

## CHILLER SEQUENCE OF OPERATIONS

## PART 1 - TEMPERATURE CONTROL SEQUENCES

- A. SEE SCHEMATICS FOR LOCATIONS OF ALL TEMPERATURE TRANSMITTERS, PANELS, DAMPERS, VALVES, AND EQUIPMENT; WHERE SUCH DEVICES ARE NOT INDICATED, HOWEVER REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED BY THE CONTRACTOR AND LOCATED IN THE FIELD BY THE
- B. ALL TEMPERATURE, PRESSURE, AND TIME SET-POINTS SHALL BE FULLY ADJUSTABLE FROM THE CENTRAL CONTROL AND MONITORING STATION

## PART 2 - TEMPERATURE CONTROL SEQUENCES

- A. THE CONTROL MANUFACTURER SHALL PREPARE AND SUBMIT FOR APPROVAL A COMPOSITE CONTROL AND INTERLOCK WIRING DIAGRAM DEPICTING THE CHILLED WATER SYSTEM PROVIDED. THE MANUFACTURER SHALL BE RESPONSIBLE FOR AND SHALL PROVIDE ALL CONTROL AND INTERLOCK WIRING FOR THE ENTIRE SYSTEM INCLUDING THE CHILLER CONTROL SYSTEM AND COMMUNICATION MODULE PROVIDED BY THE CHILLER MANUFACTURER. DIAGRAMS SHALL CLEARLY SHOW HOW CHILLER MANUFACTURER CONTROLS AND OTHER DEVICES WILL INTERFACE WITH THE
- CAMPUS CONTROL SYSTEM. B. START/STOP CONTROL OF ALL CHILLER, CHILLED WATER PUMPS, AND SYSTEM VALVES SHALL BE PROVIDED THROUGH THE CCMS PROVIDED BY THE ATC CONTRACTOR. THE CHILLER MANUFACTURER CONTROL PANEL (CCP) SHALL CONTROL THE CHILLER, CHILLED WATER PUMPS, AND ITS INTEGRAL START/STOP/SAFETY FUNCTIONS. THE CCP AND THE CCMS SHALL PROVIDE ALL STATUS AND ALARM MONITORING FOR EACH SYSTEM COMPONENT AND ALSO INDICATE CHILLER DIAGNOSTIC. START/STOP SETTINGS FOR VARIOUS COMPONENTS SHALL BE PERFORMED MANUALLY THROUGH A HAND, OFF, AUTO (H-O-A) SWITCH OR BY THE CCP AND BAS AS OUTLINED IN THE CONTRACT DOCUMENTS.
- C. THE PLANT CONTROLLER SHALL BE RESPONSIBLE FOR STARTING THE CHILLER, WHICH SHALL INITIATE CHILLER AND CHILLED WATER PUMP. THE CHILLER "START" PUSHBUTTON MAY ALSO BE ACTIVATED FROM THE CCMS TERMINAL ALL CHILLER SAFETY CONDITIONS MUST BE SATISFIED FOR A SYSTEM START ORDER TO PROCEED. IF ANY SYSTEM CONDITIONS ARE NOT NORMAL OR CHILLER DIAGNOSTICS ARE INDICATED ON THE CCP, A MESSAGE SHALL BE DISPLAYED INDICATING THE SPECIFIC PROBLEM AT THE CCMS. A DISPLAY ON THE CCMS WILL SHOW WHEN SYSTEM START WAS
- INITIATED. D. THE CHILLER SHALL BE INITIALLY MANUALLY INDEXED TO THE AUTOMATIC POSITION VIA THE H-O-A SWITCH ON THE INTEGRAL UNIT STARTER. ALL CHILLED WATER PUMPS SHALL BE INITIALLY MANUALLY INDEXED TO THE AUTOMATIC POSITION VIA THE H-O-A SWITCH ON THE PUMP VARIABLE
- FREQUENCY DRIVES (VFDS). E. THE CHILLED WATER SYSTEM SHALL BE ENERGIZED MANUALLY THROUGH THE CCMS OPERATOR'S WORK STATION, AUTOMATICALLY WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE FIFTY-FIVE (55) DEGREES FAHRENHEIT (ADJUSTABLE), AUTOMATICALLY ON A 365 DAY/24 HOUR GRAPHIC
- INTERFACE SCHEDULER PROGRAM, OR AUTOMATICALLY ON A NEED FOR CHILLED WATER FROM ANY SYSTEM LOAD. F. THE CCMS SHALL INITIATE A SYSTEM SOFT START MODE WHENEVER THE SYSTEM CHILLED WATER SUPPLYTEMPERATURE EXCEEDS THE CHILLED WATER SUPPLY SET-POINT BY 20°F (ADJUSTABLE) AT SYSTEM START-UP. THE CHILLER PLANT CONTROL APPLICATION WILL ADD COOLING CAPACITY DURING SOFT START MODE ONLY IF RETURN WATER TEMPERATURE IS NOT DECLINING AT A RATE OF AT LEAST 0.5°F PER MINUTE (ADJUSTABLE). SEQUENCE SHALL PREVENT THE UNNECESSARY OPERATION OF CHILLERS AND LIMIT SYSTEM ELECTRICAL DEMAND DURING CHILLED WATER LOOP
- PULL DOWN. G. PUMPS SHALL OPERATE IN A LEAD-LAG CONTROL CONFIGURATION TO LIMIT WEAR ON A SINGLE PUMP.

POINT OF 44°F (ADJUSTABLE) AS SEEN BY THE SUPPLY TEMPERATURE SENSOR (TS-CH-1).

- H. CHILLER AND PUMPS SEQUENCING
- 1. WHEN THE CHILLED WATER SYSTEM IS ENERGIZED, THE CHILLER SHALL BE ENERGIZED. THE PRIMARY CHILLED WATER PUMP SHALL ENERGIZE AND SOFT START TO REDUCED VFD SPEED (ADJUSTABLE). REDUCED STARTING SPEED SHALL BE 10% GREATER THAN THE CHILLER MANUFACTURER'S PUBLISHED MINIMUM EVAPORATOR FLOW AND SHALL BE FULLY ADJUSTABLE THROUGHOUT THE RANGE OF THE DRIVE. THE
- CCMS AND TAB CONTRACTOR SHALL VERIFY FLOW WITH THE CHILLER MANUFACTURER. 2. THE PRIMARY CHILLED WATER PUMP SPEED SHALL BE CONTROLLED VIA THE PUMP VFD TO MAINTAIN THE SYSTEM ON A DROP IN THE SYSTEM DIFFERENTIAL PRESSURE BELOW THE SET-POINT, THE CHILLED WATER PUMP SPEED WILL BE DECREASED. THE CONTROLLING DPT SHALL BE THE
- WORST CASE DPT, THE DPT WITH THE LARGEST PRESSURE. ONCE THE PRIMARY CHILLED WATER PUMP IS ENABLED, CHILLER OUTLET VALVE (CV-CHS) SHALL OPEN. 4. CHILLER INTEGRAL FLOW SWITCH SHALL BE INTERLOCKED WITH CHILLER REFRIGERATION AND SAFETY CONTROLS. CHILLER REFRIGERATION CONTROLS SHALL AUTOMATICALLY LOAD/UNLOAD THE CHILLER COMPRESSOR TO MAINTAIN THE CHILLED WATER SUPPLY TEMPERATURE SET-

## I. CHILLER MINIMUM FLOW BY-PASS VALVE CONTROL

PRESSURE EXCEEDS MINIMUM CHILLER FLOW.

- 1. THE CHILLER MINIMUM FLOW BY-PASS LINE AND VALVE SHALL BE SIZED TO ALLOW FOR THE MANUFACTURER'S RECOMMENDED MINIMUM FLOW,
- WITH ALL LOAD CONTROL VALVES CLOSED. THE CHILLER MINIMUM FLOW BY-PASS VALVE SHALL BE A NORMALLY CLOSED VALVE.
- 3. THE CHILLER MINIMUM FLOW BY-PASS VALVE SHALL BE MODULATED TO THE FULLY OPEN POSITION WHEN THE SYSTEM IS SHUTDOWN. THIS SHALL BE DONE TO PREVENT WATER HAMMER WHEN A PUMP IS STARTED AND TO ALLOW FOR MINIMUM FLOW IN THE EVENT THE CHILLER
- CALLS FOR PUMP OPERATION. 4. FOLLOWING THE CONFIRMED START OF THE CHILLER AND WHENEVER SYSTEM IS ENABLED, THE CCMS SHALL MODULATE THE CHILLER MINIMUM FLOW BY-PASS VALVE SUCH THAT THE CHILLED WATER FLOW THROUGH THE OPERATING CHILLER SHALL NOT DROP BELOW THE MANUFACTURER'S RECOMMENDED MINIMUM FLOW. VALVE SHALL MODULATE CLOSED WHEN THE FLOW TO MAINTAIN REMOTE DIFFERENTIAL
- 5. THE CHILLER MINIMUM FLOW SHALL BE DETERMINED BASED ON THE PRESSURE DROP ACROSS THE CHILLER EVAPORATOR BARREL USING HIGH ACCURACY PRESSURE DIFFERENTIAL SENSOR (±0.2% AT CALIBRATED FLOW, ±0.5% AT OTHER FLOW RATES). THE DIFFERENTIAL PRESSURE SET-POINT SHALL BE DETERMINED BASED ON THE MANUFACTURER'S CHILLER PRESSURE DROP RATING CURVES.

