

# Tri-house HVAC and Central Plant Improvements

FOR  
UNIVERSITY OF NORTH CAROLINA at Wilmington

601 S College Rd  
Wilmington, NC 28403



PRELIMINARY  
NOT FOR  
CONSTRUCTION

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CONDENSING BOILER SCHEDULE

DRAWING CODE	BURNER	HEATING MEDIUM	DESIGN WATER PRESSURE RATING (PSIG)	WATER		DESIGN FLOW RATE (GPM)	MINIMUM FLOW RATE (GPM)	DESIGN PRESSURE DROP (PSIG)	AHRI EFFICIENCY (%)	FUEL REQUIREMENTS			CONNECTIONS				ELECTRICAL			OPERATING WEIGHT (LBS.)	NOTES	ACCESSORIES			
				EWT (F)	LWT (F)					RATED INPUT (MBH)	MINIMUM INPUT (MBH)	RATED OUTPUT (MBH)	FUEL USAGE AT RATED INPUT (SCFH)	GAS PRESSURE (IN. WC)		GAS (IN.)	WATER (IN.)	INTAKE (IN.)	EXHAUST (IN.)				POWER SUPPLY (V/PH/Hz)	MCA	MOCP
B1	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	14	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A
B2	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	28	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A

NOTES:

1. REFER TO SPECIFICATION SECTION 235216 - CONDENSING BOILERS FOR FURTHER INFORMATION.

2. REFER TO PLANS FOR FLUE GAS EXHAUST ARRANGEMENT.

3. ROUTE CONDENSATE THROUGH 5 GALLON CONDENSATE NEUTRALIZATION KIT. REFER TO PLANS FOR LOCATION AND ARRANGEMENT.

4. BOILERS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

5. APPROVED MANUFACTURERS/MODELS: FULTON ENDURA, AERCO BENCHMARK PLATINUM AND LOCHINVAR CREST.

ACCESSORIES:

A. LONWORKS PROTOCOL COMMUNICATION GATEWAY.

PUMP SCHEDULE

DRAWING CODE	APPROVED MANUFACTURERS	PUMP TYPE	SERVICE	FLUID	CAPACITY (GPM)	TOTAL DYNAMIC HEAD (FT)	EFFICINECY (%)	INLET AND OUTLET SIZE (IN.)	MOTOR ENCLOSURE		SPEED (RPM)	HP	ELECTRICAL V/PH/Hz	NOTES	ACCESSORIES
									TYPE	MATERIALS					
SHWP-1	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B
SHWP-2	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B

NOTES:

1. REFER TO SPECIFICATION SECTION 232123 - HYDRONIC PUMPS FOR FURTHER INFORMATION.

2. PUMPS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LONWORKS DRIVE PROTOCOL.

B. INTEGRAL VFD.

AIR/DIRT SEPARATOR SCHEDULE

DRAWING CODE	TYPE	FLOW (GPM)	DESIGN PRESSURE DROP (PSIG)	WATER CONNECTIONS		DIMENSIONS		WEIGHT (LBS)	NOTES	ACCESSORIES	
				SIZE (IN)	STYLE	HEIGHT (IN.)	DIAMETER (IN.)				
AS1	CENTRIFUGAL	140		2	4 FLANGED		25	12	-	1,2	A,B,C,D,E

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. AIR SEPARATOR IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. CARBON STEEL, PRIMER PAINTED.

B. 304 STAINLESS STEEL COALESCENCE PALL RINGS.

C. AUTOMATIC AIR VENT.

D. BLOWDOWN VALVE.

E. FLUSH VALVE.

EXPANSION TANK SCHEDULE

DRAWING CODE	SERVICE	APPROVED MANUFACTURERS	MINIMUM ACCEPTANCE VOLUME (GAL)	TANK SIZE (GAL.)	DIMENSIONS		WEIGHT FULL (LBS)	NOTES	ACCESSORIES	
					HEIGHT (IN.)	DIAMETER (IN.)				
ET1	HEATING HOT WATER	TACO, ARMSTRONG, B&G		37		76	20	-	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. EXPANSION TANK IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LIFTING RINGS AND FLOOR MOUNTING SKIRT FOR VERTICAL INSTALLATION.

HEATING HOT WATER SKID SCHEDULE

DRAWING CODE	SERVICE	ELECTRICAL			WEIGHT FULL (LBS)	NOTES	ACCESSORIES
		POWER SUPPLY (V/PH/Hz)	MCA	MOCP			
SK1	HEATING HOT WATER	480/3/60	31.0	40	10,500	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. REFER TO THE OTHER SCHEDULES FOR COMPONENTS (BOILERS, PUMPS, EXPANSION TANK, AIR/DIRT SEPARATOR, CONTROLS...)

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CONDENSING BOILER SCHEDULE

DRAWING CODE	BURNER	HEATING MEDIUM	DESIGN WATER PRESSURE RATING (PSIG)	WATER		DESIGN FLOW RATE (GPM)	MINIMUM FLOW RATE (GPM)	DESIGN PRESSURE DROP (PSIG)	AHRI EFFICIENCY (%)	FUEL REQUIREMENTS			CONNECTIONS				ELECTRICAL			OPERATING WEIGHT (LBS.)	NOTES	ACCESSORIES			
				EWT (F)	LWT (F)					RATED INPUT (MBH)	MINIMUM INPUT (MBH)	RATED OUTPUT (MBH)	FUEL USAGE AT RATED INPUT (SCFH)	GAS PRESSURE (IN. WC)		GAS (IN.)	WATER (IN.)	INTAKE (IN.)	EXHAUST (IN.)				POWER SUPPLY (V/PH/Hz)	MCA	MOCP
B1	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	14	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A
B2	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	28	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A

NOTES:

1. REFER TO SPECIFICATION SECTION 235216 - CONDENSING BOILERS FOR FURTHER INFORMATION.

2. REFER TO PLANS FOR FLUE GAS EXHAUST ARRANGEMENT.

3. ROUTE CONDENSATE THROUGH 5 GALLON CONDENSATE NEUTRALIZATION KIT. REFER TO PLANS FOR LOCATION AND ARRANGEMENT.

4. BOILERS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

5. APPROVED MANUFACTURERS/MODELS: FULTON ENDURA, AERCO BENCHMARK PLATINUM AND LOCHINVAR CREST.

ACCESSORIES:

A. LONWORKS PROTOCOL COMMUNICATION GATEWAY.

PUMP SCHEDULE

DRAWING CODE	APPROVED MANUFACTURERS	PUMP TYPE	SERVICE	FLUID	CAPACITY (GPM)	TOTAL DYNAMIC HEAD (FT)	EFFICINECY (%)	INLET AND OUTLET SIZE (IN.)	MOTOR ENCLOSURE		SPEED (RPM)	HP	ELECTRICAL V/PH/Hz	NOTES	ACCESSORIES
									TYPE	MATERIALS					
SHWP-1	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B
SHWP-2	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B

NOTES:

1. REFER TO SPECIFICATION SECTION 232123 - HYDRONIC PUMPS FOR FURTHER INFORMATION.

2. PUMPS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LONWORKS DRIVE PROTOCOL.

B. INTEGRAL VFD.

AIR/DIRT SEPARATOR SCHEDULE

DRAWING CODE	TYPE	FLOW (GPM)	DESIGN PRESSURE DROP (PSIG)	WATER CONNECTIONS		DIMENSIONS		WEIGHT (LBS)	NOTES	ACCESSORIES	
				SIZE (IN)	STYLE	HEIGHT (IN.)	DIAMETER (IN.)				
AS1	CENTRIFUGAL	140		2	4 FLANGED		25	12	-	1,2	A,B,C,D,E

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. AIR SEPARATOR IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. CARBON STEEL, PRIMER PAINTED.

