COOLING TOWER REPLACEMENT
FLETCHER DANIELS
STATE OFFICE BUILDING
Kansas City, Missouri

sys-tek

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DESIGNER: sys-tek

PROJECT NUMBER: O1917-01

PROJECT MANAGEMENT: OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

SITE NUMBER: 1005
ASSET NUMBER: 3101005002

SHEET NUMBER:
G-001

GENERAL

- NOTE DESIGNATION – DEMOLITION (ALL)
- NOTE DESIGNATION – MECHANICAL NEW WORK
- NOTE DESIGNATION – ELECTRICAL NEW WORK
- NOTE DESIGNATION – PIPING/PLUMBING NEW WORK
- REVISION FROM ORIGINAL DOCUMENT
- EQUIPMENT / LOCATION &/OR NUMBER — EQUIPMENT TAG DESIGNATION
- DRAWING NUMBER / SHEET NUMBER — SECTION CUT DESIGNATION
- DRAWING NUMBER / SHEET NUMBER — RE: 3/M2 — REFERENCE DESIGNATION
- CONNECT TO EXISTING

DUCTWORK

SYMBOLS

- EXISTING DUCTWORK
- DUCTWORK TO BE REMOVED
- NEW DUCTWORK SIZE AS INDICATED
- 90° ELBOW DOWN
- 90° ELBOW UP
- SOUND ATTENUATOR, SIZE AS INDICATED
- FLEXIBLE CONNECTION
- LINED DUCTWORK
- FLEXIBLE DUCTWORK
- RECTANGULAR ECCENTRIC DUCT TRANSITION
- RECTANGULAR CONCENTRIC DUCT TRANSITION
- SQUARE TO ROUND DUCT TRANSITION
- SUPPLY AIR
- RETURN AIR
- TURNING VANES
- SUPPLY DIFFUSER
- RETURN GRILL
- CD — CONTROL DAMPER
- BD — BACKDRAFT DAMPER
- FD — FIRE DAMPER
- FS — COMBINATION FIRE/SMOKE DAMPER
- MVD — MANUAL VOLUME DAMPER
- M — MOTOR OPERATED DAMPER
- DEVICE
- WALL MOUNTED DEVICE
- S — DUCT MOUNTED SMOKE DETECTOR
- AD — ACCESS DOOR, SIZE AS INDICATED
- DEVICE TYPE / INLET SIZE / FLOW — SUPPLY/EXHAUST AIR DEVICE DESIGNATION
- DEVICE TYPE / DEVICE SIZE — RETURN AIR DEVICE DESIGNATION
- T — THERMOSTAT

ABBREVIATIONS

A.F.F.	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
B.O.D.	BOTTOM OF DUCT
℄	CENTER LINE
CFM	CUBIC FEET PER MINUTE
CD	CEILING DIFFUSER
DP	DIFFERENTIAL PRESSURE
RG	RETURN GRILLE

PIPING/PLUMBING

PLUMBING

CW	COLD WATER PIPING
ICW	INDUSTRIAL COLD WATER
IW	INDIRECT WASTE OR IRRIGATION WATER
NPW	NON–POTABLE WATER
HW	HOT WATER PIPING
HWC	HOT WATER CIRCULATING PIPING
SFT	SOFT WATER
SW	STORM WATER
TWS	TEMPERED WATER SUPPLY
TWR	TEMPERED WATER RETURN
VAC	VACUUM
V	VENT
W	WASTE

BUILDING SYSTEMS

CA	COMPRESSED AIR PIPING
CHWS	CHILLED WATER SUPPLY PIPING
CHWR	CHILLED WATER RETURN PIPING
CWFT	CONDENSER WATER FROM TOWER
CWTT	CONDENSER WATER TO TOWER
CD	CONDENSATE DRAIN PIPING
D	DRAIN
FOS	FUEL OIL SUPPLY
FOR	FUEL OIL RETURN
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
HPS	HIGH PRESSURE STEAM
HPC	HIGH PRESSURE CONDENSATE
HHWS	HEATING HOT WATER SUPPLY
HHWR	HEATING HOT WATER RETURN
HPS	HIGH PRESSURE STEAM
HPC	HIGH PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
MPC	MEDIUM PRESSURE CONDENSATE
NG	NATURAL GAS
PC	PUMPED CONDENSATE
REF	REFRIGERANT

PROCESS

AC	ACETYLENE
AW	ACID WASTE
AR	ARGON
CIPS	CLEAN IN PLACE SUPPLY PIPING
CIPR	CLEAN IN PLACE RETURN PIPING
CS	CLEAN STEAM PIPING
DI	DE–IONIZED WATER
DS	DISTILLED WATER
GN	GASEOUS NITROGEN
HE	HELIUM
HY	HYDROGEN
LN	LIQUID NITROGEN
NG	NATURAL GAS
NO	NITROUS OXIDE
PCA	PROCESS COMPRESSED AIR
P	PROPANE

VALVES

- ANGLE VALVE
- BALL VALVE
- BALANCING VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- CONTROL VALVE (TWO–WAY, PNEUMATIC)
- CONTROL VALVE (THREE–WAY, PNEUMATIC)
- GAS COCK
- GATE VALVE
- GLOBE VALVE
- MOTORIZED CONTROL VALVE (TWO–WAY)
- MOTORIZED CONTROL VALVE (THREE–WAY)
- PLUG VALVE
- PRESSURE REDUCING BACKFLOW VALVE
- PRESSURE REDUCING VALVE
- PRESSURE RELIEF VALVE
- SOLENOID VALVE
- TRIPLE DUTY VALVE

FITTINGS & ACCESSORIES

- AV / MV — AIR VENT (AUTOMATIC/MANUAL)
- BLIND FLANGE
- CAP
- C.O. — CLEAN OUT (FLOOR/WALL)
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- ELBOW 45°
- ELBOW 90°
- ELBOW 90° UP
- ELBOW 90° DOWN
- EXISTING PIPING TO REMAIN
- FLEXIBLE CONNECTOR
- FD — FLOOR DRAIN
- HB — HOSE BIBB
- NEW PIPING
- PIPE ANCHOR
- PIPE GUIDE/SLEEVE
- PIPING TO BE REMOVED
- PRESSURE GAUGE
- PT — PRESSURE/TEMPERATURE WELL (PETES PLUG)
- PUMP (IN–LINE)
- PUMP (FOR P&ID/FLOW DIAGRAM)
- STRAINER
- STRAINER WITH BLOW DOWN VALVE
- TEE
- TEE, OUTLET DOWN
- TEE, OUTLET UP
- THERMOMETER
- UNION
- VALVE IN RISER

FIRE DETECTION/PROTECTION

FP	FIRE PROTECTION PIPING
	FIRE SPRINKLER HEAD
F	FIRE ALARM BELL
H	HALON ALARM BELL
F	FIRE ALARM PULL STATION
F	FIRE PHONE JACK
	SMOKE DETECTOR
S ION	SMOKE DETECTOR – IONIZATION TYPE
S P	SMOKE DETECTOR – PHOTOMETRIC TYPE
	FIRE HORN/STROBE COMBINATION
15/75	CANDELA NUMBER DESIGNATION (TYP. FOR ALL STROBES)
PDFP	PRE–ACTION DRY–PIPE FIRE PROTECTION
H	HALON OR FM200 ALARM BELL
	HEAT DETECTOR
F	FIRE ALARM HORN
	CALL STATION (AFEA)
H	HALON OR FM200 AUDIO/VISUAL ALARM
F	FIRE ALARM LIGHT
H	HALON OR FM200 STROBE
H	HALON OR FM200 TANK
WM	WATER MIST TANK

