ADDENDUM NO. 02

Issued: 12.15.23

Project: Ridgeview Elementary School
701 Thornton Street, Liberty, Missouri 64068

Project No. 23026

Owner: Liberty Public Schools
8 Victory Lane
Liberty, MO 64068

Bidding Documents Issued: 11.30.23

This Addendum includes these 1 page and the following attachments:

Drawings:
Revised Architectural Sheets: A681
Refer to Henderson Engineers, MEP Addendum No. 2

DRAWINGS REVISIONS

A1 SHEET A681 MATERIAL FINISH LEGEND AND ROOM SCHEDULE
   A1.1 REVISED General finish notes to add Note 9 regarding Paint Touch-up

M1 REFERENCE ATTACHED MEP ADDENDUM NO. 2
E1 REFERENCE ATTACHED MEP ADDENDUM NO. 2
P1 REFERENCE ATTACHED MEP ADDENDUM NO. 2
T1 REFERENCE ATTACHED MEP ADDENDUM NO. 2

END OF ADDENDUM NO. 2
ADDENDUM NO 02

December 15, 2023

ISSUED BY
Henderson Engineers, Inc.
8345 Lenexa Dr.
Lenexa, KS 66214

ISSUED FOR
Hollis + Miller
1828 Walnut Street Suite 922
Kansas City, MO 64108

NOTICE TO ALL BIDDERS FOR THE
Liberty Public Schools Ridgeview Elementary School

You are instructed to read and to note the following described changes, corrections, clarifications, omissions, deletions, additions, approvals, and statements pertinent to the Contract Bid and Construction Documents.

This addendum is part of the Contract Bid and Construction Documents and shall govern in the performance of the Work.

DRAWINGS

MECHANICAL

1. Sheet M-201C – PIPING LEVEL 1 PLAN – AREA C
   A. Added heating water bypass valve and chilled water bypass valve.
   B. Added plan note M41 and M42.

2. Sheet M-401 – MECHANICAL SCHEDULES
   A. Revised AHU Schedule for AHU-1 and AHU-6 to have 2-way valves.

3. Sheet M-500 – MECHANICAL DETAILS
   A. Removed detail 6 – 3-Way hydronic control valve.

4. Sheet M-601 – MECHANICAL CONTROLS
   A. Added Dehumidification control points.
   B. Added title for Single Zone AHU controls schematic.

5. Sheet M-602 – MECHANICAL CONTROLS
   A. Added title for Multi zone AHU controls schematic.

6. Sheet M-603 – MECHANICAL CONTROLS
   A. Added bypass valve to sequence, controls schematic, and points list.
   B. Revised chilled water plant points list.
   C. Revised sequence of operations.
   D. Revised notes on the chiller plant load staging control matrix.

7. Sheet M-604 – MECHANICAL CONTROLS
   A. Added bypass valve to sequence, controls schematic, and points list.
   B. Revised heating hot water plant points list.
   C. Revised sequence of operations.
PLUMBING

1. Sheet P-103B – PLUMBING ROOF PLAN – AREA B
   A. Replaced the existing gas pressure regulators (GPR’s) and showed more existing gas piping.
   B. Added plan note P12.

2. Sheet P-103C – PLUMBING ROOF PLAN – AREA C
   A. Replaced the existing gas pressure regulators (GPR’s) and showed more existing gas piping.
   B. Added plan note P12.

3. Sheet P-301 – PLUMBING SCHEDULES & DETAILS
   A. Revised the Gas Pressure Regulator Schedule.

ELECTRICAL

1. Sheet ED102B – LIGHTING LEVEL 2 DEMO PLAN – AREA B
   A. Added removal of light switch in media center.

2. Sheet ED202A – POWER LEVEL 2 DEMO PLAN – AREA A
   A. Added removal of receptacles in conflict with new duct chases.

3. Sheet ED202B – POWER LEVEL 2 DEMO PLAN – AREA B
   A. Added removal of 2nd floor box in office.
   B. Added note to coordinate method of floor box removal.

