

# Department of Veterans Affairs

## Project 614-13-119

### Replace Chiller and Cooling Tower

VA Medical Center  
1030 Jefferson Avenue  
Memphis TN 38104

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V A M C  
1030 JEFFERSON AV.  
MEMPHIS, TN. 38104

AMENDMENTS

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TITLE SHEET

REPLACE  
CHILLER AND  
COOLING TOWER

SCALE:- NO SCALE

DATE  
APR 2013

DRAWN BY  
S. NEYHART

CHECKED BY

DRAWING NO.

1

CHILLER																	
TAG	LOCATION	TYPE	REFRIG	NUMBER OF COMPRESSORS	TONS	FULL LOAD (KW/TON)	IPLV (KW/TON)	EVAPORATOR				CONDESER				VOLTAGE	MAX UNIT RLA (AMPS)
								GPM	PD (FT H2O)	EWI (°F)	LWT (°F)	GPM	PD (FT H2O)	EWI (°F)	LWT (°F)		
CH-6	BWG-1 MEZZANINE	CENTRIFUGAL MAGNETIC BEARING	R-134A	2	220	.56	.33	440	10.3	56	44.0.0	660	9.1	85.0	94.25	460-3-60	178

NOTES:

1. UNIT SHALL HAVE COMPLETE 5 YEAR LABOR, REFRIGERANT, AND PARTS WARRANTY.
2. CHILLER MANUFACTURER SHALL INCLUDE A FULL 5 YEARS SERVICE MAINTENANCE AGREEMENT AS PART OF THIS BID.
3. UNIT SHALL BE STARTED BY EQUIPMENT MANUFACTURER.
4. CHILLER SHALL HAVE TWO COMPRESSORS.
5. PROVIDE FACTORY MOUNTED NON-FUSED DISCONNECT SWITCHES FOR EACH COMPRESSOR.
6. PROVIDE FIELD INSTALLED CHILLED WATER AND CONDENSER WATER FLOW SWITCH.
7. CHILLER SHALL BE INSTALLED ON VIBRATION ISOLATOR PAD.
8. PROVIDE FACTORY MOUNTED BACNET INTERFACE MODULE.
9. PROVIDE FACTORY MOUNTED GROUND FAULT PROTECTION.
10. CHILLER SHALL HAVE TWO OIL-LESS MAGNETIC BEARING COMPRESSORS.
11. CHILLER SHALL BE ARI CERTIFIED.
12. PROVIDE FACTORY CERTIFIED PERFORMANCE TEST AT FULL LOAD.
13. PROVIDE DOUBLE LAYER 1.5" THICK FACTORY INSULATION.
14. INSTALLING CONTROLS CONTRACTOR SHALL HARD WIRE INTERLOCK THE CHILLER TO CHILLED WATER AND CONDENSER WATER PUMPS.
15. INSTALLING CONTROLS CONTRACTOR SHALL HARED WIRE INTERLOCK THE CHILLER TO CHILLED WATER AND CONDENSER WATER FLOW SWITCHES.
16. INSTALLING CONTROLS CONTRACTOR SHALL PROVIDE AND TERMINATE CONDENSER WATER REGULATING VALVE FOR EACH CHILLER.
17. CHILLER SHALL HAVE REFRIGERANT SERVICE ISOLATION VALVES.
18. CHILLER SHALL HAVE TWO USER INTERFACE DEVICES FOR REDUNDANCY. CHILLER SHALL HAVE A PASSWORD PROTECTED GRAPHICAL TOUCH SCREEN USER INTERFACE DEVICE.

COOLING TOWER												
TAG	LOCATION	NOM CAP TONS REF	MODEL	GPM	TEMP °F			FAN MOTORS				VOLTAGE
					AIR WB	WATER IN	WATER OUT	NO OF FANS	SPEED	HP	VOLTAGE	
SURGERY COOLING TOWER	ROOF	480	TTXL081950	1560	80	95	85	8	VARIABLE	5	480-3-60	460-3-60

NOTES:

1. UNIT SHALL HAVE BASIN HEATERS.
2. FANS SHALL HAVE VARIABLE SPEED DRIVES.
3. PROVIDE BACNET COMPATABLE CONTROL PANEL.
4. PROVIDE BASIN HEATERS.
5. PROVIDE LEVEL CONTROLLER WITH VALVE.
6. INSTALL PRESSURE REDUCING VALVE FOR MAKE UP WATER.
7. PROVIDE FACTORY STARTUP PROVIDED BY FACTORY TRAINED TECHNICIAN.

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SCHEDULES AND NOTES

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PUMPS									
TAG	LOCATION	SERVICE	GPM	HEAD	HP	TYPE	VOLTAGE	RPM	VFD
P-1	BWG-1 MEZZANINE	CHILLED WATER	440	81	15	END SUCTION	460-3-60	1750	YES
P-2	BWG-1 MEZZANINE	CHILLED WATER	440	81	15	END SUCTION	460-3-60	1750	YES
P-3	BWG-1 MEZZANINE	CONDENSER WATER	660	60	20	END SUCTION	460-3-60	1750	NO

NOTES FOR PUMP INSTALLATION:

1. PROVIDE NEMA 1 ENCLOSURE FOR VFDS.
2. PROVIDE FACTORY STARTUP BY FACTORY TRAINED TECHNICIAN.
3. ALL NEW MOTORS TO BE NEMA PREMIUM EFFICIENT MOTORS.
4. PIPING TO PUMPS TO BE INSTALLED WITH NEW VALVES AND OTHER APPURTENANCES AS SHOWN ON DETAIL 1.

