER DISCIPLINES, TO BECOME FAMILIAR WITH THE FULL PROJECT SCOPE AND COORDINATED RESPONSIBILITIES.
   - 1.2. SHOULD IT APPEAR THAT THE WORK INTENDED TO BE DESCRIBED OR RELATED WORK ARE NOT SUFFICIENTLY DETAILED OR EXPLAINED ON THE DRAWINGS, OR IN THE SPECIFICATIONS, CONSULT THE ENGINEER FOR NECESSARY CLARIFICATIONS, AND CONFORM TO THOSE CLARIFICATIONS INSOFAR AS THEY ARE CONSISTENT WITH THE ORIGINAL DRAWINGS AND SPECIFICATIONS. IN NO CASE SHALL WORK PROCEED IN UNCERTAINTY.
   - 1.3. EQUIPMENT ARRANGEMENTS ARE DESIGNED TO SHOW PREFERRED CONFIGURATIONS TO SUIT KNOWN CONDITIONS. ACTUAL INSTALLATION BY CONTRACTOR MAY BE ALTERED AS REQUIRED TO SUIT FIELD CONDITIONS ENCOUNTERED DURING CONSTRUCTION WITHOUT COMPROMISING THE INTENT OF THE ORIGINAL DESIGN. COORDINATE ANY MODIFICATIONS WITH THE ENGINEER AND OWNER PRIOR TO STARTING WORK IN AREAS AFFECTED.
   - 1.4. THE CONTRACTOR SHALL CHECK AND VERIFY ALL DIMENSIONS AND CONDITIONS AT SITE PRIOR TO STARTING WORK.
   - 1.5. DO NOT SCALE DRAWINGS.
2. BIDDERS ARE TO VISIT THE SITE AND FAMILIARIZE THEMSELVES AS THE NATURE AND SCOPE OF THE WORK. THE SUBMISSION OF A BID SHALL BE EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE AND ENSURE THAT ALL ALTERNATE PRICING INFORMATION NOTED WITHIN THE CONSTRUCTION DOCUMENTS HAVE BEEN INCLUDED WITHIN THE ORIGINAL BID SUBMISSION. LATER CLAIMS FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED, OR FOR ANY DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN HAD AN EXAMINATION BEEN MADE, SHALL NOT BE ACCEPTED.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL RULES AND REGULATIONS, INCLUDING THOSE WHICH MAY BE ISSUED BY THE OWNER, ARE BEING OBSERVED, PARTICULARLY WORKPLACE SAFETY, INFECTION PREVENTION AND THE CONDUCT OF ALL THOSE EMPLOYED DIRECTLY AND INDIRECTLY ON THE PREMISES, AND THE OWNER'S EMPLOYEES WHO MAY BE IMPACTED OR AFFECTED BY CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL INSTALL SIGNAGE, BARRIERS, AND OTHER MEANS TO PROVIDE WARNING AND PERSONNEL SAFETY. PLACEMENT OF



1 MECHANICAL – SITE PLAN (TEMPORARY CHILLERS & CRANE LOCATION)
SCALE: 1/16" = 1'-0"

2 MECHANICAL – SITE PLAN (MAP VIEW)
SCALE: NTS

GENERAL SHEET NOTES:

1. SEE DRAWING M-001 FOR MECHANICAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. REFERENCE ALL OTHER DRAWINGS IN THIS PACKAGE FOR COORDINATION.
3. INFORMATION SHOWN ON THIS SHEET WAS GATHERED FROM ORIGINAL DRAWING INFORMATION AND FIELD STUDY.
4. CONTRACTOR SHALL SUBMIT A DETAILED SAFETY PLAN FOR APPROVAL BY VA PRIOR TO STARTING ANY CONSTRUCTION ACTIVITIES.
5. CONTRACTOR SHALL FIELD VERIFY ALL SITE UTILITIES AND EXISTING CONDITIONS FOR THE INSTALLATION OF THE TEMPORARY CHILLER. CONTRACTOR SHALL COORDINATE WITH THE RENTAL CHILLER VENDOR FOR THE REQUIRED CLEARANCES AND ALL UTILITY CONNECTIONS.

SHEET KEYNOTES:

1. REFER TO TEMPORARY CHILLED WATER FLOW DIAGRAM ON DWG. M-603 FOR FURTHER INFORMATION.
2. CONNECT TO 12"Ø CHS/R PIPE PORT CONNECTIONS. REFER TO DWG. MJ122 TEMPORARY WORK PLAN FOR CONTINUATION.

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. PENNSYLVANIA
5-11-2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

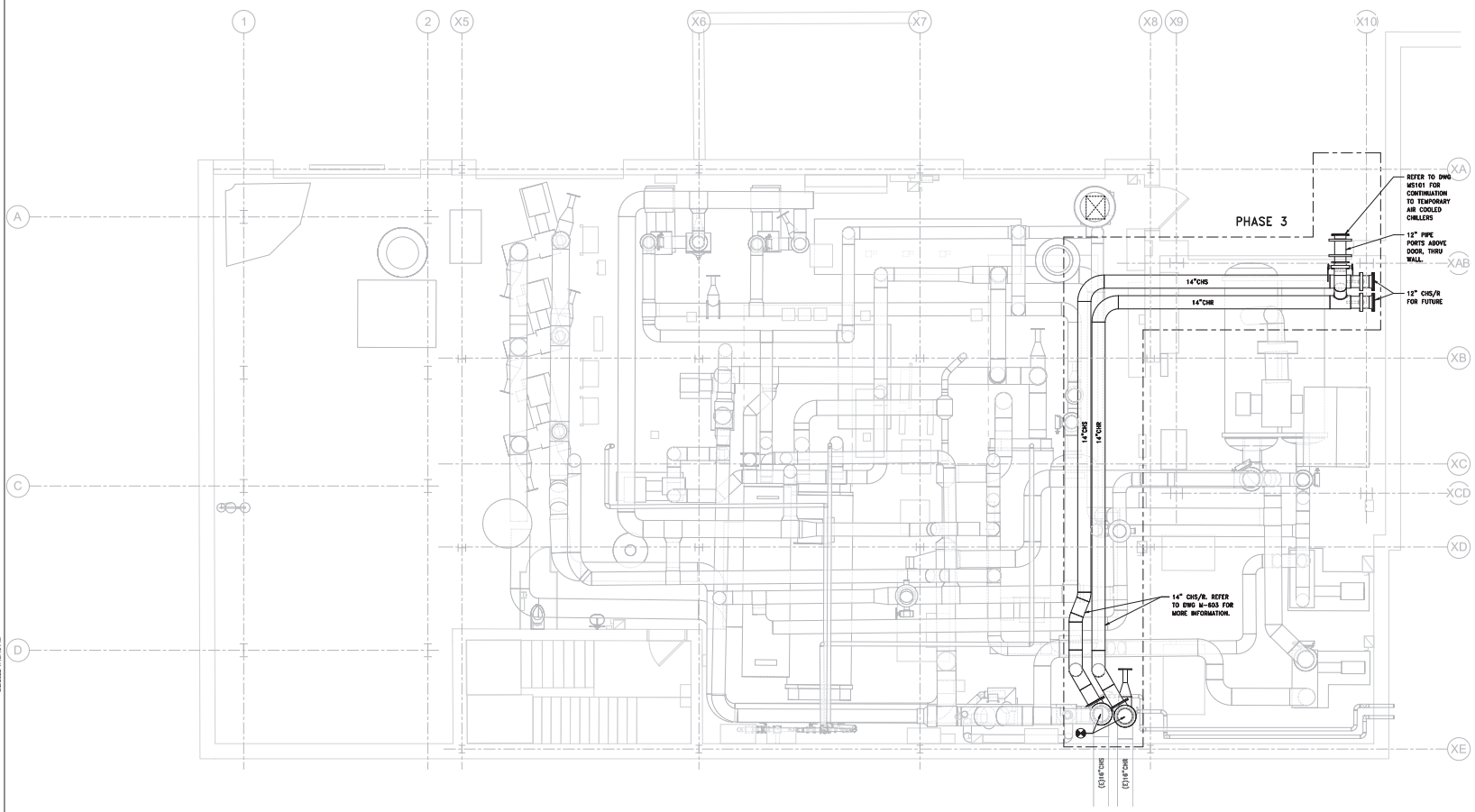
Drawing Title: MECHANICAL SITE PLAN	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MS101
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

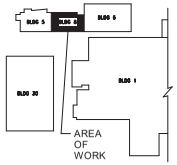
P:\0507_DVA--Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\MS101.dwg 5-11-22 11:15:24 AM sporto

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES, ABBREVIATIONS & SYMBOLS.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL TEMP. WORK PLAN - SECOND LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE062773

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL TEMPORARY WORK PLAN - SECOND LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MJ122
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

C:\Temp\REVIT BANG\527-001-4-Pit_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMO.rvt
6/2/2022 1:49:46 PM

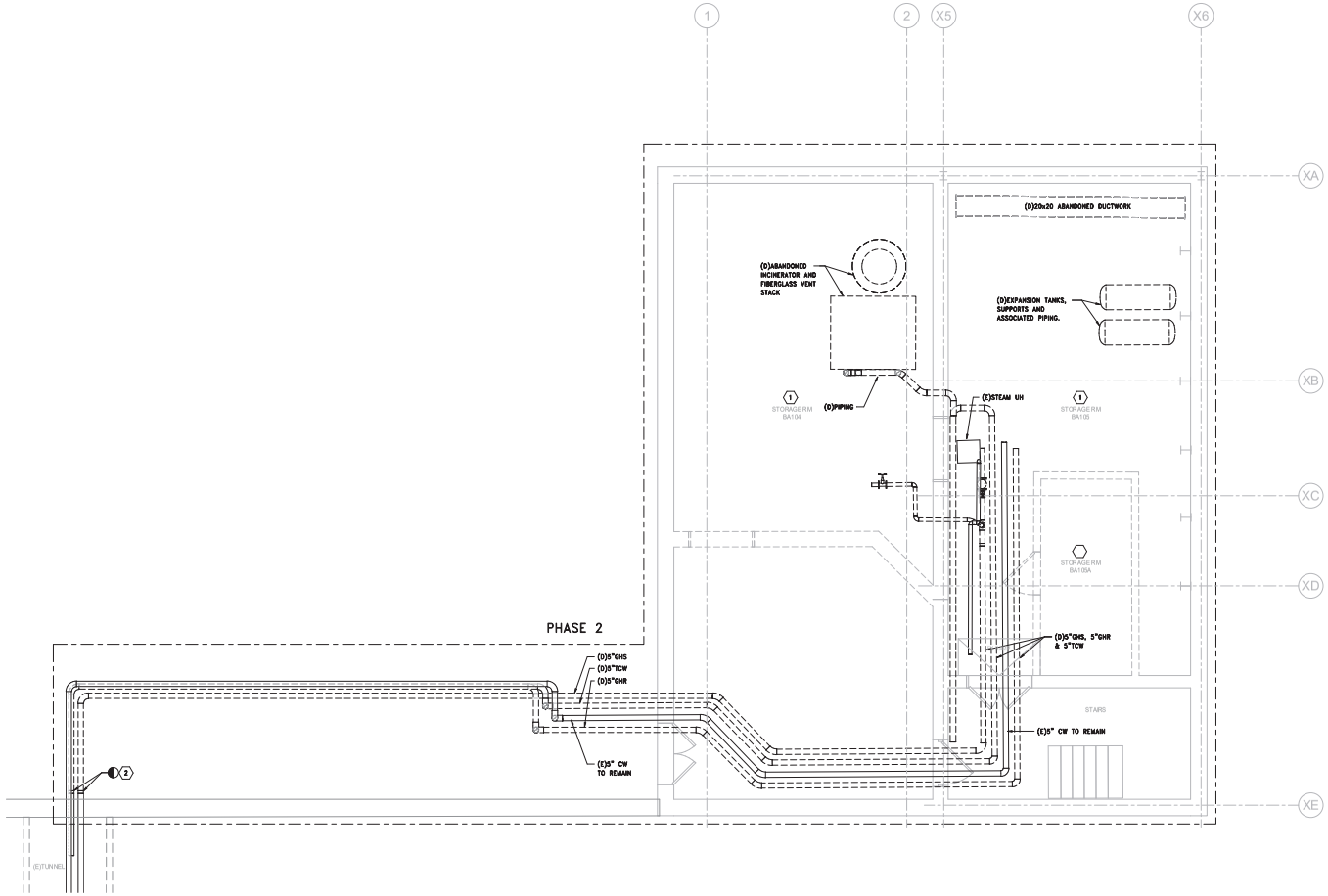
GENERAL SHEET NOTES:

1. REFER TO DWG. N-001 FOR GENERAL NOTES, ABBREVIATIONS & SYMBOLS.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.
3. ALL LEAD CONTAINING WASTE, SCRAP AND DEBRIS MUST BE SEGREGATED, COLLECTED AND TESTED USING THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) FOR LEAD TO MAKE A HAZARDOUS WASTE DETERMINATION. PROVIDE COPIES OF THE TCLP RESULTS AND HAZAROUS WASTE MANIFESTS, IF APPLICABLE, TO THE PROJECT COR AND FACILITY GEMS PERSONNEL.

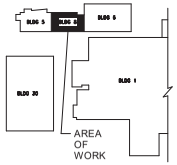
SHEET KEYNOTES:

1 DEMOLISH MECHANICAL SYSTEMS IN ROOMS BA104 AND BA105, INCLUDING EXHAUST FANS, BOILER BREECHING HEAT RECOVERY, GAS PIPING AND INCINERATOR. ALSO DEMOLISH OFFICE BA105A.

2 5" CHS, CHR & TCW TO BE DEMOLISHED. CUT AND CAP EXISTING PIPE AT EXISTING PIPE TUNNEL WALL.



1 MECHANICAL DEMOLITION PLAN - FIRST LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE-071027-E

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL DEMOLITION PLAN - FIRST LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MD111
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

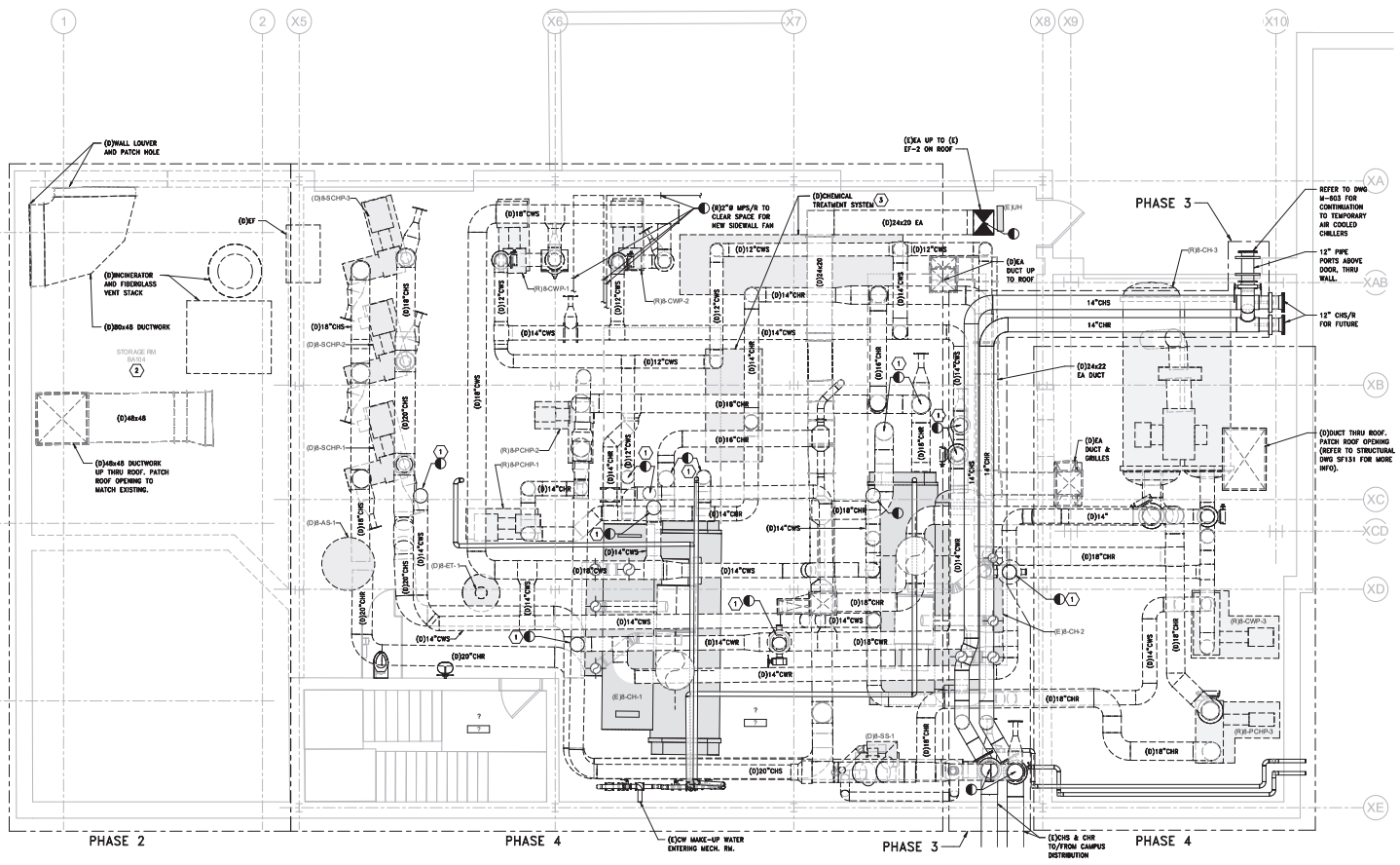
C:\Temp\REVIT BANG\0507-0014-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMG.rvt
6/2/2022 1:43:29 PM

GENERAL SHEET NOTES:

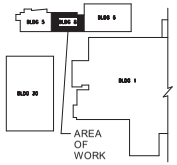
1. REFER TO DWG. M-001 FOR GENERAL NOTES, ABBREVIATIONS & SYMBOLS.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.
3. ALL LEAD CONTAINING WASTE, SCRAP AND DEBRIS MUST BE SEGREGATED, COLLECTED AND TESTED USING THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) FOR LEAD TO MAKE A HAZARDOUS WASTE DETERMINATION. PROVIDE COPIES OF THE TCLP RESULTS AND HAZARDOUS WASTE MANIFESTS, IF APPLICABLE, TO THE PROJECT COR AND FACILITY GEMS PERSONNEL.

SHEET KEYNOTES:

1. EXISTING CHILLERS (E)B-CH-1, (E)B-CH-2 ON LEVEL 2 AND EXISTING COOLING TOWERS (E)B-CT-1, (E)B-CT-2, (E)B-CT-3 ON ROOF TO REMAIN. DEMOLISH PIPE IN EXISTING RISER TO EXISTING EQUIPMENT. REFER TO DWG M-503 FOR MORE DETAIL.
2. DEMOLISH MECHANICAL SYSTEMS IN ROOMS BA104 AND BA105, INCLUDING EXHAUST FANS, BOILER BREECHING HEAT RECOVERY, GAS PIPING AND INCINERATOR. ALSO DEMOLISH OFFICE BA105A.
3. DEMOLISH EXISTING CHEMICAL TREATMENT SYSTEM AND ALL APPURTENANCES. EXISTING TAPS ARE TO REMAIN IN THE EXISTING PIPING THAT IS NOT BEING DEMOLISHED. CAP EXISTING CHEMICAL TREATMENT PIPE FOR FUTURE USE ON THE NEW CHILLED WATER SYSTEM. COORDINATE THE REMOVAL OF THE CHEMICAL TREATMENT EQUIPMENT WITH THE VA'S CHEMICAL TREATMENT CONTRACTOR AND TURN OVER ALL EQUIPMENT TO THE VA. ALSO COORDINATE ANY ELECTRICAL WORK WITH THE ELECTRICAL CONTRACTOR AND ANY PLUMBING WORK WITH THE PLUMBING CONTRACTOR.



1 MECHANICAL DEMOLITION PLAN - SECOND LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL DEMOLITION PLAN - SECOND LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MD121
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

C:\Temp\REVIT BANG\527-001-4-Rit_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordo2KCMO.rvt

VA FORM 08-6231

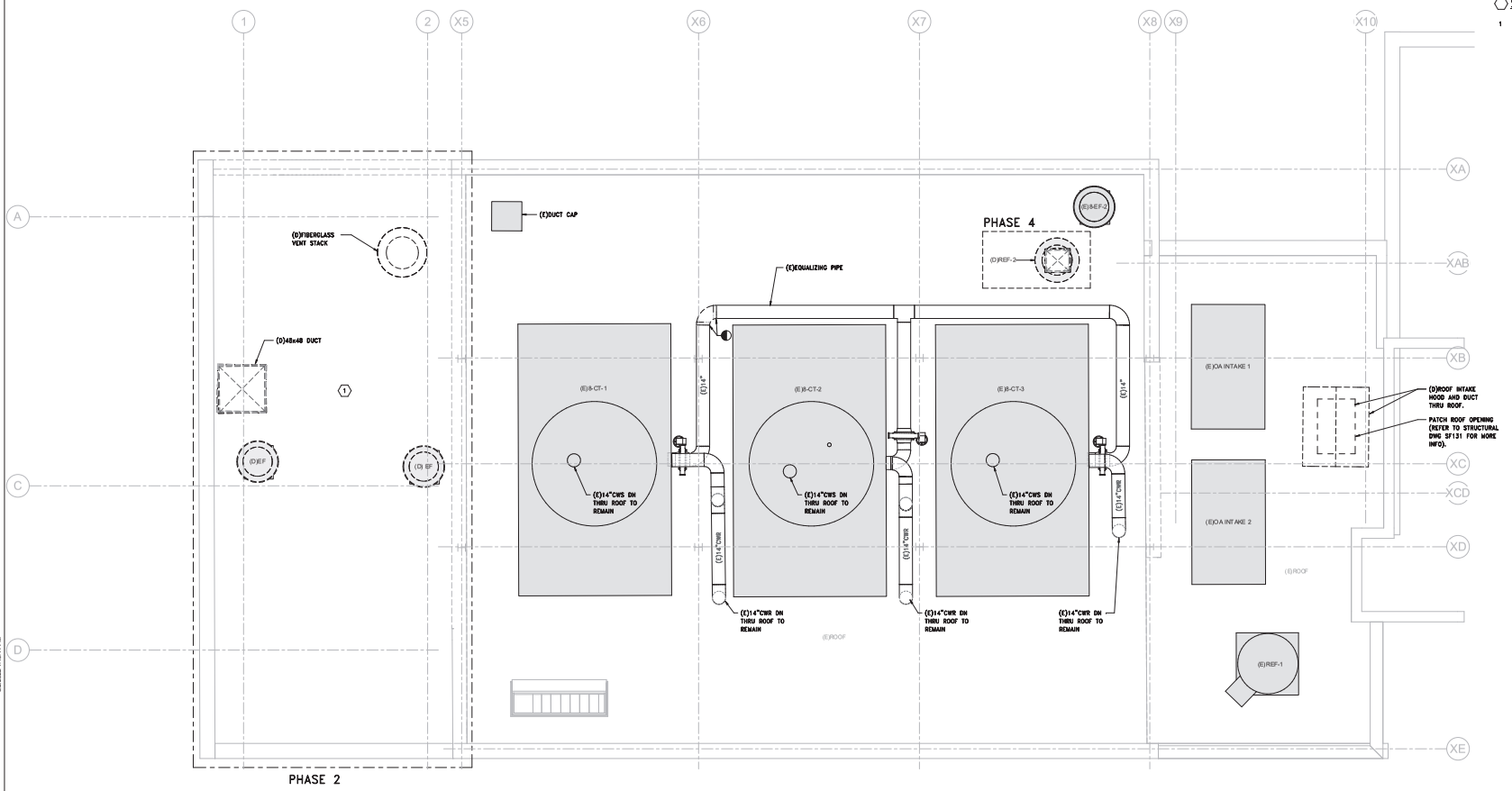
6/2/2022 1:45:38 PM

GENERAL SHEET NOTES:

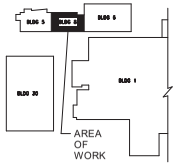
1. REFER TO DWG. N-001 FOR GENERAL NOTES, ABBREVIATIONS & SYMBOLS.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.
3. ALL LEAD CONTAINING WASTE, SCRAP AND DEBRIS MUST BE SEGREGATED, COLLECTED AND TESTED USING THE TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) FOR LEAD TO MAKE A HAZARDOUS WASTE DETERMINATION. PROVIDE COPIES OF THE TCLP RESULTS AND HAZARDOUS WASTE MANIFESTS, IF APPLICABLE, TO THE PROJECT COR AND FACILITY GEMS PERSONNEL.

