UPSTATE HUMANITIES PERFORMING ARTS CENTER (HPAC) HVAC REPLACEMENT

SC STATE PROJECT #H34-9545-JM

UNIVERSITY OF SOUTH CAROLINA UPSTATE

Spartanburg, South Carolina

DESIGN TEAM

HUMANITIES & PERFORMING ARTS CENTER (HPAC)

VICINITY MAP

OWNER

UNIVERSITY OF SOUTH CAROLINA UPSTATE
800 UNIVERSITY WAY
SPARTANBURG, SC 29303 (864) 503-5538

MECHANICAL ENGINEER

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JODY C. PARKER, P.E.

ELECTRICAL ENGINEER

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COLUMBIA, SC 29210 (803) 528-1437
JOSEPH W. LAND, P.E.

INDEX OF DRAWINGS

REVISIONS

NO.	DATE	BY	DESCRIPTION
-	-	JCP	-

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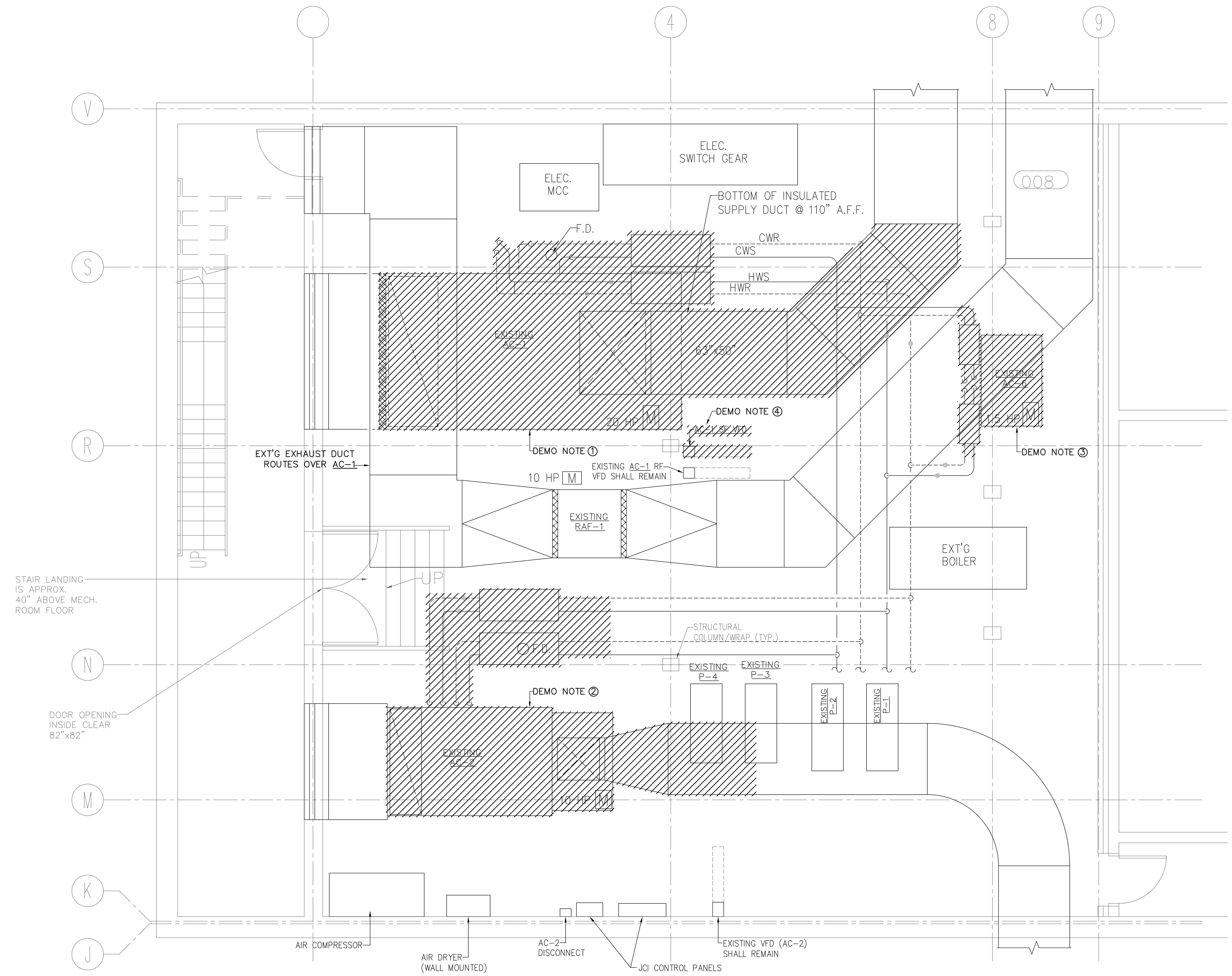
PERITUS SC# P 150203

UPSTATE HUMANITIES PERFORMING ARTS CENTER (HPAC) HVAC REPLACEMENT
SC STATE PROJECT #H34-9545-JM
SPARTANBURG, SOUTH CAROLINA

DESIGN JCP / DRAWN LDF
CHECKED JCP
DATE 9-8-15
JOB NO. PERITUS #150203
SHEET T-1
1 OF 1 SHEETS



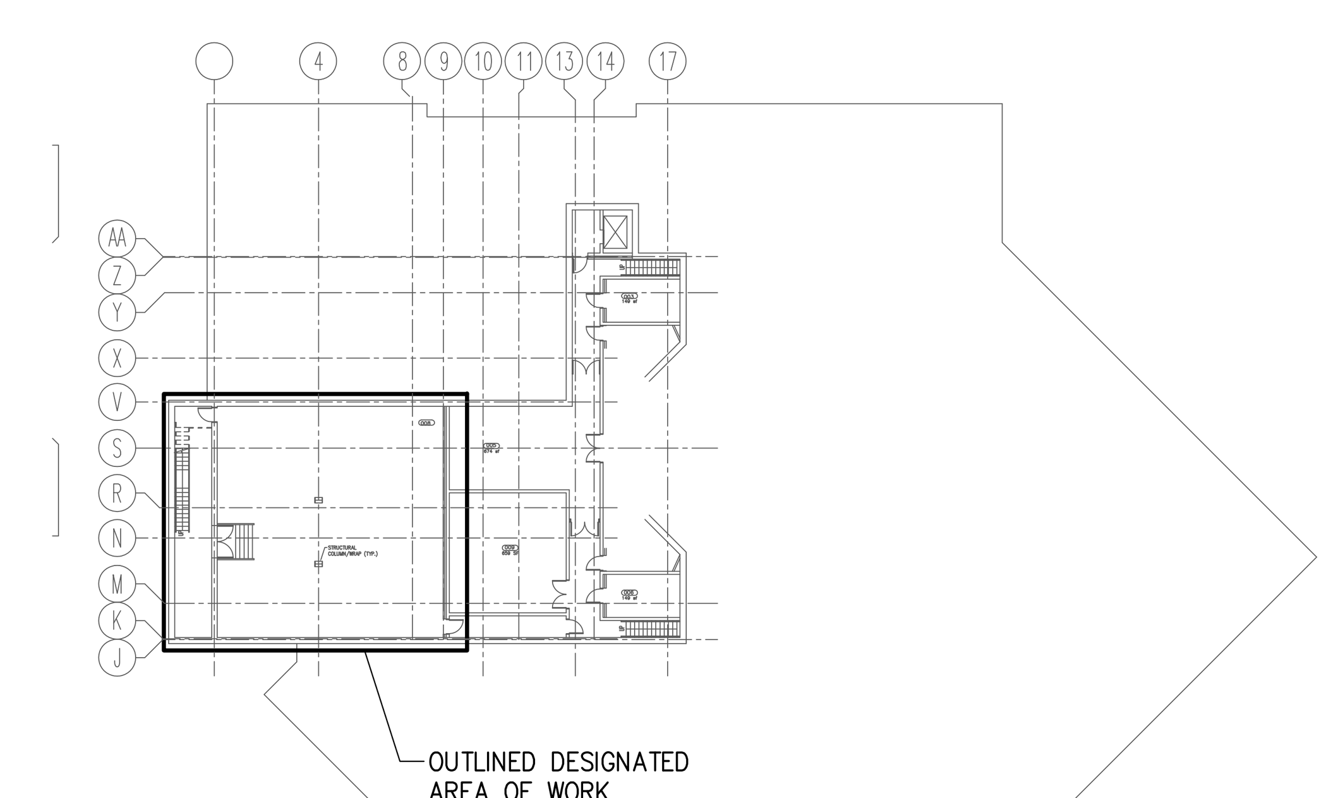
BASEMENT LEVEL HVAC DEMOLITION PLAN

SCALE: ¼" = 1'-0"

HATCHED AREA INDICATES ITEM TO BE REMOVED.

DEMOLITION NOTES:

1. REMOVE EXISTING AC-1 AIR HANDLING UNIT. DISCONNECT FROM EXISTING CHILLED WATER AND HEATING HOT WATER PIPING AND REMOVE EXISTING PIPING WHERE INDICATED. EXISTING OUTSIDE AIR PLENUM SHALL REMAIN. REMOVE EXTENTS OF SUPPLY DUCT WHERE INDICATED TO ALLOW FOR CONNECTION TO NEW AC-1. REMOVE EXISTING DUCT SMOKE DETECTOR AND STORE FOR RE-INSTALLATION IN SUPPLY DUCT UPON NEW AC-1 INSTALLATION.
2. REMOVE EXISTING AC-2 AIR HANDLING UNIT. DISCONNECT FROM EXISTING CHILLED WATER AND HEATING HOT WATER PIPING AND REMOVE EXISTING PIPING WHERE INDICATED. EXISTING OUTSIDE AIR PLENUM SHALL REMAIN REMOVE EXTENTS OF SUPPLY DUCT WHERE INDICATED TO ALLOW FOR CONNECTION TO NEW AC-2. REMOVE EXISTING DUCT SMOKE DETECTOR AND STORE FOR RE-INSTALLATION IN SUPPLY DUCT UPON NEW AC-2 INSTALLATION.
3. REMOVE EXISTING AC-6 AIR HANDLING UNIT. DISCONNECT FROM EXISTING CHILLED WATER AND HEATING HOT WATER PIPING AND REMOVE EXISTING PIPING WHERE INDICATED. EXISTING OUTSIDE AIR PLENUM SHALL REMAIN REMOVE EXTENTS OF SUPPLY DUCT WHERE INDICATED TO ALLOW FOR CONNECTION TO NEW AC-6. REMOVE EXISTING DUCT SMOKE DETECTOR AND STORE FOR RE-INSTALLATION IN SUPPLY DUCT UPON NEW AC-6 INSTALLATION.
4. REMOVE EXISTING AC-1 SUPPLY FAN VFD (20 HP) AND HAND OVER TO OWNER.



KEY PLAN

NO SCALE

REVISIONS

NO.	DATE	BY	DESCRIPTION
-	-	JCP	-

SOUTH CAROLINA PERITUS ENGINEERS & ASSOCIATES, INC. No. C00593 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 25120 JODY C. PARKER 9/29/2015

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PERITUS JOB # 150203

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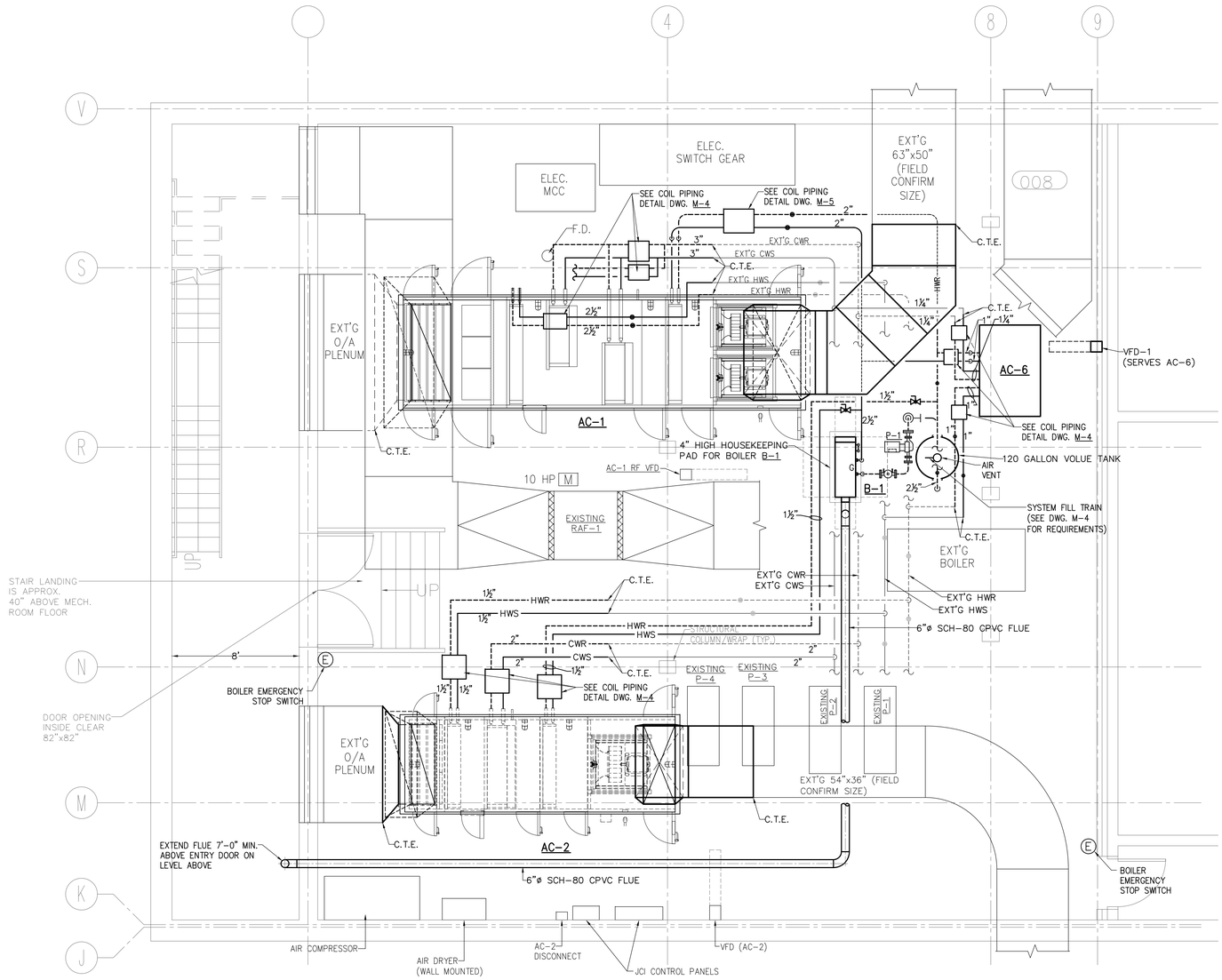
SPARTANBURG, SOUTH CAROLINA