ELECTRICAL

POWER

- HOMERUN TO PANELBOARD. NUMBER OF ARROWS INDICATES NUMBER OF CIRCUITS.
- CONDUIT EXPOSED OR IN CEILING CONSTRUCTION.
- #12 THHN WIRE IN CONDUIT UNLESS NOTED OTHERWISE. SIZE PER LATEST N.E.C.
- "J" HOOK RACEWAY MADE FROM 6" ADJUSTABLE PIPE HANGERS (B–LINE MOD. BJ3690 OR EQUAL) SUPPORTED FROM STRUCTURE BY 5/8" ALL THREAD.
- GROUND WIRE IN CONDUIT.
- DISCONNECT SWITCH – UN–FUSED TYPE
- MOTOR STARTER
- FUSED DISCONNECT
- COMBINATION DISCONNECT SWITCH AND MOTOR STARTER.
- DUPLEX GROUNDING TYPE RECEPTACLE OUTLET – RATED 20–AMP.
- DUPLEX GROUNDING TYPE RECEPTACLE OUTLET – ON EMERGENCY POWER
- DOUBLE DUPLEX GROUNDING TYPE RECEPTACLE OUTLET
- WP — DUPLEX GROUNDING TYPE RECEPTACLE OUTLET WITH WEATHERPROOF COVER.
- GFCI — DUPLEX GROUND FAULT INTERRUPTER CIRCUIT TYPE RECEPTACLE OUTLET
- SIMPLEX 125–V., 2–POLE, 3–WIRE RECEPTACLE OUTLET – WALL OR FLOOR MOUNTED
- XP — SAME AS ABOVE – EXPLOSION PROOF
- 30 — SIMPLEX 208–V., 3–POLE, 4–WIRE RECEPTACLE OUTLET
- XP — SAME AS ABOVE – EXPLOSION PROOF
- SIMPLEX 480–V., 3–POLE, 4–WIRE RECEPTACLE OUTLET
- XP — SAME AS ABOVE – EXPLOSION PROOF
- J — JUNCTION BOX
- J — 12"x18" QUAZITE JUNCTION BOX
- B — OUTLET BOX WITH BLANK COVER PLATE
- C — CLOCK HANGER OUTLET
- C — CONTACTOR
- T — TRANSFORMER
- MOTOR
- 120/208V PANELBOARD
- 277/480V PANELBOARD
- PT P — POKE THROUGH DEVICE FOR POWER
- PT P D — POKE THROUGH DEVICE FOR POWER AND DATA
- PT D — POKE THROUGH DEVICE FOR DATA ONLY
- DUPLEX GROUNDING TYPE RECEPTACLE OUTLET, 15–AMP. TWIST–LOCK NEMA L5–15R ON TOP, AND NEMA 5–15R ON BOTTOM
- 30A — SIMPLEX 208/120–V., 3–POLE, 4–WIRE, RECEPTACLE OUTLET, SURFACE MOUNT TO FLOOR IN CAST BOX
- SIMPLEX 208–V., 20–AMP., 3–POLE, 4–WIRE RECEPTACLE OUTLET
- WP — WEATHER PROOF
- GFCI — GROUND FAULT INTERRUPTER
- XP — EXPLOSION PROOF
- E — EMERGENCY STOP SWITCH
- DEVICE MOUNTED 6" ABOVE ABOVE COUNTER UNLESS NOTED OTHERWISE
- FLOOR BOX WITH OUTLET INSTALLED FLUSH WITH FLOOR

SECURITY

- CR — CARD READER
- DM — DOOR MONITOR
- ML — MAGNETIC LOCK
- MOTION SENSOR

LIGHTING

- A — 24"x48" FLUORESCENT LIGHTING FIXTURE, 'A' INDICATES DESIGNATION ON SCHEDULE
- SAME AS ABOVE – CONNECTION TO NIGHT LIGHT CIRCUIT (EMERGENCY POWER)
- A — 12"x48" FLUORESCENT LIGHTING FIXTURE, 'A' INDICATES DESIGNATION ON SCHEDULE
- SAME AS ABOVE – CONNECTION TO NIGHT LIGHT CIRCUIT (EMERGENCY POWER)
- 6"x48" TEARDROP FLUORESCENT LIGHTING FIXTURE (PROVIDED BY OTHERS)
- OR — RECESSED LIGHT FIXTURE
- GROUND MOUNTED FLOOD
- GROUND MOUNTED WALL WASHER
- CEILING MOUNTED EXIT LIGHT (EMERGENCY POWER)
- WALL MOUNTED EXIT LIGHT (EMERGENCY POWER)
- OR — WALL MOUNTED FIXTURE
- OR — POINT SOURCE SURFACE MOUNTED
- OR — ACCENT WITH DIRECTIONAL ARROW
- OR — PENDANT FIXTURE, CHAIN OR STEM MOUNTED
- RECESSED ACCENT OR WALL WASHER
- BOLLARD TYPE
- OR — POLE MOUNTED WITH ARM
- OR — POLE MOUNTED ON TOP
- OR — LUMINARE PROVIDING EMERGENCY ILLUMINATION
- EMERGENCY LIGHTS
- S — SINGLE–POLE, SINGLE–THROW WALL SWITCH
- S_2 — TWO–POLE, SINGLE–THROW WALL SWITCH
- S_3 — THREE–WAY WALL SWITCH
- S_4 — FOUR–WAY WALL SWITCH
- S_D — 1500 W, WALL MOUNTED, INCANDESCENT DIMMER SWITCH
- S_{D3} — THREE WAY, 1000 W DIMMER SWITCH (DIMMING AT ALL LOCATIONS SHOWN).
- PENDANT CABLE SUPPORT
- PC — PHOTO CELL

COMMUNICATION

- WALL MOUNTED TELEPHONE OUTLET. TELEPHONE OUTLET FURNISHED AND INSTALLED BY OWNER. FOR WALL INSTALLATION, PROVIDE AND INSTALL A FLUSH DEVICE BOX, AND PULLSTRING IN WALL STUD SPACE TO ABOVE CEILING. MOUNT DEVICE BOX CENTERLINE AT ELEVATION NOTED ON THE PLANS.
- TRIPLE DATA DEVICE OUTLET. (3) DATA DEVICES FURNISHED AND INSTALLED BY OWNER. FOR WALL INSTALLATION, PROVIDE AND INSTALL A FLUSH DEVICE BOX, AND PULLSTRING IN WALL STUD SPACE TO ABOVE CEILING. MOUNT DEVICE BOX CENTERLINE AT 17" A.F.F. UNLESS OTHERWISE NOTED.
- DATA JACK
- DEVICE MOUNTED 6" ABOVE COUNTER UNLESS NOTED OTHERWISE

MISCELLANEOUS

- AIR TERMINAL
- C — INTERCOM
- LIGHTNING PROTECTION GROUNDING ELECTRODE
- S — LOUDSPEAKER – CEILING MOUNTED
- S — LOUDSPEAKER – WALL MOUNTED
- B — SIGNALING BELL

CONTROLS

EQUIPMENT & CONTROL DEVICE SYMBOLS

- #14 AWG (UNLESS OTHERWISE NOTED)
- #18 TWSTED SHIELDED PAIR
- #18 TWSTED SHIELDED PAIR
- "xx" "PANEL DESIGNATION" (TOP) / "xx" "POSITION IN PANEL" (BOTTOM)
- TEMPERATURE SENSOR
- HUMIDITY SENSOR
- CONTROL PANEL
- NORMALLY OPEN CONTACTS
- NORMALLY CLOSED CONTACTS
- ??? — CONTROL RELAY
- TB–## — TERMINAL BLOCK
- ? — PRESSURE SENSOR

CONTROL ABBREVIATIONS

ACT	DAMPER/VALVE ACTUATOR
AD	AUTOMATIC DAMPER
AFS	AIR FLOW STATION
AI	ANALOG INPUT
AO	ANALOG OUTPUT
CS	CURRENT SWITCH
CY	CONTROL RELAY
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
E.C.	ELECTRICAL CONTRACTOR
FF	FIRST FLOOR
FRZ	FREEZE STAT
GND	GROUND
HE	HUMIDITY SENSOR
HIC	HAND INDICATING CONTROLLER
HOA	HAND/OFF/AUTO SWTCH
HT	HUMIDITY TRANSMITTER
HY	HAND RELAY
HYD	HYDROGEN TRANSMITTER/SENSOR
LD	LEAK DETECTORS
LL	LOWER LEVEL
LS	LEVEL SWITCH
M.C.	MECHANICAL CONTRACTOR
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
OT	OUTPUT TRANSDUCERS
PdS	DIFFERENTIAL PRESSURE SWITCH
POT	POTENTIOMETER
PT	PRESSURE TRANSMITTER
R	RELAY
SD	SMOKE DETECTOR BY OTHERS
SDY	SMOKE DETECTOR RELAY BY OTHERS
SMKP	SMOKE PURGE PANEL
SS	SELECTOR SWITCH
SY	SPEED RELAY
TB	TERMINAL BLOCK
T.C.	TEMPERATURE CONTROLS
T.C.C.	TEMPERATURE CONTROLS CONTRACTOR
TDY	TIME DELAY RELAY
TE	TEMPERATURE SENSOR
TSLL	TEMPERATURE SWITCH LOW LIMIT
TSP	TWISTED SHIELDED PAIR
TT	TEMPERATURE TRANSMITTER
TY	TEMPERATURE RELAY (TRANSDUCER)
UL	UPPER LEVEL
VAV	VARIABLE AIR VOLUME
VSD	VARIABLE SPEED DRIVE
XFMR	TRANSFORMER

XX–## — PART NUMBER / PART NAME

RE:1E2 — REFERENCE DESIGNATION — SHEET NUMBER / DETAIL/PLAN NUMBER

General Instrument or Function Symbols

	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR *	FIELD MOUNTED	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR *
DISCRETE INSTRUMENTS			
SHARED DISPLAY SHARED CONTROL			
COMPUTER FUNCTION			
PROGRAMMABLE LOGIC CONTROL			

* NORMALLY INACCESSIBLE OR BEHIND THE PANEL DEVICES OR FUNCTIONS ARE DEPICTED BY USING THE SAME SYMBOL WITH DASHED HORIZONTAL LINES.

- INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
- UNDEFINED SIGNAL
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- ELECTRIC SIGNAL
- PNEUMATIC BINARY SIGNAL
- ELECTRIC BINARY SIGNAL
- INTERNAL SYSTEM LINK
- MECHANICAL LINK

NOTE: THIS IS A STANDARD SYS–TEK MECHANICAL, ELECTRICAL, AND PLUMBING LEGEND. ALL SYMBOLS SHOWN MAY NOT BE RELATED TO THIS PARTICULAR PROJECT.

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DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

REVISION:
DATE:
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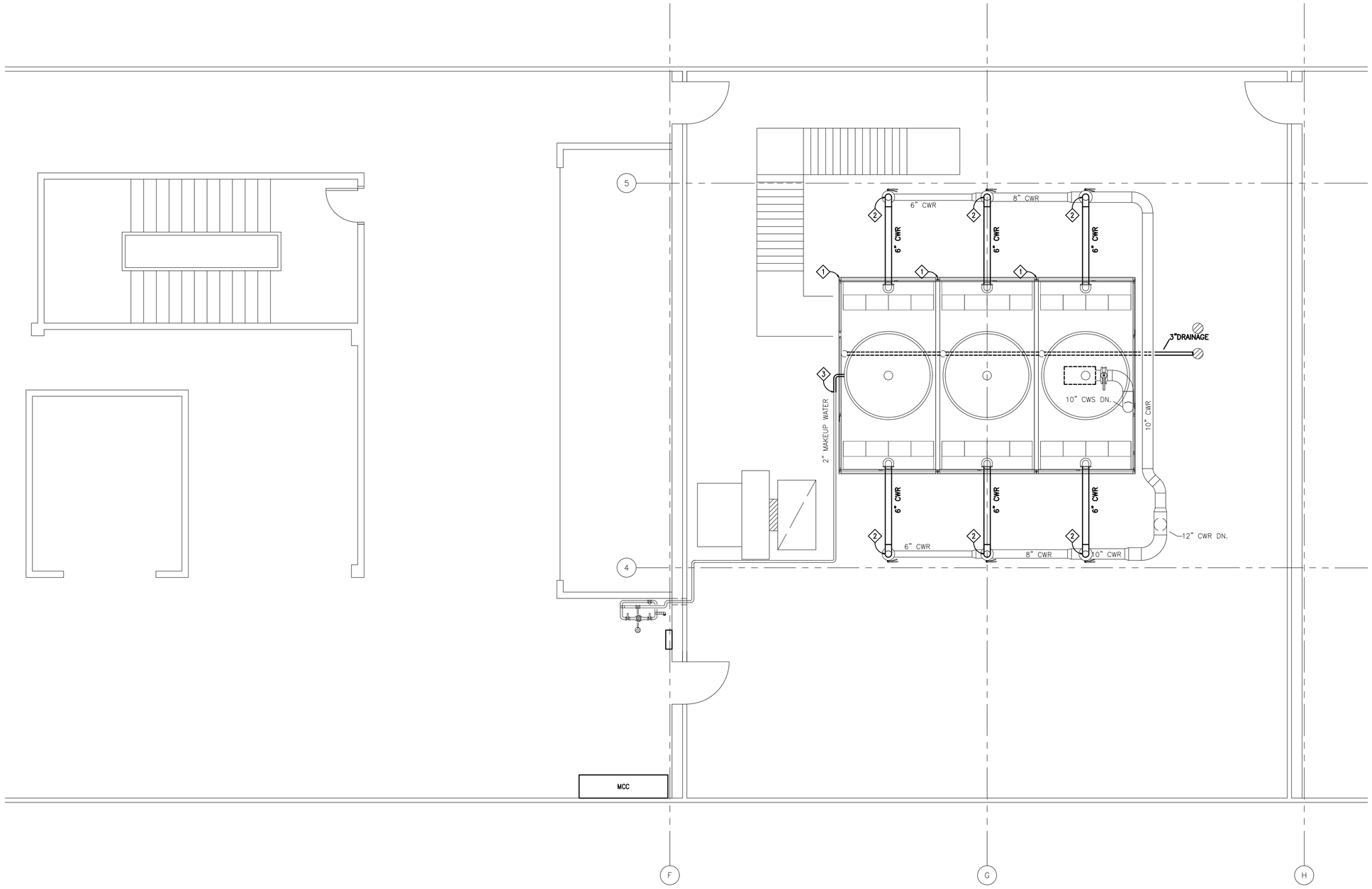
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: G-002
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
SYMBOLS LEGEND

SHEET NUMBER:
G-002

SHEET 2 OF 12
DATE: 09/09/19



1 ROOF PLAN PHASE I MECHANICAL - DEMOLITION

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

NORTH

DEMOLITION NOTES

1. TOWER TO BE DRAINED AND LOCKED OUT PRIOR TO START OF PROJECT.
2. DISCONNECT AND REMOVE EXISTING PIPE FROM COOLING TOWER TO LOCATION SHOWN. CAP AT LOCATION SHOWN.
3. DISCONNECT AND CAP MAKEUP WATER LINE TO POINT OF EASIEST RECONNECTION.

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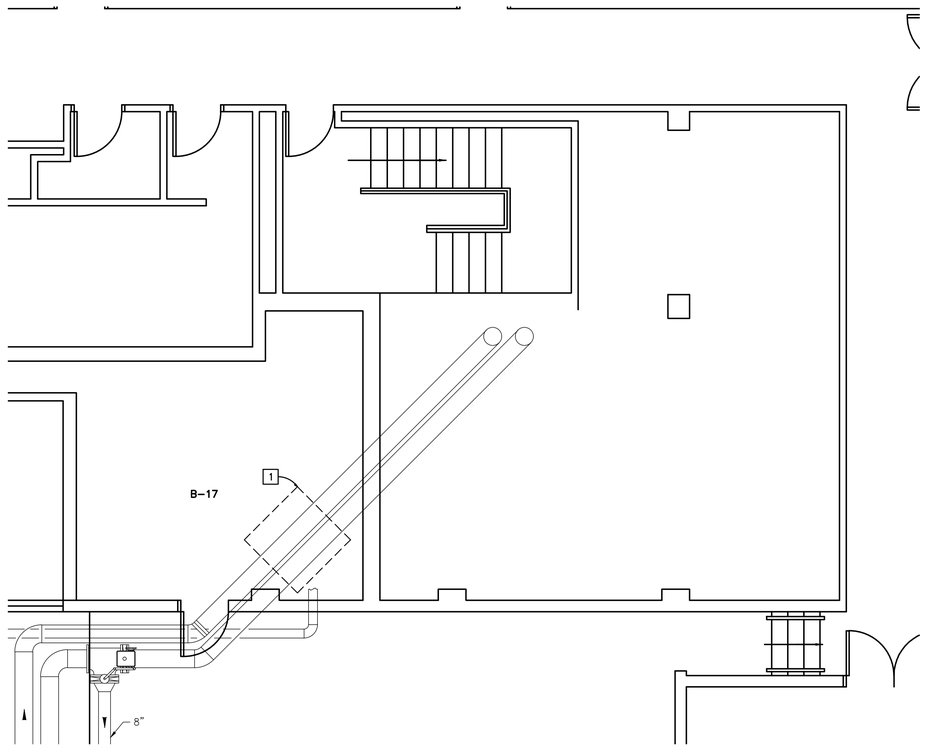
ISSUE DATE: 09/09/19

CAD DWG FILE: M-101
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ROOF PLAN PHASE I
MECH DEMO

SHEET NUMBER:
M-101

SHEET 3 OF 12
DATE: 09/09/19



1 BASEMENT PLAN PHASE 1A MECHANICAL - NEW WORK

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

NORTH

NEW WORK NOTES

1. EXISTING PVC CHEMICAL PIPING NEEDS TO BE REPLACED WITH STEEL PIPE. COORDINATE WITH DAVID DREYER WITH WALTER LOUIS CHEMICALS. PHONE # IS 913-972-8030.

