AIR SEPARATOR SCHEDULE

DESIGNATION	LOCATION	ORIENTATION	GPM	MAX. WORKING PRESSURE (PSIG)	MAX. WORKING TEMP. (°F)	SYSTEM SERVED	INLET & OUTLET SIZE	DRY WEIGHT (LBS)	BASIS OF DESIGN
AS–1	PUMP ROOM	VERTICAL	1207	165	375	CHWR	10"	547	ARMSTRONG VAS–10

NOTES:

1. PROVIDE WITH FABRICATED STEEL SHELL.
2. PROVIDE WITH BLOW DOWN CONNECTION.
3. PROVIDE WITH STAINLESS STEEL STRAINER.

EXPANSION TANK SCHEDULE

DESIGNATION	LOCATION	EQUIP. SERVED	TYPE	ORIENTATION	INITIAL FILL PRESSURE (PSIG)	TANK VOLUME (GAL)	SIZE		WEIGHT (LBS)	BASIS OF DESIGN
							DIA (IN)	LENGTH (IN)		
ET–1	CHILLER PLANT	CHWS	COMPRESSION	HORIZONTAL	12	305	30	105	523	ARMSTRONG AET 30X105

NOTES:

1. PROVIDE CEILING HUNG EXPANSION TANK.

FAN COIL UNIT SCHEDULE

MARK	NOMINAL CAPACITY (TONS)	EVAPORATOR							ELECTRICAL DATA				DIMENSIONS			WEIGHT (LBS)	BASIS OF DESIGN	NOTES
		GPM	ROWS	EWT (°F)	LWT (°F)	CFM	EAT (°F) (DB / WB)	LAT (°F) (DB / WB)	HP	VOLTS	PH	HZ	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)			
FCU–1	7.5	19.3	6	42.0	55.0	3200	80.0 / 67.0	55.5 / 54.2	1.5	460	3	60	57.2	62.0	22.4	551.0	DAIKIN HCBB130	1–2

NOTES:

1. FACTORY MOUNTED COILS, CONTROLS, MOTORS, DRIVE KITS.
2. PIPING PACKAGE WITH SINGLE 3–WAY MODULATING VALVE OPTION.

INSTANTANEOUS WATER HEATER SCHEDULE

MARK	INLET SIZE (IN.)	TURN ON FLOW (GPM)	kW	VOLTS	AMPS	MAX. TEMPERATURE (°F)	BASIS OF DESIGN	NOTES
IWH–1	1/2	0.3	2.4	120	20	90	EEMAX EX2412T	1

NOTES:

1. PROVIDE WITH THERMOSTATIC MIXING VALVE: BRADLEY MODEL S19–2000.

UNIT HEATER SCHEDULE

DESIGNATION	LOCATION	TYPE	kW	ELECTRICAL DATA					HORIZ. AIR THROW (FT)	WIDTH (IN)	HEIGHT (IN)	DEPTH (IN)	WEIGHT (LB)	BASIS OF DESIGN	NOTES
				MOTOR HP	VOLTS	PH	AMPS	RPM							
UH–3	CWPK1	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1–4
UH–4	CWPK1	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1–4
UH–5	CWPK1	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1–4
UH–6	CWPK1	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1–4

NOTES:

1. UNIT INSTALLED MOTOR STARTER.
2. DISCONNECT: FACTORY INSTALLED.
3. WALL/CEILING MOUNTED BRACKET.
4. WALL MOUNT THERMOSTAT KIT, SET POINT 50°F.

GFP A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
03/29/2018
BALAKRISHNAN VISWANATHAN
Lic. No. 043853
ENGINEER

DESIGNED K. STOCKINGER 08/11/17 DATE
DRAWN K. STOCKINGER 08/11/17 DATE
CHECKED R. SILVA 03/23/18 DATE

REFERENCE DRAWINGS

NUMBER	TITLE

REVISIONS

DATE	NUM	DESCRIPTION
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WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES
OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP

APPROVED Mark H. Magnussen 03/2018 DATE
MARK MAGNUSSEN
MANAGER, ENV. PLANNING AND COMP

APPROVED 03/2018 DATE
GRAHAM SPILLER
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
MECHANICAL EQUIPMENT SCHEDULES - SHEET 2 OF 2

M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	NONE	CWPK1-M-601	140 of 173

CHILLED WATER PLANT SEQUENCE OF OPERATION:

GENERAL FOR CHILLER PLANT CWPK1 – CLARENDON (K02)

THE CHILLER PLANT CONSISTS OF TWO (2) CHILLERS WITH TWO (2) VARIABLE CAPACITY COMPRESSORS EACH, TWO (2) COOLING TOWERS WITH ONE (1) VARIABLE SPEED FAN EACH, TWO (2) DUTY CHILLED WATER PUMP, TWO (2) STANDBY CHILLED WATER PUMP, TWO (2) DUTY CONDENSER WATER PUMP, AND TWO (2) STANDBY CONDENSER WATER PUMP.

THE CHILLER PLANT IS DESIGNED FOR CONSTANT FLOW (GPM) FOR CHILLED WATER AND CONDENSER WATER.

