

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	CWPE3	VERTICAL	644	160	375	CHWR	6”	306	ARMSTRONG VAS-6

- 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	CWPE3	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	19.5	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.

GFP

A Gannett Fleming/Parsons
JOINT VENTURE

DISTRICT OF COLUMBIA

RICHARD A. SILVA

03/29/2018

No. 096926

MECHANICAL

PROFESSIONAL ENGINEER

DESIGNED <u>B. VISWANATHAN</u> 08/11/17 DATE DRAWN <u>K. STOCKINGER</u> 08/18/17 DATE CHECKED <u>D. ROMNESS</u> 03/23/18 DATE	REFERENCE DRAWINGS		REVISIONS			<div><div></div><div>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</div><div>DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES</div><div>OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP</div><div>APPROVED <u>Mark H. Magnusson</u> 03/2018 MARK MAGNUSSEN MANAGER, ENV. PLANNING AND COMP</div><div>DATE</div></div> <div><div>APPROVED <u>Gabe Spiller</u> 03/2018 GRAHAM SPILLER GFP DEPUTY PROGRAM MANAGER</div><div>DATE</div></div>	REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS CWPE3 COLUMBIA HEIGHTS (E04) MECHANICAL EQUIPMENT SCHEDULES - SHEET 2 OF 2				
	NUMBER	TITLE	DATE	NUM	DESCRIPTION		M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
			03/30/2018	0	FINAL CONTRACT DRAWINGS		M1304	FQ-18102	NONE	CWPE3-M-601	102 of 173

CHILLED WATER PLANT SEQUENCE OF OPERATION:

GENERAL FOR CHILLER PLANT CWPE3 – COLUMBIA HEIGHTS (E04)

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

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

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 OR CHWP–2) AND CONDENSER WATER PUMP (CWP–1 OR CWP–2), 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 COOLING TOWERS CT–1 AND CT–2 SHALL OPERATE IN A LEAD/LAG CONFIGURATION. CT–1 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. AS THE LOAD INCREASES, THE COOLING TOWER CT–2 FAN SHALL BE MODULATED TO MAINTAIN THE CONDENSER WATER SUPPLY TEMPERATURE.

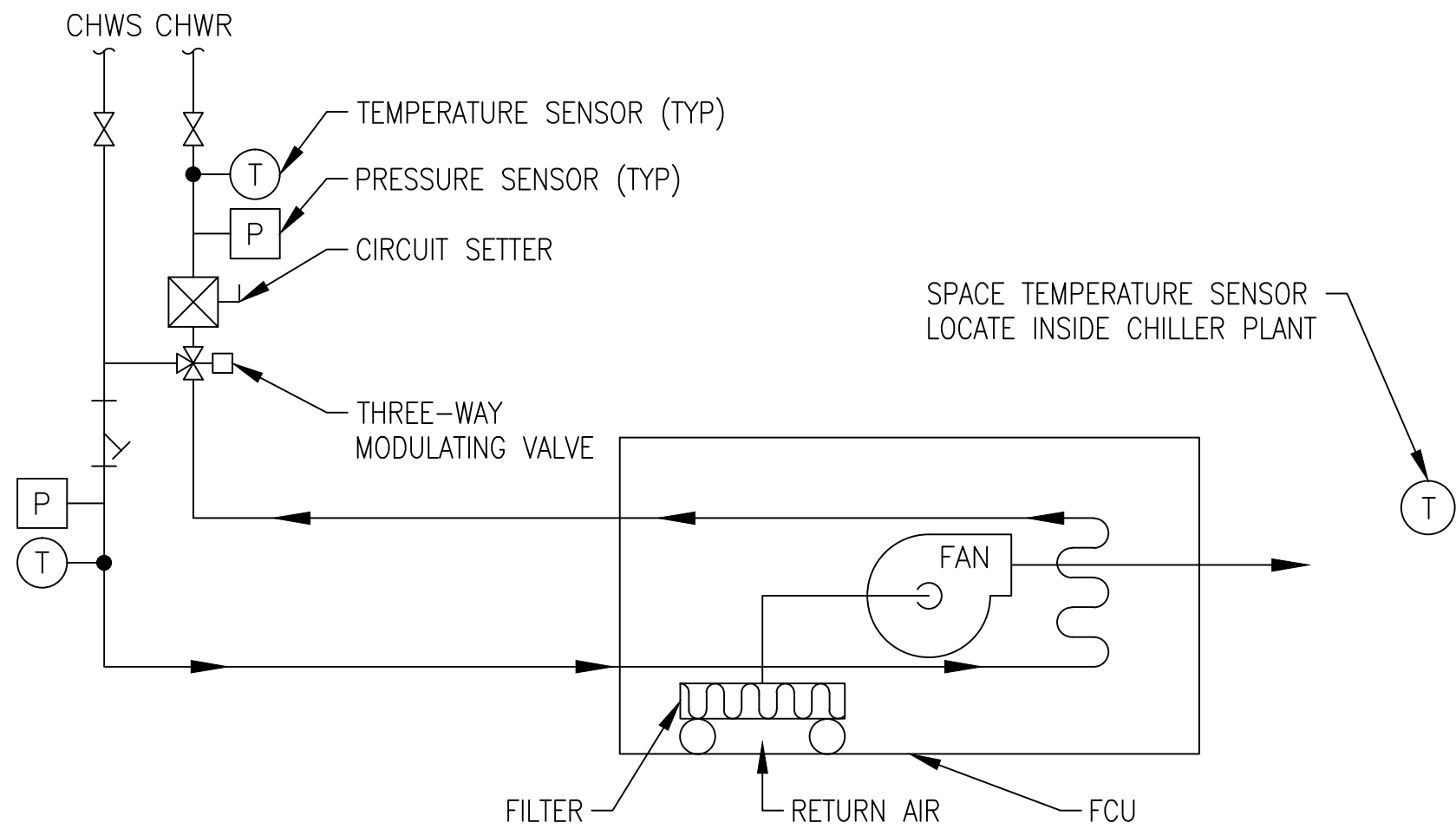
IN CASE OF FAILURE OF THE MAIN FAN MOTOR, THE PONY MOTOR IN EACH COOLING TOWER SHALL BE MODULATED BY ITS CORRESPONDING VARIABLE FREQUENCY DRIVE TO MAINTAIN THE SEQUENCE.