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REVISION:
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DATE:
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DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: M-102
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

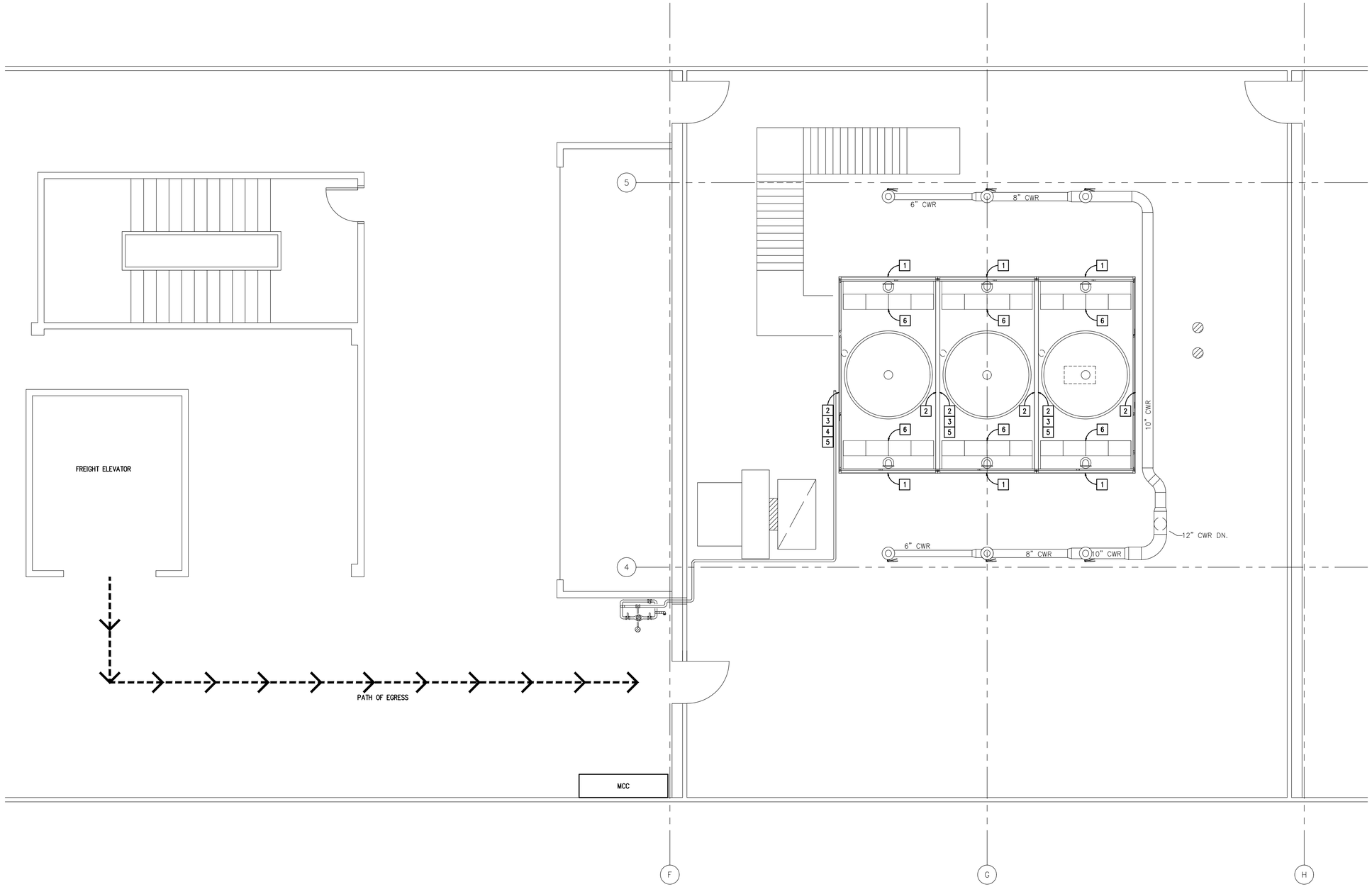
SHEET TITLE:

BSMT PLAN PHASE IA MECH NEW WORK

SHEET NUMBER:

M-102

SHEET 4 OF 12
DATE: 09/09/19



1 ROOF PLAN PHASE II MECHANICAL - NEW WORK

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

NORTH

NEW WORK NOTES

1. REMOVE AND REPLACE EXISTING MARLEY MX75 HANGING. FILL WITH NEW OEM MARLEY MX75 TO GET BACK TO ORIGINAL CAPACITY.
2. REMOVE AND REPLACE EXISTING GALVANIZED (G-235) "WETTER" CASING PANELS, WETTED BEING DEFINED AS TOUCHING THE FILL MEDIA. NEW PANELS TO BE EPOXY COATED PRIOR TO INSTALLATION. ADJACENT PANELS TO BE WETTED PANELS THAT SHOW RUST TO BE CLEARED OF RUST AND COATED IN THAT SPECIFIC LOCATION.
3. COLD WATER BASIN LINER TO BE BOLTED AND SEALED TO STAINLESS STEEL BASIN. INCLUDE A BASIN LINER ON THE STAINLESS STEEL BASIN. BASIN WILL BE PREPARED WITH A DIAMOND WIRE WHEEL TO ROUGH SURFACE AND ENSURE A GOOD SEAL WITH LINER. TWO PART EPOXY "ROLL ON" LINER TO BE APPLIED TO SEAL BASIN AND ANY CURRENT LEAKS.
4. MOUNT ELECTRONIC WATER LEVEL CONTROLLER INSIDE COOLING TOWER. RE: M-401 FOR ADDITIONAL DETAILS AND INFORMATION.
5. PROVIDE AND INSTALL NEW BASIN SWEEPER. INSTALL NEW BASIN SWEEPER AND SWEEPER PIPING INSIDE COOLING TOWER. ALL EXTERNAL PIPING TO BE INSTALLED BY OTHERS.
6. PROVIDE AND INSTALL VERIFLOW NOZZLE CUPS IN TOP BASIN PER MANUFACTURER'S RECOMMENDATIONS. RE: 5M-601 VERIFLOW NOZZLE CUPS DETAIL.

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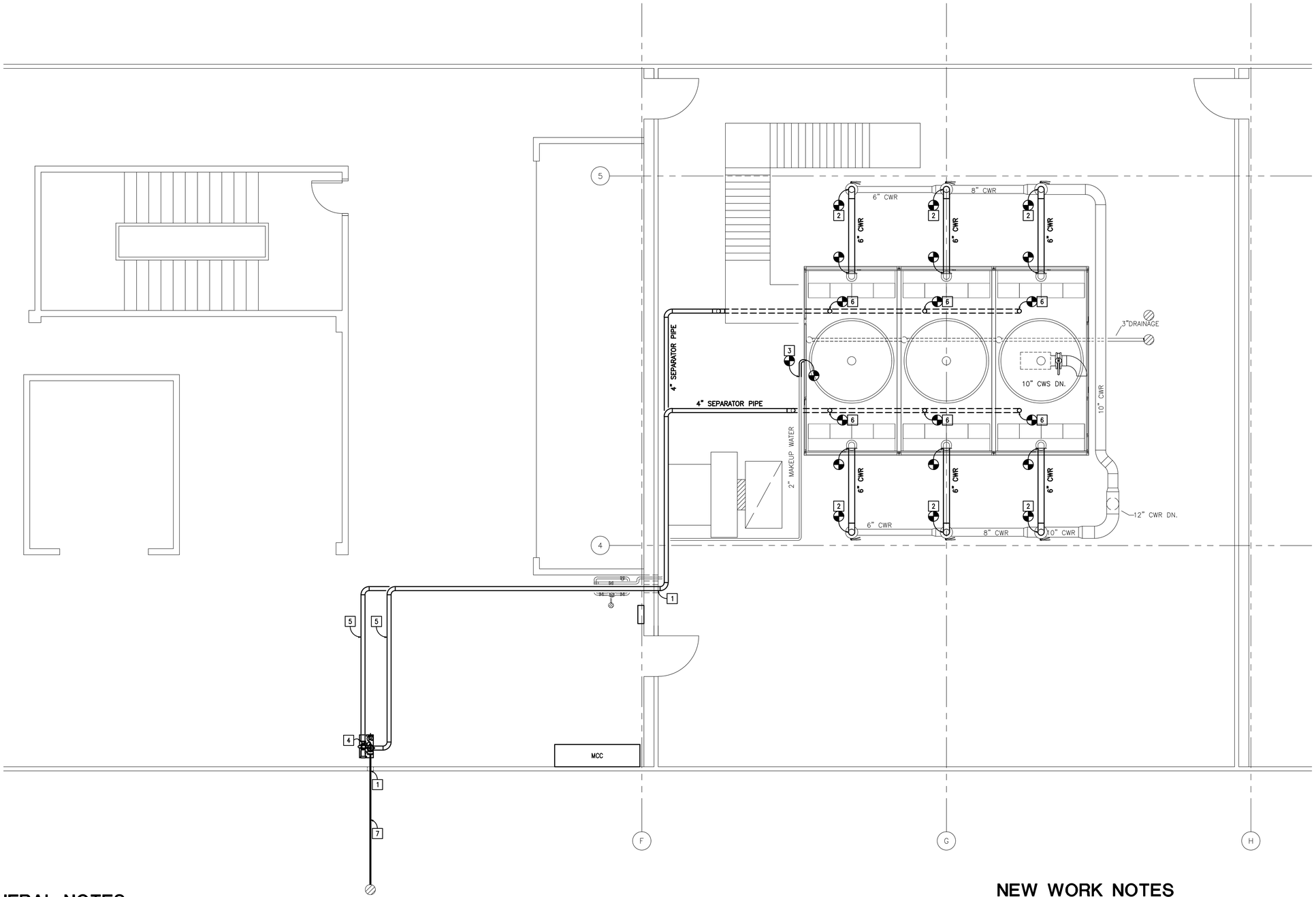
ISSUE DATE: 09/09/19