NOTES FOR LAB CHILLER INSTALLATION:

1. DEMO EXISTING LAB CHILLER LOCATED IN BWG-1 ON THE MEZZANINE.
2. INSTALL NEW LAB CHILLER. MODIFY EXISTING PIPING AS NECESSARY TO INSTALL NEW CHILLER.
3. INSULATE ANY NEW PIPING AND REINSULATE ANY DISTURBED INSULATION.
4. INSTALL NEW ELECTRICAL POWER CONNECTIONS FROM EXISTING CHILLER FEED TO NEW CHILLER.
5. TEST AND BALANCE CHILLED WATER AND CONDENSER WATER PUMPS TO THE REQUIRED FLOW RATES.
6. ALL WORK TO BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE.
7. CONNECT CONTROLS TO BACNET ENERGY MANAGEMENT SYSTEM. PROVIDE GRAPHICS ON MANAGEMENT SYSTEM.
8. PROVIDE POWER TO ALL CONTROL DEVICES.
9. ALL ELECTRIC WIRING INCLUDING CONTROLS TO BE CONTAINED IN CONDUIT.
10. REPLACE VALVES V-1, V-2, V-3, AND V-4 WITH NEW ELECTRIC CONTROL VALVES.

NOTES FOR SURGERY COOLING TOWER INSTALLATION:

1. DEMO EXISTING SURGERY COOLING TOWER LOCATED ON BUILDING 1 ROOF.
2. PROVIDE DESIGN FROM REGISTERED STRUCTURAL ENGINEER FOR COOLING TOWER ROOF SUPPORTS.
3. CONSTRUCT COOLING TOWER SUPPORTS PER APPROVED DESIGN.
4. INSTALL NEW COOLING TOWER ON ROOF.
5. MAKE PIPING CHANGES NECESSARY TO CONNECT COOLING TOWER.
6. INSULATE NEW PIPING AND REINSULATE ANY DISTURBED INSULATION.
7. INSTALL HEAT TRACE ON CONDENSER WATER AND MAKE UP WATER LINES.
8. INSTALL NEW BREAKER IN PANEL MCG-C. CONNECT TO NEW TOWER.
9. ALL WORK TO BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE.
10. CONNECT CONTROLS TO BACNET ENERGY MANAGEMENT SYSTEM. PROVIDE GRAPHICS ON MANAGEMENT SYSTEM.
11. ALL ELECTRIC WIRING INCLUDING CONTROLS TO BE CONTAINED IN CONDUIT.
12. PROVIDE POWER TO ALL CONTROL DEVICES.
13. TEST AND BALANCE CONDENSER WATER PUMP TO THE REQUIRED FLOW RATE.

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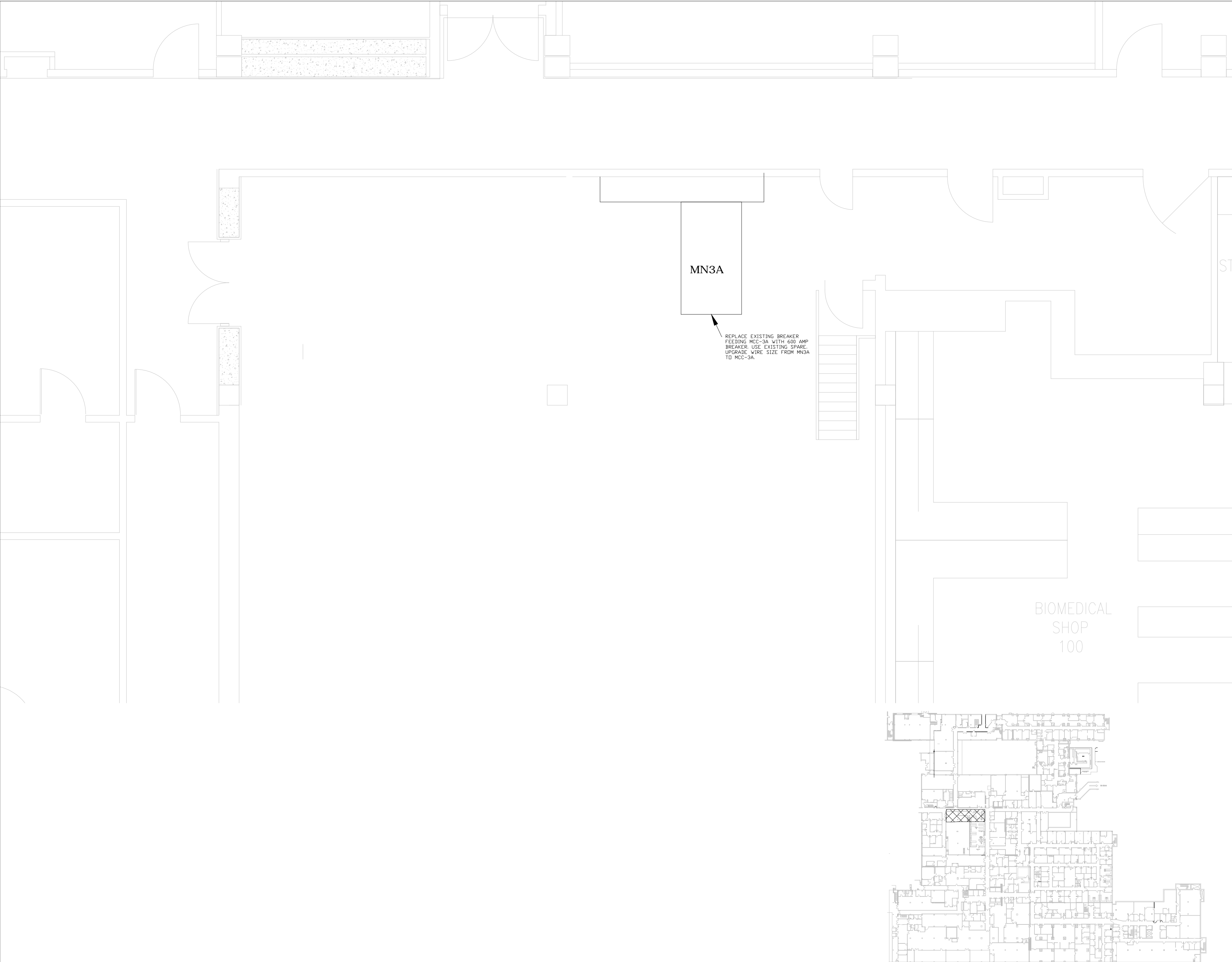
SCEDULE AND NOTES