THE CHILLER CONTROL PANEL SHALL CONTROL THE OPERATION OF THE CHILLER AND PUMPS. THE LOCAL COOLING TOWER CONTROL PANEL SHALL CONTROL THE OPERATION OF THE COOLING TOWER FAN PER 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

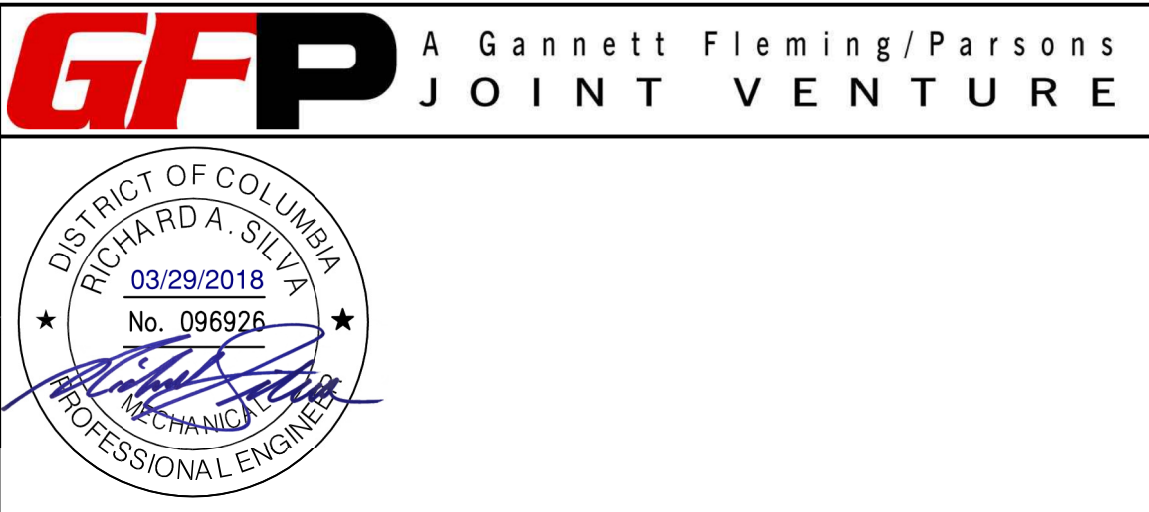
ALARMS:

