BILL OF MATERIALS

TAG	QTY	MFG/VNDR	PART #	DESCRIPTION
PANEL DEVICES:				
DC-1-2-018,019	2	JCI	MS-IOM4711-0	IOM CNTRLR, 2BI, 6UI, 3BO, 2AO, 4CO
P-10,16	2	JCI	PAKGJJ002BH0	24"X36" PNL, FEC2611, IOM4711, 2 96VA XFR
P-10A,16A	2	KELE	SC18126	18"X12"X6" ENCL. W/ PREFORATED BACK PNL
UPS-1,2	2	SOLA	SDU850	UPS, DIN, 850VA/510W, 120VACIN/OUT, 2 MIN
FIELD DEVICES:				
CT-1~4	4	VERIS	H921	CURRENT XDCR, ANALOG, 4-20mA
CT-5~11	7	VERIS	H720	CURRENT XDCR, ANALOG, 4-20mA, VFD
DPT-1~6	6	SETRA	231G-MS2-2F-D	DIFF PRESS XMTR, WET, LCD, 0-10VDC
FM-1,2	2			FLOW METER
GP-1	1	VERIS	PG05AV	GAUGE PRESSS, 0-50PSIG, 0-10VDC
R-1~26	26	VERIS	V100	10AMP, SPDT, 10-30VAC/DC/120VAC
TE-1~13	13	JCI	TE-631AP-1	TEMP SENSOR, 1KΩ NI, 0.1%, 6" DUCT
	13	JCI	TE-6300W-101	6" BRASS WELL W/ THERMAL GREASE
V-1~12	12	JCI		SEE VALVE SCHEDULE

P-10A (18"x12") — 120VAC Emergency Power — UPS-1

P-16A (18"x12") — 120VAC Emergency Power — UPS-1

P-10 (24"x36") — DC-1-2-016, DC-1-2-017, DC-1-2-018, DC-1-2-019

ACCH-1~3
Located in Penthouse

P-16 (24"x36") — DC-1-1-011, DC-1-1-012

HX-1,2
Chiller 114 Platform, Ground Floor

Penthouse / First Floor

PCHWP-4 — 375 GPM 25 ft. hd. — CT-4 PCHWP4-AMP — R-13 PCHWP4-C

PCHWP-3 — 375 GPM 25 ft. hd. — CT-3 PCHWP3-AMP — R-12 PCHWP3-C

PCHWP-2 — 375 GPM 25 ft. hd. — CT-2 PCHWP2-AMP — R-11 PCHWP2-C

PCHWP-1 — 375 GPM 25 ft. hd. — CT-1 PCHWP1-AMP — R-10 PCHWP1-C

CHWR — CHWS

TE-4 PCHWR-T

BACnet/IP to existing NAE

BACnet/IP to existing NAE

R-1 ACCH1-C
R-2 ACCH1-A
R-3 EVP1-CAL
4-20mA ACCH1-DL

R-4 ACCH2-C
R-5 ACCH2-A
R-6 EVP2-CAL
4-20mA ACCH2-DL

R-7 ACCH3-C
R-8 ACCH3-A
R-9 EVP3-CAL
4-20mA ACCH3-DL

ACCH-1 Existing/Relocated — COMP, EVAP
DPT-1 ACCH1-DP — TE-1 ACCH1-CHWST — R-21/V-1 ACCH1-ISOV — 120VAC Power

ACCH-2 Existing/Relocated — COMP, EVAP
DPT-2 ACCH2-DP — TE-2 ACCH2-CHWST — R-22/V-2 ACCH2-ISOV — 120VAC Power

ACCH-3 Existing/Relocated — COMP, EVAP
DPT-3 ACCH3-DP — TE-3 ACCH3-CHWST — R-23/V-3 ACCH3-ISOV — 120VAC Power

TE-14 PCHWS-T

R-14 SCHWP1-C — SCHWP1-O — CT-5 SCHWP1-AMP
R-15 SCHWP2-C — SCHWP2-O — CT-6 SCHWP2-AMP
R-16 SCHWP3-C — SCHWP3-O — CT-7 SCHWP3-AMP

FM-1 PCHWS-FLO
TE-5 BYP-T
TE-6 SCHWS-T
TE-7 SCHWR-T
FM-2 SCHWS-FLO
GP-1 SYS-PRES
Mount GP-1 between Air Separator & Expansion Tank

SCHWP-3 — 600 GPM 75 ft. hd.
SCHWP-2 — 600 GPM 75 ft. hd.
SCHWP-1 — 600 GPM 75 ft. hd.