B. 304 STAINLESS STEEL COALESCENCE PALL RINGS.

C. AUTOMATIC AIR VENT.

D. BLOWDOWN VALVE.

E. FLUSH VALVE.

EXPANSION TANK SCHEDULE

DRAWING CODE	SERVICE	APPROVED MANUFACTURERS	MINIMUM ACCEPTANCE VOLUME (GAL)	TANK SIZE (GAL.)	DIMENSIONS		WEIGHT FULL (LBS)	NOTES	ACCESSORIES	
					HEIGHT (IN.)	DIAMETER (IN.)				
ET1	HEATING HOT WATER	TACO, ARMSTRONG, B&G		37		76	20	-	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. EXPANSION TANK IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LIFTING RINGS AND FLOOR MOUNTING SKIRT FOR VERTICAL INSTALLATION.

HEATING HOT WATER SKID SCHEDULE

DRAWING CODE	SERVICE	ELECTRICAL			WEIGHT FULL (LBS)	NOTES	ACCESSORIES
		POWER SUPPLY (V/PH/Hz)	MCA	MOCP			
SK1	HEATING HOT WATER	480/3/60	31.0	40	10,500	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. REFER TO THE OTHER SCHEDULES FOR COMPONENTS (BOILERS, PUMPS, EXPANSION TANK, AIR/DIRT SEPARATOR, CONTROLS...)

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CONDENSING BOILER SCHEDULE

DRAWING CODE	BURNER	HEATING MEDIUM	DESIGN WATER PRESSURE RATING (PSIG)	WATER		DESIGN FLOW RATE (GPM)	MINIMUM FLOW RATE (GPM)	DESIGN PRESSURE DROP (PSIG)	AHRI EFFICIENCY (%)	FUEL REQUIREMENTS			CONNECTIONS				ELECTRICAL			OPERATING WEIGHT (LBS.)	NOTES	ACCESSORIES			
				EWT (F)	LWT (F)					RATED INPUT (MBH)	MINIMUM INPUT (MBH)	RATED OUTPUT (MBH)	FUEL USAGE AT RATED INPUT (SCFH)	GAS PRESSURE (IN. WC)		GAS (IN.)	WATER (IN.)	INTAKE (IN.)	EXHAUST (IN.)				POWER SUPPLY (V/PH/Hz)	MCA	MOCP
B1	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	14	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A
B2	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	28	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A

NOTES:

1. REFER TO SPECIFICATION SECTION 235216 - CONDENSING BOILERS FOR FURTHER INFORMATION.

2. REFER TO PLANS FOR FLUE GAS EXHAUST ARRANGEMENT.

3. ROUTE CONDENSATE THROUGH 5 GALLON CONDENSATE NEUTRALIZATION KIT. REFER TO PLANS FOR LOCATION AND ARRANGEMENT.

4. BOILERS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

5. APPROVED MANUFACTURERS/MODELS: FULTON ENDURA, AERCO BENCHMARK PLATINUM AND LOCHINVAR CREST.

ACCESSORIES:

A. LONWORKS PROTOCOL COMMUNICATION GATEWAY.

PUMP SCHEDULE

DRAWING CODE	APPROVED MANUFACTURERS	PUMP TYPE	SERVICE	FLUID	CAPACITY (GPM)	TOTAL DYNAMIC HEAD (FT)	EFFICINECY (%)	INLET AND OUTLET SIZE (IN.)	MOTOR ENCLOSURE		SPEED (RPM)	HP	ELECTRICAL V/PH/Hz	NOTES	ACCESSORIES
									TYPE	MATERIALS					
SHWP-1	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B
SHWP-2	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B

NOTES:

1. REFER TO SPECIFICATION SECTION 232123 - HYDRONIC PUMPS FOR FURTHER INFORMATION.

2. PUMPS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LONWORKS DRIVE PROTOCOL.

B. INTEGRAL VFD.

AIR/DIRT SEPARATOR SCHEDULE

DRAWING CODE	TYPE	FLOW (GPM)	DESIGN PRESSURE DROP (PSIG)	WATER CONNECTIONS		DIMENSIONS		WEIGHT (LBS)	NOTES	ACCESSORIES	
				SIZE (IN)	STYLE	HEIGHT (IN.)	DIAMETER (IN.)				
AS1	CENTRIFUGAL	140		2	4 FLANGED		25	12	-	1,2	A,B,C,D,E

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. AIR SEPARATOR IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. CARBON STEEL, PRIMER PAINTED.

B. 304 STAINLESS STEEL COALESCENCE PALL RINGS.

C. AUTOMATIC AIR VENT.

D. BLOWDOWN VALVE.

E. FLUSH VALVE.

EXPANSION TANK SCHEDULE

DRAWING CODE	SERVICE	APPROVED MANUFACTURERS	MINIMUM ACCEPTANCE VOLUME (GAL)	TANK SIZE (GAL.)	DIMENSIONS		WEIGHT FULL (LBS)	NOTES	ACCESSORIES	
					HEIGHT (IN.)	DIAMETER (IN.)				
ET1	HEATING HOT WATER	TACO, ARMSTRONG, B&G		37		76	20	-	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. EXPANSION TANK IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LIFTING RINGS AND FLOOR MOUNTING SKIRT FOR VERTICAL INSTALLATION.

HEATING HOT WATER SKID SCHEDULE

DRAWING CODE	SERVICE	ELECTRICAL			WEIGHT FULL (LBS)	NOTES	ACCESSORIES
		POWER SUPPLY (V/PH/Hz)	MCA	MOCP			
SK1	HEATING HOT WATER	480/3/60	31.0	40	10,500	1,2	A

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. REFER TO THE OTHER SCHEDULES FOR COMPONENTS (BOILERS, PUMPS, EXPANSION TANK, AIR/DIRT SEPARATOR, CONTROLS...)

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CONDENSING BOILER SCHEDULE

DRAWING CODE	BURNER	HEATING MEDIUM	DESIGN WATER PRESSURE RATING (PSIG)	WATER		DESIGN FLOW RATE (GPM)	MINIMUM FLOW RATE (GPM)	DESIGN PRESSURE DROP (PSIG)	AHRI EFFICIENCY (%)	FUEL REQUIREMENTS			CONNECTIONS				ELECTRICAL			OPERATING WEIGHT (LBS.)	NOTES	ACCESSORIES			
				EWT (F)	LWT (F)					RATED INPUT (MBH)	MINIMUM INPUT (MBH)	RATED OUTPUT (MBH)	FUEL USAGE AT RATED INPUT (SCFH)	GAS PRESSURE (IN. WC)		GAS (IN.)	WATER (IN.)	INTAKE (IN.)	EXHAUST (IN.)				POWER SUPPLY (V/PH/Hz)	MCA	MOCP
B1	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	14	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A
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NOTES:

1. REFER TO SPECIFICATION SECTION 235216 - CONDENSING BOILERS FOR FURTHER INFORMATION.

2. REFER TO PLANS FOR FLUE GAS EXHAUST ARRANGEMENT.

3. ROUTE CONDENSATE THROUGH 5 GALLON CONDENSATE NEUTRALIZATION KIT. REFER TO PLANS FOR LOCATION AND ARRANGEMENT.

4. BOILERS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

5. APPROVED MANUFACTURERS/MODELS: FULTON ENDURA, AERCO BENCHMARK PLATINUM AND LOCHINVAR CREST.

ACCESSORIES:

A. LONWORKS PROTOCOL COMMUNICATION GATEWAY.

PUMP SCHEDULE

DRAWING CODE	APPROVED MANUFACTURERS	PUMP TYPE	SERVICE	FLUID	CAPACITY (GPM)	TOTAL DYNAMIC HEAD (FT)	EFFICINECY (%)	INLET AND OUTLET SIZE (IN.)	MOTOR ENCLOSURE		SPEED (RPM)	HP	ELECTRICAL V/PH/Hz	NOTES	ACCESSORIES
									TYPE	MATERIALS					
SHWP-1	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B
SHWP-2	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B

NOTES:

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2. PUMPS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. LONWORKS DRIVE PROTOCOL.

