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DATE: January 14, 2021

TO: All Planholders

SUBJECT: **ADDENDUM NO. 5**

PROJECT: Greene Central School District
2019 Capital Improvements – Phase 2
IBI Reference No. 123890

SED REVIEW NOS. 20-0336, 20-0337, 20-0338, and 20-0339

SED PROJECT NOS.
08-06-01-04-0-002-023 – Middle School/High School
08-06-01-04-0-003-019 – Intermediate School
08-06-01-04-0-004-021 – Primary School
08-06-01-04-5-005-015 – Bus Garage

All contractors submitting proposals for the above project shall take note of the following changes, additions, interpretations, clarifications, etc., in connection with the bidding documents.

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents dated August 14, 2020, and any previously issued addenda, as noted below.

Previous Issued Addenda
Addendum No.4 – January 8, 2021
Addendum No. 3 – January 6, 2021
Addendum No. 2 – December 30, 2020
Addendum No. 1 – December 23, 2020

Attachments

I. GENERAL CLARIFICATIONS

A. Question: Is all casework/countertops/end panels/relocation and modifications to existing casework/countertops by others?

1. **Clarification:** Yes, all new casework including countertops and relocation of existing casework is by others.

II. ADDENDUM NO. 1

A. Part I. General Clarifications, Paragraph D, Item 1:

1. Question: I have been looking for detail drawings BG-510, BG-511, IS-510, IS-511 and IS-512 and they do not exist. Do you know if there are any addenda drawings coming out with these detail sheets?

a. **Clarification:** As noted in Addendum No. 1, Drawing BG-C110 – Site and Utility Plan was provided only for the purpose of coordinating the fuel tank work and the electrical light pole installation. All work shown on BG-C110, and on any other civil drawings referenced on BG-C110, is being performed by others.

III. ADDENDUM NO. 2

A. Part II Drawings, Paragraph E, Item 1 a:

1. Question: I have been looking for detail drawings BG-510, BG-511, IS-510, IS-511 and IS-512 and they do not exist. Do you know if there are any addenda drawings coming out with these detail sheets?
   a. **Clarification:** As noted in Addendum No. 2, Drawing IS-C110 – Site and Utility Plan was provided for reference only, in order to locate the Pavilion shown on IS-A111. As noted in Addendum #2, all work shown on IS-C110, and on any other civil drawings referenced on IS-C110, is being performed by others.

IV. ADDENDUM NO. 3

A. Part IV. Drawings, Paragraph H, Item 1:

1. Question: Addendum No. 3 the question was asked about the condensate drains for the fan coil units. The answer was to tie on to existing condensate drains. What size piping is the condensate drains?
   a. **Clarification:** The condensate drains are ¾" diameter.

2. Question: Can you get proper pitch for these drains or will pumps be needed?
   a. **Clarification:** Proper pitch be acquired. Existing condensate piping in the Primary and Intermediate Schools have pumps.

3. Question: Please provide drawings to show the condensate drains so that everyone is bidding on the same design.
   a. **Clarification:** Refer to sheets IS-M200 and IS-M203. The existing FCU in Room 22 has condensate piping which drains to a mop basin in Room 26A. It is intended that the condensate for the FCU's in Area A and B connect to this existing condensate piping. There is similar condensate piping that drains to Custodian Room 31A where it is intended that the condensate from FCU's in Area C and D will drain to. There is condensate piping in the Mezzanine which drains to the nearest floor drain where all new units in the Mezzanine will drain to.

B. Part IV, Paragraph R, Item 1:

1. Question: Addendum No. 3 the question was asked about the condensate drains for the fan coil units. The answer was to tie on to existing condensate drains. What size piping is the condensate drains?
   a. **Clarification:** The condensate drains are ¾" diameter.

2. Question: Can you get proper pitch for these drains or will pumps be needed?
   a. **Clarification:** Proper pitch can be acquired. Existing condensate piping in the Primary and Intermediate Schools have pumps.

3. Question: Please provide drawings to show the condensate drains so that everyone is bidding on the same design.
   a. **Clarification:** Refer to sheets PS-M200, PS-M201 and PS-M202. There is existing condensate piping for the ceiling unit ventilators which drain to sinks in the Janitor Rooms. The intention is for the condensate from the fan coils to connect into this piping system.

