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# UPSTATE CENTRAL CHILLED WATER PLANT CHILLER #3 REPLACEMENT SC STATE PROJECT #H34-9545-JM

## UNIVERSITY OF SOUTH CAROLINA UPSTATE

Spartanburg, South Carolina

### DESIGN TEAM

#### OWNER

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

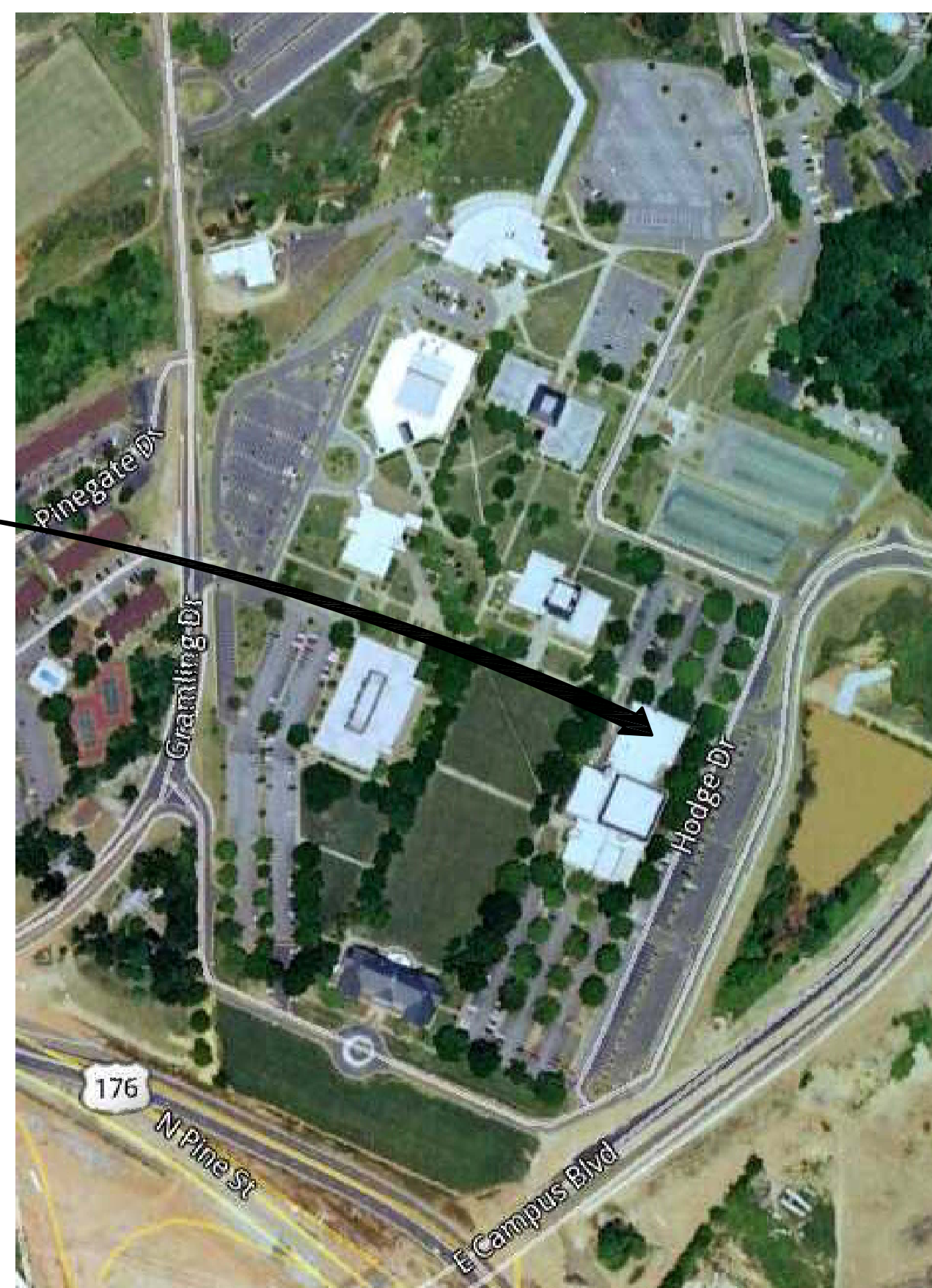
#### MECHANICAL/PLUMBING ENGINEER

PERITUS ENGINEERS & ASSOCIATES, INC.  
10 E. DORCHESTER BLVD.  
GREENVILLE, SC 29605 (864) 277-8287  
JODY C. PARKER, P.E.

#### ELECTRICAL ENGINEER

LAND ENGINEERING ASSOCIATES, LLC  
262 SANDHURST ROAD, SUITE 101  
COLUMBIA, SC 29210 (803) 528-1437  
JOSEPH W. LAND, P.E.

HODGE CENTER  
CHILLER SITE  
(BASEMENT)



VICINITY MAP

### INDEX OF DRAWINGS

DWG. #	SHEET TITLE
T-1	PROJECT TITLE SHEET
<b>MECHANICAL DRAWINGS</b>	
DMP-1	HVAC PIPING DEMOLITION PLANS
MP-1	HVAC PIPING PLANS & ELEVATIONS
MP-2	SCHEDULES
<b>ELECTRICAL DRAWINGS</b>	
DE-1	ELECTRICAL DEMOLITION PLAN
E-1	ELECTRICAL RENOVATION PLAN

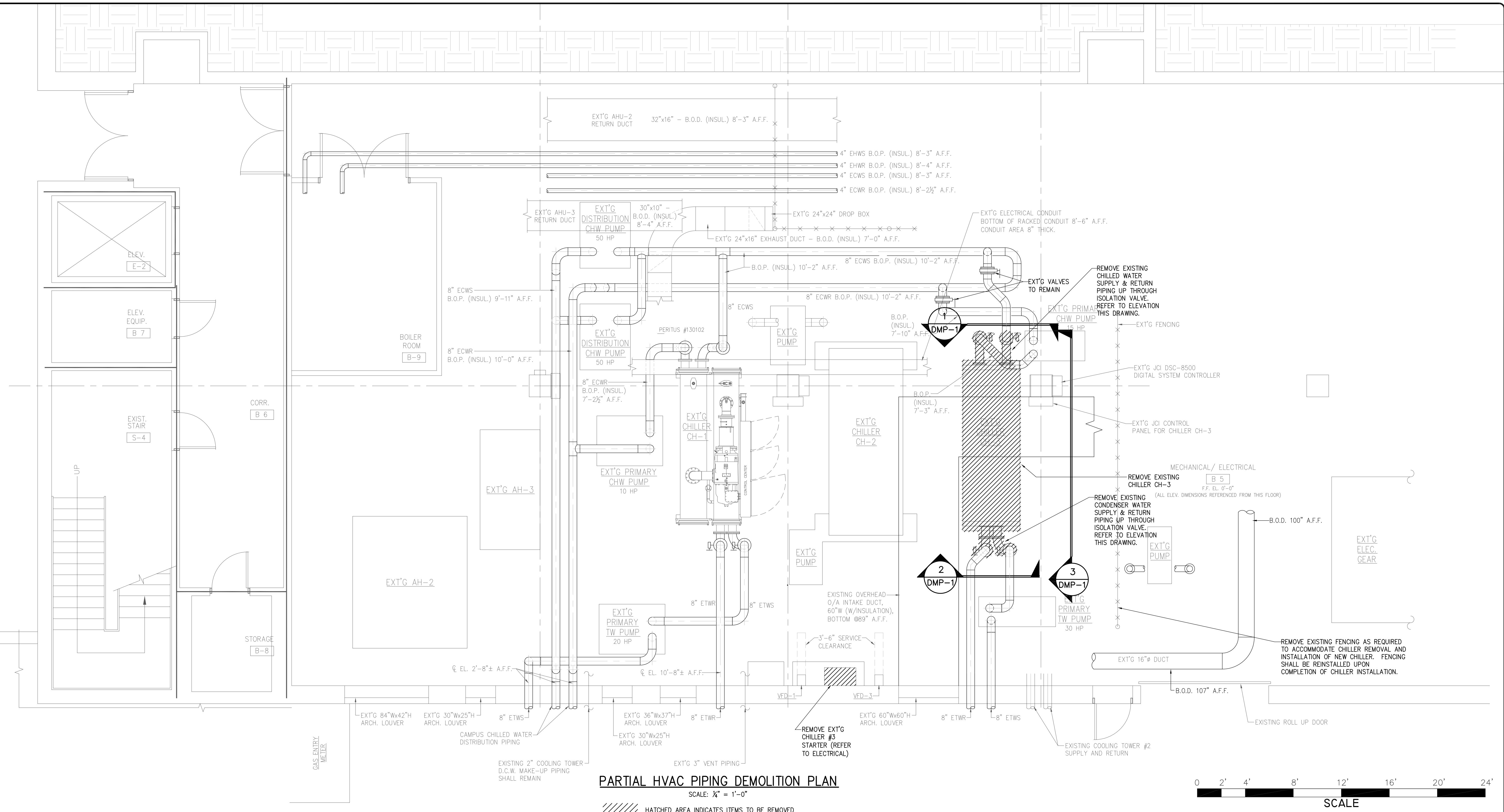
NO.	DATE	BY	DESCRIPTION	REVISIONS



UPSTATE CENTRAL CHILLED WATER PLANT  
 CHILLER #3 REPLACEMENT  
 SC STATE PROJECT #H34-9545-JM  
 SPARTANBURG, SOUTH CAROLINA