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

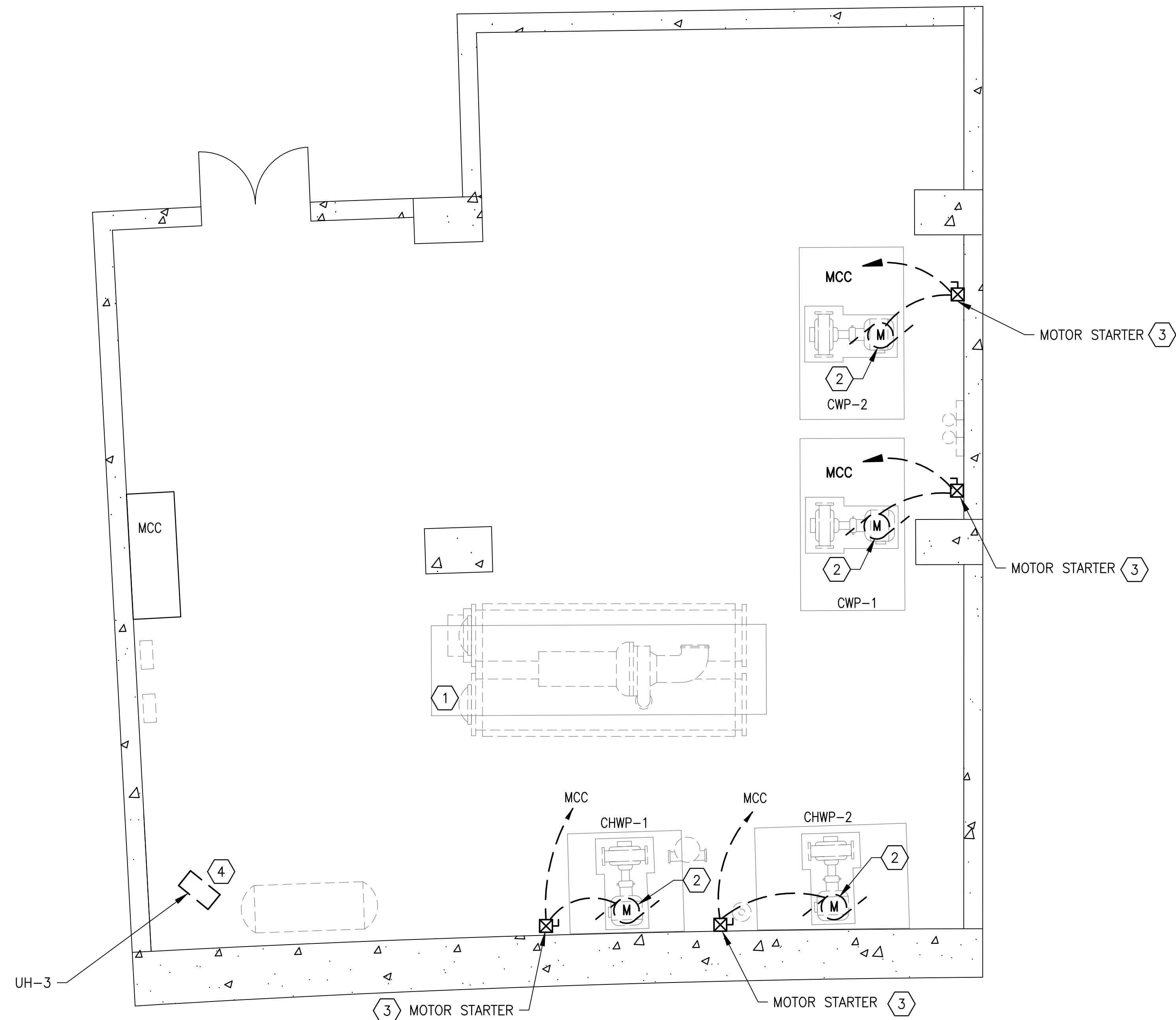
HIGH TEMPERATURE ALARM: INITIATE AN ALARM WHEN THE SPACE TEMPERATURE RISES ABOVE SETPOINT. INITIAL SET POINT SHALL BE 90 DEG F (ADJUSTABLE).

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.



