

			REFERENCE DRAWINGS			REVISIONS	N
DESIGNED C. LOOSE	07/26/17	NUMBER	TITLE	DATE	NUM	DESCRIPTION	met
DESIGNED C. LOOSE				03/30/2018	0	FINAL CONTRACT DRAWINGS	IIIEL
DRAWN C. LOOSE	07/26/17						
	DATE						_
CHECKED R. SILVA							_
	DATE						

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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

APPROVED Mark H. Magnuser 03/2018

MARK MAGNUSSEN DATE

MANAGER, ENV. PLANNING AND COMP

APPROVED MANAGER 03/2018

GRAHAM SPILLER DATE

GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPD2 - FEDERAL CENTER SW (D04)
MECHANICAL FLOW DIAGRAM - NEW WORK

		MECF	IANICAL FLOW L	DIAGRAINI - NEVV VVORK	
_	M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
	M1304	FQ-18102	NOT TO SCALE	CWPD2-M-501	81 of 173

							CHILLE	ER SC	HEDL	JLE											
			CAPACITY			EVAPORATO	R				CONDENSE	R		COMPR	RESSC	R/CI	HILLE	R ELE	CTRICA	\L	
PLANT	STATION	DESIGNATION	(TONS)	GPM	PASSES	EWT (°F)	LWT (°F)	PD FT H₂0	GPM	PASSES	EWT (°F)	LWT (°F)	PD FT H₂O	VOLT	PH	HZ	RLA	LRA	моср	МСА	BASIS OF DESIGN
CWPD2	FEDERAL CENTER SW (D04)	CH-1	330	607	2	55.0	42.0	12.0	990	2	85.0	94.3	19.0	460	3	60	298	164	450	335	DAINKIN WMC060DD
CWPD2	FEDERAL CENTER SW (D04)	CH-2	330	607	2	55.0	42.0	12.0	990	2	85.0	94.3	19.0	460	3	60	298	164	450	335	DAINKIN WMC060DD

		VALV	E SCHEDULE	-	
TYPE	SIZE (IN)	QUANTITY	SERVICE	MANUFACTURER	MODEL
GATE VALVE	8	8	CHILLED WATER	NIBCO	LD-2000-8
GATE VALVE	8	4	CONDENSER WATER	NIBCO	LD-2000-8
TRIPLE DUTY VALVE	8	4	CHILLED WATER	BELL & GOSSET	3DS-4S
TRIPLE DUTY VALVE	8	4	CONDENSER WATER	BELL & GOSSET	3DS-4S
GATE VALVE	8	2	CHILLED WATER	NIBCO	F-617-6
GATE VALVE	8	4	CONDENSER WATER	NIBCO	F-617-6

- 1. PROVIDE WITH SPRING TYPE VIBRATION ISOLATION.
- 2. PROVIDE WITH CHILLED WATER FLOW INDICATOR.
- 3. WATER-COOLED, SEMI-HERMETIC OIL-FREE CENTRIFUGAL COMPRESSOR WATER CHILLER. 4. TWO MAGNETIC BEARING, COMPLETELY OIL-FREE CENTRIFUGAL COMPRESSORS ON EACH CHILLER.
- 5. CHILLERS SHALL BE CHARGED WITH REFRIGERANT R-134A.
- MOTORS SHALL BE LIQUID REFRIGERANT COOLED WITH INTERNAL THERMAL SENSING DEVICES IN THE STATOR WINDINGS.
- 7. THE CHILLER SHALL BE EQUIPPED WITH AN INTEGRATED VARIABLE FREQUENCY DRIVE (VFD) TO AUTOMATICALLY REGULATE COMPRESSOR SPEED IN RESPONSE TO COOLING LOAD AND THE COMPRESSOR
- PRESSURE LIFT REQUIREMENT, OPERATIN CONTROLS AND EQUIPMENT PROTECTION CONTROLS. 8. CHILLER CONTROLS SHALL COORDINATE COMPRESSOR SPEED AND GUIDE VANE POSITION TO OPTIMIZE CHILLER EFFICIENCY.
- 9. CHILLER SHALL BE EQUIPPED WITH MICROTECH II CONTROLLER OR EQUIVALENT AND SHALL INCLUDE REMOTE COMMUNICATIONS CARDS WITH MODBUS RTU CAPABILITY, TO CONNECT THE I/O POINTS TO CHILLER PLANT MONITORING PANEL.
- 10. CHILLER CAPACITY BASED ON WATER.
- 11. CHILLER TOTAL OPERATING WEIGHT 13079 LB
- 12. CHILLER DIMENSIONS 171.96 IN X 55.17 IN (FOOT PRINT)
- 13 PROVIDE FACH CHILLER WITH SINGLE POINT POWER CONNECTION