REPLACE  
CHILLER AND  
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REPLACE  
CHILLER AND  
COOLING TOWER

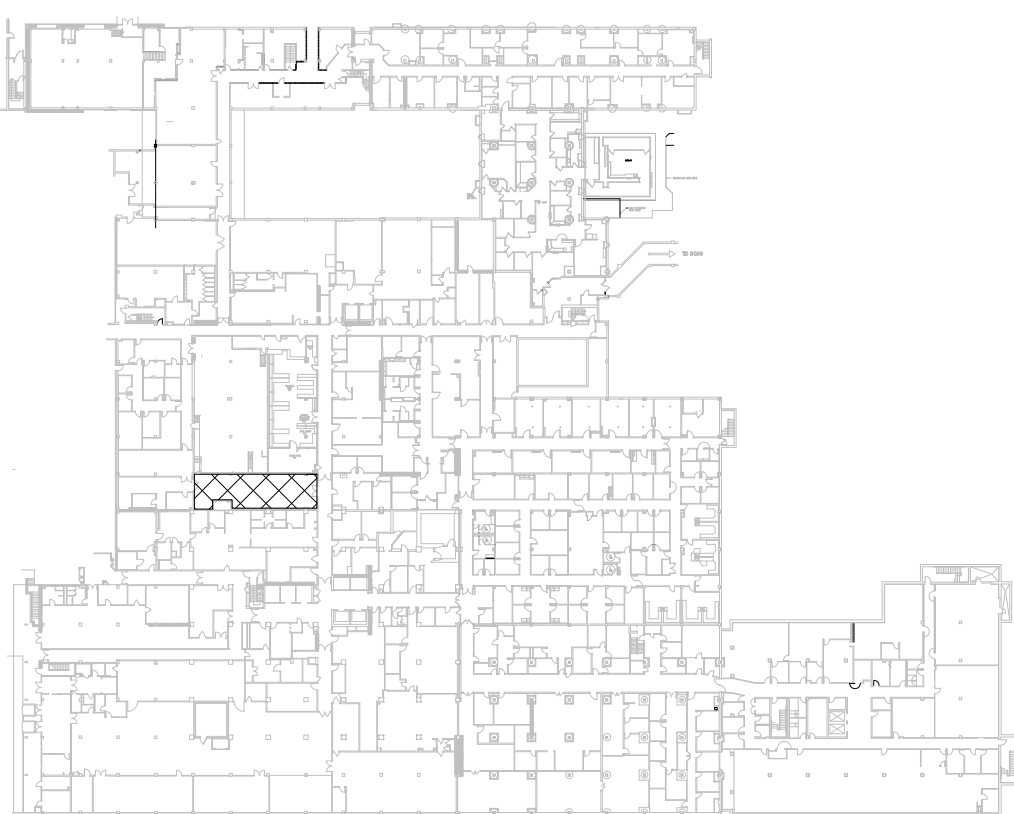
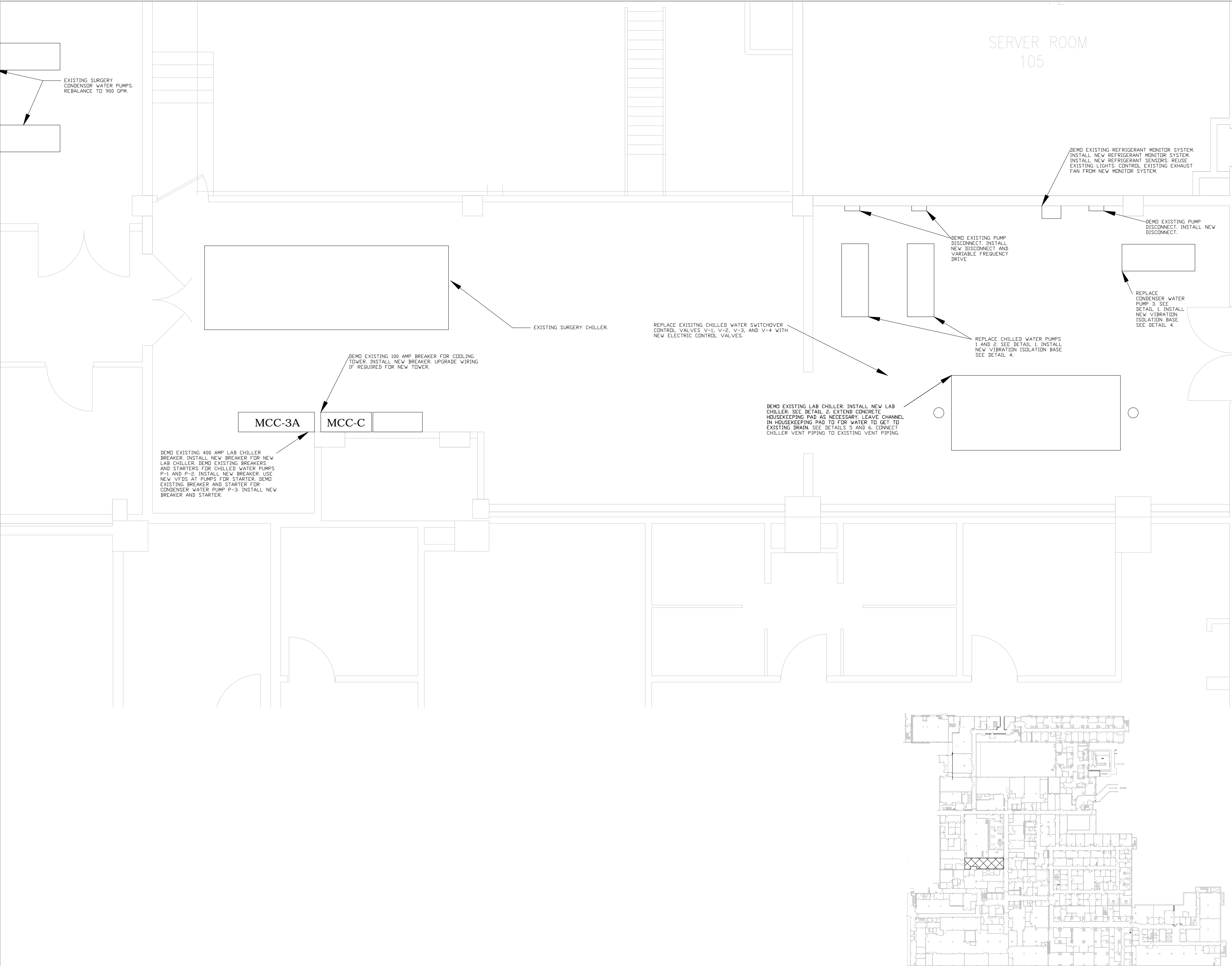
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OLD CHILLER PLANT MEZZANINE