<div>DESIGNED <u>K. STOCKINGER</u> 10/24/17 DATE</div> <div>DRAWN <u>K. STOCKINGER</u> 10/24/17 DATE</div> <div>CHECKED <u>D. ROMNESS</u> 03/23/18 DATE</div>	REFERENCE DRAWINGS		REVISIONS			<div><div><div>M</div><div>metro</div></div><div>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</div></div> <div>DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP</div> <div>APPROVED <u>Mark H. Magnusson</u> 03/2018 MARK MAGNUSSEN MANAGER, ENV. PLANNING AND COMP</div> <div>APPROVED <u>Gabe Spiller</u> 03/2018 GRAHAM SPILLER GFP DEPUTY PROGRAM MANAGER</div>	REPLACEMENT OF CHILLERS AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS CWPE3 - COLUMBIA HEIGHTS (E04) MECHANICAL SEQUENCE OF OPERATION				
	NUMBER	TITLE	DATE	NUM	DESCRIPTION		M NO.	CONTRACT NO.	SCALE	DRAWING NO.	SHEET NO.
			03/30/2018	0	FINAL CONTRACT DRAWINGS		M1304	FQ-18102	NONE	CWPE3-M-610	103 of 173

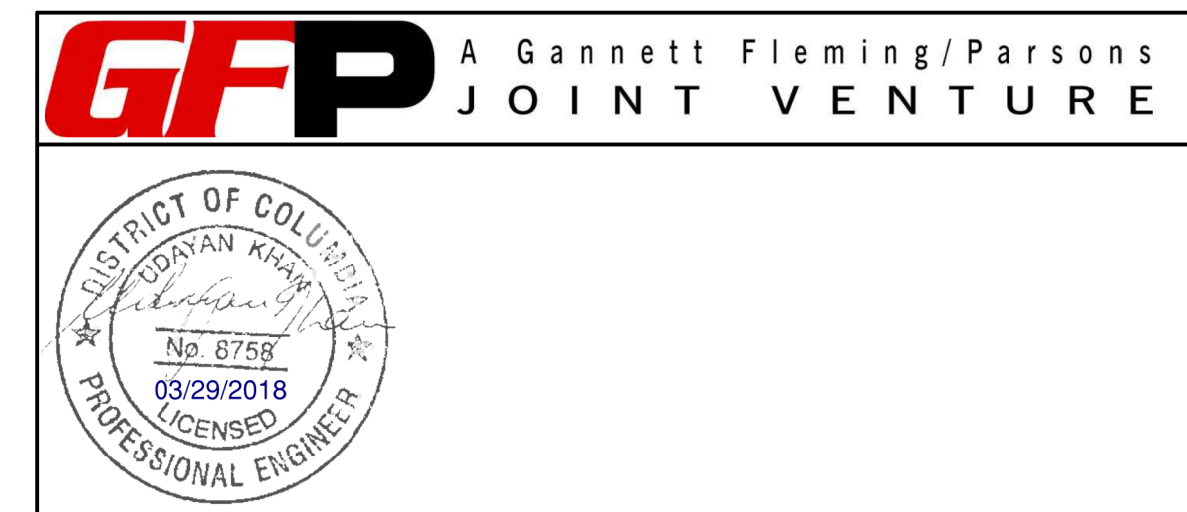


- KEYNOTES:**
- 1 EXISTING CHILLER STARTER EQUIPMENT TO BE DEMOLISHED.
 - 2 EXISTING PUMP MOTOR TO BE DEMOLISHED BY MECHANICAL.
 - 3 EXISTING PUMP MOTOR STARTERS TO BE DEMOLISHED.
 - 4 UH-3 TO BE DEMOLISHED.

- SHEET NOTES:**
- 1. ALL SHOWN EQUIPMENT IS EXISTING TO REMAIN UNLESS SHOWN OTHERWISE.
 - 2. REMOVE AND DISPOSE OF DEMOLISHED EQUIPMENT ALONG WITH ASSOCIATED WIRING.

