



**Oregon State  
University**

**Construction Contracts  
Administration, Procurement  
Contracts & Materials  
Management (PCMM)**  
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11/8/2018

Oregon State University  
Construction Contract Administration  
Pharmacy Chiller Replacement Rebid

**ADDENDUM NO. 1**

THIS ADDENDUM IS BEING ISSUED for clarification and/or revisions of the drawings and specifications as noted. This document is hereby made a part of the Contract Documents to the extent as though it was originally included herein.

The following changes shall be made to the DRAWINGS:

- Item 1            Sheet G-001"Cover Sheet", REPLACE in its entirety with sheet G-001 **Addendum 2** dated 11/06/2018. Be sure to note Addendum #1, it was not previously released.
- Item 2            Sheet M-001"Legend and Schedule", REPLACE in its entirety with sheet M-001 **Addendum 2** dated 11/06/2018. Be sure to note COLEBREIT'S Addendum #1, it was not previously released.
- Item 3            Sheet M-101 "Demo Plan and HVAC Plan", REPLACE in its entirety with sheet M-101 **Addendum 2** dated 11/06/2018. Be sure to note COLEBREIT'S Addendum #1, it was not previously released.
- Item 4            Sheet M-601 "Condenser Water Piping and Controls Schematic", REPLACE in its entirety with sheet M-601 **Addendum 2** dated 11/06/2018. Be sure to note COLEBREIT'S Addendum #1, it was not previously released.
- Item 5            DELETE Section 01 11 00 Summary of Work in its **entirety**. It is replaced with Section 01 11 00 Summary of Work attached to this addendum.
- Item 6            DELETE Section 23 64 29 Summary of Work in its **entirety**. It is replaced with Section 23 64 29 Summary of Work attached to this addendum.

QUESTIONS and ANSWERS:

- Item 7                   **Q:** Will the freight elevator be allowed to move construction personnel to the 5<sup>th</sup> floor or is there another public elevator available?  
**A:** Yes, OSU will provide a key that operates the freight elevator that can be checked out daily at public safety.
- Item 8                   **Q:** Who will remove the refrigerant?  
**A:** Oregon State University will remove the refrigerant in the existing chiller.
- Item 9                   **Q:** Who will perform any asbestos abatement?  
**A:** Oregon State will abate all asbestos that is discovered. See Division 1, section 1.04/1.05 for further clarification.
- Item 10                  **Q:** Who will demo the concrete pad?  
**A:** Prime Contractor shall demolish and remove the existing concrete pad, steel frame and isolators. New chiller will mount directly to the existing concrete floor.
- Item 11                  **Q:** Are there cut sheets of the equipment?  
**A:** Cut sheets shall be obtained from the equipment vendor/ manufacturer by the Prime Contractor.
- Item 12                  **Q:** The equipment schedule indicates a 460v Ph3 model chiller to be installed, but it appears there is only 208-240v Ph3 power available?  
**A:** Currently the Pharmacy Building only has 208v Ph3 available. ColeBreit Engineering has addressed this in their drawings marked Addendum #2.
- Item 13                  **Q:** Where is the electrical room located (which floor) that service the 400 amp disconnect currently serving the chiller?  
**A:** The 400 Amp disconnect is feed from the main electrical room (003) on the east side of the original building, just under the stairs as you walk in the east back entrance. Coordinate with OSU electrical for the shutdown of the electrical equipment.
- Item 14                  **Q:** Can the existing exhaust fans in the mechanical space be utilized to exhaust fumes/ smells when performing the demolition of the existing chiller?  
**A:** It is not recommended to use the existing exhaust fans to mitigate fumes/ smells during the demolition. The contractor should plan for and provide any mitigation for noise/fumes. There is an exterior door on the north end of the mechanical room that the contractor can use to help mitigate fumes/odors. This should be included in your bid.
- Item 15                  **Q:** Will the existing pneumatic system control the Chiller or is there a specific brand of existing BMS system that will control the new chiller?  
**A:** No, the existing pneumatic system will not operate the new chiller. See Item 16.
- Item 16                  **Q:** What controls vendor do you want?  
**A:** OSU would prefer Alerton Controls for consistency within the Pharmacy Building. The Prime Contractor shall follow industry standards and make sure that the equipment to have the following items:
- Hard wire stop/start
  - Hard wire chilled water set-point

- BACnet should be either have the ability to MSTP or IP Ethernet
- OSU controls group will tie into BACnet and take cable back to the BAS