B. INTEGRAL VFD.

AIR/DIRT SEPARATOR SCHEDULE

DRAWING CODE	TYPE	FLOW (GPM)	DESIGN PRESSURE DROP (PSIG)	WATER CONNECTIONS		DIMENSIONS		WEIGHT (LBS)	NOTES	ACCESSORIES	
				SIZE (IN)	STYLE	HEIGHT (IN.)	DIAMETER (IN.)				
AS1	CENTRIFUGAL	140		2	4 FLANGED		25	12	-	1,2	A,B,C,D,E

NOTES:

1. REFER TO SPECIFICATION SECTION 232116 - HYDRONIC PIPING SPECIALTIES FOR FURTHER INFORMATION.

2. AIR SEPARATOR IS PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. CARBON STEEL, PRIMER PAINTED.

B. 304 STAINLESS STEEL COALESCENCE PALL RINGS.

C. AUTOMATIC AIR VENT.

D. BLOWDOWN VALVE.

E. FLUSH VALVE.

EXPANSION TANK SCHEDULE

DRAWING CODE	SERVICE	APPROVED MANUFACTURERS	MINIMUM ACCEPTANCE VOLUME (GAL)	TANK SIZE (GAL.)	DIMENSIONS		WEIGHT FULL (LBS)	NOTES	ACCESSORIES	
					HEIGHT (IN.)	DIAMETER (IN.)				
ET1	HEATING HOT WATER	TACO, ARMSTRONG, B&G		37		76	20	-	1,2	A

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ACCESSORIES:

A. LIFTING RINGS AND FLOOR MOUNTING SKIRT FOR VERTICAL INSTALLATION.

HEATING HOT WATER SKID SCHEDULE

DRAWING CODE	SERVICE	ELECTRICAL			WEIGHT FULL (LBS)	NOTES	ACCESSORIES
		POWER SUPPLY (V/PH/Hz)	MCA	MOCP			
SK1	HEATING HOT WATER	480/3/60	31.0	40	10,500	1,2	A

NOTES:

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2. FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

ACCESSORIES:

A. REFER TO THE OTHER SCHEDULES FOR COMPONENTS (BOILERS, PUMPS, EXPANSION TANK, AIR/DIRT SEPARATOR, CONTROLS...)

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CONDENSING BOILER SCHEDULE

DRAWING CODE	BURNER	HEATING MEDIUM	DESIGN WATER PRESSURE RATING (PSIG)	WATER		DESIGN FLOW RATE (GPM)	MINIMUM FLOW RATE (GPM)	DESIGN PRESSURE DROP (PSIG)	AHRI EFFICIENCY (%)	FUEL REQUIREMENTS			CONNECTIONS				ELECTRICAL			OPERATING WEIGHT (LBS.)	NOTES	ACCESSORIES			
				EWT (F)	LWT (F)					RATED INPUT (MBH)	MINIMUM INPUT (MBH)	RATED OUTPUT (MBH)	FUEL USAGE AT RATED INPUT (SCFH)	GAS PRESSURE (IN. WC)		GAS (IN.)	WATER (IN.)	INTAKE (IN.)	EXHAUST (IN.)				POWER SUPPLY (V/PH/Hz)	MCA	MOCP
B1	NATURAL GAS	HOT WATER	160	160	180	70	-	3.0	94.6	2,000	400	1,874	1,961	4	14	1-1/2	4	8	8	120/1/60	25.0	-	3,210	1,2,3,4,5	A
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5. APPROVED MANUFACTURERS/MODELS: FULTON ENDURA, AERCO BENCHMARK PLATINUM AND LOCHINVAR CREST.

ACCESSORIES:

A. LONWORKS PROTOCOL COMMUNICATION GATEWAY.

PUMP SCHEDULE

DRAWING CODE	APPROVED MANUFACTURERS	PUMP TYPE	SERVICE	FLUID	CAPACITY (GPM)	TOTAL DYNAMIC HEAD (FT)	EFFICINECY (%)	INLET AND OUTLET SIZE (IN.)	MOTOR ENCLOSURE		SPEED (RPM)	HP	ELECTRICAL V/PH/Hz	NOTES	ACCESSORIES
									TYPE	MATERIALS					
SHWP-1	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B
SHWP-2	TACO, ARMSTRONG, B&G	INLINE, CLOSE COUPLED	HEATING HOT WATER	WATER	140	70	72	3	ODP	CAST IRON	3,500	5.0	460/3/60	1,2	A,B

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1. REFER TO SPECIFICATION SECTION 232123 - HYDRONIC PUMPS FOR FURTHER INFORMATION.