## J. ALARMS & FAILURE MODES

- 1. THE CCMS SHALL ALARM ALL SENSED POINTS AND DIAGNOSTIC ALARMS MONITORED BY THE CHILLER CONTROLLER.
- 2. UPON A FAILURE OF THE CHILLER TO OPERATE, AN ALARM SHALL BE ANNUNCIATED AT THE CCMS. 3. UPON A FAILURE OF THE PRIMARY CHILLED WATER PUMP TO OPERATE, AN ALARM SHALL BE ANNUNCIATED AT THE CCMS. THE PRIMARY
- CHILLED WATER PUMP SHALL BE ENERGIZED, AND THE STANDBY CHILLED WATER PUMP SHALL BE ENERGIZED.

## K. PROGRAMS

- 1. THE CHILLED WATER PUMP PRIMARY/STANDBY PROGRAMS SHALL EQUALIZE THE RUN AND LOAD TIMES ON THE EQUIPMENT (ADJUSTABLE).
- CONTROLS SHALL PROVIDE FOR CHILLER OPTIMIZATION. CONTROLS SHALL PROVIDE FOR CHILLER OPTIMIZATION.
- 3. THE CCMS SHALL BE ABLE TO MONITOR AND REDUCE CHILLER PEAK POWER DEMAND THROUGH THE LIMITING OF CHILLER CURRENT DRAW. 4. THE SYSTEM DIFFERENTIAL PRESSURE SET-POINT FOR <u>DPT-1</u> SHALL BE DETERMINED BY THE CCMS AND TAB CONTRACTORS AS REQUIRED TO
- MATCH INSTALLED SYSTEM PERFORMANCE REQUIREMENTS AND MINIMIZE CHILLED WATER PUMP HORSEPOWER USAGE.

## L. CCMS INTERFACE

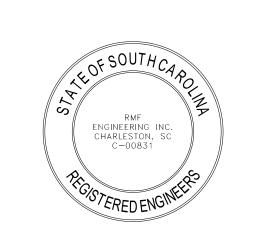
- 1. CHILLER SHALL BE PROVIDED WITH BACNET-COMPLIANT DIGITAL GATEWAY. THE CCMS SHALL BE CONNECTED TO EACH DIGITAL GATEWAY FOR FULL COMMUNICATIONS AND NUMERIC AND GRAPHIC DISPLAY OF THE FOLLOWING CHILLER PARAMETERS: SUPPLY TEMPERATURE, RETURN TEMPERATURE, PROOF OF FLOW, GPM, COMPRESSOR AMPERAGE, COMPRESSOR VOLTAGE, OIL PRESSURE (2 CIRCUITS EACH CHILLER),
- GENERAL CHILLER FAULT/ALARM. 2. THE CCMS SHALL PROVIDE ALL CONTROL LOGIC AND CONTROL FUNCTIONS. SEPARATE ANALOG SUPPLY TEMPERATURE, RETURN TEMPERATURE, AND PRIMARY FLOW MEASUREMENT DEVICES SHALL BE PROVIDED BY THE CCMS CONTRACTOR. THE CCP SHALL CONTROL CHILLER CAPACITY AND SAFETIES ONLY.
- 3. THE CCMS SHALL CONNECT TO ANALOG PRIMARY CHILLED WATER SUPPLY TEMPERATURE, PRIMARY CHILLED WATER RETURN TEMPERATURE AND CHILLED WATER FLOW SIGNALS AT THE CCP.

## M. ELECTRIC HEAT TRACE

- 1. UPON A FALL IN OUTDOOR AIR TEMPERATURE BELOW 40°F (ADJUSTABLE) AS SEEN BY THE GLOBAL OUTDOOR AIR TEMPERATURE SENSOR. THE
- ELECTRIC HEAT TRACE PANEL SHALL BE ENERGIZED VIA REMOTE SIGNAL FROM THE CCMS. 2. ON A RISE IN OUTDOOR AIR TEMPERATURE ABOVE 42°F (ADJUSTABLE), THE ELECTRIC HEAT TRACE PANEL SHALL BE DEENERGIZED.

RMF ENGINEERING, INC 194 SEVEN FARM DRIVE SUITE G CHARLESTON, SC 29492 P: 843-971-9639 F: 843-971-9641





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CHECKED BY: DWZ RMF JOB NO: 03230577.A PROJ. MGR.: DWZ OSE JOB #: PROJECT NAME : ATC - 300 Chiller