**END OF ADDENDUM NO. 1**

# Oregon State University Pharmacy Building Chiller Replacement Corvallis, Oregon

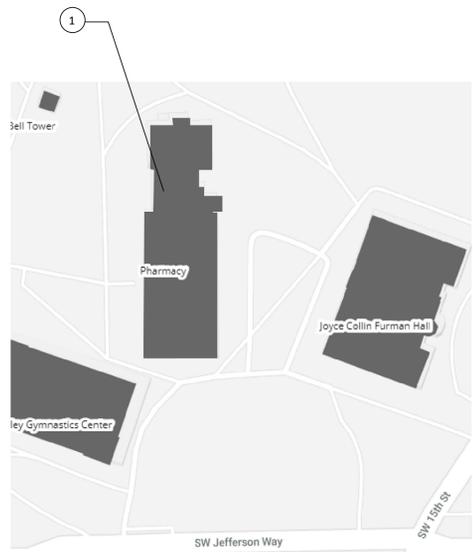
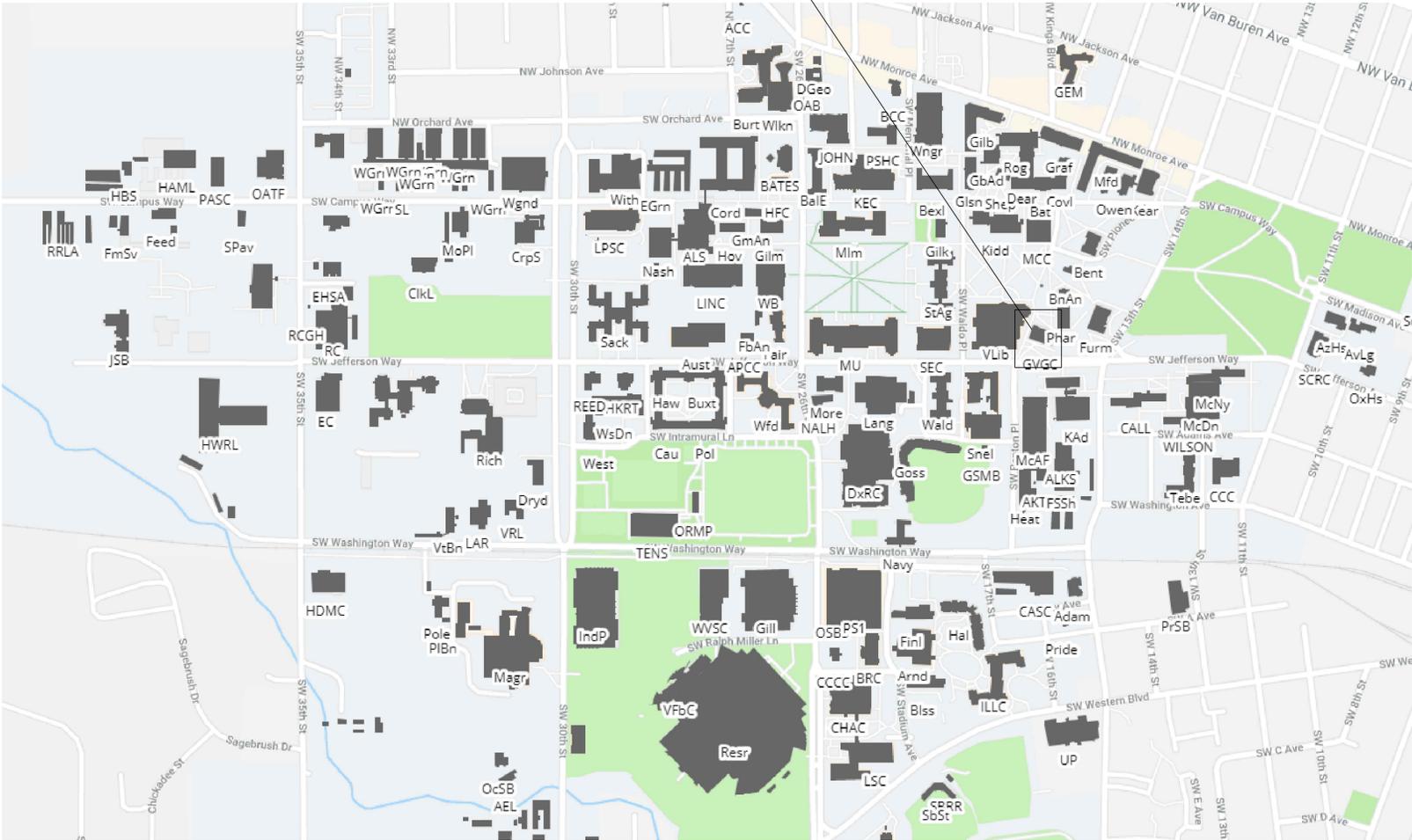


**COLEBREIT**  
ENGINEERING  
1030 NW BOND ST | SUITE 202 | BEND OR 97703  
541-728-3293 | COLEBREIT.COM

OWNER	ENGINEER
OREGON STATE UNIVERSITY CAPITAL PLANNING AND DEVELOPMENT OAK CREEK BUILDING 3015 SW WESTERN BLVD CORVALLIS, OR 541-727-5412	COLEBREIT ENGINEERING 1220 NW KINGS BLVD CORVALLIS OR 541-728-3293

**SHEET NOTES:** #

- 1. PROJECT LOCATION



SHEET KEY	
SHEET NUMBER	SHEET NAME
G-001	COVER SHEET
M-001	LEGEND AND SCHEDULES
M-101	DEMO PLAN AND HVAC PLAN
M-601	CONDENSER WATER PIPING AND CONTROLS SCHEMATIC