2. PUMPS ARE PART OF A FACTORY-ASSEMBLED BOILER PLANT PACKAGED SYSTEM.

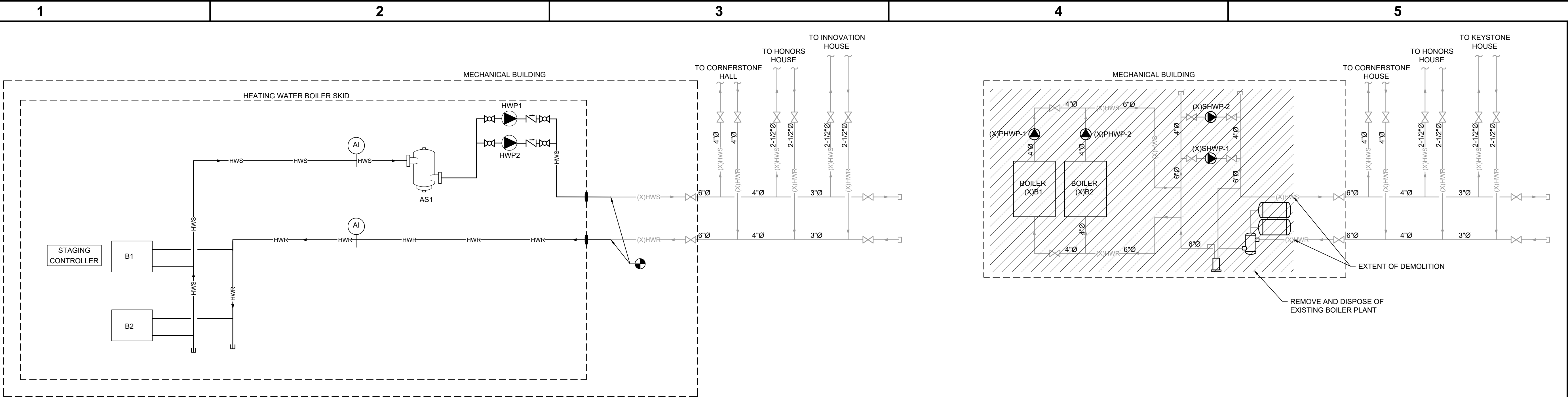
ACCESSORIES



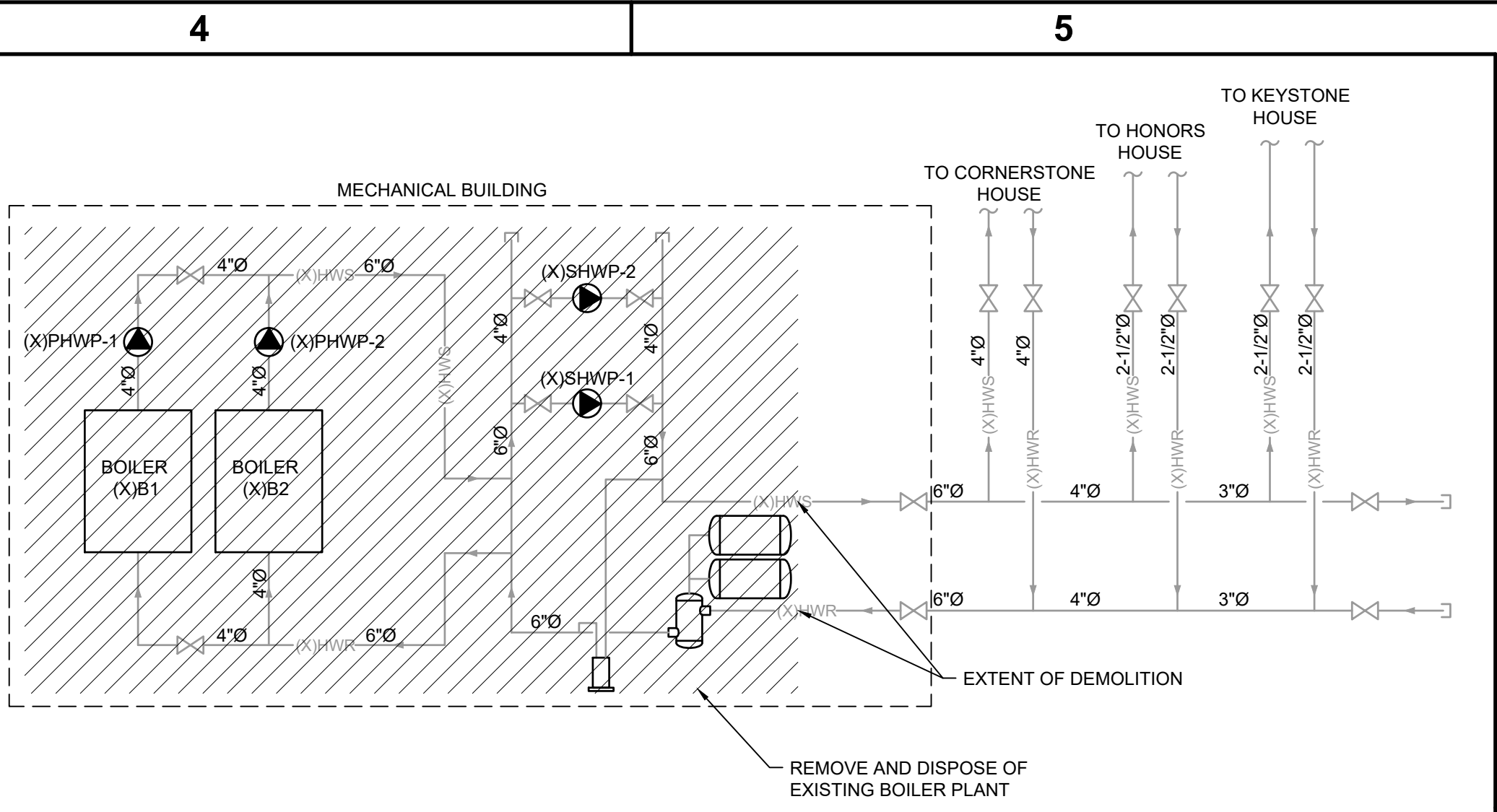




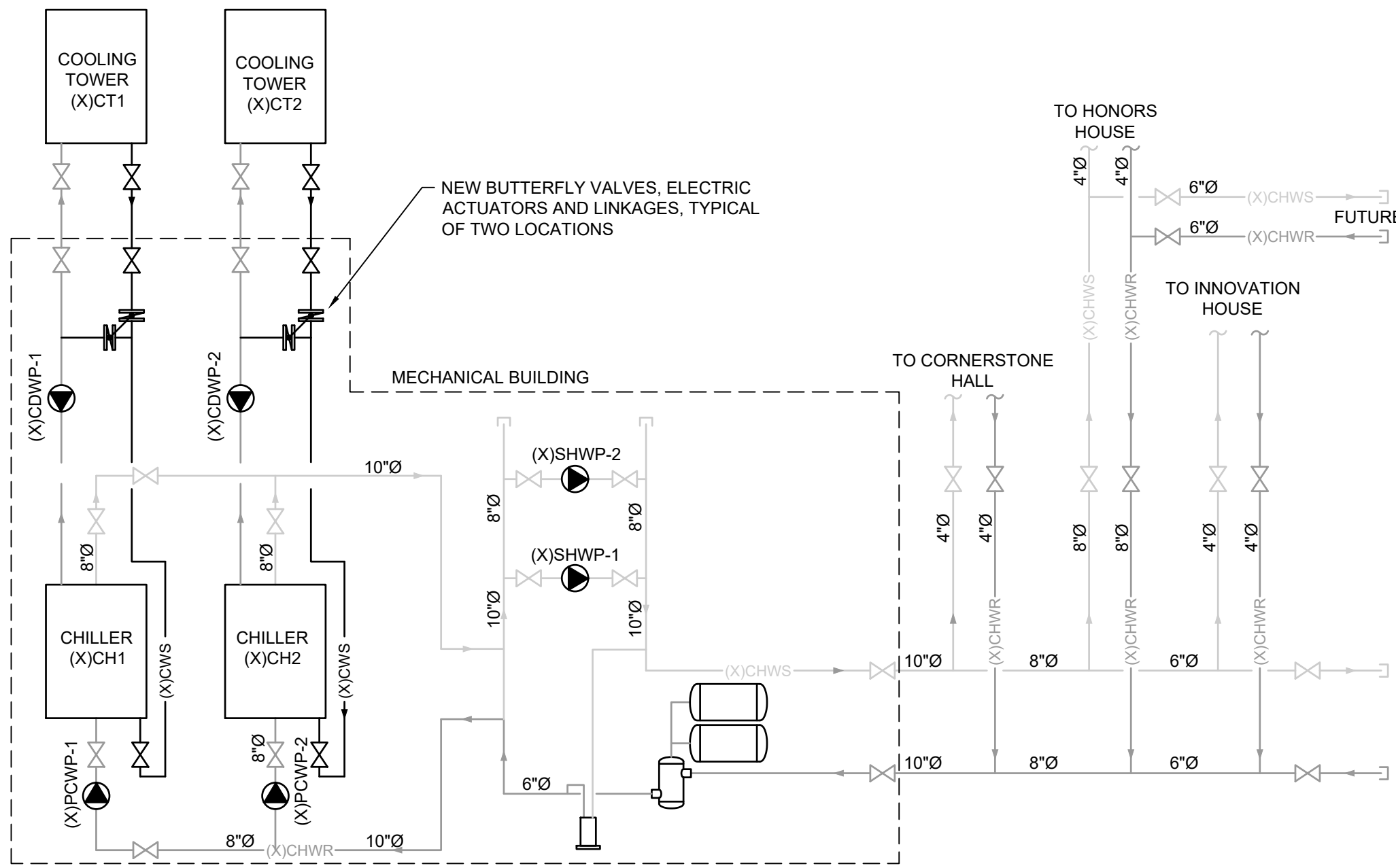




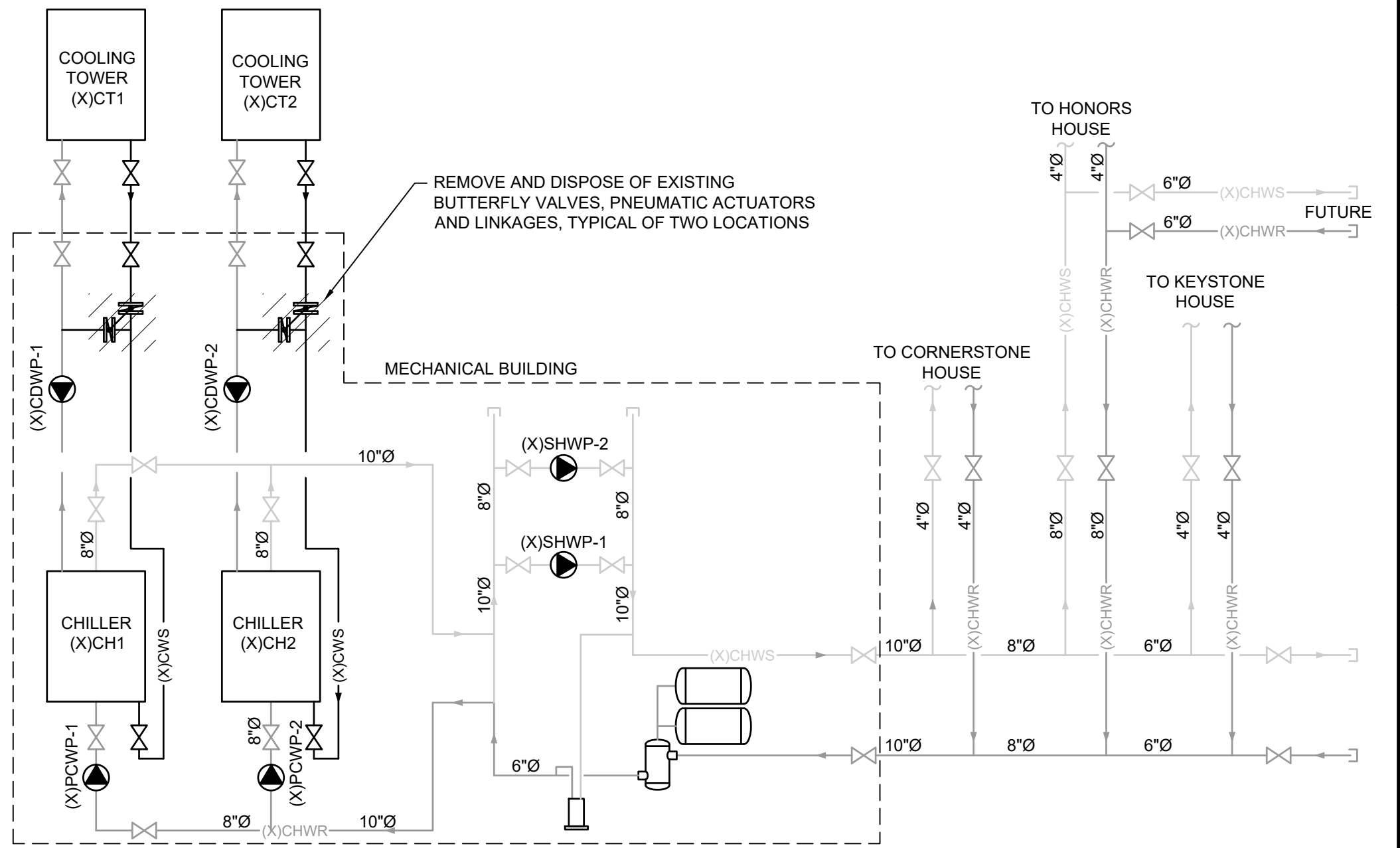
C1 HEATING HOT WATER FLOW DIAGRAM  
NOT TO SCALE



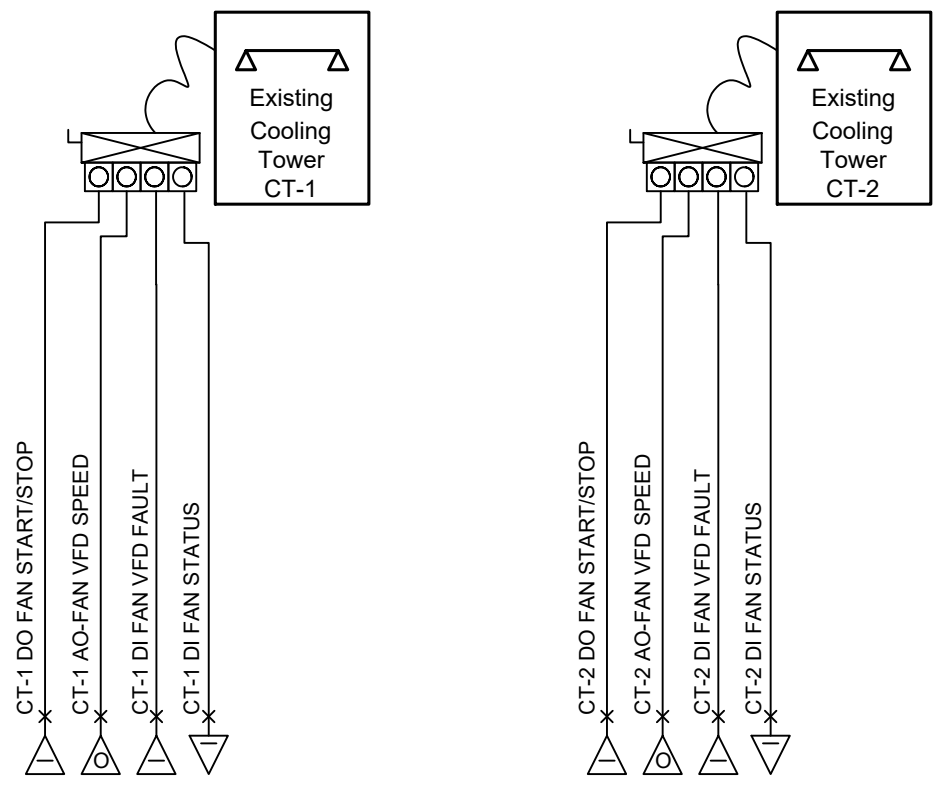
C4 HEATING HOT WATER FLOW DIAGRAM - DEMOLITION  
NOT TO SCALE



A1 CHILLED AND CONDENSER WATER FLOW DIAGRAM  
NOT TO SCALE



A4 CHILLED WATER FLOW DIAGRAM - DEMOLITION  
NOT TO SCALE

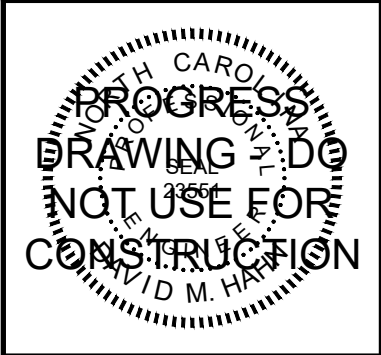


### CHILLED WATER SEQUENCE OF OPERATIONS

- CHILLERS SHALL BE ENABLED ABOVE OUTDOOR AIR TEMP SETPOINT OF 55°F (ADJ) OR OPERATOR START COMMAND.
  - CONDENSER WATER PUMP AND PRIMARY CHILLER PUMP SHALL CONTINUE TO RUN FOR 1 MINUTE (ADJ) AFTER 'CHILLER STOP' SEQUENCE IS INITIATED.
  - IF A CHILLER'S SAFETY SHUTDOWN CONTACT CLOSSES STOP CHILLER AND RESPECTIVE CHILLER AND CONDENSER PUMPS AND INITIATE ALARM.
  - UPON RESUMPTION OF POWER AFTER POWER OUTAGE, CHILLER SHALL RESTART AUTOMATICALLY AFTER 3 MINUTES.
  - UPON DETECTION OF INTERNAL CHILLER ALARM, STOP CHILLER AND RESPECTIVE CHILLER AND CONDENSER PUMPS AND INITIATE ALARM. START OTHER CHILLER AND RESPECTIVE PUMPS IF NOT ALREADY IN OPERATION.