2276 Jefferson Davis Hwy,

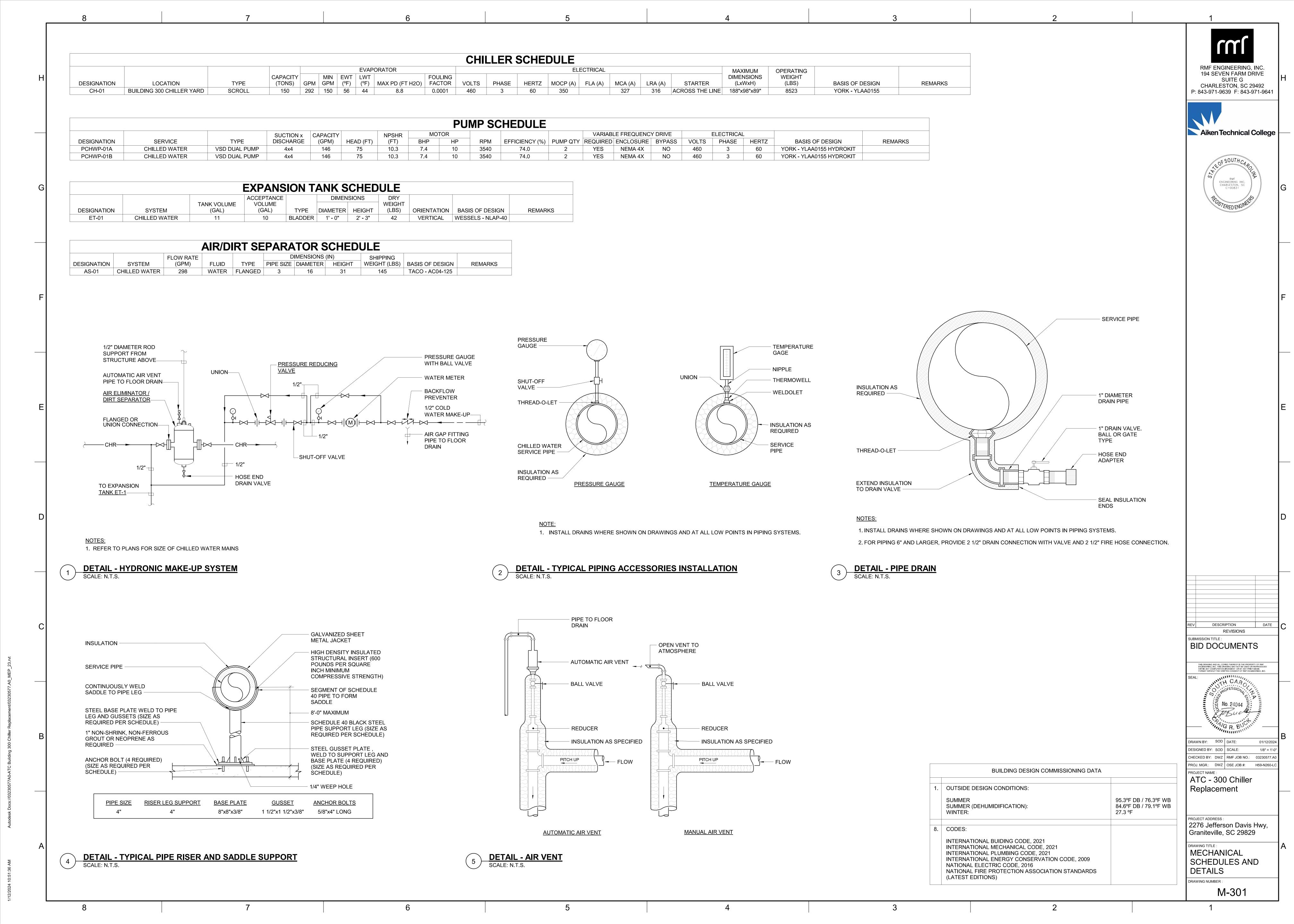
CHILLED WATER **SCHEMATIC** 

Graniteville. SC 29829

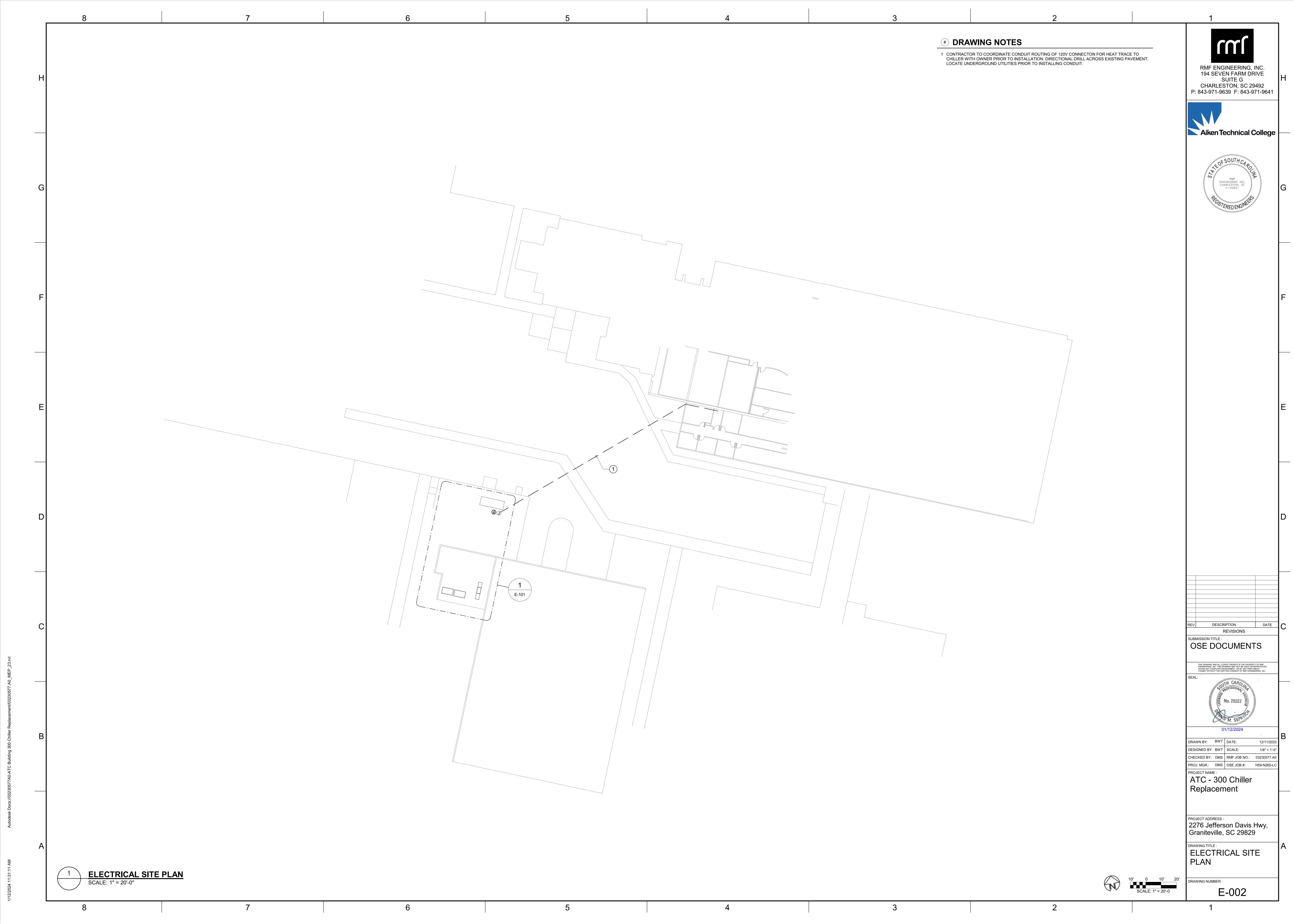
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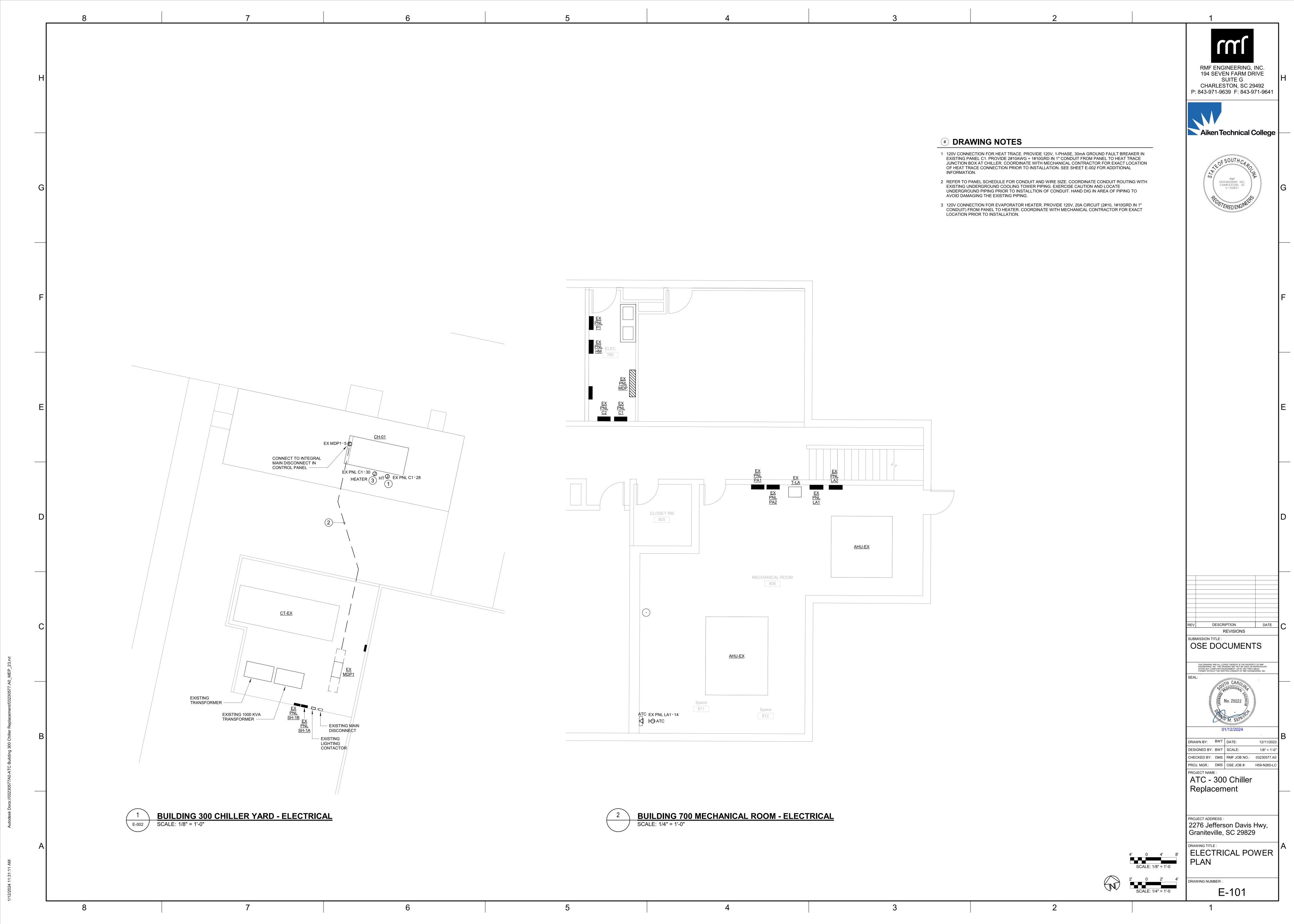
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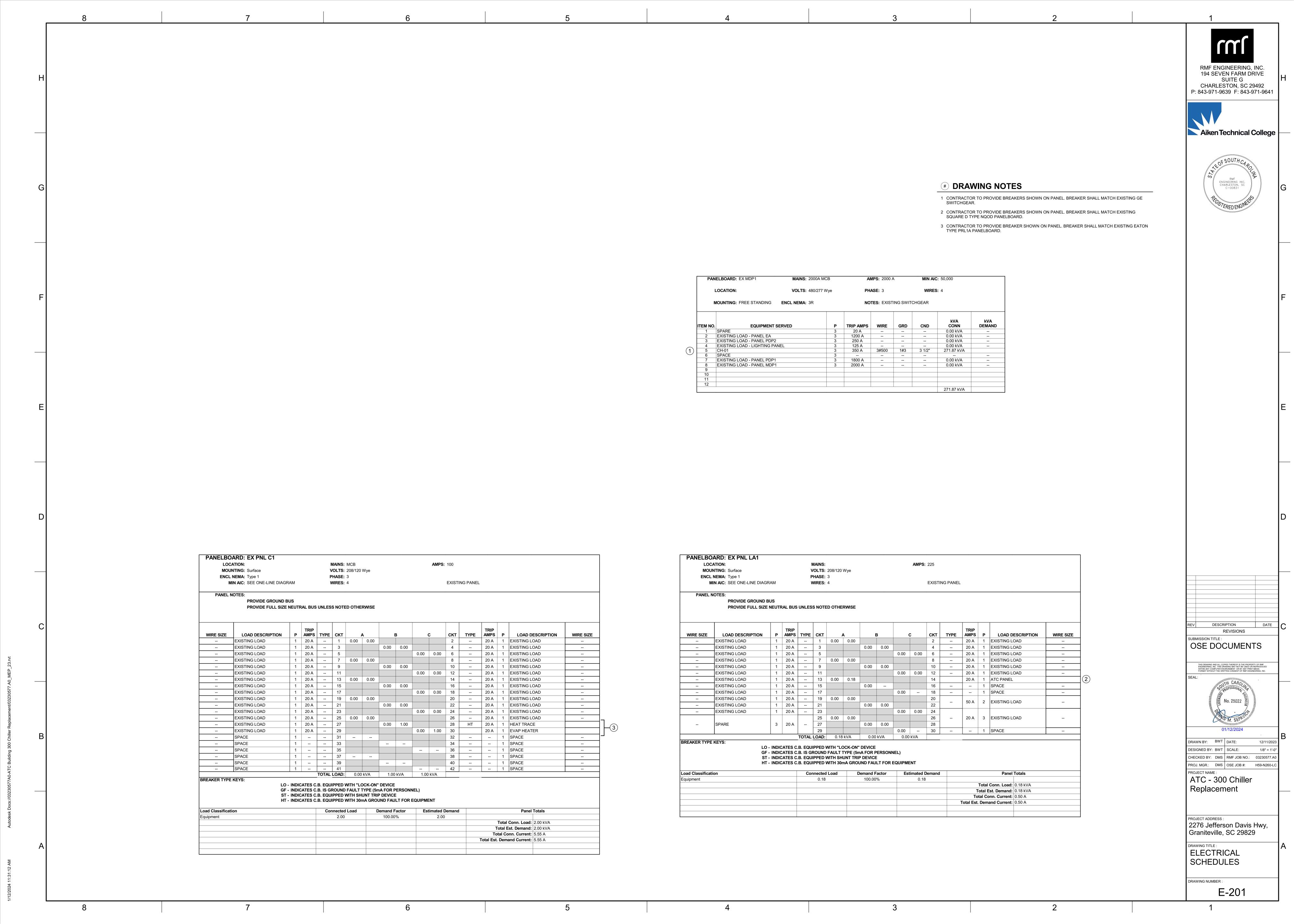
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	ELECTRICAL SYMBOLS							ELECTRICAL ABBREVIATIONS  NOTE: THIS IS A STANDARD ABBREVIATION LIST. SOME ABBREVIATIONS MAY NOT APPEAR ON THE ACCOMPANYING DRAWINGS.					
	SAMBOI	SPECIAL SYSTEMS SYMBOLS  DESCRIPTION	MH (HON)		POWER SYMBOLS				2S1W	2 SPEED SINGLE WINDING 2 SPEED DOUBLE WINDING	KWH	KILOWATT HOUR	
	SYMBOL D田 FIRE A	ALARM HORN TYPE SPEAKER	MH (UON) NOTE 5	<u>symbol</u> \$ Φ	DESCRIPTION  COMBINATION SWITCH AND SIMPLEX RECEPTACLE	MH (UON) 48" TOD	<u>SYMBOL</u>	DESCRIPTION  RACEWAY "UP" OR "TOWARDS"		AMPERE AIR CONDITIONING	LA LC LP	LIGHTNING ARRESTOR LIGHTING CONTACTOR LIGHTING PANEL	RMF ENGINEERING 194 SEVEN FARM SUITE G
	EH FIRE A	ALARM FLASHING STROBE LIGHT - WALL MOUNTED	NOTE 5	<u>\$                                    </u>	COMBINATION SWITCH AND DUPLEX RECEPTACLE	48" TOD	<b>•</b>	RACEWAY "DOWN" OR "AWAY"	AC	ALTERNATING CURRENT ARC FAULT CIRCUIT INTERRUPTER	LRA LTG	LOCKED ROTOR AMPERES LIGHTING	CHARLESTON, SC P: 843-971-9639 F: 843
	<b>VE</b> FIRE A	ALARM HORN	NOTE 5	Ө	SIMPLEX RECEPTACLE	18" CTR		CIRCUIT CONCEALED IN WALLS OR CEILING SPACE: CONDUCTORS SHALL BE MINIMUM 2#12 AWG AND 1#12	AFG	ABOVE FINISHED FLOOR ABOVE FINAL GRADE AIR HANDLING UNIT	LTNG MATV	LIGHTNING  MASTER ANTENNA TELEVISION	
	F COMB LIGHT	BINATION FIRE ALARM HORN AND FLASHING STROBE	NOTE 5	E₩	DUPLEX RECEPTACLE: 'E' (IF SHOWN) INDICATES CONNECTED TO EMERGENCY	18" CTR		AWG GROUND IN 3/4" CONDUIT (UON)	AIC	AMPS INTERRUPTING CAPACITY ALTERNATE	MCB MCC	MAIN CIRCUIT BREAKER MOTOR CONTROL CENTER	
	S F S-CEI	EILING SPEAKER, F - FIRE ALARM SPEAKER		•	CIRCUIT DUPLEX RECEPTACLE: FLOOR MOUNTED			RACEWAY CONCEALED IN SLAB OR BELOW GRADE  BRANCH CIRCUIT HOMERUN TO PANELBOARD:	APPROX	ANNUNCIATOR APPROXIMATELY	MEH MH	METAL HALIDE MANHOLE, MOUNTING HEIGHT	Aiken Technica
	S FIRE A	ALARM SPEAKER W/ STROBE		€	DUPLEX RECEPTACLE: SPLIT WIRED, BOTTOM HALF SWITCHED	18" CTR		QUANTITY OF CIRCUITS INDICATED BY ARROWS NUMBER OF CONDUCTORS SHALL BE MINIMUM 4#12 AWG AND 1#12 AWG GROUND IN 3/4" CONDUIT (UON)	ATC	ARCHITECT AUTOMATIC TEMPERATURE CONTROL AUTOMATIC TRANSFER SWITCH	MLO MSP MTD	MAIN LUGS ONLY MOTOR STARTER PANEL MOUNTED	
	DS HORN	N TYPE SPEAKER		<del>+</del>	DUPLEX RECEPTACLE: CEILING MOUNTED			RACEWAY RUN EXPOSED: CONDUCTORS SHALL BE MINIMUM 2#12 AWG AND 1#12	AV	AUDIOVISUAL AMERICAN WIRE GAUGE	MV	MERCURY VAPOR	e SOUTHO.
	H MAGN	NETIC DOOR HOLDER		<b>⊕•</b>	DUPLEX RECEPTACLE: PEDESTAL TYPE			AWG GROUND IN 3/4" CONDUIT (UON)  BUS DUCT OR CABLE TRAY "UP" OR "TOWARDS"		BUILDING AUTOMATION SYSTEM BELOW FINISHED CEILING	NC NEC NFSS	NORMALLY CLOSED  NATIONAL ELECTRIC CODE  NON-FUSED SAFETY SWITCH	LE OF SOUTH CAR
	DACT DIGITA	AL ALARM COMMUNICATOR TRANSMITTER		<del> </del>	DUPLEX RECEPTACLE: MOUNTED 6" ABOVE BACKSPLASH OR COUNTER			BUS DUCT OR CABLE TRAY "DOWN" OR "AWAY"	BFG BLDG	BELOW FINISHED GRADE BUILDING	NO	NUMBER, NORMALLY OPEN	RMF ENGINEERING INC. CHARLESTON, SC C-00831
	<u>—</u>	ALARM ANNUNCIATOR PANEL		GFI⊖	DUPLEX RECEPTACLE: GROUND FAULT INTERRUPTER TYPE	18" CTR	)	BUS DUCT: TYPE AND SIZE AS INDICATED		BOTTOM OF DEVICE  CONDUIT	OC OFCI	ON CENTER OWNER FURNISHED CONTRACTOR INSTALLED	Prico July
		ALARM CONTROL PANEL	400	GFI₩	DUPLEX RECEPTACLE: GFI MOUNTED 6" ABOVE BACKSPLASH OR COUNTER			TELEPHONE AND POWER POLE ASSEMBLY	CATV CB	CABLE TELEVISION CIRCUIT BREAKER	OFOI OH	OWNER FURNISHED OWNER INSTALLED	COOTERED ENGINE
		CUE ASSISTANCE MASTER CONTROL PANEL CUE ASSISTANCE REMOTE STATION	48" TOD 48"	н⊜	DUPLEX RECEPTACLE: MOUNTED HIGH	84" CTR		CONCRETE ENCASED DUCTBANK BELOW GRADE	CKT, CCT	CLOSED CIRCUIT TELEVISION CIRCUIT CURRENT LIMITING	OH P	OVERHEAD POLE	
		ALARM TRANSPONDER	TOD	IG <b>⊖</b>	DUPLEX RECEPTACLE: ISOLATED GROUND	18" CTR	——W——	SURFACE MOUNTED RACEWAY ASSEMBLY WITH	CLG	CEILING CONNECT	PB PF	PUSHBUTTON POWER FACTOR	