4. Sheet E102B – LIGHTING LEVEL 2 PLAN – AREA B
   A. Revised lighting controls in Nurse B206 to including dimming.
   B. Added lighting to media center closet.
   C. Added replacement switch location for media center.

5. Sheet E202A – POWER LEVEL 2 PLAN – AREA A
   A. Added replacement receptacles on new chase walls.

   A. Removed above counter receptacles in Reception B201.
   B. Added receptacle for undercounter fridge.
   C. Revised circuiting to accommodate receptacle changes.
   D. Revised connection for copier in Reception B201.

7. Sheet E500 – LIGHT FIXTURE SCHEDULE
   A. Added dimming lighting control devices.
   B. Added detail for connection of dimming lighting controls.

8. Sheet E600 – ELECTRICAL SCHEDULES
   A. Revised panel schedule LP to accommodate circuiting changes.

AUDIO-VIDEO

1. Sheet TA102B – AUDIO-VIDEO LEVEL 2 PLAN – AREA B
   A. Added connection box in classrooms A216 & A218.
   B. Revised Audio-Video Box Schedule.
TECHNOLOGY

1. Sheet TND102A – TECHNOLOGY LEVEL 2 DEMO PLAN – AREA A
   A. Added data devices to demolish in Classroom A216 and A218.

2. Sheet TND102B – TECHNOLOGY LEVEL 2 DEMO PLAN – AREA B
   A. Relocated data devices per site visit photos and changed phasing from existing to remain to demolish in Reception B201.

3. Sheet TN102A – TECHNOLOGY LEVEL 2 PLAN – AREA A
   A. Added data drops on new chase wall in Classroom A216 and A218.

4. Sheet TN102B – TECHNOLOGY LEVEL 2 PLAN – AREA B
   A. Devices that were previously shown as existing to remain are not shown as they are being demolished in Reception B201.
GENERAL FINISH NOTES

1. REFER TO FINISH FLOOR PLANS, REFLECTED CEILING PLANS, ELEVATIONS, AND DETAILS FOR EXTENT OF MULTIPLE FINISHES.
2. DO NOT PAINT NATURAL, UNMANUFACTURED STONE, BRICK, GLAZED BLOCK OR ANY OTHER PRE-FINISHED MATEIRLALS
3. DO NOT PAINT ALL BASEMENT OR OTHER NON-FINISHED MATEIRLALS THAT ARE PRE-FINISHED.
4. MATCH VERTICAL FINISH OF ALL INTERIOR GYPSUM BOARD SOFFITS TO HORIZONTAL FINISH AS NOTED ON RCP OR ROOM FINISH SCHEDULE, UNO.
5. PAINT ALL EXPOSED STEEL, UNO.
6. PAINT ALL INTERIOR HOLLOW METAL DOORS AND FRAMES TO MATCH ADJACENT WALL, UNO.
7. PAINT ALL EXPOSED STEEL, UNO.
8. PRINT ON THIS FOLLOWING ITEMS TO MATCH EXISTING PAINT OR FINISH
   a. ELECTRICAL PANELS IN FINISHED ROOMS
   b. GRILLES, LOUVERS ETC. PRIMED OR SPECIFIED TO BE PAINTED
9. NEW OR EXISTING CARPET, RESINOUS, VCT OR NORA FLOOR SYSTEM

MATERIAL FINISH LEGEND

ROOM FINISH SCHEDULE
LIGHTING DEMOLITION GENERAL NOTES:
1. ALL EXISTING ROOM/CORRIDOR LIGHTING CIRCUITRY SHALL REMAIN FOR REUSE UNLESS NOTED OTHERWISE, REFER TO NEW WORK LIGHTING PLANS FOR ADDITIONAL REQUIREMENTS.