15. 110010	LACIT CHILLER WITH SING	TE I OINT I OWE	COMM	_CHON.											
							PUMP	SCHE[	DULE						
	050,405	7.05		FT	INLET	OUTLET	IMPELLER	OPERATING	FOOTPRINT			MOTOR			5.00 05 55000
ITEM NO.   	SERVICE	TYPE	GPM	HEAD	(IN)	(IN)	DIA (IN)	WEIGHT (LB)	(IN)	RPM	HP	VOLTS	PH	HZ	BASIS OF DESIGN
CWP-1	CONDENSER WATER	CENTRIFUGAL	990	80	6	5	10.20	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-6X5X11.5
CWP-2	CONDENSER WATER	CENTRIFUGAL	990	80	6	5	10.20	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-6X5X11.5
CWP-3	CONDENSER WATER	CENTRIFUGAL	990	80	6	5	10.20	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-6X5X11.5
CWP-4	CONDENSER WATER	CENTRIFUGAL	990	80	6	5	10.20	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-6X5X11.5
CHWP-1	CHILLED WATER	CENTRIFUGAL	607	125	4	3	12.60	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-4X3X13L
CHWP-2	CHILLED WATER	CENTRIFUGAL	607	125	4	3	12.60	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-4X3X13L
CHWP-3	CHILLED WATER	CENTRIFUGAL	607	125	4	3	12.60	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-4X3X13L
CHWP-4	CHILLED WATER	CENTRIFUGAL	607	125	4	3	12.60	731	19X48	1780	30	460	3	60	ARMSTRONG 4030-4X3X13L

- 1. PROVIDE WITH INVERTER DUTY, VFD COMPATIBLE MOTOR.
- 2. PROVIDE WITH SPRING TYPE VIBRATION ISOLATION.
- 3. PROVIDE WITH SUCTION DIFFUSER WITH INTEGRAL STRAINER, AT PUMP INLET. PROVIDE ECCENTRIC REDUCER/INCREASER AT PUMP INLET/OUTLET.

					UNIT	HEA	ATER	SCH	EDULE						
					ELE	CTRICAL [	)ATA		HORIZ. AIR	WIDTH	HEIGHT	DEPTH	WEIGHT		
DESIGNATION	LOCATION	TYPE	kW	MOTOR HP	VOLTS	PH	AMPS	RPM	THROW (FT)	(IN)	(IN)	(IN)	(LB)	BASIS OF DESIGN	NOTES
UH-2	CWPD2	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1-4
UH-3	CWPD2	ELECTRIC, SUSPENDED	10.0	1/30	480	3	12	1600	18	19.00	21.75	8.50	36.00	BERKO HUHAA1048	1-4

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

			EXIST	ING	CC	OLING	) T(	OWER	SCHE	DUL	E				
				FWT	LWT	AMB. AIR			FAN					OPERATING	
DESIGNATION	SERVICE	TYPE	GPM	1	(°F)	WET BULB TEMP	NO.	CFM (EACH)	NO. OF MOTORS	HP	V	PH	HZ	WEIGHT (LBS)	BASIS OF DESIGN
(E) CT-1	CONDENSER WATER	AXIAL	990	95.0	85.0	78.0	1	103700	1	20	460	3	60	18890	BAC 3412C-MM
(E) CT-2	CONDENSER WATER	AXIAL	990	95.0	85.0	78.0	1	103700	1	20	460	3	60	18890	BAC 3412C-MM

- SEPARATE STARTER PANELS FURNISHED FOR FIELD MOUNTING.
- PROVIDE DIRECT DRIVE FAN WITH INVERTER DUTY MOTORS.
- COOLING TOWER FAN MOTORS SHALL BE RATED VFD COMPATIBLE.
- PROVIDE WITH NEW LOUVERS FOR EXISTING COOLING TOWERS. 5. PROVIDE WITH NEW PLASTIC FILL FOR EXISTING COOLING TOWERS.
- REFERENCE DRAWINGS REVISIONS DATE NUM DESCRIPTION 03/30/2018 0 FINAL CONTRACT DRAWINGS MANAGER, ENV. PLANNING AND COMP

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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

03/2018 GRAHAM SPILLER GFP DEPUTY PROGRAM MANAGER

# REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS CWPD2 - FEDERAL CENTER SW (D04)

03/29/2018

A Gannett Fleming/Parsons
JOINT VENTURE

MECHANICAL EQUIPMENT SCHEDULES - SHEET 1 OF 2 DRAWING NO. M NO. CONTRACT NO. SCALE SHEET NO. M1304 FQ-18102 NONE CWPD2-M-600 82 of 173

#### LEAK DETECTION SYTEM

- 1. PROVIDE (ONE) R-134A REFRIGERANT SENSOR FOR LEAK DETECTION (SHERLOCK 60-0054 OR EQUAL). UNDER-MOUNT THE REFRIGERANT
- MONITORING PANELS. INSTALL ALL SENSORS PER MANUFACTURER RECOMMENDATIONS. 2. PROVIDE GAS LEAK DETECTION SYSTEM (SHERLOCK 402 NEMA 4X OR EQUAL).
- 2.1. PROVIDE COMMUNICATIONS INTERFACE FOR REMOTE MONITORING AND CONTROL GENCOM COMMUNICATIONS WITH 'CHILLER PLANT MONITORING
- PANEL' THROUGH RS-485 PORT/ETHERNET CONNECTION PART 88-0541. CONNECT TO PRODUCTIVITY 3000, PAC IN CHILLER PLANT MONITORING PANEL.
- 2.3. PROVIDE RELAY OUTPUT FOR FAN F-25, EF-1, EF-2, ALARM, AND STROBE OPERATION.