DESIGN JCP	/	DRAWN TMI
CHECKED JCP		
DATE 07/27/15		
JOB NO. PERITUS #150202		
SHEET T-1		
1 OF 1 SHEETS		

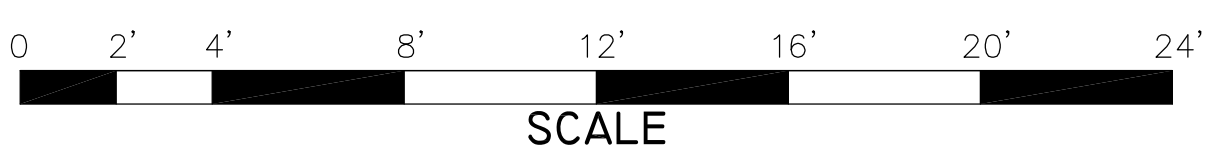
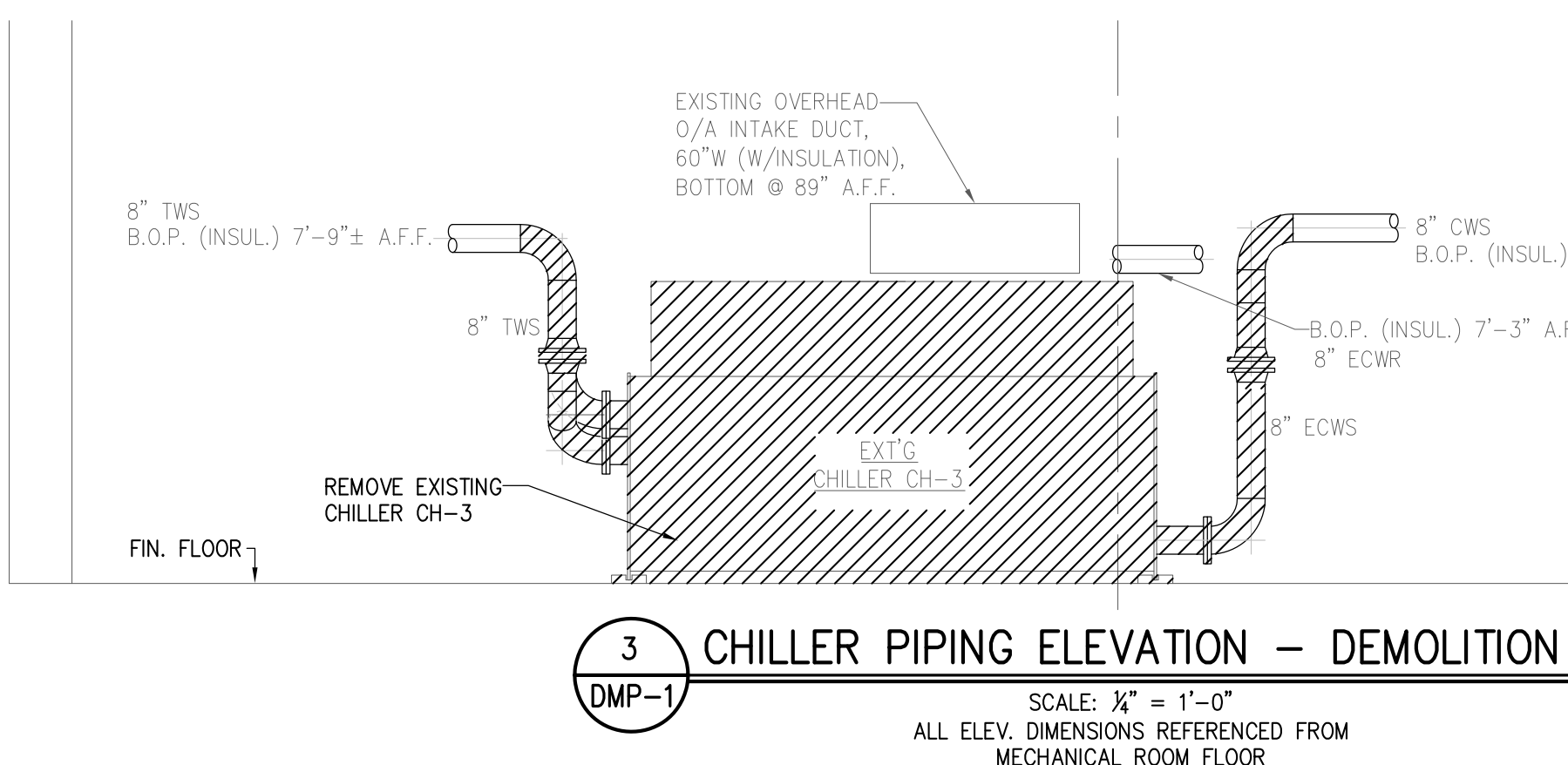
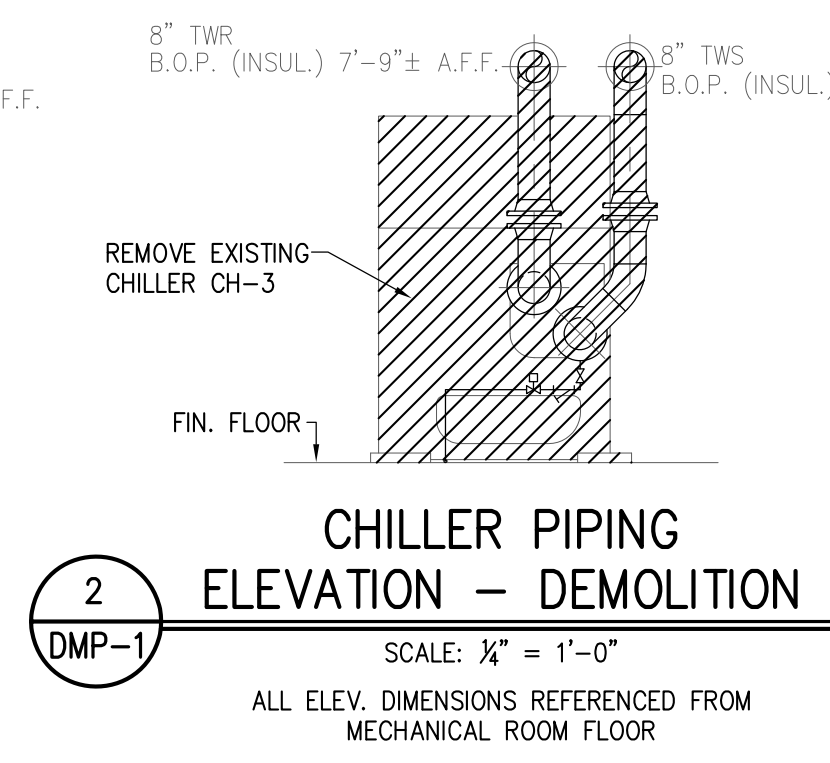
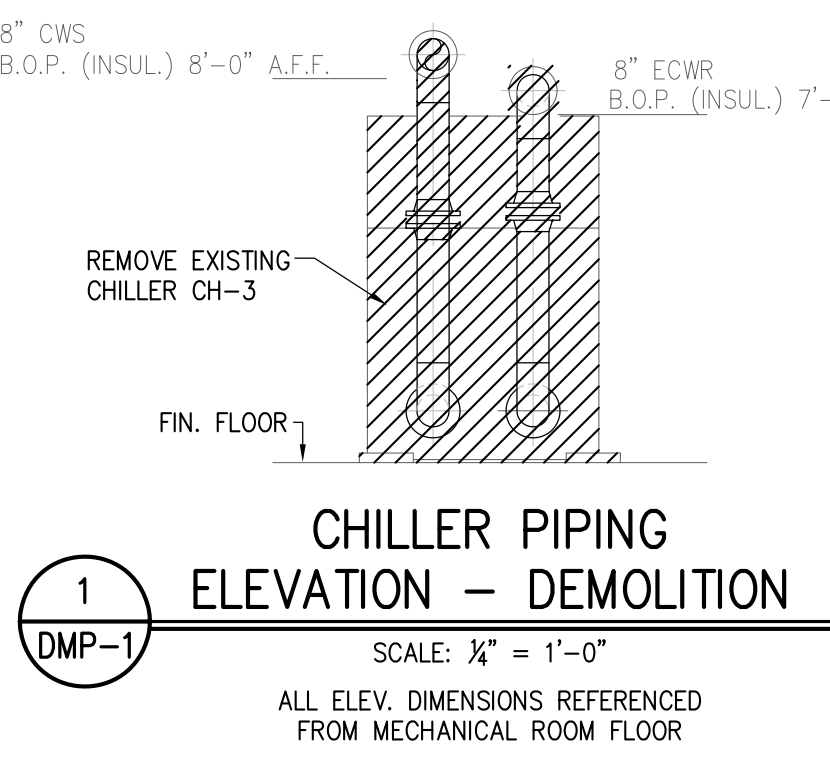
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**PARTIAL HVAC PIPING DEMOLITION PLAN**