CHILLED WATER PUMPS CHWP–1, CHWP–2 AND CONDENSER WATER PUMPS CWP–1, CWP–2 ARE ASSOCIATED WITH CH–1, CT–1. CHILLED WATER PUMPS CHWP–3, CHWP–4 AND CONDENSER WATER PUMPS CWP–3, CWP–4 ARE ASSOCIATED WITH CH–2, CT–2.

THE CHILLER PLANT OPERATION SHALL BE PROGRAMMABLE.

DURING THE COOLING SEASON, THE CHILLERS OPERATE CONTINUOUSLY DURING DAY AND NIGHT IN AUTOMATIC MODE.

THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT (42°F) IS SET TO THE CHILLER PLANT DESIGN TEMPERATURE AND THE SETPOINT TEMPERATURE CAN BE MANUALLY RESET BY THE OPERATOR. THE ENTERING CONDENSER WATER TEMPERATURE SHALL BE 85°F.

THE CHILLED WATER SYSTEM ENABLE POINT IS CONTROLLED EITHER MANUALLY BY THE OPERATOR OR PROGRAMMABLE. IF THE CHILLED WATER SYSTEM ENABLE POINT IS ON AND THERE IS A CALL FOR COOLING (I.E. THE CHILLED WATER RETURN TEMPERATURE EXCEEDS 55°F):

1. CHILLED WATER PUMP (CHWP–1, CHWP–3 OR CHWP–2, CHWP–4) AND CONDENSER WATER PUMP (CWP–1, CWP–3 OR CWP–2, CWP–4), WHICH ARE MANUALLY SELECTED BY THE PLANT OPERATOR, SHALL START. THE PUMPS SHALL OPERATE FOR CONSTANT WATER FLOW. THE ASSOCIATED VARIABLE FREQUENCY DRIVES SHALL BE UTILIZED TO ADJUST PUMP SPEED FOR DESIGN FLOW RATE AND SET.
2. THE CHILLER START OR STOP POINT SHALL TURN ON.
3. AFTER CHILLED WATER AND CONDENSER WATER FLOW ARE VERIFIED VIA FLOW SWITCHES, THE CHILLER SHALL OPERATE UNDER ITS OPERATING AND SAFETY CONTROLS. THE CHILLER'S INTEGRATED VARIABLE FREQUENCY DRIVE SHALL ADJUST ITS CAPACITY IN ORDER TO MAINTAIN THE CHILLER'S CHILLED WATER SUPPLY TEMPERATURE SETPOINT.

THE CHILLER STOP SEQUENCE SHALL INITIALLY STOP THE CHILLER. AFTER A TIME DELAY (ADJUSTABLE), THE CONDENSER WATER PUMP AND THE CHILLED WATER PUMP SHALL STOP.

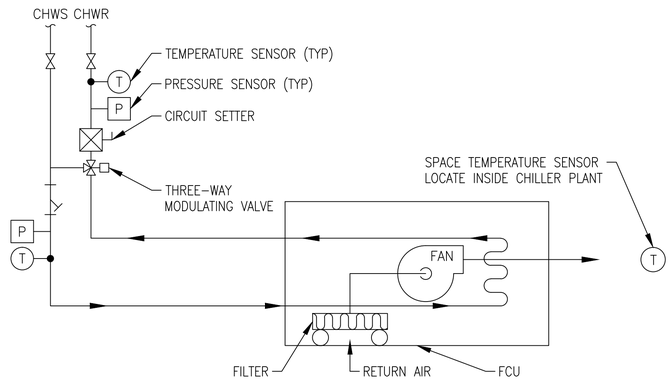
THE CORRESPONDING COOLING TOWER SHALL BE ENABLED WHEN THE CONDENSER WATER PUMP IS OPERATING. WHEN THE CONDENSER WATER SUPPLY TEMPERATURE INCREASES FROM THE SET POINT (TYPICALLY 85°F, ADJUSTABLE), THE COOLING TOWER FAN SHALL START AT LOW SPEED. THE FAN SPEED SHALL BE INCREASED OR DECREASED BY THE VARIABLE FREQUENCY DRIVE IN ORDER TO MAINTAIN THE CONDENSER WATER SUPPLY TEMPERATURE SETPOINT.

THE CHILLER CONTROL PANEL SHALL CONTROL THE OPERATION OF THE COOLING TOWER BASED ON THE SEQUENCE.

THE DESIRED STATE OF THE PUMPS (I.E. ON OR OFF) SHALL BE CONFIRMED FROM THEIR ASSOCIATED VARIABLE FREQUENCY DRIVES. AN ALARM STATUS SHALL BE GENERATED IF THE STATUS DEVIATES FROM START OR STOP CONTROL.

CHILLER EMERGENCY SHUTDOWN:

CHILLER EMERGENCY SHUTDOWN SHALL BE ENABLED THROUGH THE CHILLER MONITORING PANEL.