#### FLOW MONITORING SYSTEM

- 1. NON-INTRUSIVE CLAMP-ON FLOW SENSORS
- MAINTENANCE-FREE
- ACCURACY: 1% OF VELOCITY
- 4. NO DEPENDENCY ON CONDUCTIVITY 5. AUTOMATICALLY ADAPT TO PIPE MATERIAL AND LIQUID PROPERTY VARIATIONS
- BUILT-IN FLOW TOTALIZERS
- ISOLATED RS-485 INTERFACE WITH POWER SURGE PROTECTION. SUPPORTS THE MODBUS PROTOCOL CONNECT TO PAC 3000 IN CHILLER PLANT MONITORING
- ABUNDANT INPUT/OUTPUT, ISOLATED 4-20MA OUTPUT, RELAY, PULSE OUTPUT, ALARM OUTPUT
- 9. SELF-EXPLANATORY MENU-DRIVEN PROGRAMMING
- 10. PIPE SIZE RANGE, 8" ~ 10" 11. NEMA 4X (IP65) WEATHER-RESISTANT ENCLOSURE
- 12. SIEMENS SITRANS FUS 1010 (OR APPROVED EQUAL). PROVIDE CABLES OF SUFFICIENT LENGTH TO REACH ALL TERMINATION POINTS

				AIR SEP	ARATOR S	CHEDL	JLE				
DESIGNATION LOCATION ORIENTATION GPM MAX. WORKING PRESSURE (PSIG) MAX. WORKING TEMP. (*F) SYSTEM SERVED OUTLET SIZE DRY WEIGHT (LBS) BASIS OF DESIGN											
AS-1	PUMP ROOM	VERTICAL	1214	165	375	CHWR	10"	856	ARMSTRONG VAS-10		

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

				EXPAN	ISION T	ANK S	CHEDULI	<u> </u>		
DESIGNATION	LOCATION	EQUIP. SERVED	TYPE	ORIENTATION	INITIAL FILL PRESSURE (PSIG)	TANK VOLUME (GAL)	DIA (IN)	SIZE LENGTH (IN)	WEIGHT (LBS)	BASIS OF DESIGN

305

30

### NOTES:

1. CEILING HUNG.

						AIR I	HANDLING	UNIT SO	CHE	DUL	 - _							
MADIC	NOMINAL CAPACITY				EVAPORATO	)R				ELECTRIC	CAL DAT	·A		DIMENSION	S	WEIGHT	DACIC OF DECICAL	NOTES
MARK	(TONS)	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)	(LBS)	BASIS OF DESIGN	NOTES
AHU-1	10	24.6	6	42.0	56.7	1500	80.0 / 67.0	52.2 / 52.0	3.0	460	3	60	58.0	63.0	32.0	627.2	DAIKIN LAH010A	1-2

105

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

CHILLER PLANT | CHWS | COMPRESSION | HORIZONTAL

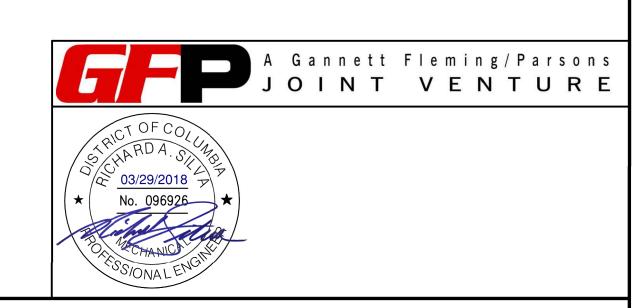
							FAN	1 S	CHE	DULE				_		
MARK	TYPE		FAN	l			ELECTI	RICAL [	DATA		dBA	DIMENS	SIONS	WEIGHT (LBS)	BASIS OF DESIGN	NOTES
		CFM	EXT. SP (IN. W.G.)	RPM	BHP	MOTOR HP	VOLTS	PH	HZ	MOTOR RPM		LENGTH (IN)	DIA. (IN)	(LDS)		
EF-1	AXIAL EXHAUST	2504	1.000	3500	0.89	1	460	3	60	3500	78	17.0	17.0	83	GREENHECK AX-36-160-0416-M10	1-4
EF-2	AXIAL EXHAUST	2504	1.000	3500	0.89	1	460	3	60	3500	78	17.0	17.0	83	GREENHECK AX-36-160-0416-M10	1-4
F-25	AXIAL SUPPLY	5023	0.9	3500	2.15	3	460	3	60	3500	84	23.0	21.5	142	GREENHECK AX-47-190-0412-M30	1-4

- 1. PROVIDE TWO SPEED FAN.
- 2. DIRECT DRIVE FAN.
- 3. WALL/CEILING HUNG WITH VIBRATION ISOLATION.
- 4. PROVIDE WITH HAND/OFF/AUTOMATIC SWITCH.

l	INSTANTANEOUS WATER HEATER SCHEDULE							
	MARK	INLET SIZE (IN.)	TURN ON FLOW (GPM)	VOLTS	kW	AMPS	MAX. TEMPERATURE (°F)	BASIS OF DESIGN
	IWH-1	1/2	0.3	120	2.4	20	90	EEMAX EX2412T EE
	IWH-2	1/2	0.3	120	2.4	20	90	EEMAX EX2412T

MOTOR-	OPERATED	DAMPER	SCHEDULE
MARK	CONTROL VOLTAGE	ASSOCIATED FAN	BASIS OF DESIGN
MOD-1	120 VAC	EF-1	POTTORF CD-41
MOD-2	120 VAC	EF-2	POTTORF CD-41