**OSU PHARMACY  
CHILLER**  
1601 SW JEFFERSON WAY  
CORVALLIS, OREGON

ISSUED:	DATE:
PERMIT SET	10/03/2018
ADDENDUM #1	10/23/2018
ADDENDUM #2	11/06/2018

JOB NUMBER: 186.002  
DRAWN BY: PHN  
CHECKED BY: AB

SHEET TITLE  
COVER SHEET

SHEET NUMBER  
**G-001**

MECHANICAL LEGEND		
	ELBOW DOWN	
	ELBOW DOWN	
	ELBOW UP	
	TEE, BRANCH DOWN	
	TEE, BRANCH UP	
	POINT OF CONNECTION	
	FLANGED CONNECTION	
	FLOW METER	
	ISOLATOR, VIBRATION	
	PIPE CAP	
	PUMP, CENTRIFUGAL	
	REDUCER, CONCENTRIC	
	STRAINER WITH VALVE	
	THERMOWELL	
	UNION, THREADED	
	VALVE, BUTTERFLY	
	VALVE, GATE	
	VALVE, PRESSURE RELIEF	
	VALVE, SWING CHECK	
	VALVE, BALL	
	VALVE, BACK PRESSURE REGULATOR	
	VALVE, MOTOR OPERATED	
	VALVE, PLUG	
	VENT, AIR	
	TEMPERATURE GAUGE	
	PRESSURE GAUGE	
	SHEET NOTE	
(A)	ABANDON IN PLACE	
(E)	EXISTING	
(N)	NEW	
AHU	AIR HANDLING UNIT	
AS	AIR SEPARATOR	
BT	BUFFER TANK	
ET	EXPANSION TANK	
CF	CHEMICAL FEED SYSTEM	
CH	CHILLER	
P	PUMP	
RS	REFRIGERANT SUCTION	
RL	REFRIGERANT LIQUID	

PIPING LEGEND		
SYMBOL	ABBRV.	IDENTIFICATION
	RLS	REFRIGERANT LINE SUCTION
	RLL	REFRIGERANT LINE LIQUID
	CWS	CONDENSER WATER SUPPLY
	CWR	CONDENSER WATER RETURN

**GENERAL NOTES:**

- LOCATION AND ARRANGEMENT OF EXISTING PIPING, VALVES, AND EQUIPMENT IS APPROXIMATE. CONTRACTOR SHALL VERIFY LOCATION OF PIPING AND DIMENSIONS FOR INSTALLATION PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.
- MECHANICAL WORK INDICATED IS DIAGRAMMATIC, EXACT LOCATIONS OF ALL COMPONENTS ARE TO BE DETERMINED IN THE FIELD TO AVOID CONFLICT WITH EXISTING SITE CONDITIONS.
- ALL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS.
- PROTECT ALL EXISTING ADJACENT SURFACES, ELEMENTS AND FIXTURES SCHEDULED TO REMAIN FROM DAMAGE DUE TO DEMOLITION AND CONSTRUCTION PROCESSES. PATCH AND REPAIR TO PREVIOUS CONDITIONS.
- PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS IN CHILLED WATER AND HOT WATER PIPING.
- CONFORM TO OREGON STATE UNIVERSITY DESIGN STANDARDS INCLUDING FOR EQUIPMENT IDENTIFICATION AND INSTALLATION.
- DIV26 CONTRACTOR TO DEMOLISH EXISTING MECHANICAL EQUIPMENT ELECTRICAL CONNECTIONS COMPLETE. REMOVE EXISTING DISCONNECTS AND PULL UNUSED CONDUCTORS.
- DIV26 TO COORDINATE WITH MECHANICAL EQUIPMENT SUPPLIER AND VERIFY BREAKER MOCAP. REPLACE EXISTING BREAKER WITH NEW AFTER CONFIRMING AVAILABLE LOAD CAPACITY OF THE EXISTING PANEL/OVERALL ELECTRICAL SYSTEM. BREAKER KAIC RATING TO MATCH EXISTING. DIV26 TO CONFIRM EXISTING GROUNDING SYSTEM IS INTACT AND PERFORMING CORRECTLY BEFORE INSTALLING NEW EQUIPMENT. UPDATE PANEL SCHEDULE WITH NEW CONNECTED LOAD DESCRIPTIONS AND ANY CHANGES TO ARC-FLASH LABELS.
- DIV26 TO PROVIDE COPPER THWN RATED CONDUCTORS AND APPROPRIATE CONDUIT FOR RACEWAY. MATCH CONDUCTOR SIZE TO EQUIPMENT MOCAP RATING. DIV26 TO COORDINATE ANY CONNECTIONS TO VFDS AND MOTOR STARTERS (PROVIDED BY OTHERS, INSTALLED BY DIV26).
- PROVIDE NEW NEMA 3R RATED FUSED DISCONNECT NEXT TO EACH NEW MOTOR BEING INSTALLED. SIZE FUSING AND DISCONNECT PER MANUFACTURERS RECOMMENDATIONS.

WATER COOLED CONDENSER												
MARK	TONS	CONDENSOR DATA					ELECTRICAL			WT LBS	MAKE & MODEL	REMARKS
		FLUID	EW T DEG. F	LWT DEG. F	GPM	PD FT	V/PH	MCA	MOCAP			
CH-1	83	WATER	80	95	159	7.2	208/3	266	400	3000	MULTISTACK MS08SXN-410A	ALL APPLY

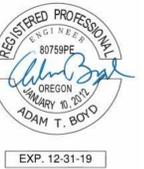
NOTES:  
1. SCROLL COMPRESSOR WITH HOT GAS BYPASS, 38 DEG F SUCTION TEMP  
2. R410A REFRIGERANT  
3. PROVIDE SINGLE POINT POWER CONNECTION AND LOCAL MAIN POWER DISCONNECT  
4. PROVIDE RESTRAINED SPRING ISOLATORS  
5. INTERNAL CONTROLS WITH BACNET EXTERNAL COMPATABILITY