V. SPECIFICATIONS

A. Section 23 09 23 – Direct-Digital Control System for HVAC:

1. Insert the following paragraph in its entirety:

"**2.1 CONTROL COMPONENT MANUFACTURERS**

A. Manufacturer List:

1. Siemens: To match existing DDC controls.

2. Substitutions: Or approved equal."

B. Section 23 09 93 – Sequence of Operations for HVAC DDC:

1. Question: There are not controls schematics, points lists, or sequence of operations included in the bid documents. Spec Section 23 09 00 refer to "Section 23 09 23 – Direct-Digital Control System for HVAC: Sequences of operation implemented using products specified in this Section." However, there is no Sequence of Operation in Section 23 09 23. Please provide a points list and sequence of operation for the mechanical equipment to be controlled.
   a. **Clarification:** Insert attached Section 23 09 93-AD5 – Sequence of Operations for HVAC DDC in its entirety.

VI. DRAWINGS

A. Drawing MH-E203 – Rooftop, 2nd Floor and Electrical Room Renovation Part Plans:

1. Question: Could you clarify the size of PanelLP31A?
   a. **Clarification:** Renovation Note R12, delete in its entirety and insert the following in lieu thereof: "Provide replacement Panel LP31A (200A, 120/208V, 3PH, 4W, 30 Pole). Re-feed existing line and load side feeders from removed panel."

B. Drawing IS-M401 – Mechanical Details:

1. Question: There is no piping detail for fan coil units or the air handler units. Please advise.
   a. **Clarification:** Refer to attached Drawing AD5-M1 – AHU Coil Piping Detail.

C. Drawing IS-E400 – Electrical Details:

1. Question: There is a note on page IS-E400 that states "extend the switchboard pad", is that responsibility of the EC?
   a. **Clarification:** Detail #3, at the end of the note, insert the following in its entirety "(by EC)".

D. PS-A103 – Reflected Ceiling Plan (Area A):

1. Question: PS-A103 appears to show new ceilings in Alternate GC-2 areas. But I do not see any note confirming this, I also do not see any note stating to demo the ceilings, are these new ceilings that should be covered in Alt. GC-2?
   a. **Clarification:** The areas of the floor plans and ceiling plans that belong to Alternate GC-2 are clearly defined on Drawings PS-A106 and PS-A103 by a thick black dashed boundary which is labeled “Alternate GC-2”.

2. Question: Rooms “Nurse 65”, “Toilet 65C” and “Office 64” (Base Bid areas) ceilings appear to be new because they have a heavier line weight than the other ceilings on the sheet, are these supposed to be new ceilings? There is no Key Note for demo or the new ceilings.
   a. **Clarification:** New ceilings are graphically differentiated from existing ceilings and are depicted in the Ceiling Legend on Drawing PS-A103 – Reflected Ceiling Plan (Area A).

E. Drawing PS-A106 – Demolition and Proposed Plans at Entry, Main Office, and Kitchen:

1. Question: I see that demo is covered on PS-A106. Should a note be added to RFC on PS-A103 noting that these are in fact new ceilings?
   a. **Clarification:** All ceiling and soffit demolition is identified on Drawing PS-A106 by Key Notes D23, D28, D55,and D74.

F. Drawing PS-M401 – Mechanical Details:

1. Question: There is no piping detail for fan coil units or the air handler units. Please advise.
   a. **Clarification:** Refer to attached Drawing AD5-M1 – AHU Coil Piping Detail.

G. Drawing PS-E206 – Power Renovation Plan Area C:

1. Question: Could you also clarify the distance from the utility pole to MDP-2?
   a. **Clarification:** Renovation Keynote R33, insert the following in its entirety: “Approximate distance from MDP2 to service transformer is 25 feet.”

END OF ADDENDUM

SECTION 23 09 93

SEQUENCE OF OPERATIONS FOR HVAC DDC

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes control sequences for DDC for HVAC systems, subsystems, and equipment.

