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Professional Land Surveyor

ADDENDUM NUMBER I

DATE: February 9, 2026

PROJECT: Newark Valley Central School District 2023
Capital Project – Phase III
High School Air Conditioning

SED PROJECT NUMBER: SED No. / Review No.
High School 60-04-02-04-0-007-023 / 25-1027

All references, drawings and specification sections noted in this Addendum have been incorporated into the Bid Documents.

KA PROJECT NUMBER: 1823.24221.1.3

OWNER: Newark Valley Central School District

ARCHITECT: Keystone Associates Architects,
Engineers and Surveyors, LLC

TO: Bidders

This Addendum forms a part of the Contract Documents and modifies the Documents dated December 12, 2025, SED Comments revision dated January 2, 2026 (Architectural), and SED Addendum #1 revision, dated January 21, 2026 (Engineering), with amendments and additions noted below.

Acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

This Addendum consists of seven (7) pages.

A. GENERAL

- I. Note the following for alternates noted on the drawings and the alternates listed in the specifications:
 - a. “Alternate 1” refers to:
 - i. “S” & “A” series drawings = Alternate GC-1
 - ii. “M” series drawings = Alternate MC-1 and TC-1
 - iii. “E” series drawings = Alternate EC-1
 - b. “Alternate 2” refers to:
 - i. “S” & “A” series drawings = Alternate GC-2
 - ii. “M” series drawings = Alternate MC-2 and TC-2
 - iii. “E” series drawings = Alternate EC-2
 - c. “Alternate 3” refers to:
 - i. “S” & “A” series drawings = Alternate GC-3
 - ii. “M” series drawings = Alternate MC-3 and TC-3
 - iii. “E” series drawings = Alternate EC-3

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- d. "Alternate 4" refers to:
 - i. "S" & "A" series drawings = Alternate GC-4
 - ii. "M" series drawings = Alternate MC-4 and TC-4
 - iii. "E" series drawings = Alternate EC-4
 - e. "Alternate 5" refers to:
 - i. "S" & "A" series drawings = Alternate GC-5
 - ii. "M" series drawings = Alternate MC-5 and TC-5
 - iii. "E" series drawings = Alternate EC-5
 - f. "Alternate 6" refers to:
 - i. "S" & "A" series drawings = Alternate GC-6
 - ii. "M" series drawings = Alternate MC-6 and TC-6
 - iii. "E" series drawings = Alternate EC-6
 - iv. See below for more information on this alternate
- 2. On Drawing E201, refer to Drawing E401-ADI for alternate numbering.
 - 3. On Drawing E202, refer to Drawing E402-ADI for alternate numbering.
 - 4. On Drawing E204, refer to Drawing E404-ADI for alternate numbering.
 - 5. On Drawing E207, refer to Drawing E407-ADI for alternate numbering.
 - 6. On Drawing E209, refer to Drawing E409-ADI for alternate numbering.

B. CLARIFICATIONS

- 1. Electrical drawings don't call out specific alternate numbers. Can alternate numbers be added to clarify the work in each alternate?
 - a. See below.
- 2. The bid form states a completion date of 8/28/2026. Will a detailed milestone schedule be provided?
 - a. *Schedule will be coordinated among Construction Manager, Contractors, and Architect's office once project is awarded.*

C. CHANGES TO THE DRAWINGS

- 1. S101 – STRUCTURAL ROOF FRAMING, DETAILS & NOTES
 - a. Refer to A/S101; ADD Alternate 6 note as shown in the attached drawing S101-ADI.
- 2. A100 – FIRST FLOOR DEMOLITION PLAN
 - a. Refer to I/A100; DELETE specific demolition note 4 at Gymnasium H108
 - b. Refer to Specific Demolition Notes; REVISE note 4 as follows: "Not Used."

3. A103 – SECOND FLOOR DEMOLITION PLAN

- a. Refer to I/A103; ADD Alternate GC-6 note as shown in the attached drawing A103-ADI.

4. A106 – FIRST FLOOR PROPOSED PLAN

- a. Refer to I/A106;
 - i. DELETE specific renovation note 7 at Gymnasium H108
 - ii. ADD specific renovation note 6 at Gymnasium H108 as shown in the attached drawing A106-ADI.
- b. Refer to Specific Renovation Notes; REVISE note 7 as follows: “Not Used.”

5. A109 – SECOND FLOOR PROPOSED PLAN

- a. Refer to I/A109; ADD Alternate GC-6 note as shown in the attached drawing A109-ADI.

6. A700 – PROPOSED ROOF PLAN AND DETAILS

- a. Refer to General Roofing Notes; REVISE note 6 as follows: “General Contractor to install Mechanical Contractor furnished roof equipment supports, duct mount pedestals, plenum roof curbs, roof curbs, and pipe portals as needed on all RTU and ACCU as shown on mechanical drawings. Flash into roofing system.”

7. M001 - SYMBOLS, LEGENDS, ABBREVIATIONS AND GENERAL NOTES

- a. REVISE General Notes – Controls & Equipment as shown on the attached drawing M001-ADI.

8. M002 - MECHANICAL SCHEDULES

- a. REVISE Fan Schedule as shown on the attached drawing M002-ADI.

9. M004 - MECHANICAL SCHEDULES

- a. REVISE Glycol Fill Tank Schedule as shown on the attached drawing M004-ADI.

10. M202 - FIRST FLOOR MECHANICAL REMOVAL PLAN - AREA 1

- a. REVISE as shown on the attached drawing M202-ADI.

11. M204 - FIRST FLOOR MECHANICAL REMOVAL PLAN - AREA 3

- a. ADD removals and removal notes as shown on the attached drawing M204-ADI.

12. M205 - SECOND FLOOR MECHANICAL REMOVAL PLAN - AREA 1
 - a. REVISE Chorus and Band rooms as shown on the attached drawing M205-ADI.
13. M206 - SECOND FLOOR MECHANICAL REMOVAL PLAN - AREA 2
 - a. REVISE as shown on the attached drawing M206-ADI.
14. M208 - ROOF MECHANICAL REMOVAL PLAN - AREA 1
 - a. REVISE as shown on the attached drawing M208-ADI.
15. M301 - FIRST FOOR DUCT PLAN - AREA 1
 - a. REVISE as shown on the attached drawing M301-ADI.
16. M303 - FIRST FLOOR DUCT PLAN - AREA 3
 - a. REVISE as shown on the attached drawing M303-ADI.
17. M304 - SECOND FLOOR DUCT PLAN - AREA 1
 - a. REVISE Chorus and Band rooms as shown on the attached drawing M304-ADI.
18. M305 - SECOND FLOOR DUCT PLAN - AREA 2
 - a. REVISE as shown on the attached drawing M305-ADI.
 - b. ADD drawing note as shown on the attached drawing M305-ADI.
19. M306 - SECOND FLOOR DUCT PLAN - AREA 3
 - a. REVISE as shown on the attached drawing M306-ADI.
20. M307 - ROOF MECHANICAL PLAN - AREA 1
 - a. REVISE as shown on the attached drawing M307-ADI.
21. M309-ADI - ROOF MECHANICAL PLAN - AREA 3
 - a. REVISE as shown on the attached drawing M309-ADI.
22. M401 - FIRST FLOOR PIPING PLAN - AREA 1
 - a. REVISE as shown on the attached drawing M401-ADI.
23. M404 - SECOND FLOOR PIPING PLAN - AREA 1
 - a. REVISE as shown on the attached drawing M404-ADI.
24. M407 - FIRST FLOOR CONDENSATE PIPING PLAN
 - a. ADD the attached drawing M407-ADI.

25. M408 - SECOND FLOOR CONDENSATE PIPING PLAN
 - a. ADD the attached drawing M408-ADI.
26. M501 - ENLARGED PLANS - BASEMENT MECHANICAL ROOM
 - a. REVISE as shown on the attached drawing M501-ADI.
27. M502 - ENLARGED PLANS - GYM HEAT EXCHANGER ROOM
 - a. REVISE as shown on the attached drawing M502-ADI.
28. M504 - GYM ISOMETRIC
 - a. REVISE as shown on the attached drawing M504-ADI.
29. M602 - MECHANICAL DETAILS
 - a. REVISE as shown on the attached drawing M602-ADI.
30. M607 - MECHANICAL DETAILS
 - a. REVISE as shown on the attached drawing M607-ADI.
31. M701-ADI - MECHANICAL CONTROLS
 - a. REVISE as shown on the attached drawing M701-ADI.
32. E004 – ELECTRICAL PANEL SCHEDULES
 - a. REVISE as shown on the attached drawing E004-ADI.
33. E401 – BASEMENT POWER & SYSTEMS PLAN - AREA 1
 - a. REVISE as shown on the attached drawing E401-ADI.
34. E402 - FIRST FLOOR POWER & SYSTEMS PLAN - AREA 1
 - a. REVISE as shown on the attached drawing E402-ADI.
35. E403 - FIRST FLOOR POWER & SYSTEMS PLAN - AREA 2
 - a. REVISE as shown on the attached drawing E403-ADI.
36. E404 - FIRST FLOOR POWER & SYSTEMS PLAN - AREA 3
 - a. REVISE as shown on the attached drawing E404-ADI.
37. E405 - SECOND FLOOR POWER & SYSTEMS PLAN - AREA 1
 - a. REVISE as shown on the attached drawing E405-ADI.
38. E406 - SECOND FLOOR POWER & SYSTEMS PLAN - AREA 2
 - a. REVISE as shown on the attached drawing E406-ADI.

39. E407 - SECOND FLOOR POWER & SYSTEMS PLAN - AREA 3

- a. REVISE as shown on the attached drawing E407-AD I.

40. E408 - ROOF POWER & SYSTEMS PLAN - AREA 1

- a. REVISE as shown on the attached drawing E408-AD I.

41. E409 - ROOF POWER & SYSTEMS PLAN - AREA 2

- a. REVISE as shown on the attached drawing E409-AD I.

42. E410 - ROOF POWER & SYSTEMS PLAN - AREA 3

- a. REVISE as shown on the attached drawing E410-AD I.

D. CHANGES TO THE PROJECT MANUAL

1. SECTION 00 11 13 – ADVERTISEMENT FOR BIDS

- a. Refer to Para. 1.5A, Subpara. 1, pg. 2, REVISE as follows: “Digital Download: Bid documents can be downloaded for a \$59.00 non-refundable fee payable by credit card from www.godataflow.com”
- b. Refer to Para. 1.5A, Subpara. 2b, pg. 2, REVISE as follows: “Shipping: Documents will be sent UPS Ground upon receipt of a separate, non-refundable shipping and handling payment for each set payable to Dataflow, Inc.”

2. DOCUMENT 00 41 16 – BID FORM - STIPULATED SUM (MULTIPLE-PRIME CONTRACT) CONTRACT NO. 1 - GENERAL CONSTRUCTION

- a. REVISE pg. 3 with the attached pg. 3 AD-I

3. DOCUMENT 00 41 16 – BID FORM - STIPULATED SUM (MULTIPLE-PRIME CONTRACT) CONTRACT NO. 2 – HVAC CONSTRUCTION

- a. REVISE pg. 3 with the attached pg. 3 AD-I

4. DOCUMENT 00 41 16 – BID FORM - STIPULATED SUM (MULTIPLE-PRIME CONTRACT) CONTRACT NO. 3 - ELECTRICAL CONSTRUCTION

- a. REVISE pg. 3 - 5 with the attached pg. 3 AD-I – 5 AD-I

5. SECTION 01 23 00 – ALTERNATES

- a. Refer to Para. 3.1A, pg. 2, ADD Subpara. 6 and 6a. as follows:

“6. ADD Alternate GC-6: Band H206 and Chorus H204 Air Conditioning

- a. Indicate on the Bid Form the amount to be added to the Base Bid if all general construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing &

balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.”

- b. Refer to Para. 3.IB, pg. 3, ADD Subpara. 6 and 6a. as follows:

“6. ADD Alternate MC-6: Band H206 and Chorus H204 Air Conditioning

- a. Indicate on the Bid Form the amount to be added to the Base Bid if all mechanical construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.”

- c. Refer to Para. 3.IC, pg. 3, REVISE Subpara. 5 as follows:

“5. ADD Alternate EC-5: Technology Room Air Conditioning”

- d. Refer to Para. 3.IC, pg. 4, ADD Subpara. 6 and 6a. as follows:

“6. ADD Alternate EC-6: Band H206 and Chorus H204 Air Conditioning

- a. Indicate on the Bid Form the amount to be added to the Base Bid if all electrical construction work associated with removing existing mechanical equipment and providing new mechanical equipment at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.”

- e. Refer to Para. 3.ID, pg. 4, ADD Subpara. 6 and 6a. as follows:

“6. ADD Alternate TC-6: Band H206 and Chorus H204 Air Conditioning

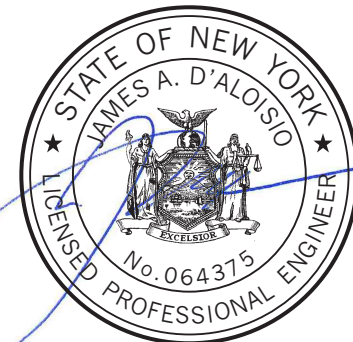
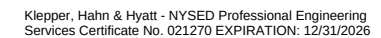
- a. Indicate on the Bid Form the amount to be added to the Base Bid if all temperature control work associated with removing existing mechanical equipment and providing new mechanical equipment at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.”

6. SECTION 23 09 93 – TEMPERATURE CONTROLS

- a. DELETE section and ADD the attached Section 23 09 93-AD I

END OF ADDENDUM

PARTIAL ROOF FRAMING PLAN



CERTIFICATE OF
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HIGH SCHOOL 60-04-02-04-0-007-023

[illegible][illegible][illegible]

**2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING**

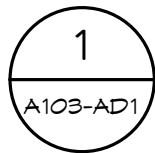
8 WILSON CREEK ROAD
TIOGA COUNTY, NY

ADD ALTERNATE REVISION

SHEET NO.
6101-AD1
PROJECT NO.
1823.24221.1.3
02/09/2026

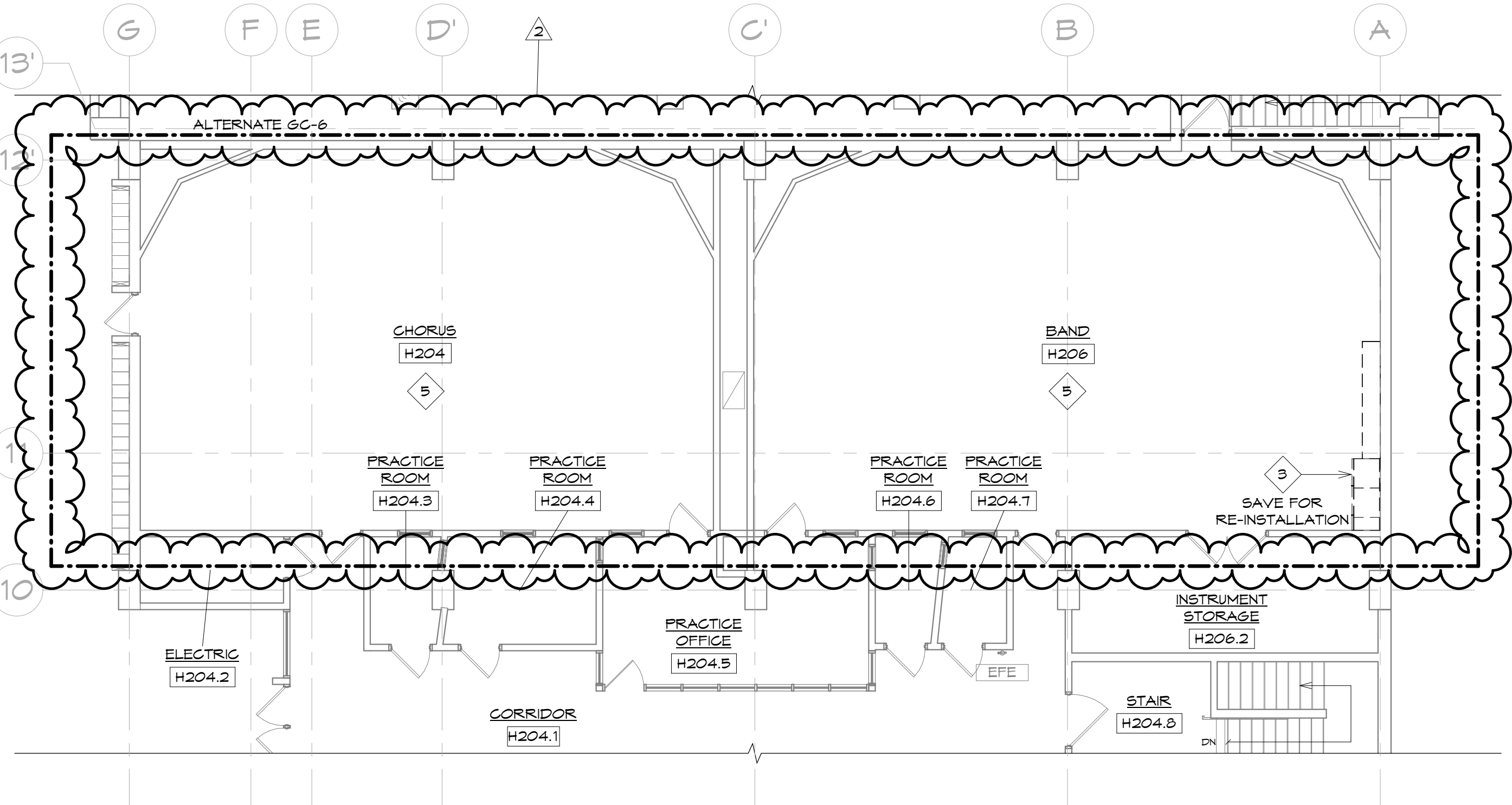
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PARTIAL SECOND FLOOR PLAN - DEMOLITION

1/8" = 1'-0"



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KEYSTONE ASSOCIATES
ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

SED PROJECT NUMBER:
HIGH SCHOOL
60-04-02-04-0-07-023

MAINTENANCE SECTION 2009
The State of New York
Department of Transportation
Section 2009
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02/09/2025
DATE

2 ADDENDUM A
02/09/2025
DATE

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY

SECOND FLOOR DEMOLITION PLAN

SHEET NO. A103-AD1
PROJECT NO. 1823.24221.1.3
DATE: 02/09/2026
CAD FILE NO.: High_School_RVT24.rvt

1
A106-AD1

PARTIAL FIRST FLOOR PLAN - PROPOSED

1/8" = 1'-0"

PLAN NORTH

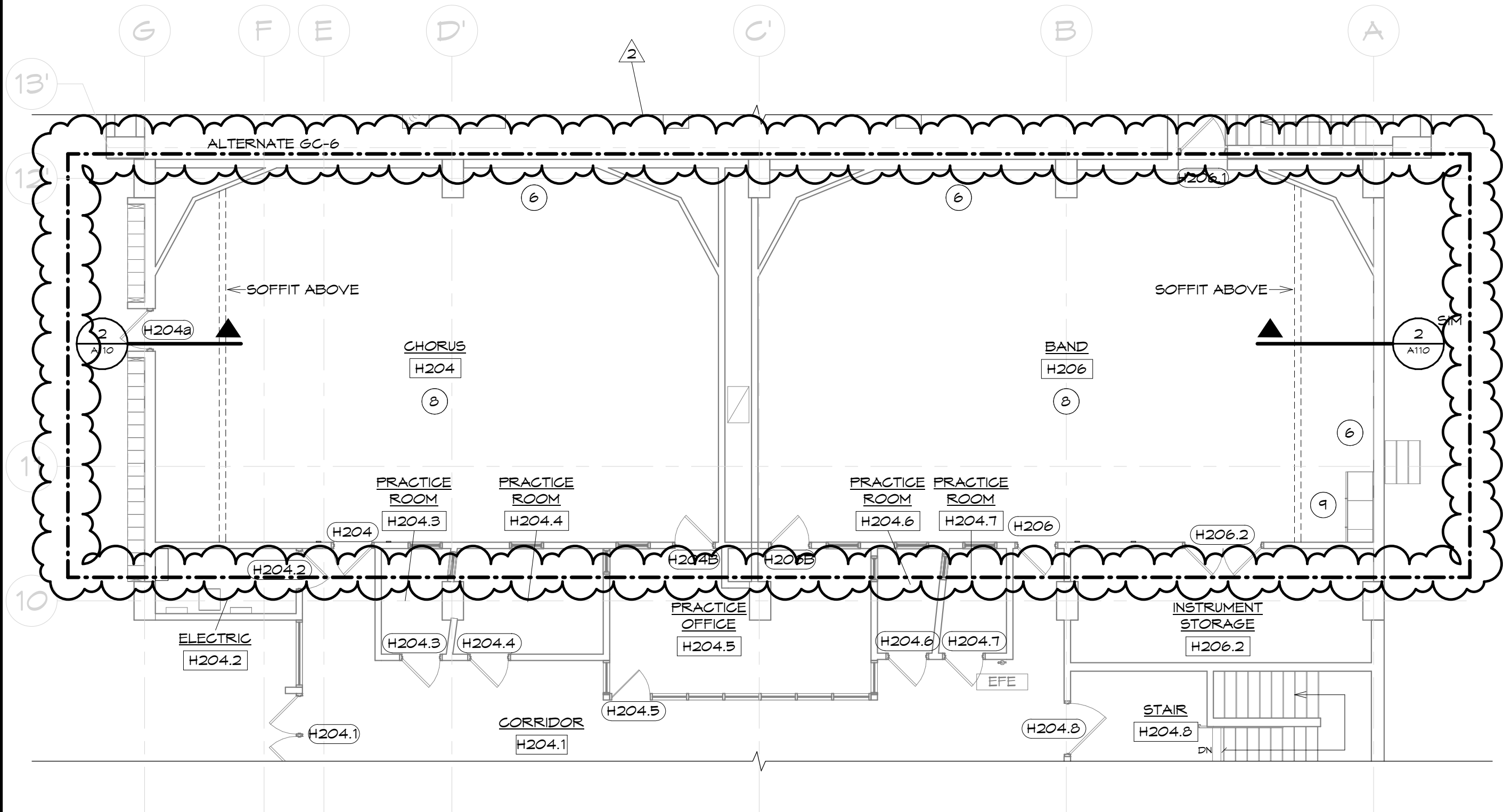
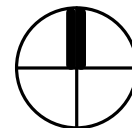
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1
A109-AD1

PARTIAL SECOND FLOOR PLAN - PROPOSED

1/8" = 1'-0"

PLAN
NORTH



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KEYSTONE ASSOCIATES ARCHITECTS, ENGINEERS AND SURVEYORS, LLC	
SED PROJECT NUMBER: HIGH SCHOOL 60-04-02-04-0-007-023	
I hereby certify that I am a duly Licensed Professional Engineer in the State of New York, No. 2095, and I am the Engineer of Record for the above project. © Copyright 2025 KeyStone Associates Architects, Engineers and Surveyors, LLC	
2	ADDITIONAL SHEETS DATE: 02/09/2025
NEWARK VALLEY CENTRAL SCHOOL DISTRICT 2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL AIR CONDITIONING 68 WILSON CREEK ROAD TIOGA COUNTY, NY	
SHEET NO. A109-AD1	
PROJECT NO. 1823.24221.1.3	
DATE: 02/09/2026	
CAD FILE NO.: High_School_RVT24.rvt	

SECOND FLOOR PROPOSED PLAN

GENERAL NOTES - CONTROLS & EQUIPMENT

THE EXISTING BUILDING AUTOMATION SYSTEM AT NEWARK VALLEY CSD IS A SCHNEIDER ELECTRIC DDC SYSTEM, INSTALLED AND SERVICED BY DAY AUTOMATION SYSTEMS.

A. THE TEMPERATURE CONTROL CONTRACTORS LABOR SHALL BE BID UNDER THE MECHANICAL CONTRACTOR AND THE TEMPERATURE CONTROL CONTRACTOR WILL BE A SUB TO THE MC. THE TEMPERATURE CONTROL CONTRACTORS SCOPE SHALL INCLUDE CONTROLS INSTALLATION AND WIRING, PROVIDING OPERATING MANUALS, START UP SERVICES, CONTROL ENGINEERING AND TRAINING AND WARRANTY FOR FACTORY RELATED ISSUES ON EQUIPMENT AND CONTROLS.

B. THE PARTS SHALL BE ON STATE CONTRACT AND THE TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE A LIST OF EQUIPMENT THAT THE MC SHALL NEED TO INSTALL PRIOR TO BID. ALL NEW DDC CONTROLS SHALL BE PROVIDED BY STARKTECH / DAY AUTOMATION AND CONNECTED TO THE EXISTING SYSTEM. TEMPERATURE CONTROL EQUIPMENT IDENTIFIED AS PER SCHEDULE AND DDC CONTROLS WILL BE PRE-PURCHASED AND SUPPLIED FOR THIS PROJECT VIA STARKTECH / DAY AUTOMATION'S NYS OGS CONTRACT.

1. EQUIPMENT WILL BE SHIPPED FROM THE FACTORY TO THE TEMPERATURE CONTROLS CONTRACTOR. THE EQUIPMENT WILL BE UNLOADED, INSPECTED AND STORED BY THE TC. ANY VALVES OR DAMPERS WILL BE GIVEN TO AND INSTALLED BY THE MECHANICAL CONTRACTOR.
2. THE STATE CONTRACT PURCHASED TC EQUIPMENT AND TC CONTROLS SHALL INCLUDE TEMPERATURE CONTROLLERS AND DEVICES.
3. SEE SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
4. ALL OTHER WARRANTY SERVICES ARE BY THE HVAC CONTRACTOR.

A. THE TEMPERATURE CONTROL CONTRACTORS LABOR SHALL BE BID UNDER THE MECHANICAL CONTRACTOR AND THE TEMPERATURE CONTROL CONTRACTOR WILL BE A SUB TO THE MC. THE TEMPERATURE CONTROL CONTRACTORS SCOPE SHALL INCLUDE CONTROLS INSTALLATION AND WIRING, PROVIDING OPERATING MANUALS, START UP SERVICES, CONTROL ENGINEERING AND TRAINING AND WARRANTY FOR FACTORY RELATED ISSUES ON EQUIPMENT AND CONTROLS.

B. THE PARTS SHALL BE ON STATE CONTRACT AND THE TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE A LIST OF EQUIPMENT THAT THE MC SHALL NEED TO INSTALL PRIOR TO BID. ALL NEW DDC CONTROLS SHALL BE PROVIDED BY STARKTECH / DAY AUTOMATION AND CONNECTED TO THE EXISTING SYSTEM. TEMPERATURE CONTROL EQUIPMENT IDENTIFIED AS PER SCHEDULE AND DDC CONTROLS WILL BE PRE-PURCHASED AND SUPPLIED FOR THIS PROJECT VIA STARKTECH / DAY AUTOMATION'S NYS OGS CONTRACT.

1. EQUIPMENT WILL BE SHIPPED FROM THE FACTORY TO THE TEMPERATURE CONTROLS CONTRACTOR. THE EQUIPMENT WILL BE UNLOADED, INSPECTED AND STORED BY THE TC. ANY VALVES OR DAMPERS WILL BE GIVEN TO AND INSTALLED BY THE MECHANICAL CONTRACTOR.
2. THE STATE CONTRACT PURCHASED TC EQUIPMENT AND TC CONTROLS SHALL INCLUDE TEMPERATURE CONTROLLERS AND DEVICES.
3. SEE SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
4. ALL OTHER WARRANTY SERVICES ARE BY THE HVAC CONTRACTOR.

FAN SCHEDULE														
TAG	SERVICE	TYPE	AIRFLOW (CFM)	E.S.P. (IN. W.G.)	MOTOR SPEED (RPM)		TIP SPEED (FPM)	SONES	DRIVE TYPE	MOTOR TYPE	FAN MOTOR DATA			
					OPERATING	MAX					HP	VOLTS	PHASE	HZ
EF-1	STORAGE / ELEC. / STORAGE - H115.4 / H219.1	DOWNBLAST	650	0.5	1581	1725	4500	9.4	DIRECT	ECM	1 / 6	115	1	60

1. FURNISH FAN WITH MANUFACTURER'S FACTORY MOUNTED AND WIRED DISCONNECT, RATED FOR DISCONNECT LOCATION.
2. FURNISH UNIT WITH MANUFACTURER'S SCHEDULED CONTROL DEVICE, FACTORY MOUNTED AND WIRED.
3. FURNISH UNIT WITH 24" TALL ROOF CURB.

E							
FAN MOTOR DATA				CONTROL		MANUFACTURER & MODEL NO.	NOTES
HP	VOLTS	PHASE	HZ	TYPE	FURNISHED BY		
1 / 6	115	1	60	POTENTIOMETER	MANUFACTURER	GREENHECK - G-095-VG	1, 2, 3

2

GLYCOL FILL TANK SCHEDULE [FURNISHED BY OWNER]							
TAG	SYSTEM	TANK VOLUME (GALLONS)	FLUID	VOLTS	PHASE	MANUFACTURER & MODEL NO.	NOTES
IT-1	GYM UNIT(S) PG LOOP	--	40% PROPYLENE	--	--	--	1
IT-2	GLYCOL HEATING LOOP	--	40% PROPYLENE	--	--	--	1

- NOTES:
1. PROVIDE UNIT WITH A PRESSURIZATION PUMP WITH CONTROLS, PRV, AND PRESSURE GAUGE.

CERTIFICATE OF AUTHORIZATION
ENGINEERING - 0021631
SURVEY - 0020652

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KA

KEYSTONE ASSOCIATES

ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

SED PROJECT NUMBER:
HIGH SCHOOL
60-04-02-04-0-007-023

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY

MECHANICAL SCHEDULES

PROJECT NO.
1823.24221.1.3

DATE
02/09/2026

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WWW.KEYSTONEASSOCIATES.COM

PROJECT NO.
1823.24221.1.3

DATE
02/09/2026

A. OWNER TO HAVE RIGHT TO FIRST REFUSAL OF ALL REMOVED EQUIPMENT. ALL EQUIPMENT WILL EITHER BE REMOVED AND DISPOSED OF OFFSITE OR THE OWNER MAY DECIDE TO KEEP IT, AT WHICH POINT, THIS CONTRACTOR SHALL BRING EQUIPMENT TO THE OWNER'S DESIRED LOCATION. COORDINATE EXACT LOCATION WITH OWNER'S REPRESENTATIVE.

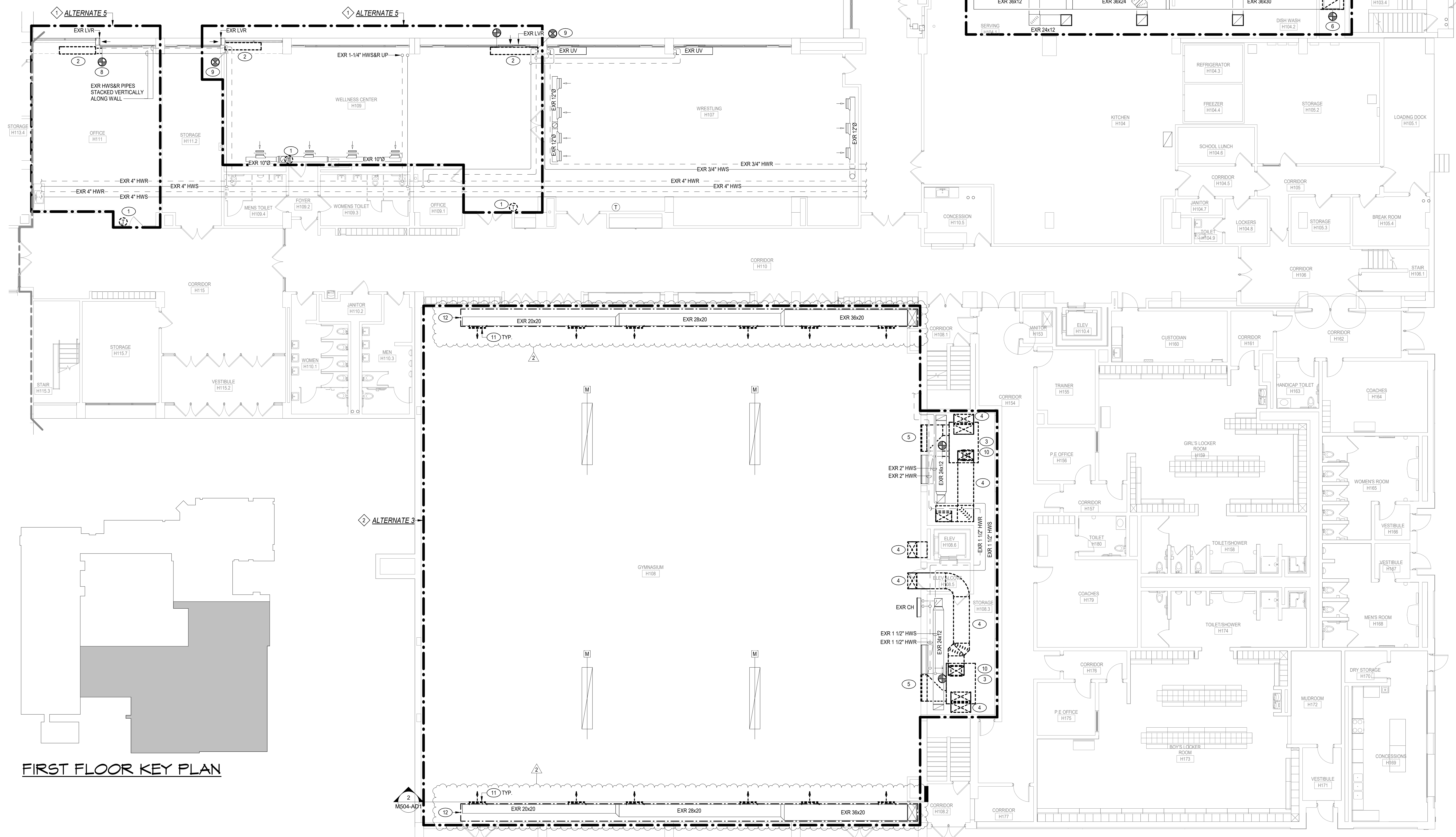
1. ALTERNATE IS AN ADD TO REMOVE EXISTING EQUIPMENT AND PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO; REMOVAL OF COUNTERTOP, UNIT VENTILATOR, PIPING, HANGERS, CONTROLS, VALVES, AND ALL ASSOCIATED APPURTENANCES.