DESIGN / DRAWN	CHECKED	DATE	JOB NO.	SHEET
JCP / LDF	JCP	9-8-15	PERITUS #150203	M-1

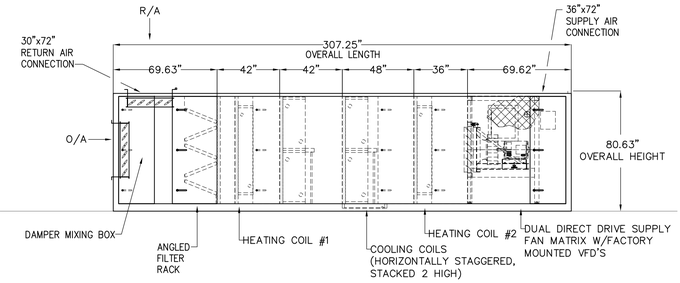
1 OF 5 SHEETS



BASEMENT LEVEL HVAC PLAN

SCALE: ¼" = 1'-0"

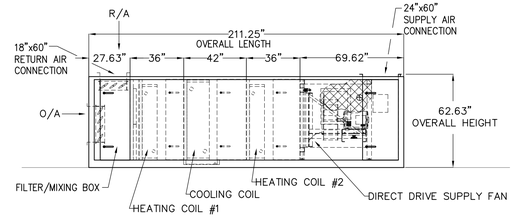
ALL NEW WORK IN **BOLD**



AC-1 ELEVATION DETAIL & SHIPPING SPLITS

NO SCALE

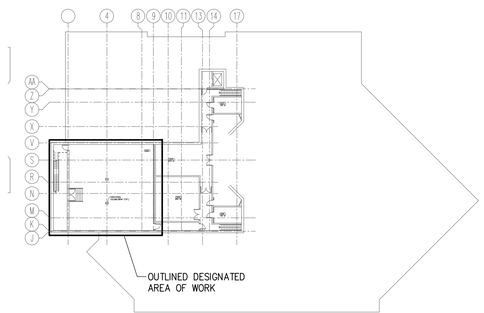
AC-1 SHALL HAVE MAX. OVERALL WIDTH OF 87"



AC-2 ELEVATION DETAIL & SHIPPING SPLITS

NO SCALE

AC-2 SHALL HAVE MAX. OVERALL WIDTH OF 75"



KEY PLAN

NO SCALE

NO.	DATE	BY	DESCRIPTION
-	-	JCP	-

REVISIONS

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030559 PERITUS ENGINEERS & ASSOCIATES, INC. CERTIFICATE OF AUTHORIZATION

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 9/29/2015 No. 25170 JOSEPH C. PARKER

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PERITUS 3.0 # 150203

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SPARTANBURG, SOUTH CAROLINA

DESIGN	DRAWN
JCP	LDF
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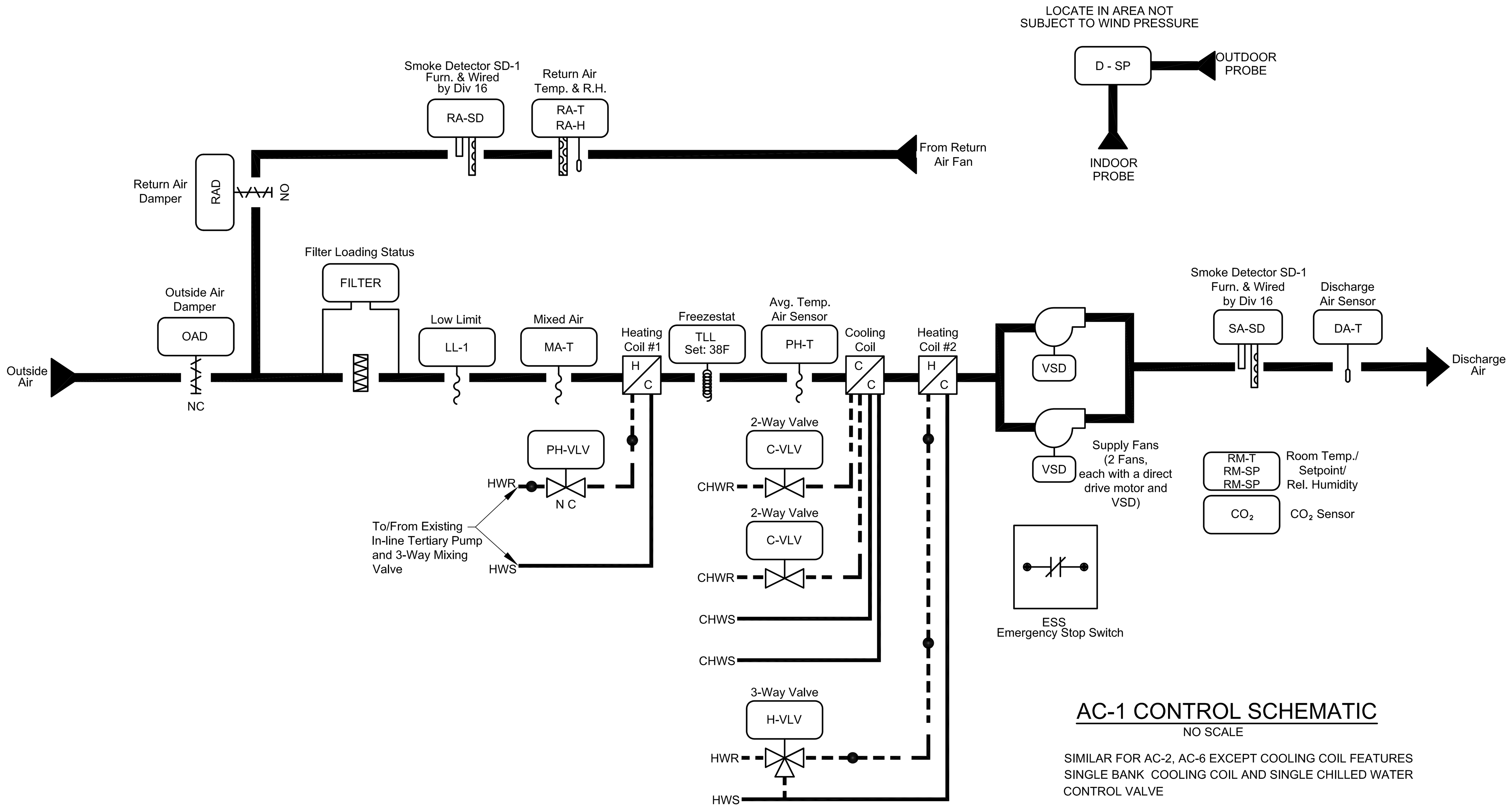
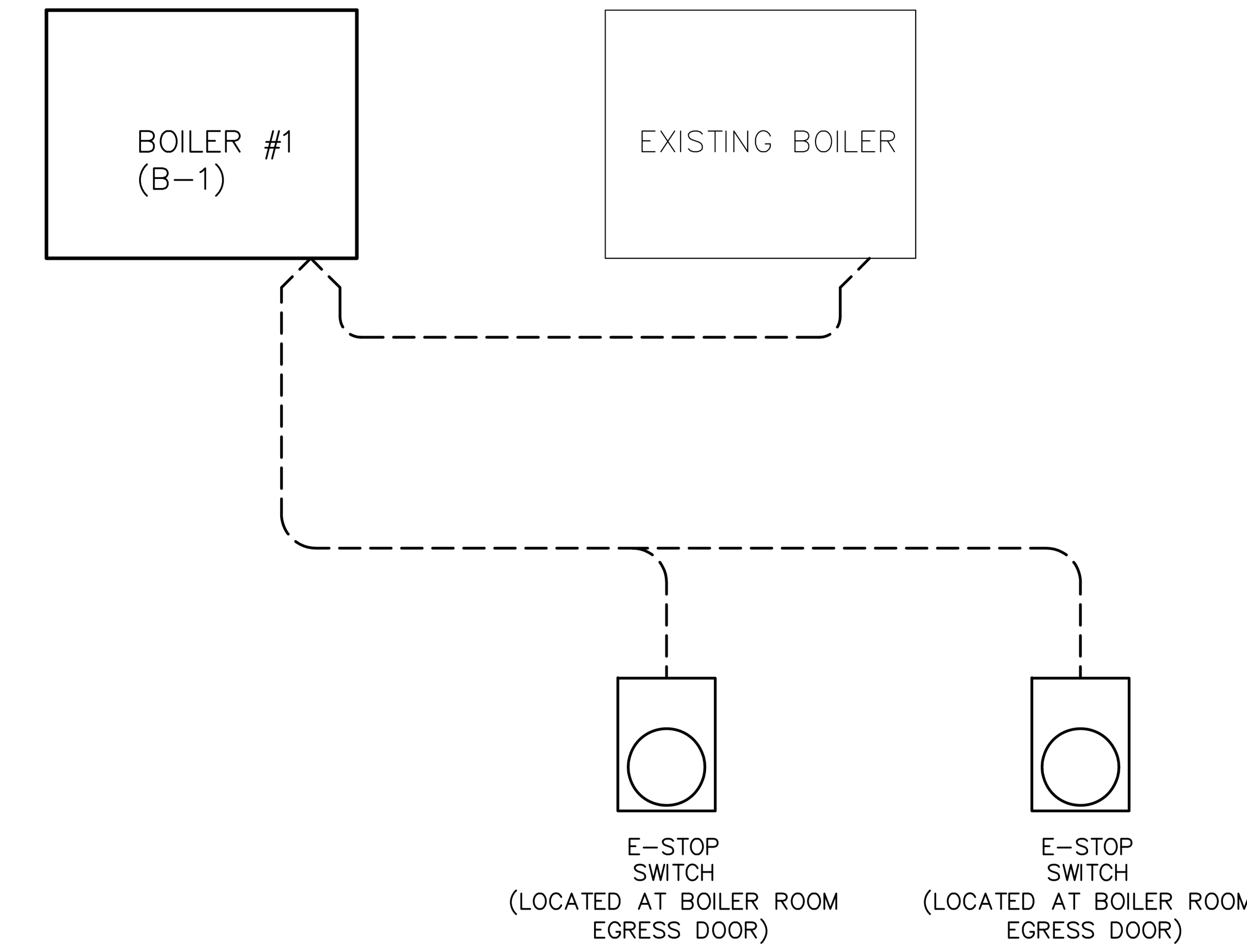
DATE	
9-8-15	
JOB NO.	
PERITUS #150203	
SHEET	
M-2	
2 OF 5 SHEETS	



AC-1 CONTROL SCHEMATIC

NO SCALE

SIMILAR FOR AC-2, AC-6 EXCEPT COOLING COIL FEATURES SINGLE BANK COOLING COIL AND SINGLE CHILLED WATER CONTROL VALVE



BOILER EMERGENCY STOP WIRING SCHEMATIC

NO SCALE

1. FIELD COMMUNICATIONS AND INTERLOCK WIRING/CONDUIT BY CONTROLS SUBCONTRACTOR
2. REFER TO BOILER EMERGENCY STOP LOCATION PLAN ON DWG. M–2 FOR E–STOP SWITCH LOCATIONS.
3. EITHER E–STOP SHALL SHUT DOWN BOTH BOILERS.

Air Handling System AC–1 (Mixed Air Single Zone VAV Systems with Return Fan Economizers)

1. GENERAL

The air handling system shall be started and stopped by the existing "Johnson Controls" Building Management System (BMS). The system shall be provided with safety controls and interlocks to comply with national and local governing codes. Low temperature cutout thermostats shall be provided to protect heating and cooling coils and shall adequately protect each square foot of coil area. At a minimum, the following safety controls shall be provided to stop the system in the event an alarm condition occurs.

2. SAFETY CONTROLS

a. LOW TEMPERATURE CUTOUT THERMOSTATS Shall be located in the air leaving the heating water coil in the air handling unit. Where more than one low limit thermostat is required, provide additional thermostats wired in series for system shutdown and wired in parallel for system alarming.

b. SMOKE DETECTORS Shall be furnished under Division 16 and mounted in duct by HVAC Contractor and shall have alarm contacts wired in series with the fire alarm contact to shutdown the air handling system with an alarm condition. Smoke detectors shall be located in the supply air and return air ducts. Alarm contacts shall also signal the BMS. Detectors to have two sets of isolated contacts. One set to be N.C. set for unit shut–down and the other set to be N. O. for monitoring.

c. Above safety controls, upon activation, shall stop the fans, position control dampers and control valves to their normal fan shutdown position and provide alarm functions to the BMS.

d. Existing Variable Frequency Drives shall feature the following controls points:

Start–Stop (Enable/Disable)
Safety Shut–down
Monitor Run Status
Monitor By–pass Status

e. Drives shall allow hand override of BMS provided all safety Controls are in their normal unalarmed condition. BMS control loops shall be enabled for normal occupied operation anytime the drive is running VFD or bypass. Heating, cooling and economizer cooling (as determined by controls and economizer override) shall operate to maintain the space temperature occupied heat cool setpoints.

f. Shut Down Positions of Devices: Anytime the control system is off, the outside, return air, and relief air dampers and hot water and chilled water valves shall be powered to drive to their normal fan shutdown position. Normal shutdown positions are as follows:

1)

Damper	Normal Position
Outside*	Closed
Relief	Closed
Return	Open

*O.A. dampers to have interlock with supply air fan drive.

