UNIVERSITY OF COLORADO
AT BOULDER
MUSIC BUILDING DELTA-P VALVE UPGRADE PROJECT
MUS-Delta P (CP133892)

GENERAL NOTES:
1. New piping and equipment is drawn with a heavy line and existing items are drawn with a light line.
2. All work and materials shall comply with International Codes and UC Construction Standards.
3. Contractor shall verify existing conditions prior to bid and shall verify pipe sizes, dimensions, voltages, etc. prior to construction.
4. Install new piping and equipment to be accessible for service and maintenance without obstructing existing devices needing service and maintenance.
5. Contractor shall ensure that new piping and equipment will not obstruct the spray pattern of any fire sprinklers.
6. Contractor shall protect fire sprinklers in the construction area against mechanical damage and paint over spray.
7. Contractor shall obtain a hot work permit for any work involving heat guns, soldering, brazing, welding, grinding, powder driven studs, metal cutting using power tools or other activities involving flammables or sparks. Hot work permit forms are available from CU Project Managers, FM Office of Planning, Design and Construction and under "Hot Work Permit" at the FLS Web site.

(http://www.colorado.edu/facilitiesManagement/pdf/safety/index.html)
8. At all times, contractor shall ensure that the project staging area and construction activities do not cause obstruction of egress paths inside the building, block exit discharge from the building or impede emergency vehicle access to the area.
9. If the construction activities generate dust or fumes inside the building, contractor shall take necessary measures to prevent nuisance actuation of any nearby smoke or duct detectors. Contact the Fire Systems Group for assistance in advance of these activities.
10. Outage Procedures: Contractor shall follow campus procedures for any outages of fire systems. The campus procedures are available from the FLS Web site.

(http://www.colorado.edu/facilitiesManagement/pdf/safety/documents/fire-suppression-systems.pdf)

and

(http://www.colorado.edu/facilitiesManagement/pdf/safety/documents/fire-detection.pdf)
11. Contractor shall make sure that new work shall not block access to any of the existing information technology outlets or pathways including but not limited to cable trays, pull boxes, buttons, wire mold, etc.

MUSIC DRAWING LIST

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## Mechanical Legend

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<td>PRT</td>
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<td>Pressure Temperature/Test Point</td>
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### Graphic Symbols

1. KEY NOTE
2. CONTROL POINT (SEE SCHEDULE)
3. REVISION NUMBER
4. CONTROL DEVICE ADDRESS
5. CONNECT TO EXISTING
6. CONNECT TO EXISTING Pipe
7. ITEM TO BE REMOVED

### Abbreviations

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### Differential Pressure Transmitter Detail

- 3/8" pitch piping smoothly and without any air pockets to manifold, typical
- 5/8" calibration manifold located below the level of the system piping
- Quick connect fittings to DDC controller

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### Pressure Independent (Delta-P) Control Valve Detail

- BUTTERFLY (OR BALL) SHUT-OFF VALVE
- CONCENTRIC REDUCER AS NEEDED
- LIQUID-FILLED PRESSURE GAUGE (0 PSIG TO 100 PSIG) PER CAMPUS STANDARDS
- WELDING NECK FLANGE
- PRESSURE INDEPENDENT CONTROL VALVE
- GAUGE ISOLATION VALVE
- SEE DRAWINGS FOR PIPE SIZE
- LINE SIZE STRAINER W/3/4" HOSE END BALL VALVE AND 316 STAINLESS 1/32" PERFORATION SCREEN

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MUSIC AHU-01 and SF-06 (SIMILAR BUT INDEPENDENT PPE SYSTEMS)

DESCRIPTION OF EXISTING SYSTEM:
THE EXISTING BUILDING PUMPS PUSH THROUGH BUILDING PIPING, THE COIL, AND THE CONTROL VALVE. THE POWERHOUSE PUMPS PUSH THROUGH THE DISTRIBUTION PIPING.