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

////// HATCHED AREA INDICATES ITEMS TO BE REMOVED



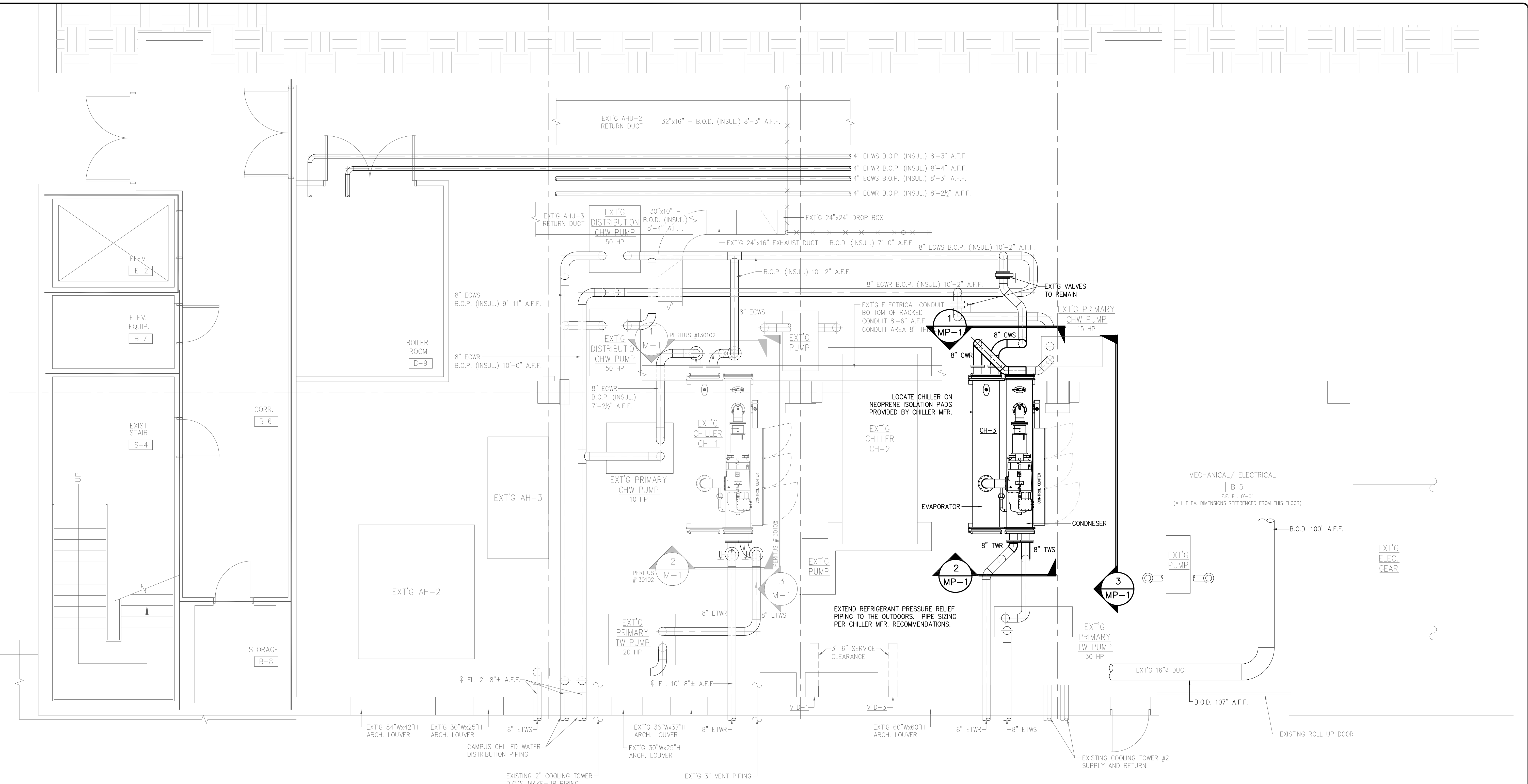
**KEY PLAN**  
NO SCALE

<p><b>UPSTATE CENTRAL CHILLED WATER PLANT</b> <b>CHILLER #3 REPLACEMENT</b> <b>SC STATE PROJECT #H34-9545-JM</b> <b>SPARTANBURG, SOUTH CAROLINA</b></p>	
DESIGN JCP	DRAWN TMI
<p>CHECKED JCP DATE 07/27/15</p>	
<p>JOB NO. PERITUS #150202</p>	
<p>SHEET <b>DMP-1</b></p>	
<p>1 OF 3 SHEETS</p>	

CAROLINA PROFESSIONAL ENGINEERS & ARCHITECTS  
 PERITUS ENGINEERS & ASSOCIATES, INC.  
 No. 00098  
 CERTIFICATE OF QUALIFICATION  
 11/9/15  
 No. 25170  
 OFFICE: SPARTANBURG, SC

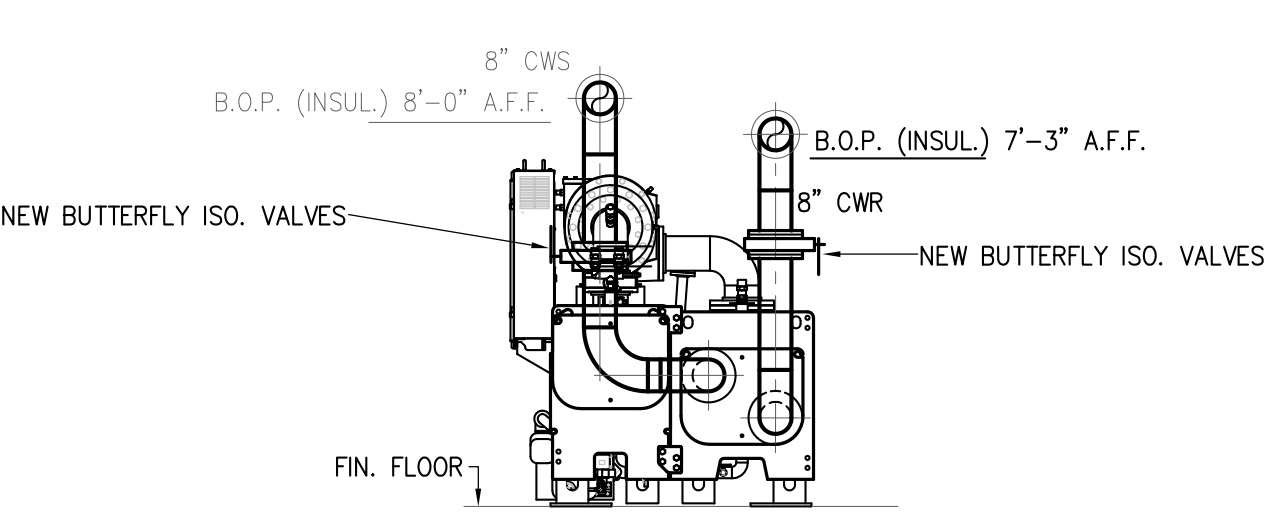
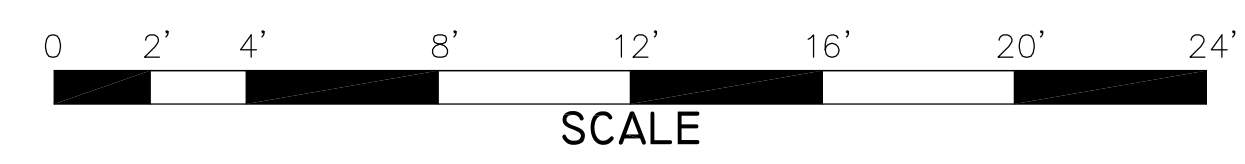
REVISIONS  
 NO. DATE BY DESCRIPTION