PUMPS										
MARK	SERVICE	FLUID	GPM	PD FT	MOTOR DATA			V/PH	MAKE & MODEL	REMARKS
					HP	BHP	RPM			
P-1	CONDENSER WATER	WATER	159	55	3	2.5	1750	208/3	B&G e-1510 2BD	ALL APPLY

NOTES:  
1. MOUNT ON SPRING VIBRATION ISOLATORS

DX COOLING COIL											
MARK	TYPE	PERFORMANCE DATA								REMARKS	
		CFM	EAT DB/WB	LAT DB/WB	PD INWG	ROWS	HxL INCH	FV MAX FPM	REFRIG		SUCTION TEMP
CC-1	DX R-410A	22,000	96/67	55/54	0.5	6	(2) 48x55	600	R410A	38	ALL APPLY

NOTES:  
1. DX COIL TO REPLACE EXISTING CHILLED WATER COIL IN ASU-1.  
2. COIL DIMENSION ARE ESTIMATED. PRIOR TO CONSTRUCTION/PURCHASE, CONFIRM EXISTING ASU-1 COIL DIMENSIONS AND ROWS PRIOR TO ORDERING. MAXIMIZE COIL DIMENSIONS TO ACHIEVE 500 FPM AS ASU-1 CABINET SPACE ALLOWS. EXISTING COIL PULL CLEARANCE IS LIMITED, SINGLE COIL FULL WIDTH OF ASU-1 IS ACCEPTABLE IF IT CAN BE INSTALLED WITH SPACE ALLOWED.



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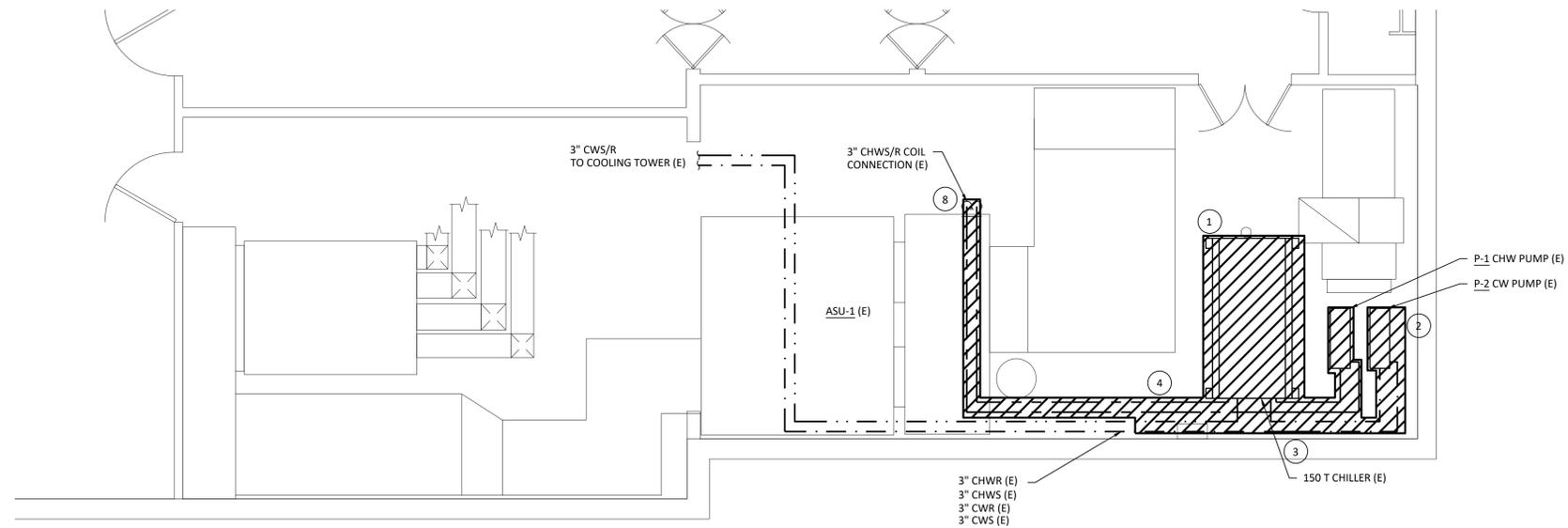
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LEGEND AND SCHEDULE