SHEET KEYNOTES:

1 SECTION OF ROOF ABOVE ROOM BA104 TO BE REMOVED.



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



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE062774

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

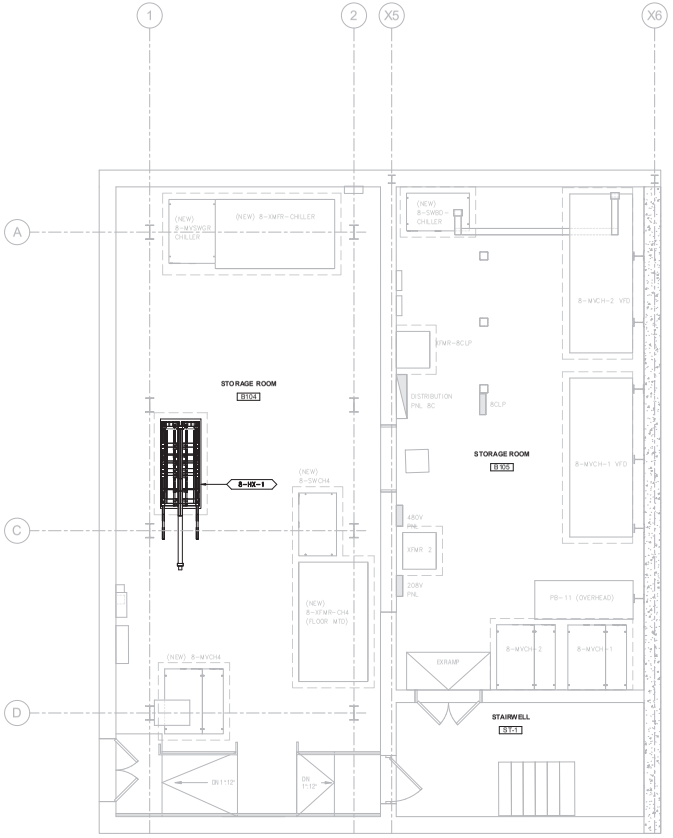
Drawing Title	MECHANICAL DEMOLITION PLAN - ROOF
Approved: Project Director	
Phase	CONSTRUCTION BID DOCUMENTS
	NON-SPRINKLERED
Project Title	UD CHILLER CAPACITY UPGRADE
Location	UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA
Issue Date	2022-05-11
Checked	LM
Drawn	SP
Project Number	646-20-109
Building Number	8
Drawing Number	MD131

VA FORM 08-6231

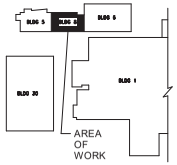
C:\Temp\REVIT BANG\527-00114-PM_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMO.rvt
6/2/2022 1:45:41 PM

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL EQUIPMENT PLAN - FIRST LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

C:\Temp\REVIT BANG\527-001-PM_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordiFZCMG.rvt

6/2/2022 1:53:00 PM

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. 076027-E

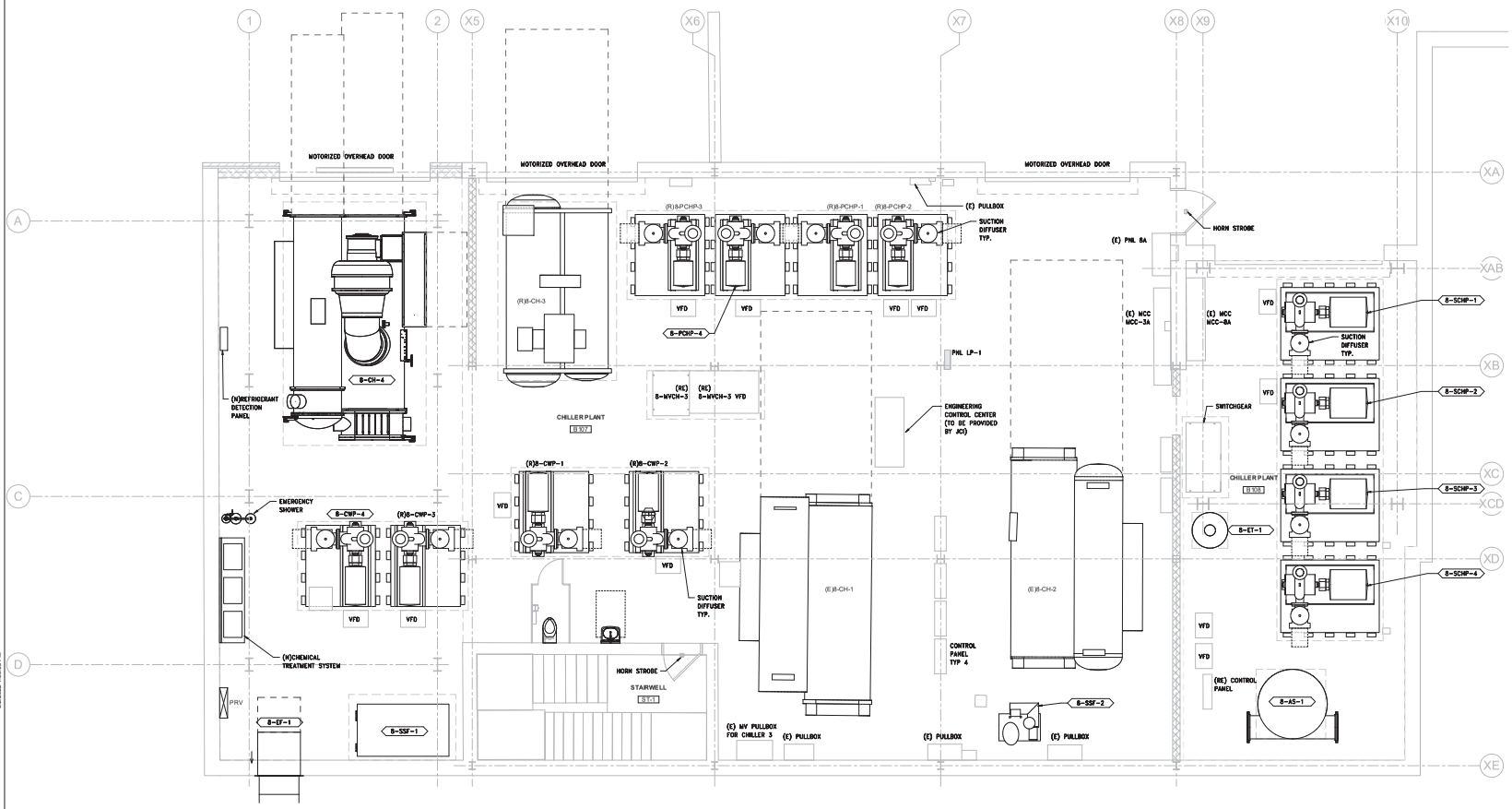
Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL EQUIPMENT PLAN - FIRST LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE		Project Number: 646-20-109
				Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA		Drawing Number: MQ111
		Issue Date: 2022-05-11	Checked: LM	Drawn: SP

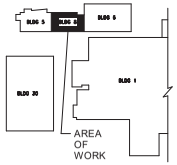
VA FORM 08-6231

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL EQUIPMENT PLAN - SECOND LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

NO.	DESCRIPTION	DATE

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ANTHONY D. PACARO, JR. ENGINEER No. PE062774

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

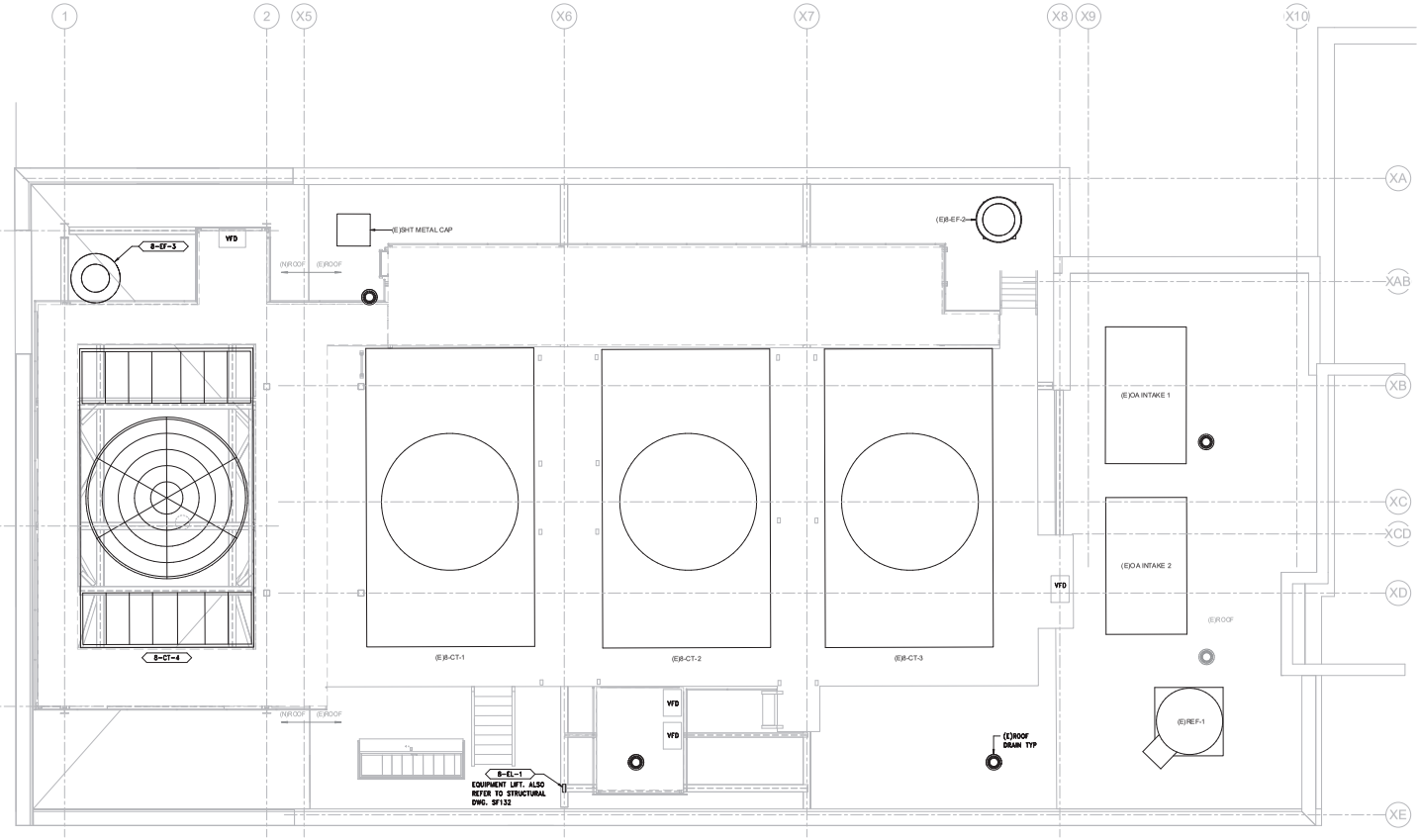
Drawing Title: MECHANICAL EQUIPMENT PLAN - SECOND LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MQ121
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

C:\Temp\REVIT BANG\527-001-4-PIL_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordo2KCMO.rvt
6/2/2022 1:50:03 PM

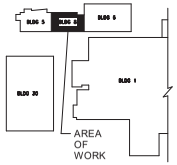
GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL EQUIPMENT PLAN - ROOF LEVEL

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



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE062173

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL EQUIPMENT PLAN	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: MQ131
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

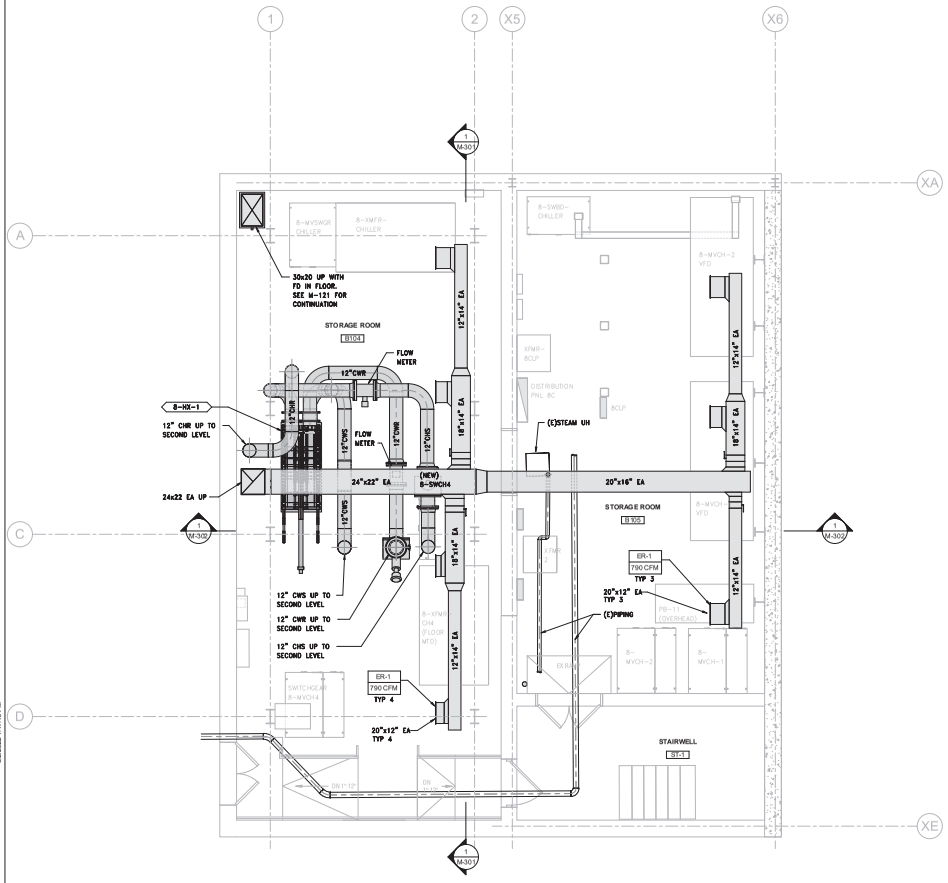
VA FORM 08-6231

C:\Temp\REVIT BANKS\507-0014-PIt_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMQ.rvt

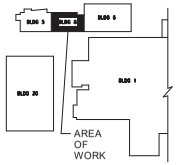
6/2/2022 4:23:35 PM

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL PLAN - FIRST LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14610
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR.
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL PLAN - FIRST LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-111
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

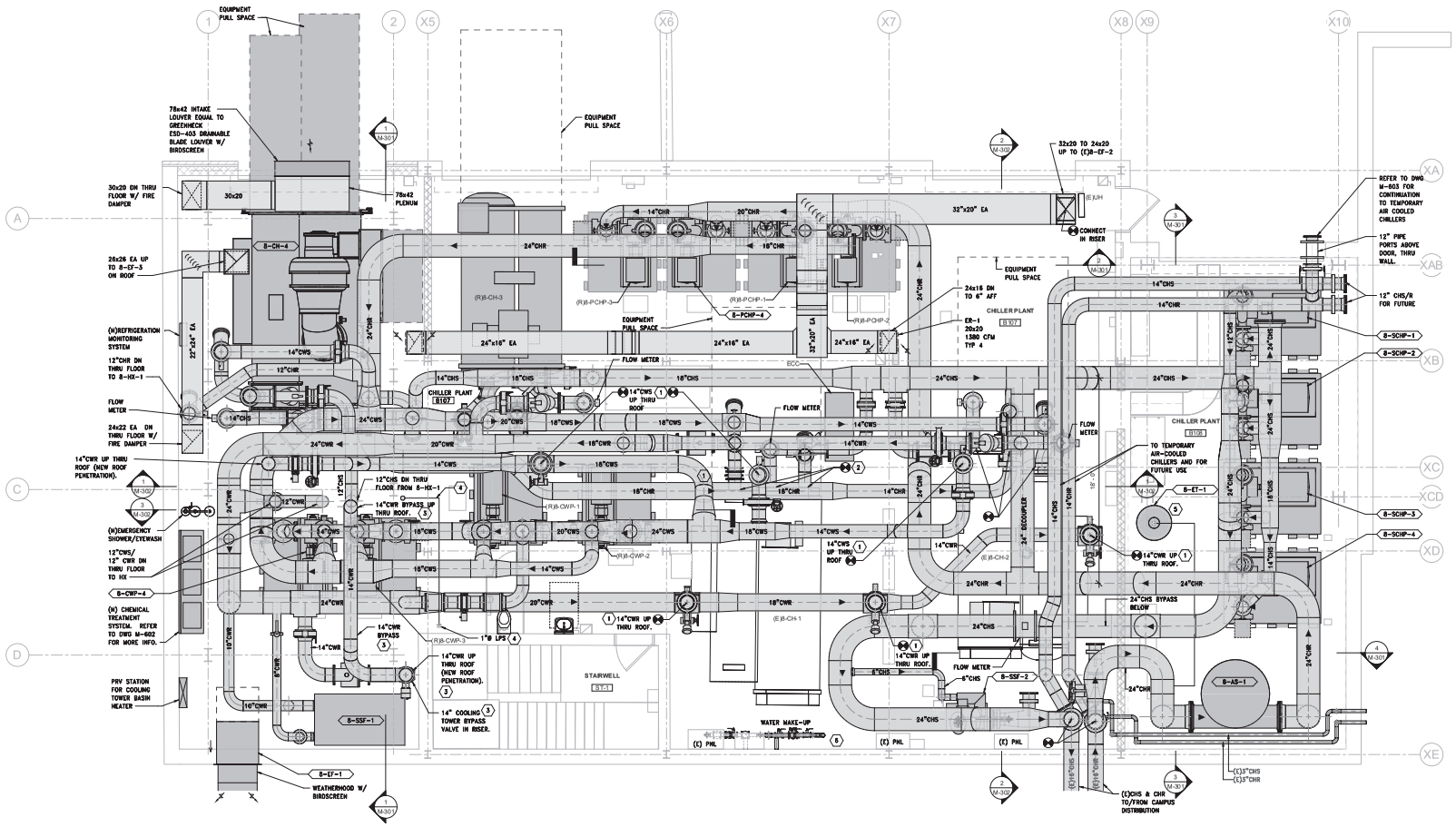
C:\Temp\REVIT BANG\527-001-4-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMG.rvt
5/2/2022 1:47:19 PM

GENERAL SHEET NOTES:

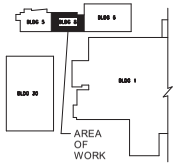
1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.

SHEET KEYNOTES:

1. CONNECT NEW PIPE TO EXISTING RISER. REFER TO DWG M-602 FOR MORE INFORMATION
2. CONNECT NEW PIPE TO EXISTING CHILLER
3. PROVIDE COOLING TOWER BYPASS VALVE IN RISER. REFER TO CW FLOW DIAGRAM ON DWG M-602 FOR MORE INFO.
4. 1" LPS TO COOLING TOWER STEAM COIL BASIN HEATER. REFER TO DIAGRAM M-602 FOR MORE INFORMATION.
5. SEE DETAIL 2 ON DWG M-501 FOR FILL CONNECTION TO CHILLED WATER SYSTEM AT EXPANSION TANK.
6. SEE DRAWING P-121 FOR WATER MAKE-UP PIPING IN THIS AREA.



1 MECHANICAL PLAN - SECOND LEVEL
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14618, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

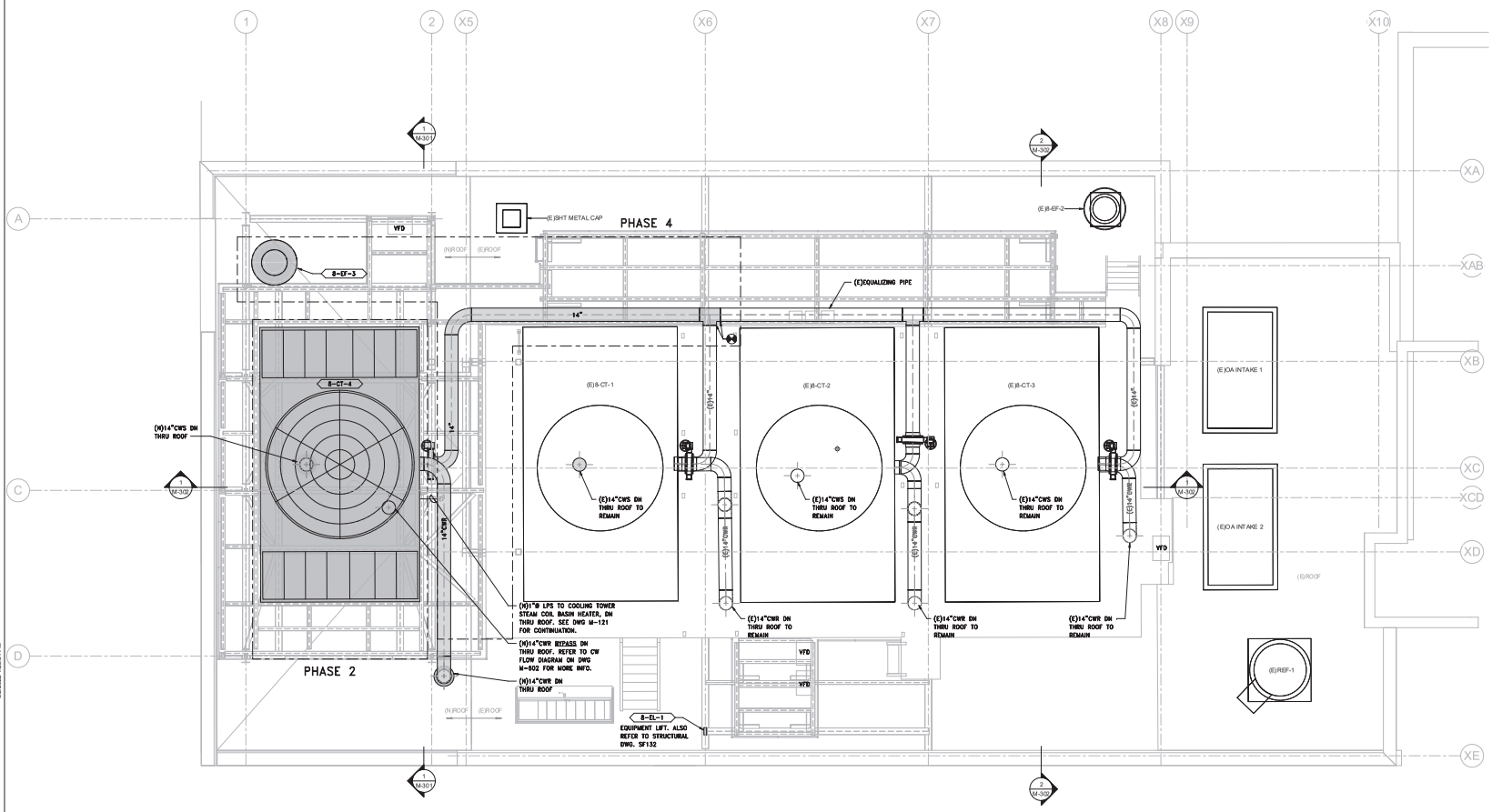
Drawing Title: MECHANICAL PLAN - SECOND LEVEL	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-121
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

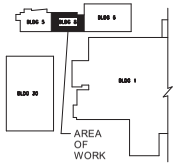
C:\Temp\REVIT BANG\527-001-4-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCOMO.rvt
6/2/2022 1:47:51 PM

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 MECHANICAL PLAN - ROOF
SCALE: 1/4" = 1'-0"



KEYPLAN

PLAN NORTH
ACTUAL NORTH

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE-075217-E

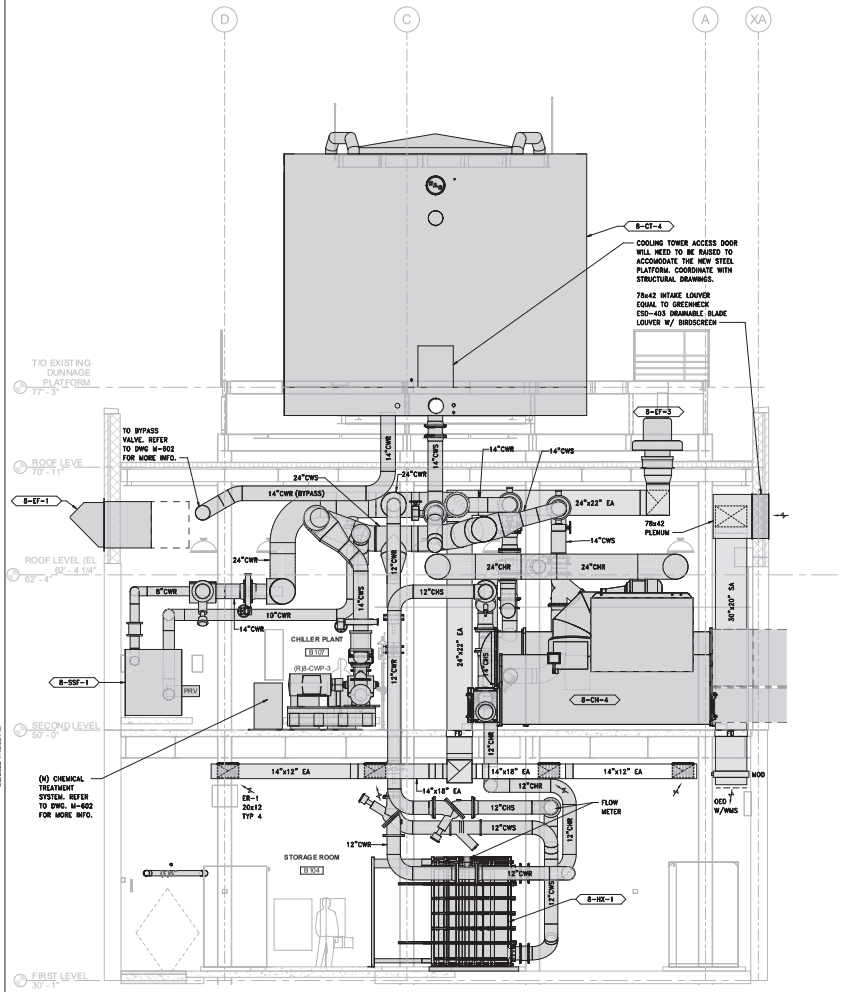
Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL PLAN - ROOF	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-131
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

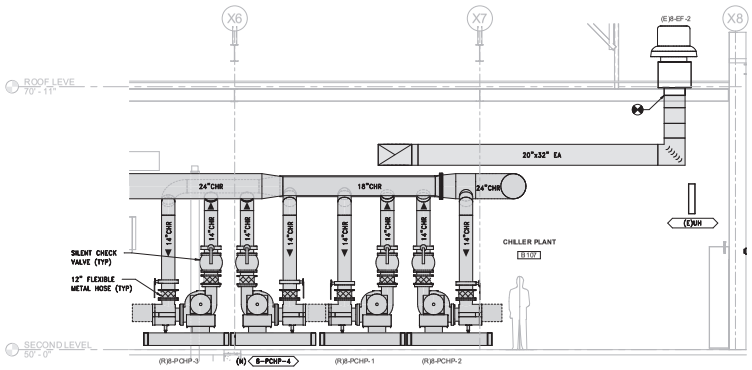
C:\Temp\REVIT BANG\527-001-14-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordiFZCMG.rvt

6/2/2022 4:23:34 PM

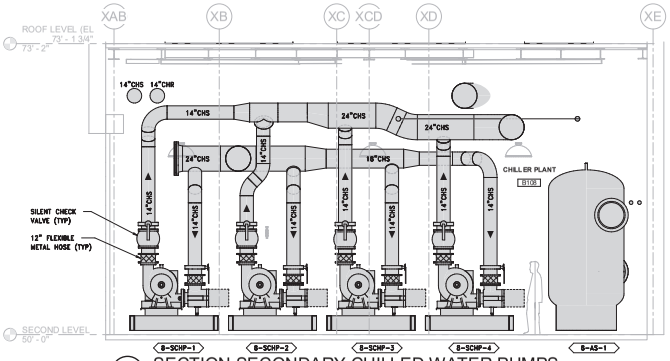
VA FORM 08-6231



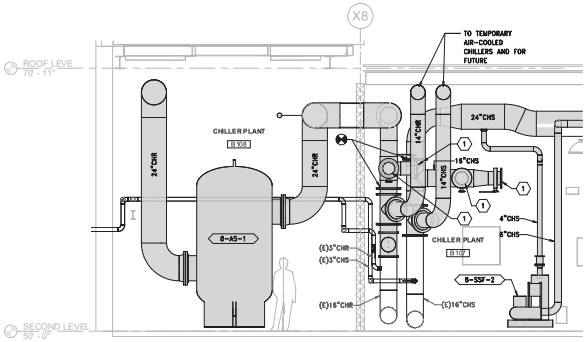
1 SECTION WEST
SCALE 1/4" = 1'-0"



2 SECTION PRIMARY CHILLED WATER PUMPS
SCALE 1/4" = 1'-0"



3 SECTION SECONDARY CHILLED WATER PUMPS
SCALE 1/4" = 1'-0"



4 SECTION CHILLED WATER SERVICE
SCALE 1/4" = 1'-0"

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.