2. ALTERNATE IS AN ADD TO REMOVE EXISTING EQUIPMENT AND PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO; REMOVAL OF PIPES, HANGERS, CONTROL VALVES, DUCTWORK, AIR HANDLING UNIT, AND ALL ASSOCIATED APPURTENANCES.

1. DISCONNECT AND REMOVE EXISTING THERMOSTAT

2. DISCONNECT AND REMOVE EXISTING UNIT VENTILATOR, PIPING, CONTROLS, WIRING, OUTSIDE AIR DUCT CONNECTION TO LOUVER, AND ALL ASSOCIATED APPURTENANCES.
3. DISCONNECT AND REMOVE EXISTING AIR HANDLING UNIT, PIPING, DUCTWORK, CONTROLS, WIRING, AND ALL ASSOCIATED APPURTENANCES.
4. DISCONNECT AND REMOVE EXISTING DUCTWORK, AIR TERMINALS, DAMPERS, HANGERS, AND ALL ASSOCIATED APPURTENANCES.
5. DISCONNECT AND REMOVE EXISTING WALL AND SLEEVE GC TO INFILL WALL AND PAINT TO MATCH LOUVER COLOR.
6. DISCONNECT AND REMOVE EXISTING DUCTWORK COMING UP FROM BASEMENT. PROVIDE SHEETMETAL CAP AND SEAL AIR TIGHT.
7. DISCONNECT EXISTING TO REMAIN AIR TERMINAL AND DUCTWORK FROM MAIN DUCT AND SEAL FOR RECONNECTION TO NEW DUCTWORK.
8. DISCONNECT AND REMOVE EXISTING HOT WATER SUPPLY AND RETURN PIPING EXISTING VERTICALLY EXISTING WALL, INCLUDING HANGERS, VALVES, CONTROLS, AND ALL ASSOCIATED APPURTENANCES.
9. DISCONNECT AND REMOVE EXISTING HOT WATER SUPPLY AND RETURN PIPING CONNECTION TO UNIT VENTILATOR, INCLUDING HANGERS, VALVES, CONTROLS, AND ALL ASSOCIATED APPURTENANCES.

10. REMOVE EXISTING CONCRETE EQUIPMENT PAD.
11. DISCONNECT AND REMOVE EXISTING AIR TERMINAL.
12. EXISTING DUCTWORK TO BE ABANDONED IN SOFFIT.

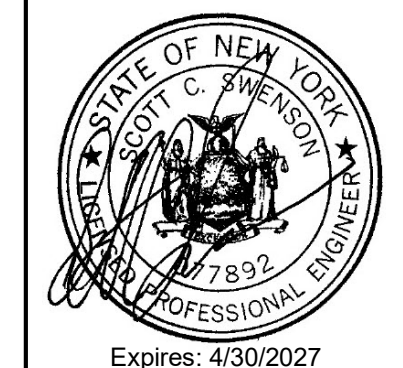


FIRST FLOOR KEY PLAN

1 FIRST FLOOR MECHANICAL REMOVAL PLAN - AREA 1
M202-AD1 1/8" = 1'-0"

CERTIFICATE OF
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SURVEY - 0020652

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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD TIOGA COUNTY, NY
FIRST FLOOR MECHANICAL REMOVAL PLAN - AREA 1

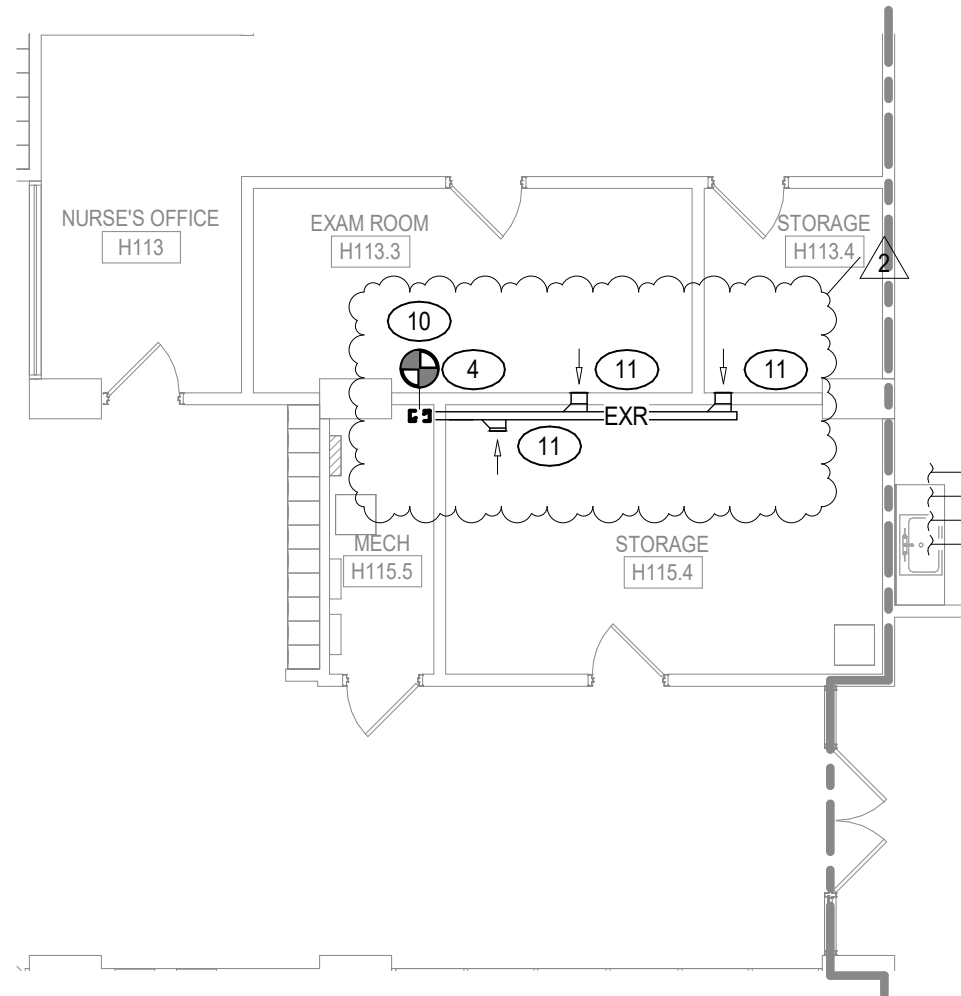
SHEET NO.
M202-AD1

PROJECT NO.	1823.24221.1.3
DATE:	12/12/2025

CAD FILE NO.: High_School_RVT24.rvt

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1 STORAGE (H115.) MECH. REMOVAL REVISION

REMOVAL NOTES: ○

4. DISCONNECT AND REMOVE EXISTING DUCTWORK, DAMPERS, HANGERS, AND ALL ASSOCIATED APPURTENANCES.
10. PROVIDE SHEETMETAL CAP OVER REMOVED SECTION OF DUCT - SEAL AIR TIGHT.
11. PRIOR TO THE START OF REMOVALS, PROVIDE PRE-BALANCING OF EXISTING TO REMAIN AIR TERMINALS. PROVIDE WRITTEN REPORT TO ENGINEER AND OWNER'S REPRESENTATIVE.

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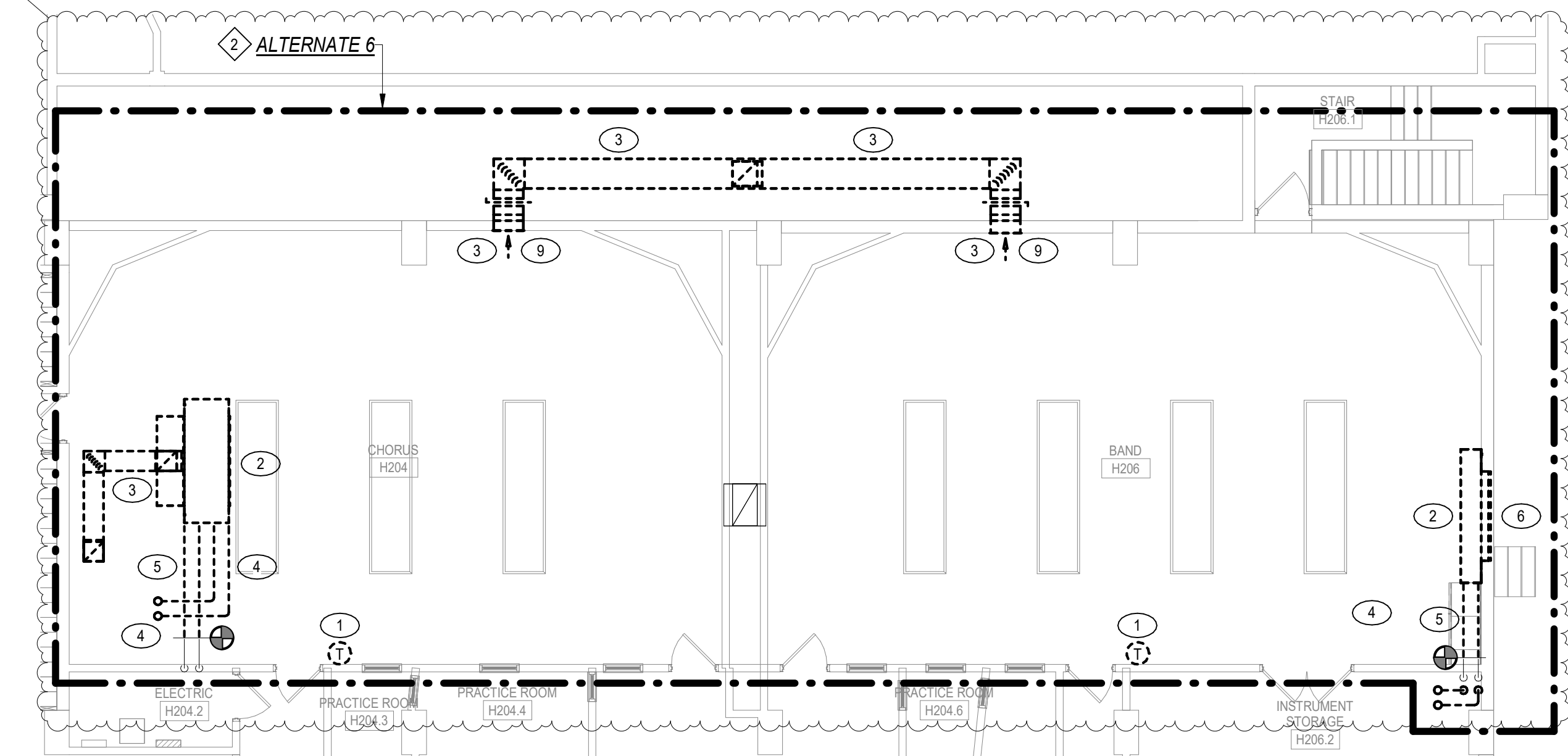
68 WILSON CREEK ROAD
TOGA COUNTY, NY

**FIRST FLOOR MECHANICAL
REMOVAL PLAN - AREA 3**

SHEET NO.	
M204-AD1	
PROJECT NO.	
1823.24221.1.3	
DATE:	02/09/2026
AD FILE NO.:	High_School_RVT24.rvt

- 

- 



1

CHORUS/ BAND (H204/H206) MECH. REMOVAL REVISION

M205-AD1 $1/8" = 1'-0"$



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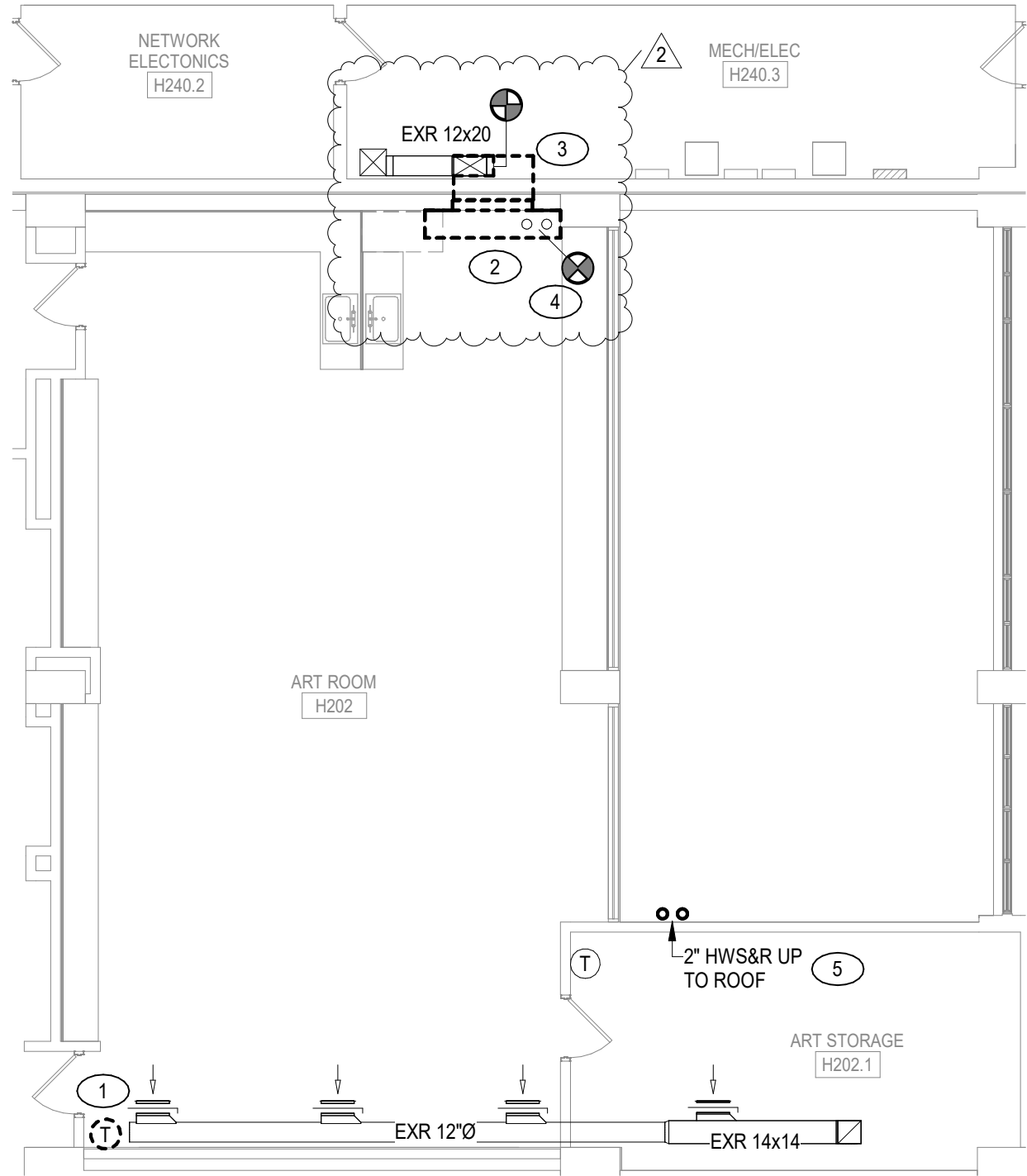
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WILSON CREEK ROAD
TOGA COUNTY, NY
**SECOND FLOOR MECHANICAL
REMOVAL PLAN - AREA 1**

SHEET NO.
1205-AD1
PROJECT NO.
1823.24221.1.3
02/09/2026
FILE NO.: High School_RVT24.rvt

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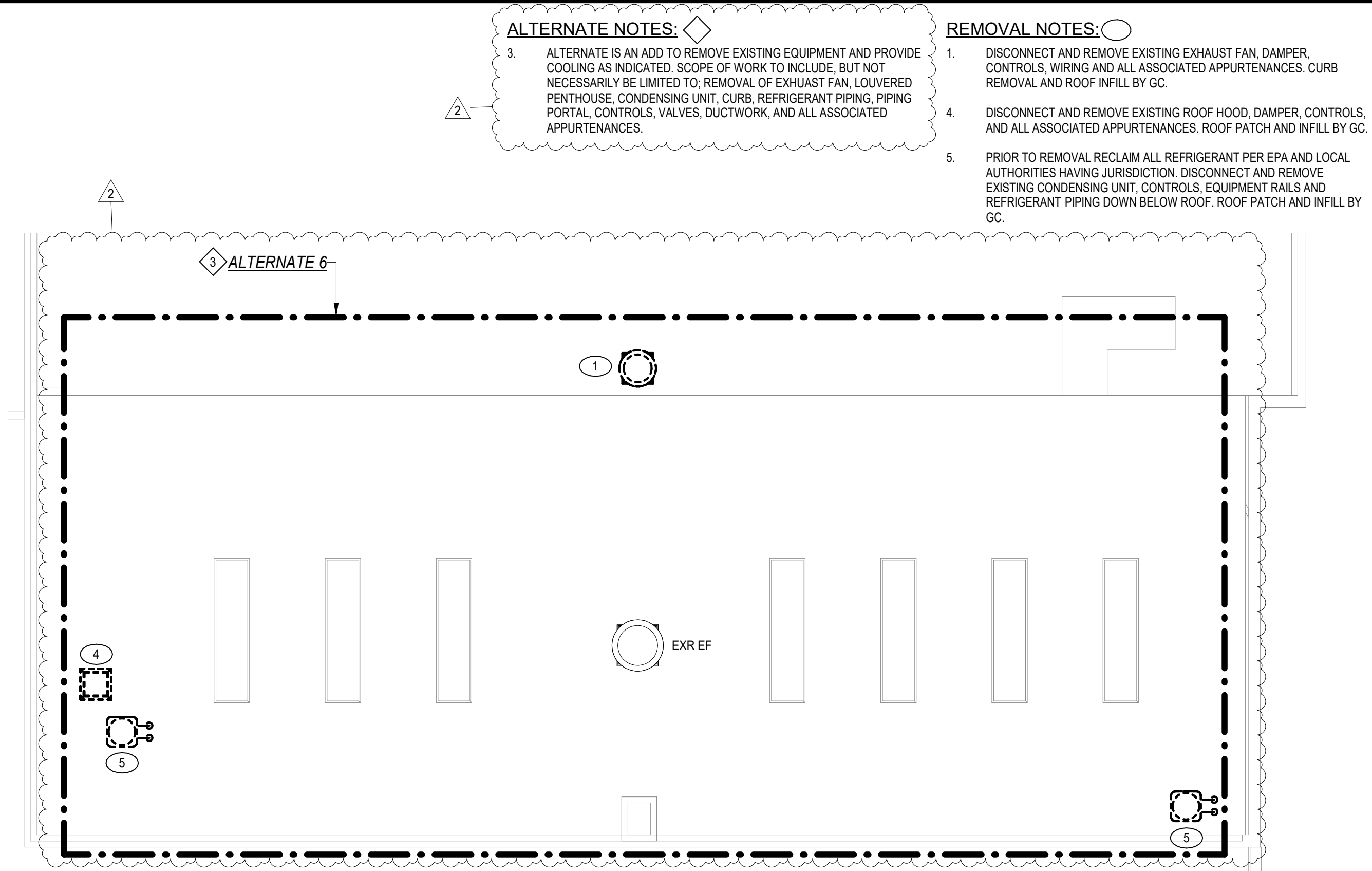


1 ART ROOM (H202) MECH. REMOVAL REVISION
M206-AD1 1/8" = 1'-0"

- REMOVAL NOTES:**
1. DISCONNECT AND REMOVE EXISTING THERMOSTAT.
 2. DISCONNECT AND REMOVE EXISTING UNIT VENTILATOR, PIPING, CONTROLS, WIRING, OUTSIDE AIR DUCT CONNECTION TO LOUVER, AND ALL ASSOCIATED APPURTENANCES.
 3. DISCONNECT AND REMOVE EXISTING DUCTWORK, AIR TERMINALS, DAMPERS, HANGERS, AND ALL ASSOCIATED APPURTENANCES.
 4. DISCONNECT AND REMOVE EXISTING HOT WATER SUPPLY AND RETURN PIPING STACKED VERTICALLY ALONG WALL, INCLUDING HANGERS, VALVES, CONTROLS, AND ALL ASSOCIATED APPURTENANCES.
 5. DISCONNECT AND REMOVE EXISTING HOT WATER SUPPLY AND RETURN PIPING UP TO ROOFTOP.

NEWARK VALLEY CENTRAL SCHOOL DISTRICT 2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL AIR CONDITIONING 68 WILSON CREEK ROAD TOGA COUNTY, NY		SED PROJECT NUMBER: HIGH SCHOOL 6004402-04-007-023		KEYSTONE ASSOCIATES ARCHITECTS, ENGINEERS AND SURVEYORS, LLC 58 Exchange Street Binghamton, New York 13901 Phone: 607.722.1100 Fax: 607.722.2515 Email: info@keystoncomp.com www.keystoncomp.com	
SECOND FLOOR MECHANICAL REMOVAL PLAN - AREA 2		WARNING: This drawing is the property of Keystone Associates, Architects, Engineers and Surveyors, LLC. It is to be used only for the project and site specified herein. No part of this drawing may be reproduced or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Keystone Associates, Architects, Engineers and Surveyors, LLC.		© Copyright 2025 Keystone Associates Architects, Engineers and Surveyors, LLC	
SHEET NO. M206-AD1		PROJECT NO. 1823.24221.1.3		DATE: 02/09/2026	
CAD FILE NO.: High_School_M206.rvt		PROJECT NO. 1823.24221.1.3		DATE: 02/09/2026	

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1 ROOF MECHANICAL REMOVAL PLAN - AREA 1 REVISION
M208-AD1 1/8" = 1'-0"

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2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL AIR CONDITIONING 88 WILSON CREEK ROAD TOGA COUNTY, NY		2 Bid Addendum #1 NO. 02/09/2026 REVISIONS AND DESCRIPTIONS DATE		SED PROJECT NUMBER: HIGH SCHOOL 60-04-02-04-0-007-023		CERTIFICATE OF AUTHORIZATION ENGINEERING - 0021631 SURVEY - 0020652 58 Exchange Street Banghainton, New York 13001 Phone: 607.722.1100 Fax: 607.722.2515 Email: info@keysoncomp.com www.keysoncomp.com KEYSTONE ASSOCIATES ARCHITECTS, ENGINEERS AND SURVEYORS, LLC	
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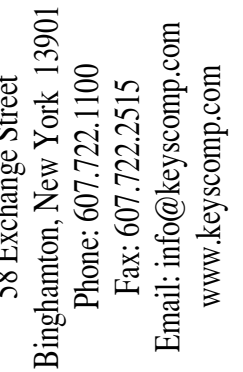
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3. MC TO FIELD MEASURE AND CUT FILLER PANELS TO FIT AS INTENDED.

DRAWING NOTES: 

1. PROVIDE VOLUME DAMPER IN VERTICAL SECTION OF DUCT.
2. SUPPLY GRILLES TO BE MOUNTED AT 45 DEGREE ANGLE POINTED DOWN.
3. SAFE OFF UNUSED PORTION OF LOUVER PER DETAIL ON M600 SERIES.
4. PROVIDE UNID RETURN DUCT WITH ELBOW OPEN TO ROOM. TERMINATE WITH 45DEG ANGLE CUT WITH WIRE MESH SCREEN OVER OPENING.
5. RE-BALANCE EXISTING TO REMAIN AIR TERMINALS TO AFFLOR OBTAINED DURING PRE-BALANCING.
6. UNIT VENTILATOR WITH ADAPTOR/FALSE BACK - REFER TO DETAIL 2M902 FOR ADDITIONAL INFORMATION.

1. PROVIDE VOLUME DAMPER IN VERTICAL SECTION OF DUCT.
2. SUPPLY GRILLES TO BE MOUNTED AT 45 DEGREE ANGLE POINTED DOWN.
3. SAFE OFF UNUSED PORTION OF LOUVER PER DETAIL ON M600 SERIES.
4. PROVIDE LINED RETURN DUCT WITH ELBOW OPEN TO ROOM. TERMINATE WITH 45DEG ANGLE CUT WITH WIRE MESH SCREEN OVER OPENING.
5. RE-BALANCE EXISTING TO REMAIN AIR TERMINALS TO AIRFLOW OBTAINED DURING PRE-BALANCING.
6. UNIT VENTILATOR WITH ADAPTOR/FALSE BACK - REFER TO DETAIL 2/M602 FOR ADDITIONAL INFORMATION.



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HIGH SCHOOL
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2023 CAPITAL PROJECT - PHASE III
 HIGH SCHOOL AIR CONDITIONING
 68 WILSON CREEK ROAD
 TIOGA COUNTY, NY
 FIRST FLOOR DUCT PLAN - AREA 3

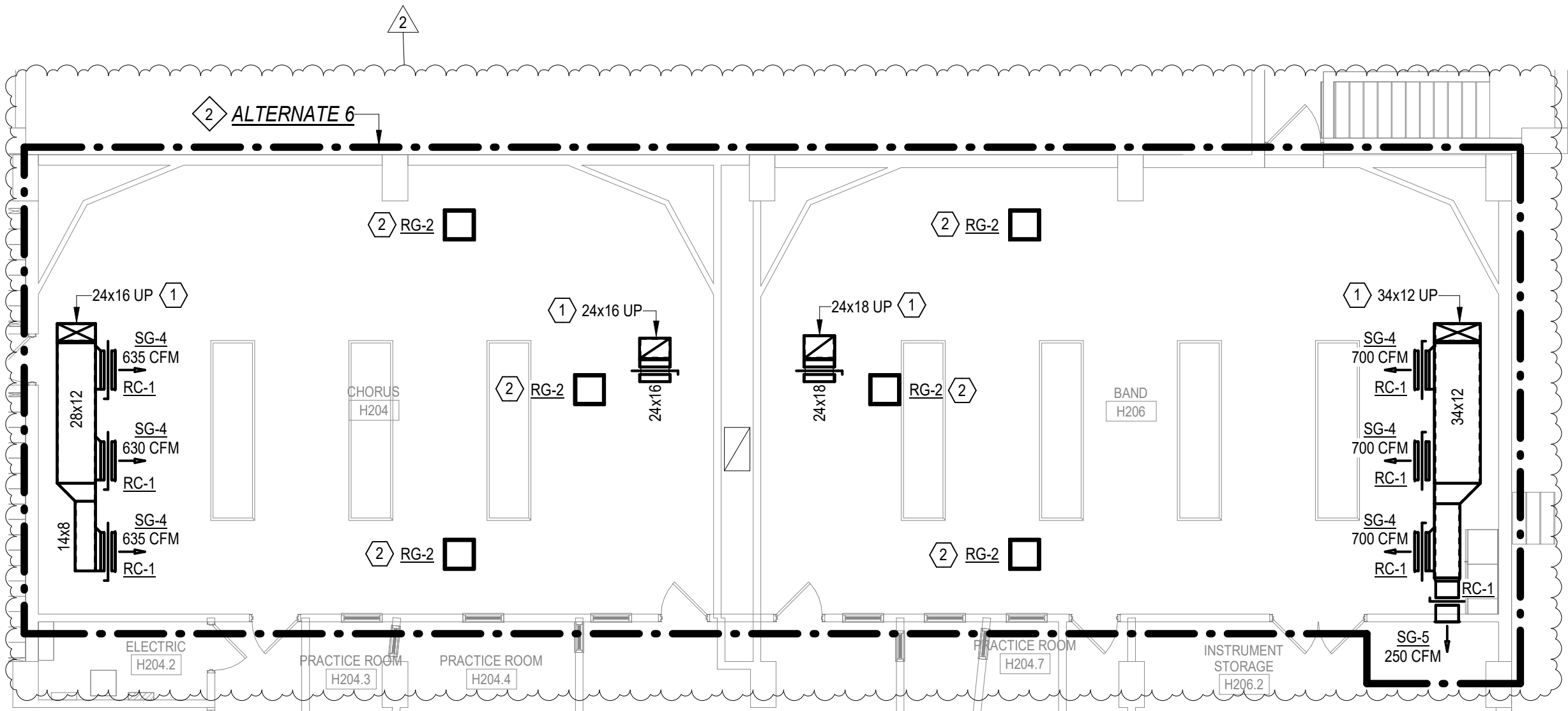
SHEET NO.
1303-AD1
PROJECT NO.

PROJECT NO.
1823.24221.1.3

TE: 12/12/2025

FILE NO.: High School_RVT24.rvt

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ALTERNATE NOTES:

2. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO; PROVIDING LINED DUCTWORK, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, PIPES, HANGERS, VALVES, PIPE INSULATION, PVC JACKETING, PUMPS, HEAT EXCHANGERS, EXPANSION TANKS, AIR SEPARATORS, GLYCOL FILL TANKS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

DRAWING NOTES:

1. COORDINATE DUCT DROP WITH EXISTING AND NEW STRUCTURAL BEAMS AND COLUMNS.
2. COORDINATE PLENUM RETURN GRILLES WITH EXISTING ACT TILES AND LIGHT FIXTURES IN FIELD.

1 CHORUS/ BAND (H204/H206) DUCT REVISION

M304-AD1 1/8" = 1'-0"

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NO.	REVISION AND DESCRIPTION	DATE
1	Bid Addendum #1	02/09/2026

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
SECOND FLOOR DUCT PLAN - AREA 1

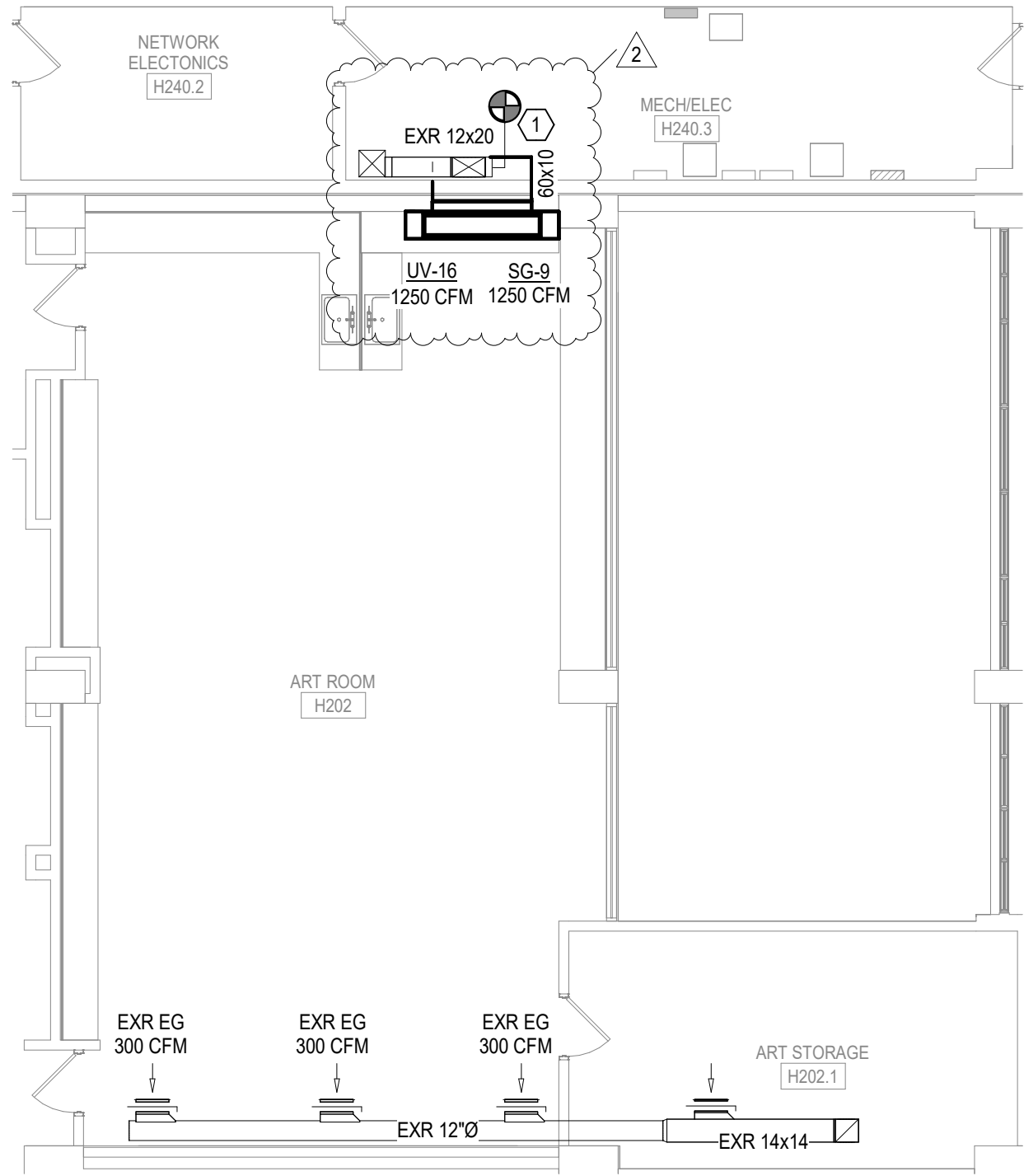
SHEET NO.
M304-AD1

PROJECT NO.
1823.24221.1.3

DATE: 02/09/2026

CAD FILE NO.: High_School_RVT24.rvt

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2

DRAWING NOTES:

1. PROVIDE FULL SIZE OA DUCT CONNECTION - EXTEND TO OPENING ON BACK OF UNIT VENTILATOR AND SEAL AIR TIGHT. EXTEND DUCTWORK AND CONNECT TO EXISTING DUCTWORK.