CAD DWG FILE: M-103
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ROOF PLAN PHASE II MECH NEW WORK

SHEET NUMBER:
M-103

SHEET 5 OF 12
DATE: 09/09/19



GENERAL NOTES

1. REPAINT ALL EXISTING PIPE AND SUPPORTS AS WELL AS NEW WORK.

1 ROOF PLAN PHASE III MECHANICAL - NEW WORK

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

NORTH

NEW WORK NOTES

1. NEW WALL PENETRATION FOR PIPING. CAULK FOR WATER TIGHT SEAL. RE: 2M-601 WALL PENETRATION DETAIL.
2. ROUTE NEW PIPE FROM EXISTING TO REFURBISHED COOLING TOWER.
3. ROUTE NEW 2" MAKEUP WATER PIPE FROM EXISTING TO REFURBISHED COOLING TOWER.
4. PROVIDE AND INSTALL NEW SEPARATOR. RE: 1M-601 SEPARATOR DETAIL.
5. ROUTE NEW 4" SEPARATOR PIPING TO AND FROM COOLING TOWER AND SUPPORT PIPING RE: 3M-601 VERTICAL PIPE SUPPORT DETAIL AND 4M-601 HORIZONTAL PIPE SUPPORT DETAIL.
6. CONNECT SEPARATOR TO BASIN OF REFURBISHED COOLING TOWER CELL BASIN NEED TO COORDINATE WITH REFURBISHMENT CONTRACTOR ON EXACT HOLE LOCATIONS.
7. ROUTE NEW PURGE LINE FROM SEPARATOR TO SANITARY DRAIN ON ROOF.

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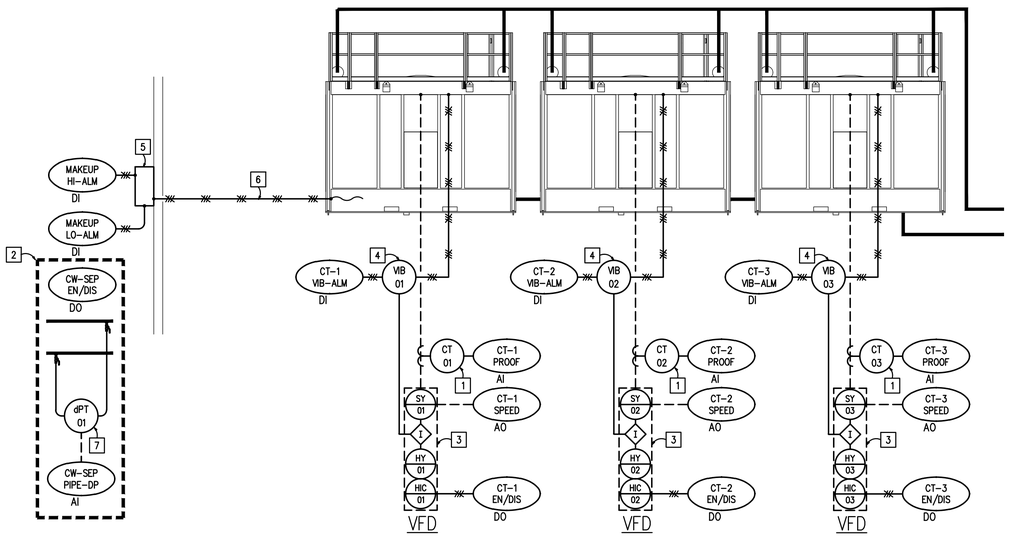
REVISION:
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: M-104
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ROOF PLAN PHASE III
MECH NEW WORK

SHEET NUMBER:
M-104

SHEET 6 OF 12
DATE: 09/09/19



1 CONDENSER WATER P&ID - NEW WORK

SCALE: N.T.S.

NEW WORK NOTES

1. NEW CURRENT TRANSDUCER FOR FAN/PUMP PROOF OF OPERATION PROVIDED, INSTALLED AND WIRED BY THE CONTROLS CONTRACTOR.
2. PROVIDE REMOTE START/STOP FROM BAS TO NEW SEPARATOR CONTROL PANEL.
3. PROVIDE BACnet MS/TP INTEGRATION WITH DESIGNATED DEVICE. INTEGRATION TO BE USED FOR MONITORING ONLY.
4. CONNECT EXISTING VIBRATION SWITCH INTO NEW VFD SAFETY CIRCUIT. MONITOR POINT FOR ALARM PURPOSES. NOTE THIS IS TO BE A HARDWIRE SAFETY.
5. MAKEUP WATER CONTROL PANEL SHALL BE MONITORED BY THE BAS.
6. LEVEL PROBE INSTALLED BY REFURBISHMENT CONTRACTOR SHALL BE FIELD CONNECTED TO THE NEW WATER LEVEL CONTROLLER. NOTE WATER LEVEL CONTROLLER IS LOCATED IN THE MECHANICAL PENTHOUSE.
7. NEW WET/WET DIFFERENTIAL PRESSURE TRANSMITTER TO BE LOCATED ACROSS SEPARATOR WATER PIPING. TRANSMITTER PROVIDED AND WIRED BY THE CONTROLS CONTRACTOR. DIFFERENTIAL PRESSURE TRANSMITTER SHALL BE INSTALLED BY THE MECHANICAL CONTRACTOR.

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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

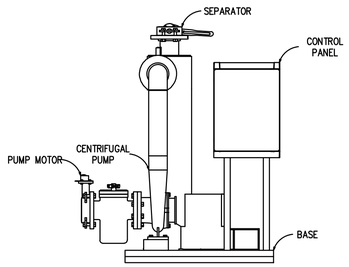
REVISION:
DATE:
REVISION:
DATE:
REVISION:
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: M-401
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

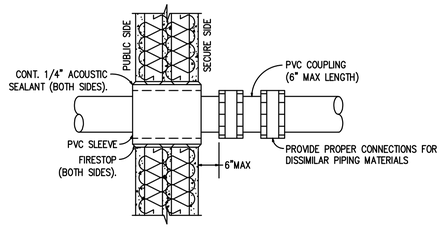
SHEET TITLE:
CONDENSER WATER P&ID NEW WORK

SHEET NUMBER:
M-401

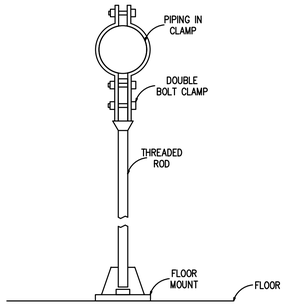
SHEET 7 OF 12
DATE: 09/09/19



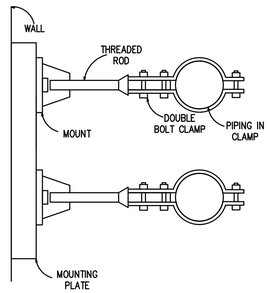
1 SEPARATOR DETAIL
SCALE: N.T.S.