V-4 CHWBYPV-O

CHWR to existing ground floor process HX's
CHWS to existing ground floor process HX's

V-7 HX2-V — TE-11 HX2-PCHWRT — **HX-2** — TE-12 HX2-SCHWRT — TE-13 HX2-SCHWST

V-5 HX1-V — TE-8 HX1-PCHWRT — **HX-1** — TE-9 HX1-SCHWRT — TE-10 HX1-SCHWST

CHWS to Existing MUA's

CHWR to Existing MUA's

DPT-4 CHW-DP

120VAC Power — R-24/V-9 CENTCH-SV — Centrifugal Chiller Plant Supply

120VAC Power — R-25/V-10 CENTCH-RV — Centrifugal Chiller Plant Return

120VAC Power — R-27/V-12 HX2-ISOV2 — CHWR to FCU's

120VAC Power — R-26/V-11 HX2-ISOV1 — CHWS to FCU's

V-8 HX2-BYPV — DPT-6 HX2-DP

SCHWP-6 — 90 GPM 75 ft. hd. — R-19 SCHWP6-C — SCHWP6-O — CT-10 SCHWP6-AMP

SCHWP-7 — 90 GPM 75 ft. hd. — R-20 SCHWP7-C — SCHWP7-O — CT-11 SCHWP7-AMP

BACnet MS/TP Trunk

Process CHWR — Process CHWS

V-6 HX1-BYPV — DPT-5 HX1-DP

SCHWP-4 — 60 GPM 75 ft. hd.

SCHWP-5 — 60 GPM 75 ft. hd.

R-17 SCHWP4-C — SCHWP4-O — CT-8 SCHWP4-AMP
R-18 SCHWP5-C — SCHWP5-O — CT-9 SCHWP5-AMP

BACnet MS/TP Trunk

Air Cooled CHW Plant Detail

NO.	Date	Revision Record

EMC SERVICES
116 Budlong Road
Cranston, Rhode Island 02920

Mechanical Contractor
Address
City, State

Customer
Address
City, State

JOB NUMBER: 10-370	SCALE: NTS	DRAWN BY: P. Braga	
		APPROVED BY: W. Roskowski	
FILE: **Air Cooled Chillers.vsd**			
DATE: 04/13/12	DRAWING NUMBER: **ATC-7**		

Chillers will operate based on the owner's operation schedule. Chiller control sequences will be performed by an integrated combination of the chiller manufacturers control package and the BAS. Chillers (CH-1, CH-2 & CH-3) will be automatically started and stopped by the BAS.

Primary CHW pumps will be interlocked with the DDC system and will be started before the chillers. The BAS will rotate the lag position of chillers 1,2&3 on a weekly basis to equalize run time. Lead/lag position can also be chosen manually through the workstation.

Control of internal chiller operation will be through the control panel provided by the chiller manufacturer and include the following: After stopping, a chiller will not be restarted for 30 minutes, and after starting , will run for at least 60 minutes before stopping. Supply water temperature for each chiller will be initially set for 44°F. CHW flow to each operating chiller will be monitored via the CHW differential pressure sensor. After 30 second time delay (adj from 0-300 seconds to prove flow), the chiller will be allowed to start. There will be a 3 to 10 second time delay for all chiller differential pressure switches before a chiller is shutdown by the safety (this allows time for the standby pump (PCHWP-2) to start after a pump failure).

The number of primary pumps and chillers on at any time will be determined by a combination of both flow and temperature as follows:

Lead Chiller Startup:
When the chilled water plant is activated, the BMS opens the lead chiller's isolation valve.
Once the isolation valve is proven open via the valve end switch, or anytime there is an evap pump call signal from any chiller, the lead primary chilled water pump is enabled. Once minimum flow is proven thru the chiller differential pressure sensor across the chiller, the lead chiller is enabled. Once flow is proven from hardwired flow switch safety interlock then the chiller will operate to maintain a leaving chilled water setpoint.

Second Chiller Startup Process:
After the lead chiller has been on for 60 minutes, if the temperature differential between secondary CHW supply and primary CHW supply rises above 1.5°F or the chiller capacity reaches 100% (adj.) for 10 consecutive minutes (adj.), the lag chiller start sequence will be started.

Prior to starting the chiller, the demand limiting will reset from 100% to 50% (adj) on all chillers. The isolation valve will open to 100% and once proven open, the lag primary chilled water pump starts. Once minimum flow is proven thru the chiller differential pressure sensor across the chiller the second chiller is enabled. After an adjustable time delay, the demand limiting is released and reset to 100%.