1 ART ROOM (H202) DUCT REVISION
M305-AD1 1/8" = 1'-0"

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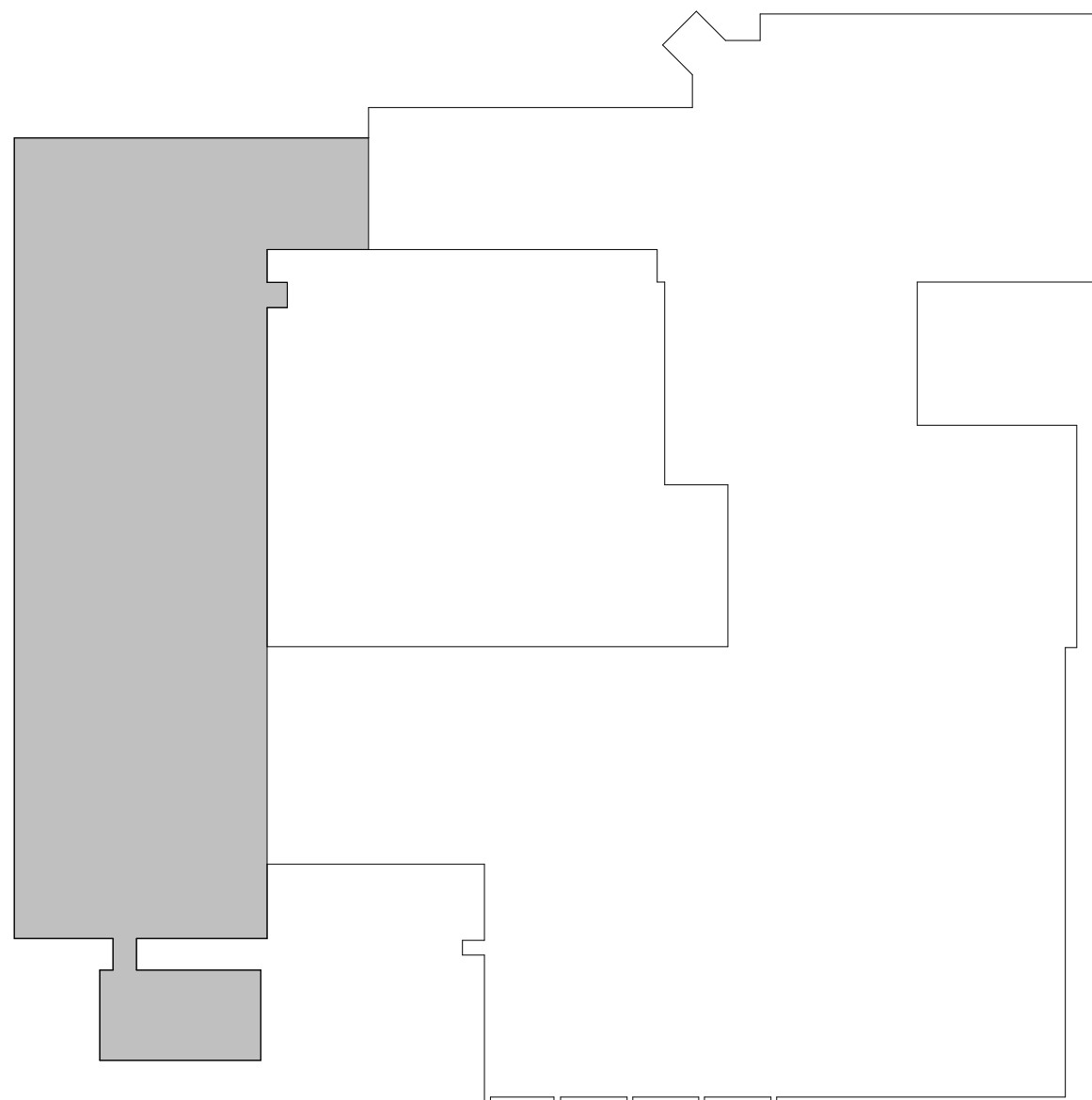
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2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING
68 WILSON CREEK ROAD
TOGA COUNTY, NY

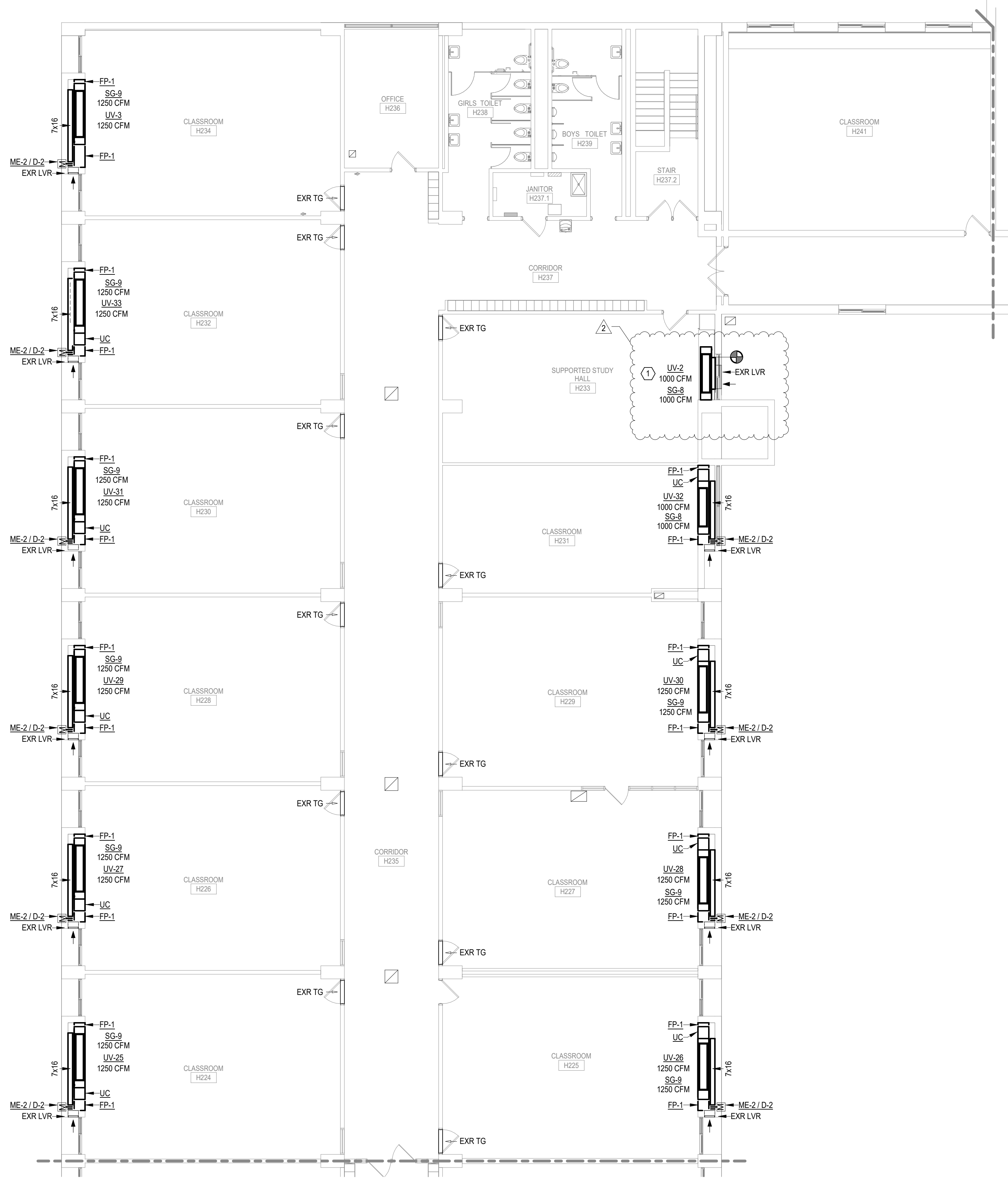
SECOND FLOOR DUCT PLAN - AREA 2

SHEET NO.
M305-AD1
PROJECT NO.
1823.24221.1.3
DATE:
02/09/2026
CAD FILE NO.: High_School_RVT24.rvt

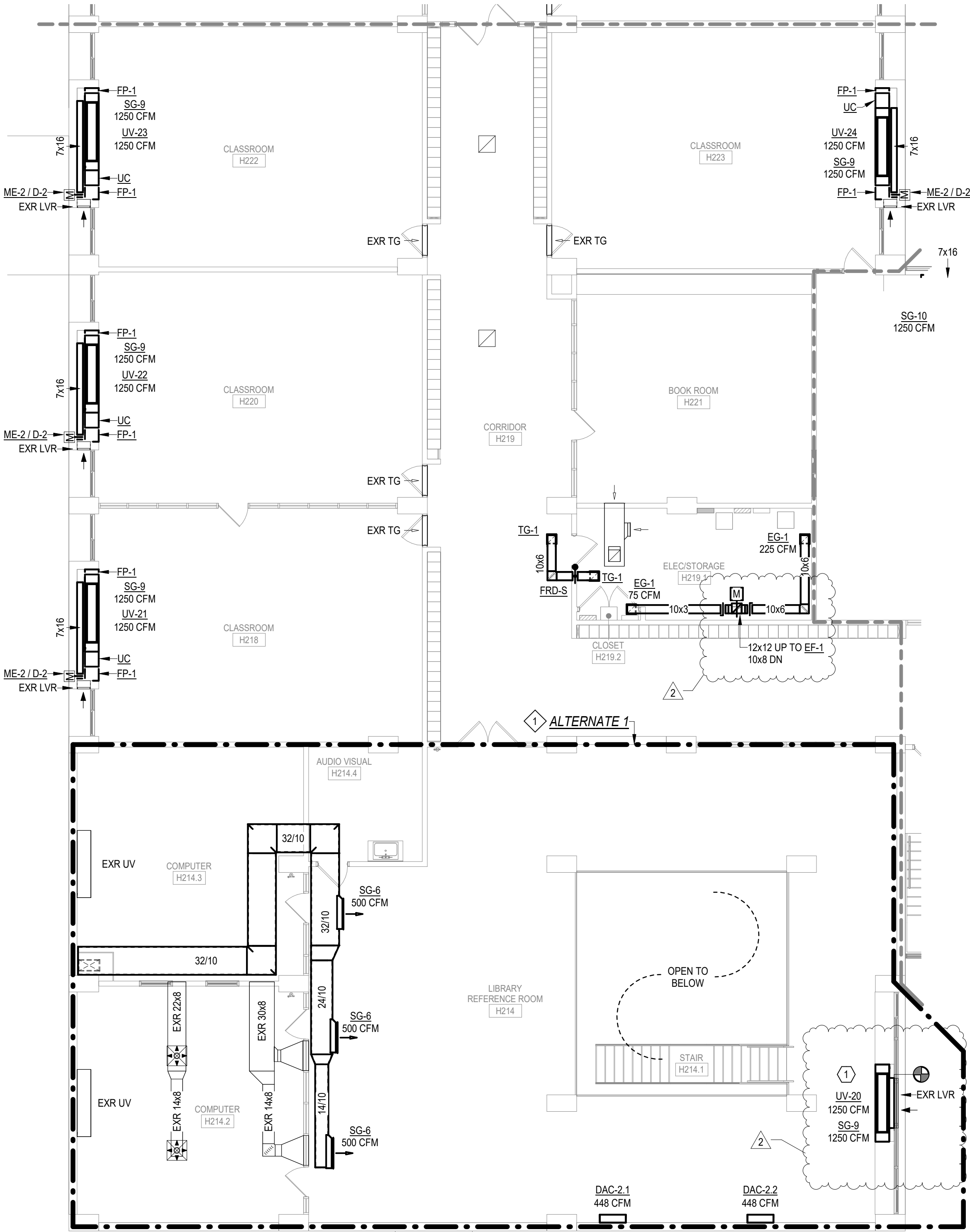
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SECOND FLOOR KEY PLAN



1 SECOND FLOOR DUCT PLAN - AREA 3 UPPER
M306-AD1 1/8" = 1'-0"



2 SECOND FLOOR DUCT PLAN - AREA 3 LOWER
M306-AD1 1/8" = 1'-0"

GENERAL NOTES:
A. MC TO FIELD MEASURE AND CUT FILLER PANELS TO FIT AS INTENDED.
DRAWING NOTES:
1. UNIT VENTILATOR WITH ADAPTOR/FALSE BACK - REFER TO DETAIL 2M602 FOR ADDITIONAL INFORMATION.

ALTERNATE NOTES:
1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING H&V UNIT VENTILATORS, COUNTERTOPS, FILLER PANELS, CONDENSING UNITS, ROOF SUPPORTS, PIPING PORTALS, REFRIGERANT AND CONDENSATE PIPING INCLUDING HANGERS & INSULATION, COOLING COILS, MANUFACTURERS REQUIRED ACCESSORIES IN UNIT VENTILATORS (CONTROL BOX & EXPANSION VALVE KITS), ADDITIONAL DDC CONTROLS & INTEGRATION FOR CONTROL OF COOLING, ALL NECESSARY APPURTENANCES, AND LABOR FOR A FULLY FUNCTIONAL SYSTEM. ADDITIONALLY, SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING LINED DUCTWORK, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

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SED PROJECT NUMBERS:
HIGH SCHOOL
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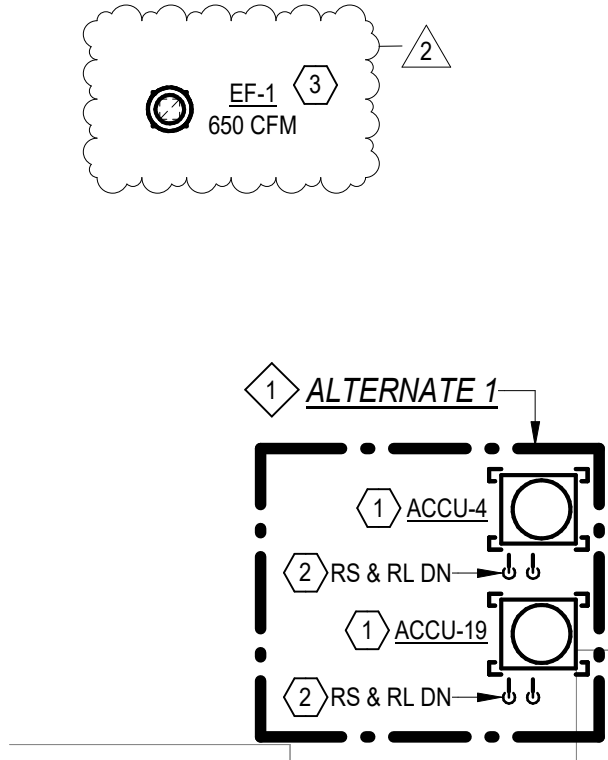
02/09/2026
07/21/2026
12/12/2025

2 Bill Addendum #1
12/12/2025
NO REVISIONS OR RESUBMISSIONS

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREK ROAD
TIOGA COUNTY, NY
SECOND FLOOR DUCT PLAN - AREA 3

SHEET NO.
PROJECT NO.
1823.24221.1.3
DATE:
12/12/2025
CAB FILE NO.: High_School_RVT24-11

M306-AD1



ALTERNATE NOTES:

1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO; PROVIDING CONDENSING UNITS, ROOF SUPPORTS, PIPING PORTALS, REFRIGERANT AND CONDENSATE PIPING INCLUDING HANGERS & INSULATION, COOLING COILS, MANUFACTURER'S REQUIRED ACCESSORIES IN UNIT VENTILATORS (CONTROL BOX & EXPANSION VALVE KITS), MANUFACTURER'S REQUIRED ACCESSORIES IN AHU, ADDITIONAL DDC CONTROLS & INTEGRATION FOR CONTROL OF COOLING, ALL NECESSARY APPURTENANCES, AND LABOR FOR A FULLY FUNCTIONAL SYSTEM.

DRAWING NOTES:

1. PROVIDE ROOF EQUIPMENT SUPPORT, RESR - TWO PER CONDENSING UNIT. GC TO ANCHOR TO DECK AND FLASH INTO ROOFING SYSTEM.
2. FURNISH PIPING PORTAL FOR INSTALLATION BY GC.
3. FURNISH ROOF CURB FOR INSTALLATION BY GC/RC.

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SED PROJECT NUMBER:
HIGH SCHOOL
600402-04-007-023

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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL
AIR CONDITIONING
68 WILSON CREEK ROAD
TOGA COUNTY, NY

ROOF MECHANICAL PLAN - AREA 3

SHEET NO.
M309-AD1

PROJECT NO.
1823.24221.1.3

DATE: 02/09/2026

CAD FILE NO.: High_School_RVT24.rvt

GENERAL NOTES - CONTROLS & EQUIPMENT

THE EXISTING BUILDING AUTOMATION SYSTEM AT NEWARK VALLEY CSD IS A SCHNEIDER ELECTRIC DDC SYSTEM, INSTALLED AND SERVICED BY DAY AUTOMATION SYSTEMS.

- A. THE TEMPERATURE CONTROL CONTRACTORS LABOR SHALL BE BID UNDER THE MECHANICAL CONTRACTOR AND THE TEMPERATURE CONTROL CONTRACTOR WILL BE A SUB TO THE MC. THE TEMPERATURE CONTROL CONTRACTORS SCOPE SHALL INCLUDE CONTROLS INSTALLATION AND WIRING, PROVIDING OPERATING MANUALS, START UP SERVICES, CONTROL ENGINEERING AND TRAINING AND WARRANTY FOR FACTORY RELATED ISSUES ON EQUIPMENT AND CONTROLS.
- B. THE PARTS SHALL BE ON STATE CONTRACT AND THE TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE A LIST OF EQUIPMENT THAT THE MC SHALL NEED TO INSTALL PRIOR TO BID. ALL NEW DDC CONTROLS SHALL BE PROVIDED BY STARKTECH / DAY AUTOMATION AND CONNECTED TO THE EXISTING SYSTEM. TEMPERATURE CONTROL EQUIPMENT IDENTIFIED AS PER SCHEDULE AND DDC CONTROLS WILL BE PRE-PURCHASED AND SUPPLIED FOR THIS PROJECT VIA STARKTECH / DAY AUTOMATION'S NYS OGS CONTRACT.
1. EQUIPMENT WILL BE SHIPPED FROM THE FACTORY TO THE TEMPERATURE CONTROLS CONTRACTOR. THE EQUIPMENT WILL BE UNLOADED, INSPECTED AND STORED BY THE TC. ANY VALVES OR DAMPERS WILL BE GIVEN TO AND INSTALLED BY THE MECHANICAL CONTRACTOR.
 2. THE STATE CONTRACT PURCHASED TC EQUIPMENT AND TC CONTROLS SHALL INCLUDE TEMPERATURE CONTROLLERS AND DEVICES.
 3. SEE SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
 4. ALL OTHER WARRANTY SERVICES ARE BY THE HVAC CONTRACTOR.

2

M701

STATE CONTRACT INFORMATION

NO SCALE

- C. ADD Alternate GC-3 - Gymnasium Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all general construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, heat exchanger, pumps, specialties, and all necessary appurtenances necessary for a fully functioning system, at the Gymnasium, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- D. ADD Alternate GC-4 - Technology Room Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all general construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Technology Room, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- E. ADD Alternate GC-5 - Miscellaneous Rooms Air Conditioning:
- I. Indicate on the Bid Form the amount to be added to the Base Bid if all general construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including PTAC(s), Unit Ventilator(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Miscellaneous Rooms, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- F. ADD Alternate GC-6 - Band H206 and Chorus H204 Air Conditioning:
- I. Indicate on the Bid Form the amount to be added to the Base Bid if all general construction work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

C. ADD Alternate MC-3 - Gymnasium Air Conditioning:

- I. Indicate the amount to be added to the Base Bid if all mechanical work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, heat exchanger, pumps, specialties, and all necessary appurtenances necessary for a fully functioning system, at the Gymnasium, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

D. ADD Alternate MC-4 - Technology Room Air Conditioning:

- I. Indicate the amount to be added to the Base Bid if all mechanical work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including rooftop unit(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at the Technology Room, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

E. ADD Alternate MC-5 - Wellness H1109, Office H1111, Psychologist Office H208, Phys Ed Offices H210 & H212 Air Conditioning:

- I. Indicate the amount to be added to the Base Bid if all mechanical work associated with removing existing mechanical equipment including unit ventilators, fin tube, etc and providing new PTAC(s), Unit Ventilator(s), ductwork, piping, insulation, testing & balancing, specialties, and all necessary appurtenances necessary for a fully functioning system at Wellness H1109, Office H1111, Psychologist Office H208, Phys Ed Offices H210 & H212, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

F. ADD Alternate MC-6 - Band H206 and Chorus H204 Air Conditioning:

- I. Indicate the amount to be added to the Base Bid if all mechanical work associated with removing existing mechanical equipment including ductwork, etc and providing new mechanical equipment including air handling unit, unit ventilator(s), split system(s), air cooled condensing units, ductwork, piping, insulation, testing & balancing, and all necessary appurtenances necessary for a fully functioning system at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- C. ADD Alternate EC-3 - Gymnasium Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all temperature control work associated with removing existing mechanical equipment and providing new mechanical equipment, at the Gymnasium, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- D. ADD Alternate EC-4 - Technology Room Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all temperature control work associated with removing existing mechanical equipment and providing new mechanical equipment at the Technology Room, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- E. ADD Alternate EC-5 - Wellness H1109, Office H111, Psychologist Office H208, Phys Ed Offices H210 & H212 Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all temperature control work associated with removing existing mechanical equipment and providing new mechanical equipment at Wellness H1109, Office H111, Psychologist Office H208, Phys Ed Offices H210 & H212, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

- F. ADD Alternate EC-6 - Band H206 and Chorus H204 Air Conditioning:
- I. Indicate the amount to be added to the Base Bid if all temperature control work associated with removing existing mechanical equipment and providing new mechanical equipment at the Band and Chorus Rooms, as shown in the Contract Documents, is added to the Project.

ADD: _____
TOTAL FOR MATERIALS AND LABOR (written) (figures)

I.3 UNIT PRICES - NONE

I.4 ALLOWANCES

The Bidder hereby certifies that the Base Bid includes the following cash allowances as stipulated by the Architect in the Specifications.

- a. Include the sum of \$15,000.00 for Field Directive Allowance.

I.5 ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for 45 calendar days from the Bid closing date. Contract Award shall be determined by the Lowest Responsible Base Bid plus any combination of Alternates at the discretion of the Owner.

If this Bid is accepted by the Owner within the time period stated above, we will:

- Execute the Agreement within 10 days of receipt of Notice to Proceed.
- Furnish the required bonds within 10 days of receipt of Notice to Proceed in the form described in Contract Documents.
- Commence Work upon receipt of written Notice to Proceed.

If this Bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required bonds, the Bid security shall be forfeited as damages to the Owner by reason of our failure, limited in amount to the lesser of the face value of the Bid security or the difference between this Bid and the Bid upon which a Contract is signed.

In the event our Bid is not accepted within the time stated above, the required security deposit will be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

The sum given in the Base Bid represents the entire cost of the Project. The sum given shall include any and all cost for insurance, including all insurance required by the Agreement, any and all fees for licenses and permits. The Undersigned agrees that no claim will be made for any additional costs regardless of any increases in costs such as higher wage scales or material prices. No amount is included in the Base Bid for State and Local sales taxes on any materials which it purchases for this project.

The Undersigned has carefully checked all the figures used in compiling the sum given in the Base Bid and understands that the Owner will not be responsible for any errors or omissions incurred by the Undersigned in making up of this Bid. The Undersigned further understands that no modification or withdrawal of this proposal will be permitted after the time specified for the receipt of Bids.

The Undersigned has examined the location of the proposed Work, Drawings, Specifications and other Contract Documents and is familiar with local conditions at the place where Work is to be performed.

I.6 CONTRACT TIME

If this Bid is accepted, we will:

- be Substantially Complete by August 28, 2026. Final Completion shall be within thirty (30) days from Substantial Completion.

I.7 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the bid sum.

Addendum #1 Dated _____

Addendum #2 Dated _____

Addendum #3 Dated _____

Addendum #4 Dated _____

Addendum #5 Dated _____

I.8 BID FORM SIGNATURES

The Corporate Seal of

.....
(Bidder - print the full name of your firm)

was hereunto affixed in the presence of:

.....
(Authorized signing officer Title)

(Seal)

.....
(Authorized signing officer Title)

(Seal)

If the Bid is a joint venture or partnership, add additional forms of execution for each member of the joint venture in the appropriate form or forms as above.

SECTION 23 09 93 - ADI

TEMPERATURE CONTROLS

PART I – GENERAL

I.1 RELATED SECTIONS

- A. The General Conditions of the Contract including all modified General Conditions, and Division I specification and shall be used in conjunction with this section as part of the contract documents. Consult the above for further instructions pertaining to this work. The Contractor is bound by the provisions of Division 0 and Division I.

I.2 STATE CONTRACT

- A. The existing building automation system at Newark Valley CSD is a Schneider Electric DDC System, installed and serviced by Day Automation Systems.
- B. The temperature control contractors labor shall be bid under the mechanical contractor and the temperature control contractor will be a sub to the MC. The temperature control contractors scope shall include controls installation and wiring, providing operating manuals, start up services, control engineering and training and warranty for factory related issues on equipment and controls.
- C. The parts shall be on state contract and the temperature control contractor shall provide a list of equipment that the mc shall need to install prior to bid. All new DDC controls shall be Schneider Electric and connected to the existing system. Day Automation Systems equipment identified as per schedule and DDC controls will be pre-purchased and supplied for this project via Stark Tech / Day Automation's NYS OGS contract.
- D. Equipment will be shipped from the factory to the temperature controls contractor. The equipment will be unloaded, inspected and stored by the TC. Any valves or dampers will be given to and installed by the mechanical contractor.
- E. The state contract purchased day equipment and day controls shall include temperature controllers and devices.
- F. See specification sections for additional requirements.
- G. All other warranty services are by the HVAC contractor.

I.3 CONNECTION TO EXISTING CONTROL SYSTEM

- A. All new control equipment must integrate seamlessly with existing Schneider Electric DDC system, installed and serviced by Day Automation. All new digital controllers are required to communicate fully with the existing temperature control network.
- B. All new controllers provided under this project must be connected to the existing BAS System. Extend network (including software) as required to provide a fully integrated control system.

- C. BAS System Contractor shall modify programming in host computer to accept all new equipment and I/O points.
- D. Contractor must visit site to inspect existing equipment required for operation of new systems. If existing miscellaneous equipment is not of sufficient size or is not functioning properly, contractor must include replacement or refurbishment in his bid.

I.4 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - I. Schneider Electric, installed and serviced by Stark Tech / Day Automation.
- B. If the Contractor is proposing to provide a product by a Manufacturer other than those listed above, the Contractor must, at least 10 days prior to bid opening, to obtain the approval of the Owner for the equal manufacturer, along with provided 5 references of sites where the company has performed projects to similar type.

I.5 SOFTWARE UPGRADES / SERVER UPGRADES

- A. At the completion of the project, the contractor shall ensure that all software is at its latest available revision and that all hardware (servers, workstations, laptops, etc.) shall be capable of meeting all requirements to ensure that the (OWNER) has been furnished with a completely updated system.
- B. If replacement of existing hardware is required due to compatibility with the latest revision of software, it shall be the responsibility of this contractor to provide new hardware.

I.6 CONTROL SYSTEM DESCRIPTION

- A. Provide labor, controls materials, controls equipment and services as required for a complete BACnet Building Automation System (BAS), to perform the functions described in this Section. Controls System shall be Web-based and accessible either directly connected and/or through the owners IP LAN network.
- B. It is the BAS manufacturer's responsibility to provide all the design, engineering, and field coordination required to ensure all equipment sequence of operations are met as specified and the designated BAS operators have the capability of managing the building mechanical system.
- C. The BAS shall meet BACnet communication standards to ensure the system maintains "interoperability" to avoid proprietary arrangements that will make it difficult for the Owner to consider other BAS manufacturers in future projects. These open protocol communication standards are discussed in more detail later in this specification.
- D. BAS controllers shall be listed by BACnet Testing Laboratories (BTL) with appropriate classification.

- E. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems and equipment on this project.
- F. The BAS shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by the security permissions of the operator role. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.
- G. The BAS manufacturer shall provide all hardware and software necessary to implement the functions and sequence of operations specified.

I.7 SUBMITTAL REQUIREMENTS

- A. BAS manufacturer shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software being provided for this project. No work may begin on any segment of this project until the Engineer has reviewed submittals for conformity with the plan and specifications. Five (5) copies are required. All shop drawings shall be provided to the Owner electronically once they have been approved and as-built drawings have been completed.
- B. Quantities of items submitted shall be reviewed by the Engineer. Such review shall not relieve the BAS manufacturer of furnishing quantities required based upon contract documents.
- C. Provide the Engineer with any additional information or data which is deemed necessary to determine compliance with the specifications or which is deemed valuable in documenting and understanding the system to be installed.
- D. Submit the following within 45 days of contract award:
 - 1. A complete bill of materials of equipment to be used indicating quantities, manufacturers and model numbers.
 - 2. A schedule of all control valves including the valve size, pressure drop, model number (including pattern and connections), flow, CV, body pressure rating, and location.
 - 3. A schedule of all control dampers including damper size, pressure drop, manufacturer, and model number.
 - 4. Note: schedule of valves and dampers shall be submitted independently of other submittals; do not combine with other submittals.
 - 5. Provide all manufacturers' technical cut sheets for major system components. When technical cut sheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Include:
 - a) Building Controllers
 - b) Custom Application Controllers
 - c) Application Specific Controllers
 - d) Operator Workstations
 - e) Portable Operator Terminals
 - f) Auxiliary Control Devices

6. Room schedule including a separate line for each VAV box and/or terminal unit indicating location and address.
 7. Samples of graphic display screen types and associated menus.
 8. Provide proposed Building Automation System architectural diagram depicting various controller types, workstations, device locations, addresses, and communication cable requirements.
 9. Provide detailed termination drawings showing all required field and factory terminations, as well as terminal tie-ins to DDC controls provided by mechanical equipment manufacturers. Terminal numbers shall be clearly labeled.
 10. Provide points list showing all system objects and the proposed object names.
 11. Provide a sequence of operation for each controlled mechanical system and terminal end devices.
 12. Provide a BACnet Protocol Implementation Conformance Statement (PICS) for each BACnet system level device (i.e. Building Controller & Operator Workstations) type. This defines the points list for proper coordination of interoperability with other building systems if applicable for this project.
- E. Project Record Documents: Upon completion of installation, submit PDF of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:
1. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic drawing files shall be provided.
 2. Testing and Commissioning Reports and Checklists signed off by trained factory (equipment manufacturers) and field (BAS) commissioning personnel.
 3. Operating and Maintenance (O & M) Manuals - These shall be as-built versions of the submittal product data. In addition to the information required for the submittals, Operating & Maintenance manual shall include:
 - a) Names, address and 24-hour/7-day per week telephone numbers of Contractor personnel managing and installing equipment, along with service personnel responsible for supporting the ongoing warranty and services of the control system.
 - b) Procedures for operating the BAS including logging on/off, alarm management, generation of reports, trends, overrides of computer control, modification of setpoints, and other interactive system requirements.
 - c) Description of the programming language including syntax, statement descriptions, algorithms, calculations, point database creation and modification, program creation and modification, and operator use of the editor.
 - d) Explanation of how to design and install new points, new DDC controllers, and other BAS hardware.
 - e) Preventative Maintenance and calibration procedures; hardware troubleshooting; and hardware repair and/or replacement procedures.
 - f) Documentation of all software program logic created for Custom Programmable Controllers including the overall point database. Provide one set of magnetic media containing files of the software and point database.
 - g) One set of electronic media containing files of all operator color graphic screens for the project.