REPLACE  
CHILLER AND  
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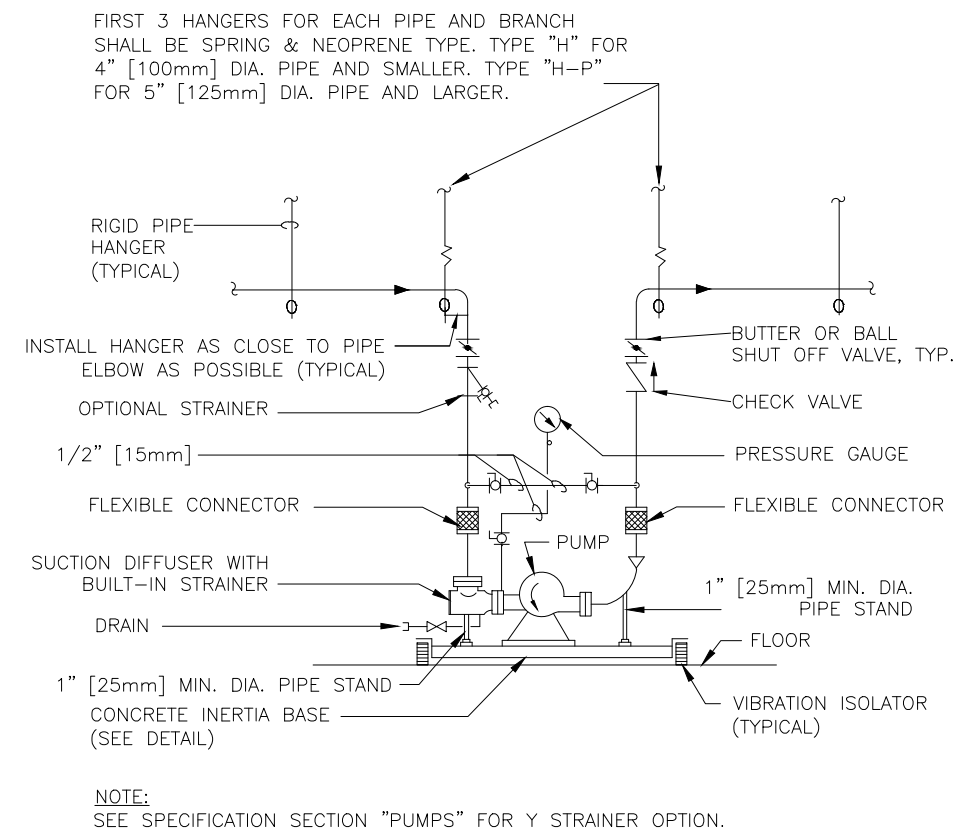
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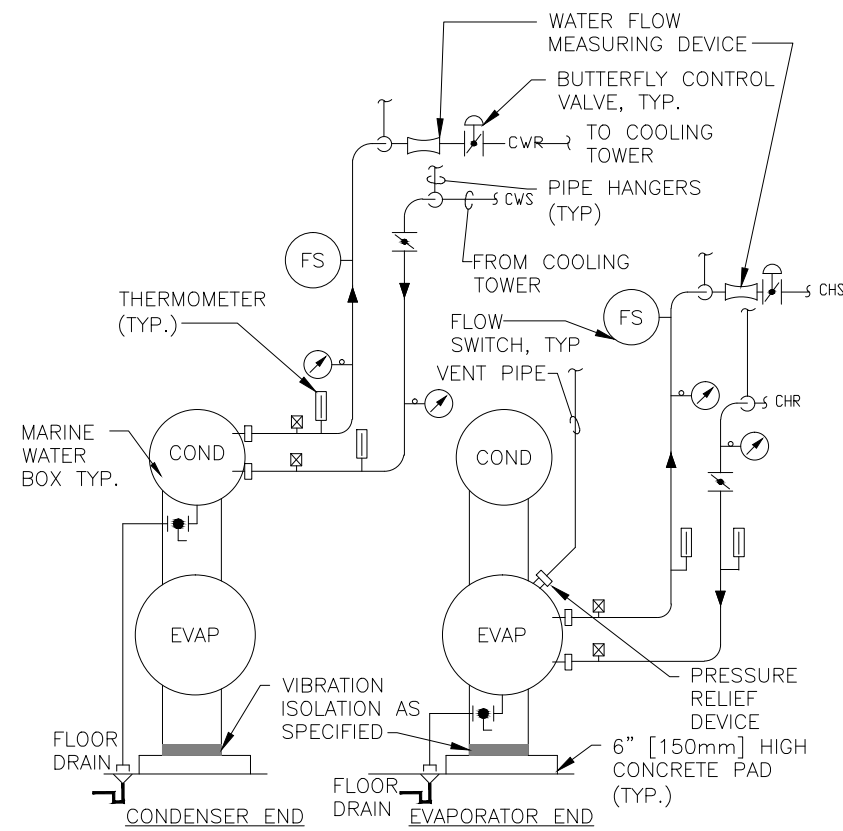
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## DOUBLE SUCTION FLOOR-MOUNTED PUMPS - CONNECTIONS WITH FLEXIBLE CONNECTORS