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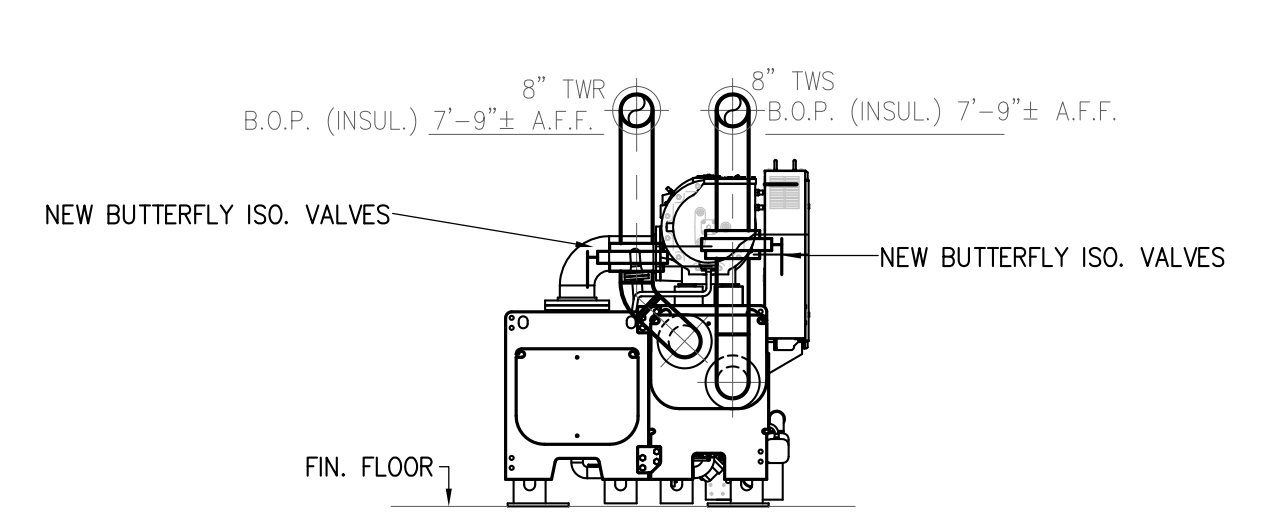


**HVAC PIPING PARTIAL NEW WORK PLAN**

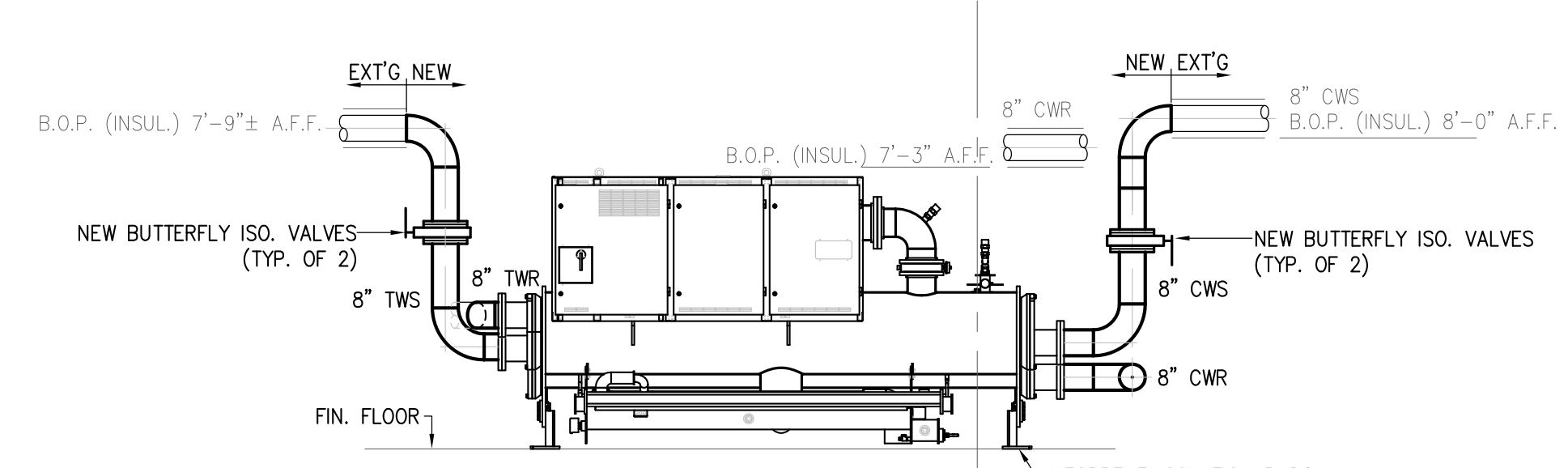
SCALE: 1/4" = 1'-0"  
ALL NEW WORK SHOWN IN BOLD



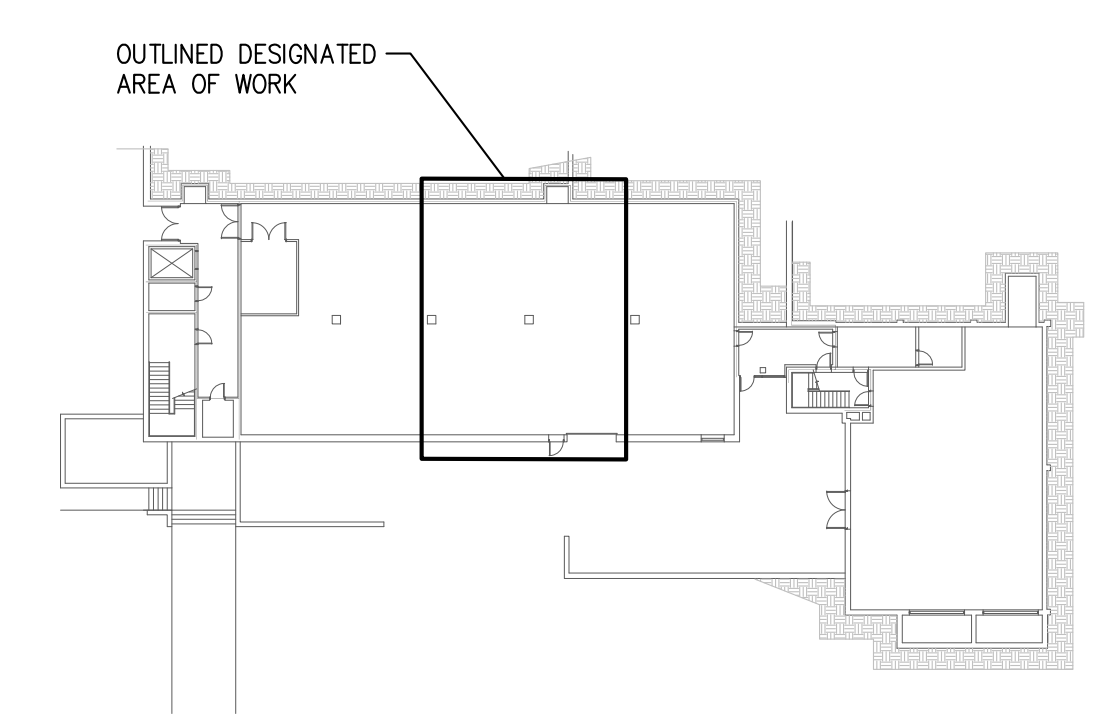
**1 CHILLER PIPING ELEVATION (CHILLED WATER)**  
SCALE: 1/4" = 1'-0"  
ALL ELEV. DIMENSIONS REFERENCED FROM MECHANICAL ROOM FLOOR