- h) A list of recommended spare parts including pricing, manufacturer, supplier, and part numbers.
- i) Documentation, installation, and maintenance information for all third party hardware/software products provided including personal computers, printers, hubs, sensors, valves, etc.
- j) Original issue media for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
- k) Licenses, Guarantee, and Warranty documents for all equipment and systems.

I.8 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Section 232113 – Hydronic Piping
 - 1. Control Valves
 - 2. Temperature Sensor Wells and Sockets
 - 3. Hydronic Pressure Taps
 - 4. Hydronic Flow Meters
- B. Section 233300 – Ductwork Accessories
 - 1. Automatic Dampers
 - 2. Airflow Stations

I.9 DEFINITIONS

Term	Definition
UCP	Unitary Controller
ACP	Air Handler Controller
BACnet/BACnet Standard	BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.
Control Systems Server	A computer(s) that maintain(s) the systems configuration and programming database.
Controller	Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.
Direct Digital Control	Microprocessor-based control including Analog/Digital conversion and program logic.
Gateway	Bi-directional protocol translator connecting control systems that use different communication protocols.
Local Area Network	Computer or control system communications network limited to local building or campus.
Master-Slave/Token Passing (MS/TP)	Data link protocol as defined by the BACnet standard.
Point-to-Point	Serial communication as defined in the BACnet standard.
Primary Controlling LAN	High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.
Protocol Implementation Conformance Statement (PICS)	A written document that identifies the particular options specified by BACnet that are implemented in a device.
Router	A device that connects two or more networks at the network layer.

Term	Definition
UCP	Unitary Controller
Wiring	Raceway, fittings, wire, boxes and related items.

I.10 CODES AND STANDARDS

- A. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.
 - 1. Underwriters Laboratories: Products shall be UL-916-Energy Management Systems for BAS components & ancillary equipment
 - 2. Underwriters Laboratories: Products shall be UL-873 Temperature Indication & Regulating Equipment.
 - 3. Federal Communications Commission –Part 15- Subpart J.
 - 4. All products shall be labeled with the appropriate approval markings. System installation shall comply with NFPA, NEMA, Local and National Standards.
 - 5. ASHRAE/ANSI 135-2012 (BACnet) - (System Level Devices) - Building Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.
 - 6. ASHRAE/ANSI 135-2012 (BACnet) - (Unit Level Devices) - Unit Controllers shall conform to the listed version of the BACnet specification in order to improve interoperability with various building system manufacturers' control systems and devices.

I.11 QUALITY ASSURANCE

- A. BAS Manufacturer Qualifications
 - 1. The BAS manufacturer shall have an established business office within 100 miles of the project site and must provide 24 hours/day, 7 days/week response in the event of a customer warranty or service call.
 - 2. The BAS Manufacturer shall have factory trained and certified personnel providing all engineering, service, startup, and commissioning field labor for the project from their local office location. BAS manufacturer shall be able to provide training certifications for all local office personnel upon request.
 - 3. The BAS shall be provided by a single manufacturer and this manufacturer's equipment must consist of operator workstation software, Web-based hardware/software, Open Standard Protocol hardware/software, Custom application Programming Language, Graphical Programming Language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (i.e., sensors, valves, dampers, actuators, etc.) need not be manufactured by the BAS manufacturer listed in this specification.

I.12 SYSTEM PERFORMANCE

- A. Performance Standards. The BAS system shall conform to the following:
 - 1. Graphic Display. The system shall display a graphic with a minimum of 20 dynamic points. All current data shall be displayed within 10 seconds of the operator's request.

2. Graphic Refresh. The system shall update all dynamic points with current data within 10 seconds.
3. Object Command. The maximum time between the command of a binary object by the operator and the reaction by the device shall be 5 seconds. Analog objects shall start to adjust within 5 seconds.
4. Object Scan. All changes of state and change of analog values shall be transmitted over the high-speed network such that any data used or displayed at a controller or workstation will be current within the prior 10 seconds.
5. Alarm Response Time. The maximum time from when an object goes into alarm to when it is annunciated at the workstation shall not exceed 10 seconds.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 seconds. The Contractor shall be responsible for selecting execution times consistent with the mechanical process under control.
7. Programmable Controllers shall be able to execute DDC PID control loops at a selectable frequency from at least once every 5 seconds. The controller shall scan and update the process value and output generated by this calculation at this same frequency.
8. Multiple Alarm Annunciations. All workstations on the network shall receive alarms within 5 seconds of each other.
9. Reporting Accuracy. Table I lists minimum acceptable reporting accuracies for all values reported by the specified system.
 - a) Table I: Reporting Accuracy (*applicable to the project*)

Measured Variable	Reported Accuracy
Space Temperature	±1°F
Ducted Air	±2°F
Outside Air	±2°F
Water Temperature	±1°F
Delta –T	±0.25°F
Relative Humidity	±5% RH
Water Flow	±5% of full scale
Air Flow (terminal)	±10% of reading
Air Flow (measuring stations)	±5% of reading
Air Pressure (ducts)	±0.1 "W.G.
Air Pressure (space)	±0.01 "W.G.
Water Pressure	±2% of full scale *Note 1
Electrical Power	5% of reading *Note 2
Carbon Monoxide (CO)	± 50 PPM
Carbon Dioxide (CO2)	± 50 PPM

Note 1: for both absolute and differential pressure

Note 2: * not including utility supplied meters

I.13 WARRANTY REQUIREMENTS

- A. Warranty all work as follows:
 - I. BAS system labor and materials shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. BAS failures during the warranty period shall be adjusted, repaired, or replaced at no charge to the Owner. The BAS manufacturer shall respond to the

- Owner's request for warranty service within 24 hours of the initiated call and will occur during normal business hours.
2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the BAS is operational, and has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of the warranty period.
 3. Operator workstation software, project specific software, graphics, database, and firmware updates shall be provided to the Owner at no charge during the warranty period. Written authorization by the Owner must be granted prior to the installation of these updates.
 4. The BAS manufacturer shall provide a web-accessible Users Network for the proposed System and give the Owner free access to question/answer forum, user tips, upgrades, and training schedules for a one year period of time correlating with the warranty period.

I.14 SYSTEM MAINTENANCE

- A. Perform Building Automation System preventative maintenance and support for a period of 1 year (beginning the date of substantial completion).
 1. Make a minimum of 2 complete Building Automation System inspections, in addition to normal warranty requirements. Inspections to include:
 - a) System Review – Review the BAS to correct programming errors, failed points, points in alarm, and points that have been overridden manually.
 - b) Seasonal Control Loop Tuning – Control loops are reviewed to reflect changing seasonal conditions and/or facility heating and cooling loads.
 - c) Sequence of operation verification – Systems all verified to be operating as designed and in automatic operation. Scheduling and setpoints are reviewed and modified.
 - d) Database back-up
 - e) Operator coaching
 2. Technician shall review critical alarm log and advise owner of additional services that may be required.
 3. Technician shall provide a written report to owner after each inspection.
- B. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of owner.

I.15 OWNERSHIP OF PROPRIETARY MATERIAL

- A. Project specific software and documentation shall become the owner's property upon project completion.

I.16 SEQUENCE OF OPERATION

- A. Unit Shut Down
 1. All units connected to FACP shall be shut down in the event of fire. (By EC via fire alarm system).

2. All units with low limit controllers (freezestats) shall be shut down if supply air temperature drops below 35°F. Shut down includes closing OA dampers, shut down fan, open control valve (or face damper).
 3. All low limit controls shall be hard wired to break fan controls. Wiring low limit through DDC is not permitted to break fan controls. Wiring from LC-I to DDC system is for alarm purposes only.
 4. When low limit control is activated, send auxiliary alarm signal to DDC unit controller. DDC system shall annunciate alarm condition.
 5. **All temperature control valves and dampers will be spring return and shall fail to the "Safe" position for that system.**
 6. **Bypass valve application will be size for 50% of the pump capacity of that system.**
- B. Remote Monitoring:
1. Provide all software necessary to monitor all sensors, equipment status and alarm conditions at operate workstation and local second tier controllers.
 2. Provide all software necessary to recognize, process and record alarm conditions as required by Owner.
- C. Occupied/Unoccupied Cycle:
1. Each system with DDC controls shall function as an individual D/N zone with individual event times for start/stop.
 2. Stagger initial start times to prevent simultaneous occupied cycle activation for all equipment.
 3. In unoccupied cycle, when room sensor override button is pushed, start software timer (setpoint 2 hours) to provide Day (occupied) cycle for a software selectable period of time after which system reverts to Night (unoccupied) cycle.
 4. While software timer is operating ignore additional override switch signals. System shall ignore switch signals initiated when area is in occupied cycle.
- D. Morning Warm-Up: Provide software routine to initiate morning warm-up when outdoor conditions dictate, warm-up schedule shall be adaptive (i.e. optimize energy usage). During morning warm-up for classrooms and shop areas with motion detector, the detector is overridden until room occupied temperature setpoint is reached, duration (2) hours (adjustable).
- E. Refer to drawings for unit specific sequences.

PART 2 – PRODUCTS

2.1 GENERAL DESCRIPTION

- A. The Building Automation System (BAS) shall use an open BACnet architecture and DDC controllers that are certified by BACnet Testing Laboratories (BTL) with the appropriate classifications. The BAS shall be capable to integrate to third-party devices and applications. The system shall be for use on the Internet, or intranets using off the shelf, industry standard technology compatible with the owner provided network.

- B. The Building Automation System (BAS) shall consist of the following:
 - 1. BACnet Testing Laboratories Certified Controllers
 - 2. Portable Operator Terminal(s)
 - 3. Networking processing, data storage, and communications equipment
 - 4. Other controls components required for a complete and working BAS
- C. The Building Automation System (BAS) shall be modular in nature, and shall permit expansion of both capacity and functionality through addition of sensors, controllers, actuators, and operator devices, while reusing existing controls equipment.

2.2 BAS ARCHITECTURE

- A. Communication Network
 - 1. This project shall be comprised of a high speed Ethernet network utilizing BACnet/IP communications between System Controllers and Workstations. Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system. Communications between System Controllers and sub-networks of Custom Application Controllers and/or Application Specific Controllers shall be as defined below.
 - 2. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/Zigbee (802.15.4) as defined by the Zigbee Standard.
 - a) Each communication interface shall be Zigbee Building Automation Certified product as defined by the BACnet Standard and the Zigbee Alliance.
 - b) Each System Controller shall function as a BACnet Router to each unit controller providing a unique BACnet Device ID for all controllers within the system.
 - c) Wireless equipment controllers and auxiliary control devices shall conform to:
 - (1) IEEE 802.15.4 radios to minimize risk of interference and maximize battery life, reliability, and range.
 - (2) Communication between equipment controllers shall conform to ZigBee Building Automation (ZBA) standard as BACnet tunneling devices to ensure future integration of other ZBA certified devices.
 - (3) Operating range shall be a minimum of 200 feet (60 m); open range shall be 2,500 ft. (762 m) with less than 2% packet error rate.
 - (4) To maintain robust communication, mesh networking and two-way communications shall be used to optimize the wireless network health.
 - (5) Wireless communication shall be capable of many-to-one sensors per controller to support averaging, monitoring, and multiple zone applications.
 - (6) Certifications shall include FCC CFR47 - RADIO FREQUENCY DEVICES - Section 15.247 & Subpart E.

3. Each System Controller shall perform communications to a network of Custom Application and Application Specific Controllers using BACnet/MSTP (RS485) as defined by the BACnet standard.
- B. Integrator Panel:
1. The BAS System shall include appropriate hardware equipment and software to allow bi-directional data communications between the BAS and the 3rd Party manufacturers' control panels. The BAS shall receive, react to, and return information from multiple building systems, including equipment manufacturers' integral packaged controls that do not have the BACnet protocol.
 2. All data required by the application shall be mapped into the BAS database, and shall be transparent to the operator.
 3. Point inputs and outputs from the third-party controllers shall have real-time interoperability with the BAS such as: Control Software, Energy Management, Custom Process Programming, Alarm Management, Historical Data and Trend Analysis, and Local Area Network Communications.

BACNET Protocol Integration:

4. The neutral protocol used between systems will be BACnet and must comply with the ASHRAE BACnet standard 135.
 5. A complete Protocol Implementation Conformance Statement (PICS) shall be provided for all BACnet system devices.
 6. The ability to command, share point object data, change of state data, and schedules between the host and BACnet systems shall be provided.
- C. The Controls Contractor shall provide all communication media, connectors, repeaters and network switches routers necessary for the high speed Ethernet communications network.

2.3 OPERATOR USER INTERFACE

- A. Furnish 1 PC based operator interface as shown on the system drawings. Each operator web interface shall be able to access all information in the system. Operator interfaces shall reside on the same dedicated high-speed IP network as the System Controller(s).
1. Each operator interface PC shall include the following:
 - a) Hardware type
 - (1) PC or Laptop
 - b. Minimum Hardware
 - (1) Pentium Core 2 DUO or better
 - (2) 4 GB RAM
 - (3) 100 GB hard drive space
 - c. Internet Browser compatibility outlined in the following sections.
- B. Operator web interface
1. The operator web interface shall be accessible via a web browser without requiring any "plug-ins" (i.e. JAVA Runtime Environment (JRE), Adobe Flash).
 2. The operator web interface shall support the following Internet web browsers:
 - a) Internet Explorer 11.0+
 - b) Firefox 47.0+

- c) Chrome 51.0+
- 3. System Security
 - a) Each operator shall be required to login to the system with a user name and password in order to view, edit, add, or delete data.
 - b) User Profiles shall restrict the user to only the objects, applications, and system functions as assigned by the system administrator.
 - c) Each operator shall be allowed to change their user password.
 - d) The System Administrator shall be able to manage the security for all other users.
 - e) The system shall include pre-defined “roles” that allow a system administrator to quickly assign permissions to a user.
 - f) User logon/logoff attempts shall be recorded.
 - g) The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
 - h) All system security data shall be stored in an encrypted format.
 - i) The system shall support Active Directory for user set-up and management.
 - j) The system shall track and record all user log-in activity and all changes done at the enterprise level including who made the change, when, what was changed, previous value and new value.
- 4. Database
 - a) Database Save: A system operator with the proper password clearance shall be able to archive controller back-ups on the designated Enterprise operator web interface PC.
 - b) Database Restore: The system operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.
 - c) Database Limits. The system operator shall have the ability to set limits on Alarm Log, Global Point Control Log, System Log, and User Change Log to manage database size.
- 5. On-line Help and Training
 - a) Provide a context sensitive, on line help system to assist the operator in operation and configuration of the system.
 - b) On-line help shall be available for all system functions and shall provide the relevant data for each particular screen.
- 6. System Diagnostics
 - a) The system shall automatically monitor the operation of all network connections, building management panels, and controllers
 - b) The failure of any device shall be annunciated to the operators.
- 7. Customizable Navigation Tree
 - a) The Enterprise operator web interface shall include a fully customizable navigation tree that shall allow an operator to do the following:
 - (1) Move and edit any of the nodes of the tree.
 - (2) Move entire groups to any area of the tree
 - (3) Change the name of any node in the tree
 - (4) Create custom nodes for any page in the web interface including graphics, data log views, schedules, and dashboards.
 - (5) Support navigation from multi-building to single building view.
 - (6) Provide the ability to assign graphics to any node in the tree.

- (7) Ability to create folders and assign and change hierarchy of nodes of the tree.
- 8. Equipment & Application Pages
 - a) The Enterprise operator web interface shall include standard pages for all equipment and applications. These pages shall allow an operator to obtain information relevant to the operation of the equipment and/or application, including:
 - (1) Animated Equipment Graphics for each major piece of equipment and floor plan in the System.
 - (2) Alarms relevant to the equipment or application without requiring a user to navigate to an alarm page and perform a filter.
 - (3) Historical Data (As defined in Data Log section below) for the equipment or application without requiring a user to navigate to a Data Log page and perform a filter.
 - (4) View of all custom graphical programming for supported controllers in real time.
 - (5) View and management of all points for equipment and applications.
 - (6) Support documents that have been assigned for that equipment.
 - (7) Live data view for any selected points.
 - (8) Touch friendly design for all action buttons, navigation, and spacing.
- 9. System Graphics. Enterprise operator web interface shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract. Indicate thermal comfort on floor plan summary graphics using colors to represent zone temperature relative to zone set point.
 - a) Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point and-click navigation between zones or equipment, and to edit set points and other specified parameters.
 - b) Graphic imagery – graphics shall use 3D images for all standard and custom graphics. The only allowable exceptions will be photo images, maps, schematic drawings, and selected floor plans.
 - c) Animation. Graphics shall be able to animate by displaying different Image lies for changed object status.
 - d) Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
 - e) Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in (such as HTML and JavaScript) or shall only require widely available no-cost plug-ins (such as Active-X and Macromedia Flash).
- 10. Custom Graphics
 - a) The operator interface shall be capable of displaying custom graphics in order to convey the status of the facility to its operators.

- b) Graphical Navigation. The Enterprise operator web interface shall provide dynamic color graphics of building areas, systems and equipment.
 - c) Graphical Data Visualization. The Enterprise operator web interface shall support dynamic points including analog and binary values, dynamic text, static text, and animation files.
 - d) Custom background images. Custom background images shall be created with the use of commonly available graphics packages such as Adobe Photoshop. The graphics generation package shall create and modify graphics that are saved in industry standard formats such as GIF and JPEG.
- 11. Graphics Library. Furnish a library of standard MECHANICAL equipment such as chillers, air handlers, terminals, fan coils, unit ventilators, rooftop units, and VAV boxes, in 3-dimensional graphic depictions. The library shall be furnished in a file format compatible with the graphics generation package program.
- 12. Document Support. The Enterprise operator web interface shall support the ability to import support files into a support files library.
 - a) Imported support files can include the following types of document formats: pdf, docx, xlsx, pptx, jpeg, tif, bmp, png, jpg, gif.
 - b) All imported support files can be associated directly with equipment or family types that can then be accessed directly from standard pages.
- 13. Manual Control and Override
 - a) Point Control. Provide a method for a user to view, override, and edit if applicable, the status of any object and property in the system. The point status shall be available by menu, on graphics or through custom programs.
 - b) Temporary Overrides. The user shall be able to perform a temporary override wherever an override is allowed, automatically removing the override after a specified period of time.
 - c) Override Owners. The system shall convey to the user the owner of each override for all priorities that an override exists.
 - d) Provide a specific icon to show timed override or operator override, when a point, unit controller or application has been overridden manually.
 - e) Global Point Control. Provide a method for a user to view, override, and edit if applicable, the status of multiple object and properties in the system. The point status shall be available by menu, on graphics or through custom programs.
- 14. Engineering Units
 - a) Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system.
 - b) Unit selection shall be able to be customized by locality to select the desired units for each measurement.
- 15. Scheduling. A user shall be able to perform the following tasks utilizing the Enterprise operator web interface:
 - a) Create a new schedule, defining the default values, events and membership.
 - b) Create expectations to a schedule for any given day.
 - c) Apply an exception that spans a single day or multiple days.
 - d) View a schedule by day, week and month.

- e) Exception schedules and holidays shall be shown clearly on the calendar.
 - f) Modify the schedule events, members and exceptions.
 - g) Create schedules and exceptions for multiple buildings.
 - h) Apply emergency schedule to multiple buildings
 - i) Drag and drop scheduling editing
 - j) Global schedule and exceptions across multiple buildings
16. Time of day scheduling
- a) Individual time schedules shall be provided for all areas and as listed below. The schedules for each area shall operate independently and shall be configured to meet the requirements of the Owner. The start time of each area shall be configured with optimum start times software functions, stop times shall follow a simple off time schedule.

Areas	Approx. Occupied Time
Office Areas	06:30 - 17:00
Classroom	07:00 - 15:00
Library	07:00 - 15:00
Toilet Room Exhaust Fans	06:00 - 20:00
Gymnasium	09:00 - 15:00
Auditorium	09:00 - 15:00
Kitchen	06:00 - 1500
Open Area	07:00 - 17:00

Note: General equipment associated with a particular area shall follow the area start/stop time schedule (i.e. – classroom general exhaust fans shall stop @ 15:00).

17. Data Logs
- a) Data Logs Definition
 - (1) The Enterprise operator web interface shall allow a user with the appropriate security permissions to define a Data Log for any data in the system.
 - (2) The Enterprise operator web interface shall allow a user to define any Data Log options as described in the Application and Control Software section.
 - (3) Data Log viewing capabilities shall include the ability to show a minimum of 5 points on a chart.
 - (4) Each data point data line shall be displayed as a unique color.
 - (5) Data points can be hidden on the display view by clicking on the point.
 - (6) The operator shall be able to specify the duration of historical data to view by scrolling, zooming, or selecting from a pull down list.
 - (7) The system shall provide a graphical trace display of the associated time stamp and value for any selected point along the x-axis.
 - (8) Operator will have the ability to show alarms and overrides on any data log view.

- b) Export Data Logs
 - (1) The Enterprise operator web interface shall allow a user to export Data Log data in CSV, xlsx or text format for use by other industry standard word processing and spreadsheet packages.
- C. Central Server – Components (Provide server as required)
 - 1. The central physical or virtual server shall consist of the following (minimum):
 - 2. System shall utilize a server class PC, tower or rack mounted.
 - 3. Two 3.0 GHz, Quad Core
 - 4. 8GB, DDR266 SDRAM memory
 - 5. Hard Drive 73 GB
 - 6. RAID 5 (recommended)
 - 7. Microsoft Windows Server 2012/2014
 - 8. Microsoft SQL Server 2008/2012
 - 9. No Exception Taken Framework V3.5, 4.0
 - 10. TCP/IP Interface
- D. The central server shall provide the following applications within the system.
 - 1. Trend Log Application
 - a) The system shall automatically harvest trend logs for defined key measurements for each controlled MECHANICAL device and MECHANICAL application.
 - b) The automatic trend logs shall monitor these parameters for a minimum of 30 days at 15 minute intervals. The automatic trend logs shall be user adjustable.
 - 2. Site Management
 - a) The system must allow for grouping of the many sites in an enterprise in a logical manner.
 - b) The system shall provide a search function to allow users to search for sites or groups of sites by name or partial names.
 - c) The system must provide the necessary means to add, remove, and manage site.
 - 3. Automatic System Database Save and Restore
 - a) The central server shall store on the hard disk backup tables of data including trends, alarms, custom settings and user profiles.
 - b) The data shall be backed up once a day.
 - c) This database shall be updated whenever a change is made in the system.
 - d) The storage of this data shall be automatic and not require operator intervention.
 - e) This capability is completed through SQL scheduled automated tasks for backup and only available in full SQL, and not SQL Express.
 - 4. Manual Database Save and Restore. A system operator with the proper password clearance shall be able to archive the database manually at any time.
 - 5. System Configuration. The central server shall serve web pages as the interface for configuring the operator-level functions of the system. A user with proper security shall be able to configure the system to allow for future changes or additions.

- E. Portable Operator's Terminal P.O.T (where indicated).: (Intended for portable field diagnostic tool.) Provide laptop computer with terminal emulation software to interface with DDC panels. Computer shall be Windows platform with latest stable windows operating system (Windows 8.1) integral pointing device. Furnish unit with all interface cards, cables, and software necessary to operate with DDC communications network, and to communicate directly with unit control panels. Furnish with (2) sets interface cables. Provide Windows 8.1 software. Schedule of laptop computer requirements:

Processing Chip	Pentium N3540, 2.5 GHz
RAM Memory	4 GB
Hard Drive	500 GB 5400 RPM
Two USB	USB 2.0 Ports and 3.0 Ports
Display	15" LED True Life HD
Video	HDMI Port
Sound	Maxx Audio
LAN Comm.	Ethernet Communications Board, 3COMM; or equal
Wireless Card	3-1 Memory Card Reader

- F. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the building operator interface.
- I. Scheduling. Provide the capability to schedule each object or group of objects in the system based off of the owner's request. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:
- a) Weekly Schedule. Provide separate schedules for each day of the week.
 - b) Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
 - c) Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
 - d) Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less than and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.

2. Trend Log Application
 - a) Trend log data shall be sampled and stored on the System Controller panel and shall be capable of being archived to a BACnet Workstation for longer term storage.
 - b) Trend logs shall include interval, start-time, and stop-time.
 - c) Trend log intervals shall be configurable as frequently as 1 minute and as infrequently as 1 year.
3. Trend Logs
 - a) The system controller shall create trend logs for defined key performance indicators for each controlled MECHANICAL device and MECHANICAL application.
 - b) The trend logs shall monitor these parameters for a minimum of 7 days at 15 minute intervals. The automatic trend logs shall be user adjustable.
4. Alarm/Event Log
 - a) Any object in the system shall be configurable to generate an alarm when transitioning in and out of a normal or fault state.
 - b) Any object in the system shall allow the alarm limits, warning limits, states, and reactions to be configured for each object in the system.
 - c) An alarm/event shall be capable of triggering any of the following actions:
 - (1) Route the alarm/event to one or more alarm log
 - (2) The alarm message shall include the name of the alarm location, the device that generated the alarm, and the alarm message itself.
 - (3) Route an e-mail message to an operator(s).
 - (4) Log a data point(s) for a period of time.
 - (5) Run a custom control program.
5. Point Control. User shall have the option to set the update interval, minimum on/off time, event notification, custom programming on change of events.
6. Timed Override. A standard application shall be utilized to enable/disable temperature control when a user selects on/cancel at the zone sensor, building operator interface, or the local operator display. The amount of time that the override takes precedence will be selectable from the building operator interface.
7. Anti-Short Cycling. All binary output points shall be protected from short cycling.
8. Alarm/Event Notification:
 - a) An operator shall be notified of new alarms/events as they occur while navigating through any part of the system via an alarm icon.
 - b) The operator will have the option of selecting an audible alarm notification for all alarm classes they subscribe to.
 - c) The system operator will have the option of setting specific times and days that they will receive alarm notifications.
 - d) Provide software alarm points as listed below and as required by the Owner. Contractor shall meet with the Owner to include additional alarm point annunciation as requested by the Owner.

Point	Alarm Function
Hardware	Communication Failure Hardware Failure
Space Temperature	Out of Limits ($\pm 5^{\circ}$ from setpoint)
Duct Air Temperature	Out of Limits ($\pm 10^{\circ}$ from setpoint)
Water Flow Switch	Loss of Flow
Air Flow Switch	Loss of Flow
Water Temperature	Out of Limits ($\pm 10^{\circ}$ from setpoint)
Freeze Stat	Report Freeze Condition
Current Flow Switch	Loss of Current (Fan/Pump)

9. User Change Log. The operator shall be able to view all logged user changes in the system from any Enterprise operator web interface.
 - a) An operator shall be able to group user changes by: date, affected, date & affected, user, date & user, transaction type, date & transaction type, or sort only.
 - b) The operator will have the option of additional filtering capability of: date, transaction, type, user, affected, and details that can be used individually or in conjunction with other filters.

2.4 BUILDING CONTROLLERS

- A. There shall be one or more independent, standalone microprocessor based System Controllers to manage the global strategies described in Application and Control Software section.
 1. The System Controller shall have sufficient memory to support its operating system, database, and programming requirements.
 2. The controller shall provide a USB communications port for connection to a PC.
 3. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
 4. All System Controllers shall have a real time clock.
 5. Data shall be shared between networked System Controllers.
 6. The System Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall.
 - a) Assume a predetermined failure mode.
 - b) Generate an alarm notification.
 - c) Create a retrievable file of the state of all applicable memory locations at the time of the failure.
 - d) Automatically reset the System Controller to return to a normal operating mode.
 7. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at -40°C to 50°C [-40°F to 122°F].
 8. Clock Synchronization:
 - a) All System Controllers shall be able to synchronize with a NTP server for automatic time synchronization.

- b) All System Controllers shall be able to accept a BACnet time synchronization command for automatic time synchronization.
 - c) All System Controllers shall automatically adjust for daylight savings time if applicable.
- 9. Serviceability
 - a) Provide diagnostic LEDs for power, communications, and processor.
 - b) The System Controller shall have a display on the main board that indicates the current operating mode of the controller.
 - c) All wiring connections shall be made to field removable, modular terminal connectors.
 - d) The System controller shall utilize standard DIN mounting methods for installation and replacement.
- 10. Memory. The System Controller shall maintain all BIOS and programming information indefinitely without power to the System controller.
- 11. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage.
- 12. BACnet Test Labs (BTL) Listing. Each System Controller shall be listed as a Building Controller (B-BC) by the BACnet Test Labs with a minimum BACnet Protocol Revision of 14.

2.5 ADVANCED APPLICATION CONTROLLERS

- A. Advance Application Controllers shall be used to control all equipment or applications of medium and high complexity, including but not limited to Air Handlers, Boiler Plants and Chiller Plants.
- B. For Stand-Alone Operation of Advanced Application Controllers:
 - 1. Shall operate a schedule in a standalone application using a Real Time Clock with a 7 day power backup.
 - a) The Controller shall have a built in schedule (assessable with or without a display).
 - b) Support will be for at least 3 schedules with up to 10 events for each day of the week.
 - c) Each of the 3 schedules can be Analog, Binary or Multi-State.
 - d) The controller shall support a minimum of 25 exceptions each with up to 10 events.
- C. For ease of troubleshooting, the Controller shall support data trend logging.
 - 1. 25,000 samples minimum
 - 2. Trends shall be capable of being collected at a minimum sample rate of once every second.
 - 3. Trends shall be capable of being scheduled or triggered.
- D. To meet the sequence of operation for each application, the Controller shall use library programs provided by the controller manufacturer that are either factory loaded or downloaded with service tool to the Controller.

- E. Environment. Controller hardware shall be suitable for the anticipated ambient conditions.
1. Storage conditions:
 - a) Temperature: -67°F to 203°F (-55°C to 95°C).
 - b) Humidity: Between 5% to 100% RH (non-condensing).
 2. Operating conditions:
 - a) Temperature: -40°F to 158°F (-40°C to 70°C)
 - b) Humidity: Between 5% to 100% RH (non-condensing).
 3. Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
 4. Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° F to 158° F [-40° C to 70° C].
- F. Input/Output: The Controller shall have on board or through expansion module all I/O capable of performing all functionality needed for the application. Controls provided by the equipment manufacture must supply the required I/O for the equipment. In addition other controls must meet the following requirements.
1. Shall support flexibility in valve type, the controllers shall be capable of supporting the following valve control types: 0-10VDC, 0-5VDC, 4-20mA, 24VAC - 2 position.
 2. Shall support flexibility in sensor type, the Controller shall be capable of reading sensor input ranges of 0 to 10V, 0 to 20mA, 50ms or longer pulses, 200 to 20Kohm and RTD input.
 3. Shall support flexibility in sensor type, all Analog Outputs shall have the additional capability of being programmed to operate as Universal Inputs or Pulse Width Modulation Outputs.
 4. Shall support flexibility in sensor type, the Controller and/or expansion modules shall support dry and wetted (24VAC) binary inputs.
 5. The controller shall support pulse accumulator for connecting devices like energy meters.
 6. In order to support a wide range of devices, the Controller's binary output shall be able to drive at least 10VA each.
 7. Any unused I/O that is not needed for the functionality of the equipment shall be available to be used by custom programs on the Controller and by any other controller on the network.
 8. The Controller shall provide 24VAC and 24VDC power terminals sensors and other devices required.
 9. The Controller shall provide a dedicated static pressure input.
- G. Input/Output Expandability – The Controller shall provide the following functionality in order to meet current and future application needs:
1. For the application flexibility, the Controller shall be capable of expanding to a total of at least 100 hardware I/O terminations.
 2. Expansion I/O can be mounted up to 650 ft. (200m) from control.
 3. Expansion I/O can be added in as small as 4 point increments.
 4. To keep BACnet network traffic to a minimum, expansion I/O must communicate via an internal controller communication bus.