ARMSTRONG AET 30X105



		REFERENCE DRAWINGS		REVISIONS		
DESIGNED B. VISWANATHAN 07/26/17	NUMBER	TITLE	DATE	NUM	DESCRIPTION	
DESIGNED B. VISWANATHAN 07/26/17 DATE			03/30/2018	0	FINAL CONTRACT DRAWINGS	
DRAWN <u>C. LOOSE</u> 07/26/17						
DATE						
CHECKED R. SILVA 03/23/18						
DATE						,
						<u>,</u>
						'n

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES

OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP

APPROVED Mark H. Magnuser
03/2018

DATE

APPROVED

GRAHAM SPILLER MANAGER, ENV. PLANNING AND COMP GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPD2 - FEDERAL CENTER SW (D04)
MECHANICAL EQUIPMENT SCHEDULES - SHEET 2 OF 2

		MECHANIC	AL EQUIPMENT	SCHEDULES - SHEET 2	OF 2
18	M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
TE	M1304	FQ-18102	NONE	CWPD2-M-601	83 of 173

#### CHILLED WATER PLANT SEQUENCE OF OPERATION:

#### GENERAL FOR CHILLER PLANT CWPD2 - FEDERAL CENTER SW (D04)

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.

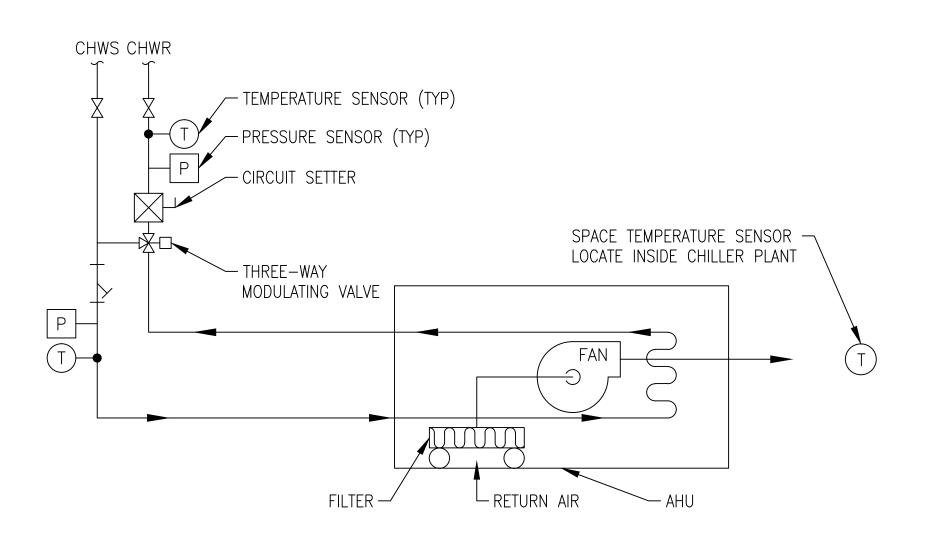
THE CORRESPONDING COOLING TOWER SHALL BE ENABLED WHEN THE CONDENSER WATER PUMP IS OPERATING. WHEN THE CONDENSER WATER SUPPLY TEMPERATURE INCREASES FROM THE SET POINT (TYPICALLY 85°F, ADJUSTABLE), THE COOLING TOWER FAN SHALL START AT LOW SPEED. THE FAN SPEED SHALL BE INCREASED OR DECREASED BY THE VARIABLE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

THE COOLING TOWER 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.

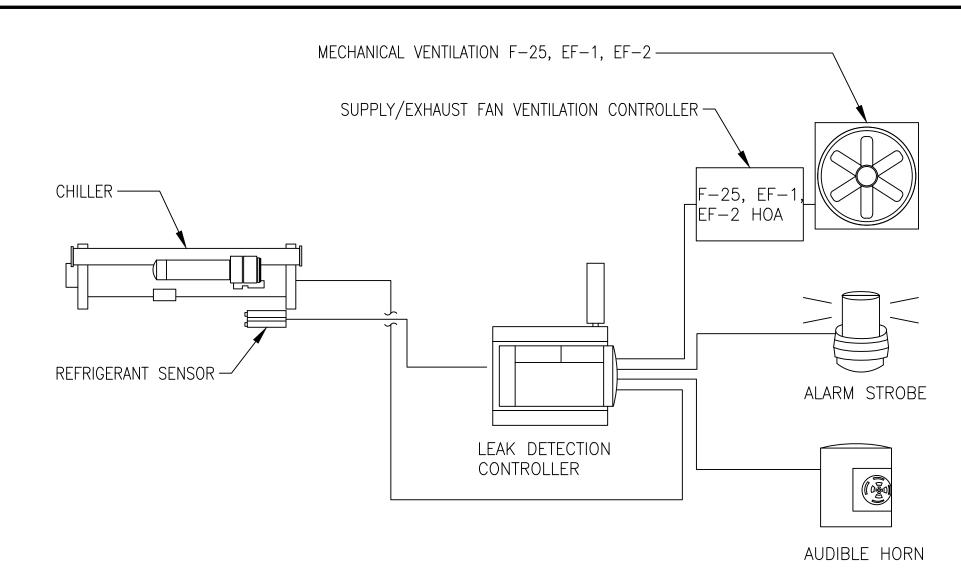
### CHILLER EMERGENCY SHUTDOWN:

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



### AIR HANDLING UNIT (AHU-1) SEQUENCE OF OPERATION:

THE AHU 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 AHU FAN SHALL TURN OFF. UPON ACTIVATION OF THE SUPPLY FAN (F-25) AND EXHAUST FANS (EF-1, EF-2), THE AHU SHALL SHUT DOWN.