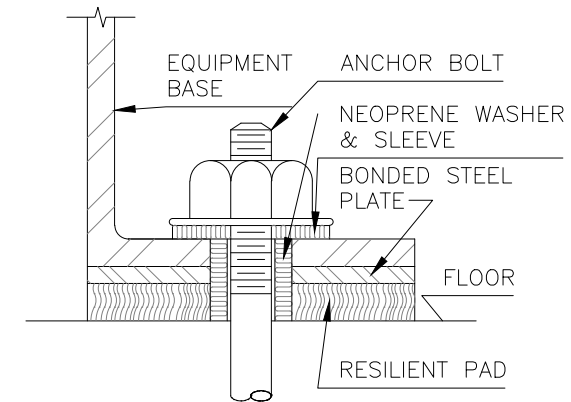
1 NTS



## WATER COOLED CHILLER - PIPING CONNECTIONS

2 NTS

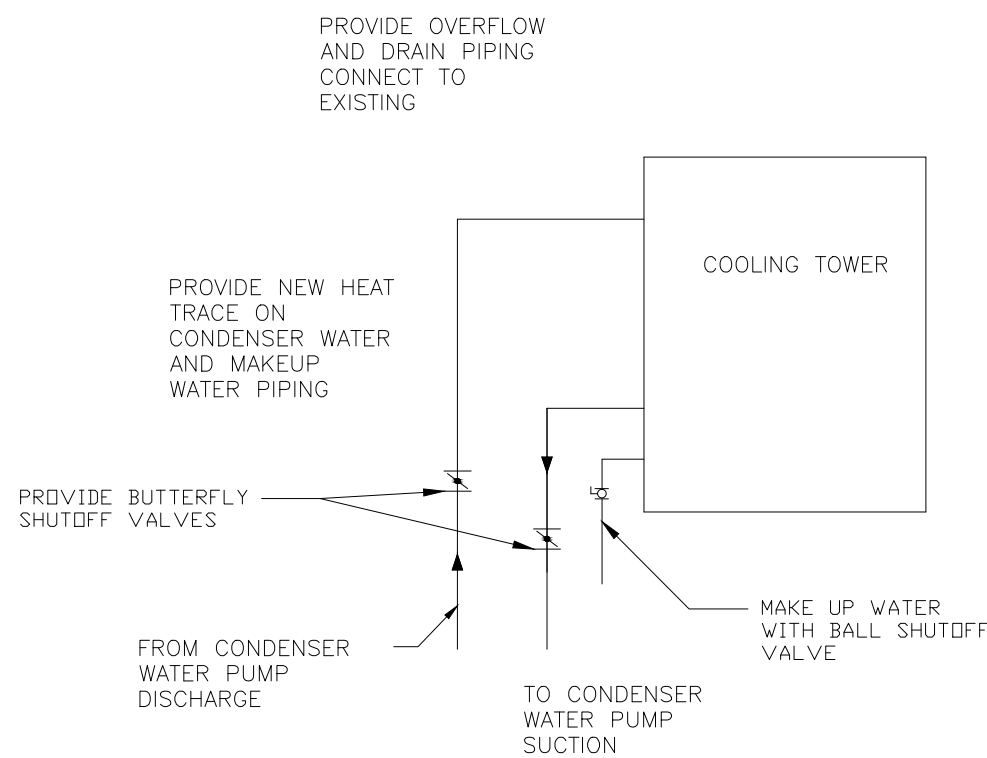
- NOTE:**
1. DRAIN ALL LOW POINTS OF SYSTEMS TO NEAREST FLOOR DRAIN.
  2. PROVIDE MARINE WATER BOXES FOR BOTH CONDENSER AND EVAPORATOR.
  3. COLLECT VENT PIPES FROM ALL REFRIGERANT PRESSURE RELIEF DEVICES AND EXTEND TO EXTERIOR OF BUILDING IN ACCORDANCE WITH ASHRAE STANDARD 15. HEADER SIZE TO EQUAL OR EXCEED TOTAL AREA OF DEVICES CONNECTED TO THE HEADER.
  4. PROVIDE MODULATING BUTTERFLY VALVES ON BOTH CHWR & CWR. VALVES CONTROLLED BY ECC.
  5. FOR PIPING 6" AND BELOW, MECHANICAL COUPLINGS ARE OPTIONAL. ABOVE 6", WELDED PIPE WITH FLANGES IS THE ONLY APPROVED JOINING METHOD.