SCOPE OF WORK:
1. REMOVE EXISTING PNEUMATIC CONTROL VALVES AT AHU-01 AND SF-06.
2. INSTALL AN ELECTRONIC ACTUATED DELTA-P VALVE AND INLET STRAINER ALONG WITH INLET AND OUTLET VALUES AT AHU-01 AND SF-06.
3. PROVIDE COIL PUMPS AT AHU-01 AND SF-06 WITH PUMP CHECK VALVE AND SHUT-OFF VALVES PIPED IN THE BYPASS LOCATION. PROVIDE STARTER-DISCONNECT AND CURRENT SWITCH FOR STATUS MONITORING AT EACH COIL PUMP PER UCB STANDARDS. PROGRAM PUMP AUTO START/STOP CONTROL TO OPERATE ONLY DURING FREEZE PROTECTION MODE.
4. INSTALL A FULL-SIZE BYPASS (WITH SHUT-OFF VALVES AND CHECK VALVE) AROUND THE BUILDING PUMP TO AVOID PRESSURE DROP WHEN PUMPING THROUGH A NON-OPERATING PUMP IF POWERHOUSE PUMPS CAN PROVIDE ENOUGH PRESSURE.
5. PROVIDE A DIFFERENTIAL PRESSURE TRANSMITTER ACROSS THE DELTA-P VALVE AT AHU-01 AND SF-06 AND MONITOR THROUGH THE EXISTING BMCS (NEW POINTS).

SEQUENCE OF OPERATION:
A. DURING COOLING MODE: THE DELTA-P VALVE AT EACH UNIT SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE ACCORDING TO CURRENT PROGRAMMING. VERIFY AVAILABILITY OF ELECTRONIC CONTROL SIGNAL AT EACH UNIT.
B. ADD PROGRAMMING TO START THE BUILDING PUMP IF THE PRESSURE DROP ACROSS THE DELTA-P VALVE FALLS BELOW 6 PSI (ADJUSTABLE) FOR MORE THAN 5 MINUTES (ADJUSTABLE). STOP THE PUMP AT MIDNIGHT FOR 10 MINUTES AND RESET PRESSURE REQUIREMENT ACROSS DELTA-P VALVE.
C. DURING FREEZE PREVENTION MODE: INITIATE FREEZE PROTECTION MODE USING EXISTING CONTROLS (NEW CONTROLS AT AHU-01). MODIFY CONTROL SEQUENCE IF NEEDED TO START THE COIL PUMP AND CLOSE THE COIL DELTA-P VALVE AT THE RESPECTIVE AIR HANDLING UNIT. PROVIDE NEW START/STOP AND STATUS POINTS FOR EACH NEW PUMP.

EQUIPMENT SELECTION:
A. DIFFERENTIAL PRESSURE TRANSMITTERS: FOXBORO IDP-10 SERIES. TRANSMITTER SHALL BE COMPLETE WITH 4-20 MA OUTPUT, REQUIRED MOUNTING BRACKETS, AND VAE-VALVE MANIFOLD. MOUNT IN A LOCATION ACCESSIBLE FOR SERVICE.
B. PRESSURE INDEPENDENT CONTROL VALVES: DELTA-P BRAND FOR 2" AND LARGER. VALUES 1-1/2" AND SMALLER MAY BE DELTA-P OR REEMO BRAND. ELECTRIC ACTUATORS SHALL BE SIEMENS OR REEMO. VALUES INSTALLED AT MUSIC SHALL BE RATED 5-70 PSI DIFFERENTIAL.

GENERAL NOTES:
1. PROVIDE PIPE INSULATION FOR CHILLED WATER TO MATCH EXISTING, COMPLY WITH CODE, ASHRAE 90.1, AND UCB STANDARDS, MINIMUM 1-1/2" THICK. REPAIR INSULATION DAMAGED BY THIS PROJECT AND/OR REMOVED FOR ABATING.
2. TO CONTRACTOR SHALL WORK WITH CU FACULTY COMMISSIONING AGENT TO SETUP THE VALUES AND OTHER CONTROLS PER UCB STANDARDS.
3. CONTRACTOR SHALL VERIFY ALL PIPE SIZES BEFORE STARTING CONSTRUCTION.
4. CONTRACTOR SHALL REINSTALL THERMOMETERS, PRESSURE GAUGES, SENSORS, ETC., DISTURBED BY PIPE MODIFICATIONS. SOME (BUT NOT ALL) DEVICES ARE SHOWN ON THE CONTRACT DRAWINGS.