SHEET NUMBER

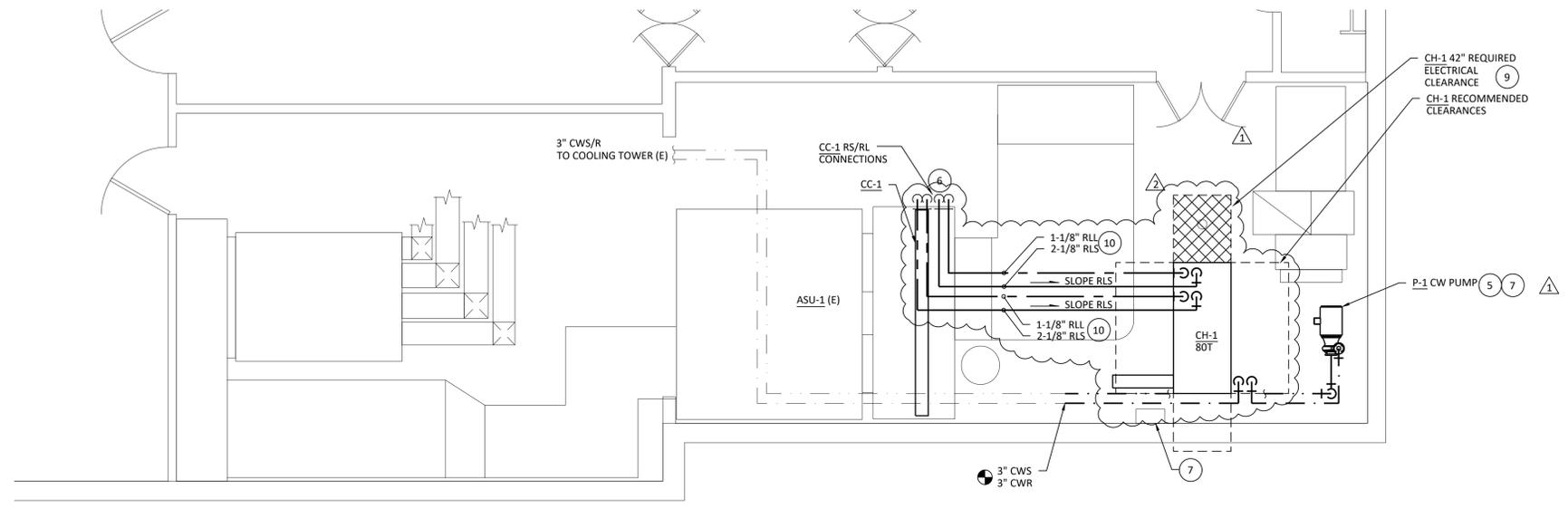
**M-001**

**SHEET NOTES:** #

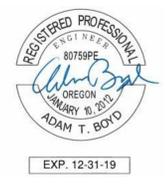
1. DEMOLISH EXISTING CHILLER, INERTIA BASE AND SPRING ISOLATORS. REMOVE CONNECTING PIPING TO EXTENT REQUIRED FOR NEW WORK.
2. DEMOLISH EXISTING P-1 CHILLED WATER PUMP AND P-2 CONDENSER WATER PUMP.
3. DEMOLISH CONDENSER WATER PIPING TO EXTENT SHOWN TO ACCOMMODATE NEW PUMP INSTALLATION.
4. DEMOLISH CHILLED WATER PIPING TO THE ASU-1 COIL, INCLUDING REMOVAL OF 3-WAY CONTROL VALVE, CHEM FEED TANK, WATER FILTERS, EXPANSION TANK AND MAKEUP WATER.
5. SEE CHILLER PIPING SCHEMATIC ON M-601 FOR PIPING DETAILS.
6. CONNECT REFRIGERANT PIPING TO NEW DX COIL IN ASU-1.
7. SEE SHEET M-001 GENERAL NOTES FOR ELECTRICAL SCOPE.
8. DEMOLISH EXISTING CHILLED WATER COOLING COIL IN ASU-1.
9. SPACE IN MECHANICAL ROOM IS LIMITED. MAINTAIN ALL CODE REQUIRED ELECTRICAL CLEARANCES AND MANDATORY CLEARANCE FROM THE MANUFACTURER. PROVIDE RECOMMENDED CLEARANCES AS ALLOWED BY SPACE LIMITATIONS.
10. CONFIRM REFRIGERANT PIPE SIZING WITH MANUFACTURER.



2  
M-101  
MECHANICAL ROOM - DEMO PLAN  
1/4"=1'-0"  
PLAN NORTH



1  
M-101  
MECHANICAL ROOM - HVAC PLAN  
1/4"=1'-0"  
PLAN NORTH



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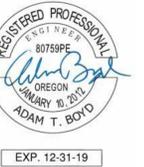
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SHEET TITLE  
DEMO PLAN  
AND HVAC PLAN