ELECTRICAL DEMOLITION PLAN NOTES:
DE7 RELOCATE EXISTING SWITCH TO NEW LOCATION TO ALLOW FOR NEW DOOR. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

Phase 2 Scope of Work (Not included in this Bid Package)
ELECTRICAL DEMOLITION PLAN NOTES:

DE6 REMOVE RECEPTACLE AND ASSOCIATED CONNECTION TO ABOVE ACCESSIBLE CEILING TO ALLOW FOR INSTALLATION OF REPLACEMENT IN SAME GENERAL LOCATION. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

ENTIRE SHEET ADDED
POWER LEVEL 2 DEMO PLAN - AREA B

ELECTRICAL DEMOLITION PLAN NOTES:

DE5 COORDINATE REMOVAL METHOD OF EXISTING FLOOR BOXES WITH ARCHITECT AND FINAL FLOOR FINISHES PRIOR TO BID.

DE6 REMOVE RECEPTACLE AND ASSOCIATED CONNECTION TO ABOVE ACCESSIBLE CEILING TO ALLOW FOR INSTALLATION OF REPLACEMENT IN SAME GENERAL LOCATION. REFER TO NEW WORK PLANS FOR MORE INFORMATION.

# Description Date

2 Addendum 2 12.15.23
MECHANICAL PLAN NOTES:

M3 INSTALL NEW CABINET UNIT HEATER AND TEMPERATURE SENSOR IN SAME LOCATIONS AS UNIT HEATER AND SENSOR REMOVED. REPLACE CONTROL WIRE IF NECESSARY. PRIOR TO PURCHASE VERIFY LOCATION TO MATCH EXISTING. RELocate PIPE PENETRATION LOCATIONS AS NECESSARY TO MATCH NEW UNIT CONNECTION LOCATIONS.

FAN COIL UNITS SERVED

- M - R

M12 CONNECT FAN COIL UNIT TO EXISTING CHILLED WATER AND HEATING HOT WATER PIPES. PROVIDE ANY ADDITIONAL PIPING, AS REQUIRED, TO MAKE NEW CONNECTION TO FAN COIL UNIT. REPLACE ANY DAMAGED PIPING AND/OR INSULATION.

M12

PROVIDE BYPASS VALVE SIZED FOR 150 GPM, CV 8.6.

M22 INSTALL NEW DIFFERENTIAL PRESSURE SENSOR. M41 LOCATION OF THE CHILLED WATER BYPASS VALVE. PROVIDE BYPASS VALVE SIZED FOR 165 GPM, CV 51.9.

M42 LOCATION OF THE HEATING WATER BYPASS VALVE.

C100

FCU

FCU

FCU

FCU

FCU

FCU

FCU

1-3

1-9

1-11

1-12

1-13

C116

C115

3/4" HWR (ETR)

3/4" HWS (ETR)

2 1/2" HWR (ETR)

2 1/2" CHS (ETR)

2 1/2" CHR (ETR)

3" CHR (ETR)

1" CHS (ETR)

1 1/4" CHR (ETR)

2 1/2" HWR (ETR)

2 1/2" HWS (ETR)