B. Related Requirements:

1. Section 23 09 23 "DDC Systems for HVAC" for control equipment.

1.03 DEFINITIONS

A. Analog Output: Proportional output signal (zero- to 10-V dc, 4 to 20 mA).

B. Binary Output: On/off output signal or contact closure.

C. DDC: Direct digital control.

D. Digital Output: Data output that must be interpreted digitally.

1.04 ACTION SUBMITTALS

A. Product Data:

1. An instrumentation list for each controlled system. Label each element of the controlled system in table format. Show, in the table element name, type of device, manufacturer, model number, and control device product data sheet number.

2. A complete description of the operation of the control system, including sequences of operation. Include and reference a schematic diagram of the controlled system.

B. Shop Drawings:

1. Riser diagrams showing control network layout, communication protocol, and wire types.

2. Schematic diagram of each controlled system. Include all control points labeled with point names shown or listed. Show the location of control elements in the system.

3. Wiring diagram for each controlled system. Show all control elements labels. Where a control element is the same as that shown on the control system schematic, label with the same name. Label all terminals.

1.05 CENTRAL CHILLED-WATER SYSTEM SEQUENCES

A. Central Chilled-Water System Time Schedule:

1. Input:
   a. Device: DDC controller.
   b. Location: Time schedule.
   c. Transference: DDC controller.
2. Output:
   a. Device: DDC controller.
3. Action:
   a. Enable startup, initiation, and control.
   b. After chilled-water system shutdown, operate pump(s) for an additional 3.
4. Display:
   a. Time and time schedule.

B. Start and Stop Chilled-Water Pump(s):

1. Input:
   a. Device: Flow or Pressure differential switch.
   b. Location: Chilled-water piping.
   c. Transference: DDC controller.
2. Output:
   a. Device: Hard wired.
   b. Location: Motor controller.
   c. Transference: Starter relay.
3. Action: Energize pump(s) when the chiller and system start.
4. Display:
   a. Chilled-water flow indication.
   b. Chilled-water pump(s) on-off status (enabled or disabled).
   c. Chilled-water pump(s) on-off indication (operating or not operating).

C. Start and Stop Chiller:

1. Input:
   a. Device: Flow or pressure differential switch.
   b. Location: Chilled-water piping.
   c. Transference: Chiller controls or DDC controller.
2. Output:
   a. Device: Hard wired.
   b. Location: Chiller control panel.
   c. Transference: Chiller controls.
3. Action: Energize chiller(s) internal control circuit when the chilled-water pump(s), and system start.
4. Display:
   a. Chilled-water flow indication.
   b. Chiller on-off indication (operating or not operating).

c. Chilled-water supply and return temperature.
d. Chilled-water temperature control-point adjustment.

D. Alarm Chiller(s) Start Failure:

1. Input:
   a. Device: Software signal.
   b. Location: Chiller control panel.
   c. Transference: DDC controller.
2. Output:
   a. Device: DDC controller.
   b. Transference: Operator's workstation.
3. Action: Signal alarm on signal from chiller control panel.
4. Display:
   a. Chiller "failure-to-start" indication.

E. Start and Stop Chiller(s):

1. Input:
   a. Device: Chiller control panel.
   b. Location: Chiller.
   c. Transference: DDC controller.
2. Output:
   a. Device: DDC controller.
   b. Transference: Operator's workstation.
3. Action: Report chiller electronic control, operating, and alarm functions.
4. Display:

F. Chilled-Water Supply Temperature:

1. Input:
   a. Device: Liquid temperature sensor or liquid temperature sensor with liquid temperature transmitter.
   b. Location: Common chilled-water supply piping.
   c. Transference: DDC controller.
2. Output:
   a. Device: DDC controller signal.
   b. Location: Local panel.
   c. Transference: Chiller control panel.
3. Action: Maintain chilled-water supply temperature.
   a. Reset chilled-water supply temperature in response to greatest cooling demand to maintain at least one cooling control valve 90 percent open.
   b. Reset chilled-water supply temperature in straight-line relationship with outdoor-air temperature for the following conditions:
      i. 44 degrees F chilled water when outdoor-air temperature is 80 degrees.
      ii. 54 degrees F chilled water when outdoor-air temperature is 60 degrees F.

c. Reset chilled-water supply temperature based on constant return chilled-water temperature of 54 deg F.