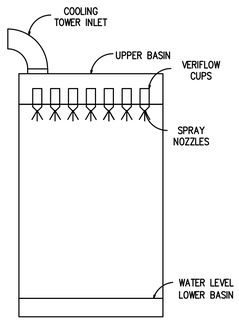
2 WALL PENETRATION DETAIL
SCALE: N.T.S.



3 VERTICAL PIPE SUPPORT DETAIL
SCALE: N.T.S.



4 HORIZONTAL PIPE SUPPORT DETAIL
SCALE: N.T.S.



5 VERIFLOW NOZZLE CUPS DETAIL
SCALE: N.T.S.

SEPARATOR SCHEDULE

FILTER UNIT				PUMP						SYSTEM		
DESIGNATION	MANUFACTURER	MODEL No.	TYPE	HEAD PRESSURE	GPM	MOTOR DATA				INLET/OUTLET	PURGE OUTLET	NOTES
						RPM	HP	VOLTS	PHASE			
SEP-1	GWS	GLS400D-HH-AC-4-MBV-B-PE	VERTICAL	40'	340	1750	.5	460	3	4"/4"	1.5"	

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OFFICE OF ADMINISTRATION
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DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS
STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

REVISION:
DATE:
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REVISION:
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: M-601
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
MECHANICAL SCHEDULES & DETAILS

SHEET NUMBER:
M-601

SHEET 8 OF 12
DATE: 09/09/19

FLETCHER DANIELS STATE OFFICE BUILDING – DESCRIPTION OF WORK

A. GENERAL:
   1) COOLING TOWER CONTROL SEQUENCES DESCRIBED HEREIN INDICATE THE MANNER AND CHRONOLOGICAL SEQUENCE IN WHICH, AND METHODS BY WHICH, AUTOMATIC, TEMPERATURE CONTROLS FUNCTION.
   2) EXISTING CONTROLS SHALL BE MODIFIED AS REQUIRED TO INCORPORATE THE ADDITIONAL POINTS REQUIRED PER DRAWING M-401. REUSE OF EXISTING CONTROL INPUTS/OUTPUTS IS ACCEPTABLE.
   3) THE BAS CONTROL SYSTEM INSTALLED UNDER THIS PROJECT SHALL BE PROGRAMMED TO PROVIDE THE INTENT OF THE SEQUENCES DESCRIBED HEREIN. THE BAS SHALL BE FURNISHED AND INSTALLED COMPLETE AND SHALL BE PROPERLY ADJUSTED AND PROGRAMMED TO PERFORM ALL SEQUENCES, FUNCTIONS, AND STATUS INDICATIONS FOR ALL EQUIPMENT AND SYSTEMS AS HEREIN SPECIFIED AND AS INDICATED ON DRAWINGS AND AS REQUIRED BY EXISTING CONDITIONS.

FLETCHER DANIELS STATE OFFICE BUILDING – COOLING TOWERS (CT-1, CT-2, CT-3)

A. GENERAL:
   1) COOLING TOWER CONTROLS SHALL NOW INCORPORATE VFD'S FOR EACH COOLING TOWER CELL.
B. SEQUENCES – UNIT SPECIFIC OPERATION
   1) THE COOLING TOWERS SHALL BE ENABLED EITHER WHEN MANUALLY COMMANDED BY AN OPERATOR OR BASED UPON THE CHILLED WATER PLANT BEING ENABLED.
   2) WHEN THE COOLING TOWERS ARE CALLED TO RUN THE FAN VFD'S AND BYPASS CONTROL VALVE SHALL MODULATE TO MAINTAIN THE CONDENSER WATER FROM TOWER SETPOINT.
   3) THE COOLING TOWER CONDENSER WATER FROM TOWER SETPOINT (SUPPLY TO CHILLER) SHALL RESET BASED UPON THE MEASURED OUTSIDE AIR WET BULB TEMPERATURE.
      i. RESET BETWEEN 70°F (ADJ.) TO 85°F (ADJ.) BASED UPON OUTSIDE AIR WET BULB TEMPERATURES OF 60°F (ADJ.) TO 75°F (ADJ.). FOR EXAMPLE, AT 60°F THE CONDENSER WATER FROM TOWER SETPOINT WILL BE 70°F WHILE AT 75°F THE SETPOINT WILL BE 85°F.
   4) THE COOLING TOWER VFD'S SHALL MODULATE SPEED TOGETHER TO MAINTAIN THE CONDENSER WATER FROM TOWER (SUPPLY TO CHILLER) TEMPERATURE AT SETPOINT. WHEN THE FAN HAS MODULATED TO THE MINIMUM VFD SPEED OF 30% (ADJ.) AND THE CONDENSER WATER FROM TOWER TEMPERATURE DROPS BELOW THE SETPOINT BY 3°F (ADJ.) THEN DISABLE THE FAN VFD'S AND BEGIN MODULATING THE CONDENSER WATER BYPASS VALVE TO MAINTAIN THE CONDENSER WATER FROM TOWER SETPOINT.
C. ALARMS
   1) THE FOLLOWING ARE SOFTWARE GENERATED ALARMS:
      i. COOLING TOWER FAN ALARM – IF THE MONITORED FAN VFD ENABLE POINT IS TRUE AND THE MONITORED VFD AMPS ARE NOT GREATER THAN 1-AMP (ADJ.) FOR A PERIOD OF 30-SECONDS (ADJ.) THEN THE FAN VFD SHALL GO INTO ALARM. WHEN IN ALARM THE VFD COMMAND SHALL REMAIN ENABLED.
         1. IF AT ANYTIME AFTER ALARM INITIATION THE VFD AMPS ARE MEASURED GREATER THAN 1-AMP (ADJ.) FOR A PERIOD GREATER THAN 30-SECONDS THEN THE ALARM STATE SHALL CLEAR. ONCE CLEARED THE PUMP SHALL OPERATE UNDER AUTOMATIC CONTROL.
   2) HIGH CONDENSER WATER FROM TOWER TEMPERATURE (SUPPLY TO CHILLER) – IF THE CONDENSER WATER FROM TOWER TEMPERATURE RISES 5°F ABOVE THE CURRENT CHILLED WATER SUPPLY TEMPERATURE SETPOINT GENERATE AN ALARM. AUTOMATICALLY RESET ALARM ONCE THE CONDENSER WATER FROM TOWER TEMPERATURE DROPS TO 3°F ABOVE THE CURRENT CHILLED WATER SUPPLY TEMPERATURE SETPOINT.
   3) VIA MONITORING OF THE WATER LEVEL CONTROLLER ALARM IF EITHER THE HIGH OR LOW ALARMS ARE TRUE FROM THE WATER LEVEL CONTROLLER.
   4) VIA MONITORING OF THE SEPARATOR DIFFERENTIAL PRESSURE PROVIDE AN ALARM WHEN THE SEPERATOR SYSTEM DIFFERENTIAL IS GREATER THAN 18 PSI (ADJ.).

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DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS
STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