#### MECHANICAL REFRIGERANT ALARM SYSTEM SEQUENCE OF OPERATION:

#### NORMAL OPERATION:

- 1. PROVIDE A LOCAL HAND-OFF-AUTOMATIC (HOA) SWITCH INSIDE THE CHILLER PLANT FOR FAN TEST AND INCIDENTAL FAN OPERATION. THE LOCAL FAN HOA SWITCH SHALL INTEGRATE WITH A 1-HOUR TIMER (ADJUSTABLE).
- 2. IN AUTOMATIC MODE, EF-1, EF-2, AND F-25 SHALL OPERATE FOR REFRIGERANT LEAK PURGING AS DESCRIBED IN THE SEQUENCE.
- 3. F-25 AND EF-1, EF-2 SHALL BE INTERLOCKED WITH THE ASSOCIATED EXHAUST AIR MOTORIZED DAMPERS. AS THE FANS ARE CALLED FOR OPERATION, THE DAMPER END LIMIT SWITCHES SHALL BE PROVED OPEN BEFORE THE FANS ARE ENERGIZED.
- 4. F-25, EF-1, AND EF-2 SHALL BE INTERLOCKED AND OPERATE WHEN THE INSIDE SPACE TEMPERATURE OF THE SPACE REACHES 90°F.
- 5. DURING NORMAL OPERATION, TWO-SPEED FANS SHALL OPERATE AT LOW-SPEED MINIMUM FLOW OF 1,000 CFM (NOMINAL).

#### REFRIGERANT LEAK PURGING OPERATION:

- 1. REFRIGERANT INFRARED GAS SENSOR SHALL MONITOR FOR R-134A LEVELS.
- 2. WHEN 250 PPM IS DETECTED, THE FIRST ALARM LEVEL (LOW) SHALL STAGE THE MECHANICAL VENTILATION. F-25 AND EF-1, EF-2 SHALL BE SET TO RUN AT LOW-SPEED MINIMUM FLOW OF 1,000 CFM (NOMINAL), AND THE WARNING STROBE LIGHT (AMBER) SHALL BE ACTIVATED
- 3. WHEN 500 PPM IS DETECTED, THE SECOND ALARM LEVEL (HIGH) SHALL STAGE THE MECHANICAL VENTILATION. F-25 AND EF-1, EF-2 SHALL BE SET TO RUN AT MAXIMUM EXHAUST FLOW OF 5,000 CFM (NOMINAL), AND THE WARNING STROBE LIGHT (AMBER) AND AUDIBLE ALARM HORN SHALL BE
- 4. ALARM STATUS SHALL BE CONTINUOUSLY COMMUNICATED VIA THE REMOTE COMMUNICATIONS SOFTWARE.

### **GENERAL:**

GRAHAM SPILLER

GFP DEPUTY PROGRAM MANAGER

1. PROVIDE NEW SUPPLY FAN AND EXHAUST FAN VENTILATION CONTROLLER FOR F-25 AND EF-1, EF-2. VENTILATION CONTROLLER SHALL BE PROVIDED WITH INPUT AND OUTPUT FOR OPERATION WITH THE REFRIGERANT MONITORING PANEL AND THERMOSTAT, PER THE SEQUENCE OF OPERATION.

03/2018

#### 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 AHU

CHILLER PLANT EXHAUST/SUPPLY FANS

CHILLER PLANT UNIT HEATERS

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

CHILLER PLANT AHU

CHILLER PLANT EXHAUST/SUPPLY FANS

CHILLER PLANT UNIT HEATERS

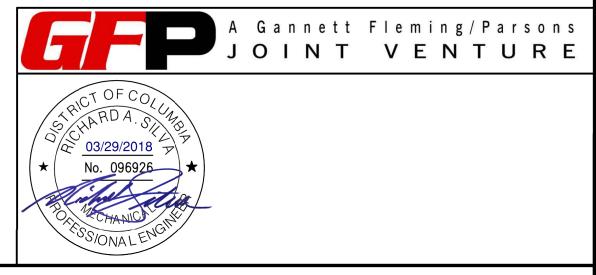
### **ALARMS:**

FAN FAILURE ALARM (AHU, EXHAUST/SUPPLY FANS): 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 AHU. THIS INCLUDES THE FILTER CHANGE ALARM.