  - CHILLERS SHALL LEAD/LAG BASED ON RUN TIME. CONTROLLER SHALL ATTEMPT TO EQUALIZE RUN TIME ON BOTH MACHINES.
  - CHILLERS SHALL BE SEQUENCED AS FOLLOWS:
    - T1 = TC + TD WHERE TC = CHWS SETPOINT, TD = DESIGN TEMP RISE.
    - IF (TR + 0.5) > T1 FOR 30 MINUTES, ISSUE STOP COMMAND.
    - T2 = TD / # OF CHILLERS THAT ARE ON.
    - IF (TR - 0.5) < (T1 - T2) FOR 30 MINUTES, ISSUE START COMMAND.
  - SECONDARY CHILLED WATER PUMPS SHALL BE INDEXED FOR OPERATION WHEN OUTDOOR TEMP IS ABOVE 55°F (ADJ) OR OPERATOR START COMMAND.
- SECONDARY CHILLED WATER RETURN TEMPERATURE SETPOINT SHALL BE MAINTAINED BY MODULATING SPEED OF SECONDARY CHW PUMP.
  - IF LOOP DIFFERENTIAL PRESSURE FALLS BELOW SETPOINT, INCREASE PUMP SPEED TO MAINTAIN PRESSURE SETPOINT. IF LOOP PRESSURE CONTINUES TO FALL BELOW SETPOINT, START SECOND SECONDARY PUMP. BOTH PUMPS SHALL RUN AT SAME SPEED TO MAINTAIN PRESSURE SETPOINT UNTIL VFD SPEED DROPS BELOW 40% (ADJ) WHERE UPON LAG PUMP SHALL SHUT DOWN.
  - CONTROLLER SHALL LEAD/LAG PUMPS BASED ON RUN TIME. CONTROLLER SHALL ATTEMPT TO EQUALIZE RUN TIME.
  - INITIATE ALARM UPON DETECTION OF PUMP OR VFD FAILURE.
