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# Addendum No. 1

| | |
|---|---|
| Date: | August 4, 2016 |
| To: | Commissioning Firms |
| From: | Clint Bunnell– Project Manager, DFCM |
| Reference: | Performing Arts Center<br>Utah Valley University<br>DFCM Project No. 15125790 |
| Subject: | **Addendum No. 1** |

| | | |
|---|---|---|
| Pages | Addendum Cover Sheet | 1 page |
| | Engineer's Addendum | 8 pages |
| | Total | 9 pages |

***Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.***

**1.1 SCHEDULE:** There are no project schedule changes.

**1.2 GENERAL ITEMS:**

1.2.1 See Engineer's Addendum.

1.2.2 Please include past performance references under "Tab Three" Management Plans.

**Project information**

| | |
|---|---|
| Project name: | Performing Arts Center<br>Utah Valley University |
| Project site address: | Orem, Utah |
| Mechanical Engineer: | Roger Hamlet, P.E.<br>Colvin Engineering Associates<br>801.505.5392<br>rhamlet@cea-ut.com |

**Code & Standards**

The mechanical systems will be designed in accordance with:

2012 IBC
2012 IMC
2012 IPC
2012 IFC
2012 IECC
ANSI/ASHRAE Standard 55-2010
ANSI/ASHRAE Standard 62.1-2010
ASHRAE Standard 52.2-1999
ANSI Z9.3-2007, Spray Finishing Operations – Safety Code for Design, Construction, and Ventilation
DFCM Design Standards, current as of completion of Design Development

**Building Performance**

HVAC systems will be designed to help the project meet the requirements of DFCM's High Performance Building Standard. Acoustical performance of the HVAC system is equally important. Refer to the Air Distribution paragraphs for more information.

**Available Utilities**

Connect to the existing central plants through the campus-wide chilled and heating water piping system in Gunther Trades
- -Assume chilled water pipes are 8" diameter.
- -Assume heating water pipes are 4" diameter.

Connect to municipal domestic water mains on site – 4" for building and 6" for fire protection.
Connect to the existing central plant domestic hot water and circulating lines in Gunther Trades
Connect to municipal sanitary sewer, 6".
Connect to municipal storm sewer, two locations, 8" each.
There will be no natural gas in the Performing Arts Center

**General Requirements**

Site Elevation 4,500 ft ASL

Outdoor design temperatures: winter: 9 deg F
(Provo Airport Weather Station) summer: $95_{DB}/63_{WB}$ deg F
dew point: 59.4 deg F

General Indoor Design Conditions: (See Room Data Sheets for Specific Requirements)

| | Temperature | | | |
|---|---|---|---|---|
| | Summer | | Winter | |
| | Occ* | Unocc | Occ* | Unocc |
| Circulation | 72/75 | 85 | 72/69 | 55 |
| Classrooms | 72/75 | 85 | 72/69 | 55 |
| Performance Halls | 72/75 | 85 | 72/69 | 55 |
| Rehearsal Rooms (1) | 72/75 | 85 | 72/69 | 55 |
| Private Offices | 72/75 | 85 | 72/69 | 55 |
| Shops | 72/75 | 85 | 69/67 | 55 |
| Restrooms | 75/75 | 85 | 72/69 | 55 |
| Storage | 80/NA | 85 | 60/NA | 55 |

* setup/setback temperature when space is temporarily unoccupied during occupied period, as determined by space occupancy sensor

(1) Active humidification/dehumidification **<u>will not be provided</u>** in any rooms that are part of this project. The performing arts department will purchase and maintain unitary humidity control devices in any rooms where they desire humidity control.

Active humidification is not provided in any space. Indoor relative humidity throughout the Performing Arts Center will vary from a low of 4% during the winter, to a high of 60% during the summer.

Noise Limits: Refer to room data sheets.

**Ventilation/Indoor Air Quality**

Comply with the minimum requirements of ASHRAE Standard 62.1-2010, Ventilation for Acceptable Indoor Air.

Reset outdoor air intake flow and/or space or zone airflow as operating conditions change, in accordance with Section 6.2.7 of the Standard, for zones that require Demand Controlled Ventilation (DCV).

Design the ventilation system for an air change effectiveness of 0.8, as determined by ASHRAE Standard 62.1-2010.

Implement a Construction IAQ Construction Management Plan that includes the use of high efficiency filters (Minimum Efficiency Reporting Value (MERV) = 8, as determined by ASHRAE 52.2-1999), at each return air grille for systems used during construction.