FAN COIL UNIT (FCU–1) SEQUENCE OF OPERATION:

THE FCU FAN AND THE CHILLED WATER FLOW CONTROL VALVE SHALL BE CONTROLLED BY THE SPACE TEMPERATURE SENSOR VIA THE PRODUCTIVITY 3000, PAC AT THE CHILLER PLANT MONITORING PANEL. WHEN THE SPACE TEMPERATURE RISES ABOVE 82°F, THE FCU FAN SHALL BE STARTED. THE THREE WAY VALVE SHALL CONTROL THE CHILLED WATER FLOW TO MAINTAIN THE SPACE SETPOINT TEMPERATURE OF 80°F. WHEN THE SPACE TEMPERATURE FALLS BELOW 78°F, THE FCU FAN SHALL TURN OFF. UPON ACTIVATION OF THE EXHAUST FANS (SEE WMATA CONTRACT FQ14114), THE FCU SHALL SHUT DOWN.

MECHANICAL REFRIGERANT ALARM SYSTEM SEQUENCE OF OPERATION:

FOR FURTHER DETAIL OF THE MECHANICAL REFRIGERANT ALARM SYSTEM SEQUENCE OF OPERATION, REFER TO WMATA CONTRACT FQ14114.

ALARM CONDITIONS:

GENERAL:

SEND ALL EQUIPMENT STATUS AND ALARM CONDITIONS TO CHILLER PLANT CONTROL PANEL WITHIN THE CHILLER PLANT. REFER TO CHILLER SPECIFICATION 15625 FOR ALL THE CHILLER, PUMP RELATED ANALOG POINT, STATUS POINT, CONTROL POINT, AND ALARM POINT REQUIREMENTS. PROVIDE CAPABILITY FOR THE CONTROL POINTS TO BE CONNECTED TO THE AEMS SYSTEM. IN ADDITION TO THE ABOVE, ALSO PROVIDE THE FOLLOWING:

HAND/OFF/AUTO:

CHILLER PLANT FCU
CHILLER PLANT UNIT HEATERS

EQUIPMENT STATUS WITH VISUAL INDICATING LAMPS (ON/OFF/FAULT):

CHILLER PLANT FCU
CHILLER PLANT UNIT HEATERS

ALARMS:

FAN FAILURE ALARM (FCU): INITIATE AN ALARM UPON SENSING A LOSS OF POWER FROM THE CURRENT SENSOR WHEN THE UNITS ARE COMMANDED TO RUN.

HIGH TEMPERATURE ALARM: INITIATE AN ALARM WHEN THE SPACE TEMPERATURE RISES ABOVE SETPOINT. INITIAL SET POINT SHALL BE 90 DEG F (ADJUSTABLE).

LOW TEMPERATURE ALARM: INITIATE AN ALARM WHEN THE SPACE TEMPERATURE FALLS BELOW SETPOINT. INITIAL SETPOINT SHALL BE 45 DEG F (ADJUSTABLE).

UNIT COMMON ALARM: INITIATE AN ALARM UPON RECEIVING A COMMON ALARM FROM THE UNIT FACTORY CONTROLS OF THE FCU. THIS INCLUDES THE FILTER CHANGE ALARM.

GFP A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
03/29/2018
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DESIGNED	D. ROMNESS	10/24/17	DATE
DRAWN	D. ROMNESS	10/24/17	DATE
CHECKED	R. SILVA	03/23/18	DATE