Third Chiller Startup Process:
After the lag chiller has been on for 30 minutes, if the temperature differential between secondary CHW supply and primary CHW supply rises above 1.5°F or the total chiller capacity is greater than 190% (adj.) for 10 consecutive minutes (adj.), the 2nd lag chiller system (chiller & pump) will be started.

Prior to starting the chiller, the demand limiting will reset from 100% to 50% (adj) on all chillers. The isolation valve will open to 100% and once proven open, the lag primary chilled water pump starts. Once minimum flow is proven thru the chiller differential pressure sensor across the chiller the second chiller is enabled. After an adjustable time delay, the demand limiting is released and reset to 100%.

Second Chiller (Lag1) Shutdown Process:
With two chillers on for 30 minutes, if the flow differential between primary CHW flow and secondary CHW flow is 10% above primary CHW flow of one chiller and the temperature differential between primary CHW return temperature and primary CHW supply temperature drops to less than 5°F (adj.) for 15 consecutive minutes (adj.), then the BAS will stop the first lag chiller.

Third Chiller (Lag2) Shutdown Process:
With two chillers on for 30 minutes, if the flow differential between primary CHW flow and secondary CHW flow is 10% above primary CHW flow of one chiller and the temperature differential between primary CHW return temperature and primary CHW supply temperature drops to less than 5°F (adj.) for 15 consecutive minutes (adj.), then the BAS will stop the second lag chiller.

Primary CHW Pump Control:
The primary CHW pumps will be rotated on a weekly basis based on runtime. The pumps will be capable of operating in any combination with any chiller and will be started before the chillers. Chiller isolation valves will be open fully and proven open before pumps are started. The pumps will be selected to run through the DDC system before the chiller is energized. The primary CHW pump will run continuously while chiller is in operation. The lag primary CHW pump will start if the corresponding main pump fails to run (after a time delay of 30 seconds (adj).

Lead/Lag/Standby Secondary CHW Pump Control:
The pumps will be rotated on a weekly basis on runtime. Secondary CHW pumps will stage on and off and vary their operating speed as required to maintain system differential pressure setpoint of 10psig (adj). The lead pump will energize and operate at its minimum speed. The bypass valve will modulate as needed to maintain the differential pressure setpoint. As the system differential pressure begins to drop, the bypass valve will modulate closed. Once closed the lead pumps VFD will ramp up and modulate as required to maintain the system differential pressure setpoint. When the lead pump reaches 75% speed for 5 minutes the lag pump will be started and both pumps will modulate in unison to maintain system differential pressure setpoint. Once the VFDs are below 40% for 5 minutes the system will stage down the pumps.

Only two pumps will operate in parallel with one pump always in standby. If lead or lag pump fail, the standby pump will become lead or lag pump and operate per lead or lag pump controls. An alarm will be initiated through the BAS to the head end workstation. If pump VFD is at its minimum speed and the system differential pressure continues to increase the differential pressure bypass valve will modulate open to maintain system differential pressure.

Setpoints:
The CHW temperature setpoint will be adjustable through the BAS. The demand limiting value of chillers will be adjustable through the BAS.

Safeties:
All necessary safeties for the operation of the chillers will be provided by the chiller manufacturer.

Process CHW Pump Control (SCHWP-4&5):
On lead pump startup through the BAS, the pump will start at its minimum VFD septoint. After one minute, the VFD will modulate to maintain system differential pressure setpoint of 10psig (adj) located in piping distribution system. If with the main pump VFD operating at its minimum speed, the differential pressure continues to rise, the differential pressure bypass valve will modulate open to maintain system differential pressure. If main pump fails, the standby pump will become main pump and operate to maintain static pressure setpoint. An alarm will be initiated through the BAS to the headend workstation. Main and standby pump selection will be automatically rotated weekly. Heat exchanger HX-1 control valve will modulate to maintain PCHWS temperature of 48°F.

CHW Pump Control (SCHWP-6&7):
When centrifugal chiller plant is not in operation (non cooling season) operator will initiate following sequence through the BAS:
2-position valves V-11 & V-12 will open and 2-position valves V-9 & V-10 will close. Main CHW pump will startup through the BAS, the pump will start at its minimum VFD setpoint. After on minute, the VFD will modulate to maintain system differential pressure setpoint of 10psig (adj). If with the main pump VFD operating at its minimum speed, the differential pressure continues to rise, the differential pressure bypass valve will modulate to maintain system differential pressure. If main pump fails, the standby pump will become main pump and operate to maintain static pressure setpoint. An alarm will be initiated through the BAS to the head end workstation. Main and standby pump selection will be automatically rotated weekly. Heat exchanger HX-2 control valve will modulate to maintain CHW supply temperature of 48°F.