SHEET KEYNOTES:

1 PROVIDE 12" PIPE TAP, VALVED AND CAPPED FOR FUTURE CONNECTION.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
ANTHONY D. PACARO, JR.
No. 076407-E
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL SECTIONS	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director: NON-SPRINKLERED		Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-301
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

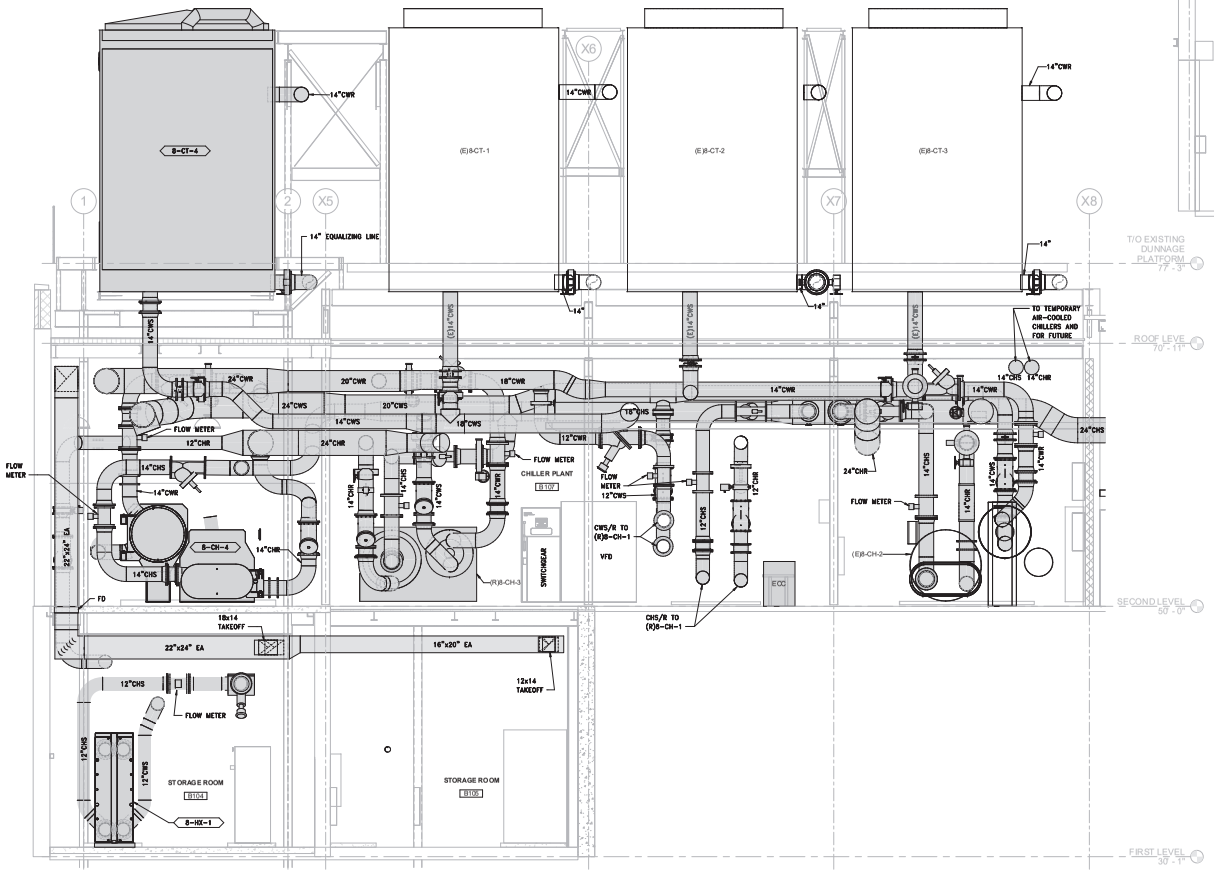
C:\Temp\REVIT BANG\527-00114-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordo2FCDMO.rvt
5/2/2022 1:48:39 PM

GENERAL SHEET NOTES:

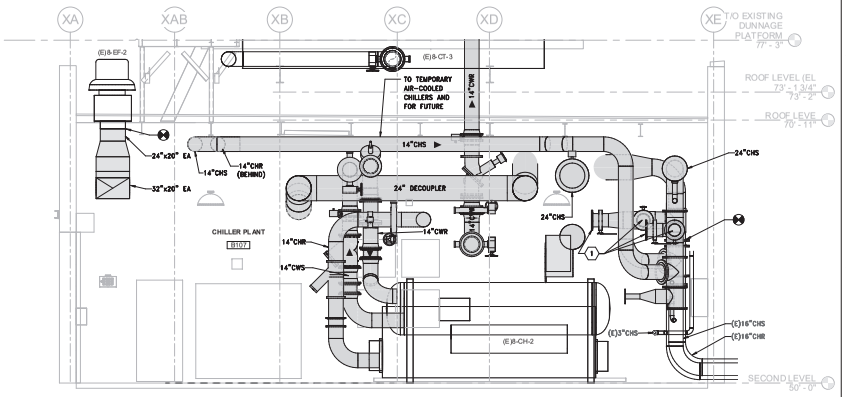
1. REFER TO DWG. M-001 FOR GENERAL NOTES.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.

SHEET KEYNOTES:

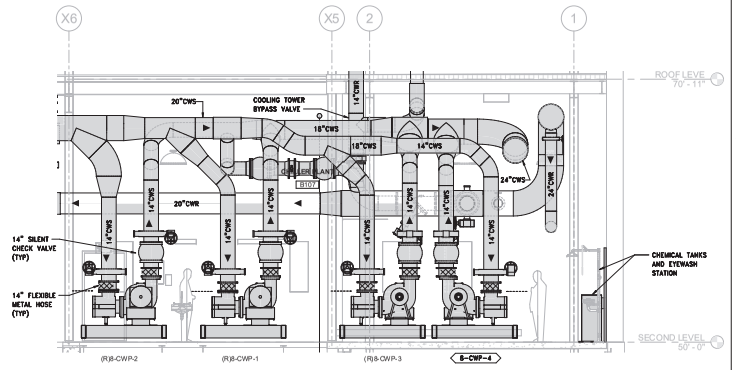
1 PROVIDE 12" PIPE TAP, VALVED AND CAPPED FOR FUTURE CONNECTION.



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



2 SECTION SIDE VIEW CHILLED WATER SERVICE
SCALE: 1/4" = 1'-0"



3 SECTION CONDENSING WATER PUMPS
SCALE: 1/4" = 1'-0"

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14610, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR.
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

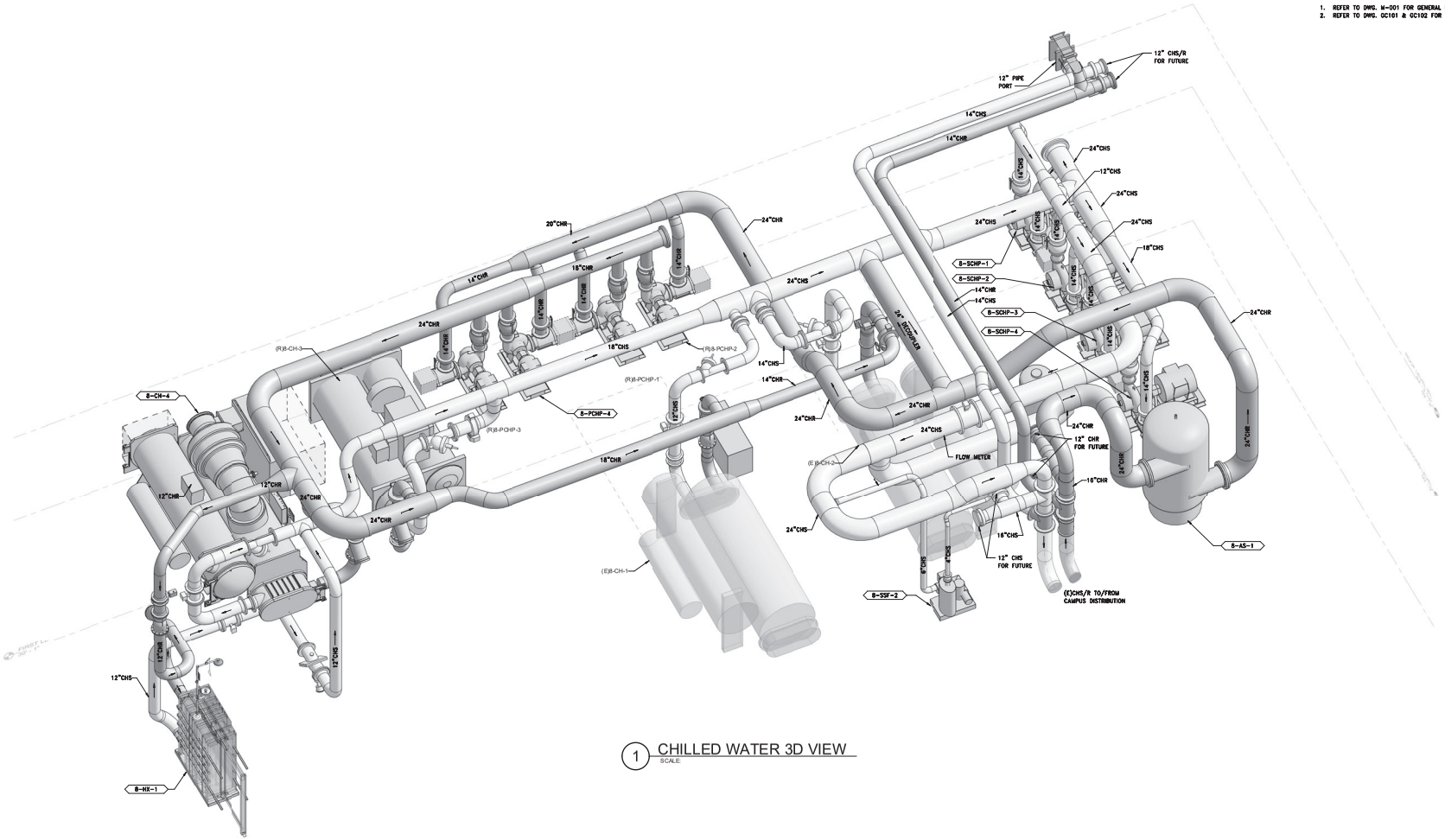
Drawing Title: MECHANICAL SECTIONS	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-302
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

VA FORM 08-6231

C:\Temp\REVIT BANG\527-00114-Pitt_UD_Chiller_Upgrade-MEP-CENTRAL_R20_jgordo2KCMG.rvt
5/2/2022 1:45:02 PM

GENERAL SHEET NOTES:

1. REFER TO DWG. M-001 FOR GENERAL NOTES, ABBREVIATIONS & SYMBOLS.
2. REFER TO DWG. GC101 & GC102 FOR PHASING PLANS.



1 CHILLED WATER 3D VIEW
SCALE:

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3100 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

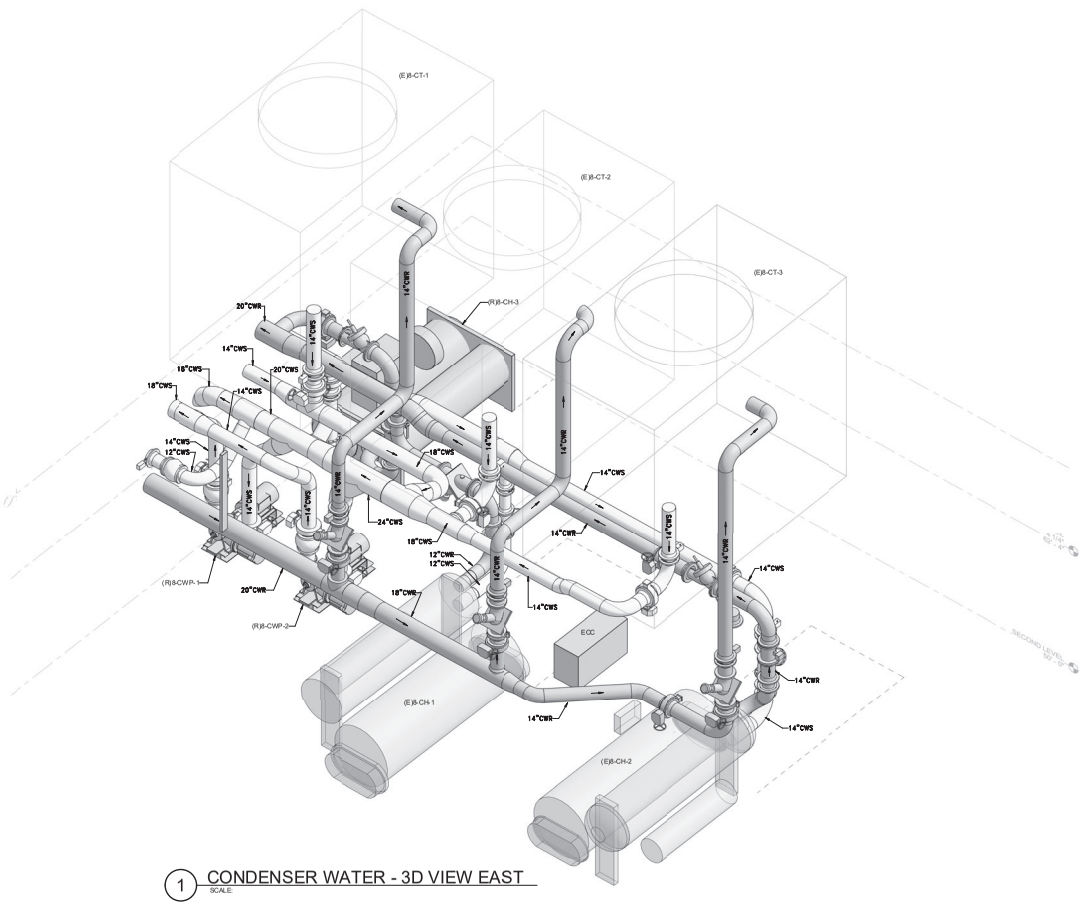
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
SDVOSB
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

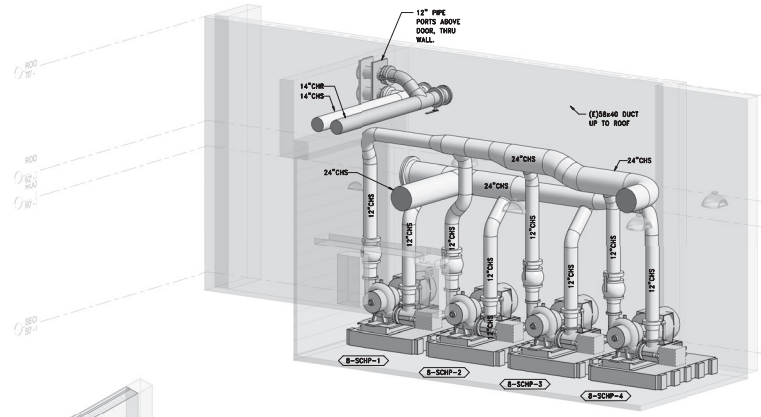
MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACAFIO JR. No. PE061774

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

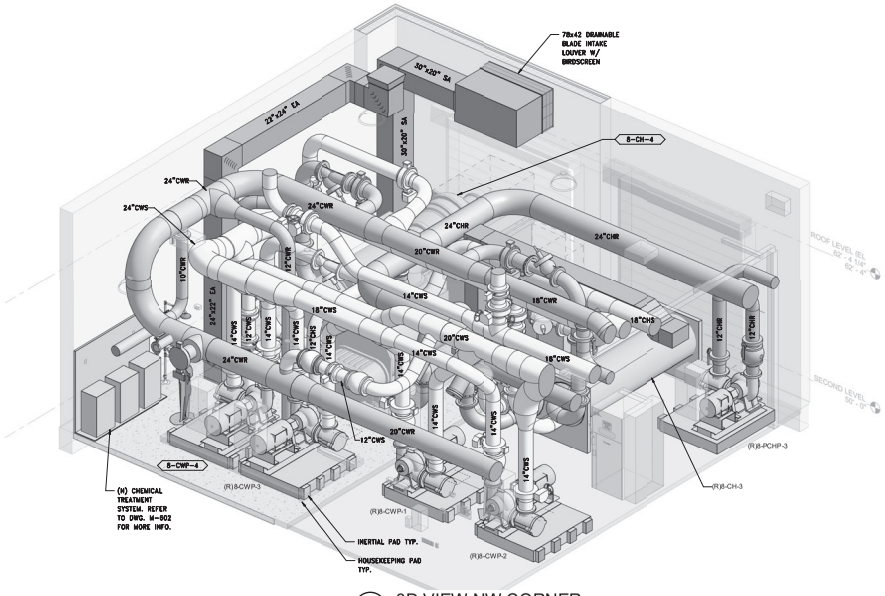
Drawing Title: MECHANICAL SECTIONS
Approved: Project Director
Phase: CONSTRUCTION BID DOCUMENTS
NON-SPRINKLERED
Project Title: UD CHILLER CAPACITY UPGRADE
Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA
Issue Date: 2022-05-11
Checked: Checker
Drawn: Author
Project Number: 646-20-109
Building Number: 8
Drawing Number: M-303

C:\Temp\REVIT BANKS\527-00114-Pitt_UD_Chiller_Upgrade-MEP-CENTRAL-R20_jgordoFZCMG.rvt
6/2/2022 1:40:08 PM
VA FORM 08-6231

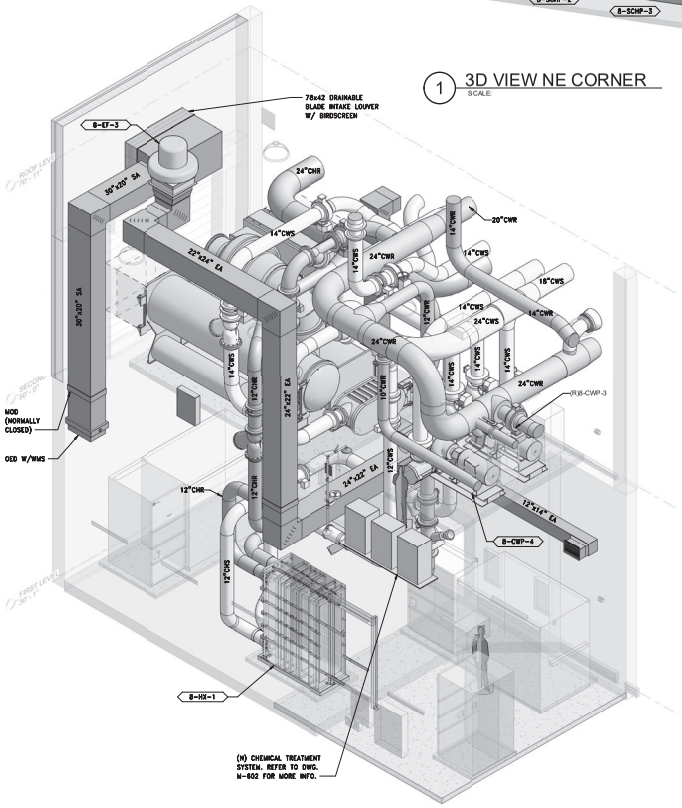

(E)8-CT-1
(E)8-CT-2
(E)8-CT-3
(R)8-CH-3
20"CWR
14"CWS
18"CWS
20"CWS
14"CWS
12"CWS
SBC-14
SBC-14
SBC-14



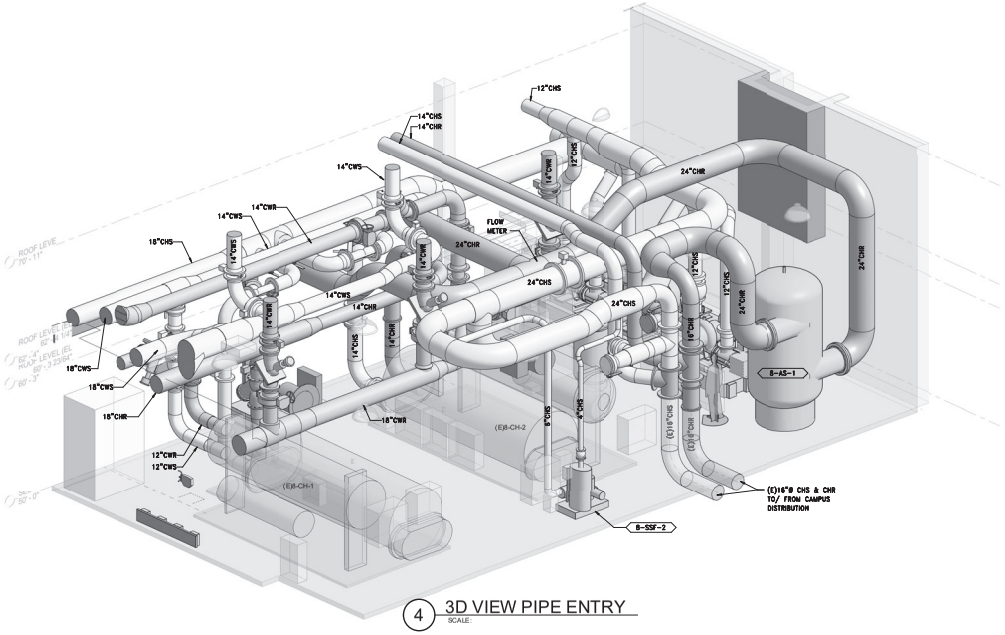
1 3D VIEW NE CORNER
SCALE:



2 3D VIEW NW CORNER
SCALE:



3 3D VIEW PIPE - WEST END
SCALE:



4 3D VIEW PIPE ENTRY
SCALE:

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER

NO.	DESCRIPTION	DATE

CONSULTANTS

LaBella
Powered by partnership.
3 00 Dake Street Suite 201 Rochester, NY 14614 P: (585) 454-6110
Engineering Architecture Environmental Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACAPIO JR. No. PE061774

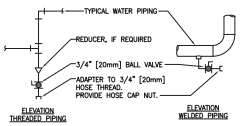
Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL SECTIONS 3D VIEWS	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-305
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

C:\Temp\REVIT BAK\0507-0014-PIB_UD_Chiller_Upgrade-MEP-CENTRAL-R20_ignsbFZCMG.rvt

6/2/2022 1:49:27 PM

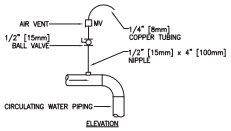
VA FORM 08-6231



TYPICAL CHILLED AND HOT WATER PIPING DRAIN VALVE CONNECTIONS

NOTES:

1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.
2. WHERE SCALE POCKETS ARE SHOWN ON PIPE RISER DIAGRAMS AND/OR PLANS LOCATE DRAIN AT BOTTOM OF SCALE POCKET.



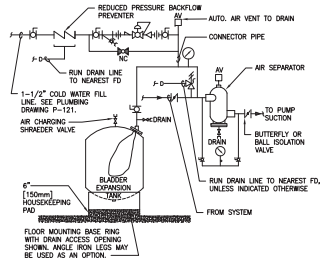
TYPICAL MANUAL AIR VENT

NOTES:

1. VENT ALL HIGH POINTS INDICATED ABOVE.

DRAIN VALVE AND AIR VENT CONNECTIONS (HYDRONIC SYSTEMS)

1 SCALE: NTS

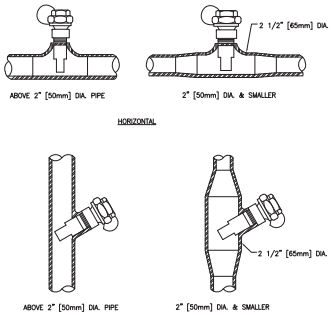


NOTES:

1. SEE EXPANSION TANK SYSTEM SCHEDULE FOR COMPONENT SIZES.
2. SET PRESSURE REDUCING VALVE SO PRESSURE AT HIGHEST POINT IN SYSTEM HAS A MINIMUM OF 4 PSIG [28kPa].

2 FLOOR MOUNTED EXPANSION TANK PIPING CONNECTIONS

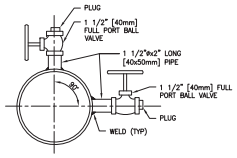
SCALE: NTS



NOTE:
PROVIDE THE APPROPRIATE WELL DEPTH TO HAVE THE NECESSARY INSULATION STAND-OFF DISTANCE.

3 INSTALLATION OF THERMOMETER WELLS

SCALE: NTS

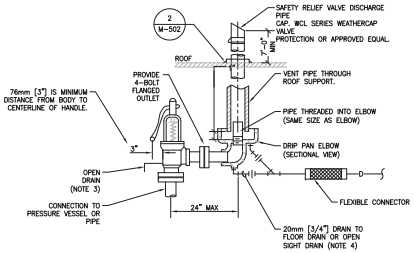


NOTES:

1. PROVIDE IN CHILLED WATER MAIN AND IN CONDENSER WATER MAIN.
2. LOCATE PILOT TUBE TAPS 20 PIPE DIAMETERS DOWNSTREAM AND 10 PIPE DIAMETERS UPSTREAM FROM THE NEAREST PIPE FITTING. EITHER TOP OR SIDE LOCATION. BOTH ARE NOT REQUIRED AT SAME LOCATION.