1-5

1-6

1-7

1-8

1-10

1-14

1-15

1-16

1-17

1/8" = 1'-0"
<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>AHU 1</th>
<th>AHU 2</th>
<th>AHU 3</th>
<th>AHU 4</th>
<th>AHU 5</th>
<th>AHU 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark</td>
<td>UCCAA30C MZ VAV FC</td>
<td>UCCAA14C MZ VAV FC</td>
<td>UCCAA12C SZ VAV FC</td>
<td>UCCAA12C SZ VAV FC</td>
<td>UCCAA12C MZ VAV FC</td>
<td>UCCA12CU MZ VAV FC</td>
</tr>
<tr>
<td>Model Type</td>
<td>TRANE</td>
<td>TRANE</td>
<td>TRANE</td>
<td>TRANE</td>
<td>TRANE</td>
<td>TRANE</td>
</tr>
<tr>
<td>CFM</td>
<td>12380</td>
<td>7855</td>
<td>5000</td>
<td>5000</td>
<td>6640</td>
<td>6675</td>
</tr>
<tr>
<td>Weight (LBS)</td>
<td>1.0</td>
<td>1.0</td>
<td>0.5</td>
<td>0.5</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>BHP Nominal</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>HP</td>
<td>10.00</td>
<td>7.50</td>
<td>5.00</td>
<td>5.00</td>
<td>7.50</td>
<td>7.50</td>
</tr>
<tr>
<td>Notes</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
<td>(Y/N) V/PH TH (MBH) SH (MBH)</td>
</tr>
<tr>
<td>Flow (GPM)</td>
<td>47</td>
<td>331.5</td>
<td>190.3</td>
<td>190.3</td>
<td>253</td>
<td>256.4</td>
</tr>
<tr>
<td>EWT (°F)</td>
<td>9.9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>LWT (°F)</td>
<td>55.0</td>
<td>245.9</td>
<td>144.7</td>
<td>144.7</td>
<td>191.1</td>
<td>192.3</td>
</tr>
<tr>
<td>Cv FPI</td>
<td>82</td>
<td>83</td>
<td>81</td>
<td>81</td>
<td>63</td>
<td>66.6</td>
</tr>
<tr>
<td>Cv Feet (Ft)</td>
<td>67.2</td>
<td>68.0</td>
<td>66.3</td>
<td>66.3</td>
<td>66.6</td>
<td>66.8</td>
</tr>
<tr>
<td>Cv Feet/In</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
</tr>
<tr>
<td>Cv Feet/Ft/In</td>
<td>100</td>
<td>91</td>
<td>75</td>
<td>75</td>
<td>83</td>
<td>85</td>
</tr>
<tr>
<td>V/PH</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Fan HP</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
<td>55.0</td>
</tr>
<tr>
<td>Fan Rpm</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Fan Weight (Lbs)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Fan Notes</td>
<td>44.7</td>
<td>34.7</td>
<td>31.9</td>
<td>31.9</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan EWT (°F)</td>
<td>40.7</td>
<td>34.7</td>
<td>31.3</td>
<td>31.3</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan LWT (°F)</td>
<td>307.5</td>
<td>287.5</td>
<td>236.1</td>
<td>236.1</td>
<td>191.8</td>
<td>200.2</td>
</tr>
<tr>
<td>Fan Feet/In</td>
<td>54.0</td>
<td>54.0</td>
<td>55.0</td>
<td>55.0</td>
<td>63.0</td>
<td>62.0</td>
</tr>
<tr>
<td>Fan Feet/Ft/In</td>
<td>90.0</td>
<td>90.0</td>
<td>95.0</td>
<td>95.0</td>
<td>90.0</td>
<td>90.0</td>
</tr>
<tr>
<td>Fan Feet/Ft</td>
<td>28</td>
<td>28</td>
<td>25</td>
<td>25</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Fan Rpm/Sec</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Fan Horsepower</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Fan Notes</td>
<td>141</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>Fan V/PH</td>
<td>2.50</td>
<td>2.80</td>
<td>2.70</td>
<td>2.70</td>
<td>1.60</td>
<td>2.10</td>
</tr>
<tr>
<td>Fan Notes</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Fan Weight (Lbs)</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Fan EWT (°F)</td>
<td>45.0</td>
<td>40.7</td>
<td>31.3</td>
<td>31.3</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan LWT (°F)</td>
<td>40.7</td>
<td>34.7</td>
<td>31.3</td>
<td>31.3</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan Feet/In</td>
<td>307.5</td>
<td>287.5</td>
<td>236.1</td>
<td>236.1</td>
<td>191.8</td>
<td>200.2</td>
</tr>
<tr>
<td>Fan Feet/Ft/In</td>
<td>54.0</td>
<td>54.0</td>
<td>55.0</td>
<td>55.0</td>
<td>63.0</td>
<td>62.0</td>
</tr>
<tr>
<td>Fan Feet/Ft</td>
<td>28</td>
<td>28</td>
<td>25</td>
<td>25</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>Fan Rpm/Sec</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Fan Horsepower</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Fan Notes</td>
<td>141</td>
<td>125</td>
<td>125</td>
<td>125</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>Fan V/PH</td>
<td>2.50</td>
<td>2.80</td>
<td>2.70</td>
<td>2.70</td>
<td>1.60</td>
<td>2.10</td>
</tr>
<tr>
<td>Fan Notes</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Fan Weight (Lbs)</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Fan EWT (°F)</td>
<td>45.0</td>
<td>40.7</td>
<td>31.3</td>
<td>31.3</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan LWT (°F)</td>
<td>40.7</td>
<td>34.7</td>
<td>31.3</td>
<td>31.3</td>
<td>38.1</td>
<td>40.0</td>
</tr>
<tr>
<td>Fan Feet/In</td>
<td>307.5</td>
<td>287.5</td>
<td>236.1</td>
<td>236.1</td>
<td>191.8</td>
<td>200.2</td>
</tr>
</tbody>
</table>