4. Display:
   a. Chilled-water supply temperature.
   b. Chilled-water supply temperature set point.

G. Control Circulating Pump(s) Speed:

1. Input Device:
   a. Device: Liquid pressure differential transmitter.
   b. Location: Chilled-water supply and return piping to chiller.
   c. Transference: DDC controller.

2. Output Device:
   a. Device: DDC controller.
   b. Location: Motor controller.
   c. Transference: Pump variable-speed controller.

3. Action:
   a. Control pump speed to maintain flow through chiller.
   b. Report pressure drop and flow.

H. Circulation through Chiller:

1. Input Device:
   a. Device: Liquid pressure differential transmitter.
   b. Location: Chilled-water supply and return piping to chiller.
   c. Transference: DDC controller.

2. Output Device:
   a. Device: DDC controller.

3. Action:
   a. Report pressure drop and flow through chiller.

I. Indicate the following on the operator's workstation display terminal:

1. DDC system graphic.
2. DDC system status, on-off.
3. Outdoor temperature.
4. Cooling (software) demand indication.
5. Time and time schedule.
6. Chilled-water pump(s) on-off status (enabled or disabled).
7. Chilled-water pump(s) on-off indication (operating or not operating).
8. Chilled-water flow indication.
9. Refrigeration machine on-off indication (operating or not operating).
10. Chilled-water supply temperature.
11. Chilled-water return temperature.
12. Chilled-water temperature control-point adjustment.
13. Chiller(s) on-off status (enabled or disabled).

14. Chiller(s) on-off indication (operating or not operating).
15. Chiller "failure-to-start" indication.
16. Chiller(s) power input (instantaneous).
17. Chilled-water pressure drop through chiller.
18. Chilled-water flow through chiller.
19. Chiller chilled-water supply and return temperature.
20. System capacity in tons.

1.06 AIR-HANDLING-UNIT CONTROL SEQUENCES

A. Air-Handling Unit Time Schedule:

1. Occupied Time Schedule:
   a. Input:
      i. Device: DDC controller.
      ii. Location: Time schedule.
      iii. Transference: DDC controller.
   b. Output:
      Device: DDC controller.

2. Action:
   a. Enable startup, initiation, and control.
   b. Energize unit on occupied/unoccupied cycle.
   c. Energize unit on day/night cycle.
   d. Energize unit on duty cycle.
   e. Do not enable mixed-air control during morning warm-up period.
      i. Unoccupied: Position outdoor-air and return-air dampers open.
   f. Enable control of heating coil(s) during morning warm-up period.
   g. Energize coil circulating pump(s).
   h. Return heating control valves to normal position when unit is cycled on.
   i. Do not enable cooling-coil control during morning warm-up period.

B. Start and Stop Supply Fan(s):

1. Enable:
   a. Input:
      i. Device: Low limit temperature switch with manual reset.
      ii. Location: Upstream of cooling coil.
      iii. Transference: Starter relay.
   b. Output:
      i. Device: Hard wired to motor controller and DDC controller.
      ii. Location: Motor controller.
      iii. Transference: Starter relay.
   c. Action:
      i. Allow start if temperature is above 37 deg F.
      ii. Signal alarm if fan fails to start as commanded.

2. Enable:
    a. Input:
        i. Device: Low limit temperature switch with manual reset.
        ii. Location: Supply airstream.
        iii. Transference: Starter relay.
    b. Output:
        i. Device: Hard wired to motor controller and DDC controller.
        ii. Location: Motor controller.
        iii. Input Transference: Starter relay.
    c. Action:
        i. Allow start if temperature is below 120 deg F.
        ii. Signal alarm if fan fails to start as commanded.

3. Enable:
    a. Input:
        i. Device: Smoke detector with auxiliary contact manual reset.
        ii. Location: Mounted in air-handling unit.
        iii. Transference: Starter relay.
    b. Output:
        i. Device: Hard wired.
        ii. Location: Motor controller.
        iii. Transference: Starter relay.
    c. Output Device: Hard wired through motor controller; DDC controller alarm.
    d. Action:
        i. Allow start if airstream is free of products of combustion.
        ii. Signal alarm if fan fails to start as commanded.