4 PITOT TEST CONNECTIONS

SCALE: NTS

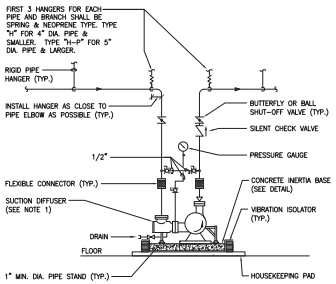


NOTES:

1. UNLESS OTHERWISE SHOWN ON THE DRAWINGS, SIZE THE VENT PIPE SO THAT STEAM IS NOT BLOWN OUT AT THE VENT PIPE ENTRANCE. UTILIZE THE CALCULATION METHOD CONTAINED IN ANSI B31.1. POWER PIPING CODE, APPENDIX II.
2. VENT PIPE SHALL TERMINATE 1829mm [6'] MIN. ABOVE FINISHED ROOF.
3. DISCHARGE OF DRAIN SHALL BE DIRECTED AWAY FROM PLATFORMS OR OTHER AREAS WHICH PERSONNEL MAY OCCUPY.
4. NO OTHER DRAIN SHALL BE CONNECTED TO THE DRIP PAN ELBOW DRAIN PIPE.

5 STEAM SAFETY VALVE DETAIL

SCALE: NTS

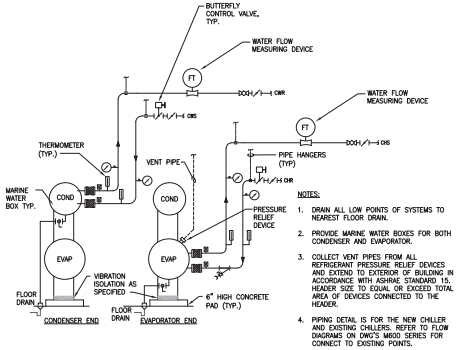


NOTES:

1. REMOVE START-UP STRAINER AFTER ALL BALANCING AND COMMISSIONING IS COMPLETE.

6 FLOOR-MOUNTED PUMP CONNECTIONS WITH FLEXIBLE CONNECTORS

SCALE: NTS

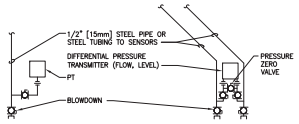


NOTES:

1. DRAIN ALL LOW POINTS OF SYSTEMS TO NEAREST FLOOR DRAIN.
2. PROVIDE MARINE WATER BOXES FOR BOTH CONDENSER AND EVAPORATOR.
3. COLLECT VENT PIPES FROM ALL REFRIGERANT PRESSURE RELIEF DEVICES AND EXTEND TO EXTERIOR OF BUILDING IN ACCORDANCE WITH ASHRAE STANDARD 15. HEADER SIZE TO EQUAL OR EXCEED TOTAL AREA OF DEVICES CONNECTED TO THE HEADER.
4. PIPING DETAIL IS FOR THE NEW CHILLER AND EXISTING CHILLERS. REFER TO FLOW DIAGRAMS ON DWG'S M600 SERIES FOR CONNECT TO EXISTING POINTS.

7 WATER COOLED CHILLER PIPING CONNETIONS DETAIL

SCALE: NTS



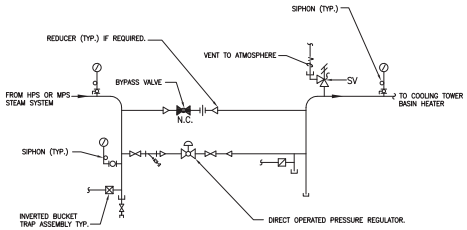
ELEVATION

NOTES:

1. INSTALLATION OF SENSORS AND TRANSMITTERS SHALL CONFORM TO RECOMMENDATIONS OF MANUFACTURER OF TRANSMITTERS.

8 PRESSURE TRANSMITTER INSTALLATION

SCALE: NTS



NOTES

1. SEE FLOOR PLANS FOR PIPE SIZES.
2. SEE EQUIPMENT SCHEDULES FOR VALVE DATA AND PIPE SIZES.
3. INSTALL VALVES AS RECOMMENDED BY MANUFACTURER.

9 STEAM PRESSURE REDUCING STATION

SCALE: NTS

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PICARDO JR. NO. PE-084122-E COMMONWEALTH OF PENNSYLVANIA

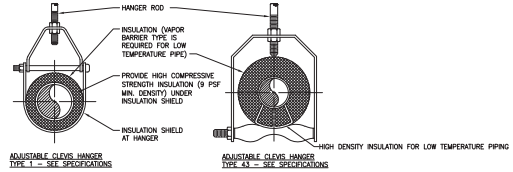
Office of Construction and Facilities Management

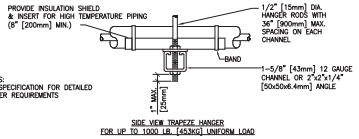
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL DETAILS	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-501
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	

P:\0507_DVA-Pittsburgh PA IDIQ\0014 PIT UD Chiller Capacity Upgrade\4_Drawings_Cad_Current Submittal Phase\6_Mechanical\M-501.dwg 5-11-22 09:55:15 AM sporto

VA FORM 08-6231





NOTES:
SEE SPECIFICATION FOR DETAILED HANGER REQUIREMENTS

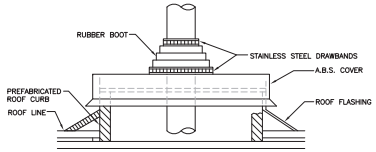
SIDE VIEW TRAPEZE HANGER
FOR UP TO 1000 LB. [453KG] UNIFORM LOAD

MAXIMUM PIPE/TUBING SUPPORT SPACING

NOM. SIZE	IN. [mm]	THRU THRU	3/4 [20]	1 [25]	1 1/4 [32]	1 1/2 [40]	2 [50]	2 1/2 [65]	3 [75]	4 [100]	5 [125]	6 [150]	8 [200]	10 [250]	12 [300]	14 [350]	16 [400]	18 [450]	20 [500]	24 [600]
PIPE	FT. [mm]	7 [2100]	7 [2100]	7 [2100]	9 [2700]	10 [3000]	11 [3400]	12 [3700]	14 [4100]	16 [4900]	17 [5200]	19 [5800]	22 [6700]	23 [7000]	25 [7600]	27 [8200]	28 [8500]	30 [9100]	32 [9600]
TUBING	FT. [mm]	5 FT. [1500]	6 [1800]	7 [2100]	8 [2400]	8 [2400]	9 [2700]	10 [3000]	12 [3700]	13 [4000]	14 [4100]	16 [4900]	–	–	–	–	–	–	–	–

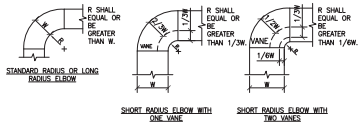
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.

1 PIPE HANGERS
SCALE: NTS



NOTE: ROOF CURB TO BE PROVIDED BY MECHANICAL CONTRACTOR AND ALL FLASHING AND ROOFING TO BE PERFORMED BY CERTIFIED ROOFING CONTRACTOR.

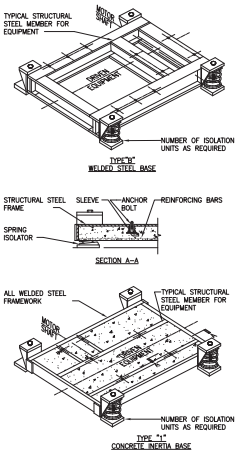
2 TYPICAL PIPE THROUGH ROOF DETAIL
SCALE: NTS



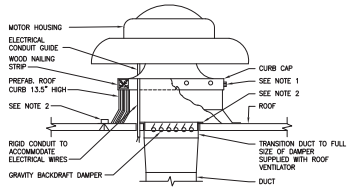
NOTES:

1. THE INTERIOR SURFACE OF ALL RADIUS ELBOWS SHALL BE MADE ROUND.
2. ALL STANDARD RADIUS ELBOWS CAN BE SUBSTITUTED WITH SHORT RADIUS ELBOWS. ALL SHORT RADIUS ELBOWS SHALL HAVE VANES. VANES SHALL BE CONSTRUCTED, SUPPORTED AND FASTENED AS RECOMMENDED BY SMACNA.

3 DUCTWORK RADIUS ELBOWS
SCALE: NTS



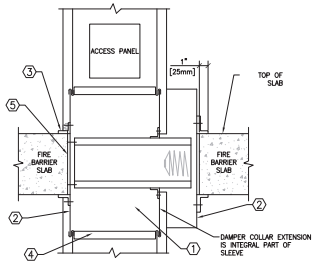
4 VIBRATION ISOLATION BASES
SCALE: NTS



NOTES:

1. SECURE CURB CAP TO WOOD NAILING STRIP WITH 3/8" [10mm] CADMIUM PLATED LAG BOLTS NOT OVER 12" [300mm] ON CENTER.
2. SECURE ROOF CURB, DUCTWORK AND DAMPER TO ROOF WITH EXPANSION BOLTS (CONCRETE ROOF) OR RUST RESISTANT BOLTS (METAL DECK AND BAR JOIST ROOF).
3. RUN ELECTRICAL LINES THROUGH CLEARANCE HOLE PROVIDED IN GRAVITY DAMPER, THEN THROUGH VENTILATOR ELECTRICAL CONDUIT GUIDE.

5 POWER ROOF VENTILATOR
SCALE: NTS



KEYED NOTES:

1. HORIZONTAL DAMPER SHOWN, FOLLOW MANUFACTURER'S INSTRUCTIONS, INCLUDING GAGES FOR SLEEVE AND PERIMETER ANGLES, FIRE DAMPERS MUST BE INSTALLED IN LINE WITH FLOOR AND NOT OUTSIDE THE PENETRATION.
2. GALVANIZED SLEEVE GAGE NOT LESS THAN CONNECTING DUCT, FASTEN SLEEVE TO DAMPER AND FLOOR SLAB WITH PERIMETER ANGLES.
3. USE GALVANIZED STEEL PERIMETER ANGLES NOT LESS THAN 1-1/2" X 1-1/2" (40mm x 40mm), MIN 14 GAGE, AND SHALL PROVIDE 1" (25mm) MINIMUM OVERLAP OF OPENING ON ALL SIDES. PERIMETER ANGLE IS FASTENED TO PARTITION.
4. BREAKAWAY DUCT CONNECTION OF TYPES INDICATED IN SMACNA. ACCESS PANELS: SIZE AND LOCATION TO PERMIT SERVICING FUSIBLE LINK OR LINKS.
5. PROVIDE 1/4" TO 3/4" (6mm TO 15mm) CLEARANCE ON HEIGHT AND WIDTH.

NOTES:

1. ALL DUCTWORK RISERS THAT RUN EXPOSED, SUCH AS THROUGH ATTIC FLOORS AND MECHANICAL ROOM FLOORS SHALL BE PROVIDED WITH 3" (75mm) HIGH CONCRETE CURB AROUND OPENING FOR DUCT.
2. ALL DETAILS SHALL COMPLY WITH FIRE DAMPER MANUFACTURER'S UL MOUNTING AND INSTALLATION REQUIREMENTS.
3. WHERE HVAC AIR DUCT PENETRATES ONLY ONE FLOOR AND PROTECTED WITH A FIRE DAMPER, AN AIR DUCT ENCLOSURE IS NOT REQUIRED.

6 FIRE DAMPER AT FLOOR PENETRATION
SCALE: NTS

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
MECHANICAL DETAILS	CONSTRUCTION BID DOCUMENTS	UD CHILLER CAPACITY UPGRADE	646-20-109
			Building Number 8
Approved: Project Director	NON-SPRINKLERED	Location UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number M-502
		Issue Date 2022-05-11 / Checked LM / Drawn RHD	

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings_Cad_Current Submittal Phase\6_Mechanical\M-502.dwg 5-11-22 09:55:08 AM sporto

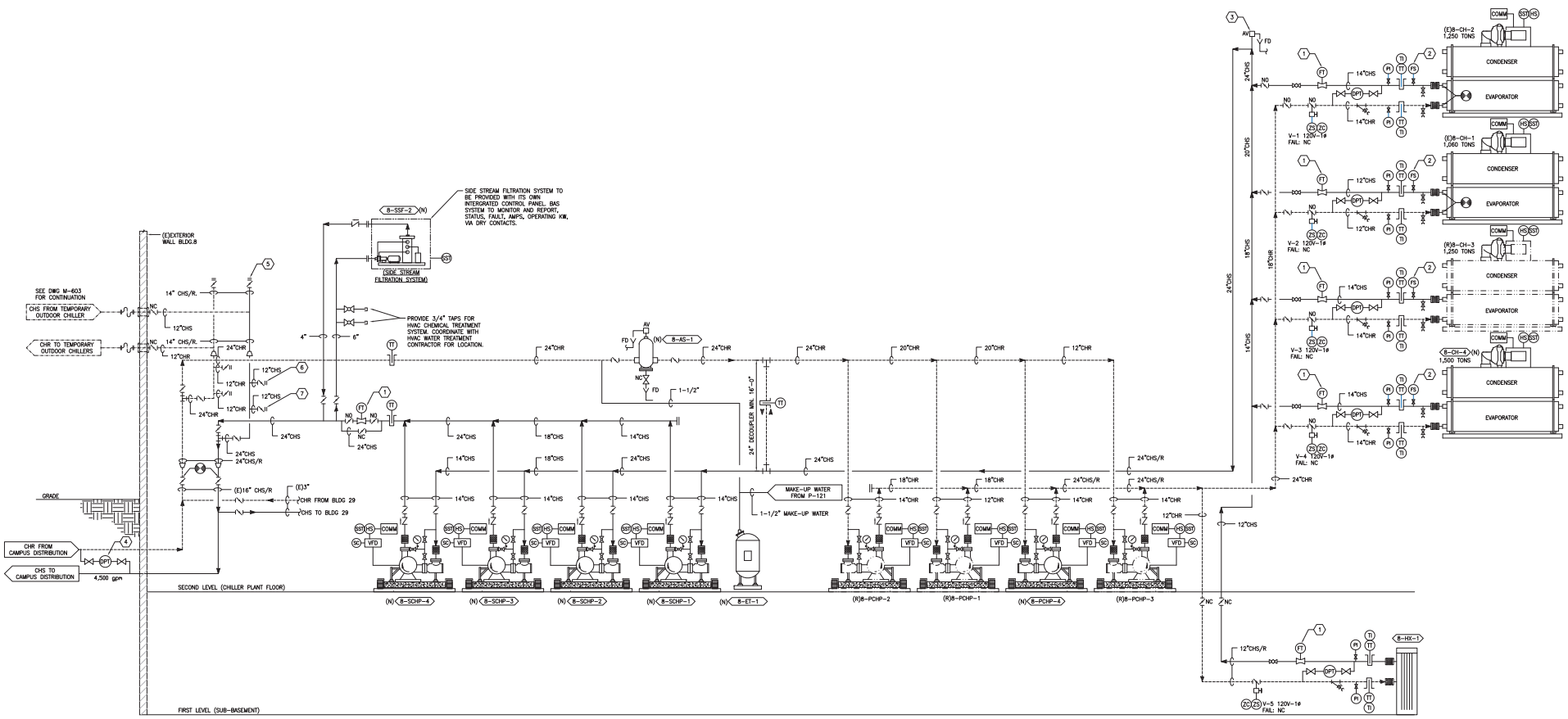
VA FORM 08-6231

SHEET KEYNOTES:

1. FLOW METER. PROVIDE MINIMUM OF 3 x PIPE DIAMETER OF STRAIGHT UNINTERRUPTED RUN UPSTREAM & 2 x DIAMETER DOWNSTREAM OF THE FLOW METER (TYP). ONICON FLOW METER F-3200 OR APPROVED EQUAL.
2. FLOW SWITCH BY CHILLER MANUFACTURER. WIRE BACK TO CHILLER CONTROL PANEL (TYPICAL).
3. PROVIDE AUTOMATIC AIR VENT ON ALL SYSTEM HIGH POINTS. ROUTE THE VALVE OUTLET TO NEAREST FLOOR DRAIN, TERMINATE 4"ABOVE FLOOR WITH AIR CAP (TO ATMOSPHERIC PRESSURE; DO NOT INSTALL VALVE ON THE AIR VENT OUTLET PIPING).
4. EXISTING DIFFERENTIAL PRESSURE TRANSMITTER IS LOCATED ON THE 10TH FLOOR OF BUILDING 1. THE TRANSMITTER IS TO BE REMOVED AND REPLACED WITH A NEW TRANSMITTER. BALANCING CONTRACTOR TO TAKE A PRESSURE DROP READING FROM THE FURTHEST CHILLED WATER CONTROL VALVE ON THE TENTH FLOOR TO DETERMINE SETPOINT FOR THE SYSTEM. COORDINATE WITH VA FOR EXACT LOCATION OF TRANSMITTER.
5. 14" FUTURE TAP, GPM CAPACITY 3,000-3500 GPM.
6. 12" FUTURE TAP, GPM CAPACITY 2,300-2800 GPM.
7. 12" FUTURE TAP, GPM CAPACITY 2,300-2800 GPM.

GENERAL SHEET NOTES:

1. SEE DRAWING M-001 FOR MECHANICAL NOTES, ABBREVIATIONS AND SYMBOLS.
2. SEE DRAWING M-602 FOR CONDENSER WATER FLOW DIAGRAM.
3. COLLECT VENT PIPES FROM CHILLER #4 AND CHILLER #3 PRESSURE RELIEF DEVICES AND EXTEND TO EXTERIOR WALL AND THROUGH TO THE OUTSIDE IN ACCORDANCE WITH ASHRAE STANDARD 15.



CHILLED WATER FLOW DIAGRAM
SCALE: NTS

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella
Powered by partnership.
300 Bulb Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

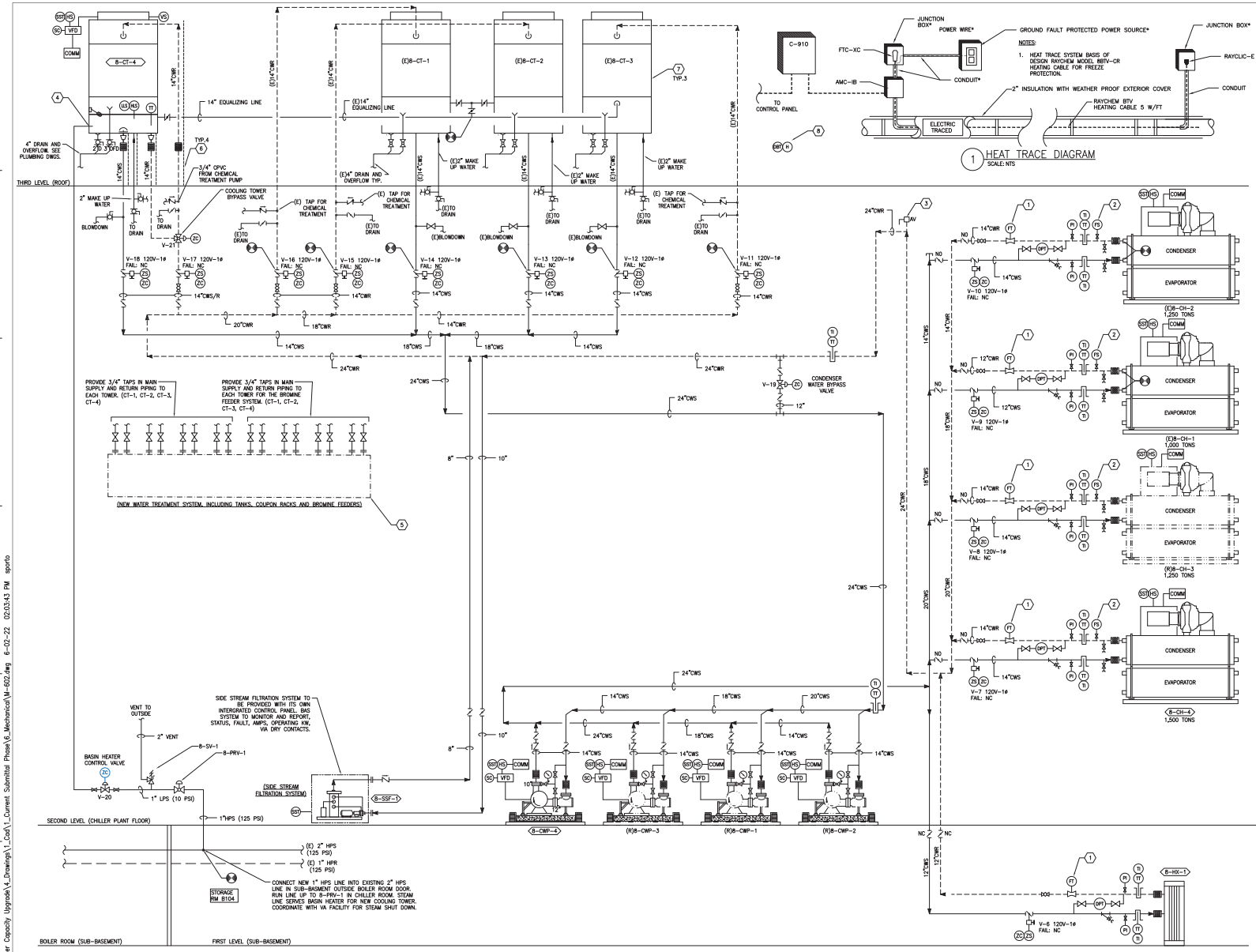
MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY P. PACARO, JR. No. PE-073217-E
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL CHILLED WATER FLOW DIAGRAM	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-601
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	

VA FORM 08-6231

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-601.dwg 5-11-22 09:54:45 AM sporto



CONDENSER WATER FLOW DIAGRAM
SCALE: NTS

NOTES:
1. HEAT TRACE SYSTEM BASIS OF DESIGN RAYCHEM MODEL BBTV-CR HEATING CABLE FOR FREEZE PROTECTION.

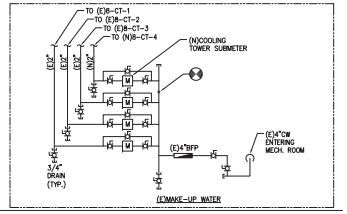
1 HEAT TRACE DIAGRAM
SCALE: NTS

GENERAL SHEET NOTES:

1. SEE DRAWING M-001 FOR MECHANICAL NOTES, ABBREVIATIONS AND SYMBOLS.
2. SEE DRAWING M-601 FOR CHILLED WATER FLOW DIAGRAM.
3. ALL COOLING TOWER WATER PIPING (CWS AND CWR) SHALL BE SCHEDULE 20 STAINLESS STEEL.

SHEET KEYNOTES:

1. FLOW METER. PROVIDE MINIMUM OF 3 x PIPE DIAMETER OF STRAIGHT UNINTERRUPTED RUN UPSTREAM & 2 x DIAMETER DOWNSTREAM OF THE FLOW METER (TYP). ONICON FLOW METER F-3200 OR APPROVED EQUAL.
2. FLOW SWITCH PROVIDED BY CHILLER MANUFACTURER. WIRE BACK TO CHILLER CONTROL PANEL.
3. PROVIDE AUTOMATIC AIR VENT ON ALL SYSTEM HIGH POINTS. ROUTE THE VALVE OUTLET TO NEAREST FLOOR DRAIN, TERMINATE 4 ABOVE FLOOR WITH AIR GAP (TO ATMOSPHERIC PRESSURE; DO NOT INSTALL VALVE ON THE AIR VENT OUTLET PIPING).
4. COOLING TOWER STEAM COIL BASIN HEATER (SUPPLIED BY COOLING TOWER MAUNUFACTURER).
5. NEW CHEMICAL WATER TREATMENT EQUIPMENT. REFER TO DRAWING MQ121 FOR LOCATION. CHEMICAL WATER TREATMENT CONTRACTOR TO PROVICE ALL APPURTENANCES NECESSARY FOR A COMPLETE AND OPERATIONAL SYSTEM. MECHANICAL CONTRACTOR TO INSTALL ALL THE EQUIPMENT. COORDINATE ALL WORK WITH WATER TREATMENT CONTRACTOR. TIE CHEMICAL WATER TREAMENT CONTROL PANELS INTO THE BAS SYSTEM. COORDINATE WITH CONTROLS CONTRACTOR.
6. PROVIDE ELECTRIC HEAT TRACING SYSTEM PER DETAIL 1.
7. REPLACE ALL EXISTING COOLING TOWER CONTROLS WITH NEW. REFER TO POINTS LIST ON DRAWING M-804.
8. PROVIDE NEW OUTSIDE AIR MONITORING CONTROLS FOR THE CHILLED WATER SYSTEM.



PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
PROFESSIONAL ENGINEER
ANTHONY P. PACARO, JR.
No. PE-041433-E
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL CONDENSER WATER FLOW DIAGRAM	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-602
		Issue Date: 2022-05-11 / Checked: LM / Drawn: SP	

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-602.dwg 6-02-22 02:03:43 PM sporto

VA FORM 08-6231

GENERAL SHEET NOTES:

1. REFER TO DRAWING M-001 FOR MECHANICAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. REFER TO DRAWING GC101 FOR PHASING PLAN.
3. REFER TO DRAWING MS101 FOR SITE PLAN.
4. FIELD VERIFY ALL SITE UTILITIES.
5. INSTALL PIPING SO IT IS NOT A TRIPPING HAZARD.

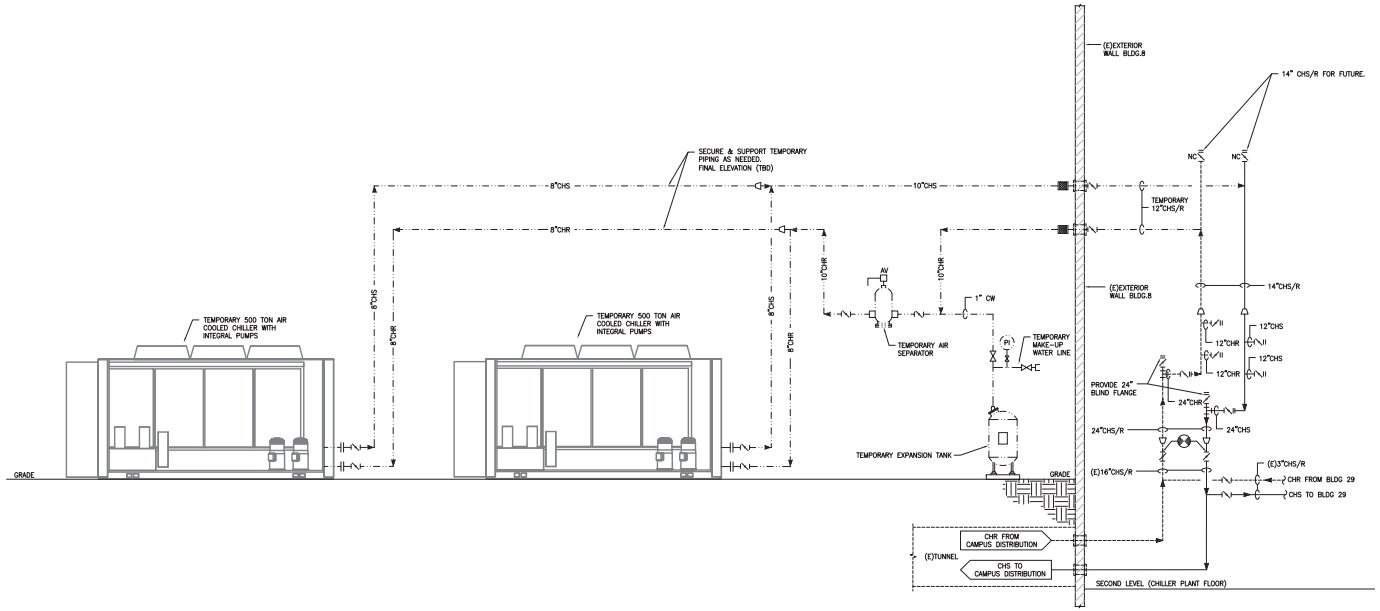
TEMPORARY AIR COOLED CHILLERS

MECHANICAL

1. PRIOR TO THE DEMOLITION OF THE PIPING SYSTEMS, ALL PIPING AND MODIFICATIONS REQUIRED FOR THE TEMPORARY CHILLERS SHALL BE INSTALLED.