**Notes:**
- DISCONNECT SWITCH PROVIDED BY DIVISION 26 CONTRACTOR.
- FACTORY MOUNTED VARIABLE FREQUENCY DRIVE.
- PROVIDE SHAFT GROUNDING SYSTEM ON MOTOR. REFER TO MOTOR SPECIFICATION FOR ADDITIONAL INFORMATION.
- PROVIDE SINGLE POINT POWER CONNECTION.
- SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. ESP EXCLUDES UNIT INLET AND OUTLET OPENING LOSSES.
- PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP. [See Designer Note 9]
- DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR AND SUPPLY AIR DUCT(S).
- UNIT SHALL BE DRAWN THRU CONFIGURATION.
- DIVISION 23 TEMPERATURE CONTROLS CONTRACTOR SHALL PROVIDE CONTROL VALVE. SELECT EQUIPMENT FOR ELEVATION OF 1000 FEET ABOVE SEA LEVEL.
- PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-THREAD HANGING RODS.
- VARIABLE FREQUENCY DRIVE FURNISHED BY DIVISION 23 CONTRACTOR.
The air handling unit(s) described by this sequence of operations consist(s) of cooling coil, heating coil and supply fan.

The controller shall use linear interpolation to define Outside Air Damper and Return Damper positions that ensure the desired supply air temperature setpoint (SAT) is provided as the supply air fan speed changes.

Control shall be programmed to allow the operator to manually initiate each operating mode so that the operation of components can be independently tested and verified.

### Calculation of the Outside Air Damper Position Setpoint (ODSP)

- When not in Economizer Mode:
  - If the Temperature Setpoint (SAT) is less than 52°F, fully open the Outside Air Damper and the Return Air Damper.
  - If the Temperature Setpoint (SAT) is greater than or equal to 52°F, modulate the Outside Air Damper between the fully open position and the calculated Outside Air Damper Position Setpoint (ODSP).

- When in Optimum Start Mode:
  - Operate as described in occupied mode.

- When in Heating Mode:
  - Fully close the Outside Air Damper.
  - Open the Return Air Damper to the fully open position.

- When in Cooling Mode:
  - Fully close the hot water valve.
  - Operate as described in Optimum Start Mode.

- When in Heating Mode and in Optimum Start Mode:
  - Operate as described in Optimum Start Mode and in Heating Mode as applicable.

- When in Optimum Start Mode and in Heating Mode:
  - Operate as described in Optimum Start Mode and in Heating Mode as applicable.

### System Configuration

- **System 1**: Temperature Sensor (SAT) at 52°F, Outside Air Temperature Sensor (OAT) at 75°F, Return Air Temperature Sensor (RAT) at 75°F, Supply Air Temperature Sensor (SAT) at 52°F, Heating Setpoint (HS) at 52°F, Cooling Setpoint (CS) at 70°F.

### Control Loops

- **Supply Air Temperature (SAT)**: Setpoint (SP) is calculated based on the current fan speed (Q).

### Environmental Control

- **Temperature Setpoint (SAT)**: Setpoint (SP) is calculated based on the current fan speed (Q). The Temperature Setpoint (SAT) is less than 52°F, fully open the Outside Air Damper and the Return Air Damper.