1 ELECTRICAL PLAN - DEMOLITION (CHILLER ROOM)
CWPE3-E-100

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



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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

APPROVED *Mark H. Magnusson* 03/2018
MARK MAGNUSSEN
MANAGER, ENV. PLANNING AND COMP

APPROVED *Gabe Spiller* 03/2018
GRAHAM SPILLER
GFP DEPUTY PROGRAM MANAGER

REPLACEMENT OF CHILLERS
AND COOLING TOWER ACCESSORIES AT EIGHT METRO-RAIL STATIONS
CWPE3 - COLUMBIA HEIGHTS (E04)
ELECTRICAL PLAN - DEMOLITION

M NO. M1304	CONTRACT NO. FQ-18102	SCALE 1/4"=1'-0"	DRAWING NO. CWPE3-E-100	SHEET NO. 105 of 173
----------------	--------------------------	---------------------	----------------------------	-------------------------

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

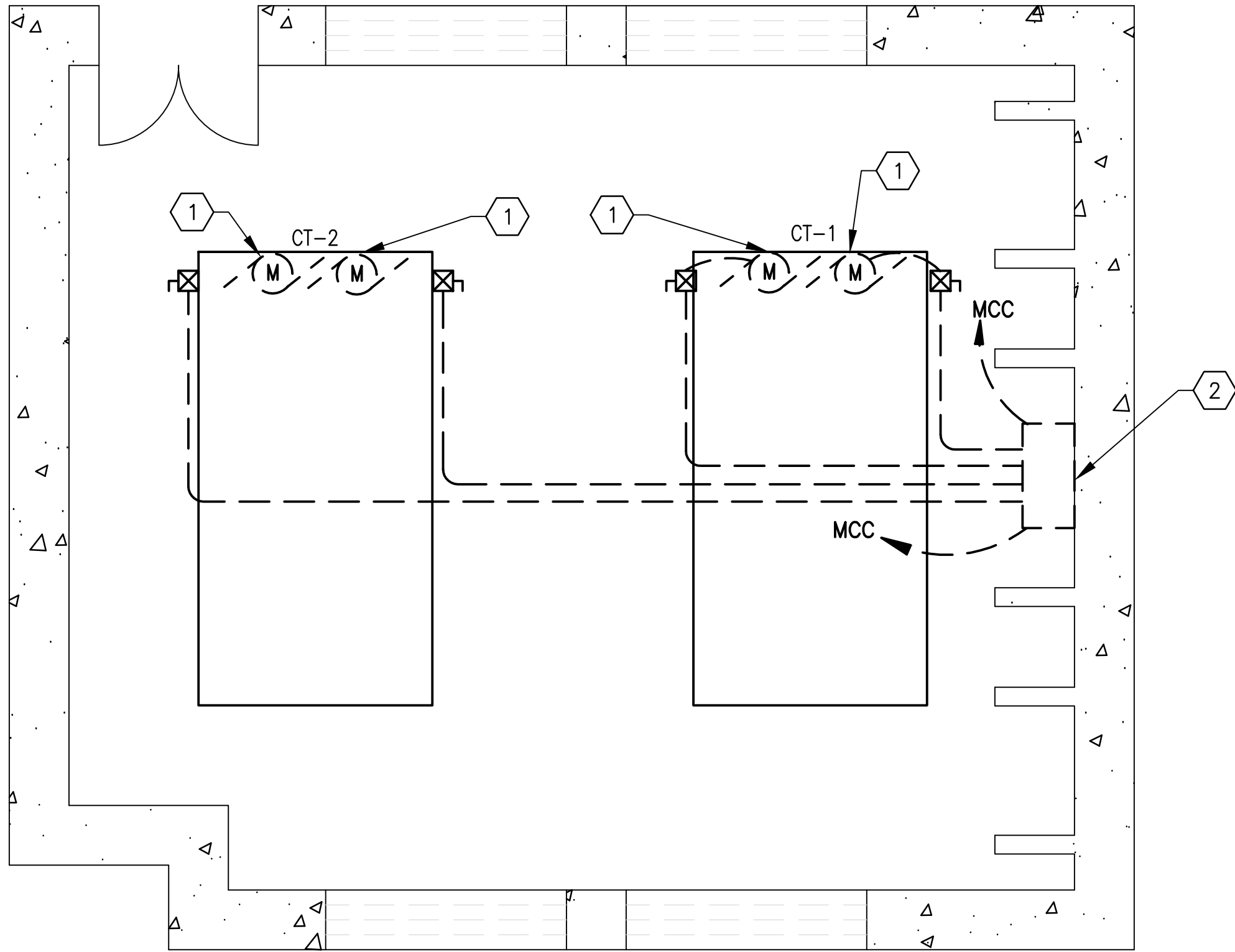
REFERENCE DRAWINGS		REVISIONS		
NUMBER	TITLE	DATE	NUM	DESCRIPTION
		03/30/2018	0	FINAL CONTRACT DRAWINGS

- KEYNOTES:
- 1

EXISTING COOLING TOWER FAN MOTORS TO BE DEMOLISHED BY MECHANICAL
- 2

EXISTING CONTROL PANEL TO BE DEMOLISHED.