REFERENCE DRAWINGS

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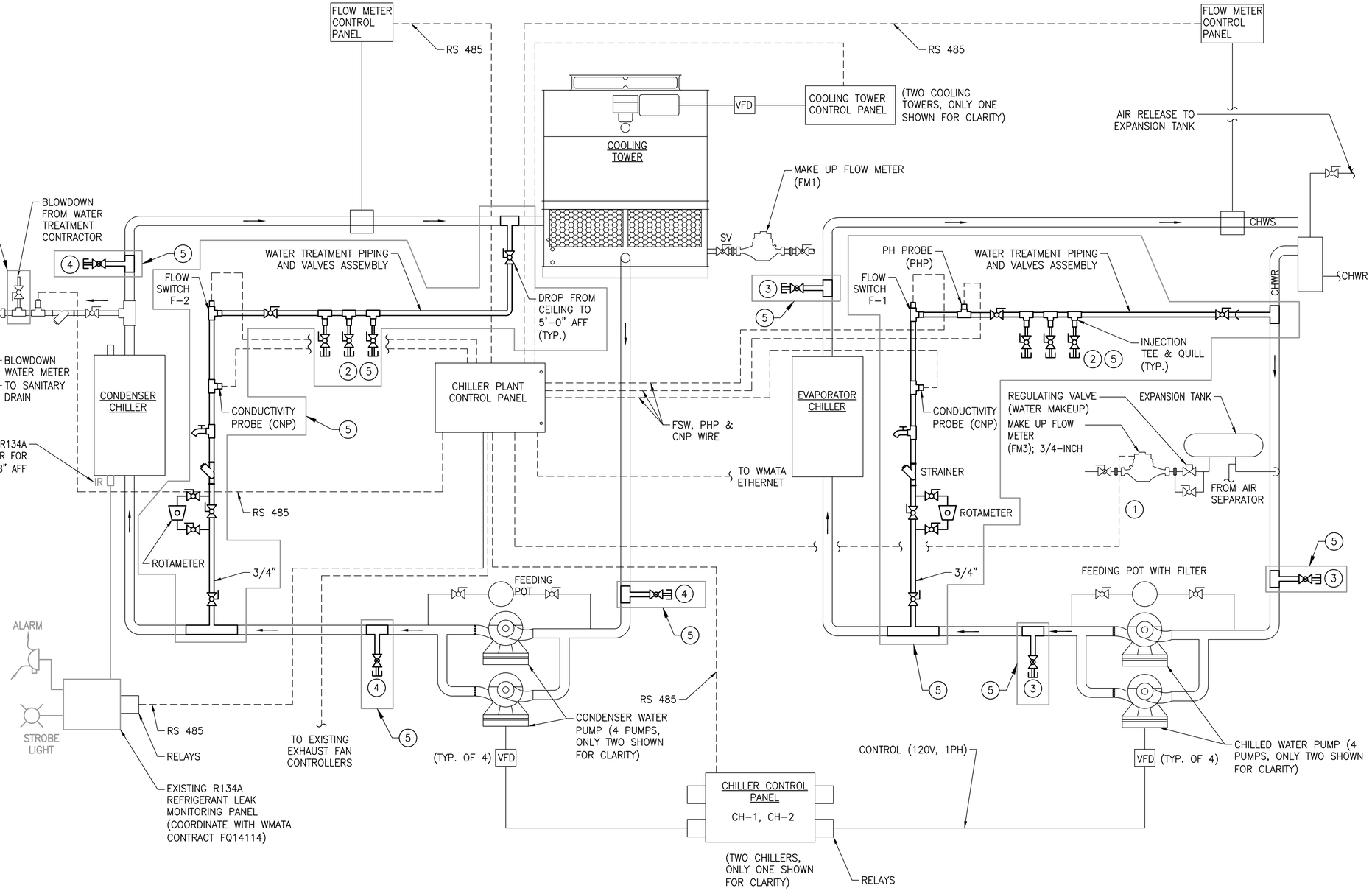
OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP

APPROVED Mark H. Magnussen 03/2018
MARK MAGNUSSEN DATE
MANAGER, ENV. PLANNING AND COMP

APPROVED 03/2018
GRAHAM SPILLER DATE
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
MECHANICAL SEQUENCE OF OPERATION

M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	NONE	CWPK1-M-610	141 of 173



GENERAL NOTES:

A. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATION AND QUANTITIES OF EQUIPMENT, PIPING, VALVES, DUCTWORK, ELECTRICAL AND CONTROL WIRING PRIOR TO DEMOLITION. ITEMS SHOWN ON THIS PLAN ARE APPROXIMATE.

B. REFER TO LEGEND SHEET FOR GENERAL ABBREVIATIONS AND SYMBOLS.

KEYNOTES:

(1) COMMUNICATIONS WIRING SHALL BE IN RIGID CONDUIT FROM FLOW METER MONITORING PANEL TO THE CHILLER PLANT CONTROL PANEL, UTILIZING BELDEN 89842 MULTI-CONDUCTOR – LOW CAPACITANCE COMPUTER AND COMPUTER POS CABLE OR EQUIVALENT.

(2) TAPS FOR FUTURE CHEMICAL INJECTION PUMPS.

(3) TAPS FOR CHILLED WATER SYSTEM WATER MONITORING/TREATMENT.

(4) TAPS FOR CONDENSER WATER SYSTEM WATER MONITORING/TREATMENT.

(5) REFER TO WMATA REFERENCE DRAWINGS DD-ME-HVAC-007, DD-ME-HVAC-008, AND DD-ME-HVAC-009.

LEGEND:

- GATE VALVE (GV)
- GLOBE VALVE (GB)
- BALL VALVE (1/4 TURN) SHUT OFF TYPE (SV), NORMALLY OPEN, UNLESS OTHERWISE NOTED
- STRAINER (STN)
- SAMPLE PET COCK (SPC)
- SOLENOID VALVE (SOL)
- IR — REFRIGERANT GAS LEAK SENSOR
- MS — MOTOR STARTER (FOR FANS)
- VFD — VARIABLE FREQUENCY DRIVE CONTROLLER
- FSW — FLOW SWITCH
- FLOW METER (FM 1 TO 3) PULSE OUTPUT
- FLOW METER — FLOW METER (FM 4 & 5) ULTRASONIC FLOW METER
- CENTRIFUGAL PUMP

A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
03/29/2018
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DESIGNED	D. ROMNESS	01/17/18 DATE
DRAWN	D. ROMNESS	01/18/18 DATE
CHECKED	R. SILVA	03/23/18 DATE

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MARK MAGNUSSEN
MANAGER, ENV. PLANNING AND COMP

APPROVED 03/2018 DATE
GRAHAM SPILLER
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
CHILLER PLANT MONITORING DIAGRAM