	DOOR DOOR	R SOLENOID, ELECTRIC STRIKE - LOCKING DEVICE		<b>Ø</b> ∃	DUPLEX RECEPTACLE: AT 54" A.F.F.	54" CTR		REMOVABLE COVER MULTI-OUTLET ASSEMBLY: DARK SQUARES INDICATE PREWIRED RECEPTACLE	СТ	CONTROL POWER TRANSFORMER CURRENT TRANSFORMER	PFCC PL	POWER FACTOR CORRECTION CAPACITOR PILOT LIGHT	
	00,	ALARM PULL STATION	48"	<del> </del>	DOUBLE DUPLEX RECEPTACLE	18" CTR	<u> </u>	LOCATIONS SIZE AS INDICATED MULTI-OUTLET ASSEMBLY: WITH RECEPTACLES LOCATED WHERE INDICATED	CU, CO	CENTER COPPER CONNECT TO EXISTING	PLC PNL	PROGRAMMABLE LIGHTING CONTROL PANEL	
		DETECTOR: LEVATOR CONTROLS	TOD	ıG <b>⇔</b> I	DOUBLE DUPLEX RECEPTACLE ISOLATED GROUND	18" CTR		2 CELL MULTI-OUTLET ASSEMBLY:	DC	DIRECT CURRENT	PP Pp PR	POWER PANEL PUMP PAIR	
	A A SMOKI	LEVATOR CONTROLS  KE DETECTOR (PHOTOELECTRIC): AUDIBLE BASE, E = ELEVATOR CONTROLS		сӨ	SIMPLEX RECEPTACLE: CART RECHARGE	36" CTR		WITH COMMUNICATION DEVICES AND RECEPTACLES LOCATED WHERE INDICATED  MULTI-OUTLET ASSEMBLY:	DN	DISCONNECT DOWN DISTRIBUTION PANEL	PRN PT	PRINTER POTENTIAL TRANSFORMER	
		KE DETECTOR (IONIZATION)		c₩	DUPLEX RECEPTACLE: CART RECHARGE	36" CTR		WITH COMMUNICATION DEVICES LOCATED WHERE INDICATED	DPDT DPST	DOUBLE POLE DOUBLE THROW DOUBLE POLE SINGLE THROW	PVC Ø, PH	POLYVINYL CHLORIDE PHASE	
	•	ALARM DUCT DETECTOR WITH RELAY		P₩	DUPLEX RECEPTACLE: PAY PHONE	54" CTR		FLEXIBLE CONDUIT		DOUBLE THROW DRAWING		QUANTITY	
	•	SON MONOXIDE DETECTOR		A <b>©</b> H	SPECIAL RECEPTACLE: NEMA 6-20R (20A, 2P, 3W, 208V)	18" CTR	_	CABLE TRAY	EA	EMERGENCY EACH	RCS REC, RECPT	REMOTE CONTROL SWITCH RECEPTACLE	
	ARC FIRE A	ALARM SYSTEM ADDRESSABLE RELAY - CONTROL		в <b>Ф</b> Н	SPECIAL RECEPTACLE: NEMA 6-30R (30A, 2P, 3W, 208V)	18" CTR	•	GROUND ROD	EF	EMPTY CONDUIT EXHAUST FAN ELECTRIC HEATER	REQ'D RFI	REQUIRED RADIO FREQUENCY INTERFERENCE	
		ALARM SYSTEM ADDRESSABLE RELAY - MONITOR		c <b>⊘</b> H	SPECIAL RECEPTACLE: NEMA 14-20R (20A, 3P, 4W, 208/120V)	18" CTR	× .	LIGHTNING PROTECTION AIR TERMINAL	ELEC ELEV	ELECTRIC ELEVATION, ELEVATOR	RGS RLA RM	RIGID GALVANIZED STEEL RUNNING LOAD AMPERES ROOM	
		ALARM SYSTEM REMOTE ALARM LIGHT		D <b>©</b> H	SPECIAL RECEPTACLE: NEMA 15-30R (30A, 3P, 4W, 208V)	18" CTR		GROUND WIRE	ETR EWC	EXISTING TO REMAIN ELECTRIC WATER COOLER	RVAT	REDUCED VOLTAGE AUTO TRANSFORMER	
		/ SWITCH CONNECTION		A 🚳	SPECIAL RECEPTACLE: FLOOR MOUNTED, NEMA 6-20R			GROUND WIRE		EXISTING EXPOSED	RX SC	REMOVE EXISTING SURGE CAPACITOR	
	TS TAMPE	PER SWITCH CONNECTION		A <b>◎</b> •	SPECIAL RECEPTACLE: PEDESTAL TYPE, NEMA 6-20R			LIGHTNING PROTECTION DOWN LEAD	FAAP	FIRE ALARM FIRE ALARM ANNUNCIATOR PANEL	SEC SN, S/N	SECONDARY SOLID NEUTRAL	
	TRASMITTE RECEIVER FIRE A	ALARM LINEAR BEAM SMOKE DETECTOR: SMITTER (LBT) AND RECEIVER (LBR)		♦·I	TELEVISION RECEPTACLE	72" CTR	ø	UTILITY POLE	FBO	FIRE ALARM CONTROL PANEL FURNISHED BY OTHERS FAN COIL	SP SPD SPDT	SURGE PROTECTION SURGE PROTECTION DEVICE SINGLE POLE DOUBLE THROW	
	<b>▼</b> <sup>F</sup> FIRE F	FIGHTER'S TELEPHONE JACK	48" TOD	н♦⊣	TELEVISION RECEPTACLE	18" BFC			FDR FLA	FEEDER FULL LOAD AMPERES	SPD1 SS SST	SAFETY SWITCH SOLID STATE	
	M MONIT	TOR SYSTEM JUNCTION BOX	36" CTR	©1	CLOCK HANGER OUTLET	84" CTR			FR	FLOOR FRAME FUSED, FUSIBLE	ST SW SWRD	SINGLE THROW SWITCH	
	A AMPLII	IFIER		¹⊕₁ ²⊕₁	PROGRAM CLOCK OUTLET: SINGLE FACE, DOUBLE FACE	84" CTR			FUSS FVNR	FUSED SAFETY SWITCH FULL VOLTAGE NON-REVERSING	SWBD TBR	SWITCHBOARD  TO BE REMOVED	
	K KEYPA	AD	48" TOD	EPO	EMERGENCY POWER OFF SWITCH	48" TOD				FULL VOLTAGE REVERSING GENERATOR, GENERAL		TIME CLOCK E TELEPHONE	
	CR CARD	) READER	TOD 48" TOD	0	JUNCTION BOX				GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TH TOC TOD	TUNGSTEN HALOGEN TOP OF CABINET TOP OF DEVICE	
	DA DOOR	R ALARM CONTACT	.00	Ф	JUNCTION BOX - WALL MOUNTED	48" TOD			GFP	GROUND FAULT INTERRUPTER GROUND FAULT PROTECTED GROUND FAULT RELAY	TRANS, XFMR TTB	TRANSFORMER  TELEPHONE TERMINAL BOARD	
	Roug	GH-IN JUNCTION BOX FOR CCTV CAMERA		€	EQUIPMENT CONNECTION AS NOTED				GRD	GROUND GALVANIZED RIGID STEEL	TYP	TELEPHONE TERMINAL BOARD TWISTED TYPICAL	
	P PUSH	I BUTTON PLATE		<b>©</b> ₁	EQUIPMENT CONNECTION AS NOTED - WALL MOUNTED	48" TOD				HIGH INTENSITY DISCHARGE HAND-OFF-AUTOMATIC	UCB	UNIT CIRCUIT BREAKER	
	<b>↓</b> TELEV	VISION ANTENNA OUTLET	18" CTR	$\Theta_3$	HEATER CONNECTION - NUMBER INDICATES KILOWATTS (3KW)				HP HPS	HEAT PUMP, HORSEPOWER HIGH PRESSURE SODIUM	UG UH UON	UNDERGROUND UNIT HEATER UNLESS OTHERWISE NOTED	