When centrifugal chiller plant is in operation (cooling season) operator will initiate following sequence through the BAS:
2-position valves V-11 & V-12 will close and 2-position valves V-9 & V-10 will open. Pumps (SCHWP-6&7) will remain off and heat exchanger HX-2 control valve will remain closed.

If any of the following conditions occur an alarm will be sent to the BAS:
1. Pumps are commanded to run and status is not indicated within 15 seconds.
2. High & low temperature limits are reached or a faulty sensor is sensed.
3. If the sensed pressure (GP-1) in the CHW system drops below the alarm setpoint initially set at 20psi.

Air Cooled CHW Plant Sequence of Operations

NO.	Date	Revision Record

EMC | SERVICES
116 Budlong Road
Cranston, Rhode Island 02920

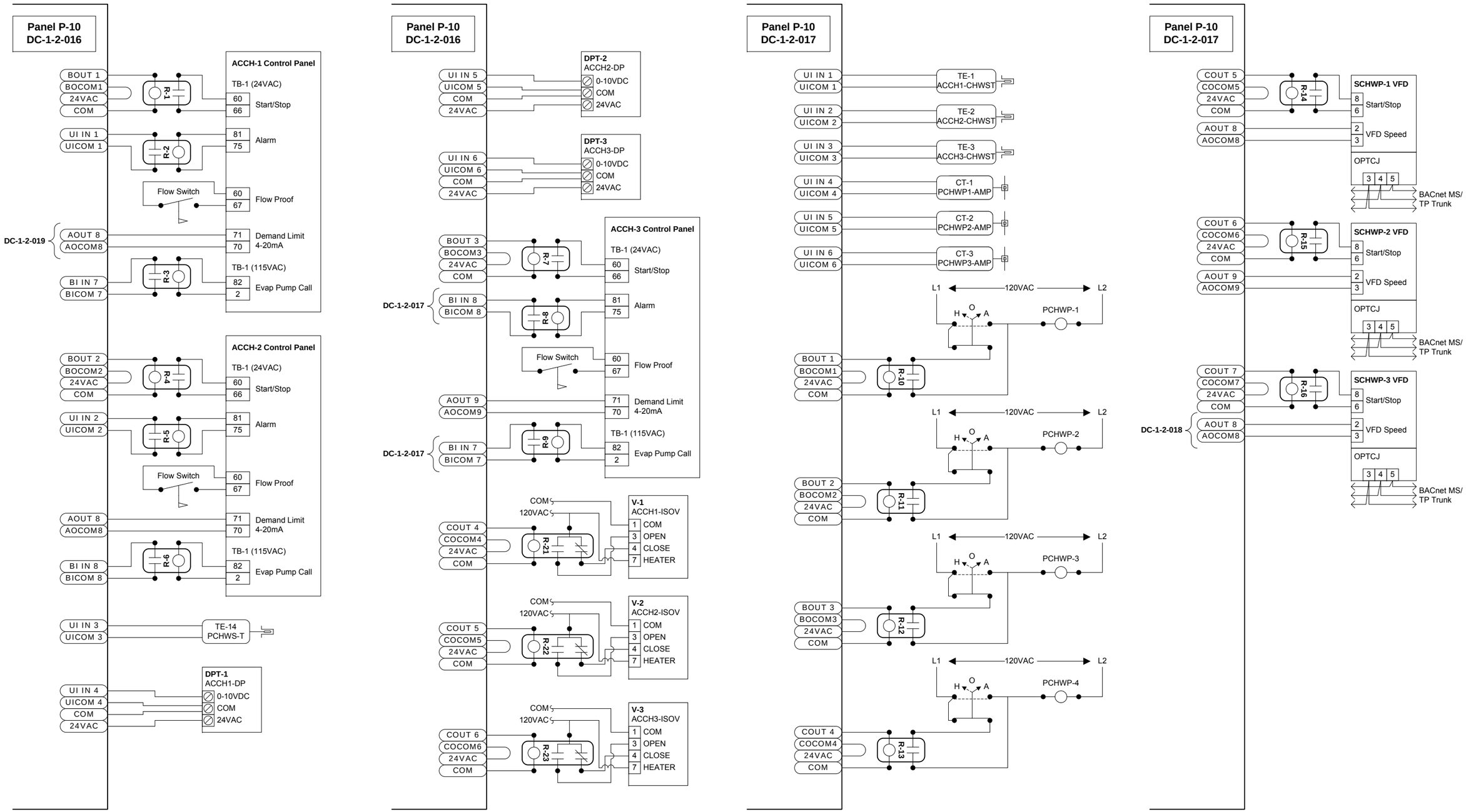
Mechanical Contractor
Address
City, State