**2 CHILLER PIPING ELEVATION (CONDENSER WATER)**  
SCALE: 1/4" = 1'-0"  
ALL ELEV. DIMENSIONS REFERENCED FROM MECHANICAL ROOM FLOOR



**3 CHILLER PIPING ELEVATION**  
SCALE: 1/4" = 1'-0"  
ALL ELEV. DIMENSIONS REFERENCED FROM MECHANICAL ROOM FLOOR



**KEY PLAN**  
NO SCALE

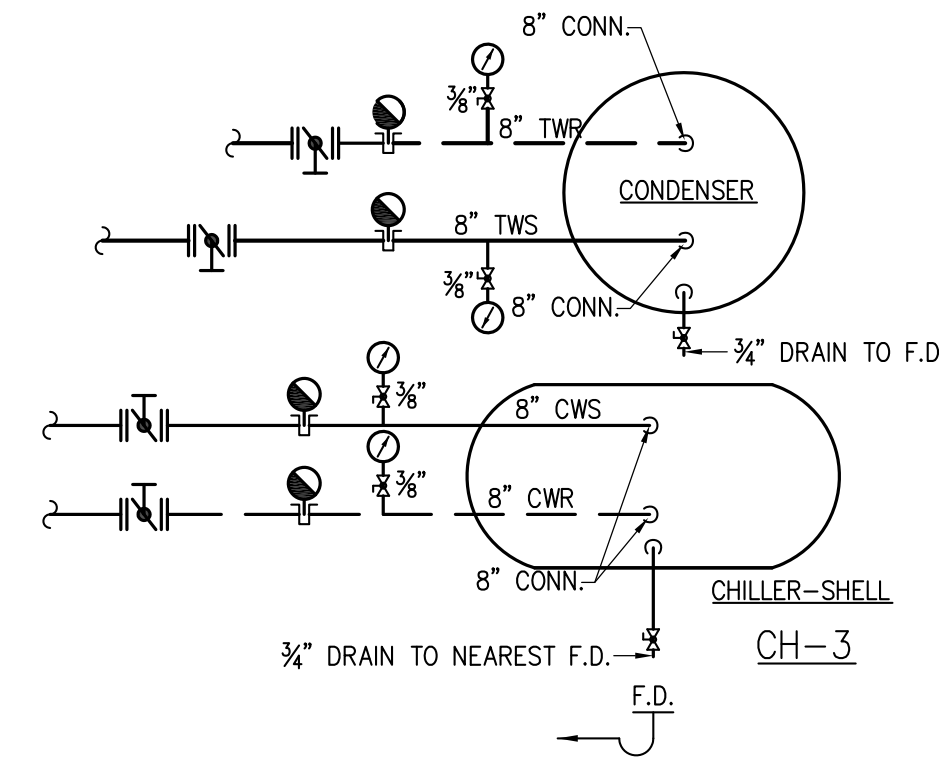
<p><b>UPSTATE CENTRAL CHILLED WATER PLANT CHILLER #3 REPLACEMENT SC STATE PROJECT #H34-9545-JM SPARTANBURG, SOUTH CAROLINA</b></p>	
DESIGN / DRAWN JCP / TMI	REVISIONS
CHECKED JCP	NO. DATE BY
DATE 07/27/15	DESCRIPTION
JOB NO. PERITUS #150202	REVISIONS
SHEET MP-1	NO. DATE BY
2 OF 3 SHEETS	DESCRIPTION

WATER-COOLED HELICAL ROTARY (VFD DRIVEN) CHILLER SCHEDULE

UNIT No.	CARRIER MODEL No.	LOADING	DESIGN MAX CAPACITY (TONS)	RATED FULL LOAD MAX. K.W. @ DESIGN CAPACITY	FULL LOAD MAX. K.W./TONS (ASHRAE 90.1)	PART LOAD MAX. IPLV	MOTOR RLA	CHILLER RLA @ RATED K.W.	CHILLER SHELL DATA					CONDENSER SHELL DATA					UNIT OPERATING WEIGHT (LB.)	UNIT RIGGING WEIGHT (LB.)	MCA	MAX FUSE/CB AMPS	VOLTAGE	REMARKS
									EWI°F	LWT°F	G.P.M.	PRESS. DROP (FT. WG.)	FOULING FACTOR	EWI°F	LWT°F	G.P.M.	PRESS. DROP (FT. WG.)	FOULING FACTOR						
CH-3	23XRV3737NQVAA51	100%	350	213	0.610	0.319	308	281	54.0	44.0	840	22.0	0.0001	85.0	94.4	1050	23.4	0.00025	19079	16960	351	600	460/3/60	1-2
		75%	263	106	0.404	-	221	144	51.5	44.0	840	22.1	0.0001	75.0	81.7	1050	24.0	0.00025						
		50%	175	48	0.271	-	164	70	49.0	44.0	840	22.2	0.0001	65.0	69.3	1050	24.6	0.00025						
		25%	88	25	0.287	-	165	43	46.5	44.0	840	22.3	0.0001	65.0	67.2	1050	24.7	0.00025						

NOTES:

- FACTORY CHARGED WITH 760 lbs. OF R-134a REFRIGERANT.
- FACTORY WELDED RAISED FACED FLANGES FOR CONDENSER WATER INLET/OUTLET AND CHILLED WATER INLET/OUTLET.



CHILLER PIPING SCHEMATIC  
NO SCALE

MECHANICAL GENERAL NOTES

- ALL SCHEDULES SHOWN ARE THE PURPOSE OF AIDING THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CORRECT TOTALS.
- CO-ORDINATE HVAC INSTALLATION WITH ALL OTHER TRADES, INCLUDING ELECTRICAL.
- REFER TO ELECTRICAL DRAWINGS FOR POWER CONNECTION POINTS.
- ALL PIPING INSULATION SHALL COMPLY WITH SECTION 503 OF THE INTERNATIONAL ENERGY CONSERVATION CODE, 2009 EDITION.
- ALL ELECTRICALLY POWERED EQUIPMENT SHALL BE LISTED AND LABELED PER NATIONAL ELECTRICAL CODE, AND INTERNATIONAL MECHANICAL CODE, 2012 EDITION, CHAPTER 3.
- ALL EQUIPMENT SHALL BE ACCESSIBLE PER INTERNATIONAL MECHANICAL CODE 2012 EDITION, CHAPTER 3.
- 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.
- CONTRACTOR SHALL RECEIVE AND OFFLOAD NEW CHILLER. COORDINATE EXACT OFFLOADING LOCATION WITH OWNER. CONTRACTOR SHALL PROVIDE FOR THE RIGGING, TRANSPORT, AND PLACEMENT OF NEW CHILLER TO LOCATION INDICATED ON MECHANICAL PIPING DRAWINGS.

MECHANICAL LEGEND	
SYMBOL	DESCRIPTION
ECWS	EXISTING CHILLED WATER SUPPLY PIPING
ECWR	EXISTING CHILLED WATER RETURN PIPING
ETWS	EXISTING TOWER WATER SUPPLY PIPING
ETWR	EXISTING TOWER WATER RETURN PIPING
EXT'G	EXISTING
TWS	COOLING TOWER WATER SUPPLY PIPING
TWR	COOLING TOWER WATER RETURN PIPING
CWS	CHILLED WATER SUPPLY PIPING
CWR	CHILLED WATER RETURN PIPING
—D—	DRAIN PIPING
—DCW—	DOMESTIC COLD WATER PIPING
—	CLEAN OUT (C.O.)
⊘	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
—	EXISTING PIPE TO REMAIN