C. Mixed-Air Control:

1. Minimum Position:
    a. Input:
        i. Device: DDC controller.
        ii. Location: Time schedule.
        iii. Transference: DDC controller.
    b. Output:
        i. Device: Analog output.
        ii. Location: Outdoor damper.
        iii. Transference: Damper actuator(s).
    c. Action:
        i. Open outdoor-air dampers to minimum position.
        ii. Modulate outdoor-air dampers to maintain minimum airflow.

2. Heating Reset:
    a. Input:
        i. Device: DDC controller.
        ii. Location: Software.
        iii. Transference: DDC controller.
    b. Output:
        i. Device: Analog output.

ii. Location: Outdoor dampers.
iii. Transference: Damper actuator(s).

c. Action: Close minimum outdoor-air dampers.

3. Supply-Air Temperature:

a. Input:

i. Device: air-temperature sensor with air-temperature RTD transmitter.
ii. Location: Supply-airstream.
iii. Transference: DDC controller.

b. Output:

i. Device: Analog output.
ii. Location: Damper section.
iii. Transference: Damper actuator(s).

c. Action:

i. Modulate outdoor-, return-, and relief-air dampers to maintain air-temperature set point of 55 deg F.
ii. Do not enable control during morning warm-up period.

4. Cooling Reset:

a. Input:

i. Device: Air-temperature sensor with air-temperature RTD transmitter.
ii. Location: Outdoor- and return-air ducts.
iii. Input Transference: DDC controller.

b. Output:

i. Device: Analog output.
ii. Location: Outdoor- and return-air ducts.
iii. Transference: Damper actuator(s).

c. Action: Set outdoor-air dampers to minimum position when outdoor-air temperature exceeds return-air temperature.

D. Filters:

1. Differential Pressure:

a. Input:

i. Device: Pressure differential transmitter.
ii. Location: Filter bank.
iii. Transference: DDC controller.

b. Output:

i. Device: DDC controller.
ii. Location: DDC controller.
iii. Transference: Operator's workstation.

c. Action: Signal alarm on high-pressure conditions.

E. Hydronic Heating Coil:

1. Discharge-Air Temperature:

a. Input:

i. Device: Air-temperature sensor with air-temperature RTD transmitter.
ii. Location: Supply-air duct.
iii. Transference: DDC controller.

b. Output:
   i. Device: Analog output.
   ii. Location: Heating-coil control valve.
   iii. Input Transference: Normally open valve actuator.
c. Action:
   i. Maintain supply-air-temperature set point within limits in response to space temperature reset:
      1) Minimum 55 degrees F.
      2) Maximum 131 degrees F.
   ii. During morning warm-up period, maintain supply-air-temperature set point of 80 degrees F.

F. Hydronic Cooling Coil:

1. Supply-Air Temperature:
   a. Input:
      i. Device: Air-temperature sensor or transmitter.
      ii. Location: Supply-air duct.
      iii. Transference: DDC controller.
   b. Output:
      i. Device: Analog output.
      ii. Location: Cooling-coil valve.
      iii. Input Transference: Valve actuator.
   c. Action:
      i. Maintain supply-air-temperature set point of 55 degrees F by modulating cooling-coil control valve.
      ii. Maintain supply-air-temperature set point within limits in response to space temperature reset:
         1) Minimum 55 degrees F.
         2) Maximum 68 degrees F.
      iii. Supply-Air-Temperature Reset: Reset the supply-air temperature to outdoor temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

G. Coordination of Air-Handling Unit Sequences: Ensure that mixed-air, heating-coil, and cooling-coil controls have common inputs and do not overlap in function.

H. Indicate the following on the operator's workstation display terminal:

1. DDC system graphic.
2. DDC system on-off indication (operating or not operating).
3. DDC system occupied/unoccupied mode.
4. Outdoor-air-temperature indication.
5. Supply-fan on-off indication (operating or not operating).
6. Supply duct static-pressure indication.
7. Supply duct static-pressure set point.
8. Supply-fan airflow rate.
9. Supply-fan speed.