- SHEET NOTES:
1. ALL SHOWN EQUIPMENT IS EXISTING TO REMAIN UNLESS NOTED OTHERWISE.
2. REMOVE AND DISPOSE OF DEMOLISHED EQUIPMENT ALONG WITH ASSOCIATED WIRING.



1

ELECTRICAL PLAN - DEMOLITION (COOLING TOWER)

CWPE3-E-101

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

GFP

A Gannett Fleming/Parsons
JOINT VENTURE

DISTRICT OF COLUMBIA

DOYAN KHAN

No. 8758

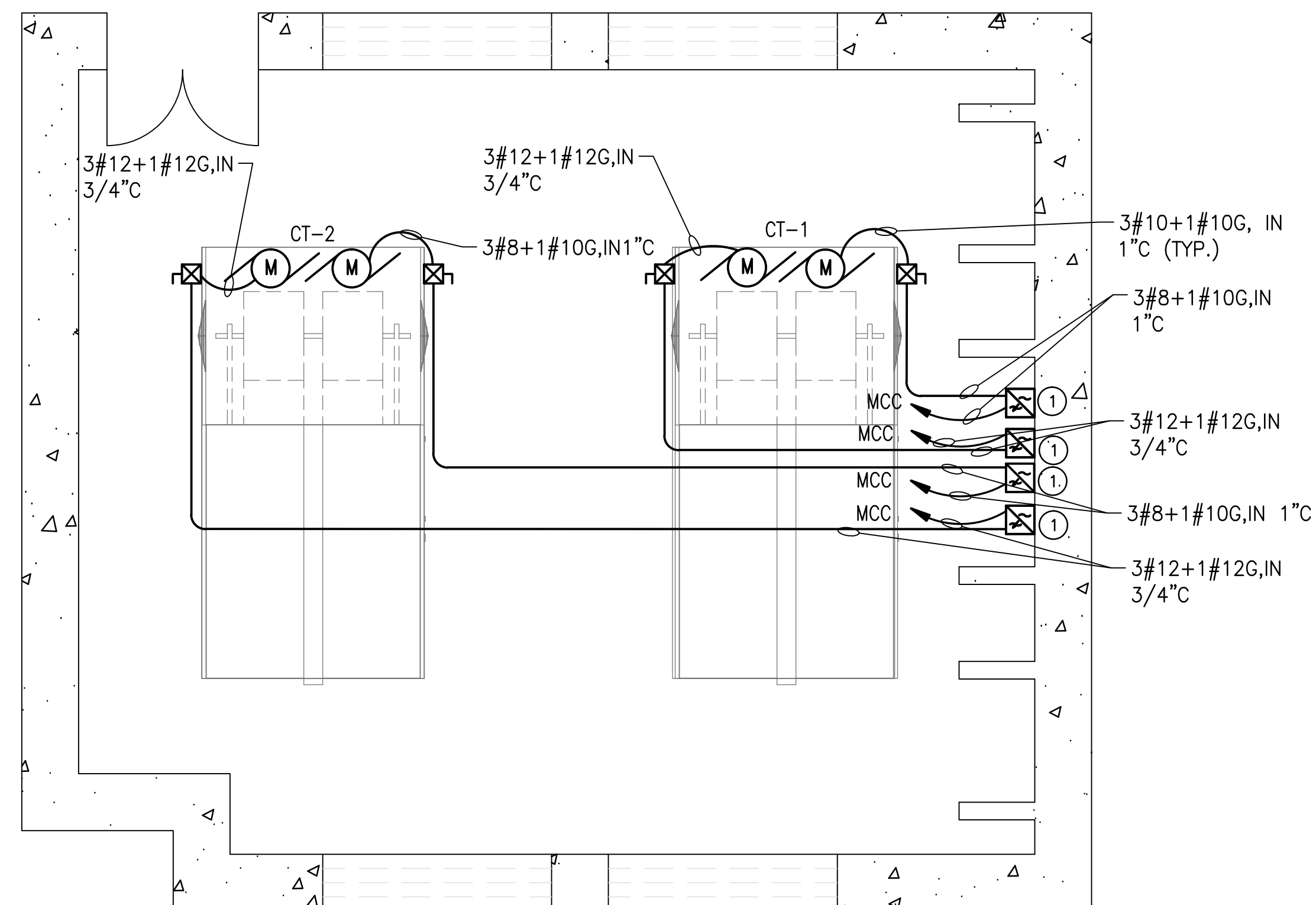
03/29/2018

LICENSED
PROFESSIONAL ENGINEER

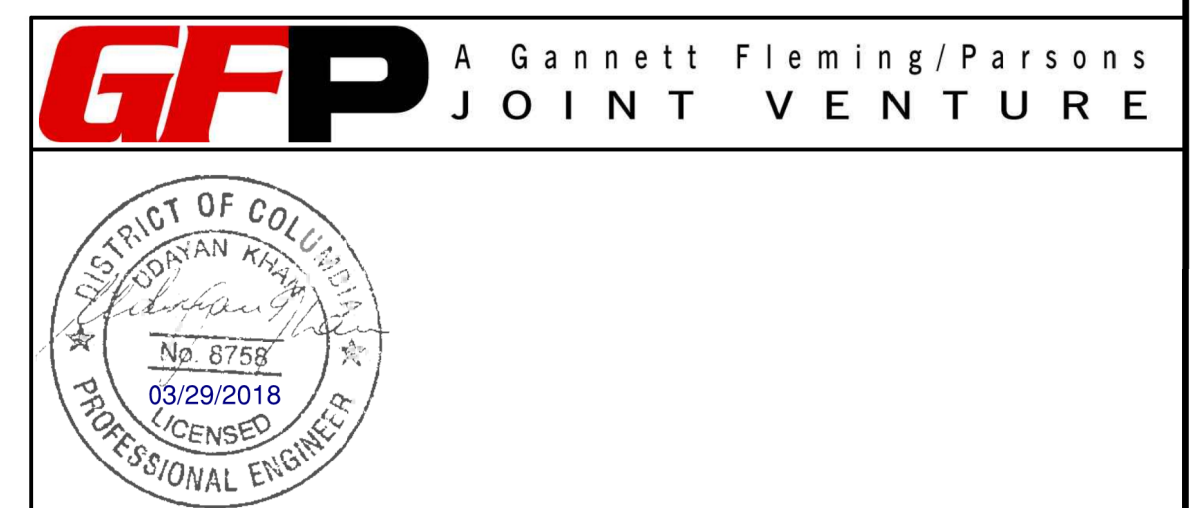
<div>DESIGNED<div>B. IDILBI</div><div>09/30/17</div><div>DATE</div></div> <div>DRAWN<div>J. ZHU</div><div>09/30/17</div><div>DATE</div></div> <div>CHECKED<div>D. KHAN</div><div>03/23/18</div><div>DATE</div></div>	REFERENCE DRAWINGS		REVISIONS			<div><div><div>M</div><div>metro</div></div><div>WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY</div><div>DEPARTMENT OF DESIGN AND