	© CABLE	E TV OUTLET		6	HEATER FAN - CEILING MOUNTED				HTR HV	HEATER HIGH VOLTAGE HERTZ	UV	UNIT VENTILATOR	
	TELEV	VISION SYSTEM SPLITTER - 2 WAY, 4 WAY		CB <sub>1</sub>	ENCLOSED CIRCUIT BREAKER					ISOLATED GROUND	V VFC VFD	VOLTS VARIABLE FREQUENCY CONTROLLER VARIABLE FREQUENCY DRIVE	
	CD A/V CR	REDENZA LOCATION		шъ	NON-FUSED DISCONNECT SWITCH: 30A, 3P (UON)					JUNCTION BOX	W	WATTS, WIRE	
	IP A/V INF	IPUT PLATE		(40A)	FUSED DISCONNECT SWITCH: FUSE SIZE AS INDICATED (40A)					THOUSAND CIRCULAR MILS KILOVOLTS	W/ WP	WITH WEATHER-PROOF	
	R A/V IN-	I-WALL RACK		MS	MAGNETIC MOTOR STARTER				KVA KVAR	KILOVOLT AMPERES KILOVOLT AMPERES REACTIVE	XP	EXPLOSION PROOF	
	MT A/V MC	ONITOR TV		FVNR <sub>1</sub>	COMBINATION MAGNETIC MOTOR STARTER: ABBREVIATION INDICATES TYPE - FVNR, FVR, RVAT, 2S1W, 2S2W, SST				KW	KILOWATTS			
	SC A/V SC	CREEN CONTROL		VFC 1	VARIABLE FREQUENCY CONTROLLER W/ FUSED DISCONNECT SWITCH			CIRCUIT DESIGNATIONS					REV DESCRIPTION REVISIONS
	SP A/V SC	CHEDULING PANEL		VFD 1	VARIABLE FREQUENCY DRIVE W/ DISCONNECT SWITCH		<u>LIGHTING</u>	A # a <u>POWER</u> #			IPMENT DESIGN		SUBMISSION TITLE: OSE DOCUMEN
	ST A/V SIG	IGNAGE TV		Ø <sub>HP</sub>	MOTOR: NUMERALS (IF SHOWN) INDICATE HP		FIXTURE TYF CIRCUIT DES	PE CIRCUIT DESIGNATION			SWITCHGEAR		
	TP A/V TO	OUCH PANEL		© <sub>kW</sub>	GENERATOR: NUMERALS (IF SHOWN) INDICATE KW		(#12AWG MIN	IIMUM)		PNL MCC	SWITCHBOAR PANELBOARD MOTOR CONT	D ITROL CENTER	THIS DRAWING AND ALL COPIES THEREOF IS THE P ENGINEERING, INC. THIS DRAWING MAY NOT BE USE WITHIN ANY COMPUTER ENVIRONMENT OR BY ANY FORMAT WITHOUT THE WRITTEN CONSENT OF RMF
	<b>⊕</b> DATA/	/TELEPHONE OUTLET, CEILING MOUNTED		\$ <sub>M</sub>	MANUAL MOTOR STARTER W/ THERMAL OVERLOADS		SWITCH DES	GIGNATION ————————————————————————————————————		XFMR	TRANSFORME	IER	SEAL:
	▼ TELEP	PHONE OUTLET	18" CTR	⊕ \$ <sub>M</sub>	MOTOR SWITCH		F1 FAT-	NOAL CVARDOLO NOTEO		EI ECTDIO		AWING PRESENTATION	No. 25022
	□ DATA (	OUTLET	18" CTR	<b>б</b>	MECHANICAL EQUIPMENT CONNECTION - WITH MOTOR		ELECTR	RICAL SYMBOLS NOTES		ELECTRIC	AL UKA	AVVING PRESENTATION	
	<b>▼</b> W TELEP	PHONE OUTLET, WALL MOUNTED	54" CTR	<b>O</b>	MECHANICAL EQUIPMENT CONNECTION - NO MOTOR		ACCOMPANYI			<u>SYMBOL</u> ∧		DESCRIPTION	01/12/2024
	<b>▼</b> <sup>E</sup> TELEP	PHONE OUTLET, EMERGENCY	54" TOD	<b>\$</b>	CONTROL PANEL:		2. REFER TO SI 3. PLAN AND SI 4. ON SINGLE L	PECIFICATIONS FOR DETAILED REQUIREMENTS. ECTION SYMBOLS MAY ALSO BE USED ON RISER DIAGRAMS. INE DIAGRAMS FOR 3 PHASE SYSTEMS, DEVICE QUANTITY = 3, UNLESS		<u></u>	REVISION NU		DRAWN BY: BWT DATE:
	UNSHA	/TELEPHONE OUTLET: HADED AREA = DATA, SHADED AREA = VOICE		СР	TYPE AS INDICATED	40" TOD	OTHERWISE N 5. DEVICE SHA	INCEDIACIONIST ON STANGE GROTEING, BEVIOL GOANTHY = 3, ONLESS  IOTED.  LL BE MOUNTED A MINIMUM OF 90" AFF TO BOTTOM OF DEVICE OR BELOW THE  LING OF NOT LESS THAN 6" TO TOP OF DEVICE, WHICHEVER IS LOWER.			DRAWING NO	NOTE NUMBER	DESIGNED BY: BWT SCALE: CHECKED BY: DMS RMF JOB NO
	NUMEI	ERALS INDICATE QUANTITY OF WIRED JACKS	18" CTR	PB	MOMENTARY CONTACT START-STOP PUSHBUTTON STATION MAINTAINED CONTACT START STOP BUSHBUTTON	48" TOD		IERWISE NOTED, ALL INTERIOR CONDUITS AND BOXES SHALL BE CONCEALED.		XX	_		PROJ. MGR.: DMS OSE JOB #:
	_	PHONE OUTLET, FLOOR MOUNTED		[LRM]	MAINTAINED CONTACT START-STOP PUSHBUTTON STATION	48" TOD				XX	SECTION/ELE	LEVATION IDENTIFICATION	ATC - 300 Chille
	<u>v</u>	OUTLET, FLOOR MOUNTED		ES	MAINTAINED CONTACT EMERGENCY STOP PUSHBUTTON STATION	48" TOD							Replacement
	UNSHA	/TELEPHONE OUTLET, FLOOR MOUNTED: HADED AREA = DATA, SHADED AREA = VOICE ERALS INDICATE QUANTITY OF WIRED JACKS			BRANCH PANELBOARD	90" TOC				XX	PART PLAN A	AND DETAIL IDENTIFICATION	
		BINATION POWER & TELEPHONE OUTLET, FLOOR			DISTRIBUTION PANELBOARD					XX			PROJECT ADDRESS:
	MOUN	NTED		Т	TRANSFORMER, CONCRETE PAD MOUNTED							TRICAL WORK LINE TYPE	2276 Jefferson Dav Graniteville, SC 298
		BINATION POWER & DATA OUTLET, FLOOR MOUNTED									FUTURE ELE	ECTRICAL WORK LINE TYPE N LINE TYPE ON DEMOLITION	DRAWING TITLE :
		BINATION POWER & DATA/TELEPHONE OUTLET, PRINCE MOUNTED											ELECTRICAL N SYMBOLS AND
		LESS ACCESS POINT											ABBREVIATION
	WAP WIREL	LEGG AGGEGGT GINT											DRAWING NUMBER :