10. Space static-pressure indication.
11. Space static-pressure set point.
12. Mixed-air-temperature indication.
13. Mixed-air-temperature set point.
14. Mixed-air damper position.
15. Filter air-pressure-drop indication.
16. Filter high-air-pressure drop set point.
17. Supply-air-temperature indication.
18. Supply-air-temperature set point.
19. Heating-coil leaving-air-temperature indication.
20. Heating-coil leaving-air-temperature set point.
21. Heating-coil control-valve position.
22. Cooling-coil leaving-air-temperature indication.
23. Cooling-coil leaving-air-temperature set point.
24. Cooling-coil control-valve position.
25. Space temperature indication.
26. Space temperature set point.

1.07 TERMINAL UNIT OPERATING SEQUENCE

A. Unit Heater, Hydronic:

1. Space Temperature:
   a. Input:
      i. Device: Line-voltage thermostat.
      ii. Location: Space.
   b. Output:
      i. Device: Hard wired.
      ii. Location: Motor controller.
      iii. Transference: Starter relay.
   c. Action: Cycle fan to maintain 75 degrees F space temperature.
2. Space Temperature:
   a. Input:
      i. Device: Air-temperature sensor.
      ii. Location: Space.
      iii. Transference: DDC controller.
   b. Output Device:
      i. Device: Binary output.
      ii. Transference: Starter relay.
   c. Action: Cycle fan to maintain 75 degrees F space temperature.
3. Low-Temperature Safety:
   a. Input Device: Line-voltage, on-off thermostat; pipe mounted.
      i. Device: Line-voltage thermostat.
      ii. Location: Return heating-water pipe.

b. Output Device:
   i. Device: Hard wired.
   ii. Location: Motor controller.
   iii. Input Transference: Starter relay.
c. Action: Stop fan when return heating-water temperature falls below 35 degrees F.

B. Four-Pipe, Hydronic Fan-Coil Unit:

1. Occupied Time Schedule:
   a. Input:
      i. Device: DDC controller.
      ii. Location: Time schedule.
      iii. Transference: DDC controller.
   b. Output:
      i. Device: Binary output.
      ii. Location: Motor controller.
      iii. Transference: Starter relay.
   c. Action: Start and stop fan and enable control.
2. Space Temperature:
   a. Input:
      i. Device: Air-temperature sensor.
      ii. Location: Space.
      iii. Transference: DDC controller.
   b. Output:
      i. Device: Analog output.
      ii. Location: Control valve.
      iii. Transference: Valve actuators.
   c. Action: Modulate control valves to maintain the following space temperature set points:
      i. Occupied Cooling Temperature: 75 degrees F.
      ii. Occupied Heating Temperature: 70 degrees F.
      iii. Unoccupied Cooling Temperature: 85 degrees F.
      iv. Unoccupied Heating Temperature: 65 degrees F.

C. Unit Ventilator:

1. Occupied Time Schedule:
   a. Input:
      i. Device: DDC controller.
      ii. Location: Time schedule.
      iii. Transference: DDC controller.
   b. Output:
      i. Device: Binary output.
      ii. Location: Fan motor controller and damper.
      iii. Transference: Starter relay and damper actuators.
   c. Action: Start and stop fan, move outdoor- and return-air dampers to minimum outdoor-air position, and enable control.
2. Space Temperature - Valves:
   a. Input:
      i. Device: Air-temperature sensor or transmitter.
      ii. Location: Space.
      iii. Transference: DDC controller.

b. Output:
    i. Device: Analog output.
    ii. Location: Control valve.
    iii. Transference: Valve actuator.
c. Action: Modulate heating-water control valve and chilled-water control valve in sequence to maintain the following space temperature set points:
    i. Occupied Cooling Temperature: 75 degrees F.
    ii. Occupied Heating Temperature: 70 degrees F.
    iii. Unoccupied Cooling Temperature: 85 degrees F.
    iv. Unoccupied Heating Temperature: 65 degrees F.

3. Space Temperature - Dampers:
    a. Input:
        i. Device: Air-temperature sensor or air-temperature RTD transmitter.
        ii. Location: Mixed-air plenum.
        iii. Transference: DDC controller.
    b. Output:
        i. Device: Analog output.
        ii. Location: Dampers.
        iii. Transference: Damper actuators.
    c. Action: Modulate outdoor- and return-air dampers to maintain the following space temperature set points:
        i. Occupied Cooling Temperature: 75 degrees F.
        ii. Occupied Heating Temperature: 70 degrees F.
        iii. Unoccupied Cooling Temperature: 85 degrees F.
        iv. Unoccupied Heating Temperature: 65 degrees F.