2)

Valves	Normal Position
Hot water valve (Heating coil #1)	Open to coil
Chilled water valve	Closed to coil

3. Preprogrammed occupied sequence shall be activated as determined by program controls and as described under BMS.

a. OCCUPIED–UNOCCUPIED MODE CONTROL: The occupied mode will be scheduled or manually commanded at the BMS. In the occupied mode the air handling unit will run continuously. In the unoccupied mode the air handling unit will be off and the room temperature and humidity will be monitored and compared to the night low limit, night high limit, and humidity setpoints. Upon a fall in room temperature below the night low limit setpoint, or a rise in room temperature above the night limit setpoint, or a rise in room relative humidity above setpoint, the air handling unit will be started and remain on until the differential is satisfied. The supply air fan shall be modulated to operate. The return fan shall also operate along with the supply fan.

b. START–STOP CONTROL: The air handling unit will be started and stopped as determined by the Occupied–Unoccupied Mode Control Program. Upon receiving a start command the supply fan and return fans will be started. Supply and return fans shall start at a minimum adjustable frequency drive allowed speed.

c. PREHEAT TEMPERATURE CONTROL: The DDC Controller will enable the inline hot water tertiary pump and modulate open the heating hot water mixing valve at a preset outdoor ambient temperature and modulate the valve as required to maintain space temperature at setpoint.

d. MIXED AIR DAMPER CONTROL (OA, RA & EA DAMPERS): The mixed air dampers will be modulated open on a call for cooling from the space temperature control signal. On a call for cooling, the discharge air temperature setpoint shall be maintained by the chilled water valve and will be modulated open in sequence. A mixed air low limit program will modulate the mixing dampers closed on a fall in mixed air temperature below setpoint (adjustable). The mixing dampers will be modulated open to meet minimum outdoor air requirements by the calculated CO2 differential sensed by a CO2 measuring station in the space and a CO2 sensor in the outside air. The mixed air dampers shall be controlled as defined in the table below:

1) CO2 – Differential of Outdoor Air and Space – 350PPM – Damper Position Closed.
2) CO2 – Differential of Outdoor Air and Space – 700PPM – Damper Position at Minimum or CFM as indicated on the AHU Equipment Schedule.

e. SPACE TEMPERATURE CONTROL: The DDC Controller shall modulate the supply fan as required to maintain the space temperature setpoints of 70ûF (cooling – adjustable) and 75ûF (heating – adjustable). At any time the system is in occupied mode the supply fan shall maintain CFM to meet minimum O/A requirements. In the cooling mode the chilled water valve will be modulated open to 100% then the VFD will ramp in sequence to 100%. There will be a minimum temperature setpoint in the discharge air set at 50ûF (adjustable). In the heating mode the heating valve will be modulated open to the 100% then the VFD will ramp up to 100% speed.

f. SUPPLY FAN CONTROL: The supply fan variable speed drive will be modulated as required to maintain space temperature during the cooling cycle and heating cycles.

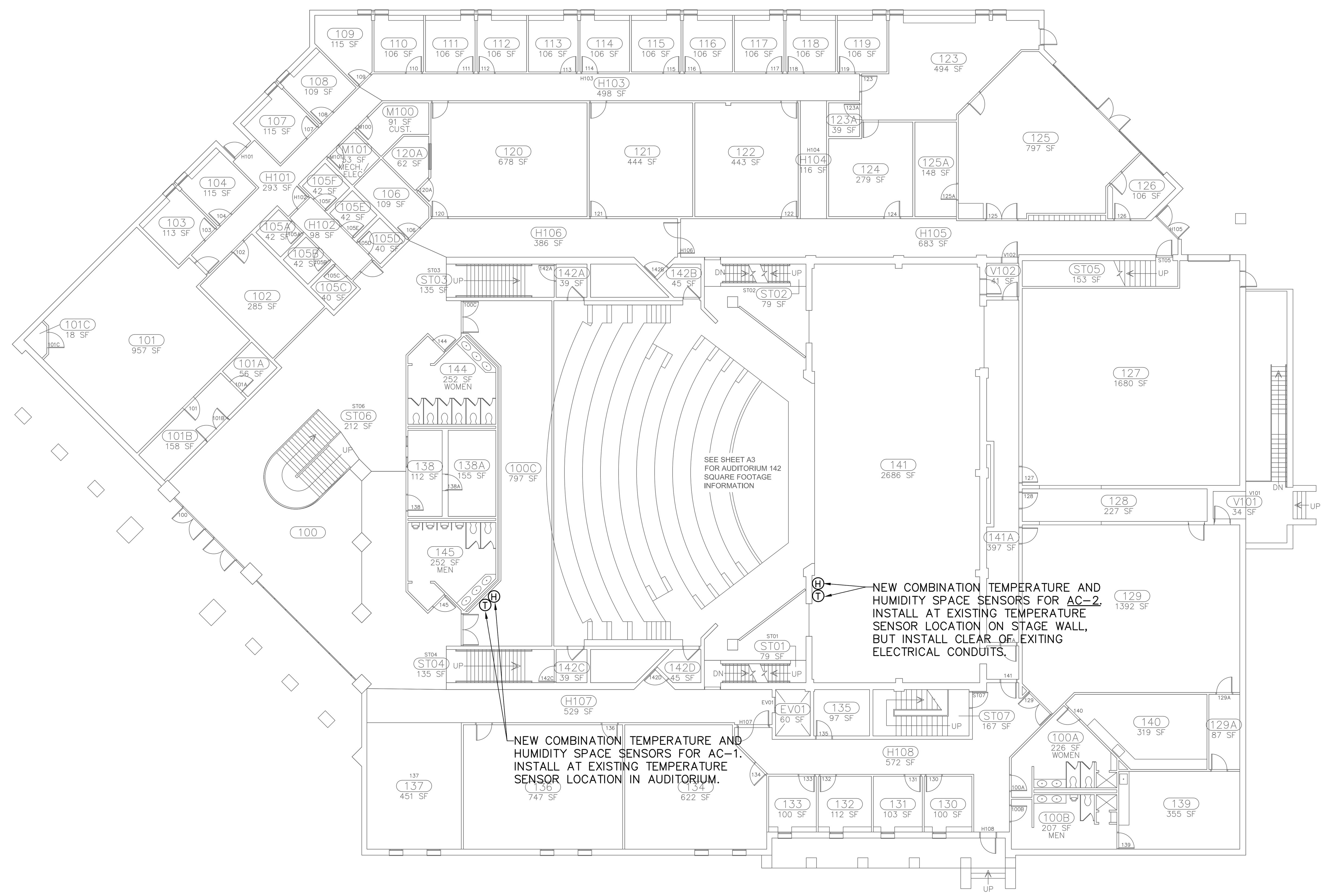
g. RETURN FAN CONTROL: The DDC controller will sense differential pressure between the conditioned space and the outdoors. The return fan variable speed drive will be modulated as required to maintain the differential pressure of 0.1 in W.G. (adjustable) within the space. The return fan shall run continuously when the supply fan is running. In addition, the supply and return airflow quantities shall be used to establish the control differential between supply fan VFD and return fan VFD.

h. FAN SHUTDOWN: The DDC controller will sense the status of the supply fan via current sensing switches. Upon sensing that the supply fan is off, the DDC controller will close the outside air damper, open the return air damper, close the chilled water valve, open the hot water valve.

i. SAFETIES: A fire alarm shutdown relay will stop the unit upon receiving a signal from the fire alarm system. A temperature low limit will stop the unit upon sensing a fall in temperature below setpoint.

k. AIR LOW MEASUREMENT: The supply air and return air quantities shall be monitored and trended by the Building Management System, and shall be used to establish speed setpoints on the Variable Frequency Drive.

l. SPACE RELATIVE HUMIDITY CONTROL: Upon the call for space dehumidification, the DDC controller shall modulate open the chilled water control valves to provide dehumidification. Heating Coil #2 Control Valve and associated condensing boiler & circulating pump shall control space temperature.



OVERALL FIRST LEVEL HVAC PLAN – CONTROL SENSOR LOCATIONS

SCALE: 1/16"= 1'–0"

Ⓣ TEMPERATURE SENSOR (DB)

NO.	DATE	BY	DESCRIPTION
–	–	JCP	–

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SHEET: M–3
3 OF 5 SHEETS

AIR HANDLING UNIT SCHEDULE (CUSTOM & CATALOGUED)

UNIT NO.	MFR. MODEL NO.	AIR SYSTEM TYPE	SUPPLY FAN DATA: CFM TOTAL	CFM O.A. MIN.	T.S.P. INCHES	E.S.P. INCHES	H.P. (QTY.)	VOLTAGE	M.C.A.	M.O.P.
AC-1	CLIMATE CRAFT CUSTOM	SZVAV	20,000	2,000	4.14	2	15 (2)	208/3/60	38.25	60
AC-2	CLIMATE CRAFT CUSTOM	SZVAV	10,000	1,000	3.77	2	10 (1)	208/3/60	15.63	30
AC-6	CARRIER "AERO" 39MN SIZE #06	SZVAV	2,210	200	2.3	1.5	1½ (1)	208/3/60	8.6	15

UNIT NO.	COOLING COIL DATA: TOTAL M.B.H.	ENT. DB F	ENT. WB F	LVG. DB F	LVG. WB F	FACE VELOCITY	S.P. INCHES	G.P.M.	ΔP FT.	MIN. ROWS
AC-1	702.0	75	63	51	50.7	519	0.91	102	7.0	8
AC-2	266.0	75	63	50.8	50.5	487	0.76	38	15	8
AC-6	55.2	75	63	54.6	54.5	450	0.70	9.5	1.0	8

UNIT NO.	HEATING COIL #1 DATA: M.B.H.	ENT. DB F	LVG. DB F	FACE VELOCITY	S.P. INCHES	G.P.M.	ΔP FT.	ROWS
AC-1	434.0	63	83	712	0.13	51	7.0	1
AC-2	217.0	63	83	508	0.09	19	2.0	1
AC-6	48.0	63	83	500	0.1	5	1.0	1

UNIT NO.	HEATING COIL #2 DATA: M.B.H.	ENT. DB F	LVG. DB F	FACE VELOCITY	S.P. INCHES	G.P.M.	ΔP FT.	ROWS
AC-1	485.0	55	77.5	712	0.23	30	3.90	2
AC-2	228.6	55	76	508	0.10	15	1.94	1
AC-6	50.35	55	76	500	0.10	4	1.0	1

CHILLED WATER EWT = 44° ; HEATING WATER EWT = 160°F(HTG COIL #1), 140°F(HTG COIL #2); SZVAV = SINGLE ZONE VARIABLE AIR VOLUME

1. MIXING BOX W/OA & RA DAMPERS AND 2" (MERV 8) FILTERS
2. HEATING COIL #1 UPSTREAM COOLING COIL
3. CHILLED WATER COOLING COIL
4. HEATING COIL #2 DOWNSTREAM COOLING COIL
5. DIRECT DRIVE OPEN SUPPLY FANS W/ INTERNAL VIBRATION ISOLATION (AC-1 & AC-2 ONLY)
6. ODP PREMIUM EFFICIENCY MOTORS (E+3)
7. FACTORY MOUNTED VFD FOR SUPPLY AIR FANS (AC-1 ONLY). VFD SHALL FEATURE MANUAL BYPASS.
8. FIELD INSTALLED AND WIRED SUPPLY FAN VFD (AC-6 ONLY). VFD SHALL FEATURE MANUAL BYPASS.

HIGH EFFICIENCY GAS-FIRED CONDENSING BOILER SCHEDULE

SYMBOL	LOCHINVAR MODEL No.	HEAT TRANSFER PERFORMANCE: HEATING M.B.H (OUTPUT)	G.P.M.	ENT. WATER TEMP. °F	LVG. WATER TEMP. °F	GAS FIRING RATE-MBH (INPUT MAX)	GAS FIRING RATE-MBH (INPUT MIN)	THERMAL EFFICIENCY	VENT DIA. INCHES	ELECTRICAL: VOLTAGE	TOTAL AMPS	REMARKS
B-1	KBN801	752	49	105	130	800	160	94%	6"	115/1/60	2.7	SEE NOTES #1 – #4

NOTES:
1. CONDENSATE NEUTRALIZATION KIT.
2. HIGH & LOW GAS PRESSURE SWITCHES WITH MANUAL RESET.
3. CATEGORY IV SCH. 80 CPVC VENTING.
4. FULLY MODULATING BURNER WITH 5:1 TURNDOWN RATIO.

PUMP SCHEDULE

PUMP No.	B & G MODEL No.	G.P.M. EA.	HEAD FT.	H.P. EA.	VOLTAGE	TRIPLE DUTY VALVE MODEL	SERVICE
P-1	SERIES 60 2"x2"x7"	49	50	3	208/1/60	3DS-2S	BOILER B-1 CIRCULATING PUMP(IN-LINE)

NOTE: 1. PUMP MOTOR STARTER W/120V CONTROL CIRCUIT BY ELECTRICAL.