Provide MERV 13 final filters at the air handling equipment, without pre-filters.

| Space | Exhaust Rate Criteria |
|---|---|
| Toilet Rooms | 100 cfm/fixture public<br>75 cfm/fixture private |
| Janitor Closets, Copy Rooms | 0.5 cfm/ft$^2$, or larger as required to maintain at negative pressure of 0.02” w.c. relative to adjoining spaces |
| Warming Kitchen | See system descriptions |

**Commissioning**

Commissioning plan will be developed by the commissioning agent hired by DFCM.

**Sustainability/Energy Efficiency**

Building energy cost is required to be 20% less than a baseline building in accordance with ASHRAE 90.1-2010, Appendix G.

Energy performance to be assessed through energy modeling and life cycle cost analysis.

The only metrics to apply to building performance is life cycle cost analysis, and he related cost-effectiveness of potential performance improvements.

**Measurement and Verification**

Energy meters to provide local as well as remote readouts, using BACnet protocol

Continuous metering equipment for the following uses (as applicable):

| System | Meter |
|---|---|
| Heating Water, Chilled Water | Insertion turbine flow meter similar to Onicon F-1200, with Onicon System 10 Btu meter providing the following information: fluid flow rate, supply and return temperature, instantaneous energy flow rate, totalized energy flow rate |

Skyspark will be the analytics program used for continuous commissioning

**Operations and Maintenance**

HVAC maintenance performed by on-campus UVU personnel.

Approximately 40 hours of training will be specified to be provided, as well as DVD of the entire training demonstrations.

**Systems: General Requirements**

**Air Handling:**

Ventilation, cooling and heating to be provided by two factory-built variable volume air handlers built by ClimateCraft or Huntair. These air handlers will be located in two mechanical rooms on the second floor. Assume one air handler is sized for 120,000 cfm, and the second air handler is sized for 40,000 cfm. Air handlers shall include air-side economizer, filter bank using 4” deep MERV 13 filters, a supply/return fan array, preheat coils, indirect evaporative cooling coils, and direct evaporative air washers. Additional air handler features include:

- 4” double-wall casing.
- Airflow measuring station for all outdoor air
- Dedicated glycol loop for preheat coil
- Leak detection on floor of air handler downstream of air washers
- Water detectors in overflow drain pipes serving the air washers
- Weather hoods in addition to storm louvers on outdoor air intakes
- Fan array with fan wheel diameter not smaller than 18”.

**Air Distribution:**

All duct systems will be constructed in accordance with the 2012 IMC and the SMACNA HVAC Duct Construction Manual. All ductwork will be constructed with galvanized steel. Medium pressure ducts (from air handler to VAV box inlets) constructed to 6” pressure class. Low pressure and exhaust ductwork constructed to 2” pressure class.

Medium and low pressure ductwork will be designed to minimize airflow-generated noise. Assume the pounds of ductwork used in this building will be **approximately 50% greater than on a typical building**. Also note that double-walled medium pressure mains will be used extensively throughout the building. Noise reductions in low pressure ductwork downstream of VAV boxes will be achieved by using sound attenuators installed in ductwork above all noise sensitive spaces.

In order to reduce vibration and noise at the point ducts enter the Proscenium and Concert Hall spaces, flexible duct connectors will be used at those wall penetrations.

Supply air will be ducted to cooling-only VAV boxes, and duct-mounted reheat coils will be located immediately downstream of the cooling-only VAV boxes. Duct-mounted reheat coils will be selected to achieve a 15°F heating water temperature differential.

Audience seating areas for the Concert Hall will be served by displacement diffusers located beneath every other seat in the audience. Supply air will be fed to diffusers through double-wall direct buried ductwork. Direct buried ductwork will be made from galvanized steel, will include a bitumastic coating to prevent corrosion, and will be encased in 4" of concrete.

All other areas of the building, including the Proscenium and dance theater, will be served by overhead diffusers.

**Building Pressure Relief:**

Multiple variable speed relief fans will be used to maintain the building interior at a constant positive pressure with respect to the outdoors. Outdoor reference pressure to be measured on four sides of building at ground floor ceiling elevation and averaged by connecting pneumatic tubing from all four sides. Indoor reference pressure to be measured at a point approximately 9 feet above the lower level floor slab in the main lobby.

**Exhaust**

Two central exhaust fans will provide exhaust in all restrooms, janitor's closets, locker rooms, and other spaces are required by code. Exhaust will be discharged above roof of building at a location it will not be entrained in the outdoor air intakes.

Generator exhaust will be ducted above the roof. The generator duct termination will be vertical and at a location that generator exhaust gasses will not be entrained in the outdoor air intakes.