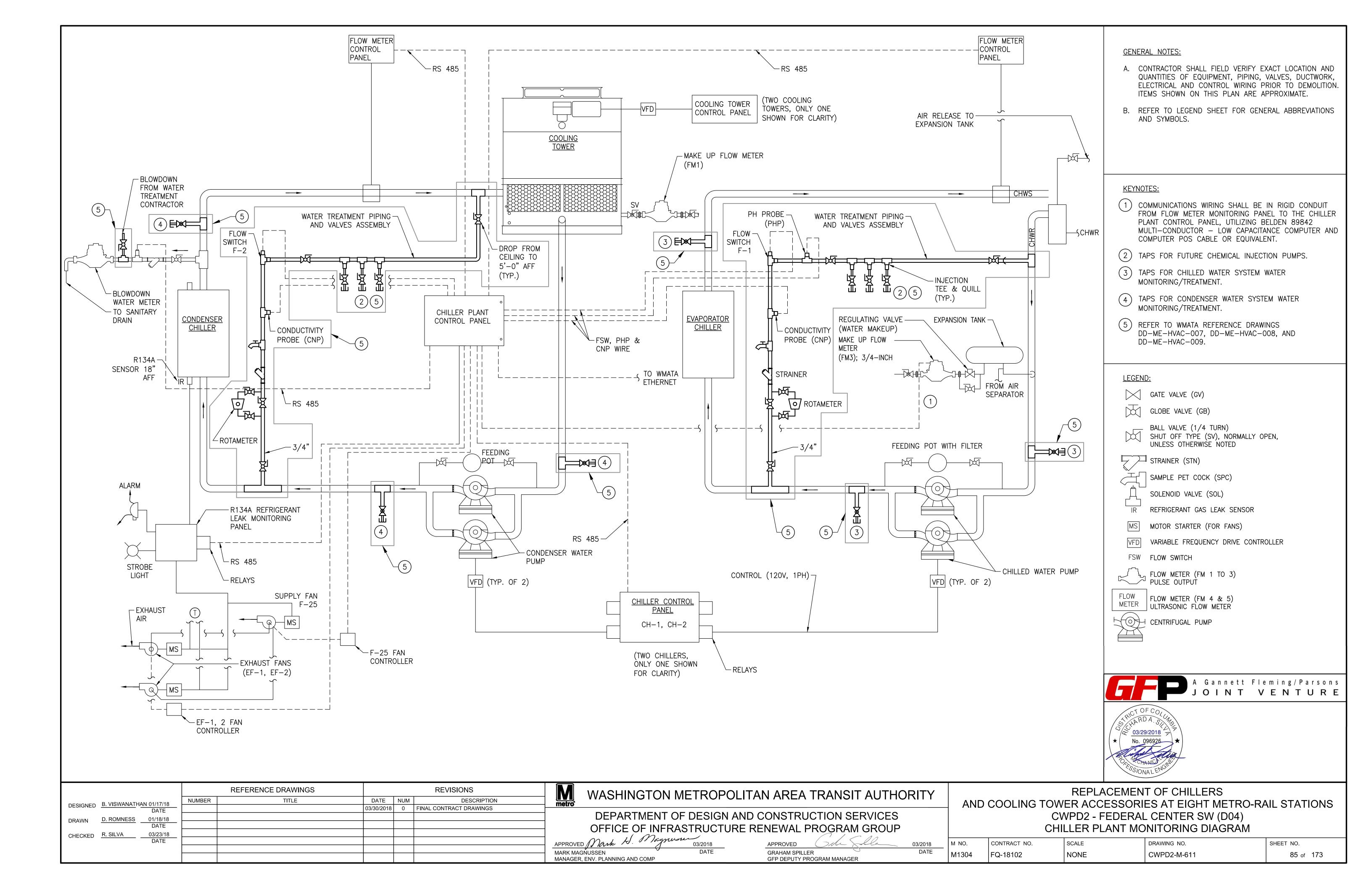


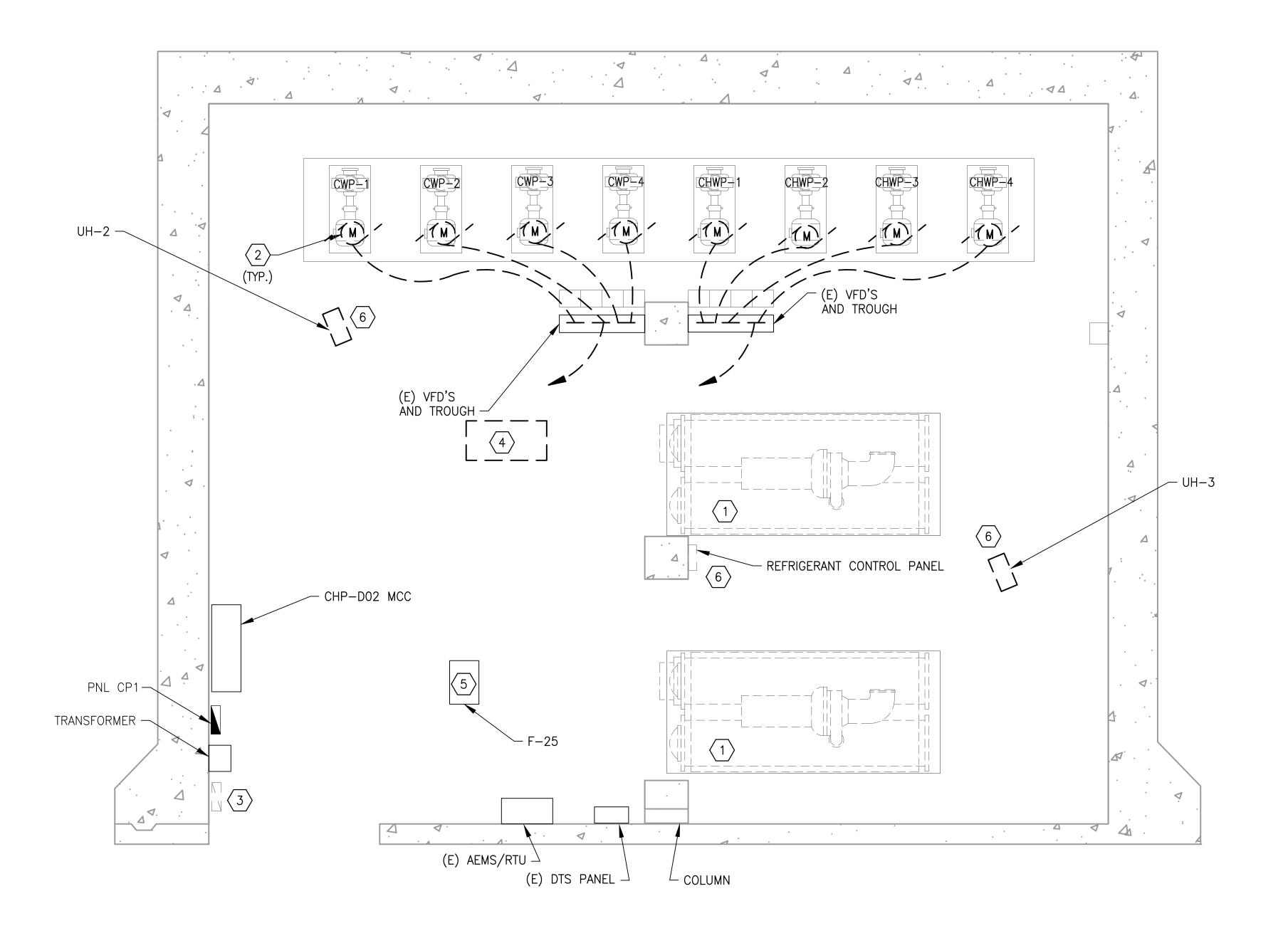
#### REFERENCE DRAWINGS REVISIONS WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY DATE | NUM | DESCRIPTION NUMBER DESIGNED K. STOCKINGER 07/26/17 03/30/2018 0 FINAL CONTRACT DRAWINGS DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES K. STOCKINGER 07/26/17 OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP 03/23/18 DATE CHECKED R. SILVA

MANAGER, ENV. PLANNING AND COMP

### REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS CWPD2 - FEDERAL CENTER SW (D04) MECHANICAL SECLIENCE OF ODEDATION

WECHANICAL SEQUENCE OF OPERATION						