4. Supply-Air-Temperature Limit:
    a. Input:
        i. Device: Air-temperature sensor or air-temperature sensor with air-temperature RTD transmitter.
        ii. Location: Discharge air.
        iii. Transference: DDC controller.
    b. Output:
        i. Device: Analog output.
        ii. Location: Control valve and dampers.
        iii. Transference: Valve and damper actuators.

5. Warm-up Cycle:
    a. Input:
        i. Device: DDC controller.
        ii. Location: Time schedule.
        iii. Input Transference: DDC controller.
    b. Output:
        i. Device: Analog output.
        ii. Location: Control valve and damper.
        iii. Transference: Valve and damper actuators.
    c. Action: Open heating-water control valve, close outdoor-air damper, and open return-air damper.

D. Heating Coils, Hydronic:

1. Space Temperature:
   a. Input:
      i. Device: Air-temperature sensor or air-temperature sensor with air-temperature RTD transmitter.
      ii. Location: Space.
      iii. Transference: DDC controller.
   b. Output:
      i. Device: Analog output.
      ii. Location: Control valve.
      iii. Transference: Valve actuator.
   c. Action: Modulate valve to maintain the following space temperature set points:
      i. Occupied Cooling Temperature: 75 degrees F.
      ii. Occupied Heating Temperature: 70 degrees F.
      iii. Unoccupied Cooling Temperature: 85 degrees F.
      iv. Unoccupied Heating Temperature: 65 degrees F.

E. Indicate the following on the operator's workstation display terminal:

1. DDC system graphic.
2. DDC system on-off indication (operating or not operating).
3. DDC system occupied/unoccupied mode.
4. Outdoor-air-temperature indication.
5. Cabinet Unit Heater, Hydronic:
   a. Space temperature indication.
   b. Space temperature set point.
   c. Fan on.
6. Unit Heater, Hydronic:
   a. Space temperature indication.
   b. Space temperature set point.
   c. Fan on.
7. Four-Pipe, Hydronic Fan-Coil Unit:
   a. Space temperature indication.
   b. Space temperature set point.
   c. Control-valve position.
8. Unit Ventilator:
   a. DDC system on-off indication (operating or not operating).
   b. Space temperature indication.
   c. Space temperature set point.
   d. Control-valve position.
   e. Damper position.
9. Heating Coils, Hydronic:
   a. Space temperature indication.
   b. Space temperature set point.
   c. Control-valve position.

10. Sequence Control:
    a. Space/area served.
    b. Space occupied/unoccupied.
    c. Space temperature indication.
    d. Space temperature set point, occupied.
    e. Space temperature set point, unoccupied.
    f. Damper position as percentage open.
    g. Control-valve positions as percentage open.

1.08 VENTILATION SEQUENCES

A. Kitchen Exhaust Fan: Occupancy sensor and Demand Controlled Ventilation

1. Input:
    a. Device: Occupancy sensor, heat sensor, smoke sensor.
    b. Location: Space.
2. Output:
    Device: Hard wired.
    a. Location: Variable speed drives.
    b. Transference: Variable speed drives.
3. Action: Start fan and energize makeup air unit when space is occupied. Modulate exhaust fan and make-up air unit based on Demand Control Ventilation.