  - UPON INITIATION OF CHILLER START COMMAND RESPECTIVE CONDENSER WATER PUMP SHALL BE INDEXED FOR OPERATION.
  - ON RISING CONDENSER WATER SUPPLY TEMPERATURE, THE CONTROLLER SHALL MODULATE THE BYPASS VALVE TO MAINTAIN SETPOINT OF 78°F (ADJ.) AND THE FAN VFD TO MAINTAIN SETPOINT OF 82°F (ADJ.). ALARMS SHALL BE PROVIDED AS FOLLOWS: FAN
    - FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
    - RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
    - RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
    - VFD FAULT: HIGH CONDENSER WATER SUPPLY (BASIN) TEMP: IF GREATER THAN 86°F (ADJ.). LOW CONDENSER WATER SUPPLY (BASIN) TEMP: IF LESS THAN 38°F (ADJ.).

07.01.20	Date:
ISSUED FOR REVIEW	REVISIONS
Revision No. A	DESCRIPTION:

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**TRI-HOUSE HVAC AND CENTRAL PLANT IMPROVEMENTS**  
601 S. COLLEGE ROAD, WILMINGTON, NORTH CAROLINA 28403  
STATE ID#20-05705-01A

**FLOW DIAGRAMS**

JOB NO.:	19116
DRAWN:	RWC
DESIGNED:	RWC
CHECKED:	DMH

DRAWING NO:  
**M-604**

REVISION:
A



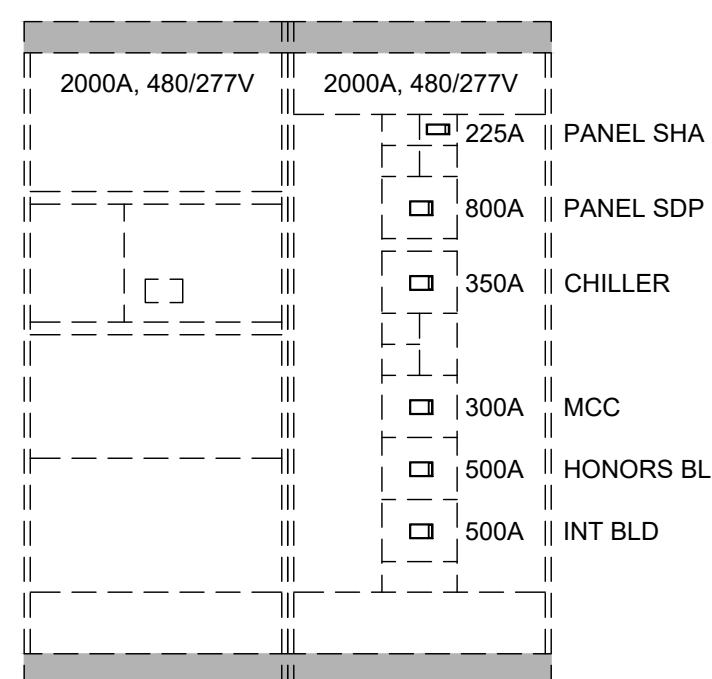
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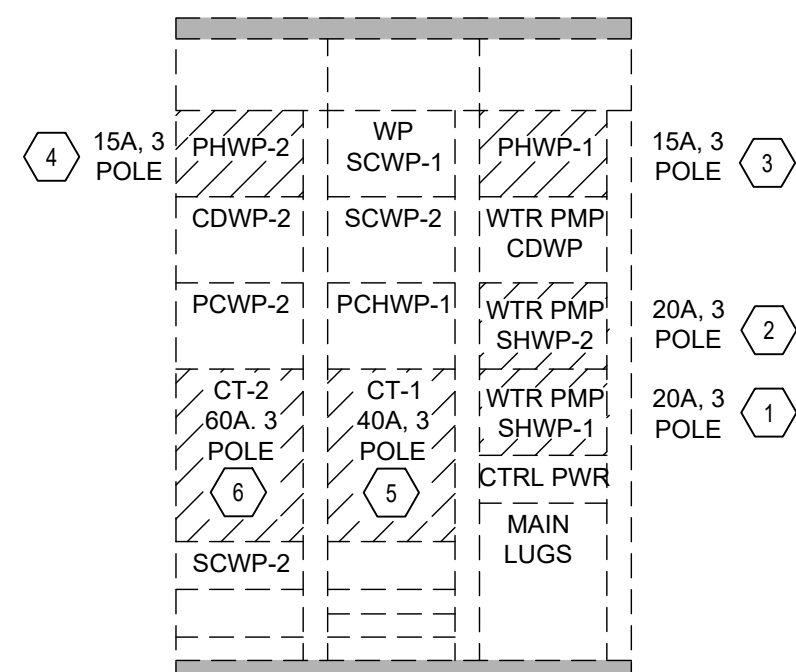