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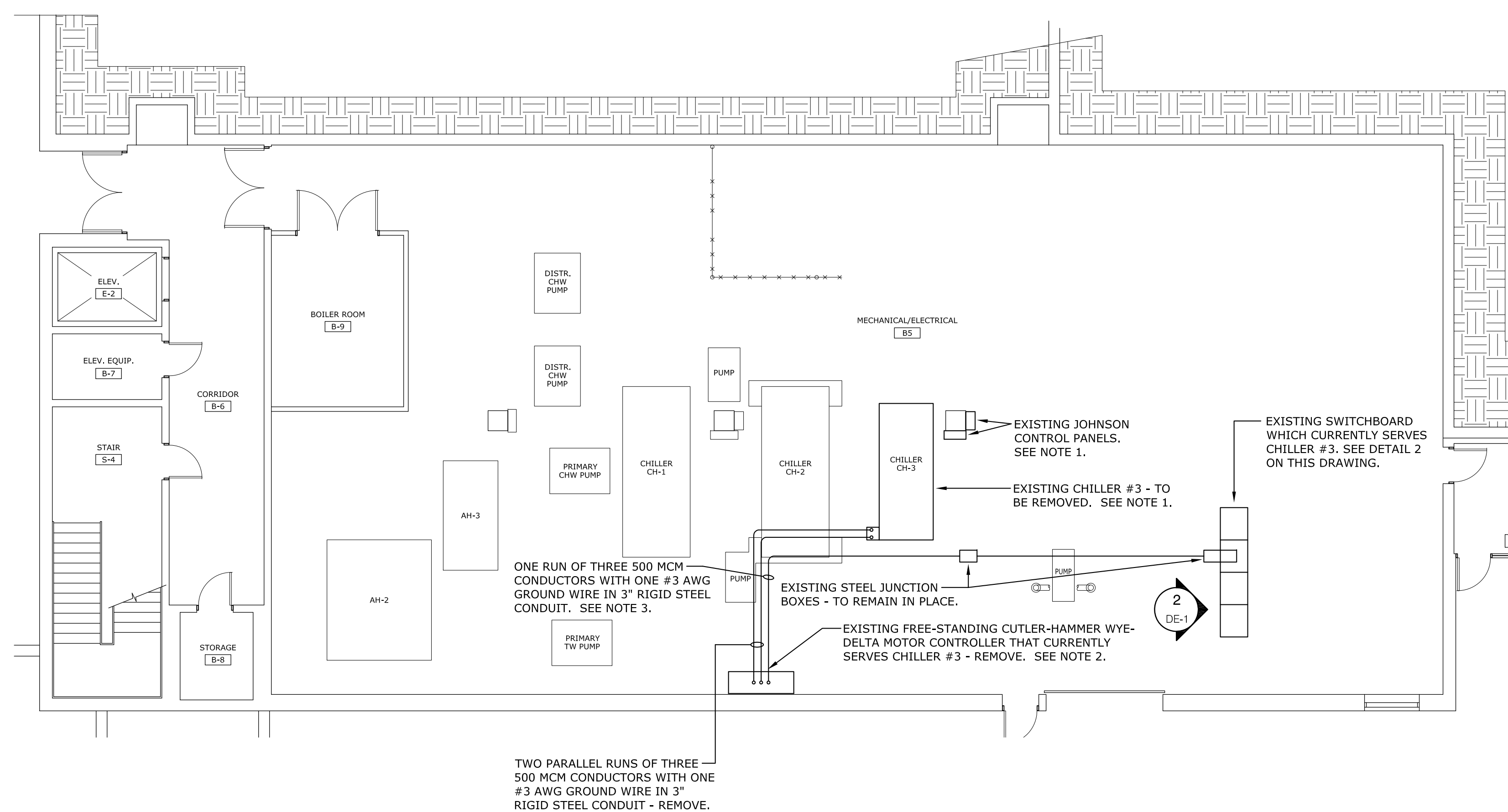
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CHILLER #3 REPLACEMENT	
SC STATE PROJECT #H34-9545-JM	
SPARTANBURG, SOUTH CAROLINA	
DESIGN JCP	DRAWN TMI
CHECKED JCP	
DATE 07/27/15	
JOB NO. PERITUS #150202	
SHEET MP-2	
3 OF 3 SHEETS	

CARLULA  
PROFESSIONAL ENGINEER  
No. 25170  
STATE OF SOUTH CAROLINA

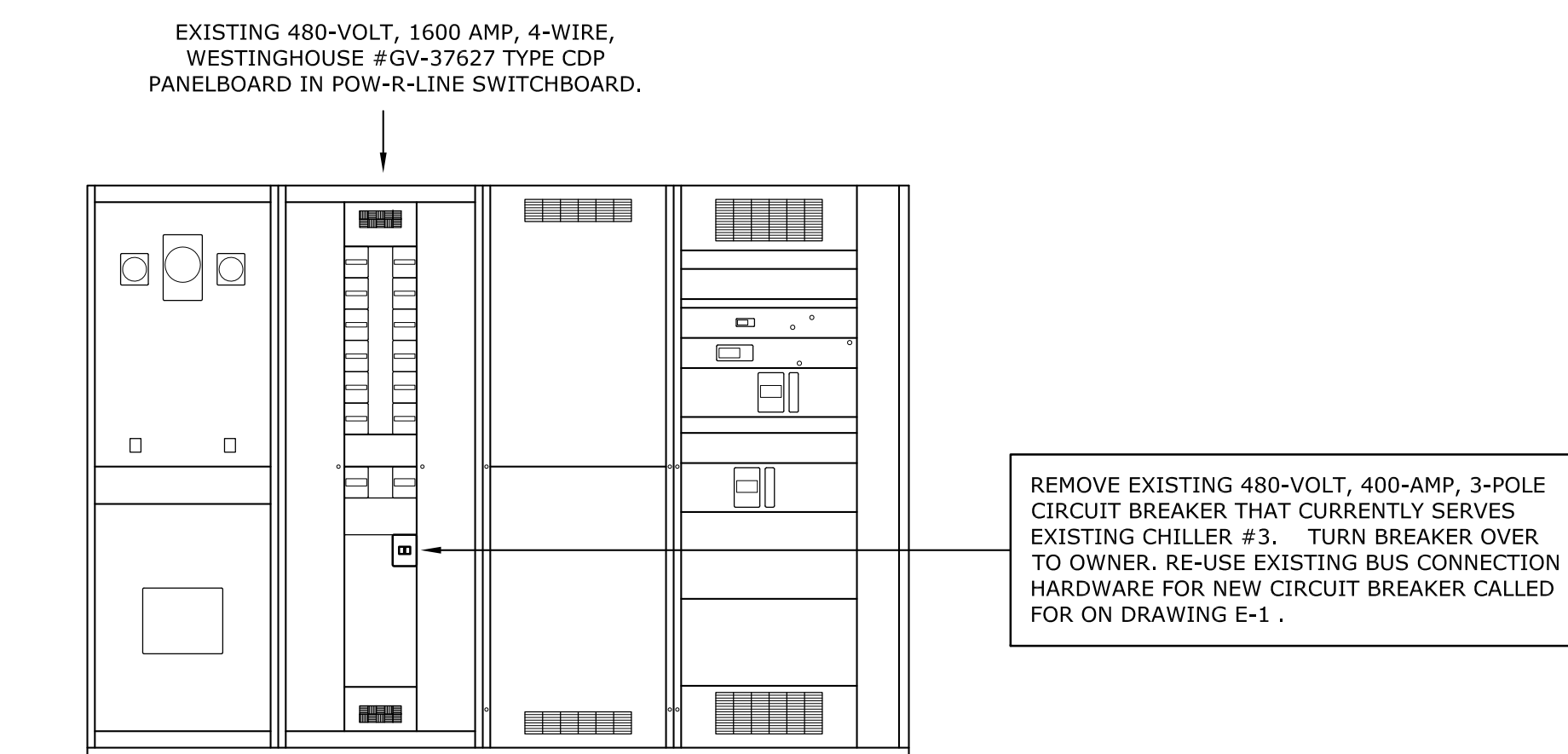
PERITUS  
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STATE OF SOUTH CAROLINA

NO.	DATE	BY	DESCRIPTION	REVISIONS

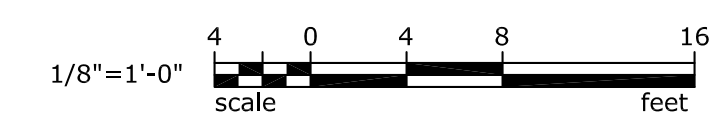
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**1 ELECTRICAL DEMOLITION PLAN**  
 SCALE: 1/8" = 1'-0"