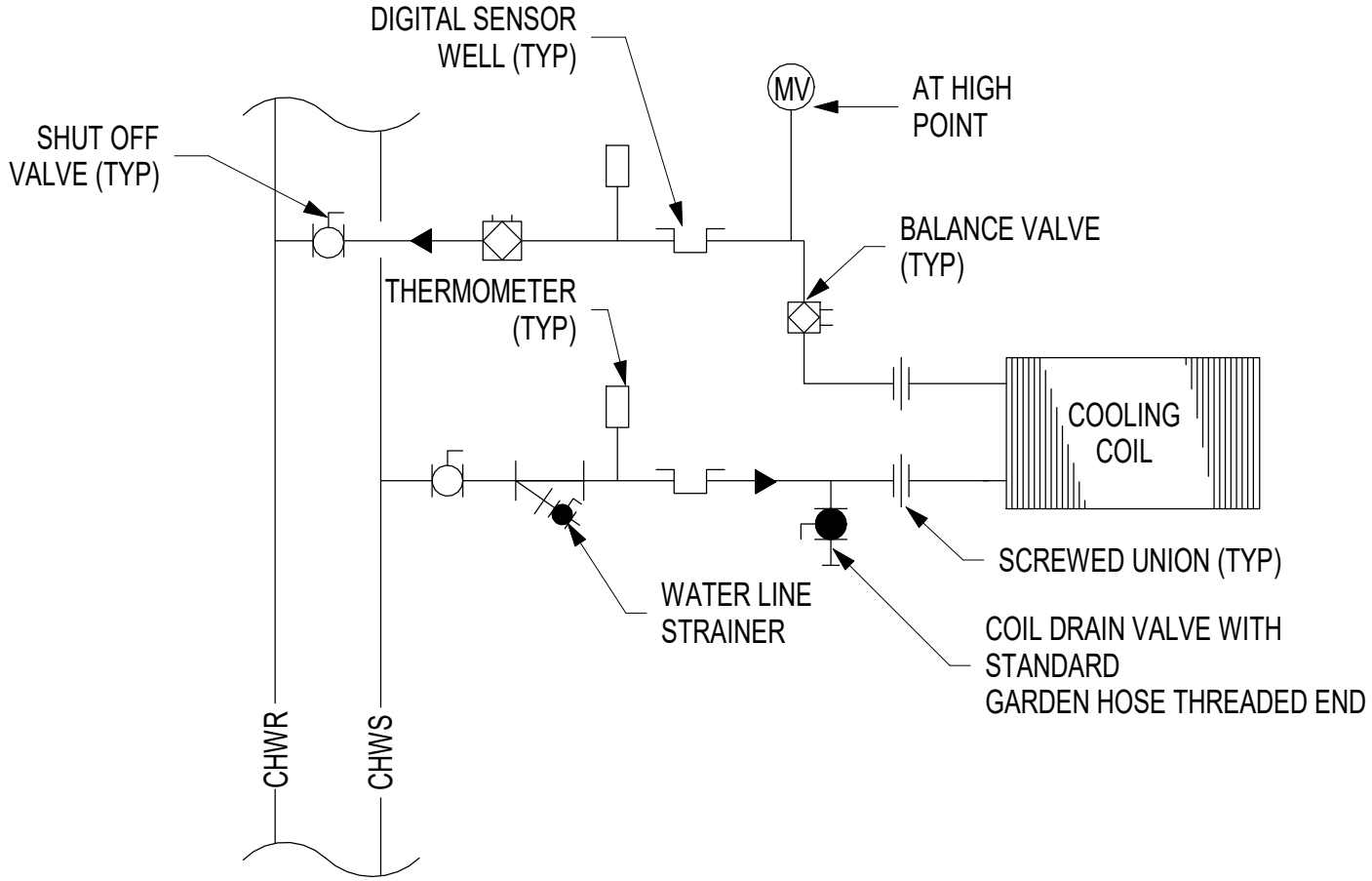
PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION



1
AD5-M1

AHU/FCU COIL PIPING SCHEMATIC

Scale: NTS

DO NOT SCALE THIS DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING AND VERIFYING ALL THE DIMENSIONS AND REPORTING ERRORS AND/OR OMISSIONS TO THE ARCHITECT IN WRITING BEFORE PROCEEDING WITH THE WORK.

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PROJECT TITLE
GREENE CENTRAL SCHOOL DISTRICT
2019 CAPITAL IMPROVEMENT - PHASE 2

PRIMARY SCHOOL

SHEET TITLE
AHU COIL PIPING DETAIL

IBI PROJECT 123890	CLIENT PROJECT NO. 08-06-01-04-0-004-021
DRAWN BY MA	REFERENCE DRAWING
SCALE 12" = 1'-0"	DATE 01/13/21
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