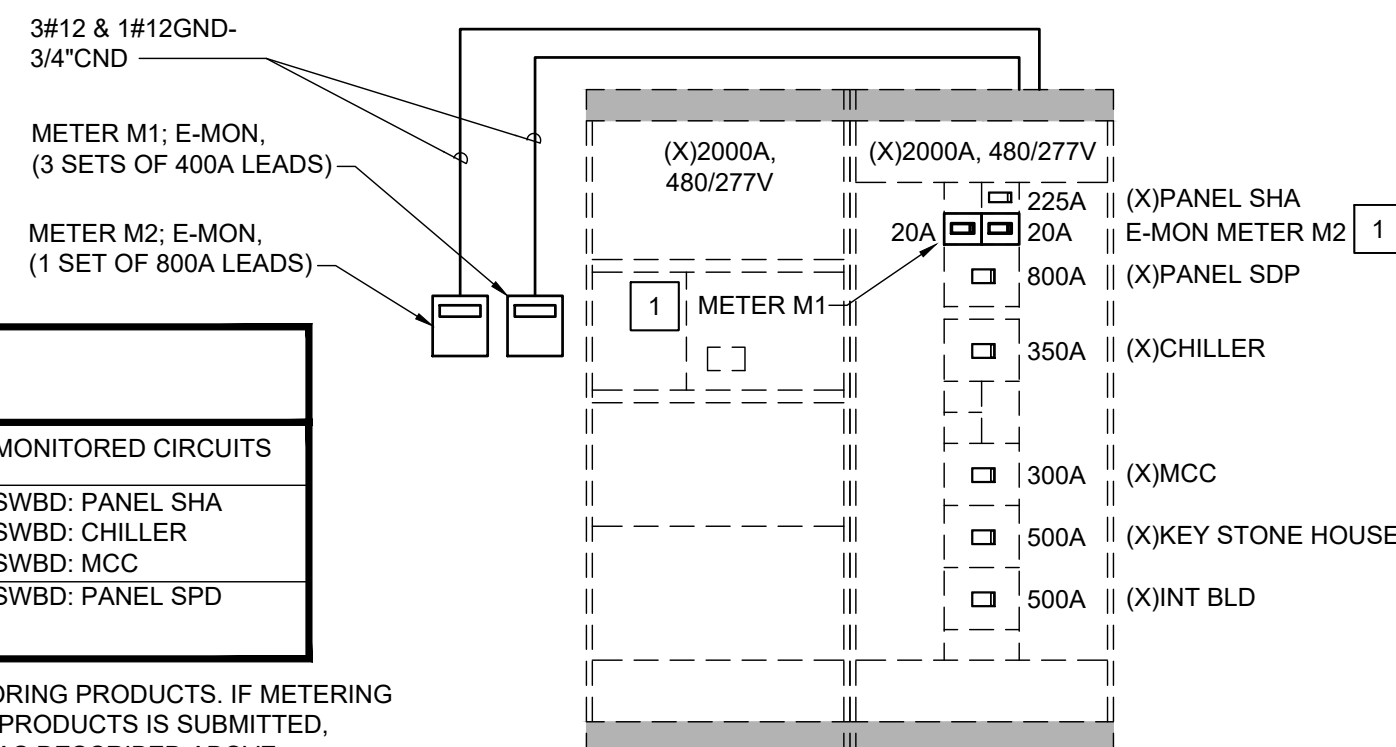
**1D** **EXISTING MAIN SWBD ELEVATION**  
NOT TO SCALE



**1C** **EXISTING MCC-A ELEVATION**  
NOT TO SCALE

EXISTING PANEL SHA										
TYPE: SQUARE D: NF	480 MOUNT:	277 SURFACE	V.	3	PH.	4	WIRE	PROVIDE IF CHECKED:	XX XX	EQUIP. GND BUS NEUTRAL BUS GUTTER TAPS SUB-FEED LUGS
LOAD SERVED	LOAD VA	CKT BKR	CKT #	LOAD VA			CKT #	CKT BKR	LOAD VA	LOAD SERVED
TRANSFORMER SL		20/3	1	A	B	C	2	20/3		BOILER #1 (NOTE 1)
			3				4			
			5				6			
LIGHTING CONTACTOR		100/3	7				8	20/3		AIR COMPRESSOR
			9				10			
			11				12			
CHILLER CONTROLS		20/1	13				14	20/3		COOLING TOWER PAN HEATER #1
IRRIGATION CONTROL		20/1	15				16			
SPARE			17				18			
SPARE		100/3	19				20	20/3		COOLING TOWER PAN HEATER #2
			21				22			
			23				24			
SPACE		-	25				26	20/1		MECH BLD. LTS - EMG LTS
SPACE		-	27				28	20/1		UNKNOWN LOAD
SPACE		-	29				30	-		SPACE
UNKNOWN LOAD		50/3	31				32	-		SPACE
			33				34	-		SPACE
			35				36	-		SPACE
BOILER #2 (NOTE 1)		20/3	37				38	30/3		PAN HEATER - CT #2
			39				40			
			41				42			
NOTES:							TOTAL V. AMPS		250 A. BUS (COPPER)	
1. LABEL BEAKER AS SPARE.							CONN. AMPS		250 A. MAIN LUGS	

EXISTING PANEL SL										
TYPE: SQUARE D NQOD	208 MOUNT:	120 SURFACE	V.	3	PH.	4	WIRE	PROVIDE IF CHECKED:	EQUIP. GND BUS NEUTRAL BUS GUTTER TAPS SUB-FEED LUGS	
LOAD SERVED	LOAD VA	CKT BKR	CKT #	LOAD VA			CKT #	CKT BKR	LOAD VA	LOAD SERVED
EXST. FAN #1		20/1	1	A	B	C	2	20/1		UNIT HEATER #1
EXST. FAN #2		20/1	3				4	20/1		UNIT HEATER #2, RCP BY DOOR
REFRIGERATOR MONITOR		20/1	5				6	20/1		HEAT TAPE
RCP- MECH. BLDG. IRRIGATION TIMER		20/1	7				8	20/1		MCC - HVAC CONTROL
FIRE ALARM PANEL		20/1	9				10	20/1		SITE LIGHTING CONTROL
RCP- MECH. BLDG. IRRIGATION TIMER		20/1	11				12	20/1		HEAT TAPE
BOILER CONTROLS (NOTE 1) // // // // //		20/1	13				14	20/1		CONTROLS - MCC
SPARE		20/1	15				16	20/1		SPARE
SPARE		20/1	17				18	20/1		SPARE
SPARE		20/1	19				20	20/1		CODE BLUE
SPARE		20/1	21				22	20/1		SPARE
SPARE		20/1	23				24	20/1		SPARE
SPARE		20/1	25				26	20/1		CODE BLUE
SPACE		-	27				28	20/1		SPARE
SPACE		-	29				30	20/1		SPARE
MAIN BREAKER		60/3	31							
			33							
			35							
NOTES:				TOTAL V. AMPS				60 A. BUS (COPPER)		
1. LABEL BREAKER AS SPARE.				CONN. AMPS				60 A. MAIN CIRCUIT BREAKER		

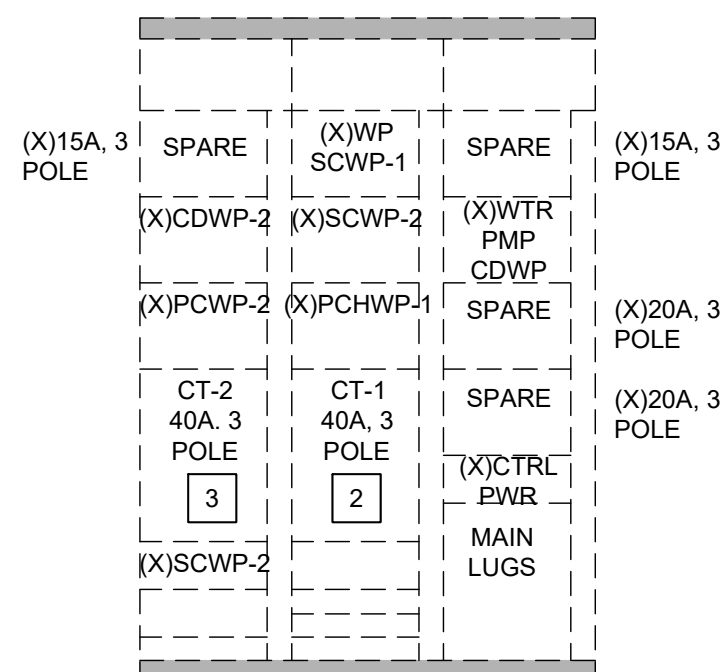


METER TABLE			
METER NAME	METER TYPE	QTY. OF CT SETS	MONITORED CIRCUITS
M1	E-MON CLASS 3200, 480V, 3Ø, 4W, 400A	3-400A	SWBD: PANEL SHA SWBD: CHILLER SWBD: MCC
M2	E-MON CLASS 3200, 480V, 3Ø, 4W, 800A	1-800A	SWBD: PANEL SPD

METERS BASED ON E-MON ENERGY MONITORING PRODUCTS. IF METERING OTHER THAN E-MON ENERGY MONITORING PRODUCTS IS SUBMITTED, METERS SHALL BE CAPABLE OF METERING AS DESCRIBED ABOVE.

ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR GROUPING ALL CIRCUITS LISTED INTO CT'S ASSOCIATED WITH EACH E-MON METERING DEVICE.