- H. Serviceability – The Controller shall provide the following in order to improve serviceability of the Controller.
1. Diagnostic LEDs for power/normal operation/status, BACnet communications, sensor bus communications, and binary outputs. All wiring connections shall be clearly labeled and made to be field removable.
 2. Binary and analog inputs and outputs shall use removable connectors or be connected to terminal strip external to the control box.
 3. Software service tool connection through all of the following methods: direct cable connection to the Controller, connection through another controller on BACnet link and through the Controller's zone sensor.
 4. For safety purposes, the controller shall be capable of being powered by a portable computer's USB port for the purposes of configuration, programming and testing programs so that this work can be accomplished with the power off to the associated equipment.
 5. The Controller software tool service port shall utilize standard off-the-shelf USB printer cable.
 6. Capabilities to temporarily override the BACnet point values with built-in time expiration in the Controller.
 7. To aid in service replacement, the Controller shall easily attached to standard DIN rail mounting.
 8. For future expansion, the Controller shall be capable of adding sequence of operation programming utilizing service tools software with a graphical programming interface (editing or programming in line code is not permissible).
 9. To aid in service replacement, the Controller shall allow for setting its BACnet address via controller mounted rotary switches that correspond to the numerical value of the address. (DIP switch methodologies are not allowed). Setting of the address shall be accomplished without the need of a service tool or power applied to the controller.
 10. Controller data shall be maintained through a power failure.
- I. Software Retention: All Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.
- J. Transformer for the Controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads for a maximum of 12 VA for each binary output.
- K. Controller must meet the following Agency Compliance:
1. UL916 PAZX, Open Energy Management Equipment
 2. UL94-5V, Flammability
 3. FCC Part 15, Subpart B, Class B Limit
 4. BACnet Testing Laboratory (BTL) Listed.
- L. A Local Operator Touch Sensitive Display shall be provided for Central Plant and Air Handler Controllers at building locations where specified in the sequence of operations or point list.

2.6 APPLICATION-SPECIFIC CONTROLLERS

- A. Application Specific Controllers (ASC) shall be microprocessor-based DDC controllers which, through hardware or firmware design, control specified equipment. They are not user programmable, but are customized for operation within the confines of the equipment they are designed to serve.
 - I. Application Specific Controller are only allowed when both the following are met.
 - a) The equipment is compressor based or boiler based.
 - b) The controller is provided by the equipment manufacturer and warranted as part of the equipment.
- B. Zone Controllers are controllers that operate equipment that control the space temperature of single zone. Examples are controllers for VAV, Fan coil, Blower Coils, Unit Ventilators, Heat Pumps, and Water Source Heat Pumps.
 - I. Software
 - a) To meet the sequence of operation for each zone control, the controller shall use programs developed and tested by the controller manufacturer that are either factory loaded or downloaded with service tool to the controller.
 - b) Stand-Alone Operation: Each piece of equipment specified in section "A" shall be controlled by a single controller and provide stand-alone control in the event of communication failure. In case of communications failure stand-alone operation shall use default values or last values for remote sensors read over the network such as outdoor air temperature.
 - c) For controlling ancillary devices and for flexibility to change the sequence of operation in the future, the controller shall be capable running custom programs written in a graphical programming language.
 - 2. Environment: Controller hardware shall be suitable for the anticipated ambient conditions.
 - a) Storage: -55° to 203° F and 5 to 95% Rh, non-condensing.
 - b) Operating: -40° to 158° F and 5 to 95% Rh, non-condensing.
 - c) Controllers used indoors shall be mounted in a NEMA 1 enclosure at a minimum.
 - d) Controllers used outdoors and/or in wet ambient shall be mounted within NEMA 4 type waterproof enclosures, and shall be rated for operation at -40° to 158° F.
 - 3. Input/Output:
 - a) For flexibility in selection and replacement of valves, the controllers shall be capable of supporting all of the following valve control types 0-10VDC, 0-5VDC, 4-20mA, 24VAC floating point, 24VAC - 2 position (Normally Open or Normally Closed).
 - b) For flexibility in selection and replacement of sensors, the controllers shall be capable of reading sensor input ranges of 0 to 10V, 0 to 20mA, pulse counts, and 200 to 20Kohm.
 - c) For flexibility in selection and replacement of binary devices, the controller shall support dry and wetted (24VAC) binary inputs.
 - d) For flexibility in selection and replacement devices, the controller's shall have binary output which are able to drive at least 12VA each.

- e) For flexibility in selection and replacement of motors, the controller shall be capable of outputting 24VAC (binary output), DC voltage (0 to 10VDC minimum range) and PWM (in the 80 to 100 Hz range).
 - f) For future needs, any I/O that is unused by functionality of equipment control shall be available to be used by custom program on the controller and by another controller on the network.
 - g) For future expansion and flexibility, the controller shall have either on board or through expansion, 20 hardware input/output points. Expansion points must communicate with the controller via an internal communications bus. Expansion points must be capable of being mounted up to 650ft. (200 m) from the controller. Expansion points that require the BACnet network for communication with the controller are not allowed.
4. Serviceability – The controller shall provide the following in order to improve serviceability of the controller.
- a) Diagnostic LEDs shall indicate correct operation or failures/faults for all of the following: power, sensors, BACnet communications, and I/O communications bus.
 - b) All binary output shall have LED's indicating the output state.
 - c) All wiring connectors shall removable without the use of a tool.
 - d) Software service tool connection through all of the following methods: direct cable connection to the controller, connection through another controller on BACnet link and through the controller's zone sensor.
 - e) For safety purposes, the controller shall be capable of being powered by a portable computer for the purposes of configuration, programming, and testing programs so that this work can be accomplished with the power off to the equipment.
 - f) Capabilities to temporarily override of BACnet point values with built-in time expiration in the controller.
 - g) BACnet MAC Address shall be set using decimal (0-9) based rotary switches.
 - h) Configuration change shall not be made in a programming environment, but rather by a configuration page utilizing dropdown list, check boxes, and numeric boxes.
 - i) BACnet trending objects resident on controller.
 - (1) Minimum of 20,000 trending points total on controller
 - (2) Shall be capable of trending all BACnet points used by controller
 - (3) Shall be capable of 1 second sample rates on all points
5. Software Retention: All Zone Controller operating parameters, setpoints, BIOS, and sequence of operation code must be stored in non-volatile memory in order to maintain such information for months without power.
6. Transformer for the controller must be rated at minimum of 115% of ASC power consumption, and shall be fused or current limiting type. 24 VAC, +/- 15% nominal, 50-60 Hz, 24 VA plus binary output loads, for a maximum of 12 VA for each binary output.
7. Agency Approval: The controller shall have meet the Agency Compliance:
- a) UL916 PAZX, Open Energy Management Equipment
 - b) UL94-5V, Flammability
 - c) FCC Part 15, Subpart B, Class B Limit

2.7 INPUT / OUTPUT INTERFACE

- A. Hardwired inputs and outputs may tie into the system through building, custom application, or ASCs.
- B. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.
- C. Binary inputs shall allow the monitoring of on/off signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against the effects of contact bounce and noise. Binary inputs shall sense “dry contact” closure without external power (other than that provided by the controller) being applied.
- D. Pulse accumulation input objects. This type of object shall conform to all the requirements of binary input objects and also accept up to 10 pulses per second for pulse accumulation.
- E. Analog inputs shall allow the monitoring of low voltage (0 to 10 VDC), current (4 to 20 mA), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with and field configurable to commonly available sensing devices.
- F. Binary outputs shall provide for on/off operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on building and custom application controllers shall have status lights. Outputs shall be selectable for either normally open or normally closed operation.
- G. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0 to 10VDC or a 4 to 20 mA signal as required to provide proper control of the output device. Analog outputs shall not exhibit a drift of greater than 0.4% of range per year.
- H. Tri-State Outputs. Provide tri-state outputs (two coordinated binary outputs) for control of three-point floating type electronic actuators without feedback. Use of three-point floating devices shall be limited to zone control and terminal unit control applications (VAV terminal units, duct-mounted heating coils, zone dampers, radiation, etc.). Control algorithms shall run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
- I. System Object Capacity. The system size shall be expandable to at least twice the number of input/ output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system.

2.8 POWER SUPPLIES

- A. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish overcurrent protection in both primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
 - 1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in overvoltage and overcurrent protection and shall be able to withstand a 150% current overload for at least three seconds without trip-out or failure.
 - a. Line voltage units shall be UL recognized and CSA approved.

2.9 AUXILIARY CONTROL DEVICES

- A. Motorized dampers, unless otherwise specified elsewhere, shall be as follows:
 - 1. **(D-1)**: Opposed blade damper.
 - 2. **(D-2)**: Parallel blade damper.
 - 3. Damper frames shall be 16 gauge galvanized sheet metal or 1/8" extruded aluminum with reinforced corner bracing.
 - 4. Damper blades shall not exceed 8" in width or 48" in length. Blades are to be suitable for medium velocity performance (2,000 fpm). Blades shall be not less than 16 gauge.
 - 5. Damper shaft bearings shall be as recommended by manufacturer for application.
 - 6. All blade edges and top and bottom of the frame shall be provided with compressible seals. Side seals shall be compressible stainless steel. The blade seals shall provide for a maximum leakage rate of 10 CFM per square foot at 2.5" w.c. differential pressure.
 - 7. All leakage testing and pressure ratings will be based on AMCA Publication 500.
 - 8. Individual damper sections shall not be larger than 48" x 60". Provide a minimum of one damper actuator per section.
 - 9. Control dampers shall be parallel or opposed blade types as scheduled on drawings.
 - 10. Acceptable Manufacturer shall be Ruskin, Greenheck, or equal.
- B. Electric damper/valve actuators **(ME-1, ME-2, ME-3)**
 - 1. ME-1: Modulating range.
 - 2. ME-2: Two Position.
 - 3. ME-3: Modulating range, for unit ventilators.
 - 4. The actuator shall have electronic overload or digital rotation sensing circuitry to prevent damage to the actuator throughout the rotation of the actuator.
 - 5. Where shown, for power-failure/safety applications, an internal mechanical, spring return mechanism shall be built into the actuator housing.
 - 6. Proportional actuators shall accept a 0-10 VDC or 0-20 ma control signal and provide a 2-10 VDC or 4-20 ma operating range.
 - 7. Actuators shall be Underwriters Laboratories Standard 873 listed.
 - 8. Acceptable Manufacturer shall be Belimo or equal.

C. Control Valves

1. Control valves shall be two-way or three-way type for two-position or modulating service as scheduled or shown.
2. Size control valves according to chart below: (Maximum DP of 3 psi):

VALVE SIZE CHART

Max GPM	VALVE SIZE	CV
7.5	1/2"	4.4
13	3/4"	7.5
24	1"	14
35	1-1/4"	20
48	1-1/2"	28
69	2"	40
113	2-1/2"	65
156	3"	156
294	4"	294

3. Close-off (differential) Pressure Rating: Valve actuator and trim shall be furnished to provide the following minimum close-off pressure ratings:
 - a) Water Valves:
 - (1) Two-way: 150% of total system (pump) head.
 - (2) Three-way: 300% of pressure differential between ports A and B at design flow or 100% of total system (pump) head.
 - b) Steam Valves: 150% of operating (inlet) pressure.
4. Water Valves
 - a) Body and trim style and materials shall be in accordance with manufacturer's recommendations for design conditions and service shown, with equal percentage ports for modulating service.
 - b) Sizing Criteria.
 - (1) **(CVT)** Two-position service.
 - (2) Two-way modulating service: Pressure drop shall be equal to twice the pressure drop through heat exchanger (load), 50% of the pressure difference between supply and return mains, or 3 psi, whichever is greater.
 - (3) **(CVM, CVZM)** Three-way modulating service: Pressure drop equal to twice the pressure drop through the coil exchanger (load), 3 psi maximum.
 - (4) Valves (1/2 in.) through (2 in.) shall be bronze body or cast brass ANSI Class 250, spring-return, PTFE packing, quick opening for two-position service. Two-way valves to have replaceable composition disc or stainless steel ball, 23°F - 250°F.
 - (5) Valves (2 1/2 in.) and larger shall be cast iron ANSI Class 125 with guided plug and PTFE packing, globe valve.
 - (6) Never provide a controls valve that is less than half the size of the supply line serving that system.
 - c) Terminal Unit Zone valves shall be sized to meet the control application and they shall be spring return so in the event of a power failure, they will go to full open.
5. Acceptable Manufacturer shall be Belimo; or equal.

- D. Binary Temperature Devices (**THL-I**)
1. Low-voltage space thermostat shall be 24 V, bimetal-operated, mercury-switch type, with either adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover. Acceptable Manufacturer shall be Honeywell; or equal.
 2. Line-voltage space thermostat shall be bimetal-actuated, open contact type, or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listed for electrical rating, concealed setpoint adjustment, 13°C to 30°C (55°F to 85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover. Acceptable Manufacturer shall be Honeywell; or equal.
- E. Temperature Sensors (**TSB, TSR, TSD, TSDA, TS/HS**)
1. TSB: Flat plate thermistor room sensor. ACI R2; or equal.
 2. TSR: Room sensor with LCD display and setpoint adjustability. ZS Pro-M, Automated Logic; or equal.
 3. TSD/TSDA: duct mounted sensor.
 4. TS/HS: Combination temperature and humidity sensor. A/RHI; Automation Components, Inc.
 5. Combination Temperature and Humidity sensor.
 6. Temperature sensors shall be RTD or thermistor.
 - a) Wireless space sensor component certifications shall include:
 - (1) UL 916 - Energy Management Equipment.
 - (2) UL 94 - The Standard for Flammability of Plastic Materials for Parts in Devices and Appliances.
 - (3) UL 873 - Temperature regulating and indicating equipment.
 - b) The wireless space sensor battery life shall provide at least 15 years life under normal operating conditions and must be readily available size AA, 1.5V.
 7. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m² (10 ft²) of duct cross section.
 8. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed. The well must withstand the flow velocities in the pipe.
 9. Space sensors shall be equipped with setpoint adjustment, override, display, and/or communication port as shown on plans.
 10. Provide matched temperature sensors for differential temperature measurement.
- F. Humidity Sensors (**HSTS-wall mount / HSP-duct mount**)
1. Space Humidity Sensors shall have a sensing range of 20% to 80% with accuracy of +/- 2% RH.
 2. Duct Sensors and Outdoor air humidity sensors shall have a sensing range of 20% to 95% RH with an accuracy of +/- 2% RH.
 3. Humidity sensor's drift shall not exceed 1% of full scale per year.
 4. Acceptable Manufacturer shall be Omega; or equal.

- G. End Switch (**ES-I**)
1. Proof of closure of damper. Kele; or equal.
- H. Pressure Sensors (**DPT-I**)
1. Air pressure of differential pressure measurements in the range of 0 to 10" water column shall be accurate to +/- 1% of range. Acceptable Manufacturer shall be Setra; or equal.
 2. Liquid pressure or differential liquid pressure measurements shall be accurate to +/- 0.25% of range. Unit shall be provided with isolation and bypass manifold for startup and maintenance operations. Acceptable Manufacturer shall be Setra; or equal.
- I. Low Limit Thermostats (**LC-I**)
1. Safety low limit thermostats shall be vapor pressure type with an element 6m [20 ft] minimum length. Element shall respond to the lowest temperature sensed by any one foot section. Acceptable Manufacturer shall be Honeywell; or equal.
 2. Low limit shall be manual reset only.
- J. Carbon Dioxide Sensors (**CDS-I**)
1. Carbon Dioxide sensors shall measure CO2 in PPM in a range of 50 ppm with drift not to exceed 20 ppm. Sensors shall be duct or space mounted as indicated in the sequence of operation.
 2. Acceptable Manufacturer shall be Dwyer; or equal.
- K. Flow Switches (**FS-I**)
1. Flow-proving switches shall be either paddle or differential pressure type.
 2. Paddle type switches (water service only) shall be UL listed, SPDT snap-acting with pilot duty rating (125VA minimum) and shall have adjustable sensitivity with NEMA 1 enclosure unless otherwise specified. Manufacturer shall be Setra; or equal.
 3. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 enclosure, with scale range and differential suitable for intended application or as specified. Acceptable Manufacturer shall be Setra; or equal.
- L. Air Flow Probes (**AF-I**)
1. Provide an array of airflow traverse probes where indicated, capable of continuously monitoring the fan or duct capacities (CFM) they serve. Each airflow traverse probe shall contain multiple total and static pressure sensors located along the exterior surface of the cylindrical probe and internally connected to their respective averaging manifolds. The flow sensors shall not protrude beyond the surface of the probe(s), and shall be the offset type for static pressure and the chamfered impact type for total pressure measurement. The airflow sensing probe's measurement accuracy shall not be affected by directional flow having pitch and/or yaw angles up to 30°. Each airflow traverse probe shall be of extruded aluminum construction and furnished with mounting plate(s), gasket and signal fittings suitable for MECHANICAL duct installation.

2. The airflow traverse probe shall not induce a pressure drop in excess of 0.03" w.c. at 2000 FPM, nor measurably contribute to sound levels within the duct. Total and static pressure sensors shall be located at the centers of equal areas (for rectangular duct) or at equal concentric area centers (for circular ducts) along the probe length. The airflow traverse probe shall be capable of producing steady, non-pulsating signals of total and static pressure without need for flow corrections or factors, with an accuracy of 2-3% of actual flow, over a velocity range of 400 to 4000 FPM.
3. Provide the minimum number of probes indicated: Duct height 8 – 12", 1 probe; 13 – 30", 2 probes; 31 – 54", 3 probes; 55 – 84", 4 probes; 85 – 120", 5 probes; 121 – 180", 6 probes.
4. The airflow traverse probe shall be the VOLU-probe as manufactured by Air Monitor Corporation, or equivalent.

M. Hydronic Flow Meters (**FM-3**)

- I. Insertion-Type Turbine Meter
 - a) Insertion type, complete with hot-tap isolation valves to enable sensor removal without water supply system shutdown.
 - b) Liquide flow measurement devices shall be accurate to +/- 1% over a turn down ratio of 10:1.
 - c) Each sensor shall be individually calibrated and tagged accordingly against the manufacturer's primary standards.
 - d) All wetted metal parts shall be constructed of 316 stainless steel.
 - e) Analog outputs shall consist of non-interactive zero and span adjustments, a DC linearity of 0.1% of span, voltage output of 0–10 Vdc, and current output of 4–20 mA.
 - f) Acceptable Manufacturer shall be Onicon; or equal.

N. Relays (**CR-1**)

1. Control relays shall be UL listed plug-in type with dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time delay relays shall be UL listed solidstate plug-in type with adjustable time delay. Delay shall be adjustable $\pm 200\%$ (minimum) from setpoint shown on plans. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure when not installed in local control panel.
3. Acceptable Manufacturer shall be Functional Device Inc.; or equal.

O. Transformers and Power Supplies

1. Control transformers (**XT-1**) shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.
2. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
3. Unit shall be UL recognized.
4. Acceptable Manufacturer shall be Functional Device Inc.; or equal.

- P. Current Switches (**CFS-I**)
1. Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.
 2. Acceptable Manufacturer shall be Functional Device Inc.; or equal.
- Q. Immersion Temperature Sensor (**ITS, ITS-I**)
1. Furnish with brass thermowell. Well insertion length to center of pipe. Glycol system require stainless steel well. ACI; or equal.
- R. Motion Detector (**MDS-I**)
1. Ultra-sonic type omni directional transmitter, dual receivers, sensitivity gain control, 600 sq. ft. coverage, 24 Volt DC, Universal Energy Control Inc.; or approved equal.
- S. Static Pressure Sensor (**SPS-I, SPNL-I**)
1. Model 264, pressure transmitter 4-20mA, 0-5VDC, 2.5VDC bidirectional output, 24VDC power by this Contractor, range 0-1.0" wg. or as applicable to individual systems needs. Setra; or approved equal.
- T. Current transmitters
1. AC current transmitters shall be the self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4 to 20 mA two-wire output. Unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A full scale, with internal zero and span adjustment and $\pm 1\%$ full-scale accuracy at 500 ohm maximum burden.
 2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
 3. Unit shall be split-core type for clamp-on installation on existing wiring.
 4. Acceptable Manufacturer shall be Functional Device Inc. or equal.
- U. Power Monitors
1. Selectable rate pulse output for kWh reading, 4–20 mA output for kW reading, N.O. alarm contact, and ability to operate with 5.0 amp current inputs or 0–0.33 volt inputs.
 2. 1.0% full-scale true RMS power accuracy, +0.5 Hz, voltage input range 120–600V, and auto range select.
 3. Under voltage/phase monitor circuitry.
 4. NEMA 1 enclosure.
 5. Current transformers having a 0.5% FS accuracy, 600 VAC isolation voltage with 0 - 0.33 V output. If 0–5 A current transformers are provided, a three-phase disconnect/ shorting switch assembly is required.
 6. Acceptable Manufacturer shall be Allen-Bradley; or equal.
- V. Push Button (**PB-I**)
1. Flush mount, stainless steel plate, mushroom head, contact block with red nameplate, white lettering to identify fan and purpose.

- W. Thermal Energy Meters
1. Matched RTD or thermistor temperature sensors with a differential temperature accuracy of $\pm 0.15^{\circ}\text{F}$.
 2. Flow meter that is accurate within $\pm 1\%$ at calibrated typical flow rate and does not exceed $\pm 2\%$ of actual reading over an extended 50:1 turndown range.
 3. Unit accuracy of $\pm 1\%$
 4. NEMA 1 enclosure.
 5. UL listed.
 6. Isolated 4–20 ma signals for energy rate and supply and return temperatures and flow.
 7. Acceptable Manufacturer shall be Onicon; or equal.
- X. Carbon Monoxide Sensor (**CDS-1**)
1. Wall mounted Carbon Monoxide Sensor (CO) shall monitor CO over a range of 0-300 PPM.
 2. The device shall have an accuracy of $\pm 3\%$ and operate within the range of 32-110 deg F and 0-95% RH.
 3. Acceptable Manufacturer shall be Honeywell; or equal.
- Y. Local Control Panels (**TCP, TCP-1**)
1. All indoor control cabinets shall be fully enclosed NEMA 1 Type construction with hinged door, and removable sub-panels or electrical sub-assemblies.
 2. Interconnections between internal and face-mounted devices shall be pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
 3. Provide on/off power switch with over-current protection for control power sources to each local panel.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. The Contract Documents shall be thoroughly examined for coordination of control devices, their installation, wiring, and commissioning. Coordinate and review mechanical equipment specifications, locations, and identify any discrepancies, conflicts, or omissions that shall be reported to the Architect/Engineer for resolution before rough-in work is started.
- B. The BAS manufacturer shall inspect the jobsite in order to verify that control equipment can be installed as required, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

3.2 PROTECTION

- A. The BAS installation contractor shall protect all work and material from damage by their work or personnel, and shall be liable for all damage thus caused.

- B. The BAS manufacturer shall be responsible for their work and equipment until final inspection, testing, and acceptance. The BAS installing contractor shall protect their work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.3 COORDINATION

- A. Site
 - 1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
 - 2. Coordinate and schedule work with all other work in the same area, or with work that is dependent upon other work, to facilitate mutual progress.
- B. Submittals. Refer to the "Submittals," section of this specification for requirements.
- C. Test and Balance
 - 1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
 - 2. The contractor shall provide training in the use of these tools. This training will be planned for a duration of 4 hours.
 - 3. The tools used during the test and balance process shall be returned to the contractor at the completion of the testing and balancing.
- D. Life Safety
 - 1. Duct smoke detectors required for air handler shutdown shall be supplied under Division 26 contract. The contractor shall interlock smoke detectors to air handlers for shutdown as described in the Sequences of Operation for this project.
- E. Coordination with Controls Specified in Other Sections or Divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:
 - 1. All communication media and equipment shall be provided as specified in the "Communication" section of this specification.
 - 2. Each supplier of a controls product is responsible for the configuration, programming, start-up, and testing of that product to meet the sequences of operation described in this section.
 - 3. The Contractor shall coordinate and resolve any incompatibility issues that arise between the control products provided under this section and those provided under other sections or divisions of this specification.

- F. Fire Alarm: Provide interface card to allow communications between temperature control network and fire alarm system. Coordinate exact requirements with Electrical Contractor. Provide all hardware and software necessary for full seamless interface. Show fire alarm failure on graphics.

3.4 GENERAL WORKMANSHIP

- A. Install equipment, piping, wiring/conduit, parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
- B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- C. Install all equipment in readily accessible locations as defined by National Electric Code (NEC). Control panels shall be attached to structural walls or properly supported in a free-standing configuration, unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.
- D. Verify integrity of all control wiring to ensure continuity and freedom from shorts and grounds prior to commencing the startup and commissioning procedures.
- E. All control device installation and wiring shall comply with Contract Documents, acceptable industry specifications, and industry standards for performance, reliability, and compatibility. Installation and wiring shall be executed in strict adherence to local codes and standard practices referenced in Contract Documents.

3.5 FIELD QUALITY CONTROL

- A. All work, materials, and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Contract Documents.
- B. BAS manufacturer shall continually monitor the field installation for building code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.
- C. BAS installing Contractor(s) shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.6 WIRING

- A. All control and interlock wiring shall comply with the National, Local Electrical Codes, and Division 26 of these Contract Document specifications.
- B. All NEC Class I (line voltage) wiring shall be UL Listed in approved raceway according to NEC requirements.
- C. All wiring in plenum spaces shall be enclosed in conduit. Plenum rated cable can be used in accessible ceilings.

- D. Where Class 2 wires are in concealed and accessible locations; including ceiling return air plenums, approved cables outside of electrical raceway can be used provided that the following conditions are met:
1. Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
 2. All cables shall be UL listed for application (i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose).
 3. Line Voltage Control Wiring:
 - a) For control relays or other low amperage circuits #14 AWG THHN.
 - b) For direct line voltage control of equipment minimum conductor size #12 AWG THHN.
 - c) Electronic Sensor Wiring: 18 AWG, stranded (16x30) copper conductors, twisted pair, 100% overall aluminum polyester shield, 20 AWG CU drain wire. Polyethylene insulation, PVC jacket, 300V, 60°C. Furnish Belden; or equal.
 - d) Computer Communications Cable: 18 AWG, stranded (16x30) copper conductors, (2) twisted pair, 100% individual aluminum polyester shields each shield with 20 AWG CU drain wire. PVC insulated, PVC jacket, 300V. Furnish Belden; or equal. Note: Actual # of conductors may be increased as required for actual communication requirement.
 4. Provide minimum (1) spare shielded twisted pair conductors in each communications wiring run. Wiring runs between operator work stations (if any) provide (2) spare shielded twisted pair conductors.
- E. Do not install Class 2 wiring in conduits containing Class I wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two via control relays and transformers.
- F. Where Class 2 wiring is run exposed, wiring shall be conduit
- G. Maximum allowable voltage for control wiring shall be 120Vac. If only higher voltages are available for use, the BAS manufacturer shall provide step-down transformers to achieve the desired control voltages.
- H. All control wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.
- I. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with Contract Documents and National and/or Local Codes.
- J. Conduit and wire sizing shall be determined by the BAS manufacturer in order to maintain manufacturer's recommendation and meet National and Local Codes.
- K. Conduit Routing and termination
- I. Conduits shall be installed so as to be concealed in all finished spaces at the conclusion of the project unless otherwise noted. Conduits may be exposed in mechanical and electrical rooms and unfinished storage, maintenance and production areas.

2. Where it is impractical to conceal wiring or conduit in finished construction, cables shall be run in wiremold.
 3. Make neat runs parallel or perpendicular to structural elements (walls, ceilings, floors) of building with minimum number of couplings and bends. Install so that required conductors may be drawn without injury or excessive strain.
 4. Provide double locknuts and insulation bushings on the end of each conduit entering an enclosure. If smaller holes are used in knockouts provide listed devices which overlap largest knockouts as required to strengthen the termination.
 5. Cap or plug open ends of conduits during construction.
 6. Conduits shall be continuous from equipment controls to cabinets, junction or pull boxes and shall enter and be secured to all boxes in such a manner that each system shall be electrically continuous.
 7. Change in Direction of Conduit:
 - a) Concealed locations - use standard radius bend.
 - b) Exposed locations or concealed locations where conduit will be accessible; use standard radius bends or conduit body.
 8. Install conduits to allow proper drainage. Do not form pockets.
 9. Securely attach all conduits to building structure utilizing approved methods and fastening devices for support.
 10. Clear obstructions in raceways or replace raceways at no additional contract cost. Demonstrate to Architect that spare conduits are free of obstruction at substantial completion and leave a drag line (1/8" polypropylene monofilament utility rope) for future use.
- L. Follow manufacturer's installation recommendations for all communication and network bus cabling. Network or communication cabling shall be run separately from all control power wiring.
- M. Adhere to the Division 26 requirements for installation of electrical raceways.
- N. BAS manufacturer shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.
- O. Flexible metal conduits and liquid-tight flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.
- P. Penetrations:
1. Provide fire stopping for all penetrations used by dedicated BMS conduits and raceways. All other project fire stopping to be by other trade.
 2. All openings in the fire proofed or fire stopped components shall be closed by using approved fire resistive sealant.
 3. All wiring passing through penetrations, including walls, shall be in conduit or enclosed raceway.
 4. Penetrations of floor slabs shall be by core drilling. All penetrations shall be plumb, true and square.
 5. No penetrations in structural elements shall be made before receipt of written approval from Engineer and/or Architect.

- Q. BMS Raceway:
1. All wiring shall be installed in conduit or raceway except as noted elsewhere in this specification. Minimum control wiring conduit size 3/4".
 2. Where it is not possible to conceal raceways in finished locations, surface raceway (wiremold) may be used as approved by the Engineer.
 3. All conduits and raceways shall be installed level, plumb, at right angles to the building lines and shall follow the contours of the surface to which they are attached.
 4. Flexible metal conduit shall be used for vibration isolation and shall be limited to 3' in length when terminating to vibrating equipment. Flexible metal conduit may be used within partition walls. Flexible metal conduit shall be UL listed.

3.7 COMMUNICATION WIRING

- A. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling.
- B. Do not install communication wiring in raceway and enclosures containing Class 1 or other Class 2 wiring.
- C. Maximum pulling, tension, and bend radius for cable installation, as specified by the cable manufacturer shall not be exceeded during installation.
- D. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.
- E. When a cable enters or exits a building, a lighting arrestor must be installed between the line and ground.
- F. All runs of communication wiring shall be unspliced length when the length is commercially available.
- G. All communication wiring shall be labeled to indicate origin and destination.

3.8 FIBER OPTIC CABLE

- A. All cabling shall be installed in a neat and workmanlike manner. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.
- B. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post installation residual cable tension shall be within cable manufacturer's specifications.
- C. Fiber optic cabinets, hardware, and cable entering the cabinet shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii as specified by cable manufacturer shall be maintained.

3.9 INSTALLATION OF SENSORS

- A. Sensors required for mechanical equipment operation shall be factory installed and wired as specified in mechanical equipment specifications. BAS manufacturer shall be responsible for coordinating these control devices and ensuring the sequence of operations will be met. Installation and wiring shall be in accordance with the BAS manufacturer's recommendations.
- B. Sensors that require field mounting shall meet the BAS manufacturer's recommendations and be coordinated with the mechanical equipment they will be associated.
- C. Mount sensors rigidly and adequately for the environment the sensor will operate.
- D. Room temperature sensors shall be installed on concealed junction boxes properly supported by the block wall framing. For installation in dry wall ceilings, the low voltage sensor wiring can be installed exposed and must meet applicable National and Local Electrical Codes.
- E. All wires attached to wall mounted sensors shall be sealed off to prevent air from transmitting in the associated conduit and affecting the room sensor readings.
- F. Install duct static pressure tap with tube end facing directly down-stream of air flow.
- G. Install space static pressure sensor with static sensing probe applicable for space installation where applicable.
- H. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.
- I. All pipe mounted temperature sensors shall be installed in matched thermowells. Install all liquid temperature sensors with heat conducting fluid in thermal wells for adequate thermal conductance.
- J. Wiring for space sensors shall be concealed in building drywall. EMT conduit is acceptable within mechanical equipment and service rooms.
- K. Install outdoor air temperature sensors on north wall complete with sun shield at manufacturer's recommended location and coordinated with Engineer.

3.10 IDENTIFICATION OF HARDWARE AND WIRING

- A. All field wiring and cabling, including that within factory mounted, and wired control panels and devices for mechanical equipment, shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information for troubleshooting, maintenance, and service purposes. BAS manufacturer to coordinate this labeling requirement with mechanical equipment manufacturer as it relates to controls.