### System Status

- **System Status**: The system enters Cooling Mode when the Temperature Setpoint (SAT) is less than 52°F.
Staged Primary Pumping. Speed setpoints shall be determined during the sequence of operations described under the Chiller Plant Load Staging Control Matrix. The pump shall sequence with other components in the order described under the Chiller Plant Load Staging Control Matrix. The sequence of operations is organized into the following main categories: operating modes, control setpoint resets, safety, overrides and interlocks, and component control loops. The operating modes describe the criteria that either enable or disable the various modes of direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies. The chilled water plant sequence of operations shall modifies the existing constant primary flow chilled water to a constant chilled water differential pressure set point. A pump that is energized shall start on low speed and ramp up to maintain the chilled water differential pressure set point at 44°F ± 2°F. When in chilled water plant enabled mode:

1. Ramp the operating pumps down to minimum speed.
2. Start another pump and repeat step 1 for the pumps operating simultaneously.
3. Ramp the remaining operating pumps together to meet setpoint.

When staging on a lag pump:

- MAXIMUM WATER FLOW IF BOTH CHILLERS ARE ENGAGED.

When staging off a lag pump:

- The valve shall modulate to maintain the minimum chilled water flow when chilled water pump VFD is at minimum flow.

When in chilled water plant disabled mode:

- BYPASS VALVE ACTUATOR TO BE REMOVED AND VALVE LOCKED IN THE OPEN POSITION
- THE new pump(s) shall be controlled by the BAS.

The pumps shall operate in parallel.

Control Loop.

When in chiller stage up mode:

- The pump shall be off.

When in chiller stage down mode:

- The test and balance contractor shall perform the following:
  1. Ramp the operating pumps down to minimum speed.
  2. Start another pump and repeat step 1 for the pumps operating simultaneously.
  3. Ramp the remaining operating pumps together to meet setpoint.

The test and balance contractor shall perform the following:

- CHILLS FOR POINT CONTROL DATA - TYPICAL ALL CHILLERS

- Points list and control diagrams shall be used to provide a complete description of the component control loops.
### Points List: Heating Hot Water Plant

<table>
<thead>
<tr>
<th>Point ID</th>
<th>Description</th>
<th>Point Default</th>
<th>Setpoint</th>
<th>Fail Status</th>
<th>Existing Alarm</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMFC-COM</td>
<td>Controller Communication</td>
<td>COM</td>
<td>X</td>
<td>G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMFC-ALM</td>
<td>Controller Alarm</td>
<td>BI</td>
<td>X</td>
<td>X</td>
<td>COMMON Alarm</td>
<td></td>
</tr>
<tr>
<td>BMFC-OAT</td>
<td>Controller Outside Air Dry Bulb Temperature</td>
<td>AV</td>
<td>X</td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-ALM-X</td>
<td>Boiler Alarm</td>
<td>BI</td>
<td>X</td>
<td>X</td>
<td>COMMON Alarm</td>
<td>R</td>
</tr>
<tr>
<td>B-C-X</td>
<td>Boiler Command (Start/Stop)</td>
<td>BO</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-COM-X</td>
<td>Boiler Communication</td>
<td>COM</td>
<td>X</td>
<td>G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-FIRE-X</td>
<td>Boiler Percent FIRing Rate</td>
<td>AV</td>
<td>X</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-RUN-X</td>
<td>Boiler Operating Hours</td>
<td>AV</td>
<td>X</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-ST-X</td>
<td>Boiler Status</td>
<td>BV</td>
<td>X</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-HWS-T-X</td>
<td>Boiler Hot Water Supply Temperature</td>
<td>AI</td>
<td>200 F</td>
<td>150 - 200 F</td>
<td>X</td>
<td>A, E, J, R</td>
</tr>
<tr>
<td>G-FM-B</td>
<td>Gas Supply Flow Meter to Boilers (Total)</td>
<td>AI</td>
<td>X</td>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HWS-T</td>
<td>Hot Water Supply Temperature</td>
<td>AI</td>
<td>X</td>
<td>A, D, J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHWP-ST-X</td>
<td>Primary Hot Water Pump Status</td>
<td>BI</td>
<td>X</td>
<td>X</td>
<td>PHWP-ST &lt;&gt; PHWP-C</td>
<td></td>
</tr>
<tr>
<td>PHWP-C-X</td>
<td>Primary Hot Water Pump</td>
<td>AI</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHWP-COM-X</td>
<td>Primary Hot Water Pump Communication</td>
<td>COM</td>
<td>X</td>
<td>G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHWP-FLT-X</td>
<td>Primary Hot Water Pump FloT</td>
<td>AI</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHWP-CO-X</td>
<td>Primary Hot Water Pump COmmunication</td>
<td>COM</td>
<td>X</td>
<td>G</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### General Description