   THIS PROJECT WILL REQUIRE THE USE OF (2) TWO RENTAL AIR COOLED CHILLERS

   a. 500 TON AIR COOLED CHILLER
   b. (2) TWO 1200 GPM @ 100' HD PUMPS PIPED IN SERIES
   c. POWER REQUIREMENTS 480V/3P
   d. CHEMICAL FEED SYSTEM: PROVIDE CHEMICAL FEED SYSTEM.
   e. MAKE-UP WATER PIPING: PROVIDE REDUCED PRESSURE ZONE (RPZ) BACKFLOW PREVENTER AND TIE-INTO THE EXISTING POTABLE WATER SYSTEM. ROUTE TEMPORARY PIPING, VALVES, FITTINGS AND APPURTENANCES TO TEMPORARY CHILLED WATER PIPING.
   f. ALL PIPING SHALL BE INSULATED AND JACKETED.



TEMPORARY CHILLED WATER FLOW DIAGRAM
SCALE: NTS

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-603.dwg 6-02-22 02:04:43 PM sporto

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

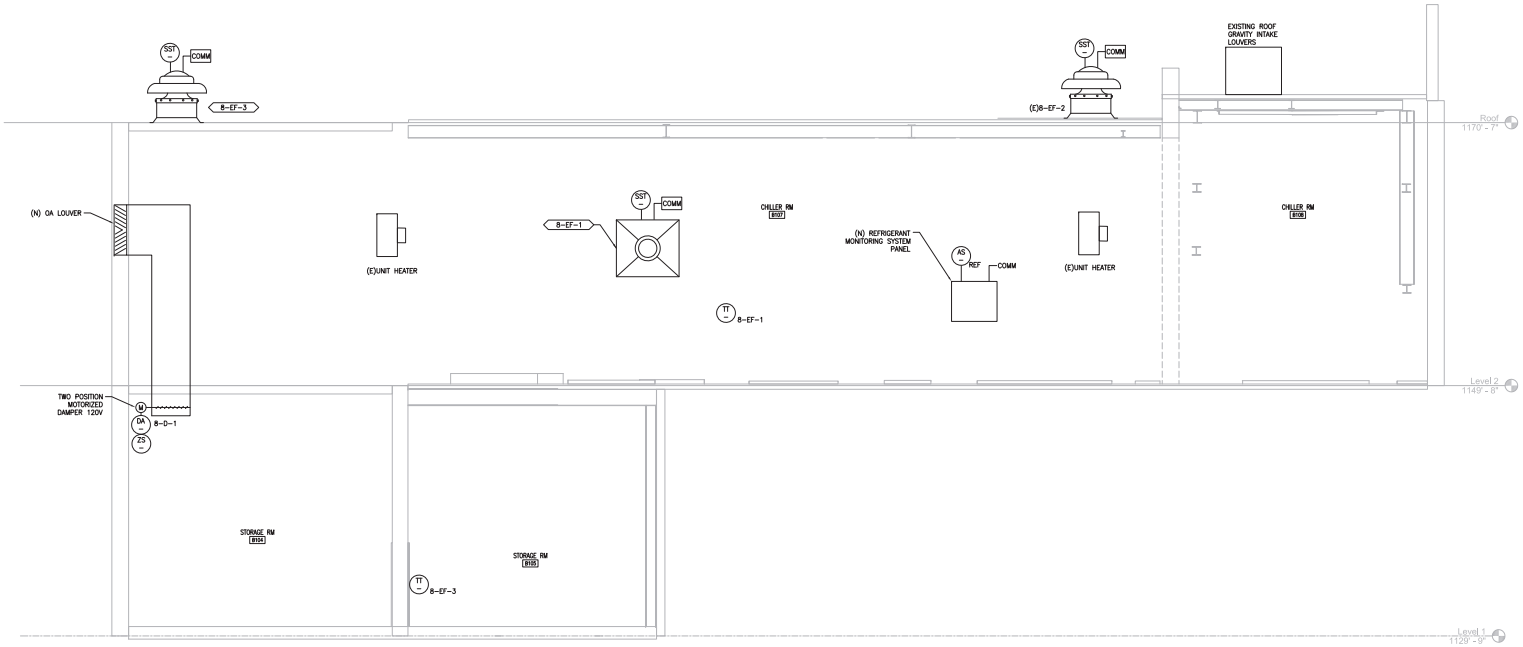
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE-075217-E
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title	Phase	Project Title	Project Number
MECHANICAL TEMPORARY CHILLED WATER FLOW DIAGRAM	CONSTRUCTION BID DOCUMENTS	UD CHILLER CAPACITY UPGRADE	646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-603
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	

VA FORM 08-6231



1 EXHAUST FLOW CONTROLS DIAGRAM
SCALE: NTS

GENERAL SHEET NOTES:

1. SEE DRAWING M-001 AND M-801 FOR MECHANICAL NOTES, ABBREVIATIONS AND SYMBOLS.
2. DUCTWORK FOR EXHAUST FANS NOT SHOWN FOR CLARITY REASONS. SEE FLOOR PLANS FOR EXHAUST DUCTWORK LAYOUT.
3. REFER TO SEQUENCE OF OPERATION FOR ADDITIONAL INFORMATION.
4. PROVIDE ALL POINTS AS NEEDED TO FULLY COMPLETE THE SEQUENCE OF OPERATIONS ON THIS DRAWING.

CHILLER PLANT VENTILATION SYSTEM SEQUENCE

VENTILATION MODE:

WHEN THE SPACE TEMPERATURE IN CHILLER ROOM RISES ABOVE 90°F, (ADJUSTABLE) EXHAUST FAN (N)8-EF-1 SHALL ENERGIZE ON AND RUN UNTIL THE SPACE DROPS TO 80°F. (ADJUSTABLE). EXISTING ROOF GRAVITY INTAKE LOUVERS WILL PROVIDE THE REQUIRED MAKE-UP AIR FOR THE EXHAUST SYSTEM.

WHEN THE SPACE TEMPERATURE IN BA105 RISES ABOVE 90°F, (ADJUSTABLE) EXHAUST FAN (N)8-EF-3 SHALL ENERGIZE ON AND RUN UNTIL THE SPACE DROPS TO 80°F. (ADJUSTABLE). DAMPER M-D-1 WILL OPEN FIRST AND THE END SWITCHES SHALL PROVE THROUGH THE BAS SYSTEM BEFORE THE EXHAUST FAN STARTS. AN ALARM WILL SOUND AFTER 30 SECONDS IF THE DAMPERS DO NOT REPORT A OPEN STATUS.

HEATING MODE:

IF THE INSIDE TEMPERATURE FALLS BELOW 50°F (ADJUSTABLE), THE EXISTING STEAM UNIT HEATERS CONTROL VALVE WILL OPEN AND THE HEATERS WILL OPERATE UNTIL SPACE TEMPERATURE IS SATISFIED 60°F (ADJUSTABLE). WHEN THE TEMPERATURE REACHES 60°F THE STEAM CONTROL VALVE SHALL CLOSE.

EMERGENCY VENTILATION MODE:

WHEN THE REFRIGERANT LEAK DETECTOR DETECTS LEVELS OF REFRIGERANT IN THE PLANT, THE FOLLOWING SHOULD OCCUR:

0-50 PPM (ADJUSTABLE) THE AUDIO AND VISUAL ALARM SHALL BE ACTIVATED AT THE LOCAL PANEL AND AN ALARM SIGNAL SHALL ALSO BE SENT TO BMS.

51-100+ PPM (ADJUSTABLE) THE AUDIO AND VISUAL ALARM SHALL BE ACTIVATED AT THE LOCAL PANEL AND AN ALARM SIGNAL SHALL ALSO BE SENT TO BMS AND EXHAUST FAN (E)8-EF-2 SHALL ENERGIZE ON AND RUN.

ONCE THE REFRIGERANT LEVELS ARE DETECTED AND DISPLAYED TO 0 PPM AT THE LOCAL PANEL AND BMS, THE OPERATOR, OR VA STAFF, CAN CLEAR THE ALARMS, BY DEACTIVATING AUDIO ALARM FIRST AND VISUAL SECOND, THE EXHAUST FAN CAN THEN BE MANUALLY SHUT DOWN AND RESET.

THE EXISTING ROOF GRAVITY INTAKE LOUVERS WILL PROVIDE THE REQUIRED MAKE-UP AIR FOR THE EXHAUST SYSTEM.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT
LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, Ph (585) 454-6119
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE-075227-E
5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL EXHAUST FLOW CONTROLS DIAGRAM	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-604
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-604.dwg 6-02-22 02:06:25 PM sporto

VA FORM 08-6231

PUMP SCHEDULE

MARK	LOCATION	AREA SERVED	SYSTEM AND/OR SERVICE	TYPE	CIRCULATING FLUID: FLUID	FLOW (GPM)	HEAD (FT)	NPSH AVAILABLE	TEMPERATURE (°F)	SP GR	MIN % EFF	ELECTRICAL MOTOR: NOMINAL POWER (HP)	PHASE	VOLT	MAX RPM	SPEED CONTROL (PROVIDED BY ELECTRICAL CONTRACTOR)	BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
(R)8-PCHP-1	CHILLER PLANT B107	VA HOSPITAL	PRIMARY CHILLED WATER	DOUBLE SUCTION	WATER	2400	43	NA	44 - 75	NA	NA	40	3	460	1200	VFD	BELL & GOSSETT	2,3,4
(R)8-PCHP-2	CHILLER PLANT B107	VA HOSPITAL	PRIMARY CHILLED WATER	DOUBLE SUCTION	WATER	2985	45	NA	44 - 75	NA	NA	50	3	460	1200	VFD	BELL & GOSSETT	2,3,4
(R)8-PCHP-3	CHILLER PLANT B107	VA HOSPITAL	PRIMARY CHILLED WATER	DOUBLE SUCTION	WATER	3000	50	NA	44 - 75	NA	NA	50	3	460	1200	VFD	BELL & GOSSETT	2,3,4
8-PCHP-4	CHILLER PLANT B107	VA HOSPITAL	PRIMARY CHILLED WATER	DOUBLE SUCTION	WATER	3580	50	-	44 - 75	1	75	75	3	460	1200	VFD	BELL & GOSSETT VSX-VSCS 10x12x11.5B	3,4
8-SCHP-1	CHILLER PLANT B106	VA HOSPITAL	SECONDARY CHILLED WATER	DOUBLE SUCTION	WATER	3000	175	NA	44 - 75	1	80	200	3	460	1800	VFD	BELL & GOSSETT VSX-VSCS 8x10x17.5B	3,4
8-SCHP-2	CHILLER PLANT B106	VA HOSPITAL	SECONDARY CHILLED WATER	DOUBLE SUCTION	WATER	3000	175	NA	44 - 75	1	80	200	3	460	1800	VFD	BELL & GOSSETT VSX-VSCS 8x10x17.5B	3,4
8-SCHP-3	CHILLER PLANT B106	VA HOSPITAL	SECONDARY CHILLED WATER	DOUBLE SUCTION	WATER	3000	175	NA	44 - 75	1	80	200	3	460	1800	VFD	BELL & GOSSETT VSX-VSCS 8x10x17.5B	3,4
8-SCHP-4	CHILLER PLANT B106	VA HOSPITAL	SECONDARY CHILLED WATER	DOUBLE SUCTION	WATER	3000	175	NA	44 - 75	1	80	200	3	460	1800	VFD	BELL & GOSSETT VSX-VSCS 8x10x17.5B	1,3,4
(R)8-CWP-1	CHILLER PLANT B107	VA HOSPITAL	CONDENSER WATER	DOUBLE SUCTION	WATER	3000	70	NA	85 - 95	NA	NA	100	3	460	1800	VFD	BELL & GOSSETT	2,3,4
(R)8-CWP-2	CHILLER PLANT B107	VA HOSPITAL	CONDENSER WATER	DOUBLE SUCTION	WATER	3750	70	NA	85 - 95	NA	MA	100	3	460	1800	VFD	BELL & GOSSETT	2,3,4
(R)8-CWP-3	CHILLER PLANT B107	VA HOSPITAL	CONDENSER WATER	DOUBLE SUCTION	WATER	3750	70	NA	85 - 95	NA	NA	100	3	460	1800	VFD	BELL & GOSSETT	2,3,4
8-CWP-4	CHILLER PLANT B107	VA HOSPITAL	CONDENSER WATER	DOUBLE SUCTION	WATER	4195	75	20	85 - 95	1	75	100	3	460	1800	VFD	BELL & GOSSETT VSX-VSCS 10x12x17.5A	3,4

REMARKS:
1. PUMP IS IN A N+1 REDUNDANCY ARRANGEMENT.
2. RETROFIT EXISTING PUMP WITH VARIABLE SPEED DRIVE
3. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, AND ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT, IN COMPLIANCE WITH PROJECT DOCUMENTS.
4. PROVIDE INERTIA BASES TO SUPPORT THE PUMPS AND PUMP ARMS, ALL ON A SINGLE ASSEMBLY.
5. EQUIPMENT ABOVE SHOWN AS (R) INDICATES EXISTING EQUIPMENT TO BE RELOCATED.

WATER COOLED CHILLER SCHEDULE

MARK	LOCATION	AREA SERVED	TYPE	REFRIGERANT TYPE	REFRIGERANT CHARGE (LBS)	CAPACITY (TONS)	MAX kW/TON	MAX IPLV (kW/TON)	EVAPORATOR: FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	FOULING FACTOR	CONDENSER: FLOW (GPM)	EWT (°F)	LWT (°F)	MAX WPD (FT)	FOULING FACTOR	ELECTRICAL: POWER MCA	MAX. FUSE / BREAKER	PHASE	VOLT	SPEED CONTROL	BASIS OF DESIGN MANUFACTURER & MODEL NO.	OPERATING WEIGHT (LBS)	REMARKS
(E) 8-CH-1	CHILLER PLANT B107	VA HOSPITAL	CENTRIFUGAL	HCFC-123	NA	1060	NA	NA	2400	54	44	14	0.00010	3000	85	95	14	0.00025	105	175	3	4160	CONSTANT	TRANE	45,000	5
(E) 8-CH-2	CHILLER PLANT B107	VA HOSPITAL	CENTRIFUGAL	HCFC-123	NA	1250	NA	NA	2985	54	44	14.3	0.00010	3750	85	94.2	10.7	0.00025	125	200	3	4160	CONSTANT	TRANE	45,000	5
(R) 8-CH-3	CHILLER PLANT B107	VA HOSPITAL	CENTRIFUGAL	R-134a	NA	1250	NA	NA	3000	54	44	18.7	0.00010	3750	85	94.1	14.2	0.00025	128	175	3	4160	VARIABLE	YORK	45,000	-
8-CH-4	CHILLER PLANT B107	VA HOSPITAL	CENTRIFUGAL	R-514a	NA	1500	.53	.32	3580	54	44	22.9	0.00010	4195	85	95	13.3	0.00025	1307	2000	3	480	VARIABLE	TRANE CVHF1470	63,518	1, 2, 3, 4

REMARKS:
1. PROVIDE WITH VARIABLE SPEED DRIVE.
2. EQUIPMENT SHALL BE PROVIDED WITH A SINGLE POINT OF CONNECTION.
3. EQUIPMENT SHALL BE INSTALLED ON A HOUSEKEEPING PAD.
4. PROVIDE MARINE WATER BOXES WITH HINGED ACCESS DOORS AT BOTH ENDS FOR THE EVAPORATOR AND CONDENSER SHELL.
5. RETROFIT EXISTING CHILLER WITH REMOTE MOUNTED VARIABLE SPEED DRIVE FROM CHILLER MANUFACTURER

COOLING TOWER SCHEDULE

MARK	LOCATION	SERVICE	TOWER TYPE	TOTAL NOMINAL CAPACITY (TONS)	FLOW RATE (GPM)	WPD (FT)	TEMPERATURE: AMBIENT Wb (°F)	EWT (°F)	LWT (°F)	FAN MOTOR: NO	POWER (HP)	PHASE	VOLT	RPM	SPEED CONTROL	SUMP HEATER: TYPE	CAPACITY (BTUH)	MAX HEIGHT W/HANDRAIL (FT)	CELL DIMENSIONS WxLxH (FT - IN)	BASIS OF DESIGN MANUFACTURER & MODEL NO.	OPERATING WEIGHT (LBS)	REMARKS
(E)8-CT-1	ROOF - BLDG 8	CONDENSER WATER	CROSS FLOW-DRAW THROUGH	1060	3000	9	78	94.1	84.1	1	100	3	480	NA	VARIABLE	NA	NA	NA	NA	NA	50,000	EXISTING
(E)8-CT-2	ROOF - BLDG 8	CONDENSER WATER	CROSS FLOW-DRAW THROUGH	1250	3750	9	78	94.1	84.1	1	100	3	480	NA	VARIABLE	NA	NA	NA	NA	NA	50,000	EXISTING
(E)8-CT-3	ROOF - BLDG 8	CONDENSER WATER	CROSS FLOW-DRAW THROUGH	1250	3750	9	78	94.1	84.1	1	100	3	480	NA	VARIABLE	NA	NA	NA	NA	NA	50,000	EXISTING
8-CT-4	ROOF - BLDG 8	CONDENSER WATER	CROSS FLOW-DRAW THROUGH	1500	4195	9	78	94.1	84.1	1	125	3	480	NA	VARIABLE	STEAM	90,000	NA	24'-1/2" x 13'-11-1/4" x 22'-1/2"	BAC - S3E-1424 ENDURA	50,280	1,2,3,4,5,6,7,8

REMARKS:
1. FOR COOLING TOWER DUNNAGE SYSTEM SEE STRUCTURAL.
2. COOLING TOWER MANUFACTURER TO PROVIDE SAFETY RAILING AROUND PERIMETER OF THE TOP OF THE COOLING TOWER.
3. COOLING TOWER SHALL BE EQUIPPED WITH BASIN SWEEPER PIPING.
4. COOLING TOWER SHALL BE EQUIPPED WITH DRIFT ELIMINATORS. BY MANUFACTURER.
5. COOLING TOWER SHALL BE PROVIDED WITH BASIN STEAM HEATER BY MANUFACTURER.
6. COOLING TOWER SHALL BE PROVIDED WITH BASIN EQUALIZER PIPING BY MANUFACTURER. PROVIDE AN ADDITIONAL CONNECTION IN THE BASIN FOR BYPASS PIPING.
7. COOLING TOWER SHALL BE PROVIDED WITH VIBRATION CUTOUT SWITCH BY MANUFACTURER. TO BE TIED INTO THE FACILITY BAS SYSTEM.
8. COOLING TOWER SHALL BE INSTALLED WITH VIBRATION ISOLATORS.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT
LaBella Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL SCHEDULES	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Building Number: 8
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	Drawing Number: M-701

VA FORM 08-6231

P:\0507_DVA-Pittsburgh PA IDIQ\0014 PIT UD Chiller Capacity Upgrade\4_Drawings_Cad_Current Submittal Phase\6_Mechanical\M-701.dwg 5-11-22 09:52:27 AM sporto

LIQUID TO LIQUID HEAT EXCHANGER SCHEDULE

MARK	LOCATION	AREA AND/OR BLDG SERVED	SYSTEM AND/OR SERVICE	TYPE	CAPACITY	RATED PRESSURE	PIPING CONNECTIONS		HOT SIDE (BUILDING SIDE)				COLD SIDE (TOWER SIDE)				BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
							INLET	OUTLET	FLOW	EWT	LWT	WPD	FLOW	EWT	LWT	WPD		
					MBH	PSIG	IN.	IN.	GPM	°F	°F	FT	GPM	°F	°F	FT		
8-HX-1	STRG RM B104	HOSPITAL	CHILLED WATER	PLATE & FRAME	13.8	150	12	12	2750	44	54	15	2750	52	42	15	BELL & GOSSETT AP188	1,2,3,4

REMARKS:
1. INSTALL THE EQUIPMENT ON A HOUSEKEEPING PAD, TO BE ELEVATED 6" ABOVE FINISHED FLOOR, AND OFFSET THE EQUIPMENT 6" ALL AROUND.
2. HEAT EXCHANGER SHALL CARRY ASME SEAL, SECTION VIII DIVISION I, WITH "U" STAMP, RATED FOR 150 PSIG OF PRESSURE.
3. HEAT EXCHANGER TO BE CERTIFIED BY AHRI LIQUID TO LIQUID HEAT EXCHANGER CERTIFICATION PROGRAM BASED ON AHRI STANDARD 400.
4. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, AND ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT, IN COMPLIANCE WITH THE PROJECT DOCUMENTS.

AIR SEPARATOR SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	AIR SEPARATOR				BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
				SIZE IN	FLOW	WPD	WEIGHT		
				IN	GPM	FT			
8-AS-1	CHILLER PLANT B108	CHILLED WATER	FULL FLOW TANGENTIAL	24	12,000	3	6400 LBS	ARMSTRONG VA-24	1, 2, 3

REMARKS:
1. SEPARATOR SHALL BEAR THE ASME SEAL AND SHALL BE RATED FOR 150 PSI.
2. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, AND ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT, IN COMPLIANCE WITH PROJECT DOCUMENTS.

EQUIPMENT LIFT AND HOIST SCHEDULE

MARK	LOCATION	LIFT RADIUS	LIFT HEGHT	CAPACITY (TONS)	LIFT SPEED (FPM)	MOTOR ELECTRICAL (HOIST)				NOTES
						V-PH	HP	AMPS	BOD (OR EQUAL)	
8-E-1	ROOF	8'-2"	20'-0"	1	26	460-3	2	6.5	STARKE	1

NOTES:
1. BOD FOR JIB CRANE IS BASED ON VESTIL FM SERIES

SOLID SEPARATOR SCHEDULE (SIDE STREAM)

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	SIZE IN.			REQ'D FLOW RATE	SIDE STREAM	PUMP HP	V-PH-HZ	EMERG POWER YES/NO	BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
				INLET	OUTLET	PURGE	GPM						
8-SSF-1	CHILLER PLANT B107	CONDENSER WATER	CENTRIFUGE	10"	8"	1.5	1,200	YES	25	460-3-60	NO	LAKOS - TBX-1670-LP	1,2,3,4,5,6,7,8,9,10
8-SSF-2	CHILLER PLANT B107	CHILLED WATER	CENTRIFUGE	6"	4"	0.75	400	YES	7.5	460-3-60	NO	LAKOS - TBX-0400	1,2,3,4,5,6,7,8,9,10

REMARKS:
1. EQUIPMENT SHALL BE INSTALLED ON HOUSEKEEPING PAD.
2. SKID MOUNT SIDE STREAM SEPARATOR. SKID IS PROVIDED WITH FILTER, SOLID SEPARATOR, FILTRATION PUMP, PURGE / BLOW OFF VALVE, CONTROL PANEL, MOTOR STARTER, AND ALL ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT BY MANUFACTURER.
3. EQUIPMENT SHALL BE PROVIDED WITH A SINGLE POINT OF ELECTRICAL CONNECTION.
4. EQUIPMENT SHALL BE PROVIDED WITH MOTOR STARTER BY MANUFACTURER WITH SOFT START CAPABILITY.
5. PROVIDE DRY CONTACTS AND TIE SYSTEM INTO THE BAS SYSTEM FOR MONITORING.
6. THE INTERNAL SLOTS AND UPPER CHAMBER OF THE SEPARATOR TO BE ACCESSIBLE. BY MANUFACTURER.
7. PROVIDE WITH HIGH EFFICIENCY FILTRATION AT 44 MICRONS. BY MANUFACTURER.
8. THE SKID SHALL BE PROVIDED WITH PURGE TO DRAIN VALVE TO PURGE THE SOLIDS TO DRAIN AT PROGRAMMED INTERVALS.
9. SKID SHALL BE PROVIDED WITH LOW LIQUID LOSS AT SOLID SEPARATOR.
10. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, AND ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT, IN COMPLIANCE WITH THE PROJECT DOCUMENTS.

EXPANSION TANK SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TYPE	MAX ACCEPTANCE VOLUME	SYSTEM TEMPERATURE		INITIAL PRESSURE IN TANK	MAX OPERATING PRESSURE	FILL PRESSURE AT TANK		MIN TANK VOLUME	PIPE SIZE TO TANK	BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
					MIN	MAX			RELIEF VALVE	AT TANK				
				GAL	°F	°F	PSIG	PSIG	PSIG	PSIG	GAL	IN		
8-ET-1	CHILLER PLANT B108	CHILLED WATER	VERTICAL DIAPHRAGM	264	40	60	35	80	90	80	264	1 1/2	ARMSTRONG-A1000	1, 2, 3, 4, 5

REMARKS:
1. INSTALL WITH TEST AND FILL PORTS.
2. INSTALL THE EQUIPMENT ON A HOUSEKEEPING PAD, TO BE ELEVATED 6" ABOVE FINISHED FLOOR, AND OFFSET THE EQUIPMENT 6" ALL AROUND.
3. EXPANSION TANK SHALL BE RATED FOR 125 PSIG OF PRESSURE.
4. CONTRACTOR TO PROVIDE ALL FITTINGS, TRANSITIONS, AND ACCESSORIES FOR PROPER FUNCTIONING OF THE EQUIPMENT, IN COMPLIANCE WITH THE PROJECT DOCUMENTS.
5. EXPANSION TANK SHALL BE PROVIDED WITH SITE GLASS. INSULATION SHALL NOT COVER THE SITE GLASS AND IT SHALL BE EASILY OBSERVABLE.