REVISION:
DATE:
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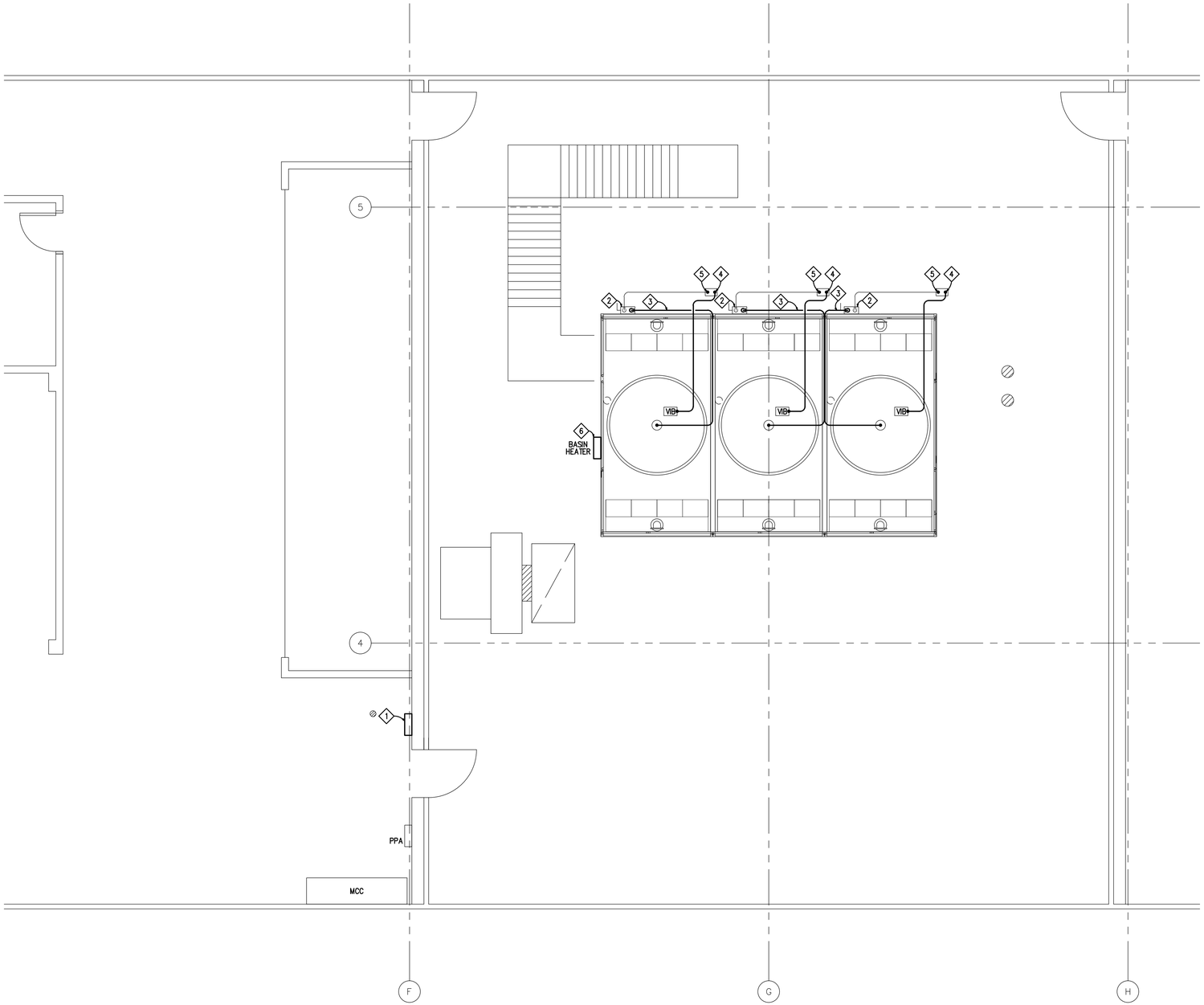
DATE:
REVISION:
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: M-801
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
SEQUENCE OF OPERATIONS

SHEET NUMBER:
M-801

SHEET 9 OF 12
DATE: 09/09/19



1 ROOF PLAN PHASE I ELECTRICAL - DEMOLITION

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

NORTH

DEMOLITION NOTES

1. DEMO EXISTING PNEUMATIC CONTROL PANEL THAT IS NO LONGER IN USE.
2. EXISTING DISCONNECT SWITCH TO REMAIN INSTALLED AND REUSED UNDER NEW WORK.
3. DEMO EXISTING CONDUIT AND WIRE FROM EXISTING DISCONNECT SWITCH TO FAN MOTOR.
4. DEMO EXISTING CONDUIT FROM JUST BEFORE WHERE THE CONDUIT PENETRATES THE ROOF. REMOVE EXISTING WIRE FROM VIBRATION SWITCH TO CONNECTION WITH THE SAFETY CIRCUIT FOR THE COOLING TOWER MOTOR. NOTE CONDUIT FROM ROOF PENETRATION TO MCC WILL BE REUSED UNDER NEW WORK.
5. REMOVE WIRE FROM DISCONNECT SWITCH THROUGH THE ROOF PENETRATION TO THE MCC. EXISTING CONDUIT FROM DISCONNECT THROUGH ROOF PENETRATION AND ULTIMATELY TO THE MCC SHALL BE REUSED UNDER NEW WORK.
6. TEMPORARILY DISCONNECT BASIN HEATER CONTROLLER TO FACILITATE COOLING TOWER REFURBISHMENT. BASIN HEATER CONTROLLER WILL BE REINSTALLED UNDER NEW WORK.

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OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

REVISION:
DATE:
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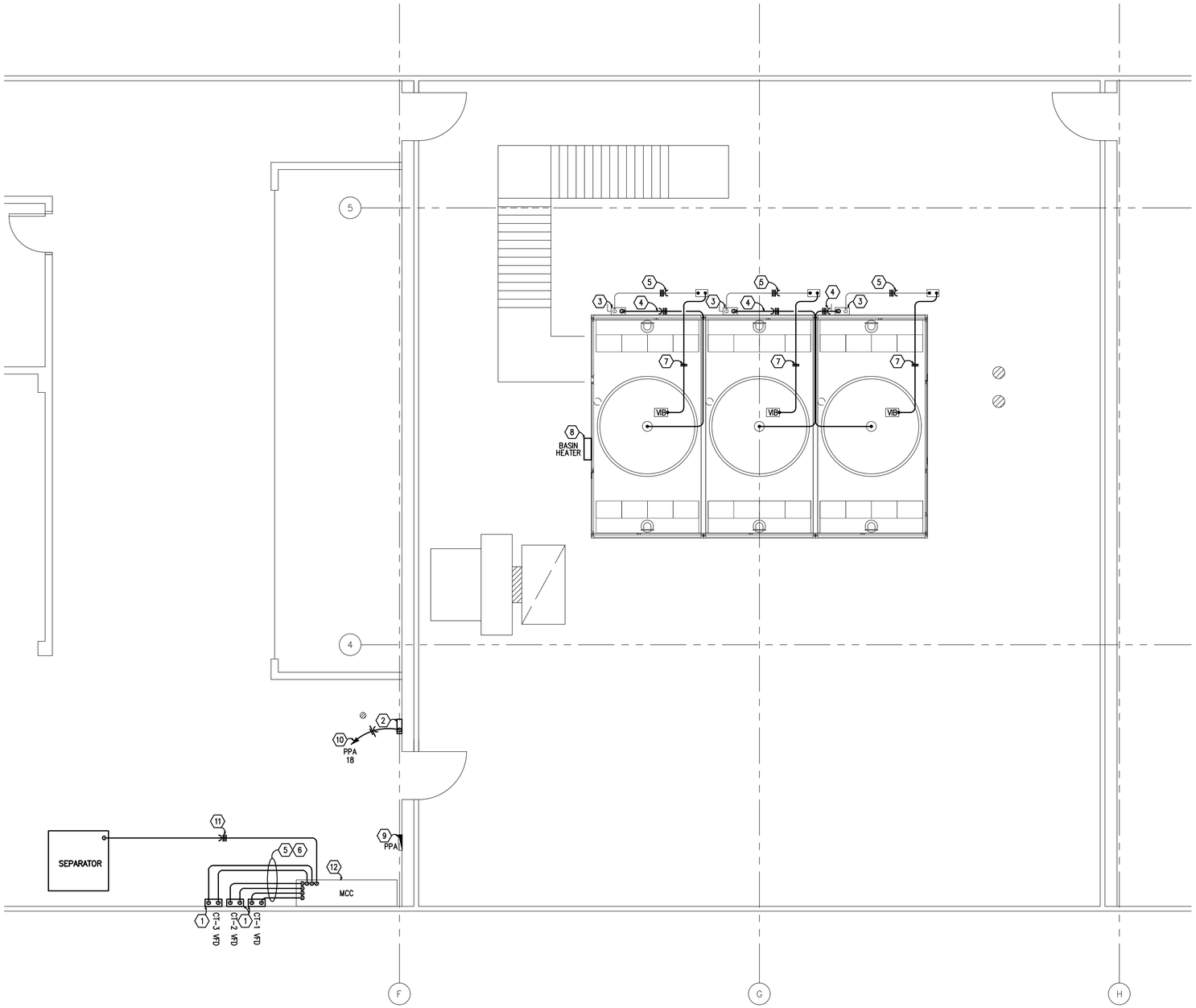
REVISION:
DATE:
ISSUE DATE: 09/09/19

CAD DWG FILE: E-101
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ROOF PLAN PHASE I ELEC DEMO