**3D** **EXISTING MAIN SWBD ELEVATION - REVISED**  
NOT TO SCALE



**3C** **EXISTING MCC-A ELEVATION - REVISED**  
NOT TO SCALE

EXISTING PANEL SHA REVISED											
TYPE: SQUARE D: NF	480 MOUNT:	277 SURFACE	V.	3	PH.	4	WIRE	PROVIDE IF CHECKED:	XX XX	EQUIP. GND BUS NEUTRAL BUS GUTTER TAPS SUB-FEED LUGS	
LOAD SERVED	LOAD VA	CKT BKR	CKT #	LOAD VA			CKT #	CKT BKR	LOAD VA	LOAD SERVED	
				A	B	C					
(X)TRANSFORMER SL		20/3	1				2	20/3		SPARE	
			3				4				
			5				6				
(X)LIGHTING CONTACTOR		100/3	7				8	20/3		(X)AIR COMPRESSOR	
			9				10				
			11				12				
(X)CHILLER CONTROLS		20/1	13				14	20/3		(X)COOLING TOWER PAN HEATER #1	
(X)IRRIGATION CONTROL		20/1	15				16				
(X)SPARE		20/1	17				18				
(X)SPARE		100/3	19				20	20/3		(X)COOLING TOWER PAN HEATER #2	
			21				22				
			23				24				
SPACE		-	25				26	20/1		(X)MECH BLD. LTS - EMG LTS	
SPACE		-	27				28	20/1		(X)UNKNOWN LOAD	
SPACE		-	29			7,842	30	40/3	7,842	HOT WATER SKID	
(X)UNKNOWN LOAD		50/3	31	7,842			32		7,842		
			33		7,842		34		7,842		
			35				36	-		SPACE	
SPACE		20/3	37				38	30/3		(X)PAN HEATER - CT #2	
			39				40				
			41				42				
NOTES:				7,842	7,842	7,842	TOTAL V. AMPS	250	A	BUS (COPPER)	
1. HVAC & REFRIG. EQUIP. SHALL USE TYPE HACR BREAKERS.				28	28	28	CONN. AMPS	250	A	MAIN LUGS	

EXISTING PANEL SL REVISED										
TYPE: SQUARE D NQOD	208 MOUNT:	120 V. SURFACE	3	PH.	4	WIRE	NEUTRAL BUS	PROVIDE IF CHECKED:	EQUIP. GND BUS	GUTTER TAPS
								SUB-FEED LUGS		
LOAD SERVED	LOAD VA	CKT BKR	CKT #	LOAD VA			CKT #	CKT BKR	LOAD VA	LOAD SERVED
EXST. FAN #1		20/1	1	A	B	C	2	20/1		UNIT HEATER #1
EXST. FAN #2		20/1	3				4	20/1		UNIT HEATER #2, RCP BY DOOR
REFRIGERATOR MONITOR		20/1	5				6	20/1		HEAT TAPE
RCP- MECH. BLDG. IRRIGATION TIMER		20/1	7				8	20/1		MCC - HVAC CONTROL
FIRE ALARM PANEL		20/1	9				10	20/1		SITE LIGHTING CONTROL
RCP- MECH. BLDG. IRRIGATION TIMER		20/1	11				12	20/1		HEAT TAPE
SPARE		20/1	13				14	20/1		CONTROLS - MCC
SPARE		20/1	15				16	20/1		SPARE
SPARE		20/1	17				18	20/1		SPARE
SPARE		20/1	19				20	20/1		CODE BLUE
SPARE		20/1	21				22	20/1		SPARE
SPARE		20/1	23				24	20/1		SPARE
ELECTRIC ACTUATORS (NOTE 1)	1,800	20/1	25	1,800			26	20/1		CODE BLUE
SPACE	-	27					28	20/1		SPARE
SPACE	-	29					30	20/1		SPARE
MAIN BREAKER	60/3	31								
		33								
		35								
				1,800			TOTAL V. AMPS		60 A. BUS (COPPER)	
NOTES:				15			CONN. AMPS		60 A. MAIN CIRCUIT BREAKER	
1. UTILIZE EXISTING BREAKER.										

## DEMOLITION KEY NOTES

- |   |  |
|---|--|
| 1 | (X)SHWP-1: AFTER CONDUIT AND CONDUCTORS ARE REMOVED LABEL BUCKET AS SPARE.   |
| 2 | (X)SHWP-2: AFTER CONDUIT AND CONDUCTORS ARE REMOVED LABEL BUCKET AS SPARE.   |
| 3 | (X)PHWP-1: AFTER CONDUIT AND CONDUCTORS ARE REMOVED LABEL BUCKET AS SPARE.   |
| 4 | (X)PHWP-2: AFTER CONDUIT AND CONDUCTORS ARE REMOVED LABEL BUCKET AS SPARE.   |
| 5 | (X)CT-1: AFTER CONDUIT AND CONDUCTORS ARE REMOVED, REMOVE HEATERS, STARTER AND ALL RELATED CONTACTS AND WIRING, PROTECT BREAKER FOR REUSE.             |
| 6 | (X)CT-2 D.S.: AFTER CONDUIT AND CONDUCTORS ARE REMOVED, REMOVE BREAKER, HEATERS, STARTER AND ALL RELATED CONTACTS AND WIRING, PREP BUCKET FOR BREAKER. |
| 7 | AFTER EQUIPMENT AND CONDUCTORS REMOVED, LABEL BREAKER SPARE.   |

## KEY NOTES

- |   |   |
|---|---|
| 1 | PROVIDE 20, 3 POLE BREAKER, BREAKER AIC MUST PANEL AIC RATING. SEE WIRING DIAGRAM FOR ADDITIONAL INFORMATION. E-601 4B & 4C.                        |
| 2 | CT-1: UTILIZE EXISTING BREAKER TO FEED CT-1 VIA VFD, SEE PLAN FOR ADDITIONAL INFORMATION.   |
| 3 | CT-2: PROVIDE 40A, 3 POLE THERMAL MAGNETIC BREAKER, BREAKER MUST MATCH PANEL AIC RATING. CONNECT CT-2 VIA VFD, SEE PLAN FOR ADDITIONAL INFORMATION. |
| 4 | HOT WATER SKID: PROVIDE 40A, 3 POLE BREAKER, BREAKER MUST MATCH PANEL AIC RATING. CONNECT HOT WATER SKID, SEE PLAN FOR ADDITIONAL INFORMATION.      |

## LOAD SUMMARY

VOLTAGE	PHASE
480	3
<b>LOADS REMOVED THIS PROJECT</b>	
<b>EQUIPMENT</b>	
CT-1	17,460 VA
CT-2	17,460 VA
SHWP-1	6,319 VA
SHWP-2	6,319 VA
SB-1	2,798 VA
SB-2	2,798 VA
PHWP-1	3,990 VA
PHWP-2	3,990 VA
TOTAL HVAC EQUIPMENT REMOVED THIS PROJECT	61,134 VA
TOTAL HVAC EQUIPMENT REMOVED THIS PROJECT	74 AMPS
<b>LOAD ADDED THIS PROJECT</b>	
<b>EQUIPMENT</b>	
HOT WATER SKID	20,618 VA
CT-1 (15HP)	17,460 VA
CT-2 (15HP)	17,460 VA
ELECTRIC ACTUATOR	1,800 VA
SUB-TOTAL EQUIPMENT DEMAND	57,338 VA
SUB-TOTAL EQUIPMENT DEMAND	69 AMPS
TOTAL EQUIPMENT DEMAND	69 AMPS
TOTAL LOAD ADDED THIS PROJECT	69 AMPS
TOTAL LOAD ADDED THIS PROJECT	57,338 VA
NET LOAD CHANGED THIS PROJECT	-5 AMPS
NET LOAD CHANGED THIS PROJECT	-3,796 VA

A	ISSUED FOR REVIEW	07/01/20
		Date:
Revision No.	DESCRIPTION	REVISIONS

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 607 S. COLLEGE ROAD, WILMINGTON, NORTH CAROLINA 28403  
 STATE ID# 20-05705-01A

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**ELEVATIONS, NOTES AND SCHEDULES**

JOB NO.:	19116
DRAWN:	HGH
DESIGNED:	HGH
CHECKED:	WAC

DRAWING NO:

**E-501**

REVISION:  
**A**