- THOROUGHLY EXAMINE THE ARCHITECTURAL, STRUCTURAL AND MECHANICAL DRAWINGS PRIOR TO COMMENCEMENT OF ANY WORK. COORDINATE WORK WITH ALL OTHER TRADES.
- ALL ELECTRICAL EQUIPMENT SHALL BE NEW, OF FIRST QUALITY, AND SHALL BE FURNISHED, DELIVERED, ERECTED, CONNECTED, AND FINISHED IN EVERY DETAIL.
- THE WORK INCLUDES, BUT IS NOT LIMITED TO, THE FOLLOWING COMPLETE ITEMS OR SYSTEMS: A SYSTEM OF INTERIOR WIRING, FIRE ALARM SYSTEM, LIGHTING FIXTURES, LAMPS AND CONNECTION TO EQUIPMENT PROVIDED UNDER OTHER SECTIONS OF THE SPECIFICATION.
- . CONTRACTOR SHALL PROVIDE TEMPORARY LIGHTING AND POWER AS REQUIRED DURING CONSTRUCTION.
- ALL MATERIALS REQUIRED FOR THE WORK SHALL BE NEW, OF FIRST QUALITY, AND SHALL BE FURNISHED, DELIVERED, ERECTED, CONNECTED AND FINISHED IN EVERY DETAIL, AND SHALL BE SO SELECTED AND ARRANGED AS TO FIT PROPERLY INTO BUILDING SPACES. WHERE NO SPECIFIC KIND OR QUALITY OF MATERIAL IS GIVEN, A FIRST-CLASS STANDARD ARTICLE AS APPROVED BY THE ENGINEER SHALL BE PROVIDED.
- 7. THESE PLANS AND SPECIFICATIONS ARE INTENDED TO PROVIDE A BROAD OUTLINE OF THE WORK AND EQUIPMENT REQUIRED, BUT ARE NOT INTENDED TO INCLUDE ALL THE DETAILS OF CONSTRUCTION.
- 8. ALTHOUGH THE LOCATION OF EQUIPMENT MAY BE SHOWN ON THE ELECTRICAL PLANS IN A CERTAIN PLACE, THE CONSTRUCTION OF THE BUILDING, MAY DISCLOSE THE FACT THAT THE LOCATION FOR THIS ELECTRICAL WORK DOES NOT MAKE ITS POSITION EASILY AND QUICKLY ACCESSIBLE. IN SUCH CASES, THE CONTRACTOR SHALL CALL ATTENTION TO THIS FACT BEFORE INSTALLING HIS WORK FOR ACTION BY THE ARCHITECT AND SHALL BE GUIDED BY HIS WRITTEN INSTRUCTIONS.
- IT SHALL BE NOTED THAT A REASONABLE SHIFTING IN LOCATION OF OUTLETS (BEFORE INSTALLATION)
  WILL BE EXPECTED AND THIS WORK SHALL BE DONE AT NO INCREASED COSTS TO THE OWNER.
  CONTRACTOR SHALL VERIFY DOOR SWINGS PRIOR TO ROUGHING-IN LIGHT SWITCHES.
- 10. THE CONTRACTOR SHALL VERIFY THE SERVICE REQUIREMENTS OF ALL PIECES OF EQUIPMENT BEFORE MAKING FINAL PROVISIONS. SHOP DRAWINGS SHALL BE AVAILABLE FOR CHECKING BEFORE INSTALLATION.
- 11. THE CONTRACTOR SHALL MAINTAIN A SET OF WHITE PRINTS THROUGHOUT THE WORK UPON WHICH HE SHALL CAREFULLY RECORD THE ACTUAL LOCATIONS INCLUDING DIMENSIONS TO LOCATE WHEN DIFFERENT FROM CONTRACT DRAWINGS, EACH PIECE OF ELECTRICAL EQUIPMENT, CONTROL DEVICES, SWITCHES, OUTLETS, WIRES, CABLES, CONDUITS, ETC. UPON COMPLETION OF THE WORK, HE SHALL DELIVER THIS SET OF PRINTS TO THE ARCHITECT. THE ARCHITECT RESERVES THE RIGHT TO WITHHOLD FINAL PAYMENTS UNTIL RECORD "AS-BUILT" DRAWINGS ARE RECEIVED.
- 12. PRIOR TO ACCEPTANCE OF THE FINISHED PROJECT THE CONTARCTOR SHALL PROVIDE TO THE ARCHITECT THREE (3) COPIES OF AN ELECTRICAL SYSTEMS MAINTENANCE MANUAL. EACH COPY SHALL BE BOUND IN A DURABLE, HARDBACK BINDER WITH DATA SHEETS INDIVIDUALLY PUNCHED OR PERFORATED AND ENTERED. DATA SHEETS SHALL BE GROUPED, AND SECTION DIVIDERS SHALL BE PROVIDED AT THE CONTRACTOR'S OPTION, THE MANUAL MAY CONTAIN HEAVY MANILA TIE-FLAP ENVELOPES, PUNCHED AND BOUND IN WITH DATA SHEETS INSERTED IN THE ENVELOPE TO IDENTIFY ITS CONTENTS. THE MANUAL SHALL HAVE AN IDENTIFYING LABEL ON THE FRONT COVER AND SHALL INCLUDE THE FOLLOWING.