- B. Permanently label or code each point of field terminal strips to show the instrument or item served and correlate them to the BAS design drawings.
- C. Identify control panels with plastic nameplates.

3.11 GROUNDING AND BONDING

- A. Equipment Grounding Conductors: All metallic non-current carrying parts of electrical equipment shall be grounded with equipment grounding conductors whether or not shown on the drawings. Equipment grounding conductors shall be green insulated copper conductors unless otherwise indicated.
 - 1. Install green, equipment grounding conductor with all feeder and branch circuit conductors.
 - 2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
 - 3. Enclosures: Ground all enclosures of electrical and electronic wiring and distribution equipment in accordance with requirements of the NEC Article 250.
 - 4. Equipment Enclosure Grounding: Bare wire, wrapped around connecting screws or mounting bolts and screws is not acceptable as a grounding connection. All ground lugs shall be of a noncorrosive material suitable for use as a grounding connection, and must be compatible with the type of metal being grounded. Ground lugs shall be mounted on clean, bare metal surfaces that are free of paint, rust, etc. Wire brush clean each surface to remove paint or oxidation prior to bolting jumper connectors in place. In general use tinned copper connectors for connections of dissimilar metals. Use of bimetal connectors shall only be allowed in special circumstances and only with the prior written approval.

3.12 CONNECTIONS

- A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - 1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
 - 2. Make connections with clean, bare metal at points of contact.
 - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Terminate insulated equipment grounding conductors for feeders with pressure-type grounding lugs. Where metallic raceways terminate at non-metallic or non-conductive housings, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to the ground bus in the housing. Bond electrically non-continuous conduits at both entrances and exits with grounding bushings and bare grounding conductors.

- C. Raceway Grounding: Surface metal raceways, wireways, or cable trays or cable rack systems shall be installed in a manner that ensures electrical continuity. Short insulated green copper bonding jumpers shall be installed between adjacent raceway sections, on both sides of each joint, to ensure proper bonding. Unless otherwise indicated, the minimum size for these bonding jumpers shall be No. 6 AWG. Jumpers shall be provided with compression connectors at each end of cable. Surface metal raceways, wireways, cable trays or cable rack systems shall be field drilled to provide bolting point for securing bonding jumper. Wire brush clean each surface to remove paint or oxidation prior to bolting jumper connectors in place. Bolts and hardware shall be as per details or as approved for grounding purposes. All metallic raceway penetrations into a facility structure shall be bonded to the earth electrode system.
- D. Other Grounding Systems: Any additional grounding systems used for electronic equipment shall be connected to the facility main ground plate, structural steel or exterior earth electrode system as shown on drawings.
- E. Tighten grounding and bonding connectors and terminals, including screws and bolts, in accordance with torque tightening values specified in UL 486A.

3.13 CONTROL SYSTEM CHECKOUT AND TESTING

- A. Acceptance Check Sheet:
 - 1. The contractor shall prepare check commissioning sheets that include all points for all functions of each system as indicated on the temperature controls submittal documents.
 - 2. Submit the check sheets to the engineer for approval within the temperature controls submittal documents.
 - 3. Engineer will use the approved check sheets as the basis for acceptance of the BAS.
 - 4. The contractor is perform complete commissioning reports for this project. Prior to final payment, contractor must submit signed commissioning checklist, approved by both the owner and engineer. The contractor must also prepare commissioning reports for each piece of equipment that is being controlled.
- B. Start-up testing. All testing in this section shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.
 - 1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service all of the instruments, controls, and accessory equipment furnished under this specification.
 - 2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
 - 3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturer's recommendations.
 - 4. Verify all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starter, etc.) operate properly and normal positions are correct.

5. Verify all analog output devices (I/Ps, actuators, etc) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
 6. Verify the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops and optimal start/stop routines.
 7. Alarms and Interlocks
 - a) Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
 - b) Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction,
 - c) Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action.
- C. Start-up testing. All testing in this section shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.

3.14 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

- A. Acceptance: The BAS will not be accepted as meeting the requirements of Completion until all tests described in this specification have been performed to the satisfaction of both the Engineer and Owner. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

3.15 TRAINING

- A. Provide minimum of 2 classroom training sessions, and 4 hours for each session, throughout the contract period. The training will be provided for personnel designated by the Owner.
- B. Provide course outline and materials prior to schedule training session. The instructor(s) shall provide one copy of training material per student.
- C. The instructor(s) shall be factory-trained and experienced in teaching this technical material.

END OF SECTION



Kenneth D. Ellsworth, P.E.
Managing Member

Paul L. Bedford, AIA
Architect

Mark Rowe, P.L.S.
Professional Land Surveyor

DATE: February 9, 2026

MEETING DATE: February 4, 2026

SUBJECT: PRE-BID MEETING MINUTES
Newark Valley Central School District
2023 Capital Project – Phase III – High School Air Conditioning
Keystone Project No.: 1823.24221.1.3
SED No:
High School 60-04-02-04-0-007-023

Minutes of meeting are issued as Available Information and do not constitute a modification to the Procurement and Contracting Documents. Modifications to the Procurement and Contracting Documents are issued by written Addendum only.

1) Attendance:

Tim Calice	Newark Valley Central School District
Gary Hoskins	Newark Valley Central School District
Paul Bedford	Keystone Associates Architects, Engineers & Surveyors
Sara Domiano	Keystone Associates Architects, Engineers & Surveyors
Scott Swenson	Engineered Solutions
Devin Wood	TamCo Management Group
Aaron Leach	TamCo Management Group

2) Project Contacts:

a) Lead Firm: Keystone Associates
Architects, Engineers and Surveyors, LLC
58 Exchange Street
Binghamton, New York 13901
(607) 722-1100
(607) 722-2515 fax

Contact: Sara Domiano
sdomiano@keyscomp.com

3) Bid Date, Time and Place:
Wednesday, February 18, 2026 at 3:00p.m. at the District Office.
Bids will be opened publicly thereafter and read aloud.

Main Office
58 Exchange Street
Binghamton, New York 13901
Phone: 607.722.1100
Fax: 607.722.2515

Branch Office
165 South Main Street, Suite 6
Cortland, New York 13045
Phone: 607.753.8015

Branch Office
30 North Street, 2nd Floor
Monticello, New York 12701

E-mail: info@keyscomp.com
www.keyscomp.com

- 4) Type of Bid Security and Bonding:
Bid Security:
a) Bid bond in the amount of a sum no less than five (5) percent of the Bid on AIA A310 – Bid Bond.
b) Certified check in the amount of five (5) percent of the Bid Price.
c) Cashier's check in the amount of five (5) percent of the Bid Price.

Bonding:
a) AIA A312 Performance Bond and Payment Bond - 100% of contract sum.
- 5) Insurance: See Project Manual
a) Note please be aware of the NYSIR requirements included.
b) Note that each contractor is required to provide OCP Insurance.
- 6) Contract Documents:
a) There are (3) Bid Contracts which are overseen by the CM
b) There are State Contract items
i) Day Automation: Controls Contract.
- 7) Start of Project: Construction Initiation to start right after award (anticipated Monday, February 23, 2026). Physical construction onsite to start once the school year ends mid-June.
- 8) Substantial Completion Date: August 28, 2026
- 9) Taxes/Permits:
a) Building permit has been obtained by District, any other permits are by the Contractor
b) District is tax exempt
- 10) Wage Rates: See Project Manual
- 11) Temporary Facilities: District will provide space within the district for CM and meetings.
- 12) Quick scope of work overview per Multiple Contract Summary
- 13) Allowances: Be aware of the allowances listed for each prime contract.
- 14) Unit Prices: Be aware of the couple unit prices listed – none
- 15) Alternates: Be aware of the various alternates.
- 16) Project Management Software (PMS): CM will be using Autodesk for the duration of the project.
- 17) Coordination Drawings: See Project Manual

18) Approximate Construction Budgets: Base bid (no alternates), estimated

- a) GC: \$300,000
- b) MC: \$2,800,000
- c) EC: \$500,000

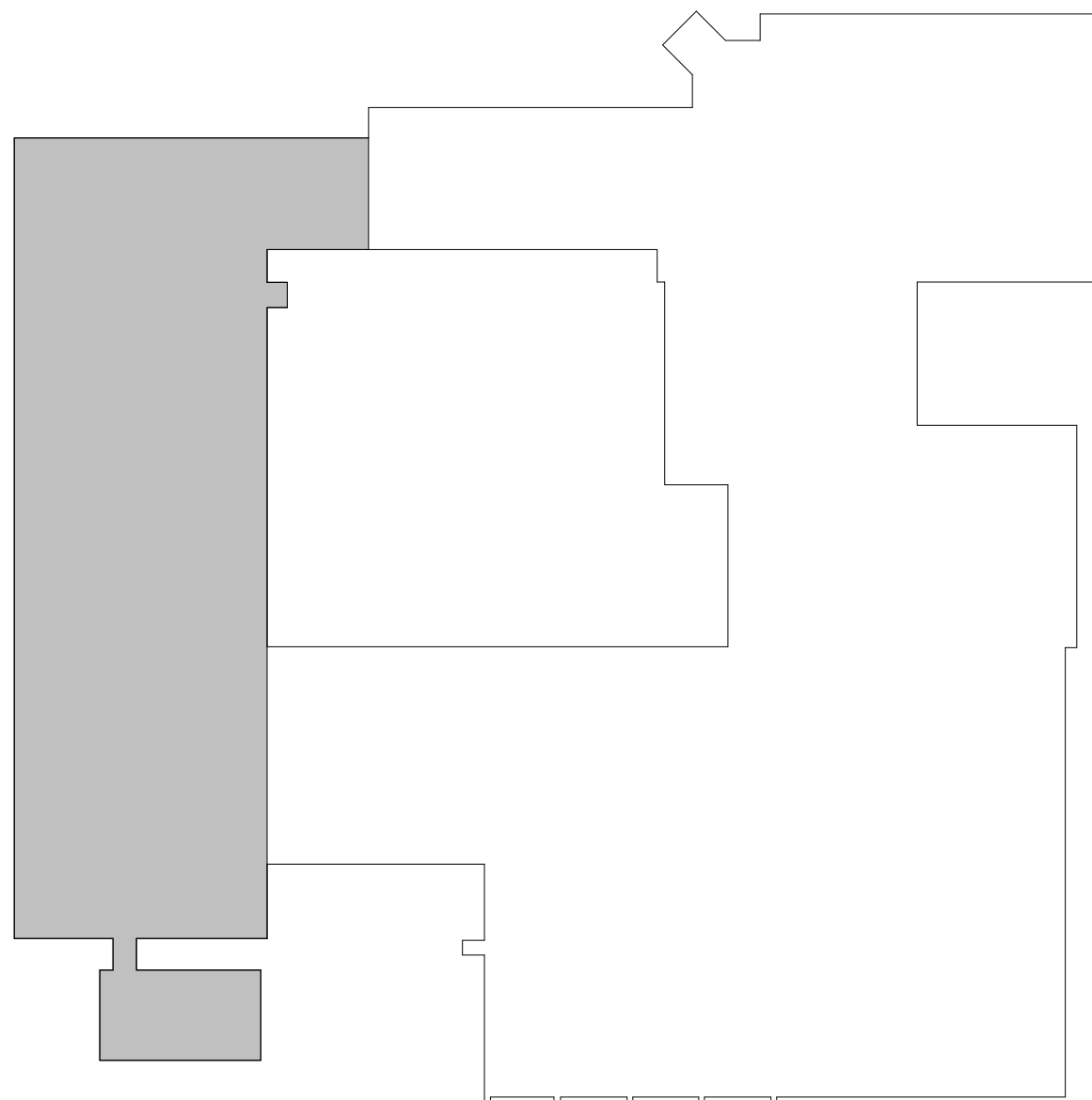
19) All questions need to be asked in writing no later than Friday, February 13, 2026 in order to respond with an addendum.

- a) However, continue to submit questions, if anything is urgent and needs to be addressed, it will.

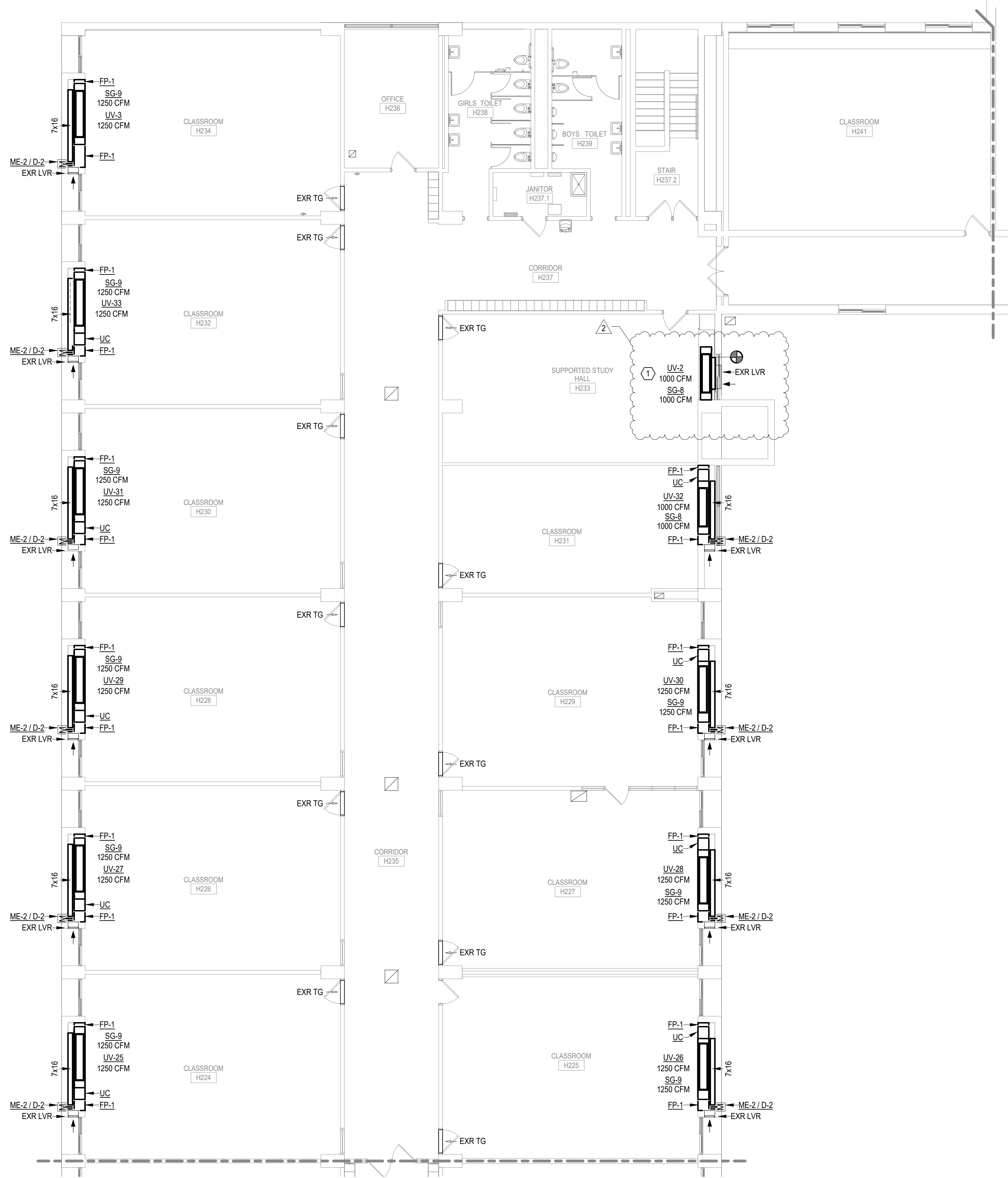
20) Questions from contractors

- a) Is there an opportunity for a bid extension?
 - i) *No, bid due date cannot be extended. Project is to be awarded on the following Monday, February 23, 2026 at District's Board Meeting.*
- b) Is there a deadline for RFCs on Friday, February 13?
 - i) *Yes, by 4:00pm.*
- c) Note that the roof is brand new, so roofing subcontractors will need to be careful to maintain the warranty. Roofing subcontractors to be a certified installer with Firestone/Elevate.

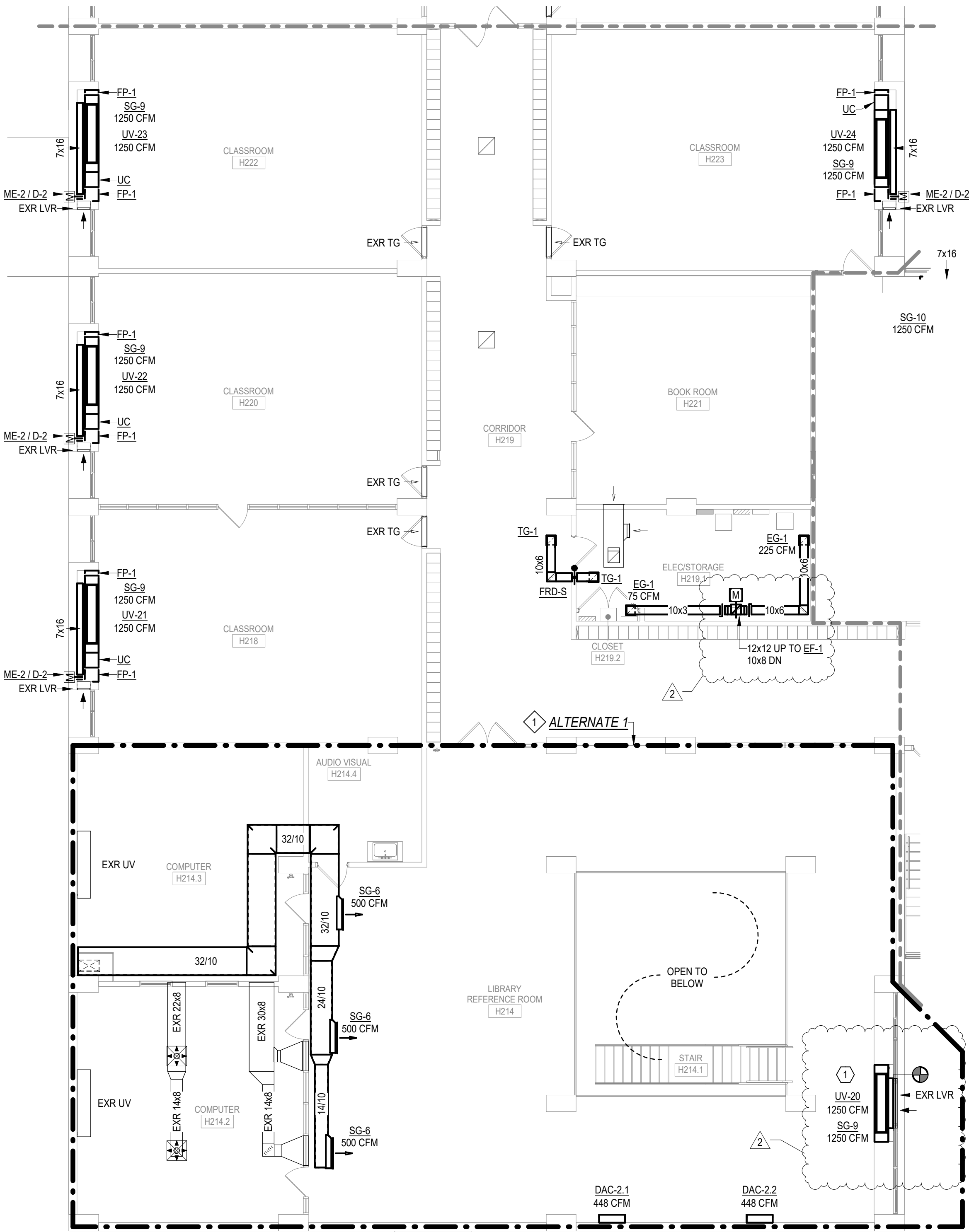
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SECOND FLOOR KEY PLAN



1 SECOND FLOOR DUCT PLAN - AREA 3 UPPER
M306-AD1 1/8" = 1'-0"



2 SECOND FLOOR DUCT PLAN - AREA 3 LOWER
M306-AD1 1/8" = 1'-0"

GENERAL NOTES:
A MC TO FIELD MEASURE AND CUT FILLER PANELS TO FIT AS INTENDED.
DRAWING NOTES:
1. UNIT VENTILATOR WITH ADAPTOR FALSE BACK - REFER TO DETAIL 2M602 FOR ADDITIONAL INFORMATION.

ALTERNATE NOTES:
1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING HX/UNIT VENTILATORS, COUNTERTOPS, FILLER PANELS, CONDENSING UNITS, ROOF SUPPORTS, PIPING PORTALS, REFRIGERANT AND CONDENSATE PIPING INCLUDING HANGERS & INSULATION, COOLING COILS, MANUFACTURERS REQUIRED ACCESSORIES IN UNIT VENTILATORS (CONTROL BOX & EXPANSION VALVE KITS), ADDITIONAL DDC CONTROLS & INTEGRATION FOR CONTROL OF COOLING, ALL NECESSARY APPURTENANCES, AND LABOR FOR A FULLY FUNCTIONAL SYSTEM. ADDITIONALLY, SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING LINED DUCTWORK, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

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ES # 2501

SED PROJECT NUMBERS:
HIGH SCHOOL
60-04-02-04-0-007-023

WARNING:
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02/09/2026
07/21/2026
NO REVISIONS REQUIRED

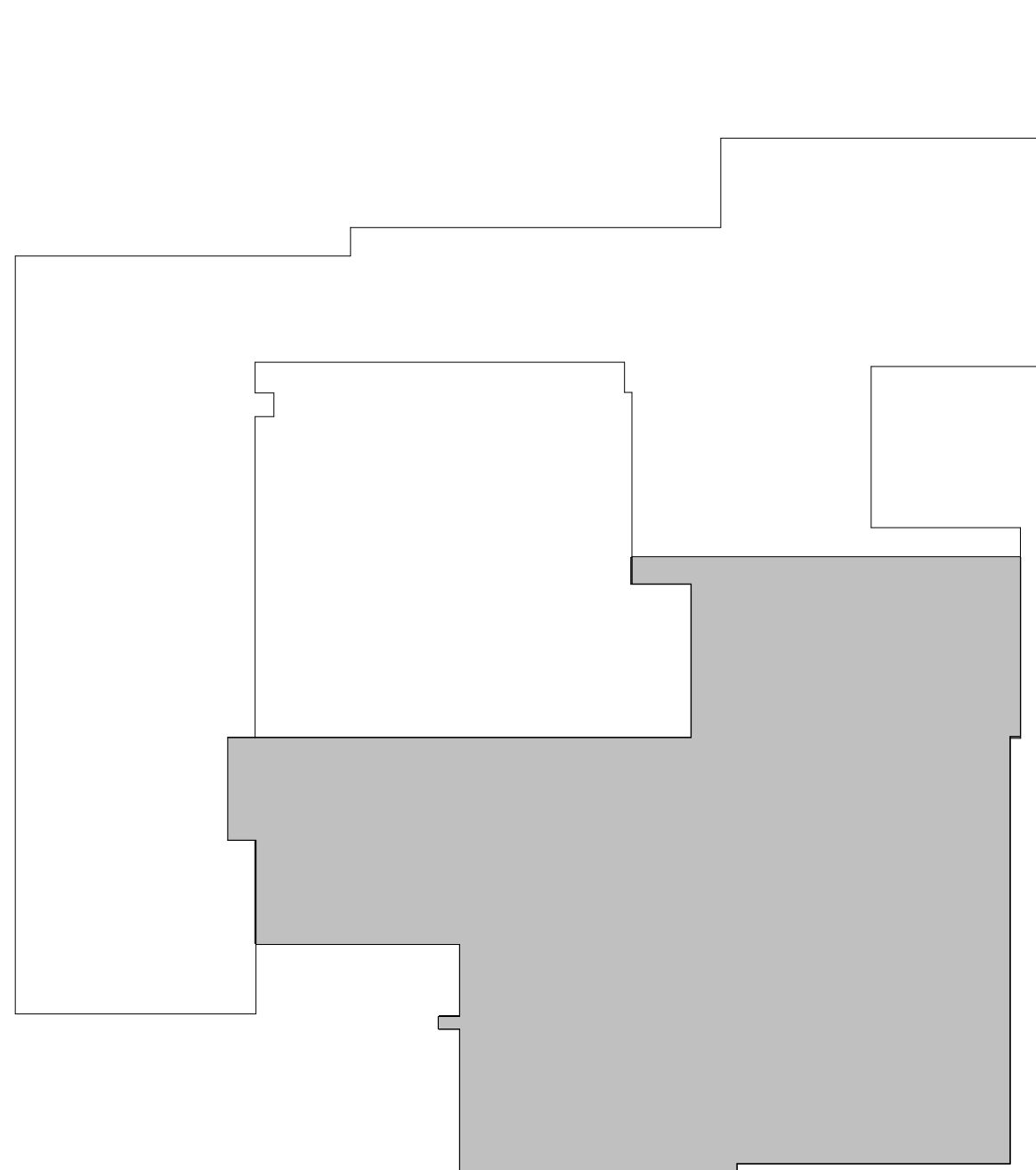
2 Bill Addendum #1
17/12/2025
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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
SECOND FLOOR DUCT PLAN - AREA 3

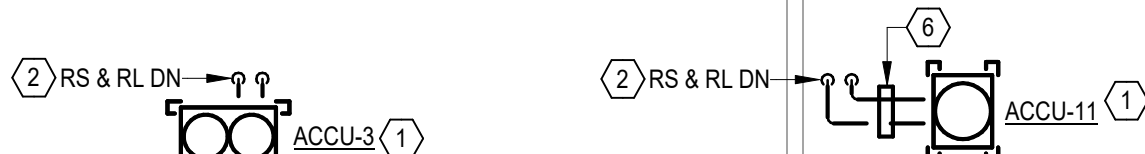
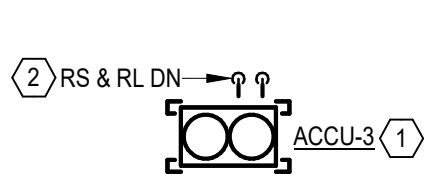
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1823.24221.1.3
DATE:
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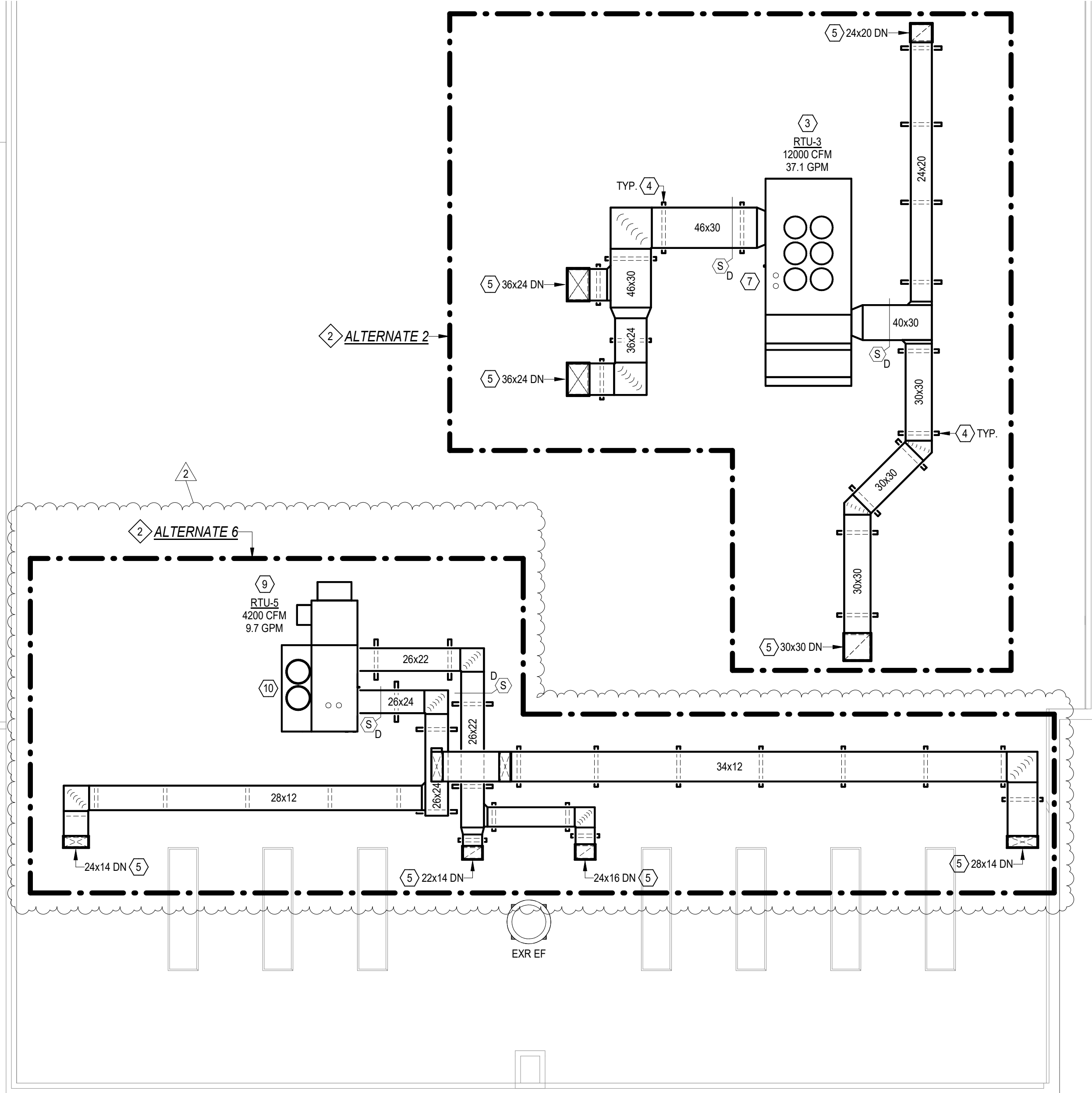
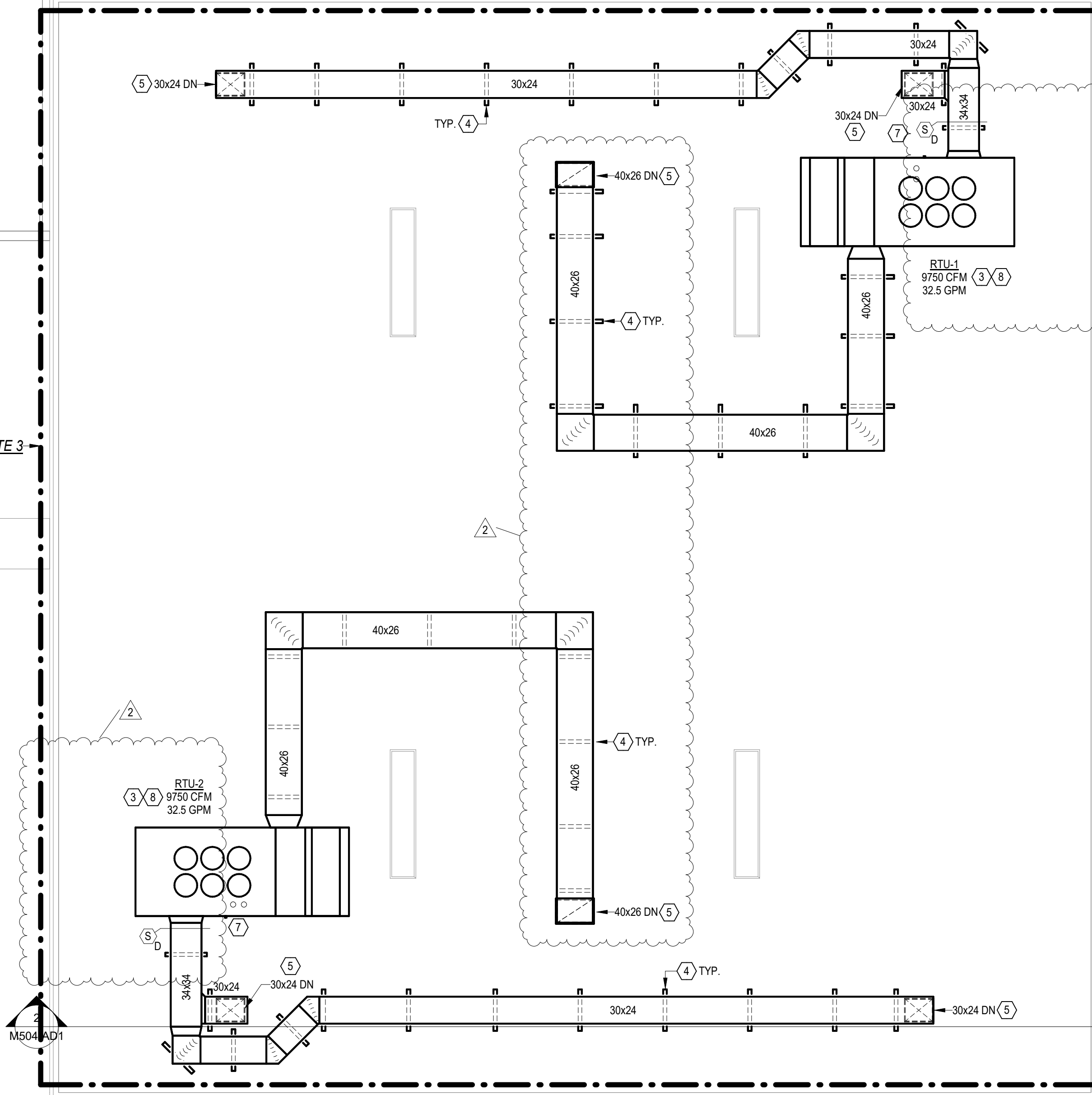


ROOF KEY PLAN



- ALTERNATE NOTES:** ◇
1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, PROVIDING HVAC UNIT VENTILATORS, COUNTERTOPS, FILLER PANELS, CONDENSING UNITS, ROOF SUPPORTS, PIPING PORTALS, REFRIGERANT AND CONDENSATE PIPING INCLUDING HANGERS & INSULATION, COOLING COILS, MANUFACTURER'S REQUIRED ACCESSORIES IN UNIT VENTILATORS (CONTROL BOX & EXPANSION VALVE KITS), ADDITIONAL DDC CONTROLS & INTEGRATION FOR CONTROL OF COOLING, ALL NECESSARY APPURTENANCES, AND LABOR FOR A FULLY FUNCTIONAL SYSTEM.
 2. ALTERNATE IS TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO, PROVIDING DUCTWORK, INSULATION WRAP, DUCT MOUNTING PEDESTALS, ROOFTOP UNIT, CURB, FILTERS, AND MANUFACTURER'S REQUIRED ACCESSORIES IN ROOF TOP UNIT, CONTROLS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

- GENERAL NOTES:** A.
- REFER TO 600 SERIES DRAWINGS FOR REFRIGERANT PIPING SIZE.
- DRAWING NOTES:** ○
1. PROVIDE ROOF EQUIPMENT SUPPORT, BS33, TWO PER CONDENSING UNIT. GC TO ANCHOR TO DECK AND FLASH INTO ROOFING SYSTEM.
 2. FURNISH PIPING PORTAL FOR INSTALLATION BY GC.
 3. FURNISH ROOF CURB FOR INSTALLATION BY GC.
 4. FURNISH DUCT MOUNT PEDESTAL, DMP-1 FOR INSTALLATION BY GC.
 5. PROVIDE DUCT LINER ONLY ON PORTION OF DUCT BELOW ROOF LINE.
 6. PROVIDE PIPE SUPPORTS FOR SUPPORT OF REFRIGERANT PIPING. PROVIDE QUANTITY NECESSARY TO ADEQUATELY SUPPORT REFRIGERANT PIPING SO IT IS FREE OF SAGS AND DIPS. SUPPORTS TO BE RPS PEDESTAL PLUS, OR EQUAL.
 7. PROVIDE 2-1/2" PGHWSR PIPING TO EQUIPMENT.
 8. GC TO PROVIDE FALL PROTECTION FOR SERVICING ROOF TOP EQUIPMENT LOCATED WITHIN 10 FEET OF THE ROOF EDGE.
 9. FURNISH PLENUM ROOF CURB FOR INSTALLATION BY GC.
 10. PROVIDE 1-1/2" PGHWSR PIPING TO EQUIPMENT.