**Dust Collector**

Permanent connections at equipment where identified on room data sheets. Discharge air will be filtered and returned to the building. We will work with UVU to determine system size.

**Heating and Chilled Water Requirements:**

All coils and terminal devices will be selected to comply with the following requirements.

| System | Supply Temperature (°F) | Min. Delta T Across Coil (°F) |
|---|---|---|
| Heating Water | 100 | 15 |
| Chilled Water | 45 | 14 |

**Chilled Water:**

Chilled water piping will be designed to run from existing campus piping mains in the Gunther Trades building to the Performing Arts building. Pipes will be routed overhead inside the building. Design will include two chilled water pumps, one lead and the other redundant, each sized for 100% of the chilled water demand at the air handlers. All chilled water pumps will be equipped with variable frequency drives, and pump speed will be modulated to satisfy pipe differential pressure setpoint.

**Heating Water:**

Heating water piping will be designed to run from existing campus piping mains in the Gunther Trades building to the Performing Arts building. Pipes will be routed overhead inside the building. Design to include two heating water pumps, one

lead and the other redundant, each sized for 100% of the heating water demand of the air handlers, duct mounted reheat coils, and unit heaters. These main heating water pumps will be equipped with variable frequency drives, and pump speed will be modulated to satisfy pipe differential pressure setpoint.

Design to include a glycol preheat loop and dedicated pump to serve the preheat coil in each air handler. Design will include a plate-and-frame heat exchanger to separate the heating water system from the glycol loop.

**Tower Water:**

Design shall include a cooling tower sized for a 3°F approach to outdoor wet bulb temperature. This water will serve the indirect cooling coils inside the air handlers. Design to include two tower water pumps, one lead and the other redundant, each sized for 100% of the demand of the indirect evaporative cooling coils in the air handlers. The tower water pumps will operate at a constant speed, and modulating three-way control valves will be included at the indirect evaporative cooling coils of each air handler.

Water treatment for the tower water system to be coordinated with the University. One elevator will be required to have a stop in the second floor mechanical room for ease of transporting water treatment chemicals to the treatment system stand.

**Continuous Loads:**

Spaces requiring continuous conditioning, 24 hours a day, 7 days a week, will be cooled by the central air handlers and their VAV boxes. The central air handlers will be constructed with fan walls with individual backdraft dampers at each fan. Fans can be staged off so the air handler can meet any low-load condition. We currently anticipate the following room types will require 24/7 cooling:

-Telecom/data server rooms

-Control rooms associated with theater and concert spaces.

-Dimmer rooms associated with theater and concert spaces.

-Amplifier Rack rooms associated with theater and concert spaces.

Note that no rehearsal spaces or instrument storage rooms will be designed with stand-alone HVAC systems. All such spaces will be served off the central air handlers, and will be subjected to the same night/weekend temperature setbacks as all other rooms served by the central air handlers.

**Snowmelt**

There will be no snowmelt system.

**Controls System**

Controls will be TAC StruxureWare BACnet compliant, and shall be provided by Utah Yamas controls. The design team will organize a controls system review meeting with Utah Yamas and the UVU facilities group during the Construction Document phase to coordinate details of the controls system before final CDs are issued.

**Plumbing Systems**

**Domestic Hot Water:**

Domestic hot water piping served by existing water heaters in the upper central plant shall be extended to the Performing Arts Center, and will be used to meet all domestic hot water needs for this project..

The central domestic hot water circulating system will be extended to the building and will be used to keep water hot in pipes during periods of low demand.

**Plumbing Pipe:**

Water supply pipe shall be type L hard-drawn copper tube with soldered joints and fittings.

Drainage, waste, vent, and storm drain pipe shall be schedule 40 or service weight cast iron pipe with no-hub joints and fittings. Above-grade joints shall use medium-duty couplings rated to 30psig. Below grade joints shall use heavy-duty couplings with stainless steel bands.

**Fixtures:**

Faucets shall comply with UVU design standards. Lavatory faucets shall be Moen Model 8413F03 with pivot action single lever handle, and must include lifetime ceramic cartridge coverage by the vendor. Coordinate sink faucets with UVU facilities staff.

Water closets shall be wall-hung and use manual flush valves by Sloan.

Urinals shall be wall-hung and use battery-powered sensor flush valves by Sloan, max 1 pint/flush.

Water coolers to be wall hung with refrigeration compressors, with stainless steel backsplash. Multiple locations with bottle fillers (location and quantity to be determined as design develops)

Freeze-proof sillcocks will be located on the outside of the building – locations will be determined with input from UVU.