FAN SCHEDULE

MARK	LOCATION	AIR FLOW	TSP	FAN			MOTOR ELECTRICAL				BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
		CFM	IN	TYPE	DRIVE	FAN MAX RPM	NOMINAL POWER HP	PHASE	VOLT	MOTOR ENCLOSURE		
8-EF-1	CHILLER PLANT B107	10,000	0.25	WALL MOUNTED EXHAUST FAN	BELT	650	1	3	460	TEFC	COOK - 36XLWH	1
8-EF-3	CHILLER PLANT ROOF	5,550	0.75	ROOF MOUNTED DOWNBLAST CENTRIFUGAL EXHAUST FAN	BELT	775	2	3	460	ODP	COOK - 24ACE-B	2

REMARKS:
1. PROVIDE PREMIUM EFFICIENCY MOTOR, GRAVITY SHUTTER, WALL COLLAR, WIREGUARD, SHUTTER GUARD, AND BELT TENSIONER.
2. PROVIDE PREMIUM EFFICIENCY MOTOR, BACKDRAFT DAMPER, ROOF CURB, BELT TENSIONER.

AIR DEVICE SCHEDULE (EXHAUST)

MARK	TYPE	AIR FLOW		MAX APD	MOUNTING	FRAME SIZE	NECK SIZE	NC	DAMPER	FINISH	BASIS OF DESIGN MANUFACTURER & MODEL NO. (OR APPROVED EQUAL)	REMARKS
		MIN	MAX			IN x IN	IN					
		CFM	CFM	IN WG								
ER-1	LOUVERED FACE	0	800	0.1	WALL	NECK + 1-3/4"	SEE PLANS	25	NONE	WHITE	TITUS350	1,2

REMARKS:
1. PROVIDE OPTIONAL OPPOSED BLADE DAMPER
2. DUCT MOUNTED EXHAUST REGISTER

STEAM PRESSURE REDUCING VALVE SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	VALVE SIZE (MM) INCHES	REQUIRED CAPACITY	MAX FLOW WIDE OPEN	PRESSURE		REMARKS
						IN	OUT	
				LBS/HR	LBS/HR	PSIG	PSIG	
8-PRV-1	CHILLER PLANT B107	8-CT-4 BASIN HEATER	1/2	95	110	125	12	BASIS OF DESIGN ARMSTRONG GO-45 OR APPROVED EQUAL

STEAM PRESSURE RELIEF VALVE SCHEDULE

MARK	LOCATION	SYSTEM AND/OR SERVICE	TEMPERATURE	MINIMUM CAPACITY	SET PRESSURE	REMARKS
			°F	LBS/HR	PSIG	
8-SV- 1	CHILLER PLANT B107	STEAM PRV STATION	287	95	20	BASIS OF DESIGN KUNKLE 6010DDM01 OR APPROVED EQUAL

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT
LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE062773 5/12/2023

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title	MECHANICAL SCHEDULES
Phase	CONSTRUCTION BID DOCUMENTS
Approved: Project Director	NON-SPRINKLERED
Project Title	UD CHILLER CAPACITY UPGRADE
Project Number	646-20-109
Building Number	8
Location	UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA
Issue Date	2022-05-11
Checked	LM
Drawn	RHD
Drawing Number	M-702

P:\0507_DVA--Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-702.dwg 6-02-22 04:19:39 PM sporto
VA FORM 08-6231

CONTROLS ABBREVIATIONS

ACD	AUTOMATIC CONTROL DAMPER, MODULATING
ACV	AUTOMATIC CONTROL VALVE
AHU	AIR-HANDLING UNIT
AHUDAT	AIR HANDLING UNIT DISCHARGE AIR TEMPERATURE SENSOR
AHUHRCLAT	AIR HANDLING UNIT HEAT RECOVERY COIL LEAVING AIR TEMPERATURE SENSOR
AHUHRCV	AIR HANDLING UNIT HEAT RECOVERY COIL VALVE
ALM	ALARM
ATC	AUTOMATIC TEMPERATURE CONTROL
AVS	AIR VOLUME STATION
AS	AIR SEPARATOR
BAS	BUILDING AUTOMATION SYSTEM
BCV	BASEBOARD CONTROL VALVE
BDD	BACKDRAFT DAMPER
BIBO	BAO-IN BAO-OUT
BMS	BUILDING MANAGEMENT SYSTEM
BV	BYPASS VALVE
CCLAT	COOLING COIL LEAVING AIR TEMPERATURE SENSOR
CFDPS	CHARCOAL FILTER DIFFERENTIAL PRESSURE SWITCH
CHCLAT	CHILLED WATER COIL LEAVING AIR TEMPERATURE SENSOR
CHWRT	CHILLED WATER RETURN TEMPERATURE SENSOR
CHWST	CHILLED WATER SUPPLY TEMPERATURE SENSOR
CHWV	CHILLED WATER VALVE
DAT	DISCHARGE AIR TEMPERATURE SENSOR
DATL	DISCHARGE AIR TEMPERATURE LIMITER
DDC	DIRECT DIGITAL CONTROL
DDCFP	DIRECT DIGITAL CONTROL FIELD PANEL
DP	DIFFERENTIAL PRESSURE SENSOR
DPS	DIFFERENTIAL PRESSURE SWITCH
DPV	DIFFERENTIAL PRESSURE BYPASS VALVE
DSP	DISCHARGE STATIC PRESSURE SENSOR
DWDI	DOUBLE WIDTH DOUBLE INLET
EAD	EXHAUST AIR DAMPER
ECC	EVIRONMENTAL CONTROL CENTER (BAS)
EHRCEAT	EXHAUST HEAT RECOVERY COIL ENTERING AIR TEMPERATURE SENSOR
EHRCLAT	EXHAUST HEAT RECOVERY COIL LEAVING AIR TEMPERATURE SENSOR
EHRCV	EXHAUST HEAT RECOVERY COIL VALVE
ES	END SWITCH
ESP	EXHAUST STATIC PRESSURE SENSOR
ET	EXPANSION TANK
FA	FAULT ALARM
FDPS	FILTER DIFFERENTIAL PRESSURE SWITCH
FID	FAN ISOLATION DAMPER
FZ	FREEZESTAT
GAPC	GENESIS AIR PHOTOCATALYSIS COMPOUND (COMMERCIAL GRADE)
GFP	GLYGOL FILL PUMP
H	HUMIDITY SENSOR
HALM	HOOD ALARM
HHL	HIGH HUMIDITY LIMIT SENSOR
HIV	HUMIDIFIER ISOLATION VALVE
HLH	HIGH/LOW HUMIDITY LIMIT SENSOR
HOA	HAND-OFF-AUTOMATIC SWITCH
HRCEAT	HEAT RECOVERY COIL ENTERING AIR TEMPERATURE SENSOR
HRCLAT	HEAT RECOVERY COIL LEAVING AIR TEMPERATURE SENSOR
HRLT	HEAT RECOVERY LOOP TEMPERATURE SENSOR
HRCV	HEAT RECOVERY COIL VALVE
HRGP	HEAT RECOVERY GLYCOL PUMP
HRL3WV	HEAT RECOVERY LOOP 3-WAY VALVE
HS	HAND SWITCH
HSPS	HIGH STATIC PRESSURE SWITCH
HSS	HOOD SASH SWITCH
HV	HUMIDIFIER VALVE
HWST	HOT WATER SUPPLY TEMPERATURE SENSOR
HWRT	HOT WATER RETURN TEMPERATURE SENSOR
HWV	HOT WATER VALVE
IFBD	INTEGRAL FACE & BYPASS DAMPER
IGV	INLET GUIDE VANES
LAT	LEAVING AIR TEMPERATURE SENSOR
LSPS	LOW STATIC PRESSURE SWITCH
LS	LIGHT SWITCH INTERFACE
MUWV	MAKEUP WATER VALVE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
OAD	OUTSIDE AIR DAMPER
OADBT	OUTSIDE AIR DRY BULB TEMPERATURE SENSOR
OAWBT	OUTSIDE AIR WET BULB TEMPERATURE SENSOR
OAT	OUTSIDE AIR TEMPERATURE SENSOR
PCHWRT	PRIMARY CHILLED WATER RETURN TEMPERATURE SENSOR
PCHWST	PRIMARY CHILLED WATER SUPPLY TEMPERATURE SENSOR
PCP	POPULATED CATALYST PANEL (GAPC – PCP COMPOUND)
RAD	RETURN AIR DAMPER
RAT	RETURN AIR TEMPERATURE SENSOR
RCV	REHEAT CONTROL VALVE
RH	RELATIVE HUMIDITY
RI	RUN INDICATOR
RID	RETURN ISOLATION DAMPER
RT	ROOM TEMPERATURE SENSOR
SAV	SUPPLY AIR VALVE
SCHWRT	SECONDARY CHILLED WATER RETURN TEMPERATURE
SCHWST	SECONDARY CHILLED WATER SUPPLY TEMPERATURE
SCLAT	STEAM COIL LEAVING AIR TEMPERATURE SENSOR
SCV	STEAM COIL VALVE
SD	SMOKE DAMPER
SDET	SMOKE DETECTOR
SPS	STATIC PRESSURE SENSOR
SSID	SUPPLY SMOKE ISOLATION DAMPER
SSP	SUCTION STATIC PRESSURE SENSOR
SST	START-STOP
T	TEMPERATURE SENSOR
TCV	TEMPERATURE CONTROL VALVE
TT	TEMPERATURE TRANSMITTER
VFD	VARIABLE FREQUENCY DRIVE
VFDS	VARIABLE FREQUENCY DRIVE SPEED
VFDSO	VARIABLE FREQUENCY DRIVE SPEED OUTPUT
VS	VIBRATION SWITCH
WC	WATER COLUMN
WFS	WATER FLOW SWITCH
WS	WALL SWITCH

CONTROLS SYMBOLS

- CONTROL DEVICE PROVIDED BY ELECTRICAL OR PLUMBING CONTRACTOR BUT INTERFACED TO DDC SYSTEM BY ATC CONTRACTOR
- ATC CONTRACTOR INTERFACE TO MANUFACTURER'S HARDWARE
- AFMD — AIRFLOW MEASURING DEVICE
- AT CO2 — CARBON DIOXIDE TRANSMITTER
- AT CO — CARBON MONOXIDE TRANSMITTER
- AT OC — OCCUPANCY SENSOR
- ATC — ATC CONTRACTOR PROVIDE DDC POINT AND HARDWARE
- CT — CURRENT TRANSMITTER
- COMM — BACNET COMMUNICATIONS
- DAT — DISCHARGE AIR TEMPERATURE SENSOR
- DBT — DRY BULB TRANSMITTER
- DPS — DIFFERENTIAL PRESSURE SWITCH
- DPSE — ROOM DIFFERENTIAL PRESSURE MONITOR
- DPT — DIFFERENTIAL PRESSURE TRANSMITTER
- EAV — EXHAUST AIR VALVE
- ECC — ENGINEERING CONTROL CENTER (BAS)
- EPT — ELECTRONIC TO PNEUMATIC TRANSDUCER
- FT — FLOW TRANSMITTER
- FC — FLOW CONTROLLER. SEE SEQUENCE OF OPERATION.
- FS — FLOW SWITCH
- FSH — FLOW SWITCH HIGH
- FSL — FLOW SWITCH LOW
- H — HUMIDITY
- HHL — HIGH HUMIDITY LIMIT SENSOR

CONTROLS SYMBOLS (CONTINUED)

- HS — HAND SWITCH (HAND-OFF-AUTO SWITCH) or HUMIDITY SWITCH
- HVAC — HVAC CONTROL PANEL
- IT — CURRENT TRANSMITTER
- KC — TIME CLOCK CONTROLLING EQUIPMENT ON A SCHEDULE
- KR — LOCAL RECORDING TIME CLOCK (RUNTIME)
- LC — LEVEL CONTROLLER
- LS — LIMIT SWITCH
- LT — LEVEL TRANSMITTER
- M — ROOM HUMIDISTAT (MOISTURE)/TRANSMITTER (WALL MOUNTED)
- M — MOTOR ACTUATED DAMPER /OR VALVE
- MT — MOISTURE (HUMIDITY) TRANSMITTER
- PC — PRESSURE CONTROLLER (SEE SEQUENCE OF OPERATIONS)
- PC — PNEUMATIC CONTROLLER (SEE SEQUENCE OF OPERATIONS)
- PDS — PRESSURE DIFFERENTIAL SWITCH
- PDT — PRESSURE DIFFERENTIAL TRANSMITTER
- PI — PRESSURE INDICATOR
- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- PT — PRESSURE TRANSMITTER
- S20 — INSTRUMENT OR CONTROL AIR @ 20 PSIG
- SAV — SUPPLY AIR VALVE
- SC — SPEED CONTROLLER (SEE SEQUENCE OF OPERATION)
- SCV — STEAM COIL CONTROL VALVE
- SD — SMOKE DETECTOR
- SDET — SMOKE DETECTOR

CONTROLS SYMBOLS (CONTINUED)

- SPS — STATIC PRESSURE SENSOR
- SST — START-STOP
- T — ROOM THERMOSTAT/TRANSMITTER – WALL MOUNTED
- TC — TEMPERATURE CONTROLLER. SEE SEQUENCE OF OPERATIONS.
- TI — TEMPERATURE INDICATOR
- TSH — TEMPERATURE SWITCH HIGH
- TSL — TEMPERATURE SWITCH LOW (FREEZESTAT)
- TT — TEMPERATURE TRANSMITTER – AVERAGING TYPE
- TT — TEMPERATURE TRANSMITTER – SINGLE POINT
- TT — TEMPERATURE TRANSMITTER – EMERSION TYPE
- VFD — VARIABLE FREQUENCY DRIVE
- VS — VIBRATION SWITCH
- VSMC — VARIABLE SPEED MOTOR CONTROLLER
- ZC — VALVE OR DAMPER POSITION CONTROLLER
- ZS — END SWITCH
- MOTOR STARTER
- O — UNOCCUPIED MODE OVERRIDE PUSH BUTTON
- FAN OR PUMP
- PIEZOMETER RING IF SHOWN
- OUTDOOR AIR TEMPERATURE SENSOR – COMBINATION HUMIDITY SENSOR IF SHOWN ON THE DRAWINGS. WITH SOLAR SHADING
- PNEUMATIC OPERATED DAMPER/OR VALVE
- TEMPERATURE SENSING ELEMENT FOR TRANSMITTING TEMPERATURE TO EMCS (PROVIDE 12 INCHES [200mm] MINIMUM LENGTH IN DUCT WHEN SPACE PERMITS.)
- A — SENSOR WITH AVERAGING ELEMENT TO TRANSMIT TEMPERATURE TO EMCS

CONTROLS GENERAL NOTES

1. THE SEQUENCE OF OPERATIONS OUTLINED SHALL BE PERFORMED BY NEW DIRECT DIGITAL CONTROL, STAND ALONE FIELD PANELS, (DDCFP) COMPATIBLE WITH THE EXISTING BUILDING MANAGEMENT SYSTEM (BMS)/ BUILDING AUTOMATION SYSTEM (BAS). NAMES FOR ALL POINTS AND VARIABLES SHALL BE COORDINATED WITH THE VAMC PRIOR TO SHOP DRAWINGS AND PROGRAMMING.
2. THE SEQUENCES OF OPERATIONS OUTLINED SHALL BE PERFORMED IN A STAGGERED/STAGED MANNER DURING INITIAL START-UP AND DURING THE TRANSITION FROM NORMAL TO EMERGENCY POWER OPERATION TO PREVENT OVERLOADING OF THE BUILDING/SITE ELECTRICAL POWER SYSTEMS. DESIGN INTENT IS FOR MECHANICAL EQUIPMENT TO OPERATE CONTINUOUSLY AND TO BE INDEXED/STARTED IN ORDER OF PRIORITY BEGINNING WITH BUILDING CENTRAL HYDRONIC SYSTEMS (HEAT EXCHANGERS, PUMPS; AND CHILLED WATER CHILLERS, PUMPS, ETC.), REFER TO CONTROLS DIAGRAMS FOR EACH SPECIFIC SYSTEM/COMPONENT FOR ADDITIONAL INFORMATION, SAFETIES, ETC. SUBMIT THE START/RESTART SEQUENCE WITHIN THE SPECIFIED BAS CONTROLS SUBMITTAL FOR REVIEW BY OWNER AND DESIGN ENGINEERS.
3. EQUIPMENT SHALL BE CAPABLE OF MANUAL OPERATION THROUGH HOA SWITCHES IN STARTERS. THE POSITIONS OF ALL CONTROL VALVES CONTROLLED BY THE BMS SHALL BE CAPABLE OF MANUAL POSITIONING VIA THE CONTROL CENTER TERMINAL OR BY LAPTOP COMPUTER PLUGGED IN TO THE DIRECT DIGITAL CONTROL FIELD CONTROL PANEL.
4. ALL VALVE AND DAMPER ACTUATORS SHALL BE ELECTRIC/ELECTRONIC.
5. REFER TO MECHANICAL DIAGRAMS AND PLANS FOR SENSOR LOCATIONS. COORDINATE TO INSURE PROPER UPSTREAM AND DOWNSTREAM DIAMETERS FOR EACH SENSOR.
6. PROVIDE CURRENT SENSOR ACROSS EACH FAN OR PUMP (WITH THE EXCEPTION OF VFD'S) TO PROVE STATUS AT BMS. SENSORS SHALL BE CAPABLE OF DIFFERENTIATING BETWEEN NORMAL OPERATION AND FREE WHEELING (I.E. FAN BELT BREAKAGE).
7. BMS CONTROLLERS AND ALL OTHER CONTROL DEVICES AND SENSORS THAT REQUIRE POWER SHALL BE POWERED FROM EMERGENCY POWER PANEL.
8. WHEN SYSTEMS ARE OFF, ALL VALVES AND DAMPERS SHALL GO TO THEIR FAIL-SAFE POSITIONS. FAIL-SAFE POSITIONS ARE POSITIONS THAT DEVICES WILL GO TO WHEN DE-ENERGIZED: NO = NORMALLY OPEN, NC = NORMALLY CLOSED, FL = FAIL LAST.
9. ALL SETPOINTS AND TIME DELAYS MENTIONED AS PART OF THIS SYSTEM SHALL BE ADJUSTABLE AT THE BMS FRONT END BY AN OPERATOR WITHOUT ANY HARDWARE OR SOFTWARE REVISIONS.
10. ALL 2-POSITION DAMPERS SHALL HAVE END SWITCHES (ES). EACH END SWITCH SHALL PROVE DAMPER OPEN AND CLOSED. WHEN COMMANDED TO OPEN OR CLOSE, AFTER 30 SECONDS (ADJ.), THE END SWITCH DOES NOT SWITCH, THE CONTROL SYSTEM SHALL SEND AN ALARM TO THE BMS FRONT END.
11. ALL 2-POSITION VALVES SHALL HAVE LIMIT SWITCHES (LS). EACH LIMIT SWITCH SHALL PROVE VALVE OPEN AND CLOSED. WHEN COMMANDED TO OPEN OR CLOSE, AFTER 30 SECONDS (ADJ.), THE LIMIT SWITCH DOES NOT SWITCH, THE CONTROL SYSTEM SHALL SEND AN ALARM TO THE BMS FRONT END.
12. PROVIDE ADDITIONAL CONTROL POINTS FOR ELECTRICAL SYSTEMS. TOTAL OF 10 POINTS FOR OPENING/CLOSING OF ELECTRICAL EQUIPMENT. COORDINATE WITH VA ON EXACTLY WHAT ELECTRICAL ITEMS THEY WANT MONITORED.
13. TIE CHEMICAL WATER TREAMENT CONTROL PANELS INTO THE BAS SYSTEM. COORDINATE WITH WATER TREATMENT CONTRACTOR.
14. THE EXISTING CHILLER CONTROL PLANT SYSTEM IS A JOHNSON CONTROL SYSTEM. THIS SYSTEM WILL BE EXPANDED TO ACCOMMODATE THE NEW CHILLER PLANT EQUIPMENT AND IT WILL ALSO ADD THE CAPABILITY TO OPTIMIZE THE CHILLER PLANT EQUIPMENT. THE CHILLER PLANT OPTIMIZATION FEATURE IS DESIGNED TO MINIMIZE THE COMBINED ELECTRICAL ENERGY CONSUMPTION OF THE OPERATING CHILLER(S), CHILLED AND CONDENSER WATER PUMP(S), AND COOLING TOWER FANS AS CONSTRAINED BY MEETING THE BUILDING CHILLED WATER FLOW AND TEMPERATURE REQUIREMENTS.
15. THE NUMBER OF CHILLERS OPERATING SHALL BE DETERMINED BY A CHILLER PLANT OPTIMIZATION PROGRAM. THE PROGRAM SHALL USE EQUIPMENT PART LOAD EFFICIENCIES TO DETERMINE THE COMBINATION OF CHILLERS THAT USES THE MINIMUM ENERGY TO PRODUCE THE REQUIRED CAPACITY AS CALCULATED USING THE FLOW MEASURED BY FLOW METER (FT) ON SECONDARY CHILLED WATER SUPPLY LOOP AND THE DELTA T AS SENSED BY ASSOCIATED (TT)'S.
16. THE FACILITY'S CONTROL SYSTEM INTEGRATOR (CSI) MUST BE CONTRACTED UNDER THIS PROJECT FOR ADDITIONS TO THE EXISTING BAS. THE EXISTING CONTROL REPRESENTATIVE FOR THE PROJECT AREA IS:

    JOHNSON CONTROLS
    JOSH ELLIOTT
    OFFICE #: 412-852-3233

NO.	DESCRIPTION	DATE

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER, WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

CONSULTANT

LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO JR.

Office of Construction and Facilities Management

VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL CONTROLS ABBREVIATIONS, NOTES & SYMBOLS	Phase: CONSTRUCTION BID DOCUMENTS	Project Title: UD CHILLER CAPACITY UPGRADE	Project Number: 646-20-109
			Building Number: 8
Approved: Project Director	NON-SPRINKLERED	Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA	Drawing Number: M-801
		Issue Date: 2022-05-11 / Checked: LM / Drawn: RHD	

VA FORM 08-6231

P:\0507_DVA-Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings_Cost_Current Submittal Phase\6_Mechanical\M-801.dwg 5-11-22 09:52:00 AM sporto

CHILLED WATER PRODUCTION SEQUENCE

GENERAL

A. THE CAMPUS BUILDING AUTOMATION SYSTEM (BAS) IS EXISTING AND CONSISTS OF A WEB BASED ENGINEERING CONTROL CENTER (ECC), WEB-ENABLED NETWORK AUTOMATION ENGINE, FIELD CONTROLLERS, AND AN INTERFACE TO THE CHILLERS USING THE BACNET MS/TP PROTOCOL.

B. ALL EQUIPMENT IS TO BE GRAPHICALLY DISPLAYED AT THE ECC AND OPERATING VALUES ARE TO BE DYNAMICALLY DISPLAYED AS INDICATED ON THE POINTS LIST.

C. THE CONTROL SYSTEM IS TO HAVE COMPONENTS AND LOCAL CONTROLLERS NECESSARY TO PROVIDE ALL FUNCTIONS DESCRIBED IN THIS SEQUENCE AND LISTED IN THE POINTS LIST. IT IS ALSO TO COMMUNICATE OVER THE WEB-BASED NETWORK AND INTERFACE WITH THE ECC AS DESCRIBED IN THE SEQUENCE AND POINTS LIST.

D. THE CHILLER PLANT OPTIMIZATION PROGRAM (CPO) FEATURE IS DESIGNED TO MINIMIZE THE COMBINED ELECTRICAL ENERGY CONSUMPTION OF THE OPERATING CHILLER(S), CHILLED AND CONDENSER WATER PUMP(S), AND COOLING TOWER FANS AS CONSTRAINED BY MEETING THE BUILDING CHILLED WATER FLOW AND TEMPERATURE REQUIREMENTS. THE CPO FEATURE WILL NOT INCREASE MAINTENANCE COSTS AND WILL NOT REDUCE EQUIPMENT LIFE EXPECTANCY OR ADVERSELY IMPACT RELIABILITY..

E. CONTROLLERS SHALL HAVE A MINIMUM OF 20% SPARE POINTS OF EACH TYPE OVER THE INDICATED DIGITAL INPUT, DIGITAL OUTPUT, ANALOG INPUT AND ANALOG OUTPUT REQUIRED BY THE SEQUENCE AND POINTS LIST.

F. AT THE TIME OF COMPLETION OF THIS PROJECT, THE CHILLED WATER (CHW) SYSTEM IS TO PRODUCE CHILLED WATER FOR DISTRIBUTION WHEN THE OUTSIDE DRY BULB TEMPERATURE IS ABOVE 55°F OR THE OUTDOOR WET BULB TEMPERATURE IS ABOVE 52°F.

G. THE NEW CHILLED WATER (CHW) SYSTEM IMPLEMENTED IN THIS PROJECT CONSISTS OF FOUR (4) VSD DRIVEN WATER COOLED CENTRIFUGAL CHILLERS 8–CH–1, 8–CH–2 , 8–CH–3 AND 8–CH–4; FOUR (4) VSD DRIVEN PRIMARY PCHP PUMPS 8– PCHP–1, 8–PCHP–2, 8–PCHP–3 AND 8–PCHP–4 PIPED TO COMMON HEADER; AND FOUR (4) VSD DRIVEN SECONDARY CHILLED WATER PUMPS 8–SCHP–1, 8–SCHP–2 , 8–SCHP–3 AND 8–SCHP–4 PIPED TO A COMMON HEADER, FOUR (4) CONDENSER WATER PUMPS 8–CWP–1, 8–CWP–2, 8–CWP–3 AND 8–CWP–4 TIE TO A COMMON HEADER AND FOUR (4) COOLING TOWERS 8–CT–1, 8–CT–2, 8–CT–3 AND 8–CT–4 EACH WITH A VARIABLE SPEED FAN.

H. EACH OF THE ABOVE GROUPS OF EQUIPMENT ARE TO BE ASSIGNED A LEAD, LAG1, LAG2, AND STANDBY ORDER OF START. THE ORDER IS TO BE ROTATED ON A WEEKLY BASIS SO THAT THE EQUIPMENT OF THE GROUP HAS AN APPROXIMATE EQUAL RUN TIME.