UNIT PRICES AND BID ALTERNATES

SCOPE OF WORK:
1. SUBMIT LUMP SUM BID ALTERNATE PRICE TO PROVIDE DIFFERENTIAL PRESSURE TRANSMITTERS NEAR DELTA-P VALVES AT SF-01 AND SF-02 AND MONITOR THROUGH THE EXISTING BMCS (NEW POINTS). TWO DPT'S IN ADDITION TO THOSE SHOWN ON THE DRAWINGS.
2. PROVIDE SEPARATE PROPOSAL FROM CONTROL CONTRACTOR TO REPLACE PNEUMATIC CONTROLS AT SF-05 WITH DDC CONTROLS FOLLOWING UCB STANDARDS.

MUSIC SF-01 THRU SF-06

DESCRIPTION OF EXISTING SYSTEM:
THE POWERHOUSE PUMPS PUSH THROUGH THE DISTRIBUTION PIPING, BUILDING PIPING, AND EXISTING CONTROL VALVES.

SCOPE OF WORK:
1. REMOVE EXISTING PNEUMATIC CONTROL VALVES AT EACH UNIT.
2. INSTALL AN ELECTRONIC ACTUATED DELTA-P VALVE AND INLET STRAINER ALONG WITH INLET AND OUTLET VALUES AT EACH UNIT.
3. PROVIDE COIL PUMPS AT EACH UNIT WITH PUMP CHECK VALVE AND SHUT-OFF VALVES PIPED IN THE BYPASS LOCATION. PROVIDE STARTER-DISCONNECT AND CURRENT SWITCH FOR STATUS MONITORING AT EACH COIL PUMP PER UCB STANDARDS. PROGRAM PUMP AUTO START/STOP CONTROL TO OPERATE ONLY DURING FREEZE PROTECTION MODE.
4. PROVIDE A DIFFERENTIAL PRESSURE TRANSMITTER ACROSS SUPPLY AND RETURN NEAR SF-05 AND MONITOR THROUGH THE EXISTING BMCS (NEW POINT).

SEQUENCE OF OPERATION:
A. DURING COOLING MODE: THE DELTA-P VALVE AT EACH UNIT SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE ACCORDING TO CURRENT PROGRAMMING. VERIFY AVAILABILITY OF ELECTRONIC CONTROL SIGNAL AT EACH UNIT.
B. DURING FREEZE PREVENTION MODE: INITIATE FREEZE PROTECTION MODE USING EXISTING CONTROLS. MODIFY CONTROL SEQUENCE IF NEEDED TO START THE COIL PUMP AND CLOSE THE COIL DELTA-P VALVE AT THE RESPECTIVE AIR HANDLING UNIT. PROVIDE NEW START/STOP AND STATUS POINTS FOR EACH NEW PUMP.

REV. DATE DESCRIPTION

MUS-DELTA P (CP133892)
DELTA-P VALVE UPGRADE PROJECT
SCOPE & NEW WORK DESCRIPTION

DATE: 24-Jan-11
CAVT: NONE
DEPT: M-1

MUSIC M-1
**SHEET NOTES**

1. DRAWING TAKEN FROM MAY 2007 CHILLED WATER STUDY PERFORMED BY THE RMH GROUP ALONG WITH AUGUST 1998 PROJECT DESIGNED BY GSER (UCB RECORD DRAWINGS #086–008).

2. REFER TO HATCHED AREAS FOR DEMOLITION WORK REQUIRED FOR THIS PROJECT.

3. REFER TO ISOMETRIC SKETCHES FOR PIPE REVISIONS.

**KEY NOTES**

1. REMOVE EXISTING CONTROL VALVE AND REPLACE WITH DELTA-P VALVE.

2. REMOVE COIL BYPASS AND PIPE NEW COIL PUMP INTO COIL BYPASS LOCATION.

3. REMOVE SECTION OF PIPE TO INSTALL PUMP BYPASS.

**ROOM N1845**

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KEY NOTES

1. REMOVE EXISTING CONTROL VALVE AND REPLACE WITH DELTA-P VALVE.
2. REMOVE COIL BYPASS AND PIPE NEW COIL PUMP INTO COIL BYPASS LOCATION.
3. REMOVE SECTION OF PIPE TO INSTALL PUMP BYPASS.
4. CONTRACTOR SHALL DETERMINE IF SUPPLY AND RETURN COIL CONNECTIONS ARE PIPED PROPERLY AND REVISE CONNECTIONS IF NEEDED.