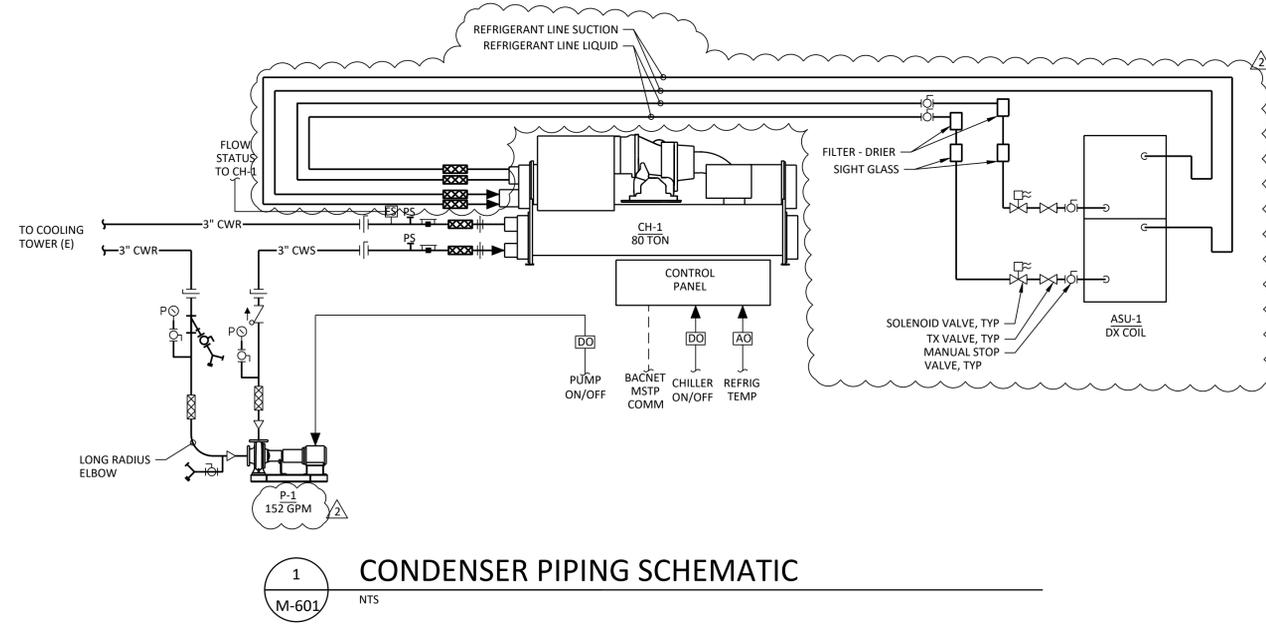
SHEET NUMBER

**M-101**



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1  
M-601 NTS  
**CONDENSER PIPING SCHEMATIC**

- SEQUENCE OF OPERATIONS**
- SYSTEM DESCRIPTION:** CONDENSER CH-1 PROVIDES REFRIGERANT COOLING TO AIR SUPPLY UNIT ASU-1 DX COOLING COIL. PUMP P-1 CIRCULATES CONDENSER WATER TO CH-1 FROM EXISTING COOLING TOWER LOCATED ON THE ROOF. NEW EQUIPMENT SHALL BE INTEGRATED WITH EXISTING EQUIPMENT AND CONTROLS WITHOUT ALTERING THE CONTROL SEQUENCES OF THE EXISTING EQUIPMENT.
  - CONTROLS:** CONNECT TO EXISTING BUILDING DIRECT DIGITAL CONTROL (DDC) SYSTEM. PACKAGED CONDENSER CONTROL PANEL CONTROLS THE INTERNAL SEQUENCES OF THE CONDENSER. CONDENSER CONTROLS SHALL BE BACNET COMPATIBLE TO INTERFACE WITH BUILDING DDC SYSTEM.
  - COOLING:** UPON CALL FOR COOLING FROM ASU-1, CH-1 AND P-1 SHALL BE ENABLED. UPON RECEIVING CALL FOR COOLING AND PROOF OF CONDENSER WATER FLOW IS PROVED FROM CW FLOW SWITCH, THE CONDENSER SHALL START. IN COOLING MODE, CONDENSER SHALL MODULATE COMPRESSOR PER INTERNAL CONTROL SEQUENCES TO MAINTAIN COOLING REFRIGERANT TEMPERATURE TO ASU-1 COOLING COIL. CONDENSER SHALL BE CONFIGURED FOR MINIMUM RUN TIME TO PREVENT SHORT CYCLING. EXISTING COOLING TOWER SHALL OPERATE ACCORDING TO EXISTING CONTROLS SEQUENCES TO MAINTAIN MAXIMUM 80 DEGREE (ADJUSTABLE) CONDENSER WATER TEMPERATURE.
  - ALARMS:** ANY CONDENSER CONTROLS FAILURE ALARM SHALL ALARM TO THE MAIN DDC SYSTEM.

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JOB NUMBER: 186.002  
 DRAWN BY: ATB  
 CHECKED BY: LJB

SHEET TITLE  
 CONDENSER WATER  
 PIPING AND CONTROLS  
 SCHEMATIC

SHEET NUMBER  
**M-601**

## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 SUMMARY OF WORK

A. The Work Contract consists of the removal and replacement of the building chiller unit, two (2) pumps and refrigerant coil in room 509 of the Pharmacy Building located at 1601 SW Jefferson Ave. on the Oregon State University Campus, Corvallis, Oregon. Work shall include all electrical connections and upgrades required for the new chiller. The work must comply with the most current edition of the OSU Construction Standards; any specific standard included within this project manual shall take precedence over the OSU Construction Standard. OSU Construction Standards are located at <http://fa.oregonstate.edu/cpd-standards> and are herein incorporated by this reference. Work shall include:

- Contractor to demolish existing mechanical equipment electrical connections complete. Remove existing disconnects and pull unused conductors.
- Coordinate with mechanical equipment supplier and verify break MOCP. Replace existing breaker with new after confirming available load capacity of the existing panel/ overall electrical system. Breaker KAIC rating to match existing. Confirm existing grounding system is intact and performing correctly before installing new equipment. Update panel schedule with new connected load descriptions and any changes to arc-flash labels.
- Provide copper THWN rated conductors and appropriate conduit for raceway. Match conductor size to equipment MOCP rating. Coordinate any connections to VFDS and motor starters (provided by others and installed to our standards per Division 26).
- Provide new NEMA 3r rated fused disconnect next to each new motor being installed. Size fusing and disconnect per manufacturers recommendations.