**2 EXISTING SWITCHBOARD ELEVATION**  
 NOT TO SCALE



**GENERAL CONSTRUCTION NOTES**

- PROVIDE ALL WORK IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:  
 INTERNATIONAL BUILDING CODE 2012 EDITION  
 NFPA 70 - NATIONAL ELECTRICAL CODE 2011 EDITION
  - RACEWAYS SHALL BE GALVANIZED RMC WITH THREADED FITTINGS UNLESS NOTED OR DETAILED OTHERWISE. ALL WIRING SHALL BE COPPER WITH THHN INSULATION AND SHALL BE INSTALLED IN METAL RACEWAY.
  - INSTALL ELECTRICAL SYSTEMS WITHOUT INTERFERING WITH DUCTS, PIPES, STRUCTURAL MEMBERS, OR OTHER SYSTEMS.
  - THOROUGHLY CLEAN ALL EQUIPMENT AND SYSTEMS BEFORE PLACING IN OPERATION. RESTORE FINISHED SURFACES IF DAMAGED AND DELIVER THE ENTIRE INSTALLATION IN AN APPROVED CONDITION. THE CONTRACTOR SHALL INSTRUCT THE OWNER'S PERSONNEL IN THE PROPER OPERATION AND MAINTENANCE OF ALL SYSTEMS. FURNISH 3 SETS OF OPERATION AND MAINTENANCE MANUALS TO THE OWNER FOR EACH SYSTEM.
  - 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.
  - 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.
  - COORDINATE AND SCHEDULE WITH THE OWNER AN ELECTRICAL OUTAGE THAT WILL BE REQUIRED TO REPLACE THE CIRCUIT BREAKER AND CONDUCTORS FOR CHILLER #3. MAXIMUM OUTAGE DURATION SHALL BE 4 HOURS TO PERFORM THE WORK.
  - 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:
    - INSTALL EQUIPMENT, MATERIALS, AND RACEWAYS IN EXISTING STRUCTURES.
    - REMOVE AND REPLACE DEFECTIVE WORK THAT DOES NOT CONFORM TO REQUIREMENTS OF THE CONTRACT DOCUMENTS.
    - 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**

- EXISTING CHILLER #3: CHILLER WILL BE REMOVED BY THE MECHANICAL CONTRACTOR. ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL EXISTING WIRING AND RACEWAYS (POWER AND CONTROL) THAT SERVE THE CHILLER IN THEIR ENTIRETY UNLESS OTHERWISE DIRECTED BY THE MECHANICAL CONTRACTOR. THERE ARE TWO EXISTING LARGE RACEWAYS WITH WIRING AND SEVEN SMALL EXISTING RACEWAYS WITH WIRING CONNECTED TO THE CHILLER - COORDINATE WITH THE MECHANICAL CONTRACTOR FOR DIRECTION CONCERNING DEMOLITION OF THE EXISTING CONTROL RACEWAY AND WIRING. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE/BUILDING TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID AND SHALL INCLUDE ALL WORK REQUIRED FOR COMPLETE DEMOLITION IN HIS BID.
- EXISTING MOTOR CONTROLLER: DISCONNECT AND REMOVE ALL EXISTING WIRING AND RACEWAYS (POWER AND CONTROL) THAT SERVE THE EXISTING CONTROLLER. THERE ARE FIVE SMALL EXISTING RACEWAYS WITH WIRING CONNECTED TO THE CONTROLLER. REMOVE EXISTING MOTOR CONTROLLER. THE ELECTRICAL CONTRACTOR SHALL VISIT THE SITE/BUILDING TO FIELD VERIFY EXISTING CONDITIONS PRIOR TO BID AND SHALL INCLUDE ALL WORK REQUIRED FOR COMPLETE DEMOLITION IN HIS BID.
- EXISTING FEEDER ROUTED FROM SWITCHBOARD TO THE MOTOR STARTER SHALL BE MODIFIED AS FOLLOWS:
  - REMOVE EXISTING CONDUCTORS AND GROUND WIRE IN THEIR ENTIRETY - DO NOT RE-USE CONDUCTORS.
  - REMOVE THE 3" RIGID STEEL CONDUIT FROM THE MOTOR STARTER TO THE FIRST STEEL JUNCTION BOX - THE EXISTING 3" RIGID STEEL CONDUIT ROUTED BETWEEN THE STEEL JUNCTION BOXES SHALL REMAIN IN PLACE AND BE RE-USED.

REVISIONS	
NO.	DESCRIPTION

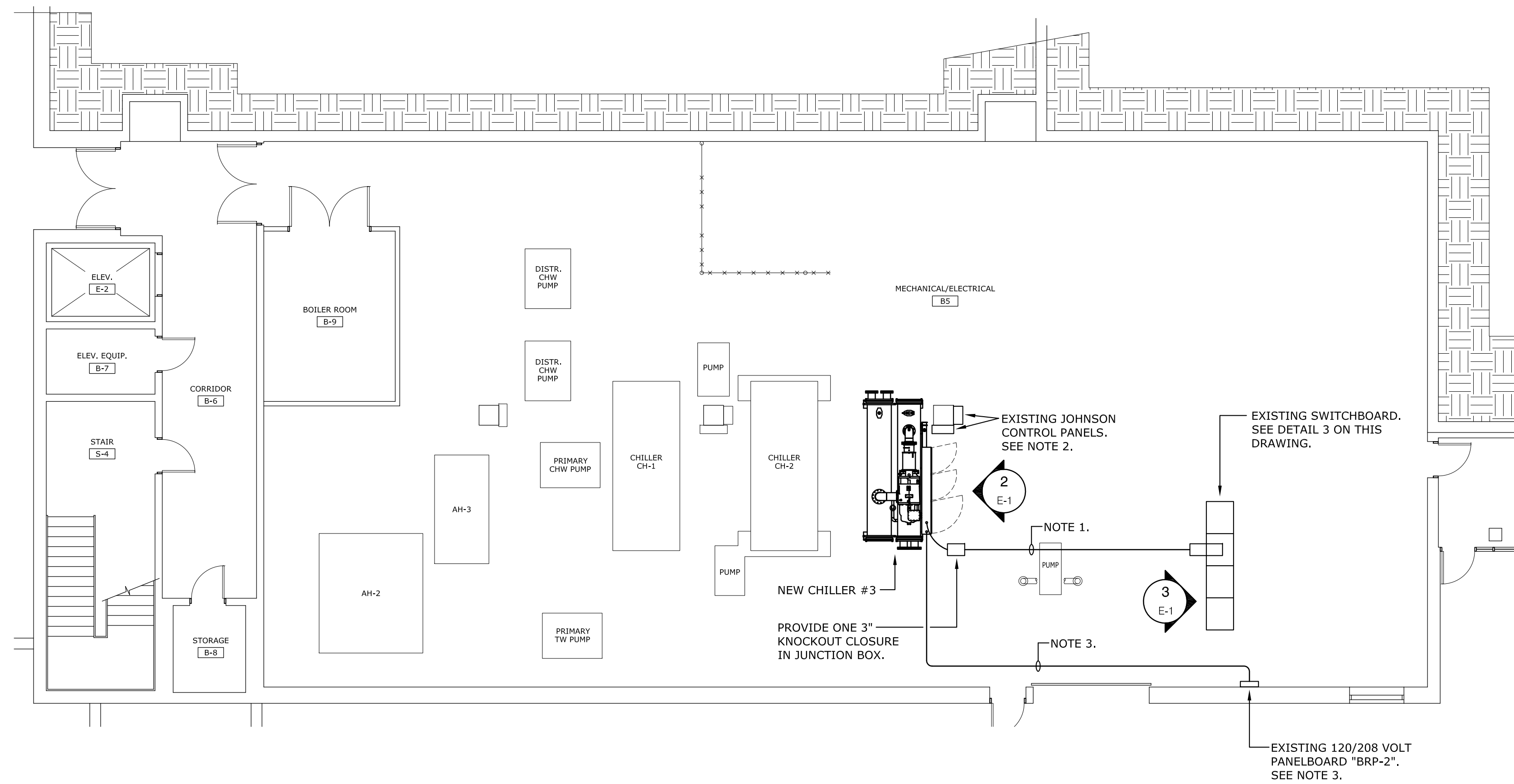
**UPSTATE CENTRAL CHILLED WATER PLANT**  
**CHILLER #3 REPLACEMENT**  
 SC STATE PROJECT #H34-9545-JM  
 SPARTANBURG, SOUTH CAROLINA