SHEET NUMBER:
E-101

SHEET 10 OF 12
DATE: 09/09/19



1 ROOF PLAN PHASE III ELECTRICAL - NEW WORK

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

NORTH

NEW WORK NOTES

1. PROVIDE AND INSTALL NEW VFD AT LOCATION SHOWN. VFD SHALL BE ROUTED THROUGH EXISTING MCC USING EXISTING CONDUIT OUT TO EXISTING COOLING TOWER FAN DISCONNECT. VFD SHALL BE MOUNTED ON NEW UNISTRUT FRAME THAT HAS BEEN SECURED TO ADJACENT WALL.
2. INSTALL NEW WATER LEVEL CONTROLLER IN LOCATION SHOWN. ROUTE WIRE IN RIGID CONDUIT FROM WATER LEVEL CONTROLLER TO WATER LEVEL PROBE IN COOLING TOWER BASIN. ROUTE WIRE AND CONDUIT TO NEW MAKEUP WATER SOLENOID VALVE. CONNECT PER MANUFACTURERS INSTRUCTIONS. M-401 FOR ADDITIONAL INFORMATION & CONTROLS P&ID DIAGRAM.
3. EXISTING DISCONNECT SWITCH TO BE REUSED. ROUTE NEW WIRE FROM NEW VFD OUTPUT TO DISCONNECT INPUT. REUSED EXISTING CONDUIT.
4. ROUTE (3) #10 AWG & (1) #10 GND IN 1-1/4" RIGID CONDUIT FROM EXISTING DISCONNECT SWITCH TO EXISTING COOLING TOWER MOTOR.
5. ROUTE (3) #10 AWG & (1) #10 GND FROM EXISTING DISCONNECT SWITCH THROUGH EXISTING CONDUIT TO MCC. USE MCC AS ROUTING POINT TO NEW COOLING TOWER VFD OUTPUT.
6. ROUTE (3) #10 AWG & (1) #10 GND FROM NEW COOLING TOWER TO EXISTING STARTER IN MCC.
7. ROUTE (2) #12 AWG FROM EXISTING VIBRATION SWITCH TO NEW COOLING TOWER VFD IN RIGID CONDUIT TO EXISTING CONDUIT IN ROOF PENETRATION TO MCC. USE MCC AS ROUTING POINT TO NEW COOLING TOWER VFD SAFETY CIRCUIT. RE: M-401 FOR ADDITIONAL INFORMATION & CONTROLS P&ID DIAGRAM.
8. REINSTALL AND RECONNECT EXISTING BASIN HEATER RETAINED DURING PHASE I DEMO WORK.
9. CONNECT NEW WATER LEVEL CONTROLLER TO EXISTING 20-AMP SINGLE POLE CIRCUIT BREAKER IN EXISTING POWER PANEL PPA.
10. ROUTE (2) #12 HOT & NEUTRAL AND (1) #12 GND IN 3/4" CONDUIT FROM NEW WATER LEVEL CONTROLLER TO EXISTING POWER PANEL PPA.
11. ROUTE (3) #12 AWG AND (1) #12 GND IN 3/4" CONDUIT FROM SEPARATOR EQUIPMENT MOUNTED DISCONNECT TO EXISTING MCC. CONNECT TO NEW MCC 20-AMP DISCONNECT.
12. PROVIDE NEW 20-AMP DISCONNECT IN EXISTING MCC IN SPARE LOCATION. CONNECT POWER FOR SEPARATOR IN THIS LOCATION.

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DESIGN AND CONSTRUCTION

COOLING TOWER REPLACEMENT

FLETCHER DANIELS STATE OFFICE BUILDING

615 E 13TH STREET
KANSAS CITY, MO 64106

PROJECT # O1917-01
SITE # 1005
ASSET # 3101005002

REVISION:
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CAD DWG FILE: E-101
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ROOF PLAN PHASE III ELEC NEW WORK

SHEET NUMBER:
E-102

SHEET 11 OF 12
DATE: 09/09/19

PP-A PENTHOUSE

VOLTAGE: 120/208 VOLTS 3 PHASE 4 WIRE
MAIN BUS: N/A AMP
MAIN BREAKER: MLO AMP

ENCLOSURE: NEMA

☐ MAIN BREAKER
☑ MAIN LUGS ONLY
☐ FEED THROUGH LUGS
☐ SOLID NEUTRAL
☐ 200% NEUTRAL

CONDUCTOR FEED:
☑ TOP
☐ BOTTOM

PANEL MOUNTING:
☐ FLUSH
☑ SURFACE

LOCATION: PENTHOUSE
FEEDER: EXISTING
SOURCE: MCC-C

DESCRIPTION	LOAD (KVA)			BREAKER		CIRCUIT BREAKER					LOAD (KVA)			DESCRIPTION
	A	B	C	TRIP	POLES	POLE NO.	PANEL DIAGRAM	POLE NO.	POLES	TRIP	A	B	C	
ROOF LIGHTS	-			20	1	1		2	1	20	-			WEST DUCT LIGHTS & ROLL FILTER
CHEMICAL FEED PUMP		-		20	1	3		4	1	20		-		WEST UNIT HEATER
EAST AHU CONTROL CIRCUIT			-	20	1	5		6	1	20			-	WEST PH PLUGS
EAST UNIT HEATER & COMPRESSOR	-			20	1	7		8	1	20	-			WEST AHU CONTROL CIRCUIT
EAST DUCT LIGHTS & ROLL FILTER		-		20	1	9		10	1	20		-		SPARE
COOLING TOWER CONTROLS			-	20	1	11		12	1	20			-	SPARE
ELEVATOR SHAFT FIRE DAMPERS	-			20	1	13		14	1	20	-			SPARE
WELDING PLUG		-		20	2	15		16	1	20		-		SPARE
			-			17		**18**	**1**	**20**			**-**	**WATER LEVEL CONTROLLER**
SPACE	-			-	1	19		20	1	-	-			SPACE
SPACE		-		-	1	21		22	1	-		-		SPACE
SPACE			-	-	1	23		24	1	-			-	SPACE

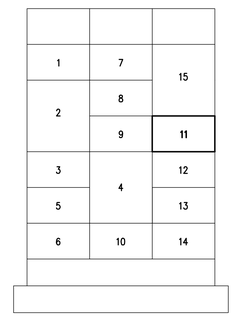
VFD SCHEDULE

TAG	EQUIPMENT SERVED	VFD BYPASS	VOLTAGE	PHASE	QTY	HP
CT-1 VFD	COOLING TOWER CT-1	NO	460	3	1	15
CT-2 VFD	COOLING TOWER CT-2	NO	460	3	1	15
CT-3 VFD	COOLING TOWER CT-3	NO	460	3	1	15

NOTES: ALL VFD'S ARE NEMA 1 ENCLOSURES. REFERENCE SPECIFICATIONS FOR DETAILS

EXISTING MCC-C

CIRCUIT NO.	LOAD SUPPLIED	A/C VOLTS	PHASE	BREAKER SIZE	FEEDER	STARTER SIZE
1	AHU-3 RETURN	480	3	40	(3) #10 / PHASE | #10 GND	2
2	AHU-3 SUPPLY	480	3	125	(3) #4 / PHASE | #8 GND	3
3	AHU-4 RETURN	480	3	50	(3) #8 / PHASE | #10 GND	2
4	AHU-4 SUPPLY	480	3	150	(3) #1/0 / PHASE | #8 GND	4
5	COOLING TOWER #1	480	3	40	(3) #10 / PHASE | #10 GND	2
6	COOLING TOWER #2	480	3	40	(3) #10 / PHASE | #10 GND	2
7	COOLING TOWER #3	480	3	40	(3) #10 / PHASE | #10 GND	2
8	ROOF EXHAUST FAN	480	3	15	(3) #12 / PHASE | #12 GND	1
9	UTILITY EXHAUST FAN	480	3	15	(3) #12 / PHASE | #12 GND	1
10	PANEL PPA	480	3	80	(3) #10 / PHASE | #12 GND	-
11	**SEPARATOR**	**480**	**3**	**20**	**(3) #12 / PHASE | #12 GND**	**-**
12	SPACE	480	3	-	-	-
13	SPACE	480	3	-	-	-
14	TOWER HEATER	480	3	-	N/G	N/G
15	SPACE	480	3	-	-	-



EXISTING MCC-C

STATE OF MISSOURI
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9/9/19
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ISSUE DATE: 09/09/19

CAD DWG FILE: E-601
DRAWN BY: sys-tek
CHECKED BY: sys-tek
DESIGNED BY: sys-tek

SHEET TITLE:
ELECTRICAL
SCHEDULES & DETAILS

SHEET NUMBER:
E-601

SHEET 12 OF 12
DATE: 09/09/19