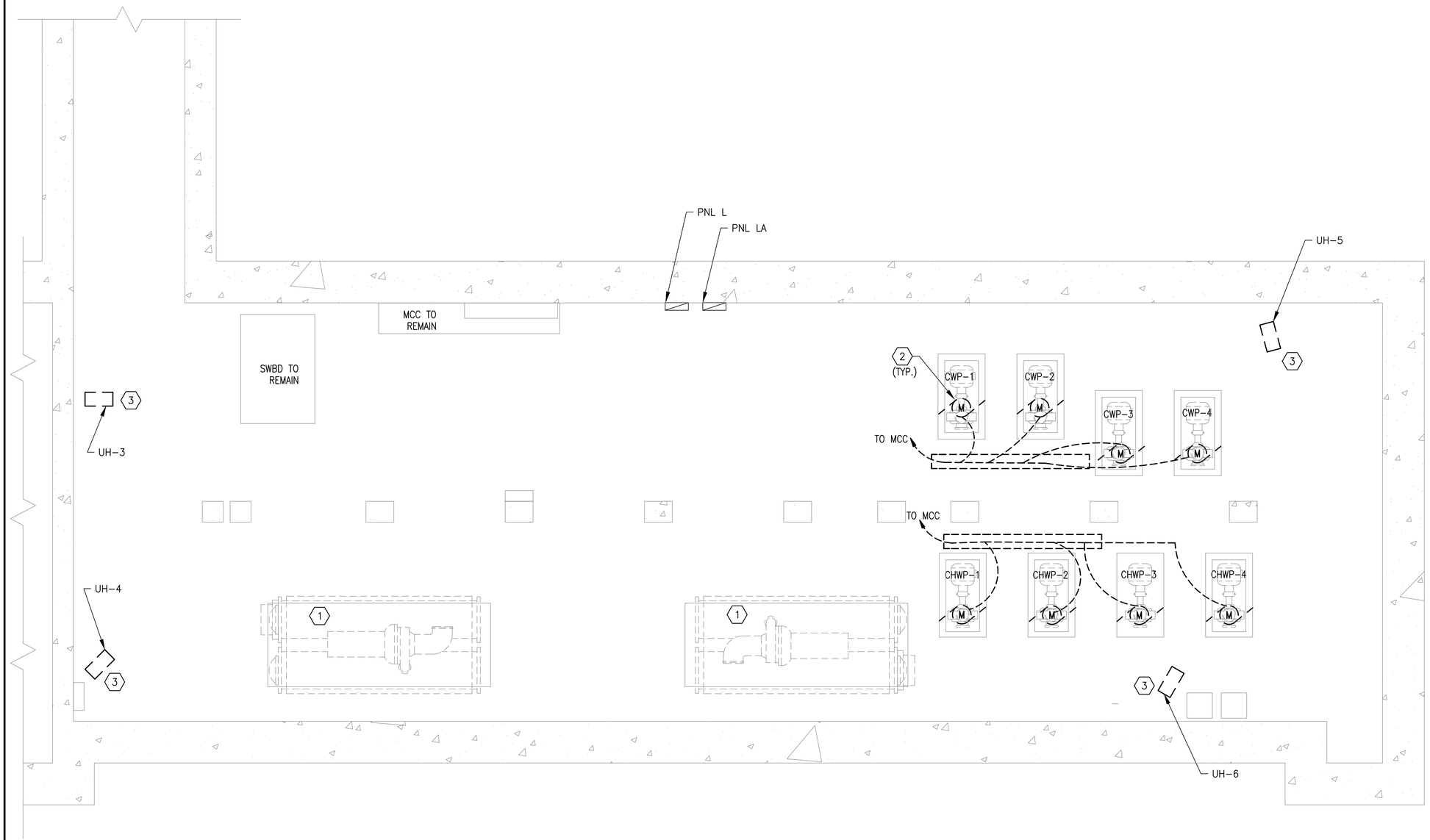
M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	NONE	CWPK1-M-611	142 of 173

KEYNOTES:

1. EXISTING CHILLER STARTER EQUIPMENT TO BE DEMOLISHED.
2. EXISTING PUMP MOTORS TO BE DEMOLISHED BY MECHANICAL.
3. EXISTING UNIT HEATER TO BE DEMOLISHED.

SHEET NOTES:

1. ALL SHOWN EQUIPMENT IS EXISTING TO REMAIN UNLESS SHOWN OTHERWISE.
2. REMOVE AND DISPOSE OF DEMOLISHED EQUIPMENT ALONG WITH ASSOCIATED CONDUITS AND WIRING.