CONTROL VALVE SCHEDULE

SYMBOL	SERVICE	SIZE	CV	G.P.M	dp FEET	TYPE	NO. REQ'D.
CV-1	AC-1 CLG COIL UPPER	1½"	28.9	50	6.9	2-WAY	2
CV-2	AC-1 CLG COIL LOWER	1½"	28.9	52	7.5	2-WAY	2
CV-3	AC-1 HTG #1 COIL	1½"	28.9	51	7.2	2-WAY	1
CV-4	AC-1 HTG #2 COIL	1½"	18.7	30	5.9	3-WAY	1
CV-5	AC-2 CLG COIL	1½"	18.7	38	9.5	2-WAY	1
CV-6	AC-2 HTG #1 COIL	1¼"	11.7	19	6.1	2-WAY	1
CV-7	AC-2 HTG #2 COIL	1"	7.4	15	9.5	3-WAY	1
CV-8	AC-6 CLG COIL	¾"	4.7	9.5	9.4	2-WAY	1
CV-9	AC-6 HTG #1 COIL	½"	2.9	5	6.9	2-WAY	1
CV-10	AC-6 HTG #2 COIL	½"	1.9	4	10.2	3-WAY	1

CIRCUIT BALANCER SCHEDULE

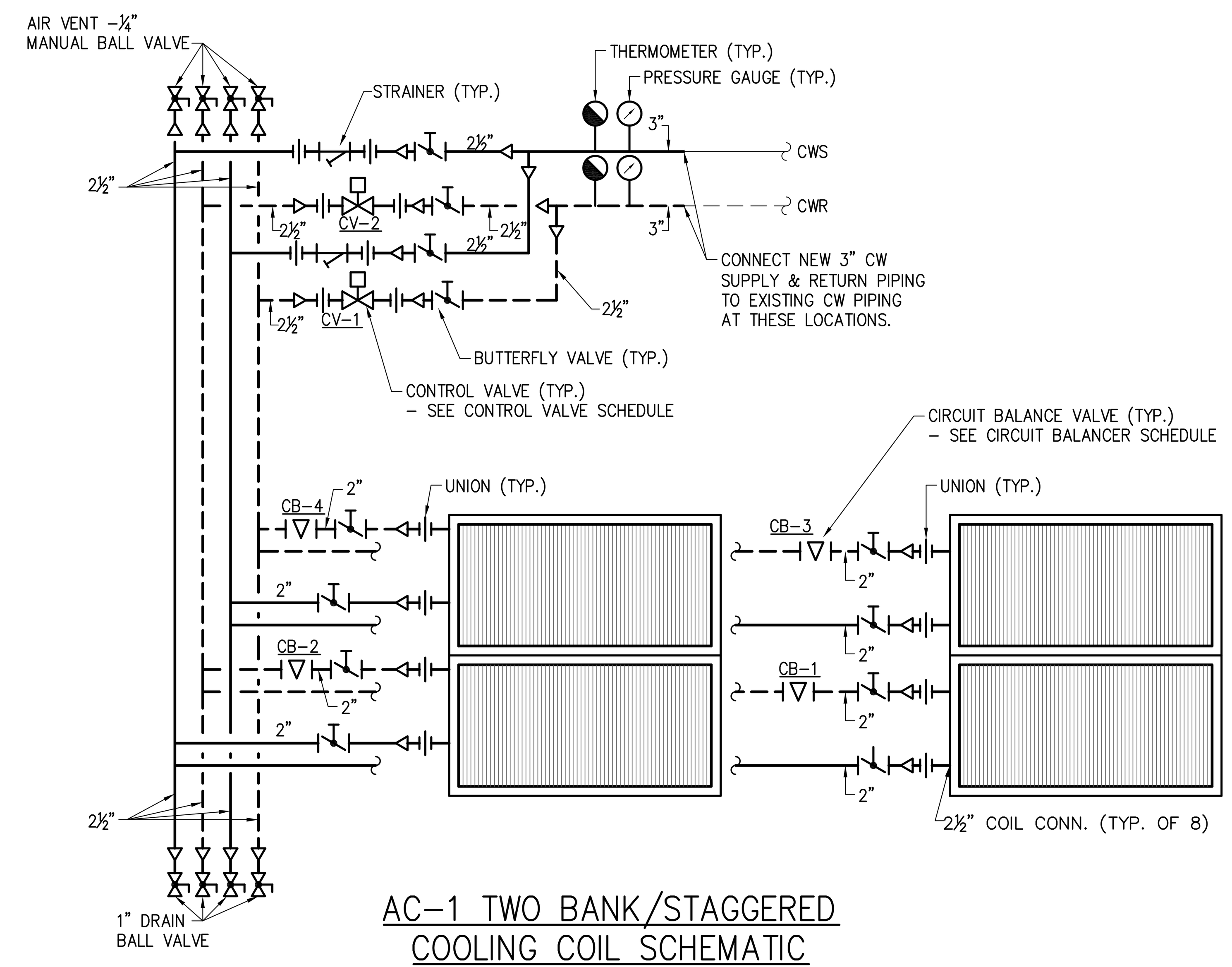
SYMBOL	B&G MODEL	G.P.M.	DP. FEET	APPROX. SETTING	NO. REQ'D.	REMARKS
CB-1	2 CB	26	*	*	1	AC-1 CLG COIL LOWER RIGHT
CB-2	2 CB	26	*	*	1	AC-1 CLG COIL LOWER LEFT
CB-3	2 CB	25	*	*	1	AC-1 CLG COIL UPPER RIGHT
CB-4	2 CB	25	*	*	1	AC-1 CLG COIL UPPER LEFT
CB-5	2 CB	30	*	*	1	AC-1 HTG COIL #2
CB-6	2 CB	30	*	*	1	AC-1 HTG COIL #2 (CV BYPASS)
CB-7	2½" CB	51	*	*	1	AC-1 HTG COIL #1
CB-8	2 CB	38	*	*	1	AC-2 CLG COIL
CB-9	1¼" CB	15	*	*	1	AC-2 HTG COIL #2
CB-10	1¼" CB	15	*	*	1	AC-2 HTG COIL #2 (CV BYPASS)
CB-11	1¼" CB	19	*	*	1	AC-2 HTG COIL #1
CB-12	1¼" CB	9.5	*	*	1	AC-3 CLG COIL
CB-13	¾" CB	4	*	*	1	AC-3 HTG COIL #2
CB-14	¾" CB	4	*	*	1	AC-3 HTG COIL #2 (CV BYPASS)
CB-15	1 CB	5	*	*	1	AC-3 HTG COIL #1

NOTES:
1. * TO BE COMPLETED BY TEST AND BALANCE CONTRACTOR.

VARIABLE FREQUENCY DRIVE SCHEDULE

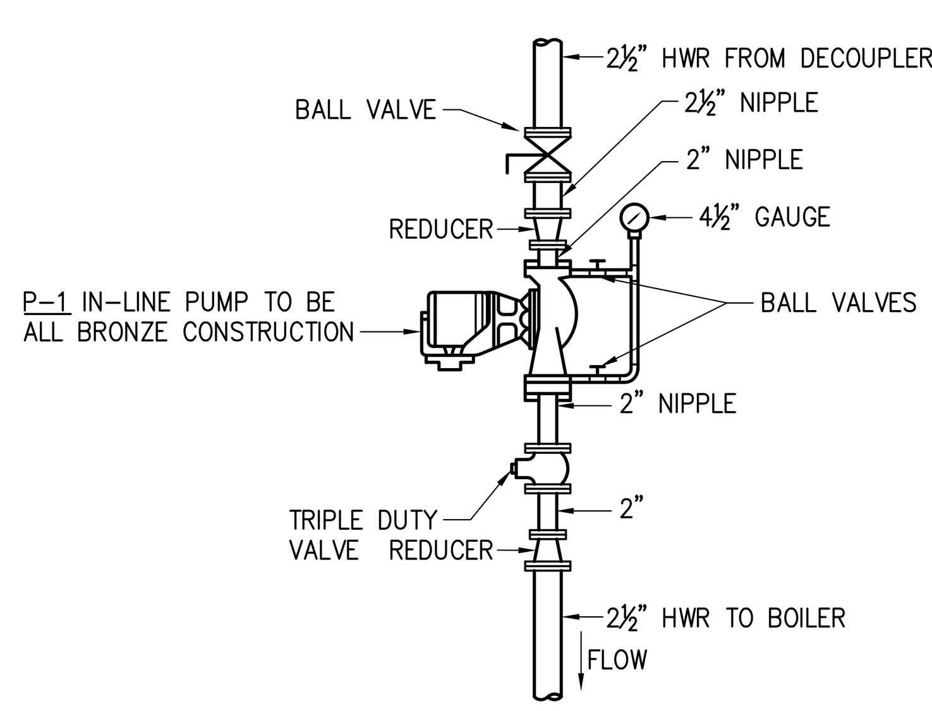
TAG	SERVICE	ABB MODEL No.	H.P.	OUTPUT AMPS	VOLTAGE	REMARKS
VFD-1	AC-6	ACH550-06A6-2	1.5	6.6	208/3/60	SEE NOTES #1 & #2

NOTES:
1. VERTICAL "E-CLIPSE-BYPASS", CIRCUIT BREAKER DISCONNECT, NEMA 3R ENCLOSURE, N2 COMMUNICATIONS BUS, WITH INPUT/OUTPUT CARDS FOR START/STOP, SPEED CONTROL INPUT AND GENERAL ALARM/FAULT OUTPUT.
2. COORDINATE INSTALLATION OF DRIVES & CONNECT TO "JCI" EXISTING METASYS SYSTEM.



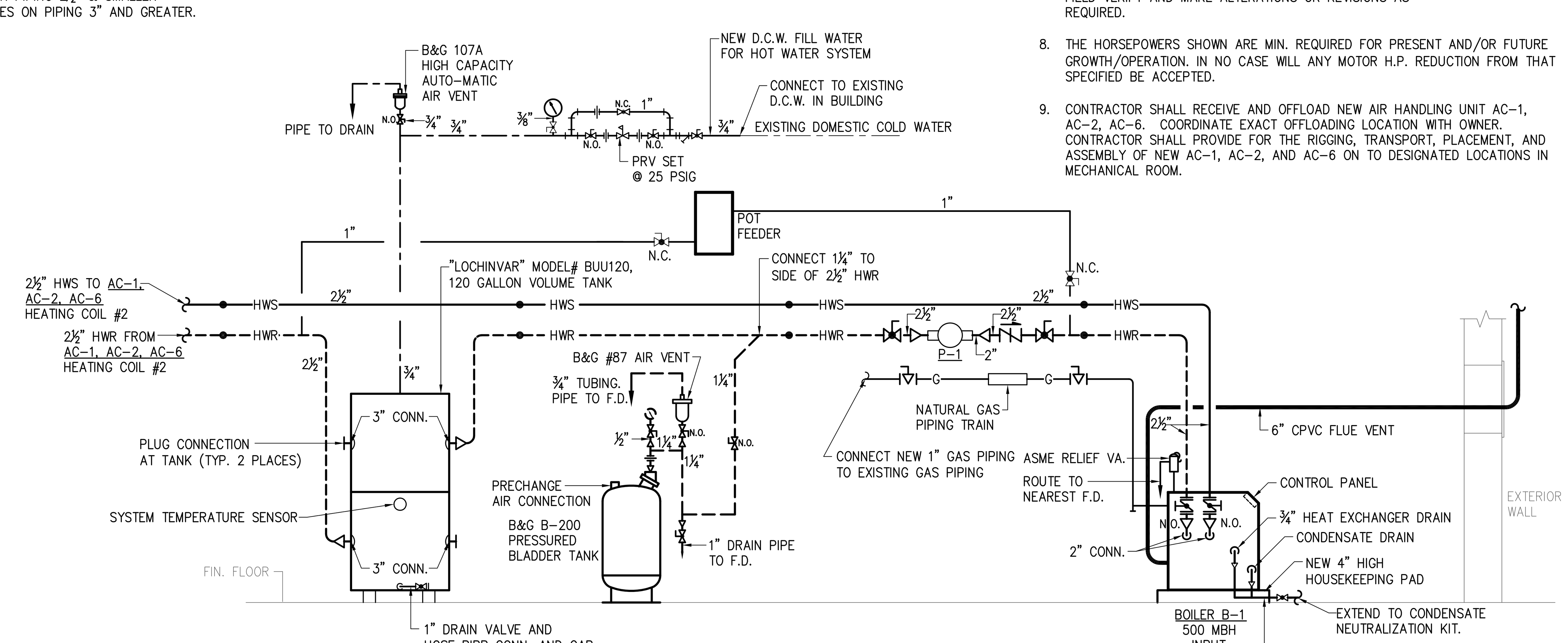
AC-1 TWO BANK/STAGGERED COOLING COIL SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



TYPICAL IN-LINE PUMP PIPING DIAGRAM
NO SCALE

SUPPORT PUMP AND HORIZONTALLY MOUNTED MOTOR PER MANUFACTURER'S RECOMMENDATIONS



BOILER B-1 PIPING FLOW DIAGRAM
NO SCALE

USE TYPE L COPPER ONLY FOR HEATING

MECHANICAL LEGEND

SYMBOL	DESCRIPTION
ECWS	EXISTING CHILLED WATER SUPPLY PIPING
ECWR	EXISTING CHILLED WATER RETURN PIPING
EHWS	EXISTING HEATING WATER SUPPLY PIPING
EHWR	EXISTING HEATING WATER RETURN PIPING
CWS	CHILLED WATER SUPPLY PIPING
CWR	CHILLED WATER RETURN PIPING
D	DRAIN PIPING
DCW	DOMESTIC COLD WATER PIPING
HWS	HEATING WATER SUPPLY PIPING
HWR	HEATING WATER RETURN PIPING
	CLEAN OUT (C.O.)
G	GAS PIPING
C.T.E.	CONNECT TO EXISTING
	BALL VALVE
	CHECK VALVE
	STRAINER ASSEMBLY
	CIRCUIT BALANCER
	BUTTERFLY VALVE (LUG BODY)
	2-WAY CONTROL VALVE
	3-WAY CONTROL VALVE
	PRESSURE REDUCING VALVE
	REDUCER
	UNION
	TRIPLE DUTY VALVE
	PRESSURE GAUGE
	THERMOMETER
N.O.	NORMALLY OPEN
N.C.	NORMALLY CLOSED
	GAS COCK
(E)	EMERGENCY STOP SWITCH

MECHANICAL GENERAL NOTES

1. ALL SCHEDULES SHOWN ARE THE PURPOSE OF AIDING THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CORRECT TOTALS.
2. CO-ORDINATE HVAC INSTALLATION WITH ALL OTHER TRADES, INCLUDING ELECTRICAL.
3. REFER TO ELECTRICAL DRAWINGS FOR POWER CONNECTION POINTS.
4. ALL PIPING INSULATION SHALL COMPLY WITH SECTION 503 OF THE INTERNATIONAL ENERGY CONSERVATION CODE. 2012 EDITION.
5. ALL ELECTRICALLY POWERED EQUIPMENT SHALL BE LISTED AND LABELED PER NATIONAL ELECTRICAL CODE, AND INTERNATIONAL MECHANICAL CODE, 2012 EDITION, CHAPTER 3.
6. ALL EQUIPMENT SHALL BE ACCESSIBLE PER INTERNATIONAL MECHANICAL CODE 2012 EDITION, CHAPTER 3.
7. ALL PIPING ARRANGEMENT AND ROUTING AS SHOWN IS DIAGRAMMATIC AND MAY REQUIRE ALTERATIONS DIFFERENT FROM THAT SHOWN IN ORDER TO ACCOMMODATE STRUCTURE/ARCHITECTURAL FEATURES. CONTRACTOR SHALL FIELD VERIFY AND MAKE ALTERATIONS OR REVISIONS AS REQUIRED.
8. THE HORSEPOWERS SHOWN ARE MIN. REQUIRED FOR PRESENT AND/OR FUTURE GROWTH/OPERATION. IN NO CASE WILL ANY MOTOR H.P. REDUCTION FROM THAT SPECIFIED BE ACCEPTED.
9. CONTRACTOR SHALL RECEIVE AND OFFLOAD NEW AIR HANDLING UNIT AC-1, AC-2, AC-6. COORDINATE EXACT OFFLOADING LOCATION WITH OWNER. CONTRACTOR SHALL PROVIDE FOR THE RIGGING, TRANSPORT, PLACEMENT, AND ASSEMBLY OF NEW AC-1, AC-2, AND AC-6 ON TO DESIGNATED LOCATIONS IN MECHANICAL ROOM.