M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.		
M1304	FQ-18102	NONE	CWPD2-M-610	84 of 173		



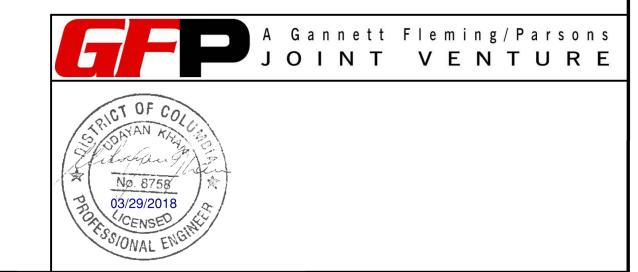


**KEYNOTES:** 

- EXISTING CHILLER STARTER EQUIPMENT TO BE DEMOLISHED.
- 2 EXISTING PUMP MOTORS TO BE DEMOLISHED BY MECHANICAL.
- $\langle 3 \rangle$  EXISTING PANEL CP2 TO BE DEMOLISHED.
- (4) EXISTING AHU TO BE DEMOLISHED.
- 5 EXISTING F-25 FAN TO BE DEMOLISHED.
- 6 EXISTING UH AND REFRIGERANT CONTROL PANEL 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.



		REFERENCE DRAWINGS			REVISIONS	M ∨	<b>V</b>
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ELECTRICAL PLAN - DEMOLITION (CHILLER ROOM)

# WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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

Mark & Magnusur

03/2018

APPROVED

APPROVED

APPROVED Mark H. ST Jagrwser 03/2018

MARK MAGNUSSEN DATE

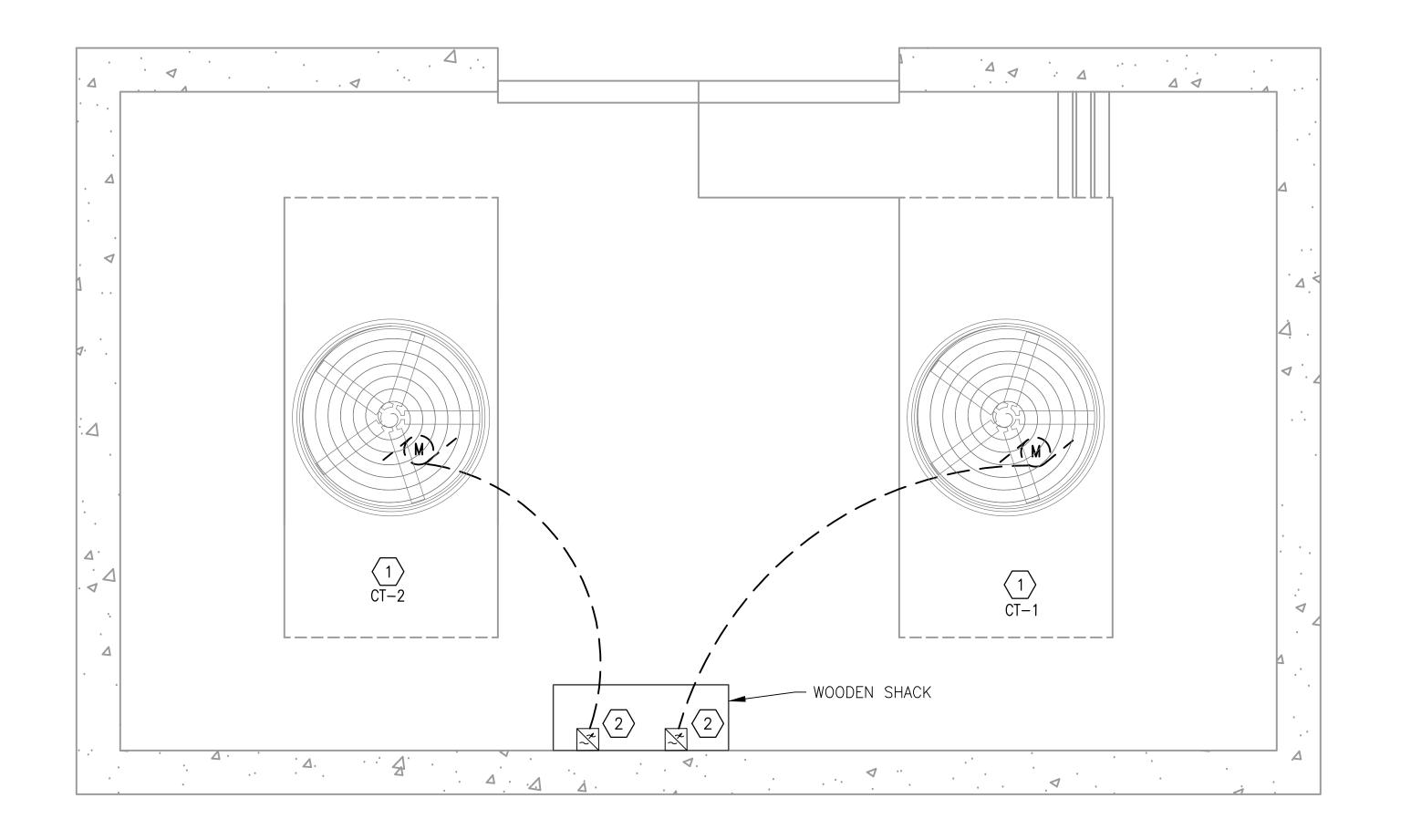
MANAGER, ENV. PLANNING AND COMP

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	GRAHAM SPILI	LER PROGRAM MANAGER	DATE	М
	C. I DEI OTTT	TOOTO WITH THE TOLK		

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

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPD2 - FEDERAL CENTER SW(D04)
ELECTRICAL PLAN - DEMOLITION

		[	ELECTRICAL PLA	AN - DEMOLITION	
_	M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
	M1304	FQ-18102	1/4" = 1'-0"	CWPD2-E-100	86 of 173



1 ELECTRICAL PLAN - DEMOLITION (COOLING TOWER)

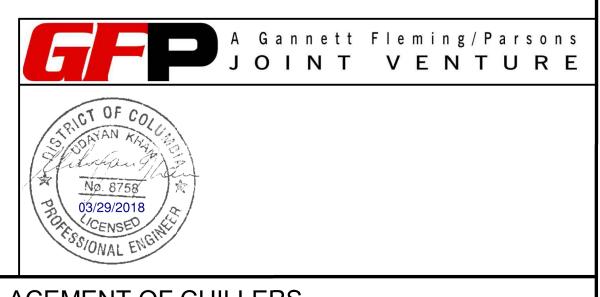
SCALE: 1/4" = 1'-0"

### **KEYNOTES:**

- 1 EXISTING COOLING TOWER FAN MOTOR TO BE DEMOLISHED BY MECHANICAL.
- 2 VFD, COMBINATION CIRCUIT BREAKER MAGNETIC STARTER TO REMAIN.

#### 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.



	REFERENCE DRAWINGS	REVISIONS	WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY REPLACEMENT OF CHILLERS
DESIGNED B. IDILBI 09/30/17	NUMBER TITLE	DATE NUM DESCRIPTION  03/30/2018 0 FINAL CONTRACT DRAWINGS	metro AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATION
DRAWN J. ZHU 09/30/17  DATE  CHECKED D. KHAN 03/23/18			DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP  CWPD2 - FEDERAL CENTER SW(D04) ELECTRICAL PLAN - DEMOLITION
DATE			APPROVED Mark H. Il Jagnusu 03/2018  APPROVED M. NO. CONTRACT NO. SCALE DRAWING NO. SHEET NO.
			MARK MAGNUSSEN  DATE  GRAHAM SPILLER  M1304  FQ-18102  1/4" = 1'-0"  CWPD2-E-101  87 of 173