1 ELECTRICAL PLAN - DEMOLITION (CHILLER ROOM)
CWPK1-E-100

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

A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
UDAYAN KHAN
Lic. No. 024655
03/29/2018
PROFESSIONAL ENGINEER

DESIGNED	B. IDILBI	09/30/17 DATE
DRAWN	J. ZHU	09/30/17 DATE
CHECKED	D. KHAN	03/23/18 DATE

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MARK MAGNUSSEN DATE
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APPROVED 03/2018
GRAHAM SPILLER DATE
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
ELECTRICAL PLAN - DEMOLITION

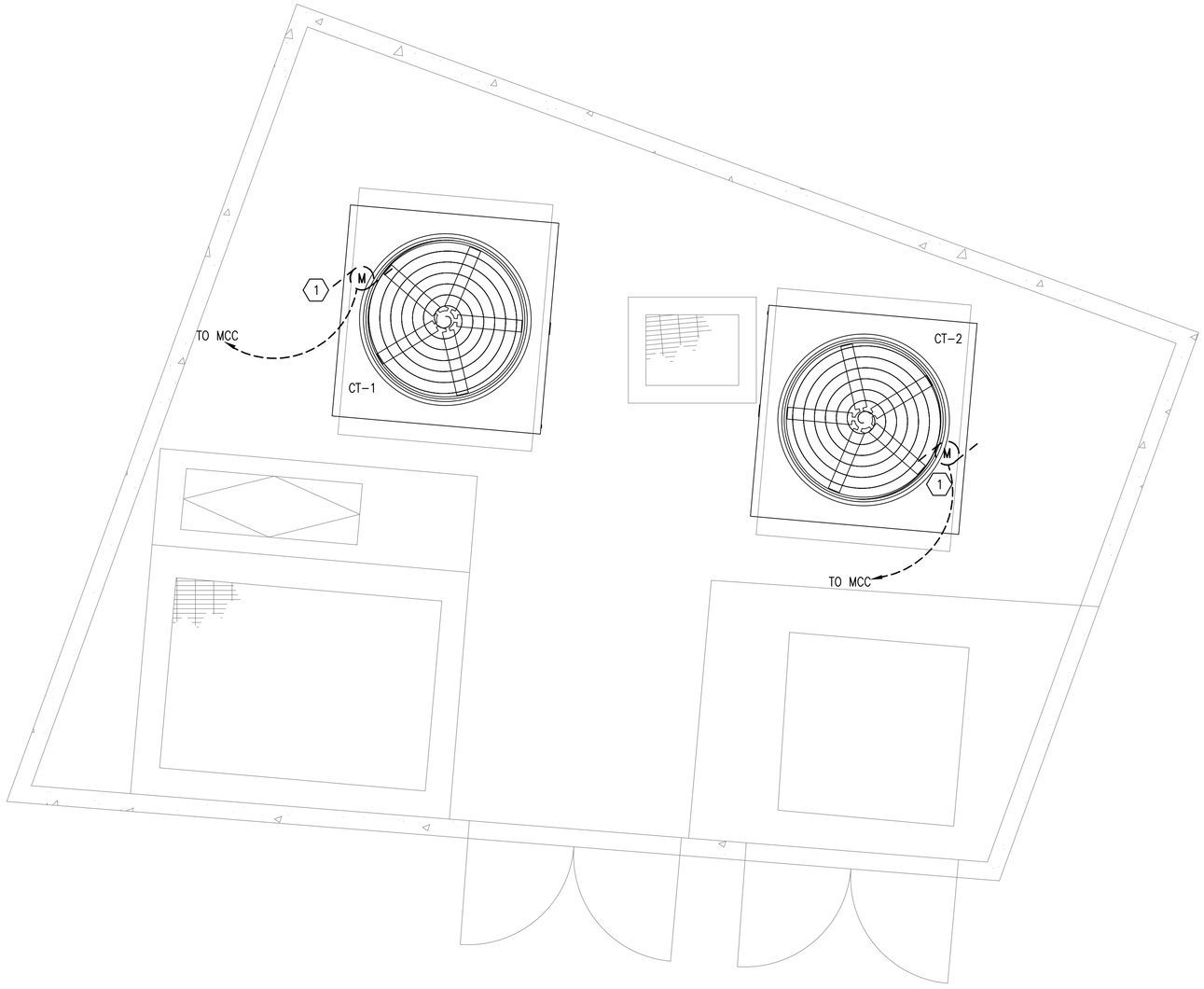
M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	1/4"=1'-0"	CWPK1-E-100	143 of 173

KEYNOTES:

1 EXISTING COOLING TOWER FAN MOTOR TO BE DEMOLISHED BY MECHANICAL.

SHEET NOTES:

1. ALL SHOWN EQUIPMENT IS EXISTING TO REMAIN UNLESS SHOWN OTHERWISE.
2. REMOVE AND DISPOSE OF DEMOLISHED EQUIPMENT ALONG WITH ASSOCIATED CONDUITS AND WIRING.