REVISIONS

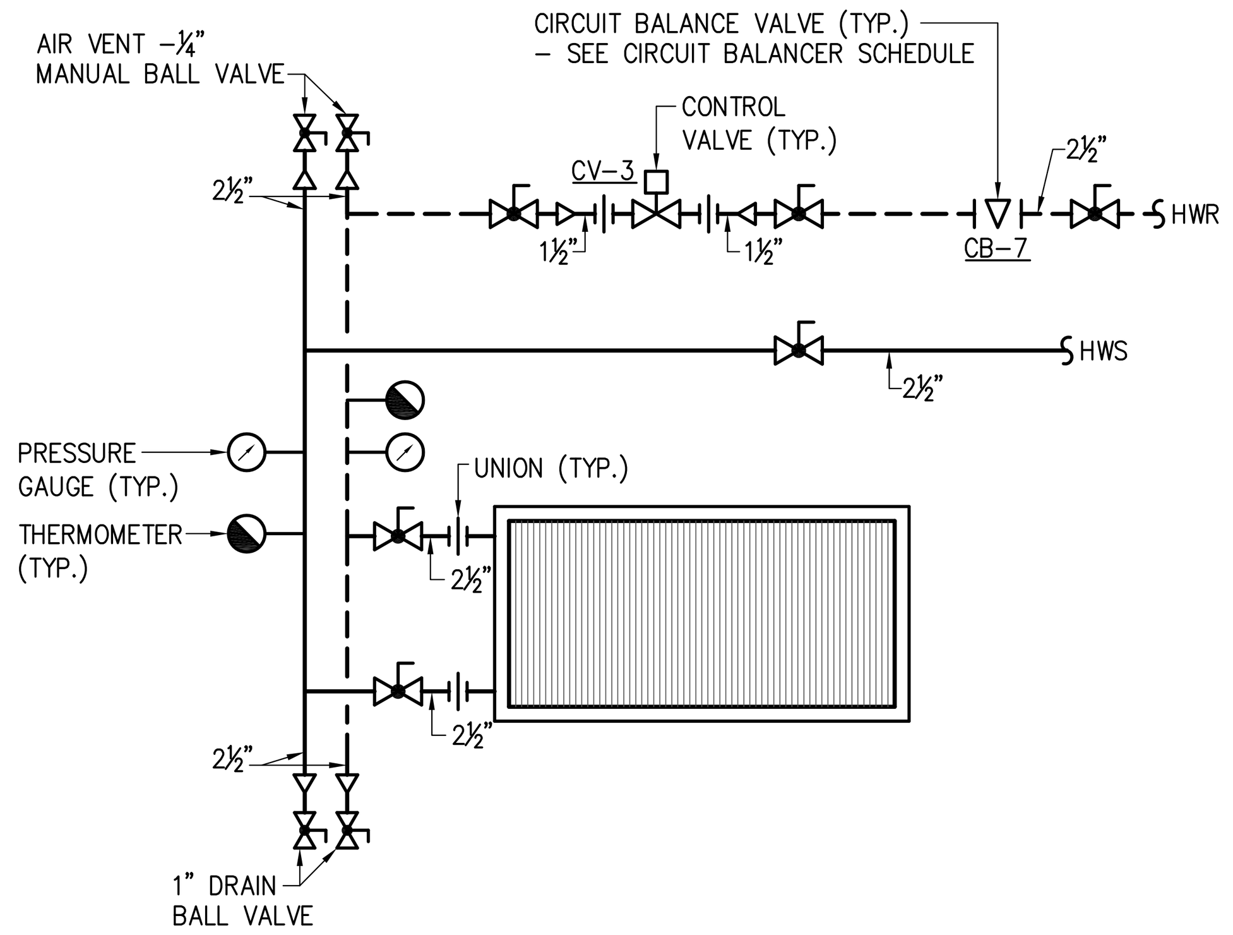
NO.	DATE	BY	DESCRIPTION
-	-	JCP	-

PERITUS
SKILLED IN THE ART OF ENGINEERING

PERITUS JOB # 150203

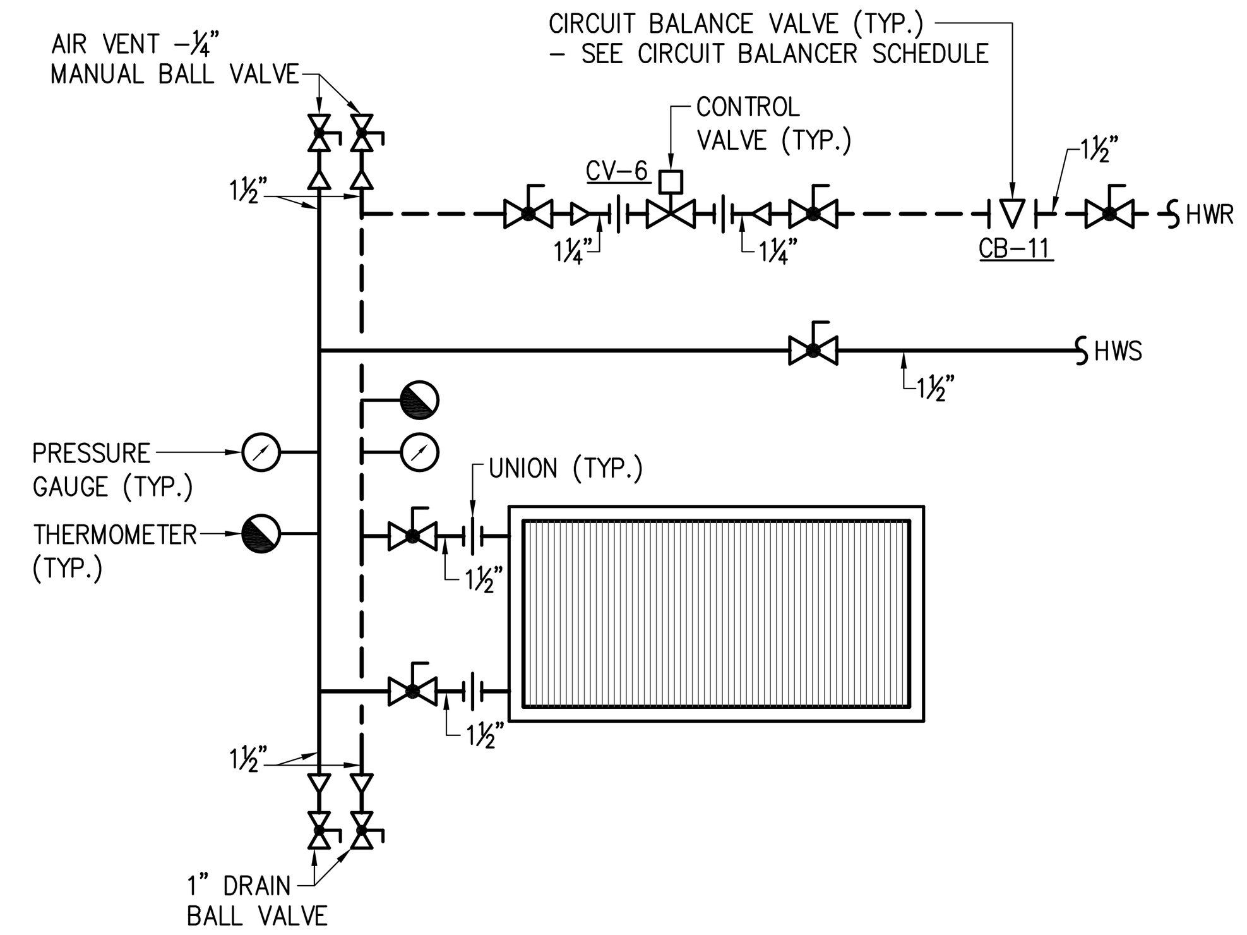
UPSTATE HUMANITIES PERFORMING ARTS CENTER (HPAC) HVAC REPLACEMENT
SC STATE PROJECT #H34-9545-JM
SPARTANBURG, SOUTH CAROLINA

DESIGN / DRAWN: JCP / LDF
CHECKED: JCP
DATE: 9-8-15
JOB NO.: PERITUS #150203
SHEET: M-4



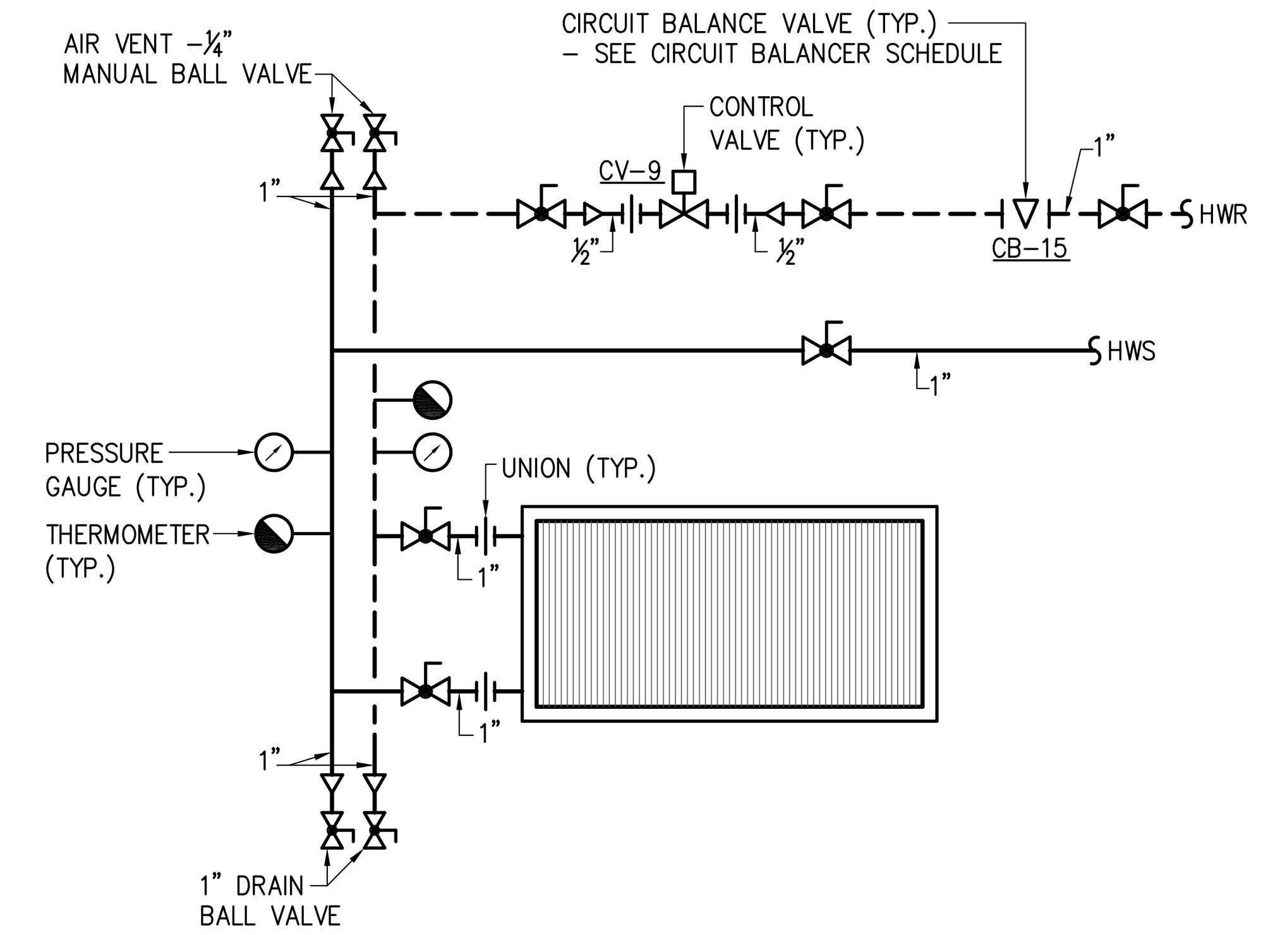
AC–1 SINGLE BANK
HEATING COIL #1 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



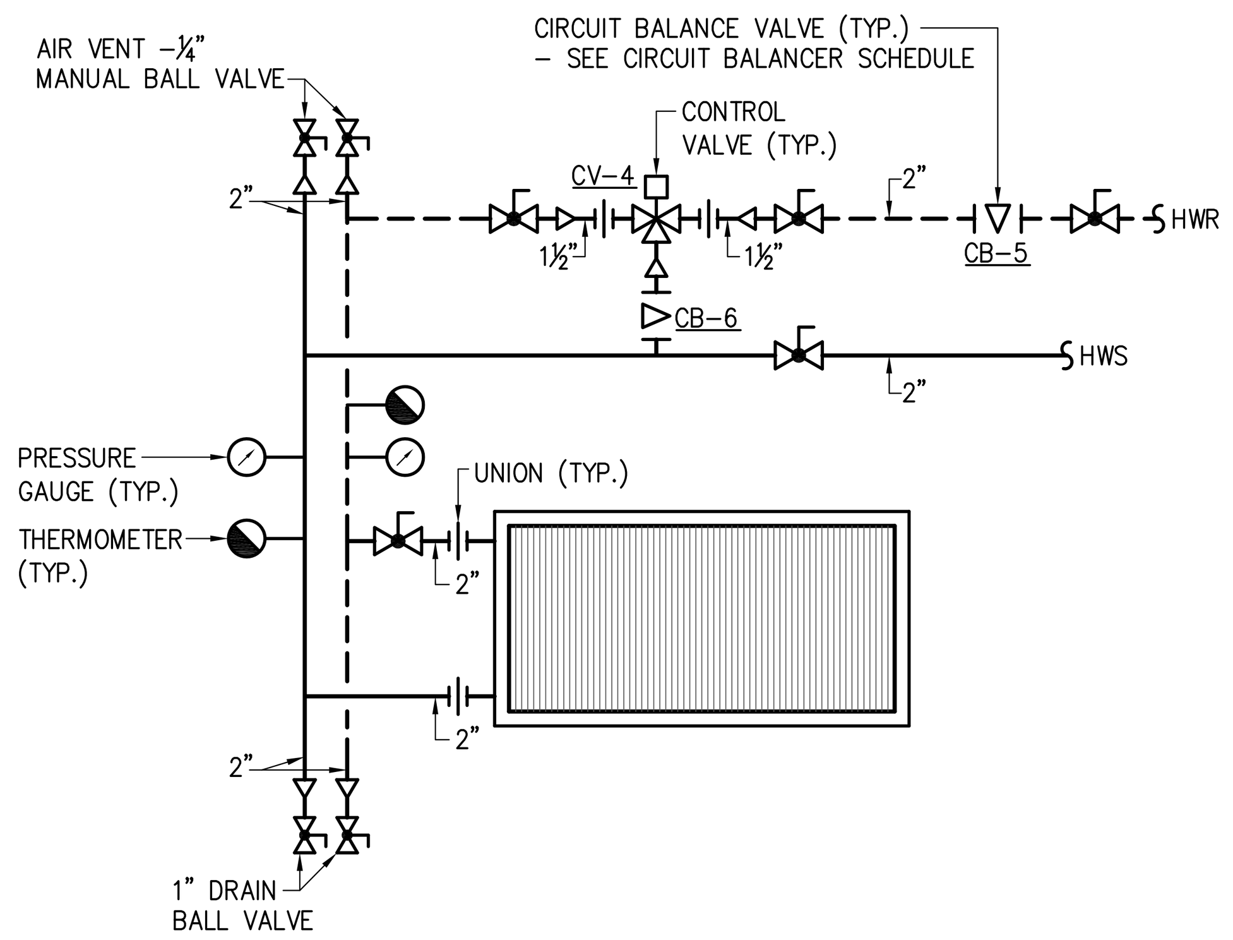
AC–2 SINGLE BANK
HEATING COIL #1 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