ONE (1) ACCEPTED COPY OF THE MATERIALS LIST.

ONE (1) ACCEPTED COPY OF EACH SHOP DRAWING.
ONE (1) COMPLETE COPY OF EACH PANELBOARD DIRECTORY. EACH DIRECTORY SHALL BE A SEPARATE SHEET.
ONE (1) COPY OF EACH CIRCUIT BREAKER TIME-CURRENT CURVE. ONE (1) COPY OF EACH OPERATION

- 13. THE CONTRACTOR SHALL MAKE ARRANGEMENTS FOR INSPECTION FOR THE PROJECT. UPON COMPLETION OF THE WORK, A FINAL INSPECTION CERTIFICATE SHALL BE SUBMITTED TO THE ARCHITECT IN TRIPLICATE. THIS CERTIFICATE SHALL BE SUBMITTED PRIOR TO REQUEST FOR FINAL PAYMENT. THE CONTRACTOR SHALL PAY ALL FEES REQUIRED FOR INSPECTION.
- 14. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO BID DATE TO EXAMINE THE CONDITIONS UNDER WHICH HIS WORK IS TO BE PERFORMED. NO EXTRAS SHALL BE ALLOWED FOR FAILURE TO NOTE EXISTING CONDITIONS.
- 15. USE NEMA TYPE 1 GENERAL PURPOSE ENCLOSURES FOR ALL INDOOR EQUIPMENT, NEMA 3R FOR OUTDOOR EQUIPMENT UNLESS OTHERWISE NOTED.
- 16. PROVIDE ENGRAVED PLASTIC PHENOLIC LAMINATED NAMEPLATES FOR EACH PANELBOARD, CONTROLLER AND DISCONNECT. ENGRAVED NAMEPLATES SHALL BE PROVIDED WITH 1/4" HIGH VERTICAL BLACK LETTERS ON A WHITE BACKGROUND. NAMEPLATES SHALL BE SECURED BY MEANS OF STAINLESS STEEL METAL SCREWS.
- 17. SUBMIT DRAWINGS AND DATA SHEETS OF THE FOLLOWING APPARATUS GIVING FULL INFORMATION AS TO DIMENSIONS, MATERIALS, FITNESS AND OTHER PERTINENT FACTS SPECIFIC TO THIS PROJECT. WHERE OPTIONAL EQUIPMENT, FUNCTIONS OR ITEMS ARE REQUIRED TO MEET THESE SPECIFICATION THEY SHALL BE SPECIFICALLY NOTED. OBTAIN APPROVAL BEFORE THE FOLLOWING APPARATUS INVOLVED IS ORDERED, BUILT, OR INSTALLED: SWITCHBOARD, PANELBOARDS AND CIRCUIT BREAKERS, FUSES, FIRE ALARM SYSTEM, WIRING DEVICES AND PLATES, MOTOR STARTERS, AND LIGHTING FIXTURES.
- 18. ALL CONDUITS PASSING THROUGH FIRE RATED, FIRE RESISTANT OR FIRE STOPPED WALLS, CEILINGS OR FLOORS SHALL BE SEALED WITH FOAM TYPE FIRE RESISTANT SEALANT.

#### 260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- 1. ALL WIRING SHALL BE SINGLE CONDUCTOR ANNEALED COPPER WITH TYPE THHN, OR THWN INSULATION UNLESS OTHERWISE NOTED OR HEREINAFTER SPECIFIED. WIRING SHALL BE RATED 600 VOLTS, AND SHALL COMPLY WITH FEDERAL SPECIFICATION J-C-30. BRANCH CIRCUIT WIRING, NO. 10 AND SMALLER, CONNECTED TO INTERIOR RECEPTACLES, LIGHTING FIXTURES, AND SWITCHES SHALL BE SOLID CONDUCTOR AND MAY BE TYPE THW OR THHN. ALL WIRING NO. 8 AWG AND LARGER SHALL BE STRANDED. WHERE ALLOWED BY THE LOCAL CODES METAL CLAD (M.C.) OR NON-METALLIC (NM) CABLE MAY BE UTILIZED WHERE SPECIFIED HEREINAFTER UNDER WIRING METHODS.
- 2. MINIMUM SIZE OF BRANCH CIRCUIT WIRING IS NO. 12 AWG. MINIMUM SIZE OF NORMAL BRANCH CIRCUIT WIRE IS NO. 10 AWG WHERE USED FOR 120 VOLT BRANCH CIRCUIT HOMERUNS SEVENTY-FIVE (75) FEET AND LONGER.
- 3. ALL PHASE CONDUCTORS SHALL BE FACTORY COLOR CODED TAPE OR COLOR CODED "SLIPPERS", APPLIED AT EACH SPLICE AND TERMINATION IN ACCORDANCE WITH THE FOLLOWING SCHEDULES:

208/120V. SYSTEMS
PHASE - COLOR

A - BLACK

480/277V. SYSTEMS
PHASE - COLOR

A - BROWN

 B - RED
 B - ORANGE

 C - BLUE
 C - YELLOW

 N - WHITE
 N - GRAY

 GRD - GREEN
 GRD - GREEN

- 4. GREEN COLORED INSULATED EQUIPMENT GROUND CONDUCTOR SHALL BE PROVIDED FOR ALL FEEDERS AND FOR ALL BRANCH CIRCUITS.
- 5. FOR WIRE IDENTIFICATION, USE BRADY "QUICK-LABELS" ON ALL CONDUCTORS AT THE TERMINATION OF THE RUN AND IN ALL OUTLETS. CODING SCHEME IS THE RESPONSIBILITY OF THE CONTRACTOR, BUT IS GENERALLY TO FOLLOW THE TERMINAL NUMBERING SCHEME OF THE PANELBOARD. ARRANGE THIS CODING SCHEME SO AS TO PROVIDE QUICK AND EASY IDENTIFICATION OF THE CONDUCTORS. IDENTIFY EACH FEEDER CONDUCTOR IN PULL AND JUNCTION BOXES WITH A STAMPED FIBRE TAG
  - INSTALL ALL UNDERGROUND WIRING IN SCHEDULE 40 PVC RACEWAY, EXCEPT WHERE OTHERWISE SPECIFIED. ALL FEEDERS FROM SWITCHBOARD TO BRANCH CIRCUIT PANELS SHALL BE IN CONDUIT. CONVERT RIGID METAL CONDUIT SWEEPS AND EMERGE FROM GRADE IN RIGID METAL CONDUIT.
- 7. RUN ALL GROUNDING CONDUCTORS IN RACEWAYS.
- 8. ALL 120V BRANCH CIRCUITS SHALL HAVE AN INDIVIDUAL NEUTRAL.
- 9. NO MORE THAN 3 PHASE WIRES IN ANY BRANCH CIRCUIT CONDUIT.

### 260526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

THE LOW VOLTAGE DISTRIBUTION SYSTEM SHALL BE PROVIDED WITH A SEPARATE GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR EACH SINGLE OR THREE-PHASE FEEDER OR BRANCH CIRCUIT. THE REQUIRED GROUNDING CONDUCTOR SHALL BE INSTALLED IN THE COMMON RACEWAY WITH THE RELATED PHASE AND/OR NEUTRAL CONDUCTORS. WHEN THE RACEWAY FOR BRANCH CIRCUITS IS EMT OR METAL SURFACE RACEWAY, A GROUND WIRE SHALL BE INSTALLED IN THE RACEWAY. FLEXIBLE METALLIC CONDUIT EQUIPMENT CONNECTIONS UTILIZED IN CONJUNCTION WITH THE ABOVE SHALL BE PROVIDED WITH SUITABLE GREEN INSULATED GROUNDING CONDUCTORS CONNECTED TO APPROVED GROUNDING TERMINALS AT EACH END OF THE FLEXIBLE CONDUIT.