FLOOR MOUNT EQUIPMENT  
RESTRAINED BY RESILIENT PADS  
(TYPE DS)

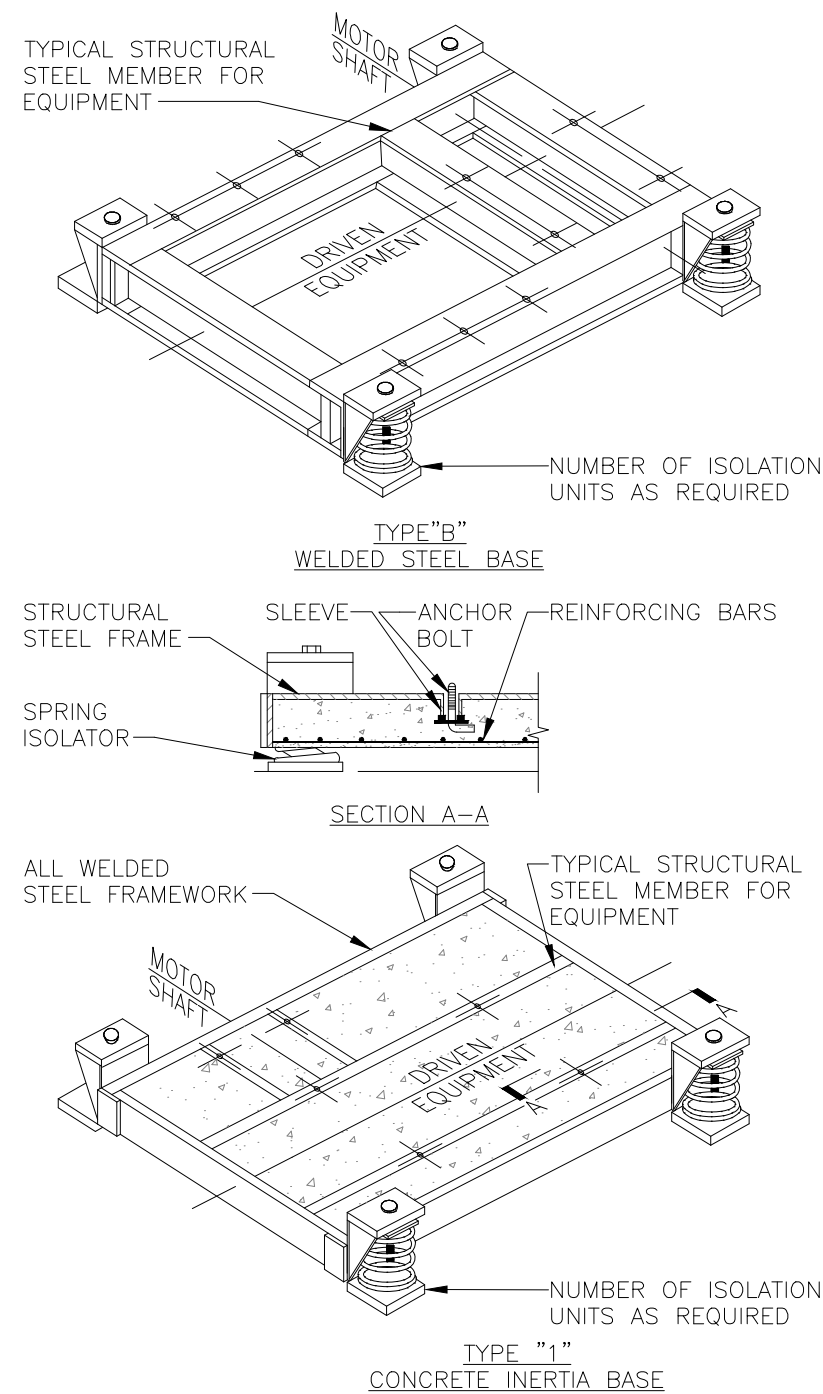
## SEISMIC BRACING FOR EQUIPMENT

5 NTS



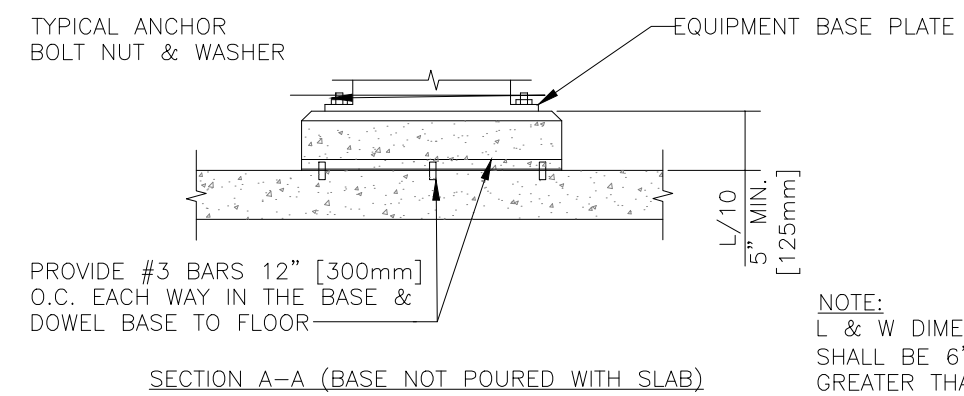
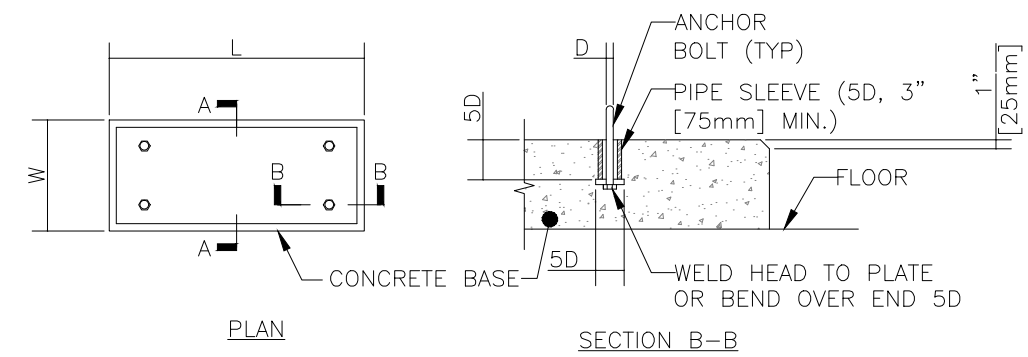
## COOLING TOWER - PIPING CONNECTIONS

3 NTS



## VIBRATION ISOLATION BASES

4 NTS



## CONCRETE EQUIPMENT BASES

6 NTS

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SEQUENCE OF OPERATION LAB CHILLER

THE NEW CHILLER, SHALL HAVE THE CAPABILITY OF BEING STARTED AND STOPPED THROUGH THE EMS BY MANUAL ACTIVATION OR AUTOMATICALLY THROUGH THE EMS ON EVENT INITIATION PROGRAM.

ON CHILLER START COMMAND CONTROLS SHALL SEQUENCE VALVES V-1 THROUGH V-4 AS DESCRIBED HERE FOR LAB CHILLER RUNNING.

V-1 CLOSED  
V-2 CLOSED  
V-3 OPEN  
V-4 CLOSED  
NEW CHILLER RUNNING  
ONE CHILLED WATER PUMP RUNNING

ON CHILLER START COMMAND CONDENSER WATER PUMP, P-3, AND THE LEAD CHILLED WATER PUMP, P-1 OR P-2 SHALL START. UPON PROOF OF FLOW THROUGH BOTH CHILLER TUBE BUNDLES (EVAPORATOR AND CONDENSER) AS SENSED BY THE RESPECTIVE FLOW SWITCHES THE NEW LAB CHILLER SHALL START.

WHEN RUNNING ON MAIN PLANT:  
V-1 OPEN  
V-2 OPEN  
V-3 CLOSED  
V-4 OPEN  
NEW CHILLER SHALL BE OFF  
ONE CHILLED WATER PUMP RUNNING

LEAD-LAG CHILLED WATER PUMPS  
ONE NEW CHILLED WATER PUMP IS 100% CAPACITY AND THE OTHER CHILLED WATER PUMP IS 100% STANDBY CAPACITY.