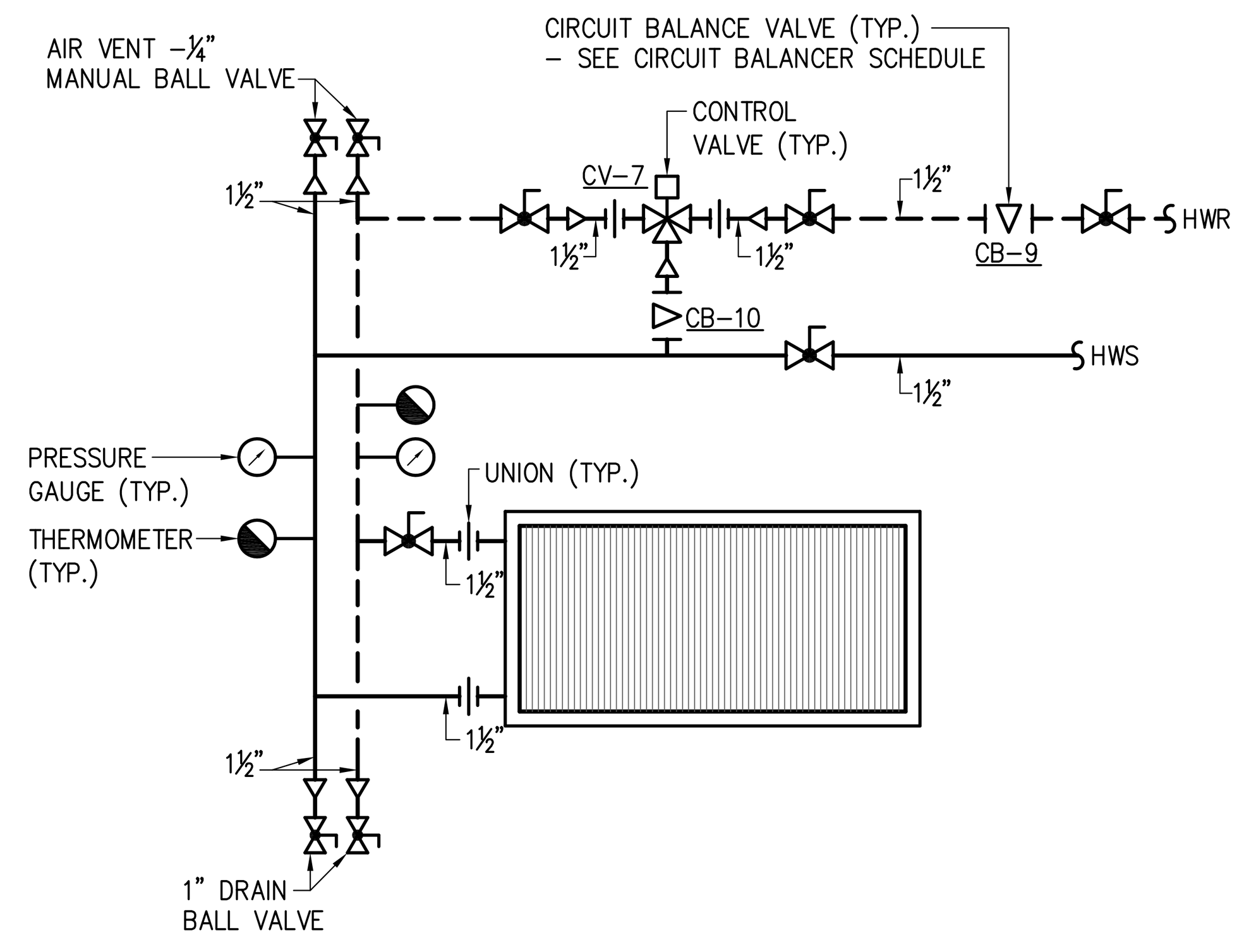
AC–6 SINGLE BANK
HEATING COIL #1 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



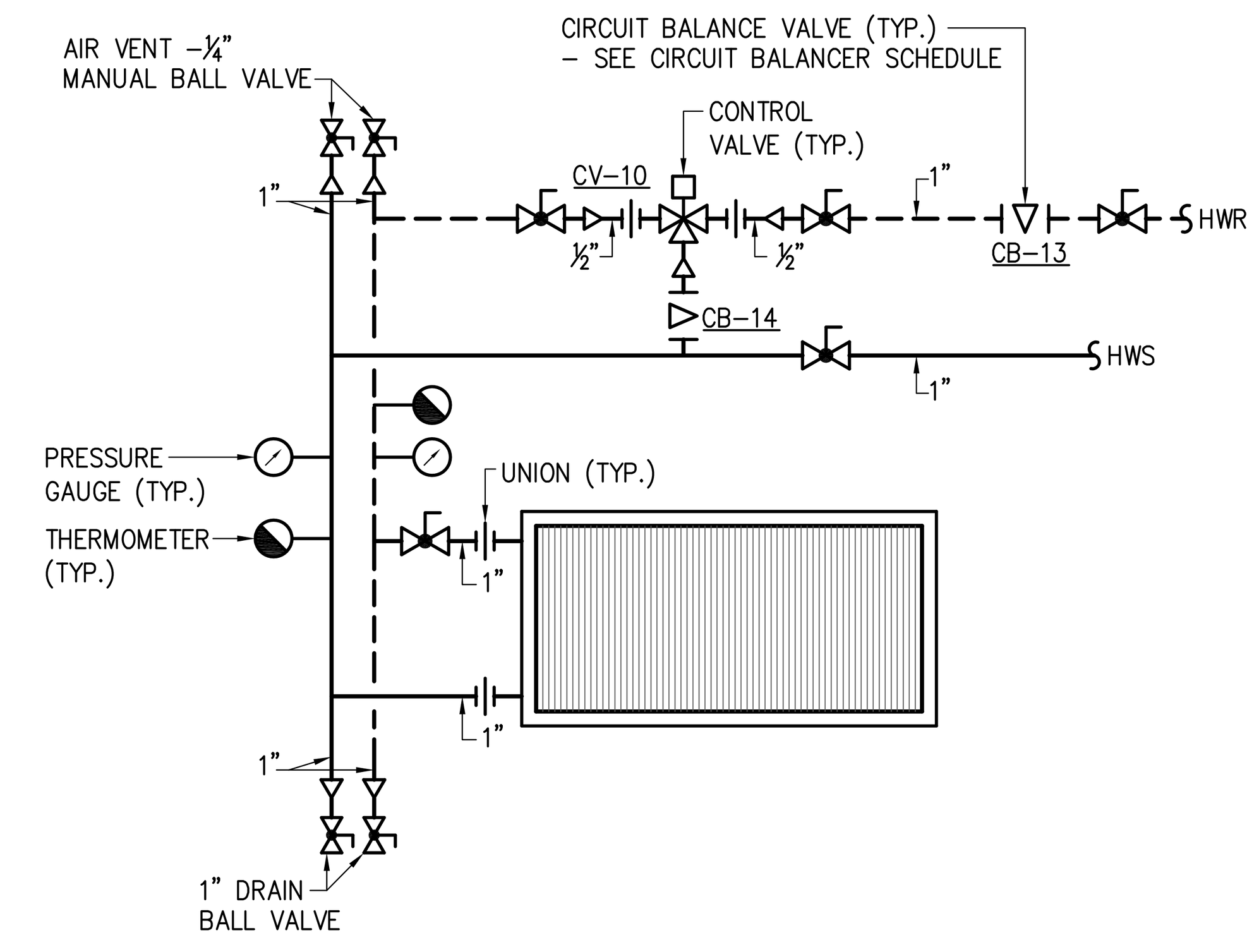
AC–1 SINGLE BANK
HEATING COIL #2 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



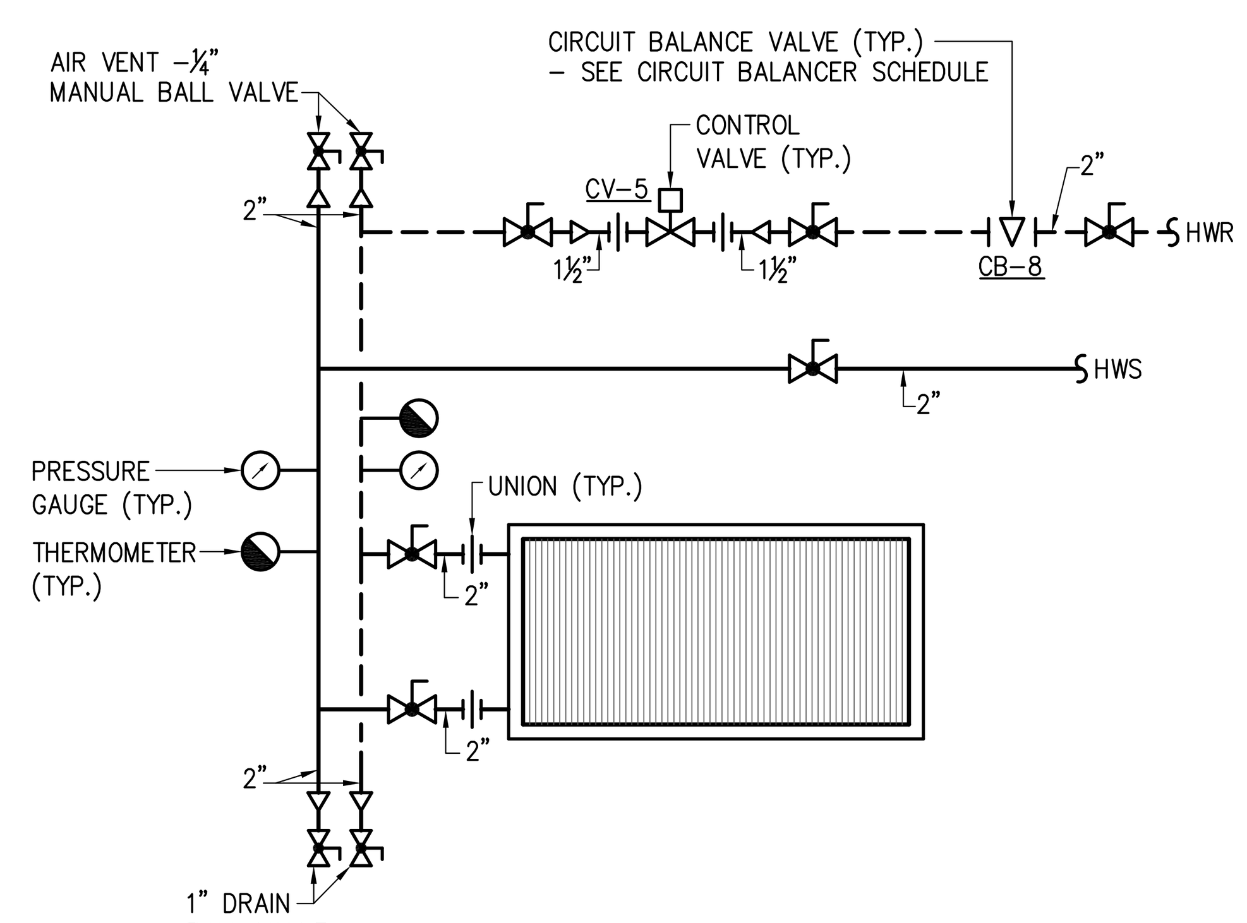
AC–2 SINGLE BANK
HEATING COIL #2 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