Customer
Address
City, State

JOB NUMBER: 10-370	SCALE: NTS	DRAWN BY:	P. Braga
		APPROVED BY:	W. Roskowski
FILE: **Air Cooled Chillers.vsd**			
DATE: 04/13/12	DRAWING NUMBER:	**ATC-7A**	

Submittal		Point Information			Controller Information								Intermediate Device		Field Device			
Tag	Point Type	System Name	Object Name	Expanded ID	Controller Type	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	DO Type	Module Type	Panel	Device	Location	Wiring /Tubing	Device	Location	Comment
		Air Cooled Chlr			FEC/IOM							P-10						Power to Controller
		Air Cooled Chlr			FEC/IOM	MS/TP	2	16				P-10						BacNet FC Bus
	UI IN-1	Air Cooled Chlr	ACCH1-A	ACCH-1 Alarm	FEC/IOM	MS/TP	2	16	UI IN-1			P-10			2/18	Contact (NO)		
	UI IN-2	Air Cooled Chlr	ACCH2-A	ACCH-2 Alarm	FEC/IOM	MS/TP	2	16	UI IN-2			P-10			2/18	Contact (NO)		
	UI IN-3	Air Cooled Chlr	PCHWS-T	Primary CHW Supply Temperature	FEC/IOM	MS/TP	2	16	UI IN-3			P-10						
	UI IN-4	Air Cooled Chlr	ACCH1-DP	ACCH-1 Diff Pressure	FEC/IOM	MS/TP	2	16	UI IN-4			P-10			4/18	0-10VDC		
	UI IN-5	Air Cooled Chlr	ACCH2-DP	ACCH-2 Diff Pressure	FEC/IOM	MS/TP	2	16	UI IN-5			P-10			4/18	0-10VDC		
	UI IN-6	Air Cooled Chlr	ACCH3-DP	ACCH-3 Diff Pressure	FEC/IOM	MS/TP	2	16	UI IN-6			P-10			4/18	0-10VDC		
	BI IN-7	Air Cooled Chlr	EVP1-CAL	Evaporator 1 Call	FEC/IOM	MS/TP	2	16	BI IN-7			P-10	Relay		2/18	Contact (NO)		
	BI IN-8	Air Cooled Chlr	EVP2-CAL	Evaporator 2 Call	FEC/IOM	MS/TP	2	16	BI IN-8			P-10	Relay		2/18	Contact (NO)		
	BO OUT-1	Air Cooled Chlr	ACCH1-C	ACCH-1 Command	FEC/IOM	MS/TP	2	16	BO OUT-1			P-10	Relay		2/18	24VAC Out		
	BO OUT-2	Air Cooled Chlr	ACCH2-C	ACCH-2 Command	FEC/IOM	MS/TP	2	16	BO OUT-2			P-10	Relay		2/18	24VAC Out		
	BO OUT-3	Air Cooled Chlr	ACCH3-C	ACCH-3 Command	FEC/IOM	MS/TP	2	16	BO OUT-3			P-10	Relay		2/18	24VAC Out		
	CO OUT-4	Air Cooled Chlr	ACCH1-ISOV	ACCH-1 Isolation Valve	FEC/IOM	MS/TP	2	16	CO OUT-4			P-10	Relay		2/18	24VAC Out		
	CO OUT-5	Air Cooled Chlr	ACCH2-ISOV	ACCH-2 Isolation Valve	FEC/IOM	MS/TP	2	16	CO OUT-5			P-10	Relay		2/18	24VAC Out		
	CO OUT-6	Air Cooled Chlr	ACCH3-ISOV	ACCH-3 Isolation Valve	FEC/IOM	MS/TP	2	16	CO OUT-6			P-10	Relay		2/18	24VAC Out		
	CO OUT-7	Air Cooled Chlr			FEC/IOM	MS/TP	2	16	CO OUT-7			P-10						
	AO OUT-8	Air Cooled Chlr	ACCH2-DL	ACCH-2 Demand Limit	FEC/IOM	MS/TP	2	16	AO OUT-8			P-10			2/18	4-20mA		
	AO OUT-9	Air Cooled Chlr	ACCH3-DL	ACCH-3 Demand Limit	FEC/IOM	MS/TP	2	16	AO OUT-9			P-10			2/18	4-20mA		
		Air Cooled Chlr			FEC/IOM							P-10						Power to Controller
		Air Cooled Chlr			FEC/IOM	SA Bus	2	17				P-10						BacNet SA Bus
	UI IN-1	Air Cooled Chlr	ACCH1-CHWST	ACCH-1 CHW Supply Temp	FEC/IOM	SA Bus	2	17	UI IN-1			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-2	Air Cooled Chlr	ACCH2-CHWST	ACCH-2 CHW Supply Temp	FEC/IOM	SA Bus	2	17	UI IN-2			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-3	Air Cooled Chlr	ACCH3-CHWST	ACCH-3 CHW Supply Temp	FEC/IOM	SA Bus	2	17	UI IN-3			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-4	Air Cooled Chlr	PCHWP1-AMP	PCHWP-1 Amps	FEC/IOM	SA Bus	2	17	UI IN-4			P-10			2/18	4-20mA		
	UI IN-5	Air Cooled Chlr	PCHWP2-AMP	PCHWP-2 Amps	FEC/IOM	SA Bus	2	17	UI IN-5			P-10			2/18	4-20mA		
	UI IN-6	Air Cooled Chlr	PCHWP3-AMP	PCHWP-3 Amps	FEC/IOM	SA Bus	2	17	UI IN-6			P-10			2/18	4-20mA		
	BI IN-7	Air Cooled Chlr	EVP3-CAL	Evaporator 3 Call	FEC/IOM	SA Bus	2	17	BI IN-7			P-10	Relay		2/18	Contact (NO)		
	BI IN-8	Air Cooled Chlr	ACCH3-A	ACCH-3 Alarm	FEC/IOM	SA Bus	2	17	BI IN-8			P-10			2/18	Contact (NO)		