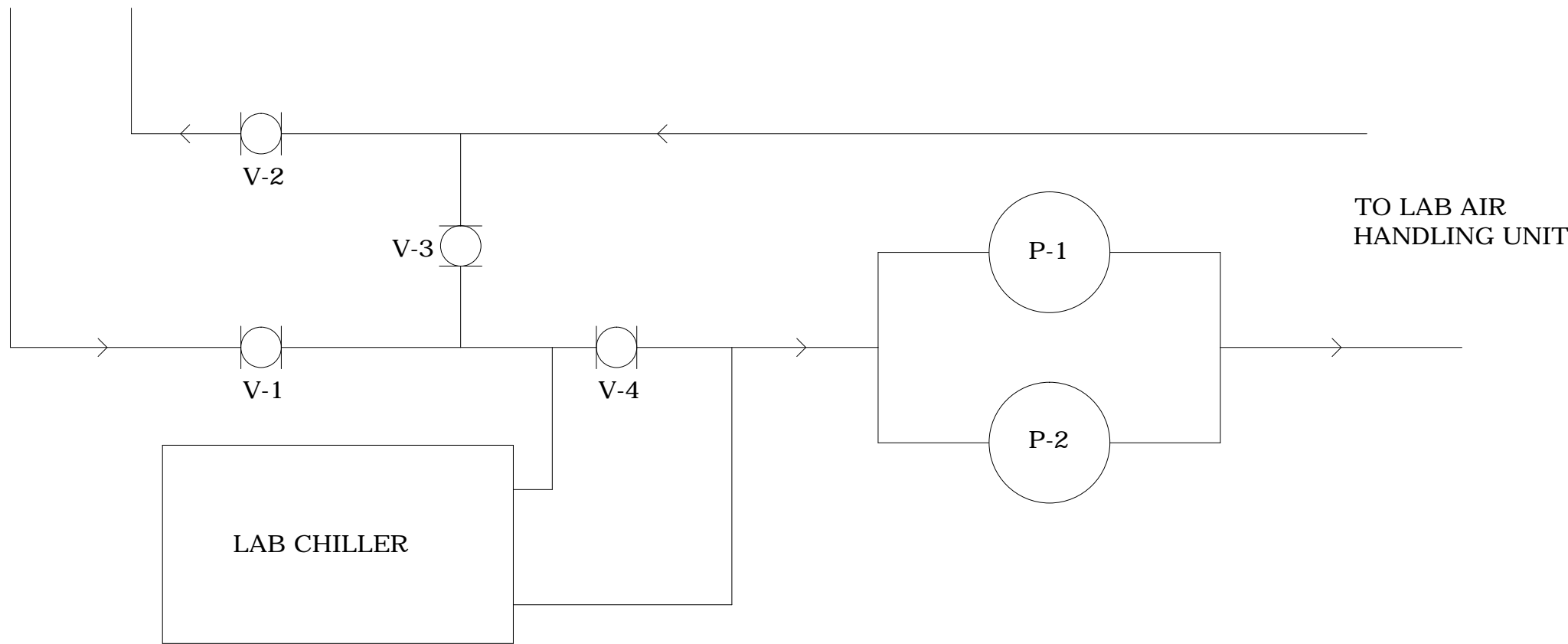
UPON FAILURE OF THE LEAD CHILLED WATER PUMP (P1- OR P-2) AS SENSED BY DIFFERENTIAL PRESSURE SENSORS ACROSS EACH PUMP, THE STANDBY CHILLED WATER PUMP (P-2 OR P-1) SHALL START AND AUDIO AND VISUAL ALARMS SHALL BE SENT TO THE EXISTING CENTRAL EMS CONTROL CENTER.

SEQUENCE OF OPERATION COOLING TOWER

THE COOLING TOWER FAN CONTROL WILL BE ENABLED UPON A COMMAND FOR SURGERY CHILLER. AS THE CONDENSER SUPPLY WATER TEMPERATURE RISES, THE TOWER VFD FAN MODULATES TO 100%. AS THE WATER TEMPERATURE FALLS , THE REVERSE WILL OCCUR.  
COOLING TOWER BYPASS SET TO FULL FLOW TO COOLING TOWER.  
COLLING TOWER FAN VFD SET POINT: 85° (ADJ)

BASIN HEATERS ARE ENERGIZED WHEN THE TEMPERATURE FALLS BELOW 35° F.

TO MAIN CHILLER  
PLANT



CHILLED WATER SWITCHOVER  
VALVING SCHEMATIC

POINTS LIST								
DESCRIPTION	INPUT		OUTPUT					
	ANALOG	DIGITAL	ANALOG	DIGITAL	ALARM	TREND	SETPPOINT	GRAPHIC
CHILLED WATER PUMPS 1 AND 2								
START/STOP				X	X	X		X
STATUS		X			X	X		X
SPEED	X		X			x		x
CHILLED WATER SUPPLY TEMP	X						X	X
CHILLED WATER RETURN TEMP	X						X	X
CONDENSER WATER PUMP 3								
START/STOP				X	X	X		X
STATUS		X			X	X		X
COND WATER SUPPLY TEMP	X						X	X
COND WATER RETURN TEMP	X						X	X
LAB CHILLER								
START/STOP				X	X	X		X
STATUS		X			X	X		X
AMPS	X				X	X		X
CONDENSER FLOWMETER	X				X	X		X
EVAPORATOR FLOWMETER	X				X	X		X
REFRIG DIFF PRESSURE	X				X	X	X	X
CONDENSER ISOLATION VALVE			X					X
EVAPORATOR ISOLATION VALVE			X					X
NEW COOLING TOWER								
ENTERING WATER TEMP	X				X	X		X
LEAVING WATER TEMP	X				X	X		X
FAN START/STOP				X	X	X		X
FAN STATUS		X			X	X		X
FAN SPEED	X		X					
CONSENSOR WATER FLOWMETER	X					X		X
TOWER BASIN TEMP	X					X	X	X
TOWER BASIN HEATER				X		X		X

NOTES:

1. ALL POINTS MAY NOT BE SHOWN ON POINTS LIST.
2. ADDITIONAL CONTROL POINTS MAY BE SHOWN ON OTHER PARTS OF DRAWINGS.
3. ADDITIONAL POINTS MAY BE REQUIRED TO COMPLETE SEQUENCE OF OPERATION.

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