B. Work shall be started in December 2018, immediately after signing of Contract on behalf of Oregon State University. The Contract may not be signed prior to approval of the Contractor's Certificate of Insurance by Construction Contract Administration (CCA), Oregon State University. Work shall be completed on or before June 30, 2018.

##### 1.02 CONTRACTORS USE OF PREMISES

- A. Contractor shall limit use of the Premises for work and storage to allow for:
1. Owner occupancy, day and night.
  2. Public use, day and night.
  3. Security.
  4. Safe entry and exit for vehicles and pedestrians.
  5. Fire egress.
- B. Coordinate all operations with the Owner's Authorized Representative during

the construction period. A 96-hour notification is required prior to scheduled utility shutdowns or street closures, but more lead time is often required to schedule around other critical activities.

- C. Limit Contractor's employee parking to locations designated at the Pre-construction Conference.

### **1.03 OWNER OCCUPANCY**

- A. The Owner will occupy the Premises during the entire period of construction for the conduct of normal operations. Cooperate with Owner's Authorized Representative in construction operations to minimize conflict and to facilitate the Owner's usage especially in the following areas:
  - 1. Restricted access and parking.
  - 2. Use of stairs.
  - 3. Storage space availability.
- B. Conduct operations in such a way to ensure the least inconvenience to the general public, including:
  - 1. Limitations and easements.
  - 2. Emergency vehicle access.
  - 3. Building access to the public, day and night.

### **1.04 ASBESTOS AND OTHER HAZARDOUS MATERIAL**

- A. The Owner has made a reasonable attempt to locate and identify asbestos or other hazardous material that may be encountered during the course of the Work.
- B. If the Contractor observes or suspects the existence of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials in the structure or components of the building, the Contractor shall immediately stop work and notify the Owner's Authorized Representative.
- C. The Owner will arrange for the removal of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials as required by Facilities Services personnel or by separate contract.
- D. Schedule ten (10) days of slack or "down" time for the removal of hazardous materials without penalty to Owner for the delay of the Contract.

### **1.05 LEAD BASED PAINT**

- A. The Owner may have tested existing paint in the project area and if levels are found the following conditions apply.
- B. Contractor shall remove paint as specified for surface preparation and capture removed material for disposal.
- C. Contractor shall follow OSHA guidelines involving exposure to workers.
- D. Owner will provide containers for Contractor's use at project site.

- E. Contractor shall comply with the requirements of DEQ and EPA and shall submit a lead abatement plan.
- F. Contractor shall separate lead contaminated material from effluent and water.
- G. Owner will dispose of lead paint and effluent resulting from stripping operation.
- H. Soil contaminated by stripping operations shall be replaced with topsoil.

**END OF SECTION**

2

## SECTION 236429 - MODULAR WATER COOLED CONDENSER

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A Factory-assembled packaged condenser.
- B Charge of refrigerant and oil.
- C Controls and control connections.
- D Chilled water connections.
- E Condenser water connections.
- F Electrical power connections.

#### 1.2 RELATED REQUIREMENTS

- A Section 03 3000 - Cast-in-Place Concrete: Concrete housekeeping pads.
- B Section 23 0593 - Testing, Adjusting, and Balancing for HVAC.
- C Section 23 0800 - Commissioning of HVAC.
- D Section 23 2113 - Hydronic Piping.
- E Section 23 2114 - Hydronic Specialties.
- F Section 26 0583 - Wiring Connections.

#### 1.3 REFERENCE STANDARDS

- A AHRI 550/590 - Performance Rating of Water-Chilling and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle 2011.
- B AHRI 575 - Method of Measuring Machinery Sound Within an Equipment Space 2008.
- C ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2013.
- D ASHRAE Std 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings 2013, Including All Addenda.
- E ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels 2017.
- F NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.
- G UL 984 - Hermetic Refrigerant Motor-Compressors Current Edition, Including All Revisions.
- H UL 1995 - Heating and Cooling Equipment Current Edition, Including All Revisions.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A Coordination: Coordinate physical size, weight and location of major pieces of equipment to be installed. Notify Engineer of any major deviations from the equipment originally specified prior to ordering equipment.

#### 1.5 SUBMITTALS

- A Product Data: Provide rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- B Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Indicate equipment, piping and connections, valves, strainers, and thermostatic valves required for complete system.
- C Manufacturer's Certificate: Certify that components furnished but not produced by manufacturer meet or exceed manufacturer's requirements.
- D Manufacturer's Performance Data: Indicate energy input versus cooling load output from 0 to 100 percent of full load at specified and minimum condenser water temperature for water-cooled condensers.
- E Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F Operation and Maintenance Data: Include start-up instructions, maintenance data, parts lists, controls, and accessories; include trouble-shooting guide.
- G Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

#### 1.6 WARRANTY

- A Manufacturer's Warranty: Provide minimum five year warranty to include coverage for compressor and minimum one year warranty on parts.

2 PART 2 PRODUCTS

2.1 CONDENSER APPLICATIONS

A Condenser CH-1: Water-Cooled.

1. See equipment schedules on drawings for capacities and performance.

2.2 WATER COOLED CONDENSERS

A Water Cooled Condenser: Factory assemble and test module consisting of compressor(s), compressor motor(s), condenser, enclosure, DX refrigeration circuits(s) and specialties, interconnecting piping, condenser water circuit isolation valves, starters, and microprocessor-based controls.