1 ELECTRICAL PLAN - DEMOLITION (COOLING TOWER)
CWPK1-E-101

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

A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
UDAYAN KHAN
Lic. No. 024655
03/29/2018
PROFESSIONAL ENGINEER

DESIGNED	B. IDILBI	09/30/17 DATE
DRAWN	J. ZHU	09/30/17 DATE
CHECKED	D. KHAN	03/23/18 DATE

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MARK MAGNUSSEN DATE
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GRAHAM SPILLER DATE
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
ELECTRICAL PLAN - DEMOLITION

M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	1/4"=1'-0"	CWPK1-E-101	144 of 173

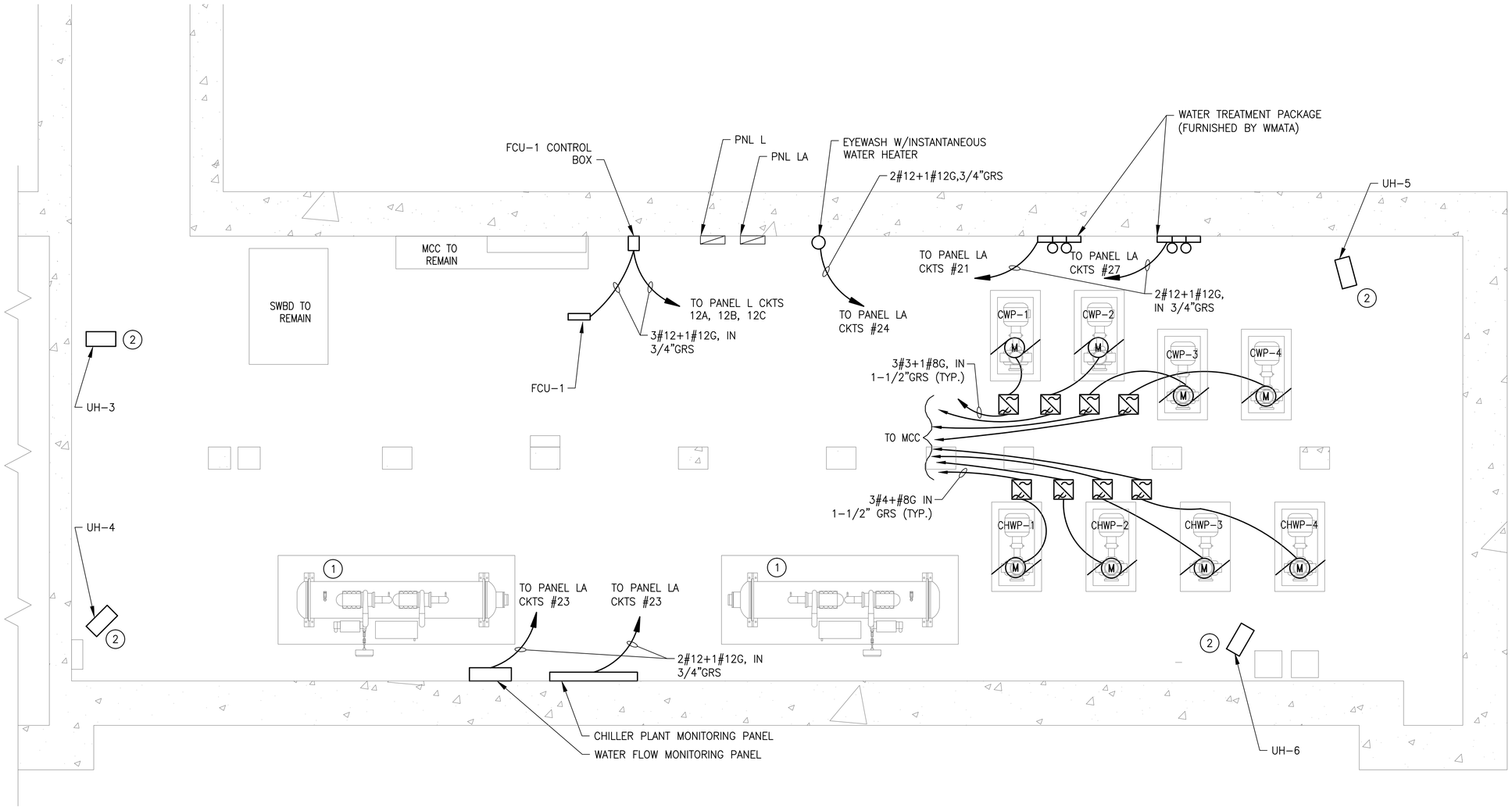
KEYNOTES:

(1) CHILLER VFD/DISCONNECT SUPPLIED WITH CHILLER, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.

(2) REUSE EXISTING CKTS AND CONDUITS. PROVIDE NEW WRING.

SHEET NOTES:

1. PROVIDE FILTERS FOR VFD'S AS REQUIRED.
2. ALL WIRING FOR VFD'S SHALL BE VFD RATED CABLES.



1 ELECTRICAL PLAN - NEW WORK (CHILLER ROOM)
CWPK1-E-102

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

A Gannett Fleming/Parsons JOINT VENTURE

COMMONWEALTH OF VIRGINIA
UDAYAN KHAN
Lic. No. 024656
03/29/2018
PROFESSIONAL ENGINEER

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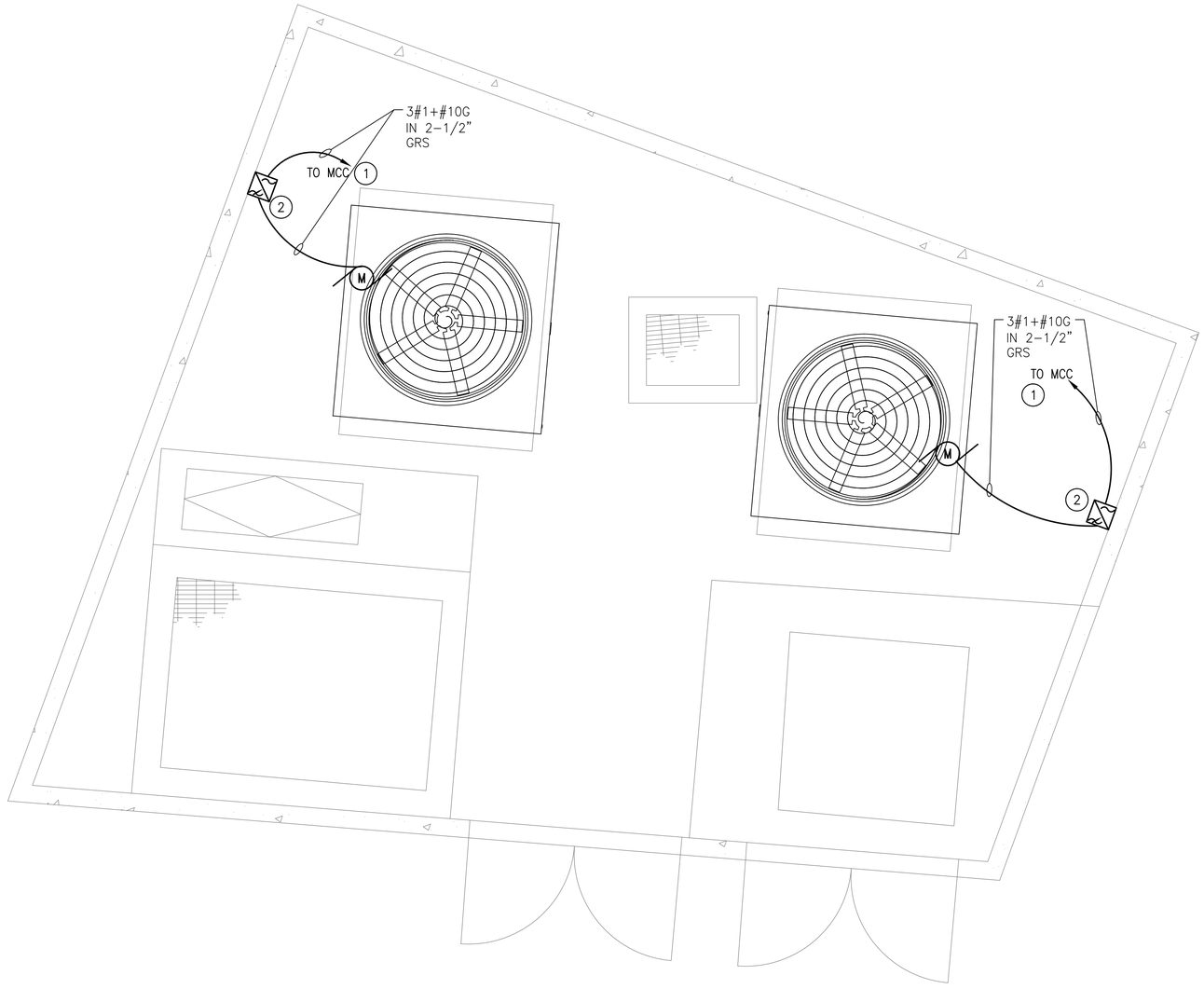
REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
ELECTRICAL PLAN - NEW WORK

M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	1/4"=1'-0"	CWPK1-E-102	145 of 173



1 ELECTRICAL PLAN - NEW WORK (COOLING TOWER)
CWPK1-E-103

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

KEYNOTES:

1. UTILIZE EXISTING CONDUITS.
2. PROVIDE AND INSTALL VFD/DISCONNECT FOR COOLING TOWER MOTOR. PROVIDE AND INSTALL WIRING FROM MOTOR TO VFD AND FROM VFD TO MCC-1.

SHEET NOTES:

1. PROVIDE FILTERS FOR VFD'S AS REQUIRED.
2. ALL WIRING FOR VFD'S SHALL BE VFD RATED CABLES.
3. THE CHILLER ROOM IS APPROXIMATELY 20' UNDERGROUND.
   THE DISTANCE FROM THE CENTER OF THE CHILLER ROOM TO THE ENTRANCE OF THE STATION IS APPROXIMATELY 470'.
   THE DISTANCE FROM THE STATION ENTRANCE TO THE COOLING TOWERS IS APPROXIMATELY 1310'.
   FROM THE COOLING TOWER TO MCC IS APPROXIMATELY 1900'.

GFP A Gannett Fleming/Parsons JOINT VENTURE

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REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPK1 - CLARENDON (K02)
ELECTRICAL PLAN - NEW WORK

M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
M1304	FQ-18102	1/4"=1'-0"	CWPK1-E-103	146 of 173