	BO OUT-1	Air Cooled Chlr	PCHWP1-C	PCHWP-1 Command	FEC/IOM	SA Bus	2	17	BO OUT-1			P-10	Relay		2/18	24VAC Out		
	BO OUT-2	Air Cooled Chlr	PCHWP2-C	PCHWP-2 Command	FEC/IOM	SA Bus	2	17	BO OUT-2			P-10	Relay		2/18	24VAC Out		
	BO OUT-3	Air Cooled Chlr	PCHWP3-C	PCHWP-3 Command	FEC/IOM	SA Bus	2	17	BO OUT-3			P-10	Relay		2/18	24VAC Out		
	CO OUT-4	Air Cooled Chlr	PCHWP4-C	PCHWP-4 Command	FEC/IOM	SA Bus	2	17	CO OUT-4			P-10	Relay		2/18	24VAC Out		
	CO OUT-5	Air Cooled Chlr	SCHWP1-C	SCHWP-1 Command	FEC/IOM	SA Bus	2	17	CO OUT-5			P-10	Relay		2/18	24VAC Out		
	CO OUT-6	Air Cooled Chlr	SCHWP2-C	SCHWP-2 Command	FEC/IOM	SA Bus	2	17	CO OUT-6			P-10	Relay		2/18	24VAC Out		
	CO OUT-7	Air Cooled Chlr	SCHWP3-C	SCHWP-3 Command	FEC/IOM	SA Bus	2	17	CO OUT-7			P-10	Relay		2/18	24VAC Out		
	AO OUT-8	Air Cooled Chlr	SCHWP1-O	SCHWP-1 VFD Speed Output	FEC/IOM	SA Bus	2	17	AO OUT-8			P-10			2/18	0-10VDC		
	AO OUT-9	Air Cooled Chlr	SCHWP2-O	SCHWP-2 VFD Speed Output	FEC/IOM	SA Bus	2	17	AO OUT-9			P-10			2/18	0-10VDC		
		Air Cooled Chlr			FEC/IOM							P-10						Power to Controller
		Air Cooled Chlr			FEC/IOM	SA Bus	2	18				P-10						BacNet SA Bus
	UI IN-1	Air Cooled Chlr	PCHWP4-AMP	PCHWP-4 Amps	FEC/IOM	SA Bus	2	18	UI IN-1			P-10			2/18	4-20mA		
	UI IN-2	Air Cooled Chlr	SCHWP1-AMP	SCHWP-1 Amps	FEC/IOM	SA Bus	2	18	UI IN-2			P-10			3/18	4-20mA		
	UI IN-3	Air Cooled Chlr	SCHWP2-AMP	SCHWP-2 Amps	FEC/IOM	SA Bus	2	18	UI IN-3			P-10			3/18	4-20mA		
	UI IN-4	Air Cooled Chlr	SCHWP3-AMP	SCHWP-3 Amps	FEC/IOM	SA Bus	2	18	UI IN-4			P-10			3/18	4-20mA		
	UI IN-5	Air Cooled Chlr	PCHWR-T	Primary CHW Return Temp	FEC/IOM	SA Bus	2	18	UI IN-5			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-6	Air Cooled Chlr	SCHWS-T	Secondary CHW Supply Temp	FEC/IOM	SA Bus	2	18	UI IN-6			P-10			2/18	TE-6300 (1kΩ Ni)		
	BI IN-7	Air Cooled Chlr	ACCH1-ISOVS	ACCH-1 Isolation Valve Status	FEC/IOM	SA Bus	2	18	BI IN-7			P-10			2/18	Contact (NO)		
	BI IN-8	Air Cooled Chlr	ACCH2-ISOVS	ACCH-2 Isolation Valve Status	FEC/IOM	SA Bus	2	18	BI IN-8			P-10			2/18	Contact (NO)		
	BO OUT-1	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	BO OUT-1			P-10						
	BO OUT-2	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	BO OUT-2			P-10						
	BO OUT-3	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	BO OUT-3			P-10						
	CO OUT-4	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	CO OUT-4			P-10						
	CO OUT-5	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	CO OUT-5			P-10						
	CO OUT-6	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	CO OUT-6			P-10						
	CO OUT-7	Air Cooled Chlr			FEC/IOM	SA Bus	2	18	CO OUT-7			P-10						
	AO OUT-8	Air Cooled Chlr	SCHWP3-O	SCHWP-3 VFD Speed Output	FEC/IOM	SA Bus	2	18	AO OUT-8			P-10			2/18	0-10VDC		
	AO OUT-9	Air Cooled Chlr	BYP-V	Bypass Valve	FEC/IOM	SA Bus	2	18	AO OUT-9			P-10			4/18	0-10VDC		
		Air Cooled Chlr			FEC/IOM							P-10						Power to Controller
		Air Cooled Chlr			FEC/IOM	SA Bus	2	19				P-10						BacNet SA Bus
	UI IN-1	Air Cooled Chlr	SCHWR-T	Secondary CHW Return Temp	FEC/IOM	SA Bus	2	19	UI IN-1			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-2	Air Cooled Chlr	BYP-T	Bypass Temperature	FEC/IOM	SA Bus	2	19	UI IN-2			P-10			2/18	TE-6300 (1kΩ Ni)		
	UI IN-3	Air Cooled Chlr	PCHWS-FLO	Primary CHW Supply Flow	FEC/IOM	SA Bus	2	19	UI IN-3			P-10			4/18	0-10VDC		
	UI IN-4	Air Cooled Chlr	SCHWS-FLO	Secondary CHW Supply Flow	FEC/IOM	SA Bus	2	19	UI IN-4			P-10			4/18	0-10VDC		
	UI IN-5	Air Cooled Chlr	CHW-DP	CHW Differential Pressure	FEC/IOM	SA Bus	2	19	UI IN-5			P-10			4/18	0-10VDC		