The heating hot water plant described by this sequence of operations shall be modified from a constant volume system to a variable volume system. Refer to previous project for boiler controls. HEI project number.

### Sequence of Operations

1. The pump shall be off.
2. The bypass control valve shall be sized for 150 gpm.
3. The valve shall modulate to maintain the minimum heating water flow when heating water pump VFD is at minimum flow.
4. The pump staging setpoints shall be determined from the rpm speed at which operating more pumps at the same flow rate draws less amperage than the current quantity of operating pumps.
5. When staging on a lag pump:
   1. Ramp the operating pumps down to minimum speed.
   2. Turn the lag pump on.
   3. Ramp the operating pumps together to meet setpoint.
6. When staging off a lag pump:
   1. Ramp the operating pumps down to minimum speed.
   2. Turn the lag pump off.
   3. Determine setpoint in field.
7. The test and balance contractor shall perform the following:
   1. Ramp the operating pumps down to minimum speed.
   2. Turn the lag pump on.
   3. Ramp the operating pumps together to meet setpoint.
8. All points shown shall be provided by BAS contractor unless noted otherwise.

### Notes:

- The Professional Architects seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, instruments or other documents not exhibiting this seal shall not be considered prepared by this architect, and this architect expressly disclaims any and all responsibility for such plan, drawings, or documents not exhibiting this seal.

---

**Hollis + Miller Architects**

Missouri State Certificate of Authority

Architecture # 0000161

Structure # 2006031333

Mechanical/Electrical Engineers

8345 LENEXA DRIVE, SUITE 300
Liberty, MO 64068

WWW.HENDERSONENGINEERS.COM

EXPIRES 10/31/2024
PLUMBING ROOF PLAN - AREA B

PLUMBING ROOF PLAN NOTES:

P12 REMOVE EXISTING GAS PRESSURE REGULATOR AND INSTALL NEW GAS PRESSURE REGULATOR IN THE SAME LOCATION.
PLUMBING ROOF PLAN - AREA C

PLUMBING ROOM NOTES:

P11 ROUTE CD PIPE TO NEAREST DRAIN. P12 REMOVE EXISTING GAS PRESSURE REGULATOR AND INSTALL NEW GAS PRESSURE REGULATOR IN THE SAME LOCATION.

RTU - 5 (80 CFH)
RTU - 4 (350 CFH)
RTU - 6 (350 CFH)

CONTRACTOR SHALL COORDINATE LOCATION OF EXISTING VTR'S WITH LOCATION OF NEW DOAS AND RELOCATE AS REQUIRED KEEPING 10 FEET CLEARANCE FROM INTAKE AIR LOCATION.
1. THE MAXIMUM EXTENT POSSIBLE TO CONNECT TO NEW FIXTURES AND CONTROLS IN EACH SPACE, AS DICTATED BY THE CONTROL SCHEME. EXTEND EXISTING CIRCUITRY AS REQUIRED FOR CONNECTION. NEW CIRCUITRY SHOWN ONLY WHERE DIFFERS FROM EXISTING DOCUMENTATION OR CHANGES ARE REQUIRED TO MEET DESIGN INTENT.
ELECTRICAL PLAN NOTES:

1. Provide new receptacle in new chase wall and connect to existing circuit serving receptacle to be removed. Refer to demo plans for more information.