SHEET NOTES

1. DRAWING TAKEN FROM MAY 2007 CHILLED WATER STUDY PERFORMED BY THE RMH GROUP ALONG WITH AUGUST 1998 PROJECT DESIGNED BY BCER (UCB RECORD DRAWINGS #006-008).
2. REFER TO HATCHED AREAS FOR DEMOLITION WORK REQUIRED FOR THIS PROJECT.
3. REFER TO ISOMETRIC SKETCHES FOR PIPE REVISIONS.

MUSIC/IMIG (334)
SHEET NOTES
1. DRAWING TAKEN FROM MAY 2007 CHILLED WATER STUDY PERFORMED BY THE RHG GROUP ALONG WITH AUGUST 1998 PROJECT DESIGNED BY RICE (UCB RECORD DRAWINGS #06-008).
2. REFER TO ISOMETRIC SKETCHES FOR PIPE REVISIONS.

KEY NOTES
1. PROVIDE DELTA-P VALVE PER DETAIL.
2. PROVIDE COIL PUMP IN BYPASS LOCATION WITH PUMP CHECK VALVE AND SHUT-OFF VALVES (SEE ISOMETRIC SKETCHES).
3. PROVIDE FULL-SIZE BYPASS AROUND BUILDING PUMP WITH CHECK VALVE AND ISOLATION VALVES.
4. PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER PER DETAIL.
5. PROVIDE PUMP CHECK VALVE IF NOT ALREADY EXISTING.
**SF-06 DEMOLITION**

**SF-06 NEW (ROOM N1B45)**

**SF-01 DEMOLITION**

**SF-01 NEW (ROOM C1B63)**

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**KEY NOTES**

1. **SF-06 DELTA-P VALVE SHALL BE 3" MODEL HDP-115, SET AT 100 GPM.**
2. **SF-01 DELTA-P VALVE SHALL BE 2" MODEL HDP-75, SET AT 51 GPM.**
3. **SF-06 COIL PUMP SHALL BE MIL-O MODEL 1,5X30 RATED 40 GPM AT 25', 0.9HP/460V/3PH/60HZ MOTOR, PROVIDE 3A 3P BREAKER IN PANEL MP, CIRCUITS 22, 23, 25. PROVIDE 3/4"C, 3/4"D FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND A/C RATING.**
4. **SF-01 COIL PUMP SHALL BE MIL-O MODEL 1,5X30 RATED 25 GPM AT 25', 0.9HP/460V/3PH/60HZ MOTOR. REMOVE (C) 20A 3P BREAKER FROM PANEL M-1 & M-2, CIRCUITS 37, 39, 41. PROVIDE 15A 3P BREAKER IN PANEL M-1 & M-2, CIRCUITS 37, 39, 41. PROVIDE 3/4"C, 3/4"D FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND A/C RATING.**
5. **UPDATE BREAKER PANEL DIRECTORY WITH NEW TYPED INFORMATION.**
6. **THE FUSING FOR THE NEW MOTOR SHALL BE COORDINATED WITH THE MANUFACTURER'S RECOMMENDATIONS AND SIZED ACCORDINGLY. THE OVERLOAD HEATERS IN THE MOTOR STARTER SHALL BE SIZED ACCORDING TO THE MOTOR NAMEPLATE DATA. PROVIDE HEATERS AS REQUIRED.**