Submittal		Point Information			Controller Information								Intermediate Device		Field Device			
Tag	Point Type	System Name	Object Name	Expanded ID	Controller Type	Trunk Type	Trunk Nbr	Trunk Addr.	Cable Destination Bay/Terminal	DO Type	Module Type	Panel	Device	Location	Wiring /Tubing	Device	Location	Comment
	UI IN-6	Air Cooled Chlr	SYS-PRES	System Pressure	FEC/IOM	SA Bus	2	19	UI IN-6			P-10			3/18	0-10VDC		
	BI IN-7	Air Cooled Chlr	ACCH3-ISOVS	ACCH-3 Isolation Valve Status	FEC/IOM	SA Bus	2	19	BI IN-7			P-10			2/18	Contact (NO)		
	BI IN-8	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	BI IN-8			P-10						
	BO OUT-1	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	BO OUT-1			P-10						
	BO OUT-2	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	BO OUT-2			P-10						
	BO OUT-3	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	BO OUT-3			P-10						
	CO OUT-4	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	CO OUT-4			P-10						
	CO OUT-5	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	CO OUT-5			P-10						
	CO OUT-6	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	CO OUT-6			P-10						
	CO OUT-7	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	CO OUT-7			P-10						
	AO OUT-8	Air Cooled Chlr	ACCH1-DL	ACCH-1 Demand Limit	FEC/IOM	SA Bus	2	19	AO OUT-8			P-10			2/18	4-20mA		
	AO OUT-9	Air Cooled Chlr			FEC/IOM	SA Bus	2	19	AO OUT-9			P-10						