2. Addendum 2 12.15.23

12/14/2023

DOUGLAS M. EVERHART

Henderson Engineers
Mechanical/Electrical Engineers
Missouri #E-556D
1801 Main, Suite 300
Kansas City, MO 64108
816.663.8700 phone

The Professional Architects seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, instruments or other documents not exhibiting this seal shall not be considered prepared by this architect, and this architect expressly disclaims any and all responsibility for such plan, drawings, or documents not exhibiting this seal.

Please consider the environment before printing this.
ELECTRICAL PLAN NOTES:
- E2 Connect receptacle in new wall to existing circuit serving receptacle removed in the same general location.
- E10 Provide new receptacle in new chase wall and connect to existing circuit serving receptacle to be removed. Refer to demo plans for more information.

NOTE: Replace all existing receptacles to remain in nurse and office areas with tamper resistant type devices.
| C | Code | Count | Volt | Phase | Type | Current | Protection
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>P201</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>B</td>
<td>P202</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>C</td>
<td>P203</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>D</td>
<td>P204</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>E</td>
<td>P205</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>F</td>
<td>P206</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>G</td>
<td>P207</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
<tr>
<td>H</td>
<td>P208</td>
<td>1</td>
<td>208Y/120V</td>
<td>3PH</td>
<td>4W</td>
<td>GENERAL POWER</td>
<td>80 A</td>
</tr>
</tbody>
</table>

**Not All Abbreviations Are Used.**
A1 EXISTING CONNECTION PLATE AND WIRING SHALL BE REMOVED AND PROTECTED PRIOR TO EXECUTING NEW WORK AND REINSTALLED IN TO NEW BOX AND CONDUIT AS SHOWN ON DRAWING. OWNER WILL BE RESPONSIBLE FOR AV RACK AND EQUIPMENT.

R8' MB1
R8' MB1

8' MB1
8' MB1

AUDIO-VIDEO BOX SCHEDULE

<table>
<thead>
<tr>
<th>BOX FUNCTION</th>
<th>BOX PROPERTIES</th>
<th>BOX ACCESSORIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>GYM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B.O.D.
B.O.D.

MANUF.
MANUF.

MODEL MOUNTING COVER INSERTS

NOTES ID DESCRIPTION TYPE
Q2 AV ASSORTED CONNECTION WALL BOX 2G/2G RACO 260 W/ 818 FL USH N/A 2-GANG MUD RING
T2 TELEVISION CONNECTION BOX WALL BOX 14X07X04 FSR PWB- 250 FLUSH N/A N/A

CLASSROOM
CLASSROOM

AUDIO-VIDEO FLAT PANEL DISPLAY SCHEDULE

| MANUFACTURER REMOTE CONTROLLER, TYPICAL. |
| DISPLAY PROPERTIES MOUNTING REQUIREMENTS |
| DISPLAY RESPONSIBILITY |
| TYPE-1 |
| A0 |
| Structure # 2006031333 |
| Henderson Engineers |
| Mechanical/Electrical Engineers |
| Missouri #e |
| 1801 Main, Suite 300 |
| Kansas City, MO 64108 |
| 816.663.8700 phone |
| WWW.HENDERSONENGINEERS.COM |
| CONTRACTOR |
| CONTRACTOR |
| CONTRACTOR |

AUDIO-VIDEO LOUDSPEAKER SCHEDULE

<table>
<thead>
<tr>
<th>LOUDSPEAKER PROPERTIES</th>
<th>CIRCUIT PROPERTIES</th>
<th>LOUDSPEAKER MOUNTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat Panel Display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SoundBar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

B.O.D.
B.O.D.

IMPEDANCE
POWER
WIRE
MOUNTING

B.O.D.
B.O.D.

( OHM )
DRAW
AWG#
CONDITION HEIGHT
St
JBL PSB-1
SB:TYPE-1 SOUND BAR - TYPE-1 1 JBL PSB-1 4 20 W 18 WALL - SURFACE 48"