**Fire Protection**

Design-build/performance based criteria will be developed for a wet sprinkler system to protect entire building in accordance with NFPA 13. DFCM will commission a flow test for water sources on site. A copy of flow test report will be included with the fire sprinkler system specification for reference by contractor. Freeze protected sprinkler systems will be required to protect areas subject to freezing. All wet sprinkler pipe will be schedule 40 black steel.

Single-Interlock Preaction Fire Sprinkler Systems: At this point in the design phase, the following room types will be specified to be protected by single-interlock predation fire sprinkler systems:

-Stage and Wing areas of the Proscenium Theater

-Concert Platform, Platform Wings, and Backstage Assembly areas of the Concert Hall.

-All control rooms, dimmer rooms, and audio rack rooms associated with the Proscenium Theater and Concert Hall.

Preaction system pipe and fittings will be schedule 40, galvanized.

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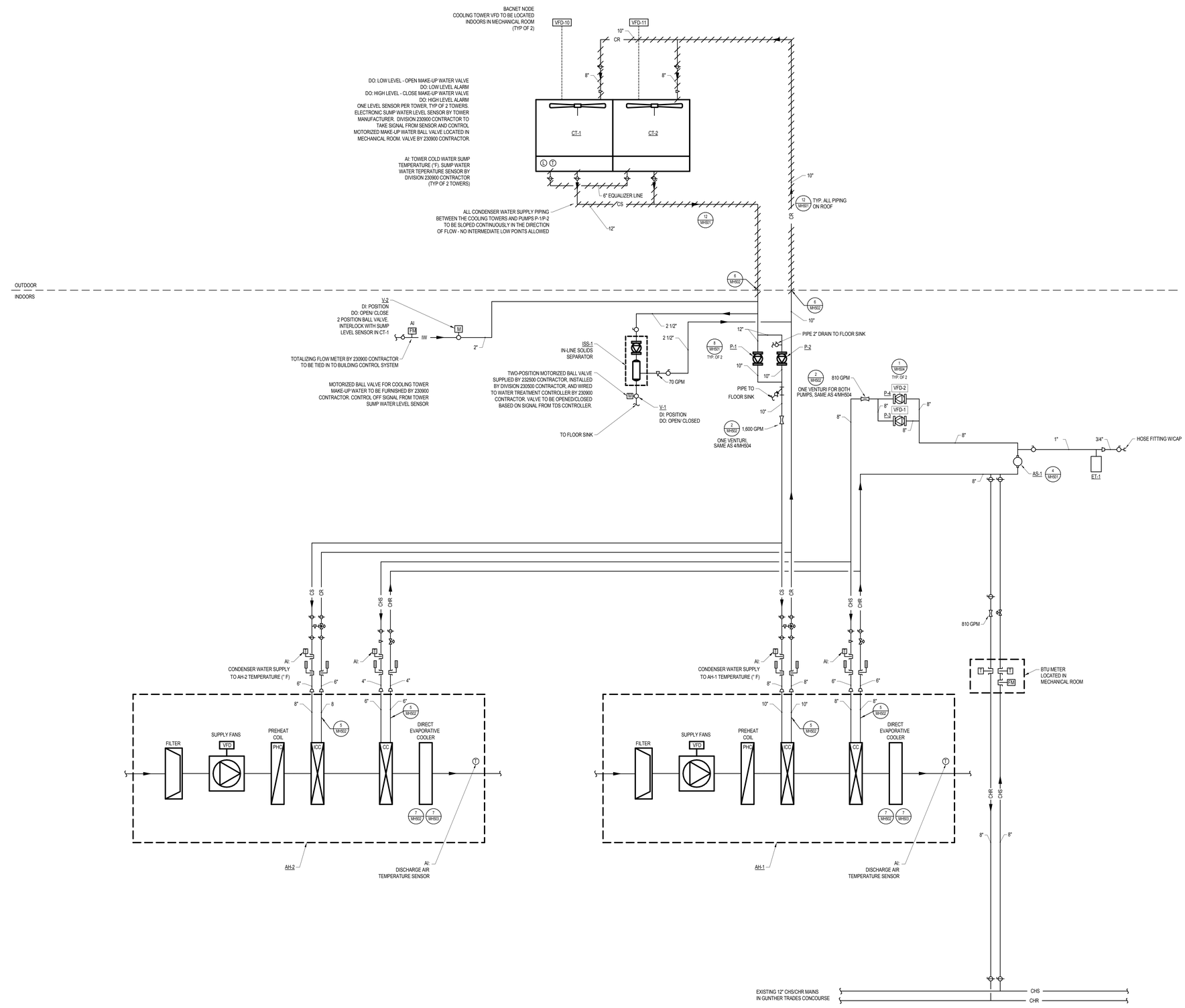