DESIGN JWL	DRAWN JSJ
CHECKED JWL	DATE 07/27/15
SHEET LAND #USC-2015-10	
<b>DE-1</b>	
1 OF 2 SHEETS	

**LAND ENGINEERING ASSOCIATES, LLC**

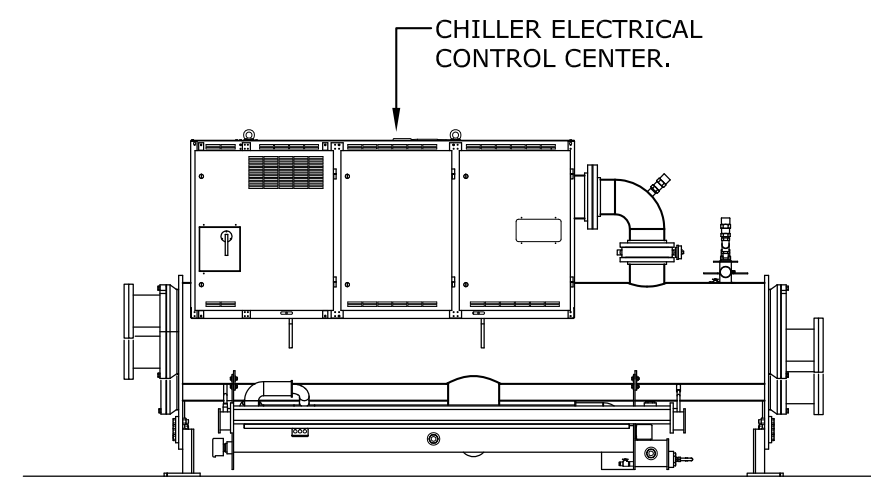
262 SANDHURST ROAD, SUITE 101  
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 Joe.Land.LEA@sc.rr.com

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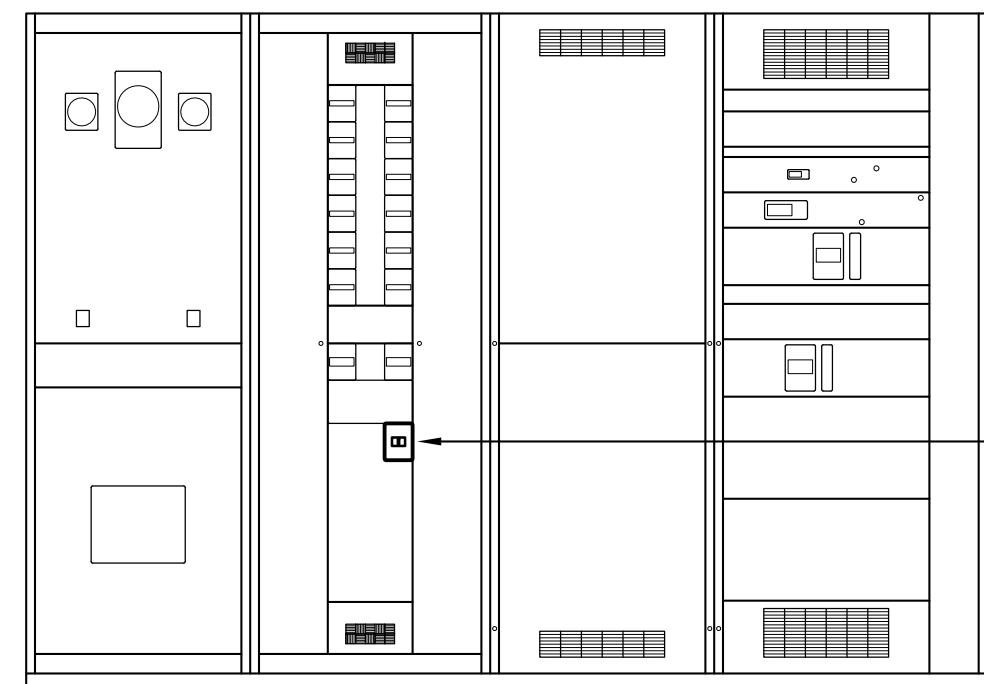
- ### RENOVATION NOTES
- NEW CHILLER #3**: PROVIDE THREE #500 MCM THHN COPPER CONDUCTORS WITH ONE #2 AWG GREEN INSULATED COPPER GROUND WIRE FROM EXISTING SWITCHBOARD TO NEW CHILLER CONTROL CENTER - RE-USE EXISTING 3" RMC RACEWAY. FINAL RACEWAY CONNECTION TO CHILLER CONTROL CENTER SHALL BE MADE WITH 3" LIQUID-TIGHT FLEXIBLE METAL CONDUIT. COORDINATE ENTRY POINT OF RACEWAY TO CHILLER CONTROL CENTER WITH CHILLER SHOP DRAWINGS. SUPPORT RACEWAYS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
  - EXISTING JOHNSON CONTROL PANELS**: EXTEND EXISTING DISCONNECTED RACEWAYS FOR CONTROL WIRING TO NEW CHILLER CONTROL CENTER - COORDINATE WITH THE MECHANICAL CONTRACTOR FOR REQUIREMENTS. FINAL RACEWAY CONNECTION TO CHILLER CONTROL PANEL SHALL BE MADE WITH LIQUID-TIGHT FLEXIBLE METAL CONDUIT. ALL CONTROL WIRING WILL BE PROVIDED BY THE MECHANICAL CONTRACTOR.
  - EXISTING PANELBOARD "BRP-2"**: EXISTING PANEL IS A SQUARE-D #NQ442L2, 225 AMP, 120/208 VOLT PANELBOARD. PROVIDE ONE 20-AMP, SINGLE-POLE CIRCUIT BREAKER IN PANELBOARD TO SERVE 120-VOLT CONTROL POWER TO NEW CHILLER CONTROL CENTER. PROVIDE TWO #12 AWG THHN COPPER CONDUCTORS WITH ONE #12 AWG GREEN INSULATED COPPER GROUND WIRE IN 3/4" RMC RACEWAY FROM EXISTING PANELBOARD TO NEW CHILLER. FINAL RACEWAY CONNECTION TO CHILLER CONTROL PANEL SHALL BE MADE WITH 3/4" LIQUID-TIGHT FLEXIBLE METAL CONDUIT. COORDINATE ENTRY POINT OF RACEWAY TO CHILLER CONTROL CENTER WITH CHILLER SHOP DRAWINGS. 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.

**1 ELECTRICAL RENOVATION PLAN**  
SCALE: 1/8" = 1'-0"



**2 NEW CHILLER ELEVATION**  
NOT TO SCALE

EXISTING 480-VOLT, 1600 AMP, 4-WIRE, WESTINGHOUSE #GV-37627 TYPE CDP PANELBOARD IN POW-R-LINE SWITCHBOARD.

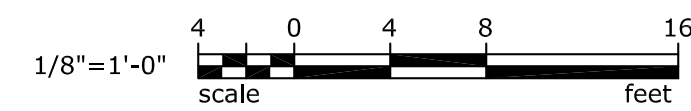


PROVIDE ONE 480-VOLT, 500-AMP, 3-POLE CIRCUIT BREAKER WITH LONG-TIME, SHORT-TIME, AND INSTANTANEOUS TRIP SETTINGS TO SERVE NEW CHILLER #3. PROVIDE NEW FILLER COVER PLATE AS REQUIRED TO ACCOMMODATE NEW CIRCUIT BREAKER. PROVIDE A PLASTIC ENGRAVED SIGN ON COVER PLATE THAT READS "CHILLER #3".

PROCURE THE SERVICES OF EATON/CUTLER-HAMMER TO COORDINATE WITH THE CHILLER MANUFACTURER AND PERFORM A COORDINATION STUDY TO DETERMINE AND APPLY ALL THREE TRIP SETTINGS OF THE CIRCUIT BREAKER.

CONTACT PERSON WITH EATON/CUTLER-HAMMER IS STEPHEN HOLLAMON, PHONE NUMBER (828) 551-9576.

**3 EXISTING SWITCHBOARD ELEVATION**  
NOT TO SCALE



**LEA** LAND ENGINEERING ASSOCIATES, LLC

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REVISIONS	
NO.	DESCRIPTION

**UPSTATE CENTRAL CHILLED WATER PLANT**  
**CHILLER #3 REPLACEMENT**  
SC STATE PROJECT #H34-9545-JM  
SPARTANBURG, SOUTH CAROLINA

DESIGN JWL	DRAWN JSJ
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LAND #USC-2015-10	
SHEET	
<b>E-1</b>	
2 OF 2 SHEETS	