1. Rating: AHRI 550/590.
2. Safety: UL 1995 and ASHRAE Std 15.
3. Machinery Sound Testing: AHRI 575.
4. Construction & Testing: ASME BPVC-VIII-1 if applicable for construction type.
5. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. or testing firm acceptable to the Authority Having Jurisdiction as suitable for the purpose specified and indicated.
6. Energy Efficiency: ASHRAE Std 90.1.
  - a. See Drawings.
7. Enclosures:
  - a. Frame:
    - 1) Heavy gage steel.
    - 2) Factory painted finish.
  - b. Steel Cabinets:
    - 1) Factory baked on enamel finish.
  - c. Electrical Equipment: NEMA 250 or UL 1995 as applicable.
8. Motors: UL 984. See Section 23 0513 for additional requirements.

2.3 COMPRESSORS

A Compressors: Oil-free Centrifugal Compressor.

1. Module: Multiple independent refrigerant circuits. Two, scroll compressors with hot gas bypass, adequate valve types and specialties required for operation and servicing in accordance with manufacturer's recommendations.
2. Vibration Control: Factory installed internal rubber-in-shear isolators.
3. Capacity Reduction System: Hot gas bypass. Compressor staging per integrated condenser controls.
4. Motor: 3600 rpm, suction gas-cooled, with overload protection.
5. Evaporator: Direct expansion arrangement connecting refrigerant circuit directly to ASU-1 cooling coil.

2.4 WATER-COOLED CONDENSER

A Provide brazed plate type.

1. Plate Material: 316 stainless steel.
2. Refrigerant Working-Side Pressure Rating: 650 psig(4482 kPa) minimum.
3. Water Working-Side Pressure Rating: 285 psig(1965 kPa) minimum.
4. Provide with flanged or grooved connections.
5. Provide factory or field installed vents and water drain connections on condenser or piping.
6. Provide factory or field installed fittings for temperature control sensors on condenser or piping.

2.5 REFRIGERATION CIRCUITS

A Provide two independent refrigeration circuits with one compressor per circuit.

B Provide liquid line shut-off valve, filter-drier, thermal expansion valve, refrigerant relief device and compressor discharge check valve for each independent circuit.

2.6 INTEGRATED MICROPROCESSOR BASED DDC CONTROLS PACKAGE

A Pre-wire, assemble, factory mount, and test operating and safety control system consisting

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of a digital display or gages, on-auto-off switch, motor starting contactors, disconnect switches, power and control wiring. Provide controls, monitoring, programmable set-points, alarms, and BAS as defined below:

1. Automatic Adjustable Operating Controls:
  - a. Temperature of refrigerant leaving condenser.
  - b. Number of compressor circuits required to operate based on set-points and system load.
  - c. Compressor short-cycling prevention.
  - d. Lead/lag operation for compressors. New lead compressor selected every 24 hours to equalize run time.
  - e. Automatic reset on power source failure.
  - f. Load limiting.
2. Normal Operation Monitoring and Open Cover-less Displays:
  - a. Hours of operation.
  - b. Suction and discharge refrigerant pressures.
  - c. Automatic diagnostics.
  - d. Number of starts.
  - e. On/off compressor status.
  - f. Entering and leaving chilled water temperatures.
  - g. Status of operation.
  - h. Compressor winding temperature.
  - i. Suction temperature.
  - j. Condenser water entering and leaving temperatures.
  - k. Oil pressure.
3. Set-Points:
  - a. Leaving refrigerant temperature.
  - b. Date/time.
  - c. Leaving condenser water temperature.
4. Automatic Condenser Shut-Down Safety Controls and Alarm:
  - a. Automatic Reset:
    - 1) Chilled water flow interlock.
    - 2) Voltage protection (over/under).
    - 3) Phase reversal protection.
  - b. Manual Reset:
    - 1) Low suction pressure.
    - 2) High motor winding temperature.
    - 3) Low chilled water temperature.
    - 4) Low chilled water flow.
    - 5) High condenser refrigerant discharge pressure.
    - 6) Motor current overload and phase loss.
    - 7) Low oil flow.
  - c. Remote Alarm: Activate remote, audible bell upon safety shutdown of condenser.
5. Building Automation System (BAS) Communications via Shielded Cable:
  - a. Minimum Data Transmission to BAS:
    - 1) All system operating conditions.
    - 2) Capacity control information.
    - 3) Safety shutdown conditions.
  - b. Minimum Operating Commands from BAS:
    - 1) Remote unit start/stop.
    - 2) Remote condenser water reset.
    - 3) Remote chilled water reset.

### PART 3 EXECUTION

#### 3.1 INSTALLATION

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- A Install in accordance with manufacturer's instructions.
- B Align condenser package on steel or concrete foundations.
- C Install units on vibration isolators.
- D Connect to electrical service.
- E Connect to chilled water piping.
- F Connect to condenser water piping.
- G Arrange piping for easy dismantling to permit tube cleaning and removal.

3.2 MANUFACTURER'S FIELD SERVICES

- A Perform factory startup of the condenser by factory trained and authorized servicing technicians confirming equipment has been correctly installed prior to equipment becoming operational and covered under the manufacturer's warranty.
- B Supply initial charge of refrigerant and oil if not completely factory charged.
- C Demonstrate system operations and verify specified performance.

END OF SECTION