I. EACH OPERATING COMPONENT OF THE GROUP SHALL RECEIVE THE SAME OPERATING SPEED OR CAPACITY SIGNAL FROM THE CONTROL SYSTEM.

J. THE CHW PLANT IS PIPED IN A PRIMARY/SECONDARY CONFIGURATION WITH A DECOUPLER.

K. THE OPERATING PRIMARY PUMPS <u>WHEN FEEDING AN ACTIVE CHILLER</u> SHALL HAVE A MINIMUM SPEED ESTABLISHED TO PROVIDE THE MINIMUM FLOW EQUAL TO THE CHILLER MANUFACTURER'S REQUIREMENT. THE MINIMUM OPERATING SPEED IS TO BE ESTABLISHED BY THE TEST AND BALANCE CONTRACTOR.

L. THE CONDENSER WATER SYSTEM CONSISTS OF FOUR (4) INDIVIDUAL COOLING TOWERS 8–CT–1, 8–CT–2, 8–CT–3 AND 8–CT–4 EACH WITH A VARIABLE SPEED FAN, AND FOUR (4) VSD DRIVEN CONDENSER WATER PUMPS PIPED INTO A COMMON HEADER ARRANGED SO THAT ANY COMBINATION OF TOWERS OR PUMPS CAN BE RUN TO SUPPORT THE CHILLER OPERATIONS. NOTE THAT TWO OPERATING TOWERS CAN SUPPORT THE ENTIRE CHILLED WATER (CHW) SYSTEM. HOWEVER, THE SEQUENCE DESCRIBED BELOW, WHICH MAXIMIZES THE NUMBER OF OPERATING TOWERS, DEFINES A MORE EFFICIENT OPERATION.

M. THE WATER SIDE ECONOMIZER SYSTEM IS TO CONSIST OF ONE (1) PLATE AND FRAME HEAT EXCHANGER. THE HX IS EQUIPPED WITH A 2–POSITION ISOLATION VALVE ON THE CONDENSER WATER AND CHILLED WATER CONNECTION COMPLETE WITH ACTUATOR AND END SWITCHES.

N. PRIOR TO THE STARTUP OF THE PLANT, THE BALANCING CONTRACTOR SHALL BALANCE THE COOLING TOWER CELLS. WHILE ANY TWO (2) CONDENSER PUMPS ARE RUNNING AT FULL CAPACITY. THE FLOW TO EACH TOWER CELL BRANCH SHALL BE BALANCED:

	<u>OPERATING</u>
ONE CHILLER OPERATING	– TWO TOWERS
TWO CHILLERS OPERATING	– THREE TOWERS
THREE CHILLERS OPERATING	– THREE TOWERS
STANDBY COOLING TOWERS	– ONE TOWER

O. INITIAL SUPPLY WATER TEMPERATURE SETPOINT AT THE CHILLER CONTROL PANEL OF ALL CHILLERS SHALL BE 44°F.

P. SHUT DOWN OF A CHILLER BECAUSE OF EITHER A REDUCTION OF THE NUMBER OF CHILLERS OPERATING, CONVERTING THE PLANT TO WATERSIDE ECONOMIZER MODE, A DROP IN THE OUTDOOR TEMPERATURE, OR AN OPERATOR INTERVENTION CALLING FOR A CHILLER TO STOP SHALL INITIATE THE FOLLOWING:

1. DISABLE THE CHILLER TO RUN AT THE START–STOP INTERFACE BUT KEEP THE CHILLED AND CONDENSER WATER ISOLATION VALVES OPEN.
2. AFTER 10 SECONDS OF SHUTTING DOWN THE CHILLER OPERATION, START CLOSING THE CHILLED AND CONDENSER WATER ISOLATION VALVES.
3. AFTER 30 SECONDS OF SHUTTING DOWN THE CHILLER OPERATION, SHUT DOWN THE ASSOCIATED PRIMARY CHILLED WATER AND CONDENSER WATER PUMPS.

S. OPERATING SPEED IS USED IN THE SEQUENCE TO REDUCE THE NUMBER OF OPERATING SECONDARY CHILLED WATER PUMPS. THE VALUE TO BE USED TO REPLACE THE COUNT OF OPERATING PUMPS IS TO BE VERIFIED BY THE TEST AND BALANCE CONTRACTOR TO ASSURE THAT THE DISTRIBUTION PRESSURE DIFFERENTIAL IS MAINTAINED BEFORE AND AFTER TRANSITION. INDICATION THAT THE STATED TRANSITION SPEED VALUE IS TOO LOW WOULD BE THAT SINGLE PUMP OPERATION CANNOT PRODUCE PRESSURE DIFFERENTIAL IN THE SECONDARY DISTRIBUTION. INDICATION THAT THE TRANSITION SPEED IS TOO HIGH WOULD BE THAT THE LEAD PUMP WOULD QUICKLY INCREASE ITS REQUIRED SPEED TO 95% OF ITS DESIGN SPEED TO MAINTAIN SETPOINT AND THE LAG PUMP WOULD RESTART.

T. THE OUTDOOR AIR WET BULB TEMPERATURE IS REQUIRED TO ESTABLISH THE OPTIMUM COOLING TOWER DISCHARGE WATER TEMPERATURE SETPOINT AS AN APPROACH TO OUTDOOR AIR WET BULB TEMPERATURE AND WHEN IMPLEMENTED THE ABILITY TO TRANSFER FROM MECHANICAL REFRIGERATION TO WATER SIDE ECONOMIZER. (FOR COOLING TOWER 8–CT–4 ONLY)

U. CHILLER CAPACITY IS USED TO MODULATE THE OPERATING CAPACITY OF THE CONDENSER WATER PUMPS. THE OPERATING CHILLER CAPACITY IS TO BE ACQUIRED FROM THE BACNET CHILLER INTERFACE. FOR THE PURPOSES OF THIS SEQUENCE, THE CAPACITY WILL BE EXPRESSED AS A FRACTION FROM 0.0 (NO LOAD) TO 1.0 (A SINGLE CHILLER FULLY LOADED)

V. CHILLER PLANT CAPACITY IS USED TO ESTABLISH THE NUMBER OF COOLING TOWERS OPERATING. THE PLANT CAPACITY IS DEFINED AS THE SUM OF THE CAPACITY OF THE INDIVIDUAL CHILLERS AND IS TO VARY FROM 0.0 (NO LOAD) TO 3.0 (ALL CHILLERS FULLY LOADED).

<u>CHILLER PLANT OPERATING CONTROL SEQUENCE OF OPERATIONS</u>

A. THE PLANT WILL PRODUCE CHILLED WATER ON COOLER DAYS THAN THE PRESENT OPERATION AND THEN WILL PRODUCE WATER ECONOMIZER BASED CHILLED WATER WHEN THE OUTDOOR AIR WET BULB IS BELOW 42°F. UNTIL THEN, THE PLANT WILL OPERATE AS DESCRIBED BELOW.

B. THE CHILLER OPERATION BASED CHILLED WATER (CHW) SYSTEM IS TO BE ENABLED AND PRODUCE CHILLED WATER FOR DISTRIBUTION WHEN THE OUTSIDE DRY BULB TEMPERATURE IS ABOVE 55°F OR THE OUTDOOR DEW POINT TEMPERATURE IS ABOVE 52°F.

C. SECONDARY CHILLED WATER PUMP CONTROL.

1. THE SECONDARY (DISTRIBUTION) CHILLED WATER FLOW IS DEFINED AS THE OUTPUT OF 8–SCHP–1, 8–SCHP–2, 8–SCHP–3 AND 8–SCHP–4. NOTE THAT THREE OF THE PUMPS ARE SIZED FOR 100% DISTRIBUTION CAPACITY AND ONE PUMP IS STANDBY.
2. UPON THE CHILLED WATER (CHW) SYSTEM STARTING UP FROM AN INACTIVE PERIOD, THE DESIGNATED LEAD SECONDARY CHILLED WATER PUMP SHALL START AND ITS SPEED IS TO INCREASE AT THE RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE.
3. WHEN THE LEAD PUMP PRODUCES A FLOW CONDITION SUCH THAT THE DISTRIBUTION PIPING DIFFERENTIAL PRESSURE (AS MEASURED BY DPT) SETPOINT IS ATTAINED. AFTER DIFFERENTIAL PRESSURE SETPOINT IS ATTAINED, THE SPEED OF THE LEAD PUMP IS TO BE MODULATED TO SATISFY THE PRESSURE DIFFERENTIAL SETPOINT.
4. IF, DURING THE STARTUP PROCEDURE OR ANYTIME DURING NORMAL OPERATION, THE LEAD PUMP REACHES 95% OF ITS DESIGN RPM, THE ALREADY OPERATING LEAD PUMP IS TO CONTINUE TO BE CONTROLLED TO MAINTAIN DIFFERENTIAL PRESSURE SETPOINT AND THE LAG1 PUMP IS TO START AND IT'S SPEED IS TO INCREASE AT THE RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE. IF THE LAG1 PUMP WAS TO REACH 95% OF ITS DESIGN SPEED, THEN LAG2 PUMP IS TO START AND IT'S SPEED IS TO INCREASE AT THE RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE.
5. WHEN THE DISTRIBUTION DIFFERENTIAL PRESSURE REACHES SETPOINT, BOTH PUMPS SHALL RECEIVE THE SAME SPEED SIGNAL MODULATED TO MAINTAIN SETPOINT.
6. IF BOTH THE LEAD AND LAG SECONDARY PUMPS ARE OPERATING AND THE SPEED OF THE PUMPS FALLS TO 75% OF FULL DESIGN SPEED, THE LAG SECONDARY PUMP SHALL BE SHUT DOWN AND THE LEAD SECONDARY PUMP SPEED SHALL INCREASE TO ATTAIN PRESSURE DIFFERENTIAL SETPOINT.

<u>CHILLER AND PRIMARY PUMP CONTROL</u>

A. CONCURRENT WITH THE INITIAL START OF THE SECONDARY CHILLED WATER PUMP, OPEN THE PRIMARY CHILLED AND CONDENSER WATER ISOLATION VALVE OF THE LEAD CHILLER. AFTER THE VALVE END SWITCH PROVES THE VALVE IS OPEN, START THE LEAD CHILLED AND CONDENSER WATER PUMPS AND INCREASE THEIR SPEED AT THE RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE.

B. THE LEAD CHILLED WATER AND CONDENSER WATER PUMPS ARE TO ATTAIN, AS A MINIMUM, THE SPEED NECESSARY TO GENERATE THE MINIMUM CHILLED WATER AND CONDENSER WATER FLOW THROUGH THE CHILLER. THE SPEED OF THE PRIMARY CHILLED WATER PUMP SPEED IS, IF NECESSARY, TO BE FURTHER INCREASED SO THAT THE FLOW THROUGH THE LEAD CHILLER EQUALS THE FLOW OF THE SECONDARY DISTRIBUTION.

C. IF THE MINIMUM CHILLER FLOW IS GREATER THAN THE SECONDARY CHILLED WATER FLOW, THE EXCESS PRIMARY CHILLED WATER WILL RECIRCULATE BACK TO THE PRIMARY PUMP SUCTION THROUGH THE DECOUPLER.

D. UPON THE CHILLER PROVIDED CONDENSER WATER AND CHILLED WATER FLOW PROVING SWITCHES ESTABLISHING SUFFICIENT FLOW, THE CHILLER STARTS AND IS CONTROLLED UNDER THE CHILLER'S OWN CONTROL SYSTEM.

E. THE CHILLER BACNET COMMUNICATIONS CAPACITY VALUE IS TO BE USED TO STAGE THE NUMBER OF CHILLERS OPERATING. IF ONE OR TWO CHILLERS ARE OPERATING AND THE CAPACITY OF THE INDIVIDUAL OPERATING CHILLERS REACHES 80% (0.8) OF FULL CAPACITY, THE CONTROLS ARE TO CALL FOR AN ADDITIONAL CHILLER TO BE BROUGHT ON LINE.

F. THERE SHALL BE A MINIMUM OF 5 MINUTE DELAY FROM THE START OR STOPPING OF THE PREVIOUS CHILLER TO THE START UP OR SHUT DOWN OF AN ADDITIONAL CHILLER.

G. AN ADDITIONAL CHILLER IS TO BE BROUGHT ON LINE AS FOLLOWS:

1. LOCK THE OPERATING PRIMARY CHILLED WATER AND CONDENSER WATER PUMPS' SPEED AT 100% DESIGN SPEED.
2. START THE NEXT PRIMARY CHILLED AND CONDENSER WATER PUMP IN THE LEAD, LAG1, LAG2 SEQUENCE AND INCREASE ITS SPEED TO THE MINIMUM PRIMARY AND CONDENSER WATER FLOW SPEED AT A RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE.
3. AFTER BOTH THE CONDENSER AND PRIMARY CHILLED WATER PUMPS ADDED ATTAIN THEIR MINIMUM FLOW SPEED, OPEN THE NEXT LAG CHILLER CHILLED AND CONDENSER WATER ISOLATION VALVE AND VERIFY THAT THEY HAVE OPENED BY MONITORING THE VALVE END SWITCHES.
4. UNLOCK THE OPERATING PRIMARY CHILLED AND CONDENSER WATER PUMPS' SPEED AND REESTABLISH THE MODULATION OF OPERATING PRIMARY CHILLED AND CONDENSER WATER PUMPS.
5. ENABLE THE CHILLER TO RUN AND UPON THE CHILLER PROVIDED CONDENSER WATER AND CHILLED WATER FLOW PROVING SWITCHES ESTABLISHING SUFFICIENT FLOW, THE CHILLER STARTS AND IS INTERNALLY CONTROLLED UNDER THE CHILLERS OWN CONTROL SYSTEM.

H. IF MULTIPLE CHILLERS ARE OPERATING AND THEIR AVERAGE INDIVIDUAL CAPACITY VALUE DROPS TO 35% (0.35) OF FULL CAPACITY, THE CONTROLS ARE TO CALL FOR AN OPERATING CHILLER TO BE SHUT DOWN. A REDUCTION OF THE NUMBER OF CHILLERS OPERATING IS IMPLEMENTED AS DESCRIBED IN THE GENERAL PART OF THE SEQUENCE.

THE EXISTING DIFFERENTIAL PRESSURE TRANSMITTER IS LOCATED ON THE 10TH FLOOR OF BUILDING 1. THE TRANSMITTER IS TO BE REMOVED AND REPLACED WITH A NEW TRANSMITTER. BALANCING CONTRACTOR TO TAKE A PRESSURE DROP READING FROM THE FURTHEST CHILLED WATER CONTROL VALVE ON THE TENTH FLOOR TO DETERMINE SETPOINT FOR THE SYSTEM. COORDINATE WITH VA FOR EXACT LOCATION OF TRANSMITTER.

I. PUMP CAPACITY SHALL BE CONTROLLED TO MEET THE DEMAND OF THE SECONDARY PUMPING SYSTEM. THIS CONTROL WILL BE A FLOATING POINT CONTROL OF THE PRIMARY SIDE OF THE PLANT. CONTROL SHALL BE AS FOLLOWS:

a. PRIMARY SUPPLY WATER TEMP. (PS) – AS SENSED BY ASSOCIATED TT
b. PRIMARY RETURN WATER TEMP. (PR) – AS SENSED BY ASSOCIATED TT
c. SECONDARY SUPPLY WATER TEMP. (SS) – AS SENSED BY ASSOCIATED TT
d. SECONDARY RETURN WATER TEMP. (SR) – AS SENSED BY ASSOCIATED TT
e. PRIMARY PLANT CAPACITY BEING UNDER THE SECONDARY DEMAND SHALL BE WHEN: SS > (PS + 1 DEGREE)
f. PRIMARY PLANT CAPACITY BEING OVER THE SECONDARY DEMAND SHALL BE WHEN: PR < (SR – 1 DEGREE)
g. WHEN THE PRIMARY PLANT IS UNDER CAPACITY, THE PRIMARY PUMP(S) SPEED SHALL BE INCREASED AT THE RATE OF 4 HZ PER MINUTE UNTIL THE PRIMARY CHILLER PLANT IS NO LONGER UNDER CAPACITY. THE OPERATING SPEED OF THE PUMPS SHALL THEN BE LOCKED AT THAT SPEED.
h. WHEN THE PRIMARY PLANT IS OVER CAPACITY, THE PRIMARY PUMP(S) SPEED SHALL BE REDUCED AT THE RATE OF 4 HZ PER MINUTE UNTIL THE PRIMARY CHILLER PLANT IS NO LONGER OVER CAPACITY. THE OPERATING SPEED OF THE PUMPS SHALL THEN BE LOCKED AT THAT SPEED.

<u>CONDENSER WATER PUMP SPEED CONTROL</u>

A. PROVIDE AN EFFICIENT BALANCE BETWEEN THE CONDENSER WATER PUMP AND CHILLER POWER REQUIREMENTS.

B. THE CHILLER CAPACITIES (0.0 TO 1.0 AS DEFINED IN THE GENERAL SECTION) WILL BE USED TO DETERMINE THE DESIRED CONDENSER WATER FLOW TO THE OPERATING CHILLERS.

C. INDIVIDUAL REQUIRED CONDENSER WATER FLOW THROUGH EACH OPERATING CHILLER IS DEFINED AS:

<u>CHILLER CAPACITY BETWEEN 1.0 AND 0.8</u>

FLOW = FULL DESIGN FLOW = DESIGN GPM

<u>CHILLER CAPACITY BELOW 0.8 AND ABOVE 0.4</u>

FLOW = (1.0 – (0.8 – CHILLER CAPACITY)) * DESIGN FLOW

<u>CHILLER CAPACITY BELOW 0.4</u>

FLOW = 0.55 * FULL DESIGN FLOW

<u>EXAMPLE</u> CHILLER CAPACITY AT 50% (0.5), DESIGN FLOW = 1500 GPM

FLOW = (1.0 – (0.8 – 0.5)) * 1500 = 1050 GPM

D. THE CONDENSER WATER PUMP'S SPEED WILL BE MODULATED TO ATTAIN THE FLOW, AS MEASURED BY THE FLOW METERS AT THE OPERATING CHILLER(S) WITH THE LOWEST FLOW.

E. AT CHILLER PLANT START UP, CONCURRENT WITH THE INITIAL START OF THE SECONDARY CHILLED WATER PUMP, OPEN THE CONDENSER WATER ISOLATION VALVE OF THE LEAD CHILLER. AFTER THE VALVE END SWITCH PROVES THE VALVE IS OPEN, START THE LEAD CONDENSER WATER PUMP AND INCREASE ITS SPEED TO FULL SPEED AT A THE RATE THAT WOULD ATTAIN FULL SPEED IN ONE MINUTE.

F. AFTER TWO MINUTES OF CHILLER OPERATION WHEN THE LEAD CHILLER IS STARTED OR DURING NORMAL OPERATION OF THE PLANT AND AFTER START UP OF AN ADDITIONAL CHILLER, THE CAPACITY OF THE CONDENSER WATER PUMPS ARE TO BE MODULATED TO MAINTAIN CHILLER CONDENSER WATER FLOW REQUIREMENTS DESCRIBED ABOVE.

<u>COOLING TOWER CONTROL</u>

A. THE NUMBER OF OPERATING TOWERS IS MAXIMIZED TO HAVE THE REQUIRED CONDENSER WATER FLOW COOLED TO THE DESIRED SETPOINT TEMPERATURE EFFICIENTLY AS POSSIBLE.

B. THE PLANT OPERATING CAPACITY IS TO BE USED TO DETERMINE THE NUMBER OF OPERATING TOWERS IS AS FOLLOWS WHERE THE PLANT CAPACITY IS EXPRESSED AS A FRACTION OF A SINGLE CHILLER CAPACITY:

13. PLANT CAPACITY 0.0 TO 0.7 – ONE TOWER OPERATING.
14. PLANT CAPACITY 0.71 TO 1.4 – TWO TOWERS OPERATING.
15. PLANT CAPACITY 1.41 TO 3.0 – THREE TOWERS OPERATING.

C. THE OUTDOOR WET BULB TEMPERATURE (WBT) IS USED TO ESTABLISH THE TOWER LEAVING WATER TEMPERATURE SETPOINT AS FOLLOWS:

<u>OUTDOOR WET BULB TEMPERATURE (WBT) ABOVE 70°F</u>

SETPOINT = WBT + 7 DEG

<u>OUTDOOR WET BULB TEMPERATURE (WBT) BELOW 70°F</u>

SETPOINT = WBT + (7 + (70 – WBT) * 0.25)

MINIMUM LEAVING WATER TEMPERATURE SETPOINT (ADJ) (FOR CHILLER OPERATION) = 57°F

D. THE TOWER CAPACITY IS TO BE CONTROLLED SO THAT THE LEAVING WATER TEMPERATURE IS EQUAL TO THE SETPOINT. THESE ACTIONS AND CAPACITY MODULATIONS ARE TO BE THE SAME FOR ALL OPERATING TOWERS AS FOLLOWS:

1. IF THE LEAVING WATER TEMPERATURE IS ABOVE SETPOINT, THE TOWER FAN SPEED IS TO BE MODULATED TO MAINTAIN SETPOINT. THE MINIMUM TOWER FAN SPEED IS 30% OF THE DESIGN MAXIMUM.
2. IF THE LEAVING WATER TEMPERATURE FALLS 2 DEGREES BELOW SETPOINT, THE FANS SHALL STOP.
3. IF THE TOWER FANS ARE OFF, AND THE WATER TEMPERATURE FALLS BELOW 55 DEGREES, AN ALARM IS TO BE SENT TO THE ECC, AND THIS ECC SHALL MODULATE THE CONDENSER WATER BYPASS VALVE (V–19) WITHIN THE CHILLER PLANT SO THAT THE BLENDED TOWER/BYPASS CONDENSER WATER TEMPERATURE IS MAINTAINED AT 57 DEGREES UNTIL THE CONDENSER WATER TEMPERATURE COMING FROM THE TOWER IS 57 DEGREES OR HIGHER.

E. FAN OPERATING CRITICAL SPEEDS, ESTABLISHED AS THE SPEED THAT PRODUCES HARMONIC VIBRATION OF THE FAN AS DETERMINED BY THE TOWER MANUFACTURER, ARE TO BE LOCKED OUT OF THE POSSIBLE CONTROL SPEED OPERATION AND THE FAN SPEED SHALL BE THE ALLOWABLE SPEED BELOW SETPOINT.

F. THE TOWERS ARE PROVIDED WITH VIBRATION CUT OUT SWITCHES BY THE TOWER MANUFACTURER. THIS SWITCH IS TO BE WIRED THROUGH THE VFD SAFETY ENABLE TERMINALS AND SHALL SHUT DOWN THE FAN IF VIBRATION IS SENSED. ALARM SHALL BE DISPLAYED AT THE ECC AND THE NEXT TOWER IN THE LEAD LAG DESIGNATION SHALL REPLACE THE FUNCTION OF THE FAILED TOWER.

<u>WATER SIDE ECONOMIZER OPERATION</u>

A. WATER SIDE ECONOMIZER OPERATION (COOLING TOWER 8–CT–4 ONLY) IS TO BE INITIATED AT AN OUTDOOR WET BULB TEMPERATURE BELOW 42°F. WHEN THIS OCCURS, THE CHILLERS ARE TO BE TURNED OFF.

B. WHEN IN THE WATERSIDE ECONOMIZER FLOW MODE, OPERATION OF THE COOLING TOWER DURING OPERATION OF THE WATER SIDE ECONOMIZER IS TO BE THE SAME AS WITH THE CHILLER OPERATION.

1. THE LEAVING WATER TEMPERATURE SETPOINT IS TO BE 44°F.
2. THE COOLING TOWER BYPASS VALVE (V–21) SHALL MODULATE BETWEEN SENDING WATER INTO THE BASIN AND SENDING WATER OVER THE TOP OF THE TOWER TO MAINTAIN SETPOINT. FAN SHALL BE OFF.
3. THE STEAM BASIN HEATER SHALL MAINTAIN WATER TEMPERATURE TO 40°F.(ADJ)

<u>PRIMARY/SECONDARY CHILLED WATER AND CONDENSER WATER PUMPS</u>

1. CHILLED WATER AND CONDENSER WATER PUMPS 8–PCHP–3, 8–SCHP–1, AND 8–CWP–1 ARE TO RUN AND SHALL BE CONTROLLED BY THE SYSTEMS FLOW METERS TO MAINTAIN A GPM 2750.

<u>HEAT EXCHANGERS (8–HX–1)</u>

D. ACTIVATION OF THE HEAT EXCHANGER IS TO BE BY OPENING THE ASSOCIATED CHILLED WATER AND CONDENSER WATER ISOLATION VALVES. DEACTIVATION IS THE REVERSE.

E. THE SPEED OF THE CHILLED WATER PUMPS IS TO BE CONSTANT SO THAT THE CHILLED WATER FLOW MEASURED IS 2750 GPM.

F. THE SPEED OF THE CONDENSER WATER PUMP IS TO BE CONSTANT SO THAT THE CHILLED WATER FLOW MEASURED IS 2750 GPM.

G. WHEN IN WATER SIDE ECONOMIZER AND THE OUTDOOR WET BULB RISES ABOVE 44°F THE PLANT SHALL REVERT BACK TO CHILLER OPERATION. AT THE START OF THIS TRANSITION THE COOLING TOWER IS FULL OF WATER THAT IS BELOW THE ALLOWABLE CONDENSER WATER TEMPERATURE FOR THE CHILLERS. THE TRANSITION TO CHILLER OPERATION IS AS FOLLOWS:

1. TOWER LEAVING WATER TEMPERATURE SETPOINT IS CHANGED FROM 44°F TO 57°F OR HIGHER AS REQUIRED BY OUTDOOR TEMPERATURE.
2. THE LEAD CHILLER IS TO BE ENABLED TO RUN. NOTE THE CHILLER WILL NOT ACTUALLY START UNTIL THE CHILLED AND CONDENSER WATER FLOW IS DETECTED.
3. ALL CONDENSER WATER PUMPS ARE TO BE STOPPED.
4. THE LEAD CHILLER CHILLED AND CONDENSER WATER ISOLATION VALVES ARE TO FULLY OPEN. AND POSITION IS TO BE VERIFIED BY THE END SWITCHES.
5. THE LEAD CONDENSER WATER PUMP SHALL BE RESTARTED AND ITS SPEED IS TO BE INCREASED AT A RATE THAT WOULD ATTAIN FULL SPEED IN <u>THREE</u> MINUTES.
6. THE CONDENSER WATER BYPASS VALVE WITHIN THE CHILLER PLANT SHALL MODULATE SO THAT THE BLENDED TOWER/BYPASS CONDENSER WATER TEMPERATURE IS MAINTAINED AT 57°F UNTIL THE CONDENSER WATER TEMPERATURE COMING FROM THE TOWER IS 57°F OR HIGHER.
7. UPON THE CHILLER PROVIDED CONDENSER WATER AND CHILLED WATER FLOW PROVING SWITCHES ESTABLISHING SUFFICIENT FLOW, THE CHILLER STARTS AND IS CONTROLLED UNDER THE CHILLER'S OWN CONTROL SYSTEM.