1 CHILLED WATER PIPING DIAGRAM
SCALE: NONE

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**project:**
UVU PERFORMING ARTS COMPLEX

**project#:** 2015.149.02
**date:** 7/15/2016

**revisions :**

**title:**
# CHILLED WATER PIPING DIAGRAM

**sheet:**
# MP201

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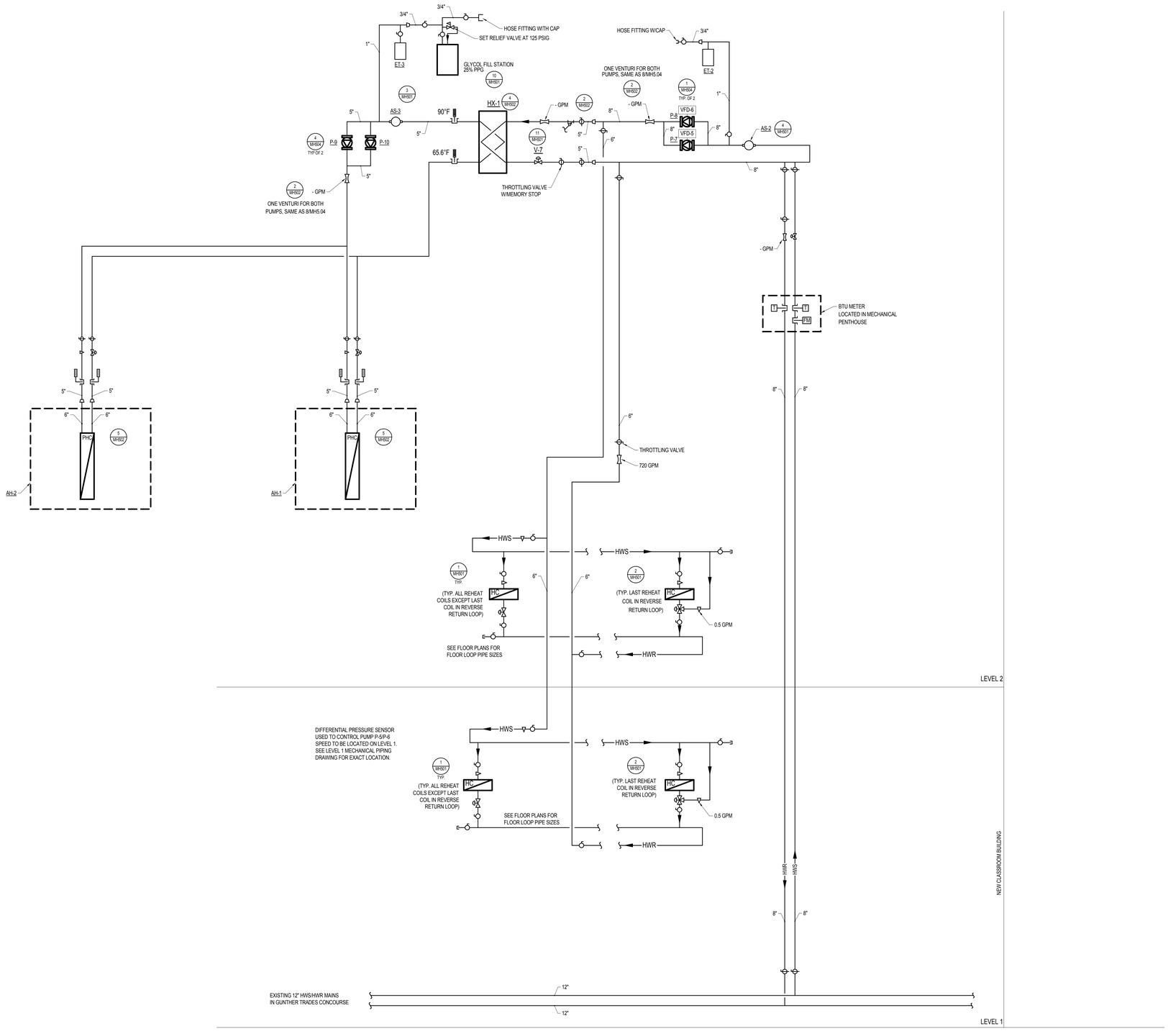


1 HEATING WATER PIPING DIAGRAM
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