1 ROOF MECHANICAL PLAN - AREA 1
M307-AD1 1/8" = 1'-0"

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ES # 28101

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60-04-02-04-0-007-023

HIGH SCHOOL

WARNING:
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NO.	REVISION	DATE	DESCRIPTION
1	Rev. 1	02/09/2026	REVISED FOR DESCRIPTIONS

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
ROOF MECHANICAL PLAN - AREA 1

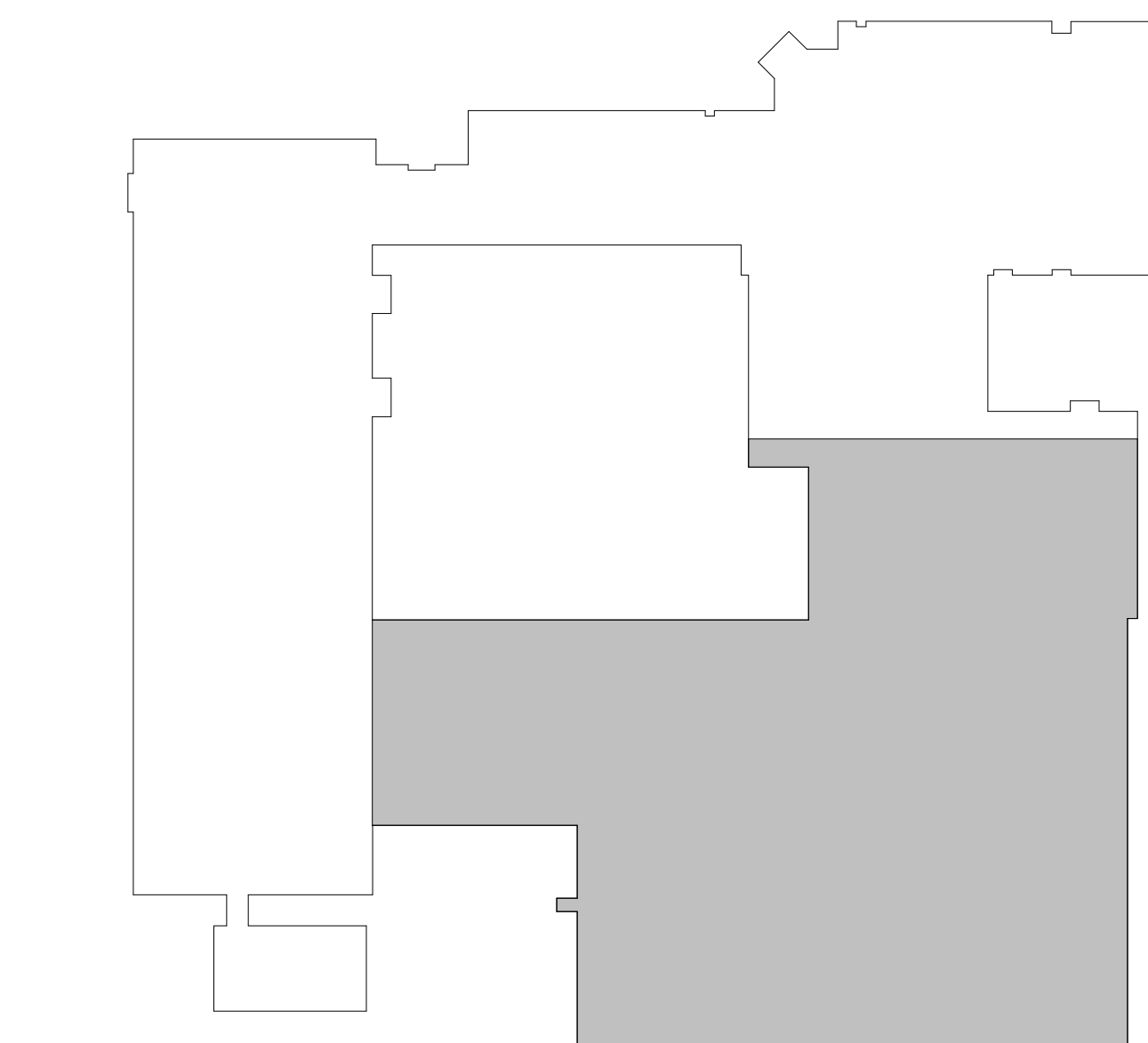
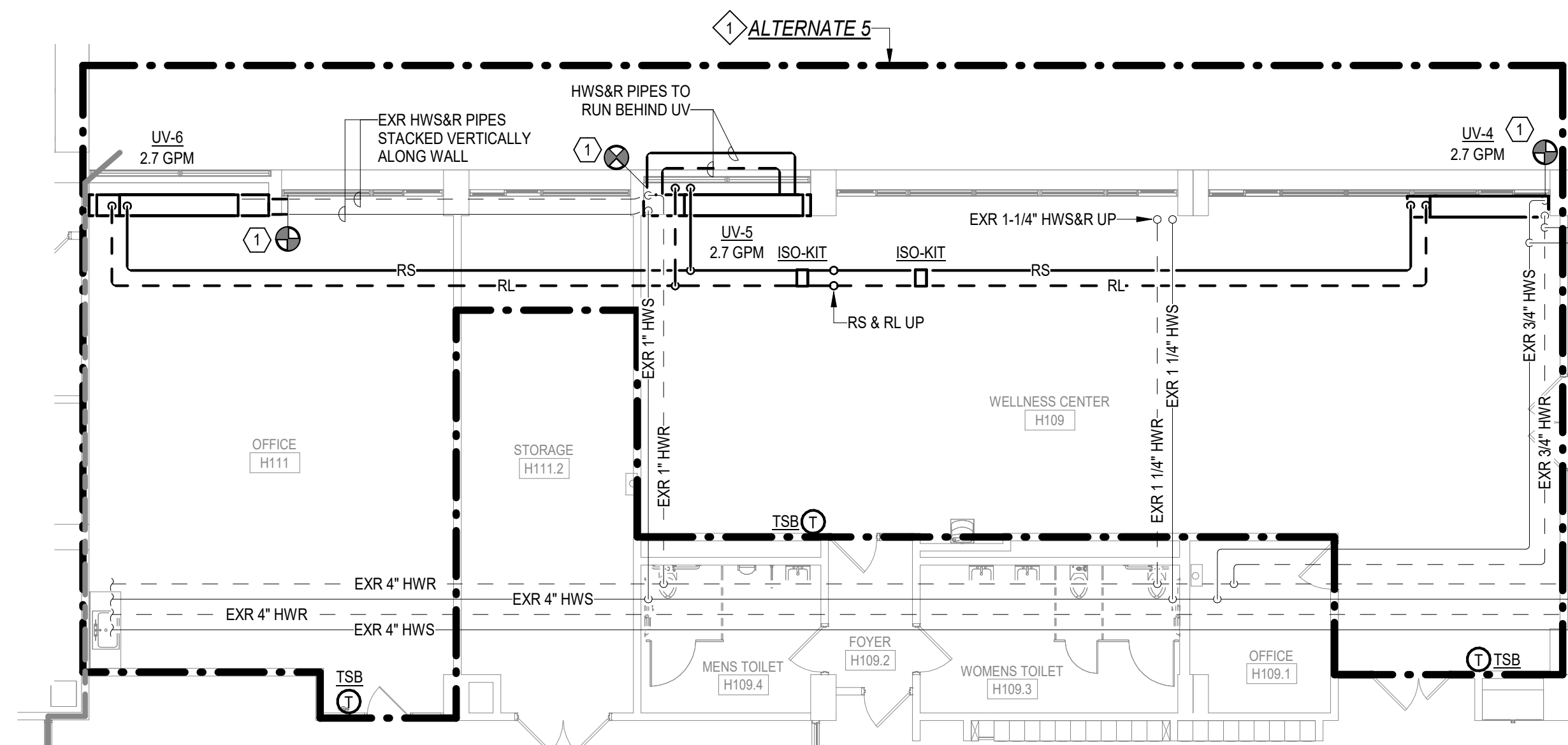
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PROJECT NO.
1823.24221.1.3

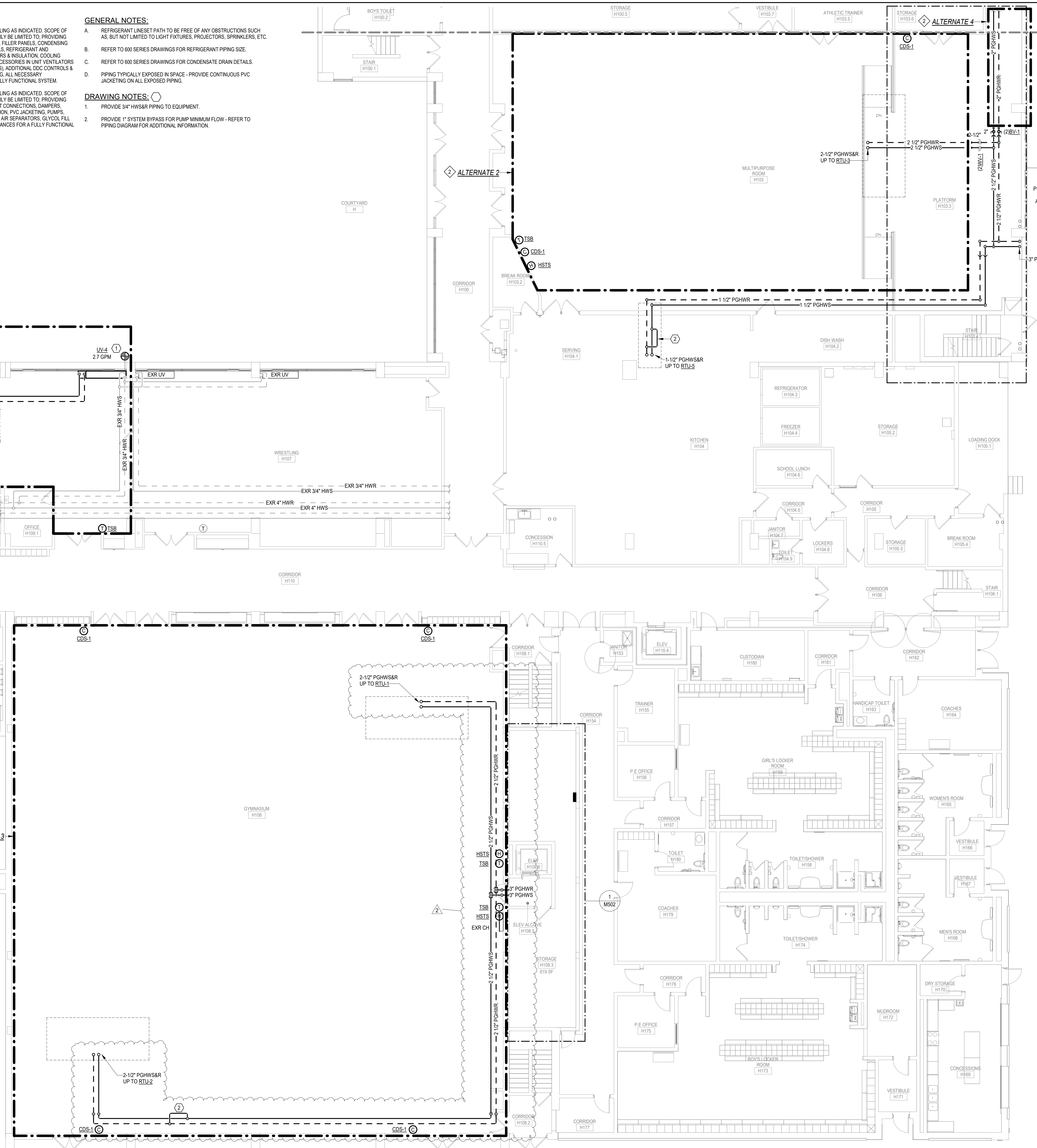
1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING HAV UNIT Ventilators, COUNTERTOPS, FILLER PANELS, CONDENSING UNITS, ROOF SUPPORTS, PIPING FOR TANKS, REFRIGERANT AND CONDENSATE PIPING, COOLING COILS, COOLING COILS, COOLING COILS, MANUFACTURER'S REQUIRED ACCESSORIES IN UNIT Ventilators (CONTROL BOX & EXPANSION VALVE KITS), ADDITIONAL DUCT CONTROLS & INTEGRATION FOR CONTROL OF COOLING, ALL NECESSARY APPURTENANCES, AND LABOR FOR A FULLY FUNCTIONAL SYSTEM.
2. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING LINED HANGERS, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, PIPES, DUCTWORK, VALVES, PIPE INSULATION, ICE JACKETING, PUMPS, FLEX HANGERS, EXPANSION TANKS, AIR SEPARATORS, GUYOT, FILL TANKS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

- A. REFRIGERANT LINESET PATH TO BE FREE OF ANY OBSTRUCTIONS SUCH AS, BUT NOT LIMITED TO LIGHT FIXTURES, PROJECTORS, SPRINKLERS, ETC.
- B. REFER TO 600 SERIES DRAWINGS FOR REFRIGERANT PIPING SIZE.
- C. REFER TO 600 SERIES DRAWINGS FOR CONDENSATE DRAIN DETAILS.
- D. PIPING TYPICALLY EXPOSED IN SPACE - PROVIDE CONTINUOUS PVC JACKETING ON ALL EXPOSED PIPING.

1. PROVIDE 3/4" HWS&R PIPING TO EQUIPMENT.
2. PROVIDE 1" SYSTEM BYPASS FOR PUMP MINIMUM FLOW - REFER TO PIPING DIAGRAM FOR ADDITIONAL INFORMATION.

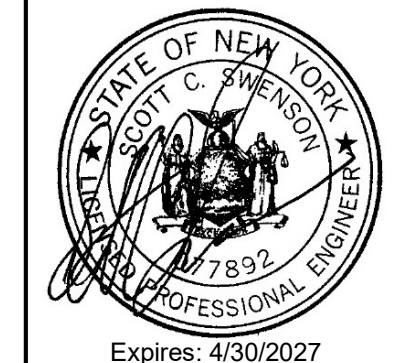


FIRST FLOOR KEY PLAN



CERTIFICATE OF
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**NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
FIRST FLOOR PIPING PLAN - AREA 1**

SHEET NO.
M401-AD1

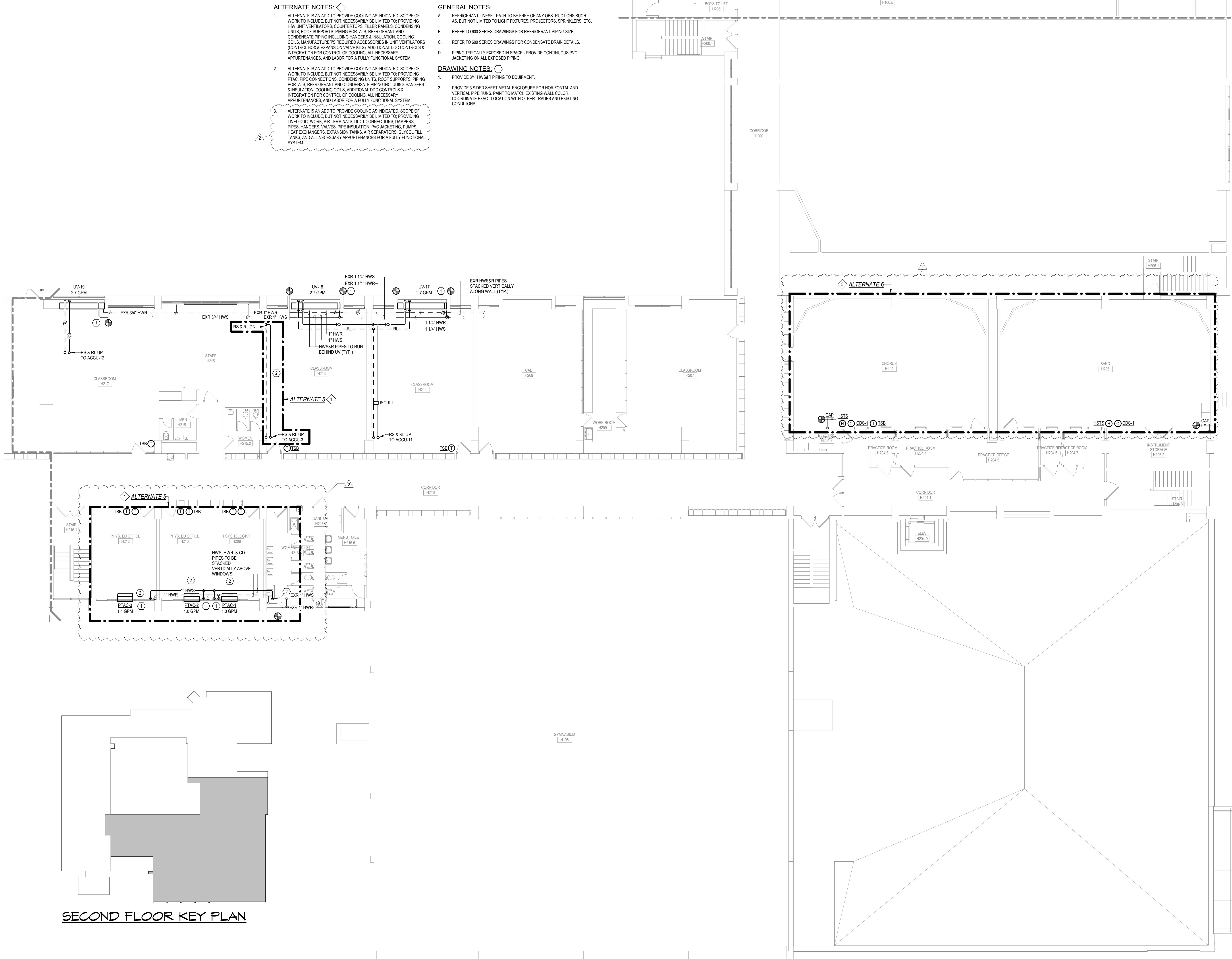
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DATE: 12/12/2025

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1 SECOND FLOOR PIPING PLAN - AREA 1
M404-AD1 1/8" = 1'-0"

CERTIFICATE OF AUTHORIZATION
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SURVEY - 0020652

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KA

KEYSTONE ASSOCIATES

ARCHITECTS, ENGINEERS AND SURVEYORS, LLC

STATE OF NEW YORK
JANUARY 1, 2023
EXPIRES 12/31/2027
PROFESSIONAL ENGINEER

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646 Plank Road #104
Clifton Park, NY 12065
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Fax: (518) 282-2461
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60-04-02-04-0-007-023

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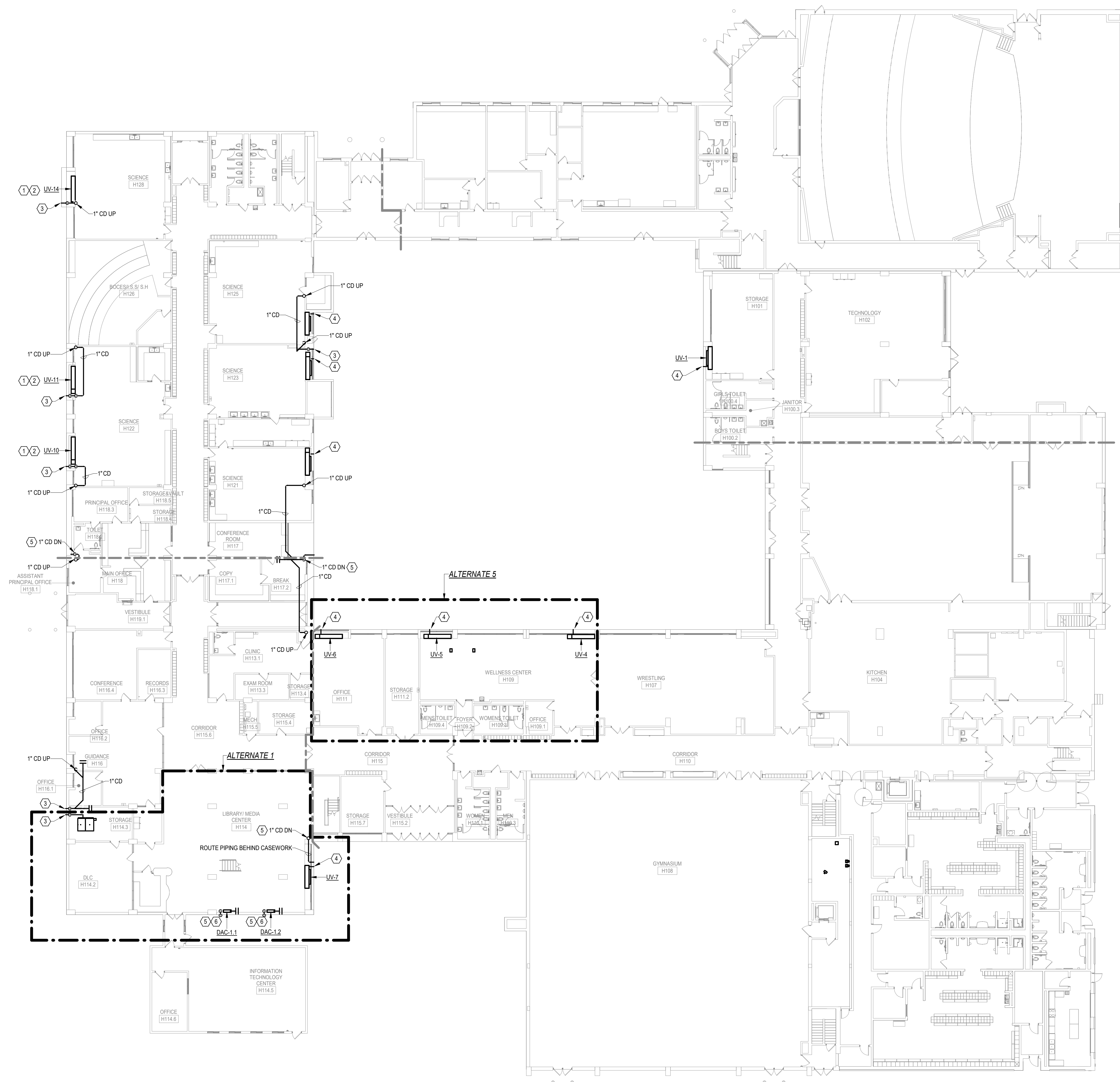
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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREK ROAD
TIOGA COUNTY, NY

SHEET NO.
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1823.24221.1.3
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12/12/2025
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M404-AD1
PROJECT NO.
1823.24221.1.3
DATE:
12/12/2025
CAB FILE NO.: High_School_RVT24.mxd

SECOND FLOOR PIPING PLAN - AREA 1



GENERAL NOTES:

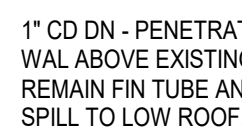
- A. INSTALL CONDENSATE PIPING PATH TO BE FREE OF ANY OBSTRUCTIONS SUCH AS, BUT NOT LIMITED TO LIGHT FIXTURES, PROJECTORS, SPRINKLERS, ETC.
- B. REFER TO 600 SERIES DRAWINGS FOR CONDENSATE DRAIN DETAILS.
- C. PIPING TYPICALLY EXPOSED IN SPACE - PROVIDE CONTINUOUS PVC JACKETING ON ALL EXPOSED PIPING.

DRAWING NOTES:

1. PROVIDE CONDENSATE PUMP. PUMP SHALL BE CAPABLE OF 48 GPH AT 10'-0" HEAD. CONDENSATE PUMP SHALL HAVE 1/30HP MOTOR, 115V/1PH WITH THERMAL OVERLOAD PROTECTION AND 1/2 GALLON ABS TANK. LITTLE GIANI VCM-20ULS, OR EQUAL.
2. PROVIDE 1" PUMPED CONDENSATE LINE FROM UNIT VENTILATOR - CONNECT TO 1" DROP FROM UNITS ON FLOOR ABOVE UNDER COUNTER.
3. PROVIDE 1" CONDENSATE LINE OUT THRU EXTERIOR WALL. SPILL WITHIN 1' OF GRADE.
4. PROVIDE 1" CONDENSATE PIPING FROM FIRST FLOOR UNIT OUT THRU WALL.
5. PROVIDE SHEETMETAL ENCLOSURE, FLOOR TO DECK ABOVE.
6. PROVIDE 3/4" CONDENSATE CONNECTION TO EQUIPMENT AND SPILL WITHIN 12" OF GRADE.

- A. INSTALL CONDENSATE PIPING PATH TO BE FREE OF ANY OBSTRUCTIONS SUCH AS, BUT NOT LIMITED TO LIGHT FIXTURES, PROJECTORS, SPRINKLERS, ETC.
- B. REFER TO 600 SERIES DRAWINGS FOR CONDENSATE DRAIN DETAILS.
- C. PIPING TYPICALLY EXPOSED IN SPACE - PROVIDE CONTINUOUS PVC JACKETING ON ALL EXPOSED PIPING.

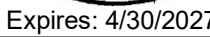
1. PROVIDE CONDENSATE PUMP. PUMP SHALL BE CAPABLE OF 48 GPH AT 10' O HEAD. CONDENSATE PUMP SHALL HAVE 1/30HP MOTOR, 115V/1PH WITH THERMAL OVERLOAD PROTECTION AND 1/2 GALLON ABS TANK - LITTLE GIANT VCMA-20ULS, OR EQUAL.
2. PROVIDE 1" PUMPED CONDENSATE LINE FROM UNIT VENTILATOR - ROUTE ADJACENT TO REFRIGERANT PIPING IN A WORKMAN LIKE MANNER.
3. PROVIDE SHEETMETAL ENCLOSURE, FLOOR TO DECK ABOVE.