CONSTRUCTION SERVICES</div><div>OFFICE OF INFRASTRUCTURE RENEWAL PROGRAM GROUP</div><div>APPROVED<div>Mark H. Magnusson</div>03/2018</div><div>MARK MAGNUSSEN</div><div>MANAGER, ENV. PLANNING AND COMP</div><div>DATE</div></div> <div>APPROVED<div>Gabe Spiller</div>03/2018</div> <div>GRAHAM SPILLER</div> <div>GFP DEPUTY PROGRAM MANAGER</div> <div>DATE</div>
--	--------------------	--	-----------	--	--	---

① PROVIDE VFD'S WITH LINE AND LOAD REACTORS.

1. PROVIDE FILTERS FOR VFD'S AS REQUIRED.
2. ALL WIRING FOR VFD'S SHALL BE VFD RATED CABLES.
3. THE CHILLER PLANT FLOOR IS APPROXIMATELY 40' UNDERGROUND.
THE CHILLER PLANT TO THE HIGHLAND PARK APARTMENTS IS ROUGHLY 210'.
THE COOLING TOWER SITS ON THE ROOF OF THE HIGHLAND PARK APARTMENTS WHICH IS 8 STORIES TALL
APPROXIMATE DISTANCE 500'.



1 ELECTRICAL PLAN - NEW WORK (COOLING TOWER)
 CWPE3-E-103 SCALE: 1/4" = 1'-0"

[illegible]