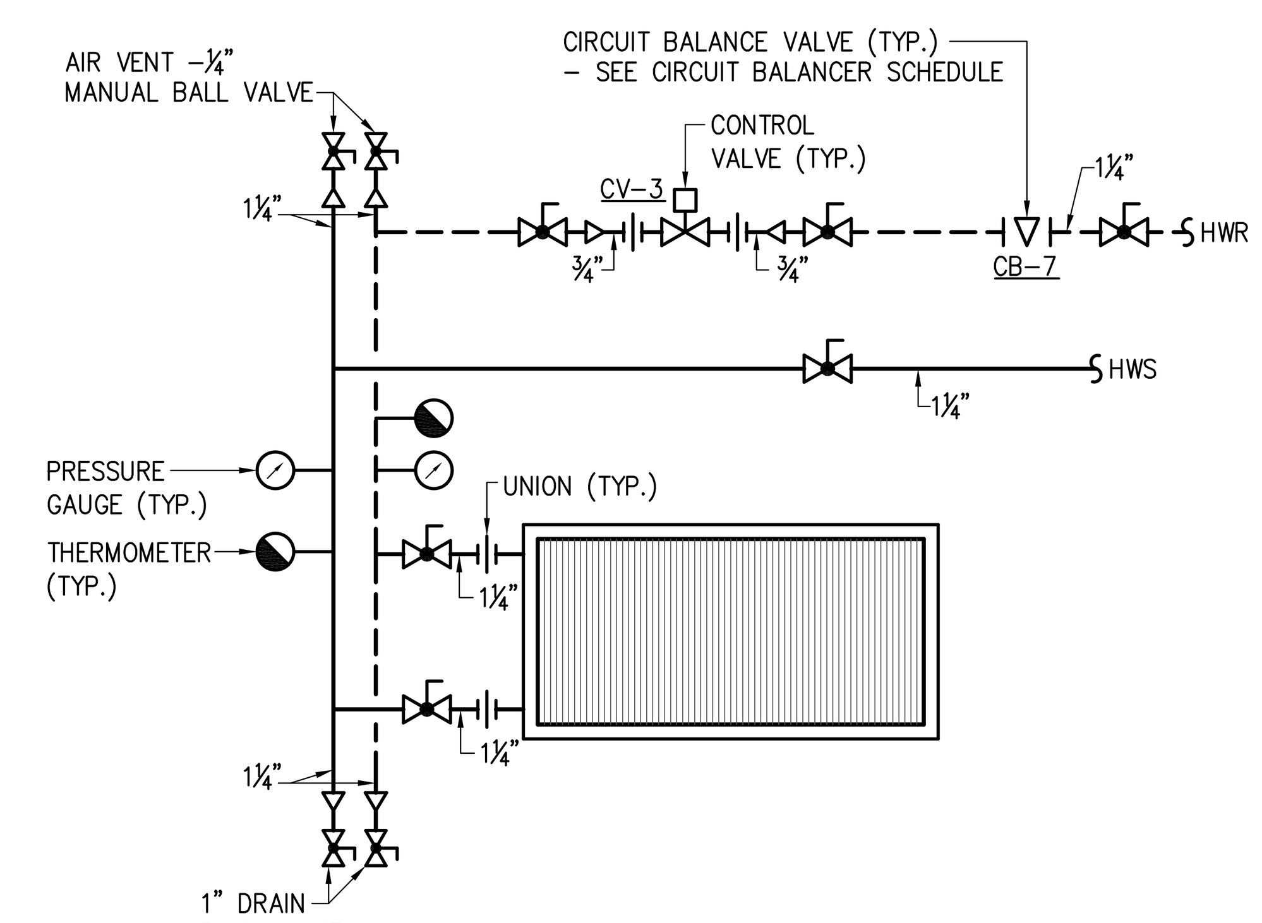
AC–6 SINGLE BANK
HEATING COIL #2 SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



AC–2 SINGLE BANK
COOLING COIL SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.



AC–6 SINGLE BANK
COOLING COIL SCHEMATIC
NO SCALE

NOTE: USE BALL VALVES FOR PIPING 2½" & SMALLER
USE BUTTERFLY VALVES ON PIPING 3" AND GREATER.

NO.	DATE	BY	DESCRIPTION
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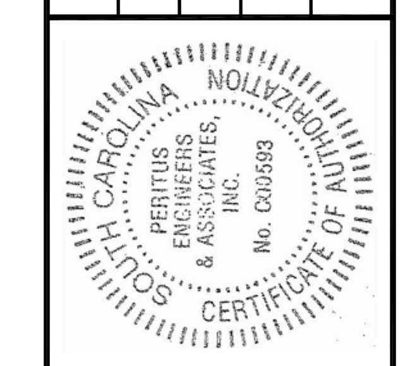
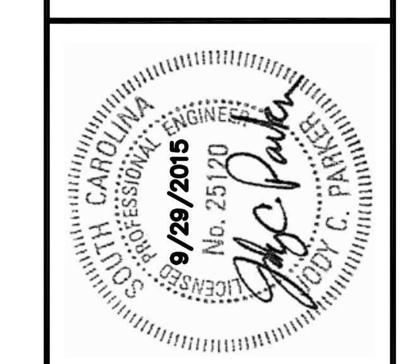
REVISIONS





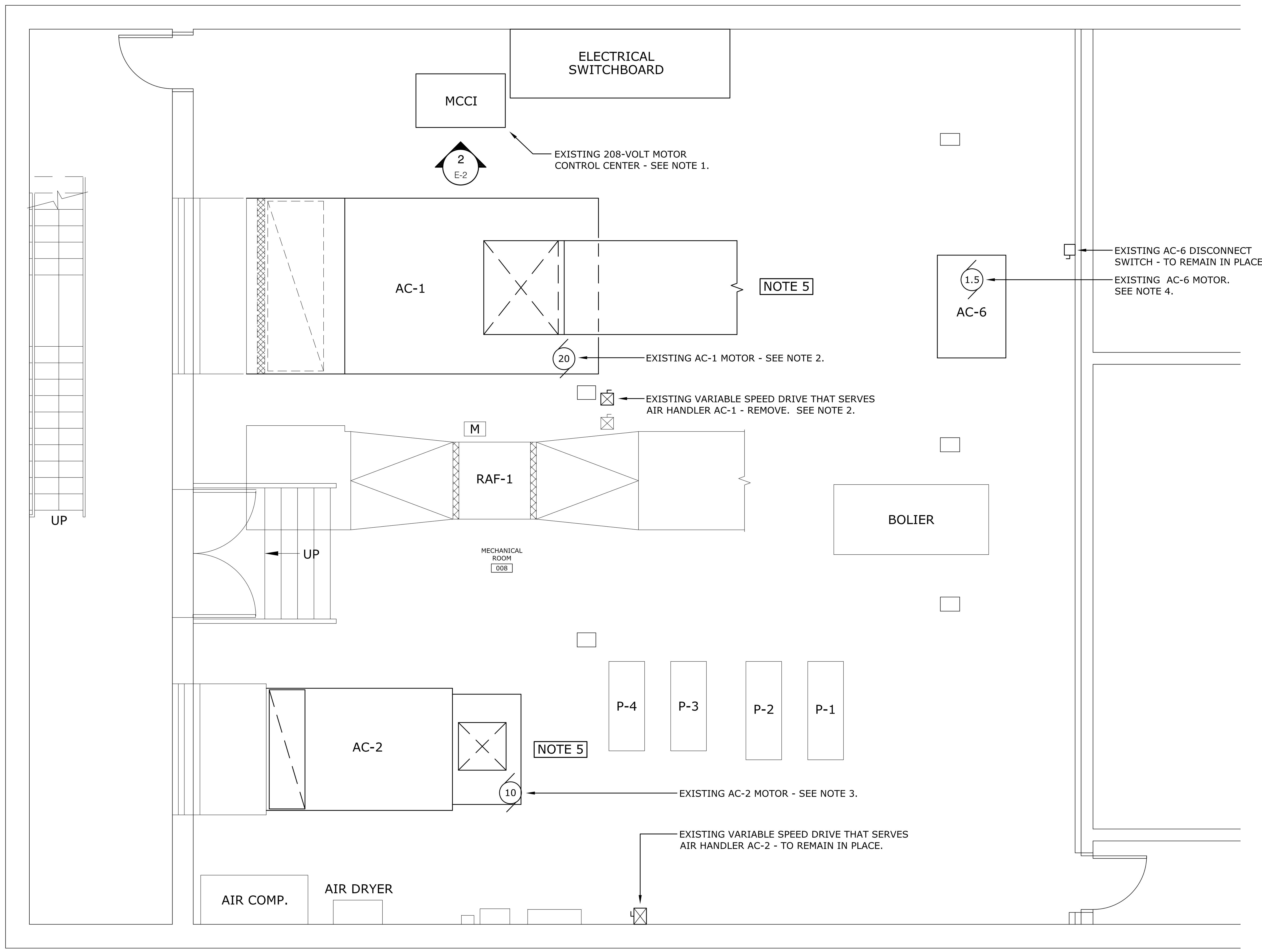
PERITUS
SKILLED IN THE ART OF ENGINEERING

PERITUS JOB # 150203

UPSTATE HUMANITIES PERFORMING ARTS CENTER (HPAC) HVAC REPLACEMENT
SC STATE PROJECT #H34–9545–JM
SPARTANBURG, SOUTH CAROLINA

DESIGN / DRAWN	JCP / LDF
CHECKED	JCP
DATE	9–8–15
JOB NO.	PERITUS #150203
SHEET	M–5

5 OF 5 SHEETS



1 / E-1 ELECTRICAL DEMOLITION PLAN

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

GENERAL CONSTRUCTION NOTES

1. PROVIDE ALL WORK IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:

INTERNATIONAL BUILDING CODE	2012 EDITION
NFPA 70 - NATIONAL ELECTRICAL CODE	2011 EDITION

2. RACEWAYS SHALL BE EMT WITH COMPRESSION FITTINGS UNLESS NOTED OR DETAILED OTHERWISE. ALL WIRING SHALL BE COPPER WITH THHN INSULATION AND SHALL BE INSTALLED IN METAL RACEWAY.
3. INSTALL ELECTRICAL SYSTEMS WITHOUT INTERFERING WITH DUCTS, PIPES, STRUCTURAL MEMBERS, OR OTHER SYSTEMS.
4. THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS BEFORE PLACING IN OPERATION. RESTORE FINISHED SURFACES IF DAMAGED AND DELIVER THE ENTIRE INSTALLATION IN AN APPROVED CONDITION.
5. THE CONTRACTOR SHALL GUARANTEE THE WORK INSTALLED UNDER THIS CONTRACT FOR A PERIOD OF ONE YEAR AFTER DATE OF FINAL ACCEPTANCE. DEFECTS WHICH APPEAR AS A RESULT OF NORMAL USAGE SHALL BE REMEDIED BY THE CONTRACTOR TO THE COMPLETE SATISFACTION OF THE OWNER WITHOUT COST TO THE OWNER.
6. WHERE MATERIALS AND EQUIPMENT ARE INDICATED TO BE REMOVED, THE CONTRACTOR SHALL REMOVE AND LEGALLY DISPOSE OF MATERIALS AND EQUIPMENT, UNLESS NOTED OTHERWISE ON PLAN.
7. CUTTING, DRILLING, AND PATCHING: PROVIDE CHASES, SLOTS, AND OPENINGS IN EXISTING BUILDING COMPONENTS TO ALLOW FOR ELECTRICAL INSTALLATIONS. PERFORM CUTTING, DRILLING, FITTING, AND PATCHING REQUIRED TO:

   A) INSTALL EQUIPMENT, MATERIALS, AND RACEWAYS IN EXISTING STRUCTURES.

   B) REMOVE AND REPLACE DEFECTIVE WORK THAT DOES NOT CONFORM TO REQUIREMENTS OF THE CONTRACT DOCUMENTS.

   C) UPON WRITTEN INSTRUCTIONS FROM THE ARCHITECT/ENGINEER, UNCOVER AND RESTORE WORK TO PROVIDE FOR ARCHITECT/ENGINEER OBSERVATION OF CONCEALED WORK.

   PROTECT EXISTING STRUCTURES, FURNISHINGS, FINISHES, MECHANICAL/PLUMBING SYSTEMS, AND ELECTRICAL SYSTEMS WHILE PERFORMING CUTTING, DRILLING, FITTING, AND PATCHING.

   PATCH EXISTING SURFACES AND BUILDING COMPONENTS USING NEW MATERIALS THAT MATCH EXISTING MATERIALS. PATCHING SHALL BE PERFORMED BY EXPERIENCED INSTALLERS.

DEMOLITION NOTES

1. EXISTING AIR HANDLER MOTOR LOADS ARE SERVED FROM EXISTING MOTOR CONTROL CENTER "MCCI" UNLESS NOTED OTHERWISE. SEE DETAIL 2 ON DRAWING E-2 FOR BREAKER/BUCKET LOCATIONS.
2. EXISTING AIR HANDLER AC-1: AIR HANDLER WILL BE REMOVED BY THE MECHANICAL CONTRACTOR. DISCONNECT EXISTING FLEXIBLE RACEWAY AND WIRING SERVING AIR HANDLER MOTOR. REMOVE CONDUCTORS ROUTED FROM VARIABLE SPEED DRIVE TO MOTOR. REMOVE LIQUID-TIGHT FLEXIBLE RACEWAY AT MOTOR. REMOVE EXISTING CONDUCTORS FROM MCCI TO VARIABLE SPEED DRIVE - CONTRACTOR MAY MODIFY AND RE-USE EXISTING FEEDER RACEWAY COMING FROM MOTOR CONTROL CENTER TO SERVE NEW AC-1 MOTOR LOAD AS INDICATED ON DRAWING E-2. REMOVE VARIABLE SPEED DRIVE AND TURN OVER TO OWNER.
3. EXISTING AIR HANDLER AC-2: AIR HANDLER WILL BE REMOVED BY THE MECHANICAL CONTRACTOR. DISCONNECT EXISTING FLEXIBLE RACEWAY AND WIRING SERVING AIR HANDLER MOTOR. REMOVE CONDUCTORS ROUTED FROM VARIABLE SPEED DRIVE TO MOTOR. REMOVE LIQUID-TIGHT FLEXIBLE RACEWAY AT MOTOR.
4. EXISTING AIR HANDLER AC-6: AIR HANDLER WILL BE REMOVED BY THE MECHANICAL CONTRACTOR. DISCONNECT EXISTING FLEXIBLE RACEWAY AND WIRING SERVING AIR HANDLER MOTOR FROM EXISTING DISCONNECT SWITCH.
5. THERE ARE EXISTING INDUSTRIAL-TYPE FLUORESCENT STRIP FIXTURES HUNG BY CHAINS IN MECHANICAL ROOM 008. CONTRACTOR SHALL INCLUDE IN HIS BID MATERIALS AND LABOR TO RELOCATE 6 EXISTING LIGHT FIXTURES TO ACCOMMODATE PIPING AND DUCTWORK ADDITIONS IN THE MECHANICAL ROOM. PROVIDE NEW FIXTURE WHIPS AND ASSOCIATED WIRING AS REQUIRED TO SERVE FIXTURES AT NEW LOCATIONS.