Air Cooled CHW Plant Wiring Detail

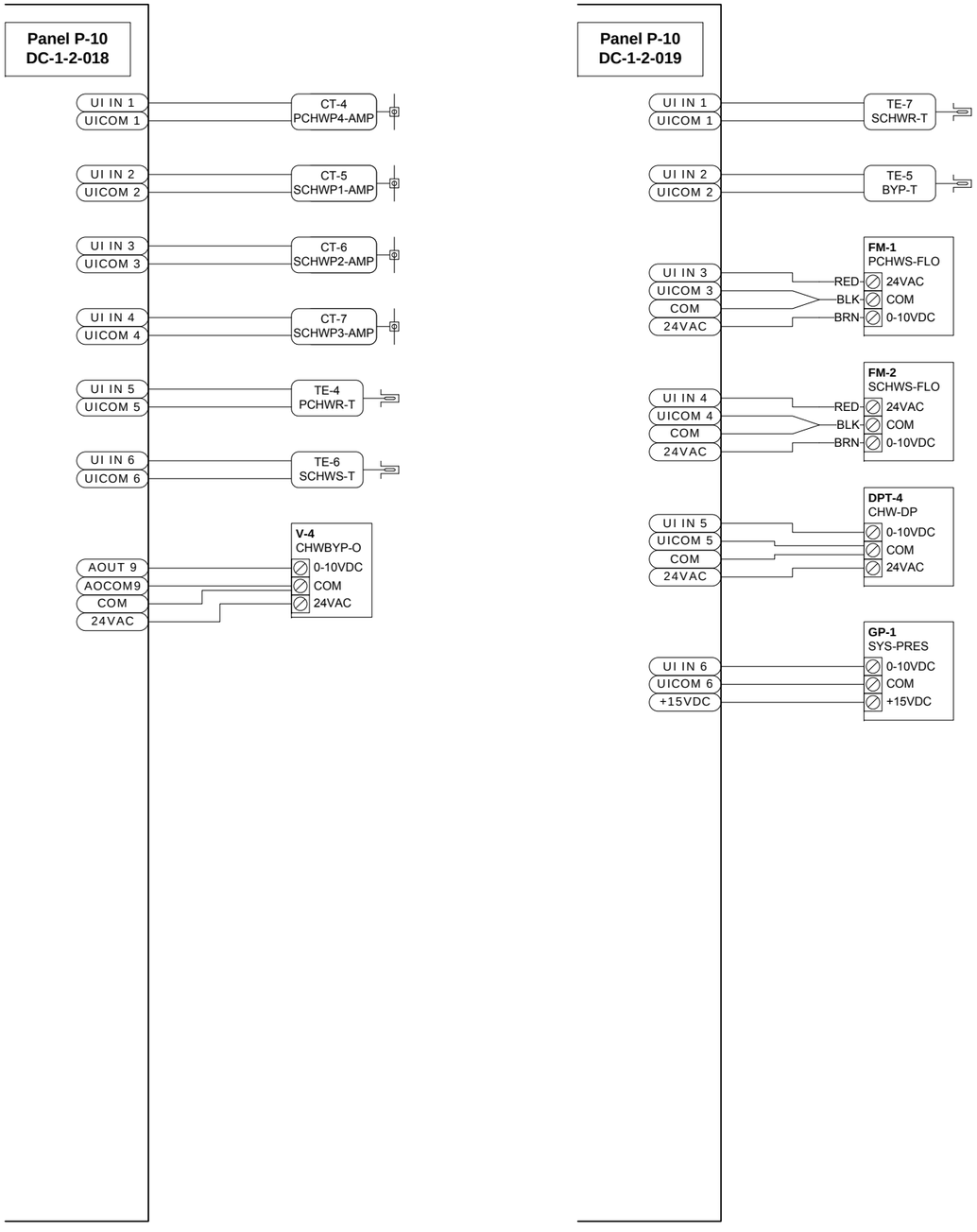
NO.	Date	Revision Record

EMC SERVICES
116 Budlong Road
Cranston, Rhode Island 02920

Mechanical Contractor
Address
City, State

Customer
Address
City, State

JOB NUMBER: 10-370	SCALE: NTS	DRAWN BY:	P. Braga
		APPROVED BY:	W. Roskowski
FILE: **Air Cooled Chillers.vsd**			
DATE: 04/13/12	DRAWING NUMBER:	**ATC-7C**	



Air Cooled CHW Plant Wiring Detail cont'd

NO.	Date	Revision Record

EMC SERVICES
116 Budlong Road
Cranston, Rhode Island 02920

Mechanical Contractor
Address
City, State

Customer
Address
City, State

JOB NUMBER: 10-370	SCALE: NTS	DRAWN BY:	P. Braga
		APPROVED BY:	W. Roskowski
FILE: **Air Cooled Chillers.vsd**			
DATE: 04/13/12	DRAWING NUMBER: **ATC-7D**		