<u>FAULT HANDLING:</u>

A. PRIMARY CHILLED WATER, SECONDARY CHILLED WATER AND CONDENSER WATER PUMPS – FAULT SHALL BE DETECTED BY THE PRESSURE DIFFERENTIAL SWITCH ACROSS THE PUMP SUCTION AND DISCHARGE OR BY THE VFD COMMUNICATING THROUGH THE BACNET COMMUNICATIONS THAT THE VFD HAS FAULTED OR THE AMPS DRAW OF THE PUMP IS LOW. THE SYSTEM SHALL REPLACE THE MALFUNCTIONING PUMP WITH THE NEXT IN LINE LAG PUMP. ALL CONTROL SIGNALS SHALL BE TRANSFERRED TO THAT PUMP. AN ALARM IS TO BE DISPLAYED AT THE ECC.

B. A CHILLER SHALL NOT BE CALLED TO START MORE OFTEN THAN ONCE AN HOUR AND THE MINIMUM RUN TIME SHALL BE ONE HALF HOUR. IF A CHILLER IS TO BE STARTED OF STOPPED MORE OFTEN, AN ALARM IS TO BE DISPLAYED AT THE ECC.

C. CENTRIFUGAL CHILLER FAULT – CENTRIFUGAL CHILLER FAULT CAN BE CAUSED BY:

1. CHILLED WATER ISOLATION VALVE NOT OPENING AS DETECTED BY THE VALVE END SWITCHES NOT INDICATING THAT THE VALVE HAS OPENED. A TIME DELAY OF TWO MINUTES SHALL BE ALLOWED FROM THE SIGNAL TO OPEN TO THE VERIFICATION OF VALVE OPEN.
2. CHILLER WATER FLOW SENSORS INTERNAL TO THE CHILLER CONTROLS DO NOT DETECT CHILLED WATER FLOW THROUGH THE CHILLER. THIS CONDITION WILL BE REPORTED THROUGH THE BACNET COMMUNICATIONS OF THE CHILLER. THERE SHALL BE A 15 SECOND DELAY FROM THE TIME THE CHILLED WATER ISOLATION VALVES PROOF OPEN UNTIL AN ALARM CONDITION OCCURS.
3. CONDENSER WATER ISOLATION VALVE NOT OPENING AS DETECTED BY THE VALVE END SWITCHES NOT INDICATING THAT THE VALVE HAS OPENED. A TIME DELAY OF TWO MINUTES SHALL BE ALLOWED FROM THE SIGNAL TO OPEN TO THE VERIFICATION OF VALVE OPEN.
4. CONDENSER WATER FLOW SENSORS INTERNAL TO THE CHILLER CONTROLS DO NOT DETECT CHILLED WATER FLOW THROUGH THE CHILLER. THIS CONDITION WILL BE REPORTED THROUGH THE BACNET COMMUNICATIONS OF THE CHILLER. THERE SHALL BE A 15 SECOND DELAY FROM THE TIME THE CHILLED WATER ISOLATION VALVES PROOF OPEN UNTIL AN ALARM CONDITION OCCURS.
5. GENERAL CHILLER FAULT – THIS CONDITION WILL BE REPORTED THROUGH THE BACNET COMMUNICATIONS OF THE CHILLER.
6. ANY OF THE ABOVE ITEMS UNDER ITEM C. WILL CAUSE A CONDITION WHERE THE CHILLER ASSOCIATED WITH THE FAULT WILL HAVE ITS START SEQUENCE TERMINATED OR THE CHILLER WILL BE SHUT DOWN AND THE REMAINING CHILLERS WILL BE ASSIGNED THE NEXT HIGHER LEAD/LAG PRIORITY AND THE CHILLER START SEQUENCE IS TO RESUME. AN ALARM IS TO BE DISPLAYED AT THE ECC.

D. COOLING TOWER – FAULT SHALL BE DETECTED BY THE FOLLOWING:

1. CONDENSER WATER ISOLATION VALVE FAILING TO OPEN AS DETECTED BY THE VALVE END SWITCHES NOT INDICATING THAT THE VALVE HAS OPENED. A TIME DELAY OF TWO MINUTES SHALL BE ALLOWED FROM THE SIGNAL TO OPEN TO THE VERIFICATION OF VALVE OPEN.
2. TOWER FAN NOT OPERATING – FAULT SHALL BE DETECTED BY THE VFD COMMUNICATING THROUGH THE BACNET COMMUNICATIONS THAT THE VFD HAS FAULTED OR THE AMPS DRAW OF THE FAN IS LOW.
3. LEAVING TOWER TEMPERATURE 5 DEGREES ABOVE SETPOINT.

ANY OF THE ABOVE ITEMS UNDER ITEM D. WILL CAUSE A CONDITION WHERE THE TOWER ASSOCIATED WITH THE FAULT WILL HAVE ITS START SEQUENCE TERMINATED OR THE TOWER WILL BE SHUT DOWN AND THE REMAINING TOWERS WILL BE ASSIGNED THE NEXT HIGHER LEAD/LAG PRIORITY AND THE TOWER START SEQUENCE IS TO RESUME. AN ALARM IS TO BE DISPLAYED AT THE ECC.

4. IF THE COOLING TOWER WATER HIGH LEVEL SWITCH HLS, IS ACTIVATED, AN ALARM SHALL BE GENERATED AT THE ECC BUT THE TOWER SHALL CONTINUE TO OPERATE.
5. THE MINIMUM WATER LEVEL IN AT LEAST ONE COOLING TOWER CELL BASIN IS TO BE VERIFIED. IF AT LEAST ONE OF THE TOWERS ARE NOT FILLED, THE CONTROL SYSTEM WILL NOT LET ANY CHILLER START. IF THE WEATHER CONDITIONS CALL FOR THE CHILLER SYSTEM TO OPERATE AND THE WATER LEVEL IS INSUFFICIENT, AN ALARM IS TO BE SHOWN AT THE ECC.

E. ALARMS SHALL ALSO BE DISPLAYED FOR THE FOLLOWING:

1. CENTRAL CHILLED WATER SUPPLY TEMPERATURE BEING TOO HIGH OR TOO LOW.
2. CONDENSER WATER TEMPERATURE DISCHARGE FROM TOWERS BEING TOO HIGH OR TOO LOW.
3. THE WATER TREATMENT SYSTEM IS OFF OR INDICATES A GENERAL ALARM.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT
LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6119
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
ANTHONY D. PACARO, JR.
ENGINE

POINTS SUMMARY - CHILLED WATER SYSTEM

SYSTEM COMPONENT	Point ID	System Outputs: Binary: Electric	Binary: Pneumatic	Analog: Electric	Analog: Pneumatic	System Inputs: Binary: Status	Analog: Temperature	Pressure	Humidity	Flow	Current	Data	System Software/Control: Alarm Processing: Equipment Status	Low Limit	High Limit	Application/Function: Schedule Start/Stop	Lead/Lag	Temperature Control	Enthalpy Economizer	Pressure/Volume Control	Humidity Control	Humidity Reset	Value	Graphic Display	Trending	REMARK
PUMP 8-PCHP-1 Start/STOP	SST		●														●							●		
PUMP 8-PCHP-1 SPEED CONTROL	SC				●															●				●		
PUMP 8-PCHP-1 VFD BACnet COMM	COMM																							●		
PUMP 8-PCHP-2 Start/STOP	SST		●														●							●		
PUMP 8-PCHP-2 SPEED CONTROL	SC				●															●				●		
PUMP 8-PCHP-2 VFD BACnet COMM	COMM																							●		
PUMP 8-PCHP-3 Start/STOP	SST		●														●							●		
PUMP 8-PCHP-3 SPEED CONTROL	SC				●															●				●		
PUMP 8-PCHP-3 VFD BACnet COMM	COMM																							●		
PUMP 8-PCHP-4 Start/STOP	SST		●														●							●		
PUMP 8-PCHP-4 SPEED CONTROL	SC				●															●				●		
PUMP 8-PCHP-4 VFD BACnet COMM	COMM																							●		
PUMP 8-SCHP-1 Start/STOP	SST		●														●							●		
PUMP 8-SCHP-1 SPEED CONTROL	SC				●															●				●		
PUMP 8-SCHP-1 VFD BACnet COMM	COMM																							●		
PUMP 8-SCHP-2 Start/STOP	SST		●														●							●		
PUMP 8-SCHP-2 SPEED CONTROL	SC				●															●				●		
PUMP 8-SCHP-2 VFD BACnet COMM	COMM																							●		
PUMP 8-SCHP-3 Start/STOP	SST		●														●							●		
PUMP 8-SCHP-3 SPEED CONTROL	SC				●															●				●		
PUMP 8-SCHP-3 VFD BACnet COMM	COMM																							●		
PUMP 8-SCHP-4 Start/STOP	SST		●														●							●		
PUMP 8-SCHP-4 SPEED CONTROL	SC				●															●				●		
PUMP 8-SCHP-4 VFD BACnet COMM	COMM																							●		
PUMP 8-CWP-1 Start/STOP	SST		●														●							●		
PUMP 8-CWP-1 SPEED CONTROL	SC				●															●				●		
PUMP 8-CWP-1 VFD BACnet COMM	COMM																							●		
PUMP 8-CWP-2 Start/STOP	SST		●														●							●		
PUMP 8-CWP-2 SPEED CONTROL	SC				●															●				●		
PUMP 8-CWP-2 VFD BACnet COMM	COMM																							●		
PUMP 8-CWP-3 Start/STOP	SST		●														●							●		
PUMP 8-CWP-3 SPEED CONTROL	SC				●															●				●		
PUMP 8-CWP-3 VFD BACnet COMM	COMM																							●		
PUMP 8-CWP-4 Start/STOP	SST		●														●							●		
PUMP 8-CWP-4 SPEED CONTROL	SC				●															●				●		
PUMP 8-CWP-4 VFD BACnet COMM	COMM																							●		
Chiller 8-CH-1 Stop/Start	SST		●														●							●		
Chiller 8-CH-1 Chilled Water Valve Position (V-2)	ZC	C	●																					●		
Chiller 8-CH-1 Chilled Water Valve End Switch	ZS						●						●											●		
Chiller 8-CH-1 Condenser Water Valve Position (V-9)	ZC	C	●																					●		
Chiller 8-CH-1 Condenser Water Valve End Switch	ZS						●						●											●		
Chiller 8-CH-1 Chilled Water Supply Temp	TT							●						38	48									●		
Chiller 8-CH-1 Chilled Water Return Temp	TT							●																●		
Chiller 8-CH-1 Condenser Water Supply Temp	TT							●																●		
Chiller 8-CH-1 Condenser Water Return Temp	TT							●						89	101									●		
Chiller 8-CH-1 Chilled Water Diff Pressure	DPT								●											●				●		
Chiller 8-CH-1 Condenser Water Diff Pressure	DPT								●											●				●		
Chiller 8-CH-1 Chilled Water Flow Switch	FS		●																	●						
Chiller 8-CH-1 Condenser Water Flow Switch	FS		●																	●						
Chiller 8-CH-1 Evaporator Water Flow Transmitter	FT									●										●				●		
Chiller 8-CH-1 Condenser Water Flow Transmitter	FT									●										●				●		
8-CH-1 BACnet Comm	COMM																							●		

POINTS SUMMARY - CHILLED WATER SYSTEM

SYSTEM COMPONENT	Point ID	Device Fail Position (O)-Open (C)-Closed	System Outputs: Binary: Electric	Binary: Pneumatic	Analog: Electric	Analog: Pneumatic	System Inputs: Binary: Status	Analog: Temperature	Pressure	Humidity	Flow	Current	Data	System Software/Control: Alarm Processing: Equipment Status	Low Limit	High Limit	Application/Function: Schedule Start/Stop	Lead/Lag	Temperature Control	Enthalpy Economizer	Pressure/Volume Control	Humidity Control	Humidity Reset	Value	Graphic Display	Trending	REMARK
Chiller 8-CH-2 Stop/Start	SST			●														●							●		
Chiller 8-CH-2 Chilled Water Valve Position (V-1)	ZC	C		●																					●		
Chiller 8-CH-2 Chilled Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-2 Condenser Water Valve Position (V-10)	ZC	C		●																					●		
Chiller 8-CH-2Condenser Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-2 Chilled Water Supply Temp	TT								●																●		
Chiller 8-CH-2 Chilled Water Return Temp	TT								●						38	48									●		
Chiller 8-CH-2 Condenser Water Supply Temp	TT								●																●		
Chiller 8-CH-2 Condenser Water Return Temp	TT								●						89	101									●		
Chiller 8-CH-2 Chilled Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-2 Condenser Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-2 Chilled Water Flow Switch	FS			●																	●						
Chiller 8-CH-2 Condenser Water Flow Switch	FS			●																	●						
Chiller 8-CH-2 Evaporator Water Flow Transmitter	FT										●										●				●		
Chiller 8-CH-2 Condenser Water Flow Transmitter	FT										●										●				●		
8-CH-2 BACnet Comm	COMM																								●		
Chiller 8-CH-3 Stop/Start	SST			●														●							●		
Chiller 8-CH-3 Chilled Water Valve Position (V-3)	ZC	C		●																					●		
Chiller 8-CH-3 Chilled Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-3 Condenser Water Valve Position (V-8)	ZC	C		●																					●		
Chiller 8-CH-3 Condenser Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-3 Chilled Water Supply Temp	TT								●																●		
Chiller 8-CH-3 Chilled Water Return Temp	TT								●						38	48									●		
Chiller 8-CH-3 Condenser Water Supply Temp	TT								●																●		
Chiller 8-CH-3 Condenser Water Return Temp	TT								●						89	101									●		
Chiller 8-CH-3 Chilled Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-3 Condenser Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-3 Chilled Water Flow Switch	FS			●																	●						
Chiller 8-CH-3 Condenser Water Flow Switch	FS			●																	●						
Chiller 8-CH-3 Evaporator Water Flow Transmitter	FT										●										●				●		
Chiller 8-CH-3 Condenser Water Flow Transmitter	FT										●										●				●		
8-CH-3 BACnet Comm	COMM																								●		
Chiller 8-CH-4 Stop/Start	SST			●														●							●		
Chiller 8-CH-4 Chilled Water Valve Position (V-4)	ZC	C		●																					●		
Chiller 8-CH-4 Chilled Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-4 Condenser Water Valve Position (V-7)	ZC	C		●																					●		
Chiller 8-CH-4 Condenser Water Valve End Switch	ZS						●							●											●		
Chiller 8-CH-4 Chilled Water Supply Temp	TT								●																●		
Chiller 8-CH-4 Chilled Water Return Temp	TT								●						38	48									●		
Chiller 8-CH-4 Condenser Water Supply Temp	TT								●																●		
Chiller 8-CH-4 Condenser Water Return Temp	TT								●						89	101									●		
Chiller 8-CH-4 Chilled Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-4 Condenser Water Diff Pressure	DPT									●											●				●		
Chiller 8-CH-4 Chilled Water Flow Switch	FS			●																	●						
Chiller 8-CH-4 Condenser Water Flow Switch	FS			●																	●						
Chiller 8-CH-4 Evaporator Water Flow Transmitter	FT										●										●				●		
Chiller 8-CH-4 Condenser Water Flow Transmitter	FT										●										●				●		
8-CH-4 BACnet Comm	COMM																								●		
Heat Exchanger 8- HX-1 Chilled Water Valve Position (V-5)	ZC	C		●																					●		
Heat Exchanger 8- HX-1 Chilled Water Valve End Switch	ZS						●							●											●		
Heat Exchanger 8- HX-1 Condenser Water Valve Position (V-6)	ZC	C		●																					●		
Heat Exchanger 8- HX-1 Condenser Water Valve End Switch	ZS						●							●											●		
Heat Exchanger 8- HX-1 Chilled Water Diff Pressure	DPT								●												●				●		
Heat Exchanger 8- HX-1 Condenser Water Diff Pressure	DPT								●												●				●		
Heat Exchanger 8- HX-1 Chilled Water Supply Temp	TT								●																●		
Heat Exchanger 8- HX-1 Chilled Water Return Temp	TT								●																●		
Heat Exchanger 8- HX-1 Condenser Water Supply Temp	TT								●																●		
Heat Exchanger 8- HX-1 Condenser Water Return Temp	TT								●																●		
Heat Exchanger 8- HX-1 Evaporator Water Flow Transmitter	FT										●										●				●		
Heat Exchanger 8- HX-1 Condenser Water Flow Transmitter	FT										●										●				●		

CONTROLS GENERAL NOTES

1. PROVIDE ALL POINTS REQUIRED AS SHOWN ON THIS DRAWING.
2. PROVIDE ALL POINTS AS NEEDED TO FULLY COMPLETE THE SEQUENCE OF OPERATIONS.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT

LaBella Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614
P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.labellapc.com

ENGINEER OF RECORD

Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ANTHONY D. PACARO, JR. ENGINEER No. PE081733-E
5-11-22

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title: MECHANICAL CONTROLS POINTS LIST - 1
Approved: Project Director
Phase: CONSTRUCTION BID DOCUMENTS
NON-SPRINKLERED
Project Title: UD CHILLER CAPACITY UPGRADE
Location: UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA
Issue Date: 2022-05-11
Checked: LM
Drawn: RHD
Project Number: 646-20-109
Building Number: 8
Drawing Number: M-803

P:\0507_DVA-Pittsburgh PA IDIQ\0014 PIT UD Chiller Capacity Upgrade\4_Drawings_Cad_Current Submittal Phase\6_Mechanical\M-803.dwg 5-11-22 09:51:41 AM sporto

VA FORM 08-6231

POINTS SUMMARY - CHILLED WATER SYSTEM

SYSTEM COMPONENT	Point ID	Device Fail Position (O)-Open, (C)- Closed	System Outputs: Binary: Electric	System Outputs: Binary: Pneumatic	System Outputs: Analog: Electric	System Outputs: Analog: Pneumatic	System Inputs: Binary: Status	System Inputs: Analog: Temperature	System Inputs: Analog: Pressure	System Inputs: Analog: Humidity	System Inputs: Analog: Flow	System Inputs: Analog: Current	System Inputs: Analog: Data	System Software/Control: Alarm Processing: Equipment Status	System Software/Control: Alarm Processing: Low Limit	System Software/Control: Alarm Processing: High Limit	System Software/Control: Application/Function: Schedule Start/Stop	System Software/Control: Application/Function: Lead/Lag	System Software/Control: Application/Function: Temperature Control	System Software/Control: Application/Function: Enthalpy Economizer	System Software/Control: Application/Function: Pressure/Volume Control	System Software/Control: Application/Function: Humidity Control	System Software/Control: Application/Function: Humidity Reset	System Software/Control: Application/Function: Value	Graphic Display	Trending	REMARK
Main Chilled Water Supply Temp	TT								•																•			
Main Chilled Water Return Temp	TT								•																•			
Main Chilled Water Flow Transmitter	FT										•										•				•			
System Chilled Water Differential Pressure	DPT									•															•			
Condenser Water Bypass Valve Position (V-19)	ZC		•																						•			MODULATING
Decoupler Temp	TT								•																•			
Cooling Tower Cell 8-CTC-1 Fan Start/Stop	SST		•															•							•			
Cooling Tower Cell 8-CTC-1 Fan Speed Control	SC				•														•						•			
Cooling Tower Cell 8-CTC-1 Basin Low Water Level	LLS		•												•													
Cooling Tower Cell 8-CTC-1 Basin High Water Level	HLS		•													•												
Cooling Tower Cell 8-CTC-1 Inlet Isolation Valve (V-16)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-1 Inlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-1 Outlet Isolation Valve (V-14)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-1 Outlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-1 Vibration Switch	VS						•							•											•			
Cooling Tower Cell 8-CTC-2 Fan Start/Stop	SST		•															•							•			
Cooling Tower Cell 8-CTC-2 Fan Speed Control	SC				•														•						•			
Cooling Tower Cell 8-CTC-2 Basin Low Water Level	LLS		•												•													
Cooling Tower Cell 8-CTC-2 Basin High Water Level	HLS		•													•												
Cooling Tower Cell 8-CTC-2 Inlet Isolation Valve (V-15)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-2 Inlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-2 Outlet Isolation Valve (V-13)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-2 Outlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-2 Vibration Switch	VS						•							•											•			
Cooling Tower Cell 8-CTC-3 Fan Start/Stop	SST		•															•							•			
Cooling Tower Cell 8-CTC-3 Fan Speed Control	SC				•														•						•			
Cooling Tower Cell 8-CTC-3 Basin Low Water Level	LLS		•												•													
Cooling Tower Cell 8-CTC-3 Basin High Water Level	HLS		•													•												
Cooling Tower Cell 8-CTC-3 Inlet Isolation Valve (V-11)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-3 Inlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-3 Outlet Isolation Valve (V-12)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-3 Outlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-3 Vibration Switch	VS						•							•											•			
Cooling Tower Cell 8-CTC-4 Fan Start/Stop	SST		•															•							•			
Cooling Tower Cell 8-CTC-4 Fan Speed Control	SC				•														•						•			
Cooling Tower Cell 8-CTC-4 Basin Low Water Level	LLS		•												•													
Cooling Tower Cell 8-CTC-4 Basin High Water Level	HLS		•													•												
Cooling Tower Cell 8-CTC-4 Inlet Isolation Valve (V-17)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-4 Inlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-4 Outlet Isolation Valve (V-18)	ZC	C	•																						•			
Cooling Tower Cell 8-CTC-4 Outlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-4 Vibration Switch	VS						•							•											•			
Cooling Tower Bypass Valve (V-21)	ZC	C	•																						•			MODULATING
Cooling Tower Cell 8-CTC-4 Inlet Isolation Valve End Switch	ZS						•							•											•			
Cooling Tower Cell 8-CTC-4 Basin Heater Valve (V-20)	ZC	C	•																						•			MODULATING
Side Stream Seperator 8-SSF-1 Pump Start/Stop	SST		•									•		•											•			

POINTS SUMMARY - CHILLED WATER SYSTEM

SYSTEM COMPONENT	Point ID	Device Fail Position (O)-Open, (C)- Closed	System Outputs: Binary: Electric	System Outputs: Binary: Pneumatic	System Outputs: Analog: Electric	System Outputs: Analog: Pneumatic	System Inputs: Binary: Status	System Inputs: Analog: Temperature	System Inputs: Analog: Pressure	System Inputs: Analog: Humidity	System Inputs: Analog: Flow	System Inputs: Analog: Current	System Inputs: Analog: Data	System Software/Control: Alarm Processing: Equipment Status	System Software/Control: Alarm Processing: Low Limit	System Software/Control: Alarm Processing: High Limit	System Software/Control: Application/Function: Schedule Start/Stop	System Software/Control: Application/Function: Lead/Lag	System Software/Control: Application/Function: Temperature Control	System Software/Control: Application/Function: Enthalpy Economizer	System Software/Control: Application/Function: Pressure/Volume Control	System Software/Control: Application/Function: Humidity Control	System Software/Control: Application/Function: Humidity Reset	System Software/Control: Application/Function: Value	Graphic Display	Trending	REMARK
Side Stream Seperator 8-SSF-2 Pump Start/Stop	SST		•									•		•											•			
Outside Air Humidity Ratio	H									•																		
Outside Air Dry Bulb Temperature	DBT							•																				
Exhaust Fan 8-EF-1 Stat/Stop	SST		•																						•			
Exhaust Fan 8-EF-2 Stat/Stop	SST		•																						•			
Exhaust Fan 8-EF-3 Stat/Stop	SST		•																						•			
Damper 8-D-1 Modulator / Motor - 1	DA		•																•									
Damper 8-D-1 End Switch - 1	ZS		•				•																					
Chiller Room B107 Temperature Sensor (8-EF-1)	TT							•							100										•			ADJUSTABLE HIGH LIMIT.
Storage Room BA105 Temperature Sensor (8-EF-3)	TT							•							100										•			ADJUSTABLE HIGH LIMIT.

CONTROLS GENERAL NOTES

1. PROVIDE ALL POINTS REQUIRED AS SHOWN ON THIS DRAWING.
2. PROVIDE ALL POINTS AS NEEDED TO FULLY COMPLETE THE SEQUENCE OF OPERATIONS.

PRINTS OF THIS DRAWING SHALL NOT BE USED FOR ANY PURPOSE WHATSOEVER WITHOUT THE SEAL AND SIGNATURE OF THE PROFESSIONAL ENGINEER.

NO.	DESCRIPTION	DATE

CONSULTANT
LaBella
Powered by partnership.
300 State Street, Suite 201, Rochester, NY 14614, P: (585) 454-6110
Engineering, Architecture, Environmental, Planning
www.LaBellaAgo.com

ENGINEER OF RECORD
Miller-Remick LLC
Mechanical, Electrical, Plumbing, & Structural Engineering
1010 KINGS HIGHWAY SOUTH
CHERRY HILL, NEW JERSEY 08034
PHONE: (856)429-4000
FAX: (856)429-5002
MR PROJECT NO: 0507-0014

MILLER-REMICK LLC PROFESSIONAL ENGINEER
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER ANTHONY D. PACARO, JR. No. PE061713 5/11/2022

Office of Construction and Facilities Management
VA U.S. Department of Veterans Affairs

Drawing Title	MECHANICAL CONTROLS POINTS LIST - 2
Phase	CONSTRUCTION BID DOCUMENTS
Project Title	UD CHILLER CAPACITY UPGRADE
Project Number	646-20-109
Building Number	8
Approved: Project Director	NON-SPRINKLERED
Location	UNIVERSITY DRIVE CAMPUS PITTSBURGH, PENNSYLVANIA
Issue Date	2022-05-11
Checked	LM
Drawn	RHD
Drawing Number	M-804

P:\0507_DVA--Pittsburgh PA IDIQ\0014 Pitt UD Chiller Capacity Upgrade\4_Drawings\1_Cad\1_Current Submittal Phase\6_Mechanical\M-804.dwg 6-02-22 02:05:07 PM sporto

VA FORM 08-6231