1/4"=1'-0" scale 2 0 2 4 8 feet

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(803) 528-1437
Joe.Land.LEA@sc.rr.com

REVISIONS

NO.	DATE	BY	DESCRIPTION
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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION — LAND ENGINEERING ASSOC., LLC — COA-4406

SOUTH CAROLINA PROFESSIONAL ENGINEER — JOSEPH W. LAND — No. 19085 — REGISTERED — 09/08/15

PERITUS — SKILLED IN THE ART OF ENGINEERING

USC UPSTATE HPAC HVAC REPLACEMENT
SC STATE PROJECT #H34-9545
SPARTANBURG, SOUTH CAROLINA

DESIGN / DRAWN	JWL / JSJ
CHECKED	JWL
DATE	09/08/15
JOB NO.	LAND #USC-2015-11
SHEET	E-1

1 OF 2 SHEETS

RENOVATION NOTES

1. NEW AC-1: AIR HANDLER WILL HAVE TWO 15 HORSEPOWER MOTORS WITH TWO VARIABLE SPEED DRIVES, FACTORY WIRED FROM DRIVES TO MOTORS. PROVIDE THREE #6 AWG THHN COPPER CONDUCTORS WITH ONE #8 AWG GREEN INSULATED COPPER GROUND WIRE IN 3/4" (MINIMUM) EMT RACEWAY FROM THE EXISTING MOTOR CONTROL CENTER TO EACH VARIABLE SPEED DRIVE (EXISTING RACEWAY THAT SERVED THE OLD AC-1 UNIT MAY BE RE-USED IF IT DOES NOT CONFLICT WITH THE NEW AIR HANDLER INSTALLATION - FIELD VERIFY RACEWAY ROUTING). EMT FITTINGS SHALL BE OF THE COMPRESSION TYPE. FINAL RACEWAY CONNECTION TO VARIABLE SPEED DRIVES SHALL BE MADE WITH 3/4" (MINIMUM) LIQUID-TIGHT FLEXIBLE METAL CONDUIT. INSTALL HORIZONTAL RACEWAYS AS CLOSE AS PRACTICAL TO EXISTING CEILING AND SUPPORT IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. ALL CONTROL WIRING WILL BE PROVIDED BY THE MECHANICAL CONTRACTOR.

2. NEW AC-2: PROVIDE THREE #8 AWG THHN COPPER CONDUCTORS WITH ONE #10 AWG GREEN INSULATED COPPER GROUND WIRE IN 3/4" EMT RACEWAY FROM EXISTING VARIABLE SPEED DRIVE TO NEW AIR HANDLER MOTOR (EXISTING EMT RACEWAY MAY BE RE-USED IF IT DOES NOT CONFLICT WITH THE NEW AIR HANDLER INSTALLATION). EMT FITTINGS SHALL BE OF THE COMPRESSION TYPE. FINAL RACEWAY CONNECTION TO MOTOR SHALL BE MADE WITH 3/4" LIQUID-TIGHT FLEXIBLE METAL CONDUIT. INSTALL HORIZONTAL RACEWAY AS CLOSE AS PRACTICAL TO EXISTING CEILING AND SUPPORT IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. ALL CONTROL WIRING WILL BE PROVIDED BY THE MECHANICAL CONTRACTOR.

3. NEW AC-6: A NEW VARIABLE SPEED DRIVE UNIT WILL BE FURNISHED BY THE MECHANICAL CONTRACTOR TO SERVE AC-6. ELECTRICAL CONTRACTOR SHALL WALL MOUNT DRIVE IN A CODE COMPLIANT LOCATION - PROVIDE UNITSTRUT FRAMING MEMBERS AS REQUIRED TO OFFSETT DRIVE FROM WALL WHERE EXISTING WALL MOUNTED RACEWAYS INTERFERE WITH DIRECT WALL MOUNTING. PROVIDE THREE #12 AWG THHN COPPER CONDUCTORS WITH ONE #12 AWG GREEN INSULATED COPPER GROUND WIRE IN 1/2" (MINIMUM) EMT RACEWAY FROM EXISTING DISCONNECT SWITCH, THROUGH THE NEW VARIABLE SPEED DRIVE, TO AC-6 MOTOR. EMT FITTINGS SHALL BE OF THE COMPRESSION TYPE. FINAL RACEWAY CONNECTION TO MOTOR SHALL BE MADE WITH 1/2" (MINIMUM) LIQUID-TIGHT FLEXIBLE METAL CONDUIT. INSTALL HORIZONTAL RACEWAY AS CLOSE AS PRACTICAL TO EXISTING CEILING AND SUPPORT IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. ALL CONTROL WIRING WILL BE PROVIDED BY THE MECHANICAL CONTRACTOR.

4. EXISTING PANELBOARD "A": EXISTING PANEL IS A WESTINGHOUSE POW-R-LINE C #PRL1, 100 AMP, 120/208 VOLT PANELBOARD. PROVIDE ONE 35-AMP, TWO-POLE CIRCUIT BREAKER IN SPACES 20,22 OF PANELBOARD TO SERVE 208-VOLT, SINGLE-PHASE POWER TO PUMP P-1. PROVIDE TWO #10 AWG THHN COPPER CONDUCTORS WITH ONE #10 AWG GREEN INSULATED COPPER GROUND WIRE IN 3/4" EMT RACEWAY FROM EXISTING PANELBOARD, THROUGH NEW STARTER, TO NEW BOILER PUMP MOTOR. EMT FITTINGS SHALL BE OF THE COMPRESSION TYPE. FINAL RACEWAY CONNECTION TO PUMP P-1 SHALL BE MADE WITH 3/4" LIQUID-TIGHT FLEXIBLE METAL CONDUIT. INSTALL HORIZONTAL RACEWAY AS CLOSE AS PRACTICAL TO EXISTING CEILING AND SUPPORT IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. UPDATE EXISTING PANELBOARD DIRECTORY TO INDICATE ADDED LOAD.

5. NEW STARTER FOR PUMP P-1: PROVIDE ONE SQUARE-D #8539SCG71V80CFF4P51P52T THERMAL-MAGNETIC COMBINATION STARTER (OR PRIOR APPROVED EQUAL): STARTER SHALL HAVE THE FOLLOWING FEATURES:

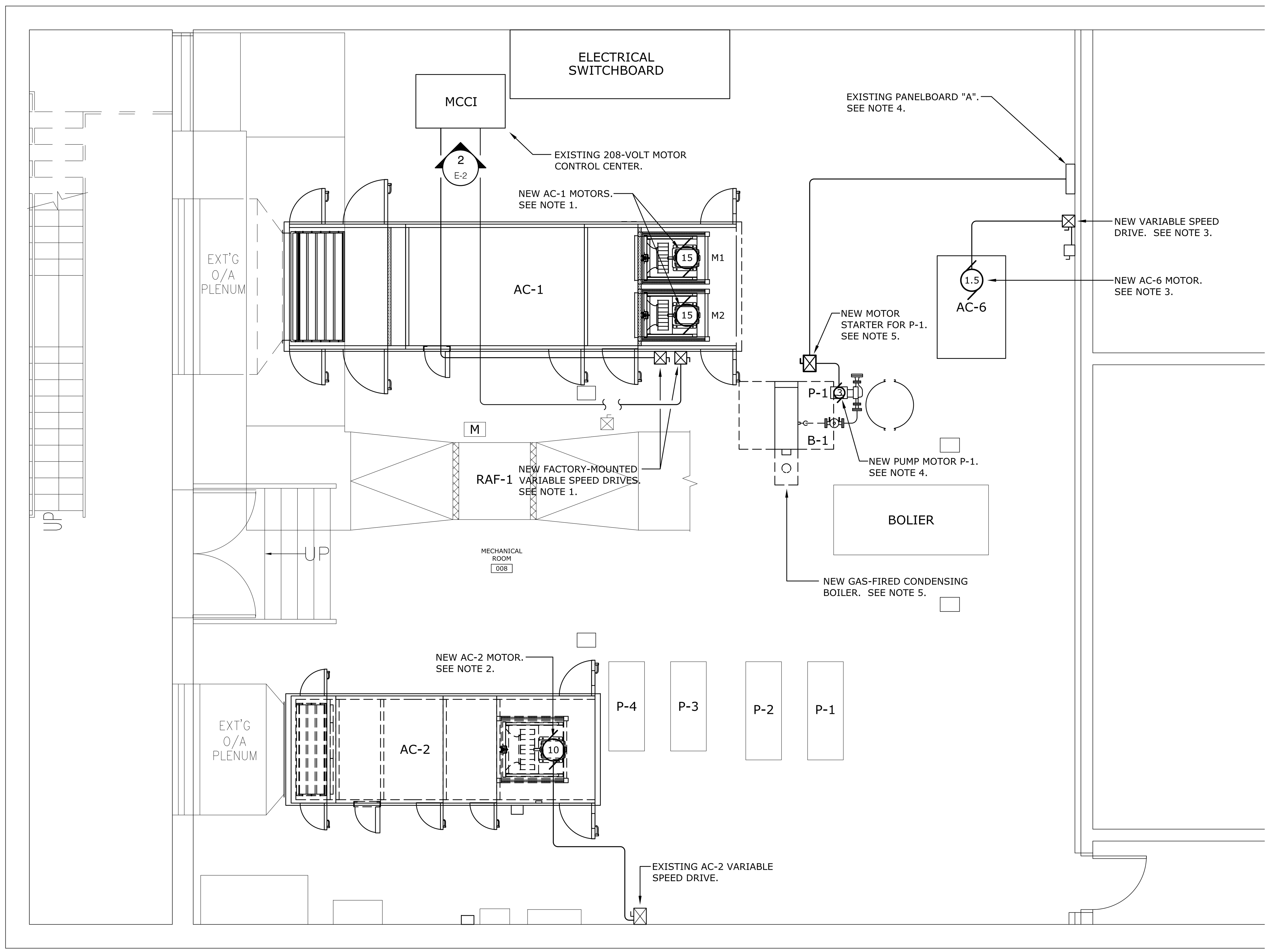
STARTER SIZE:	NEMA 1
ENCLOSURE:	NEMA 1
TYPE:	NON-REVERSING
VOLTAGE:	208
POLES:	2
MOTOR HP:	3
OVERLOAD:	MELTING ALLOY TYPE RATED FOR 3 HP MOTOR
CONTACTS:	OVERLOAD - NORMALLY CLOSED & OFF PILOT - NORMALLY CLOSED
COIL VOLTAGE:	120V, 60Hz
TRANSFORMER:	208-120V AC CONTROL TRANSFORMER (STANDARD CAPACITY)
XFMR FUSING:	TWO PRIMARY AND ONE SECONDARY
SWITCH:	HAND-OFF-AUTO SELECTOR SWITCH
PILOT LIGHT 1:	POWER "ON", RED, L.E.D. TYPE LAMP
PILOT LIGHT 2:	POWER "OFF", GREEN, L.E.D. TYPE LAMP

PROVIDE A CUSTOM, FREE-STANDING UNISTRUT RACK TO MOUNT MOTOR STARTER AT 60 INCHES ABOVE FINISHED FLOOR. COORDINATE LOCATION OF RACK WITH THE MECHANICAL CONTRACTOR.

PROVIDE A CONTROL CIRCUIT FROM BOILER B-1 CONTROL CONTACTS TO NEW STARTER FOR CONTROL OF PUMP P-1. CONTROL CIRCUIT SHALL BE TWO #12 AWG THHN COPPER CONDUCTORS WITH ONE #12 AWG GREEN INSULATED COPPER GROUND WIRE IN 1/2" (MINIMUM) LIQUID-TIGHT FLEXIBLE METAL CONDUIT.

6. EXISITNG MCCI - AC-1, MOTOR M1: BUCKET OF MOTOR CONTROL CENTER REFERENCED TO THIS NOTE SHALL BE RETROFITTED AS FOLLOWS: REMOVE EXISTING SPARE BUCKET DOOR. PROVIDE ONE 208-VOLT, 3-POLE, 80-AMP RATED, THERMAL-MAGNETIC TYPE CIRCUIT BREAKER IN BUCKET. MODIFY EXISTING MCC BUSWORK AND PROVIDE BUS CONNECTING KITS AND CONDUCTORS AS REQUIRED TO CONNECT CIRCUIT BREAKER. CIRCUIT BREAKER HANDLE SHALL BE ACCESSIBLE FROM FRONT OF MCC AND SHALL INCLUDE A LOCK-OFF FEATURE. PROVIDE A HINGED, STEEL DOOR, CUSTOM FABRICATED FOR THE MOTOR CONTROL CENTER.

7. EXISITNG MCCI - AC-1, MOTOR M2: BUCKET OF MOTOR CONTROL CENTER REFERENCED TO THIS NOTE SHALL BE RETROFITTED AS FOLLOWS: REMOVE EXISTING MOTOR STATER, CIRCUIT BREAKER, CONTROL WIRING, AND BUCKET DOOR. PROVIDE ONE 208-VOLT, 3-POLE, 80-AMP RATED, THERMAL-MAGNETIC TYPE CIRCUIT BREAKER IN BUCKET. MODIFY EXISTING MCC BUSWORK AND PROVIDE BUS CONNECTING KITS AND CONDUCTORS AS REQUIRED TO CONNECT CIRCUIT BREAKER. CIRCUIT BREAKER HANDLE SHALL BE ACCESSIBLE FROM FRONT OF MCC AND SHALL INCLUDE A LOCK-OFF FEATURE. PROVIDE A HINGED, STEEL DOOR, CUSTOM FABRICATED FOR THE MOTOR CONTROL CENTER.



1 E-2 ELECTRICAL RENOVATION PLAN

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

EXISTING WESTINGHOUSE SERIES 2100
208-VOLT MOTOR CONTROL CENTER

2 E-2 EXISTING MCCI ELEVATION

NOT TO SCALE

1/4"=1'-0" 2 0 2 4 8 scale feet

REVISIONS

NO.	DATE	BY	DESCRIPTION
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SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION LAND ENGINEERING ASSOC., LLC C0A-4406

SOUTH CAROLINA PROFESSIONAL ENGINEER No. 19085 JOSEPH W. LAND REGISTERED 09/08/15

PERITUS SKILLED IN THE ART OF ENGINEERING

USC UPSTATE HPAC HVAC REPLACEMENT
SC STATE PROJECT #H34-9545
SPARTANBURG, SOUTH CAROLINA

DESIGN / DRAWN	JWL / JSJ
CHECKED	JWL
DATE	09/08/15
JOB NO.	LAND #USC-2015-11
SHEET	E-2

2 OF 2 SHEETS

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