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**SHOE NOTES**

1. **SF-06 DELTA-P VALVE SHALL BE 3" MODEL HDP-115, SET AT 100 GPM.**
2. **SF-01 DELTA-P VALVE SHALL BE 2" MODEL HDP-75, SET AT 51 GPM.**
3. **SF-06 COIL PUMP SHALL BE MIL-O MODEL 1,5X30 RATED 40 GPM AT 25', 0.9HP/460V/3PH/60HZ MOTOR, PROVIDE 3A 3P BREAKER IN PANEL MP, CIRCUITS 22, 23, 25. PROVIDE 3/4"C, 3/4"D FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND A/C RATING.**
4. **SF-01 COIL PUMP SHALL BE MIL-O MODEL 1,5X30 RATED 25 GPM AT 25', 0.9HP/460V/3PH/60HZ MOTOR. REMOVE (C) 20A 3P BREAKER FROM PANEL M-1 & M-2, CIRCUITS 37, 39, 41. PROVIDE 15A 3P BREAKER IN PANEL M-1 & M-2, CIRCUITS 37, 39, 41. PROVIDE 3/4"C, 3/4"D FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND A/C RATING.**
5. **UPDATE BREAKER PANEL DIRECTORY WITH NEW TYPED INFORMATION.**
6. **THE FUSING FOR THE NEW MOTOR SHALL BE COORDINATED WITH THE MANUFACTURER'S RECOMMENDATIONS AND SIZED ACCORDINGLY. THE OVERLOAD HEATERS IN THE MOTOR STARTER SHALL BE SIZED ACCORDING TO THE MOTOR NAMEPLATE DATA. PROVIDE HEATERS AS REQUIRED.**

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DELTA-P VALVE UPGRADE PROJECT  
MUSIC ISOMETRIC 1 OF 4 |
SF-03 DEMOLITION
SF-03 NEW

SF-02 DEMOLITION
SF-02 NEW

KEY NOTES
1. REMOVE PIPING, CONTROL VALVE, VENTURI, AND BALANCE VALVE AS INDICATED.
2. PROVIDE DELTA-P VALVE PER DETAIL.
3. PROVIDE COIL PUMP IN BYPASS LOCATION.

SHEET NOTES
1. SF-02 DELTA-P VALVE SHALL BE 2" MODEL HDP-75, SET AT 56 GPM.
2. SF-03 SOUTH DELTA-P VALVE SHALL BE 1-1/4" MODEL HDP-24, SET AT 13 GPM.
3. SF-03 NORTH DELTA-P VALVE SHALL BE 1-1/4" MODEL HDP-24, SET AT 13 GPM.
4. SF-02 COIL PUMP SHALL BE WILCO MODEL 1.25X35 RATED 20 GPM AT 23°, 0.2HP/115V/60Hz MOTOR, PROVIDE 1SA 1P BREAKER IN PANEL G, CIRCUIT #19. PROVIDE 3/4"C, 2P/2, 1/2G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.
5. SF-03 SOUTH COIL PUMP SHALL BE WILCO MODEL 1.25X35 RATED 6 GPM AT 23°, 0.13HP/115V/60Hz MOTOR, PROVIDE 1SA 1P BREAKER IN PANEL G, CIRCUIT #21. PROVIDE 3/4"C, 2P/2, 1/2G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.
6. SF-03 NORTH COIL PUMP SHALL BE WILCO MODEL 1.25X35 RATED 6 GPM AT 23°, 0.13HP/115V/60Hz MOTOR, PROVIDE 1SA 1P BREAKER IN PANEL G, CIRCUIT #23. PROVIDE 3/4"C, 2P/2, 1/2G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.
7. UPDATE BREAKER PANEL DIRECTORY WITH NEW TYPED INFORMATION.
8. THE FUSING FOR THE NEW MOTOR SHALL BE COORDINATED WITH THE MANUFACTURER'S RECOMMENDATIONS AND SIZED ACCORDINGLY. THE OVERLOAD HEATERS IN THE MOTOR STARTER SHALL BE SIZED ACCORDING TO THE MOTOR NAME PLATE DATA. PROVIDE HEATERS AS REQUIRED.