## 260533 RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

## RACEWAYS:

- ALL RACEWAYS RUN IN CEILING OR WALL SPACE AND EXPOSED ON INTERIOR WALLS SHALL BE EMT. ALL CIRCUIT RACEWAYS SHALL BE CONCEALED WHERE POSSIBLE AND A MINIMUM SIZE OF 3/4" UNLESS OTHERWISE NOTED. ALL RACEWAYS RUN IN SLAB OR EXPOSED ON EXTERIOR WALLS SHALL BE RIGID STEEL OR IMC.
- 2. PROVIDE TRAPEZE TYPE CONDUIT HANGERS EVERY EIGHT (8) FEET FOR STRAIGHT RUNS AND WITHIN THREE (3) FEET OF EACH TERMINATION.
- 3. ELECTRICAL METALLIC TUBING SHALL BE AS MANUFACTURED BY ALLIED CONDUIT OR APPROVED EQUAL. ALL CONDUIT FITTINGS SHALL BE STEEL COMPRESSION FITTINGS.
- 4. RIGID GALVANIZED STEEL CONDUIT SHALL BE THREADED, GALVANIZED OR SHERARDIZED INSIDE AND OUT, AS MANUFACTURED BY ALLIED, TRIANGLE, WESTERN OR WHEATLAND. CONTRACTOR MAY USE INTERMEDIATE GRADE CONDUIT (IMC).
- 5. CONNECTIONS TO VIBRATING EQUIPMENT AND TO LIGHTING FIXTURES SHALL BE MADE WITH FLEXIBLE CONDUIT, GALVANIZED TYPE AS MANUFACTURED BY NATIONAL-FLEX STEEL OR APPROVED EQUAL.
- 6. CONNECTIONS TO EQUIPMENT OR MOTORS LOCATED OUTDOORS SHALL BE MADE WITH LIQUID TIGHT SEAL-TITE CONDUIT WITH COMPRESSION TYPE FITTINGS, AS MANUFACTURED BY CROUSE HIND SERIES LA.
- 7. MAINTAIN SIX (6) INCH MINIMUM CLEARANCE BETWEEN ALL RACEWAY AND PARALLEL RUNS OF WATER PIPES.
- 8. USE OZ/GEDNEY COMPANY TYPE B INSULATING BUSHINGS ON ALL RACEWAY FREE ENDS AND ENTERING PANELS, PULL BOXES, DISCONNECTS, ETC.
- 9. VERTICAL ELBOWS STUBBED OUT OF FLOORS OR EQUIPMENT PADS SHALL BE IMC OR RGS CONDUIT.
- 10. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY PROVIDE UL LISTED FIRE STOPPING MATERIALS.

# OUTLET BOXES:

- 1. AT ALL OUTLETS OF WHATEVER KIND, FOR ALL SYSTEMS, PROVIDE A SUITABLE BOX SPECIALLY DESIGNED TO RECEIVE THE TYPE OF FIXTURE OR DEVICE TO BE MOUNTED THEREON. PROVIDE FIXTURE OUTLET BOXES WITH SUITABLE FIXTURE SUPPORTS OF SIZE AND KIND REQUIRED FOR THE FIXTURE TO BE HUNG.
- 2. PROVIDE BOX COVERS TO FIT OUTLET BOX INSTALLED OF THE REQUIRED DEPTH SO THAT THE EDGE OF THE RING IS FLUSHED WITH THE FINISHED PLASTER, MASONRY, ACOUSTICAL MATERIAL, OR OTHER FINISH.
- 3. PROVIDE JUNCTION OR PULL BOXES WHERE EVER INDICATED OR WHERE REQUIRED TO FACILITATE WIRE PULLING OR CONNECTION. FABRICATE BOXES WITH TWELVE (12) GAUGE MINIMUM GALVANIZED STEEL AND EQUIP WITH SCREW COVER. SIZE BOX PER NEC. LABEL ALL CIRCUITS INSIDE BOX AND ON EXTERIOR OF COVER WITH ONE (1) INCH HIGH STENCILED LETTERS.
  - . BOXES INSTALLED FLUSH IN WALLS SHALL BE SUPPORTED RIGIDELY ON TWO (2) SIDES.

260548 VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

- PROVIDE SEISMIC SUPPORTS AND ANCHORS FOR ELECTRICAL EQUIPMENT, AND SEISMIC BRACING FOR RACEWAY SYSTEMS IN COMPLIANCE WITH THE INTERNATIONAL BUILDING CODE 2015.
- 2. SEISMIC DESIGN CATEGORY AS DEFINED IN IBC: D. SEISMIC OCCUPANCY CATEGORY AS DEFINED IN IBC: III.

#### 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS

- ALL RACEWAYS SHALL BE LABELED WITH SELF ADHESIVE VINYL LABEL WITH BLACK LETTERS
  ON AN ORANGE FIELD. LABEL SHALL INDICATE VOLTAGE AND SYSTEM OR SERVICE TYPE.
- 2. ALL CONDUCTORS SHALL BE INDENTIFIED WITH COLORED SELF-ADHESIVE VINYL TAPE. COLORS SHALL BE AS INDICATED IN SECTION 260519.
- PROVIDE ENGRAVED LAMINATED ACRYLIC OR MELAMINE NAMEPLATES FOR EACH
  PANELBOARD, CONTROLLER AND DISCONNECT. ENGRAVED NAMEPLATES SHALL BE PROVIDED
  WITH 3/8" HIGH VERTICAL BLACK LETTERS ON A WHITE BACKGROUND. NAMEPLATES SHALL BE
  SECURED BY MEANS OF STAINLESS STEEL METAL SCREWS.
- 4. PROVIDE DYMO LABEL AT EACH RECEPTACLE, JUNCTION/OUTLET BOX, AND SWITCH WITH CIRCUIT INFORMATION. LABEL SHALL HAVE BLACK LETTERING ON A CLEAR FIELD.

### 262726 WIRING DEVICES

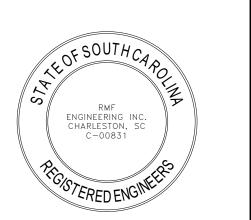
- 1. STANDARDS COMPLIANCE: COMPLY WITH REQUIREMENTS OF APPLICABLE LOCAL CODES, NEC, UL, NEMA, AND IEEE STANDARDS PERTAINING TO WIRING DEVICES. PROVIDE WIRING DEVICES WHICH ARE U.L. LISTED AND LABELED. PROVIDED DEVICE PLATES WHICH ARE U.L. LISTED.
- ALL WALL SWITCHES SHALL BE TOGGLE, QUIET TYPE, FULLY ENCLOSED IN COMPOSITION CASE, 20 AMPERES 120/277 VOLT RATING AS MANUFACTURED BY HUBBELL, PASS AND SEYMOUR, ARROW-HART, LEVITON OR APPROVAL EQUAL.
- 3. ALL RECEPTACLES SHALL BE 20 AMPERES, 120 VOLT, HEAVY DUTY, GROUNDING TYPE, BACK AND SIDE WIRED FULLY ENCLOSED IN COMPOSITION CASE AS MANUFACTURED BY HUBBELL, PASS AND SEYMOUR, ARROW-HART, LEVITON OR APPROVED EQUAL. RECEPTACLES SHALL BE SINGLE OR DUPLEX AS INDICATED ON DRAWINGS
- 4. SWITCHES AND RECEPTACLES SHALL BE IVORY IN COLOR FOR 120 VOLT. RECEPTACLES 250 VOLT SHALL BE BLACK.
- 5. SWITCH AND RECEPTACLE COVER PLATES SHALL BE SHALL BE STAINLESS STEEL
- 6. PROVIDE MULTI-GANG SWITCH COVERPLATES WHERE TWO (2) OR MORE SWITCHES OR RECEPTACLES ARE INDICATED ADJACENT ON THE DRAWINGS. .
- PROVIDE MINIMUM #12 AWG GREEN INSULATED GROUND WIRE FROM DEVICE GROUND LUG TO DEVICE BOX GROUND LUG.

### 262816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- 1. PROVIDE SAFETY SWITCHES WHERE INDICATED AND/OR SPECIFIED.
- 2. SAFETY SWITCHES SHALL MEET FEDERAL SPECIFICATION WS-865C AND NEMA KS1-M83.
- SAFETY SWITCHES SHALL BE MANUFACTURED BY GENERAL ELECTRIC, SQUARE D OR CUTLER HAMMER. SAFETY SWITCHES SHALL BE HORSEPOWER RATED, HEAVY DUTY, QUICK MAKE QUICK BREAK OPERATING MECHANISM, U.L. LISTED, WITH NUMBER OF POLES, FUSES, NEMA TYPE, AND CAPACITIES INDICATED. COVER SHALL BE INTERLOCKED WITH SWITCH HANDLE. VOLTAGE RATING; 240 VOLT FOR 208 VOLT SYSTEM.
- 4. ENCLOSURES SHALL BE NEMA 1 RATED INDOORS, NEMA 3R RATED OUTDOORS, OR AS OTHERWISE INDICATED.

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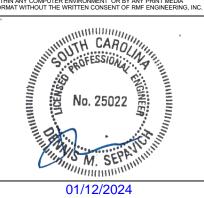
DATE

REVISIONS
SUBMISSION TITLE:

DESCRIPTION

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 DRAWN BY:
 BWT
 DATE:
 12/11/2023

 DESIGNED BY:
 BWT
 SCALE:
 1/8" = 1'-0

 CHECKED BY:
 DMS
 RMF JOB NO.:
 03230577.A0

 PROJ. MGR.:
 DMS
 OSE JOB #:
 H59-N260-LC

 PROJECT NAME :

ATC - 300 Chiller Replacement

Graniteville, SC 29829

DRAWING TITLE:

ELECTRICAL

2276 Jefferson Davis Hwv.

DRAWING NUMBER :

**SPECIFICATIONS** 

E-301

7 4