REV. DATE DESCRIPTION

MUS-Delta P (CP133892)
DELTA-P VALVE UPGRADE PROJECT
MUSIC ISOMETRIC 2 OF 4

THE RICH GROUP, INC.
LiEN Group New England, Inc.
THE WILCO GROUP, INC.
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THE WILCO GROUP, INC.
THE WILCO GROUP, INC.
SF-04 & SF-05 DEMOLITION

SF-04 & SF-05 NEW (ROOM C160)

Sheet Notes:
1. SF-04 DELTA-P VALVE SHALL BE 2" MODEL HPD-52, SET AT 28 GPM.
2. SF-05 DELTA-P VALVE SHALL BE 1-1/4" MODEL HPD-32, SET AT 19 GPM.
3. SF-04 COIL PUMP SHALL BE MILCO MODEL 125X35 RATED 14 GPM AT 23°, 0.25HP/115V/60HZ MOTOR. REMOVE (E) 20A 3P BREAKER FROM PANEL F, CIRCUITS #26,28,30. PROVIDE 1SA 1P BREAKER IN PANEL F, CIRCUIT #26 AND PROVIDE CLOSURE FOR BREAKER SPACE #30. PROVIDE 3/4"C, 2#12, 1#12G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.
4. SF-05 COIL PUMP SHALL BE MILCO MODEL 125X35 RATED 10 GPM AT 23°, 0.25HP/115V/60HZ MOTOR. PROVIDE 15A 1P BREAKER IN PANEL F, CIRCUIT #28. PROVIDE 3/4"C, 2#12, 1#12G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.
5. UPDATED BREAKER PANEL DIRECTORY WITH NEW TYPED INFORMATION.
6. THE FUSING FOR THE NEW MOTOR SHALL BE COORDINATED WITH THE MANUFACTURER'S RECOMMENDATIONS AND SIZED ACCORDINGLY. THE OVERLOAD HEATERS IN THE MOTOR STARTER BE SIZED ACCORDING TO THE MOTOR NAME PLATE DATA. PROVIDE HEATERS AS REQUIRED.

Key Notes:
1. REMOVE PIPING, CONTROL VALVE, VENTURI, AND BALANCE VALVE AS INDICATED.
2. PROVIDE DELTA-P VALVE PER DETAIL.
3. PROVIDE COIL PUMP IN BYPASS LOCATION.
4. PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER PER DETAIL.
5. SUBMIT SEPARATE PROPOSAL TO REPLACE PNEUMATIC CONTROLS WITH DDC AT SF-05.

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<th>REV.</th>
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<td>24-Jan-11</td>
<td>MUS-DELTA P (CP133892)</td>
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<td>DELTA-P VALVE UPGRADE PROJECT</td>
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The Name: MUSIC. MlB.org
MUSIC Number: 1768
AHU-01 DEMOLITION  

AHU-01 NEW (ROOM E1B75B)  

**SHEET NOTES**

1. AHU-01 DELTA-P VALVE SHALL BE 3" MODEL HDP-140, SET AT 120 GPM.

2. AHU-01 COIL PUMP SHALL BE WILCO MODEL 1.5X30 RATED 45 GPM AT 25', 0.5HP/200V/3/60HZ MOTORS. PROVIDE 15A/3P BREAKER IN PANEL MDC, CIRCUITS #26,28,30. PROVIDE 3/4"C, 3/8"D, 1#2G FROM PANEL TO STARTER AND PUMP. MATCH EXISTING CIRCUIT BREAKER TYPE AND AIC RATING.

3. UPDATE BREAKER PANEL DIRECTORY WITH NEW TYPED INFORMATION.

4. THE FUSING FOR THE NEW MOTOR SHALL BE COORDINATED WITH THE MANUFACTURER'S RECOMMENDATIONS AND SIZED ACCORDINGLY. THE OVERLOAD HEATERS IN THE MOTOR STARTER SHALL BE SIZED ACCORDING TO THE MOTOR NAME PLATE DATA. PROVIDE HEATERS AS REQUIRED.

**KEY NOTES**

1. REMOVE PIPING, CONTROL VALVE, VENTURI, AND BALANCE VALVE AS INDICATED.

2. PROVIDE DELTA-P VALVE PER DETAIL.

3. PROVIDE COIL PUMP IN BYPASS LOCATION.

4. PROVIDE DIFFERENTIAL PRESSURE TRANSMITTER PER DETAIL.

5. PROVIDE FULL-SIZE PUMP BYPASS WITH CHECK VALVE AND ISOLATION VALVES.

**REV.** | **DATE** | **DESCRIPTION**
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M-0 | 24-Jan-11 | MUS-DELTA P (CP133892)  
DELTA-P VALVE UPGRADE PROJECT  
MUSIC ISOMETRIC 4 OF 4