M408-AD1



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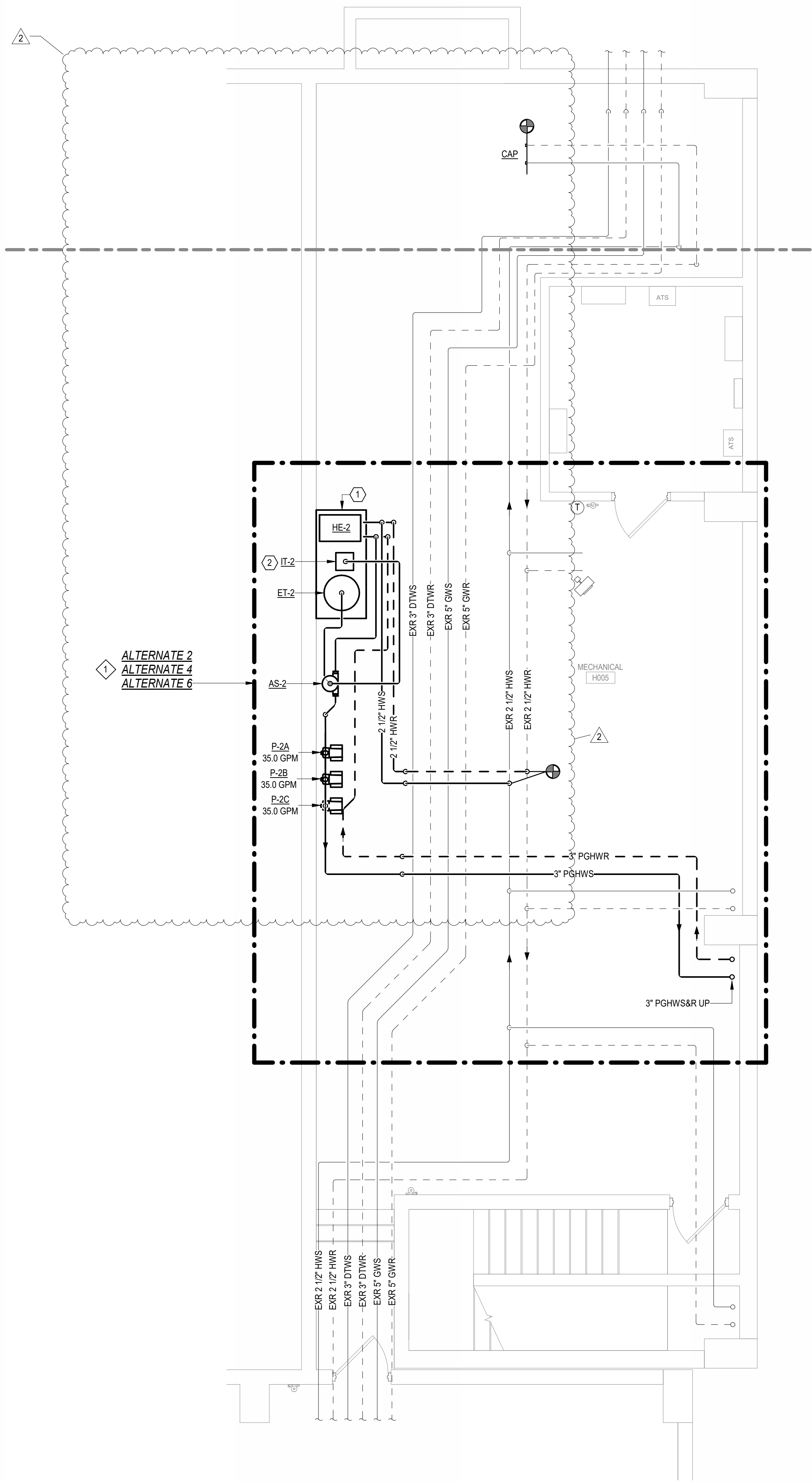
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2	Bid Addendum #1	02/09/2020

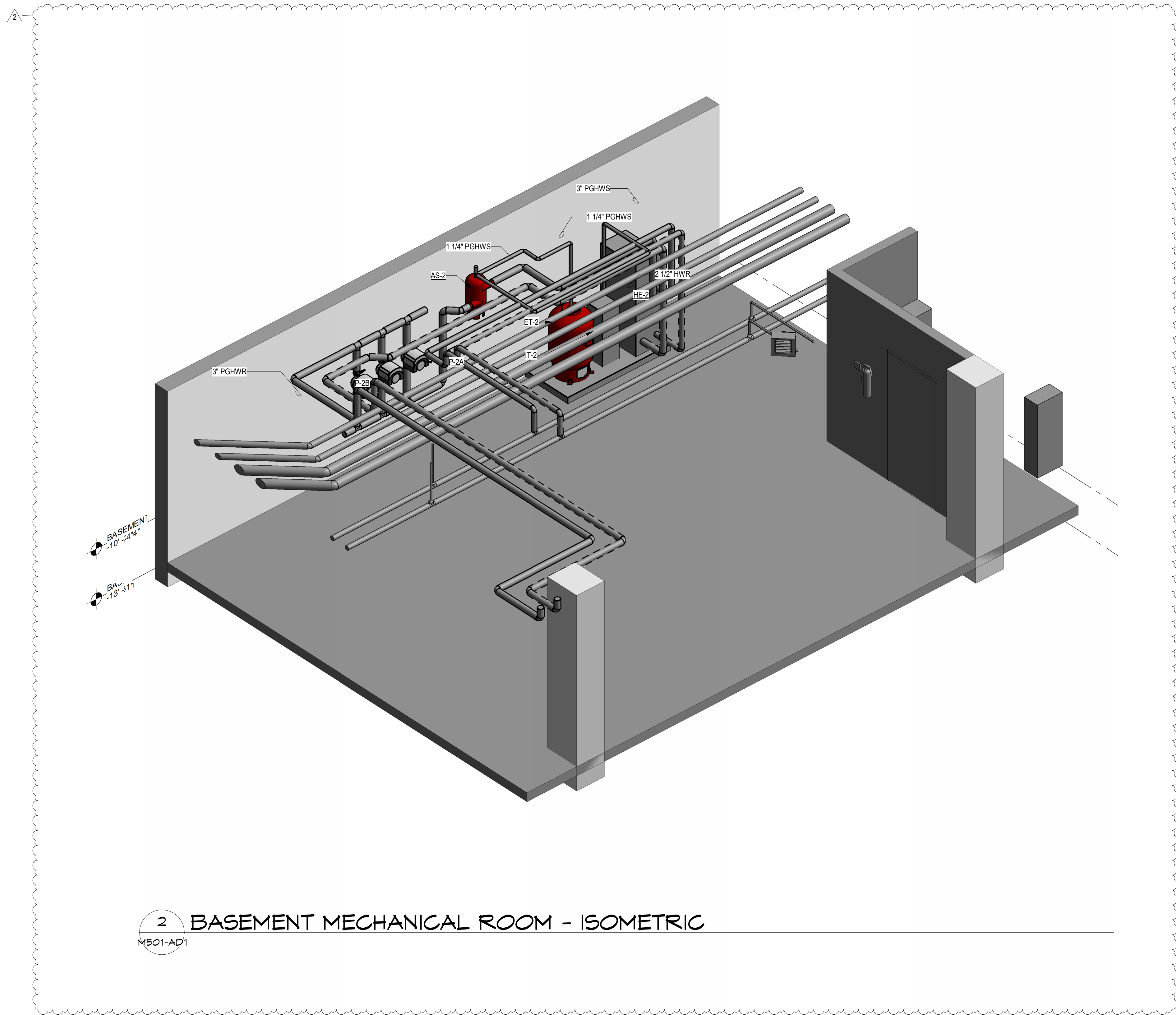
**NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TOGA COUNTY, NY
SECOND FLOOR CONDENSATE PIPING PLAN**

SHEET NO.
M408-AD

PROJECT NO.



1 ENLARGED PIPING PLAN - BASEMENT MECHANICAL ROOM
M501-AD1 1/4" = 1'-0"



2 BASEMENT MECHANICAL ROOM - ISOMETRIC
M501-AD1

ALTERNATE NOTES:

1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING LINED DUCTWORK, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, PIPES, HANGERS, VALVES, PIPE INSULATION, PVC JACKETING, PUMPS, HEAT EXCHANGERS, EXPANSION TANKS, AIR SEPARATORS, GLYCOL FILL TANKS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.
NOTE: IF ANY OF THE LISTED ALTERNATES ARE ACCEPTED, PROVIDE GLYCOL HOT WATER LOOP TO FEED PROPOSED ROOFTOP(S).

DRAWING NOTES:

1. PROVIDE 4" THICK CONCRETE EQUIPMENT PAD, A MINIMUM OF 4" LARGER THAN EQUIPMENT IN ALL DIRECTIONS.
2. OWNER FURNISHED GLYCOL FILL TANK - INSTALL TANK, CONNECT TO SYSTEM, AND PROVIDE FILL OF 40% PROPYLENE GLYCOL.

CERTIFICATE OF AUTHORIZATION
ENGINEERING - 0021631
SURVEY - 0020652

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SED PROJECT NUMBERS:
HIGH SCHOOL
60-04-02-04-0-007-023

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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREK ROAD
TIOGA COUNTY, NY

ENLARGED PLANS - BASEMENT MECHANICAL ROOM

SHEET NO.
M501-AD1

PROJECT NO.
1823-24221-1.3

DATE:
12/12/2025

CAD FILE NO.: High_School_RVT24-m

1. ALTERNATE IS AN ADD TO PROVIDE COOLING AS INDICATED. SCOPE OF WORK TO INCLUDE, BUT NOT NECESSARILY BE LIMITED TO: PROVIDING LINED DUCTWORK, AIR TERMINALS, DUCT CONNECTIONS, DAMPERS, PIPES, HANGERS, VALVES, PIPE INSULATION, P.V.C JACKETING, PUMPS, HEAT EXCHANGERS, EXPANSION TANKS, AIR SEPARATORS, GLYCOL FILL TANKS, AND ALL NECESSARY APPURTENANCES FOR A FULLY FUNCTIONAL SYSTEM.

1. PROVIDE 4" THICK CONCRETE EQUIPMENT PAD, A MINIMUM OF 4" LARGER THAN EQUIPMENT IN ALL DIRECTIONS.
2. OWNER FURNISHED GLYCOL FILL TANK - INSTALL TANK, CONNECT TO SYSTEM, AND PROVIDE FILL OF 40% PROPYLENE GLYCOL.



1 ROOM
M502-AD1 1/4" = 1'-0"



2
M502-AD



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2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY

SHEET NO.
1504-AD1

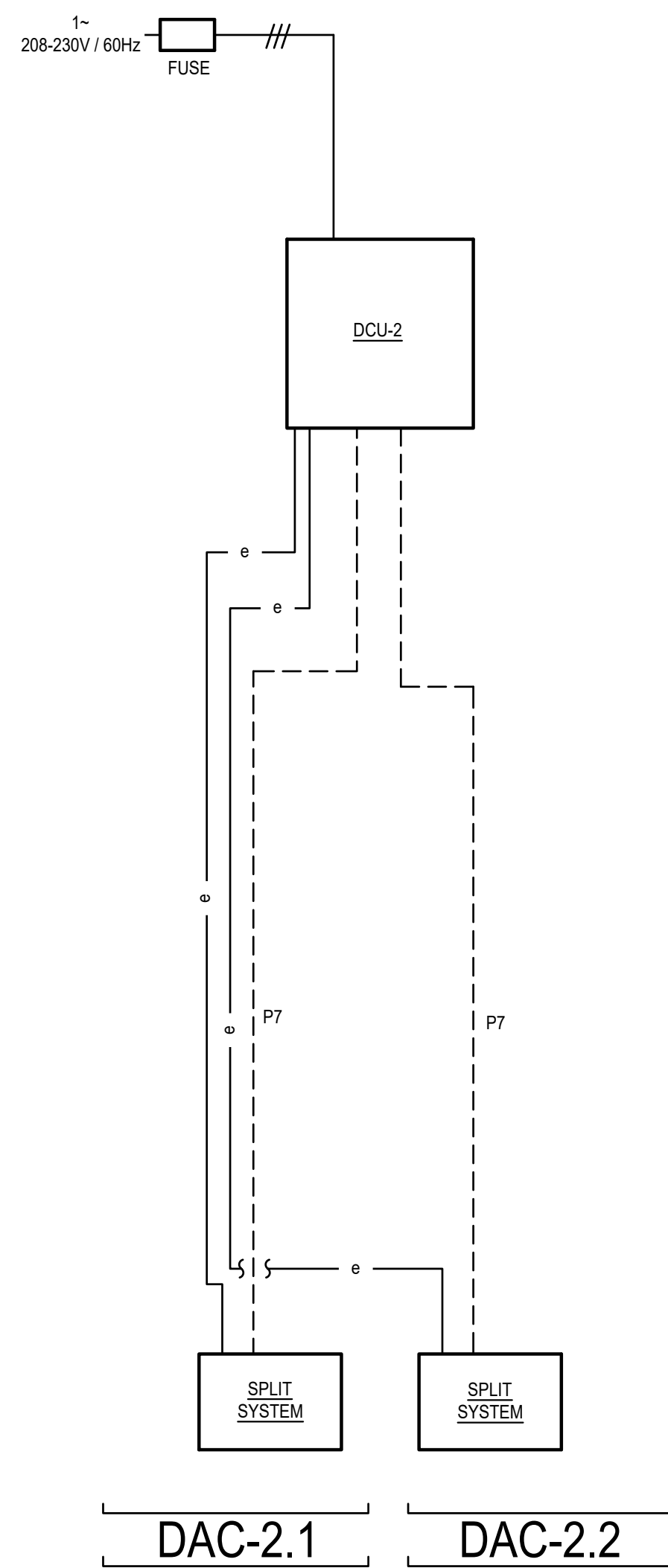
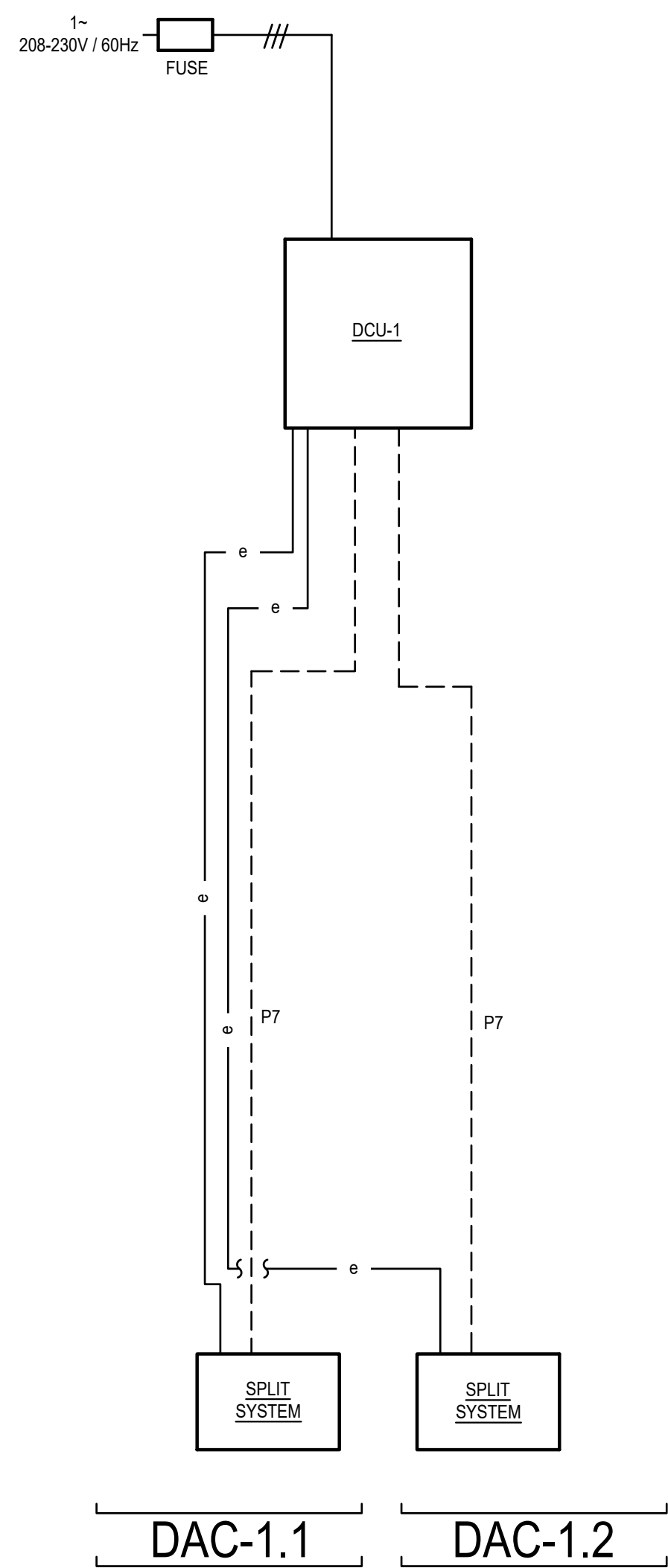
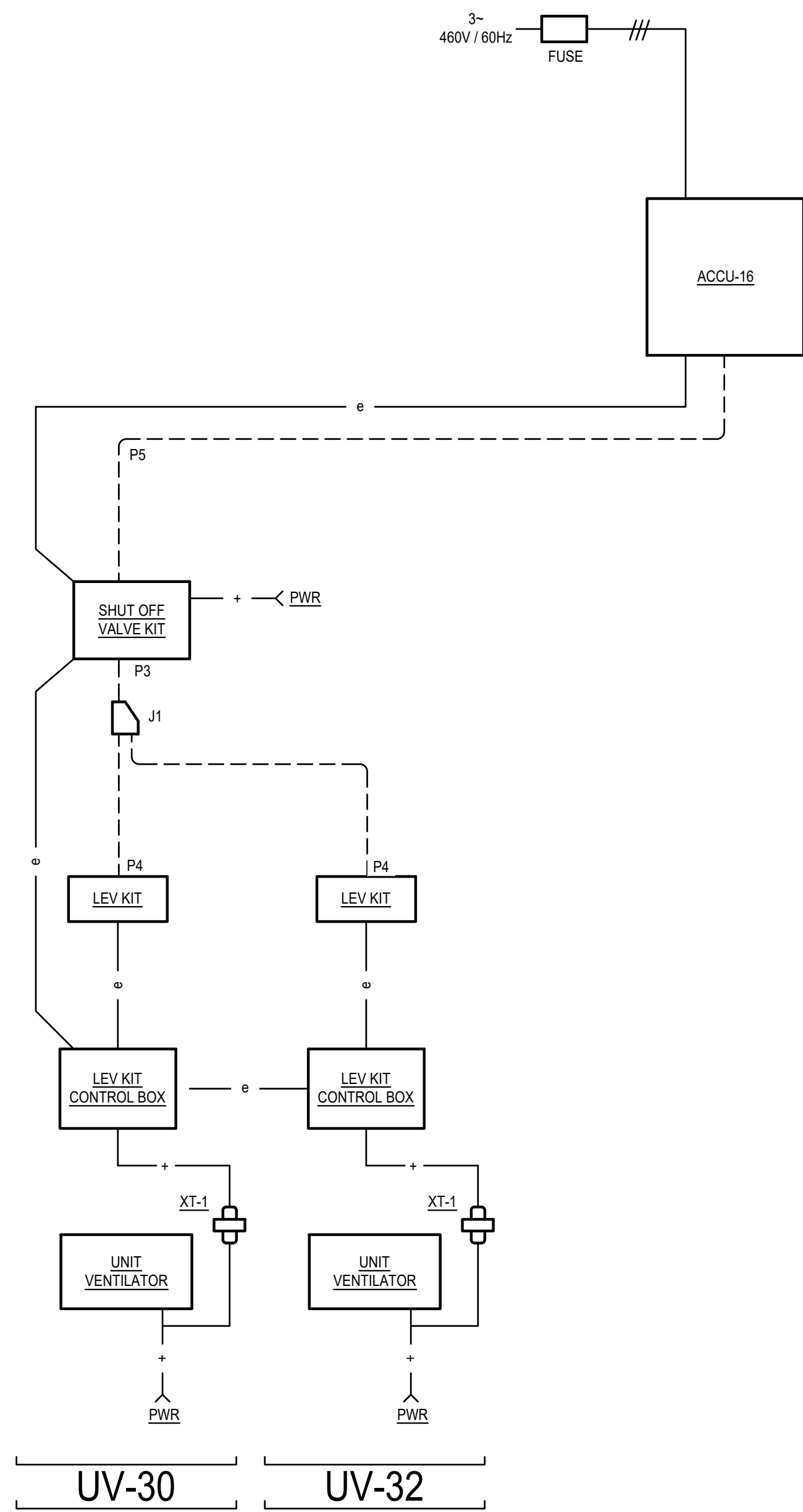
PROJECT NO.	1823.24221.1.3
DATE:	12/12/2025

FILE NO.: High_School_RVT24.rvt

1. INSTALL DUCT MAIN AS HIGH AS POSSIBLE, UP IN PLANE OF STRUCTURE.
2. SUPPLY GRILLES TO BE MOUNTED AT 45 DEGREE ANGLE POINTED DOWN TO AVOID BLOWING AIR DIRECTLY AT STRUCTURE. COORDINATE EXACT ANGLE WITH FIELD CONDITIONS AND DUCT ELEVATION.



2

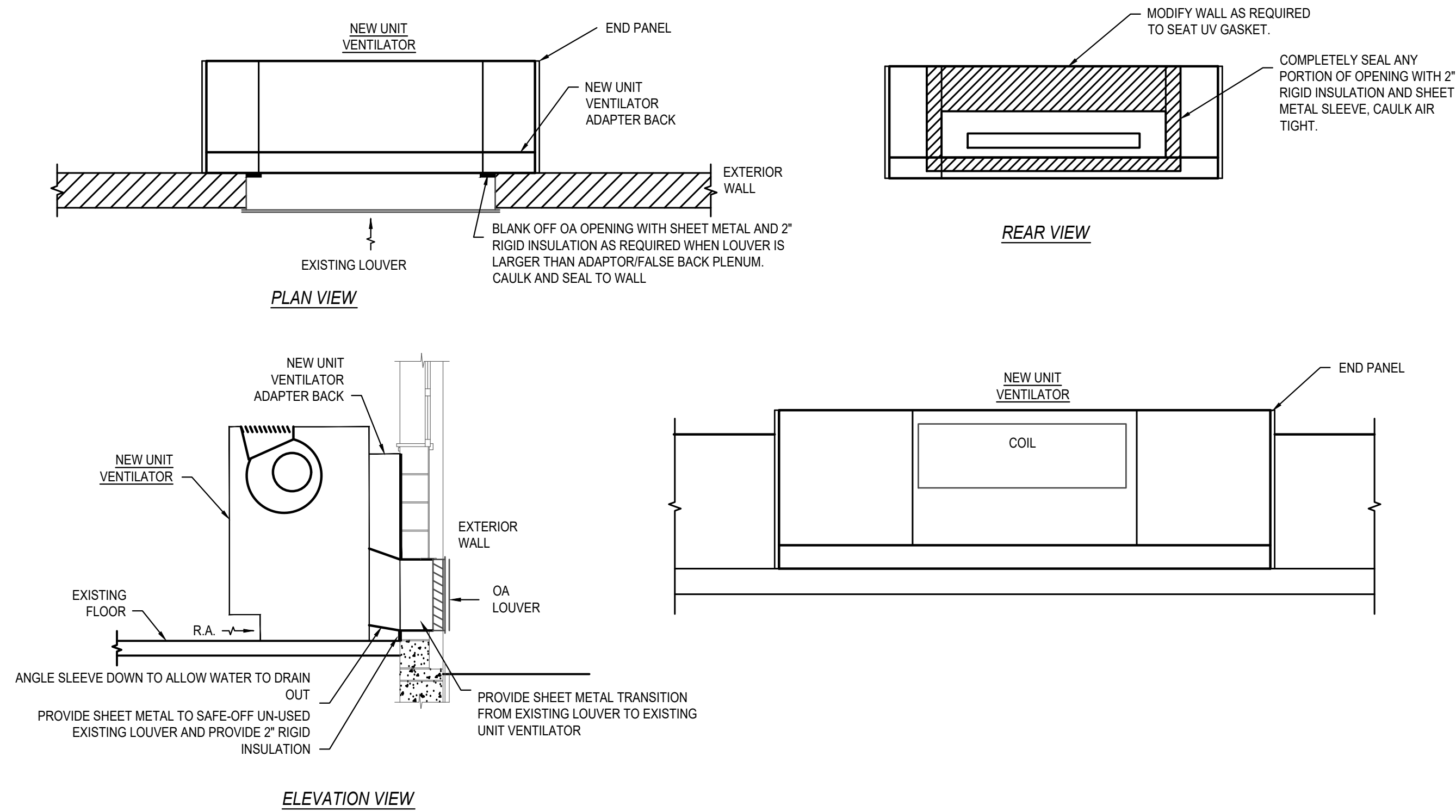


PIPING AND CONTROLS	
SYMBOL	BRANCH PIPE MODEL NAME
J1	CMY-Y102LS-G2R1
SVK1	CMR-M100KT-NA
SYMBOL	LIQUID PIPE / GAS PIPE SIZE
P1	1/2 / 1-1/8
P2	3/8 / 5/8
P3	1/2 / 7/8
P4	1/2 / 5/8
P5	3/8 / 7/8
P6	5/8 / 1-1/8
P7	1/4 / 3/8
SYMBOL	MODEL NUMBER
MA / WR	STOCK CONTROLLER

DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
	POWER WIRE
	CONTROL WIRE
	REFRIGERANT PIPE

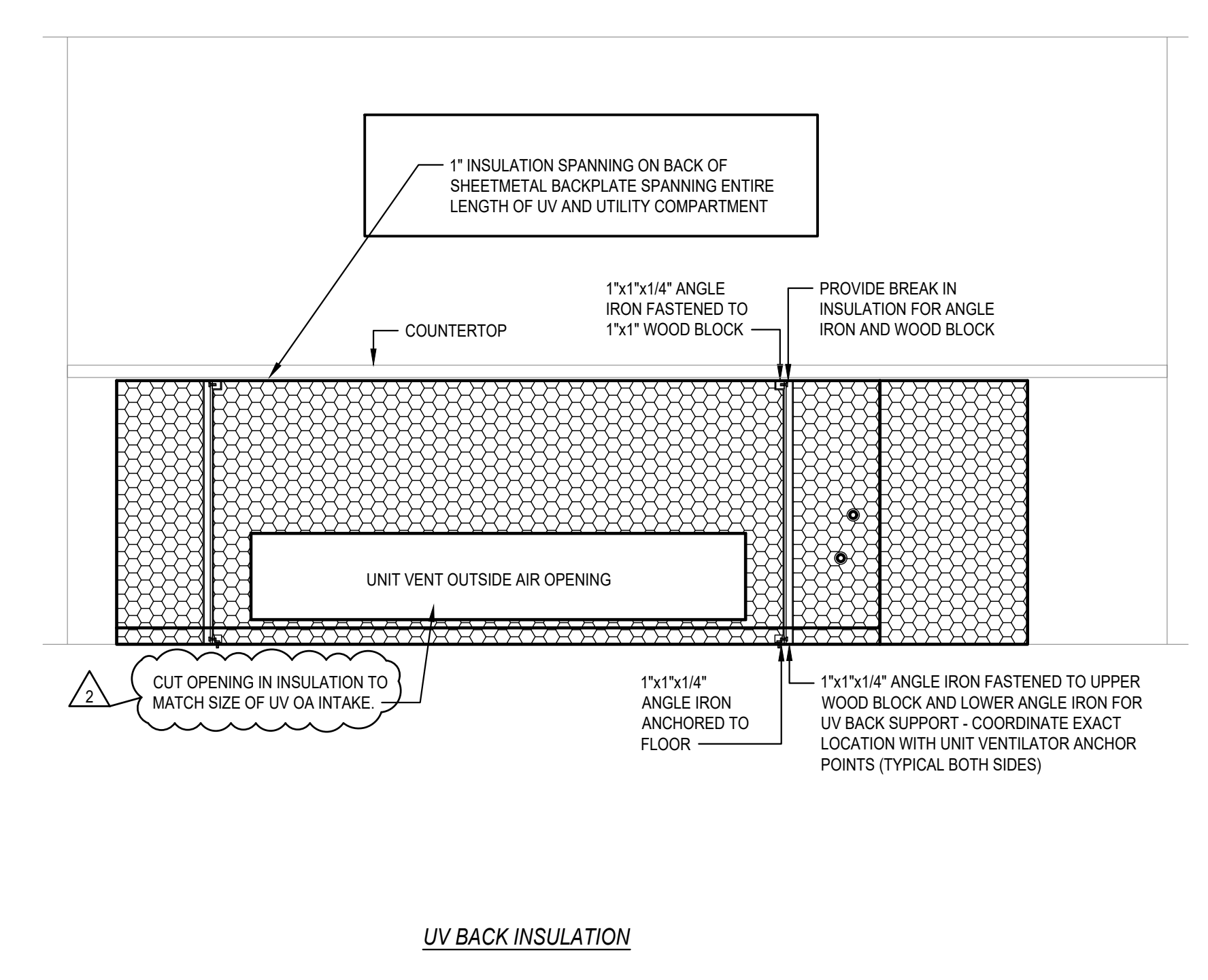
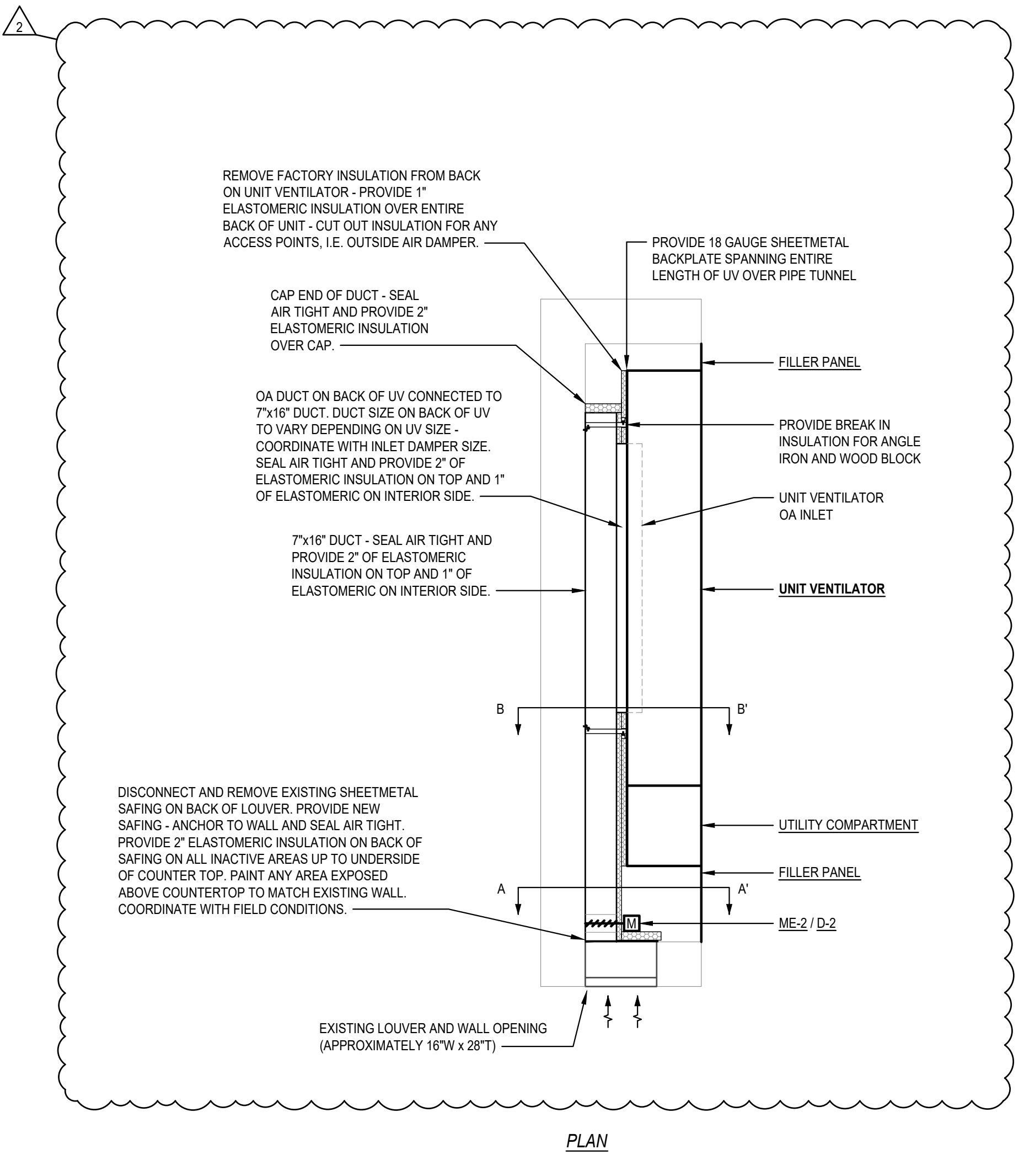
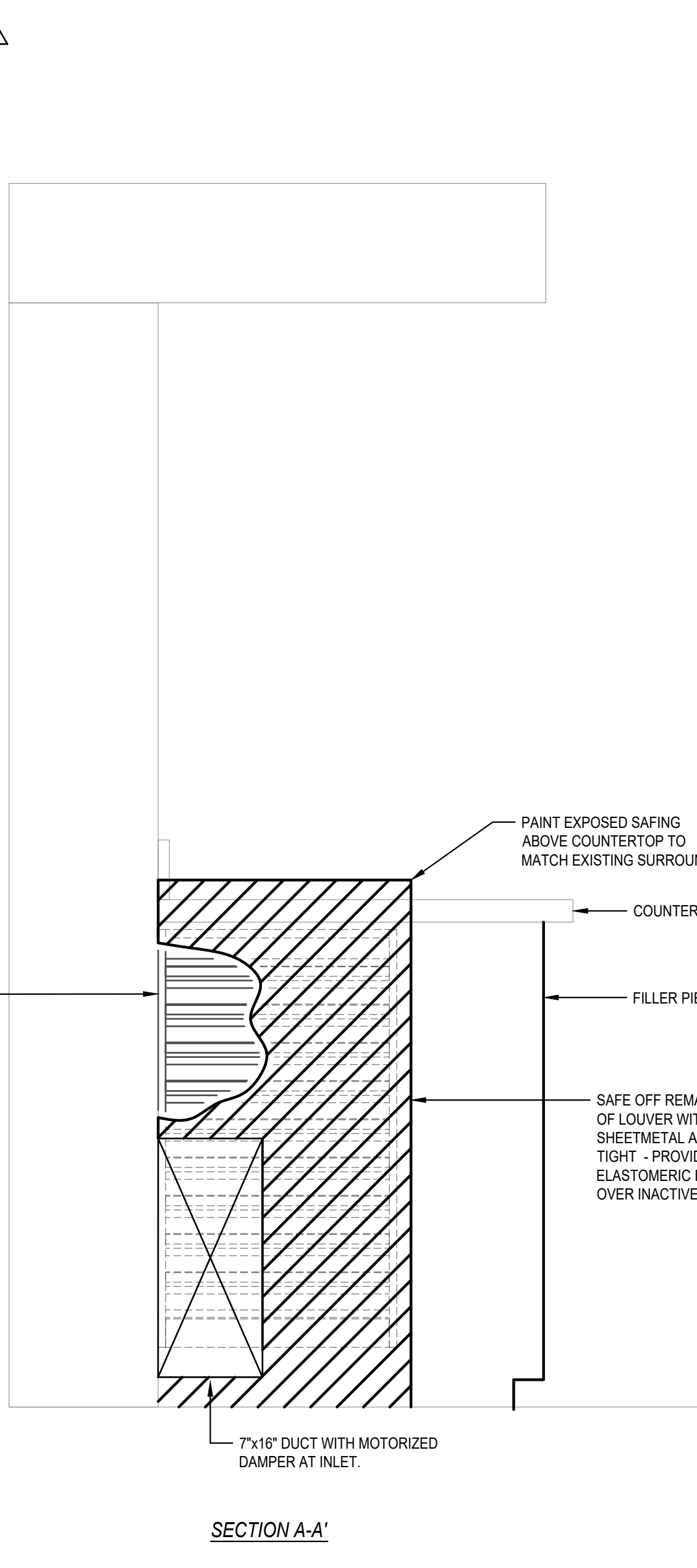
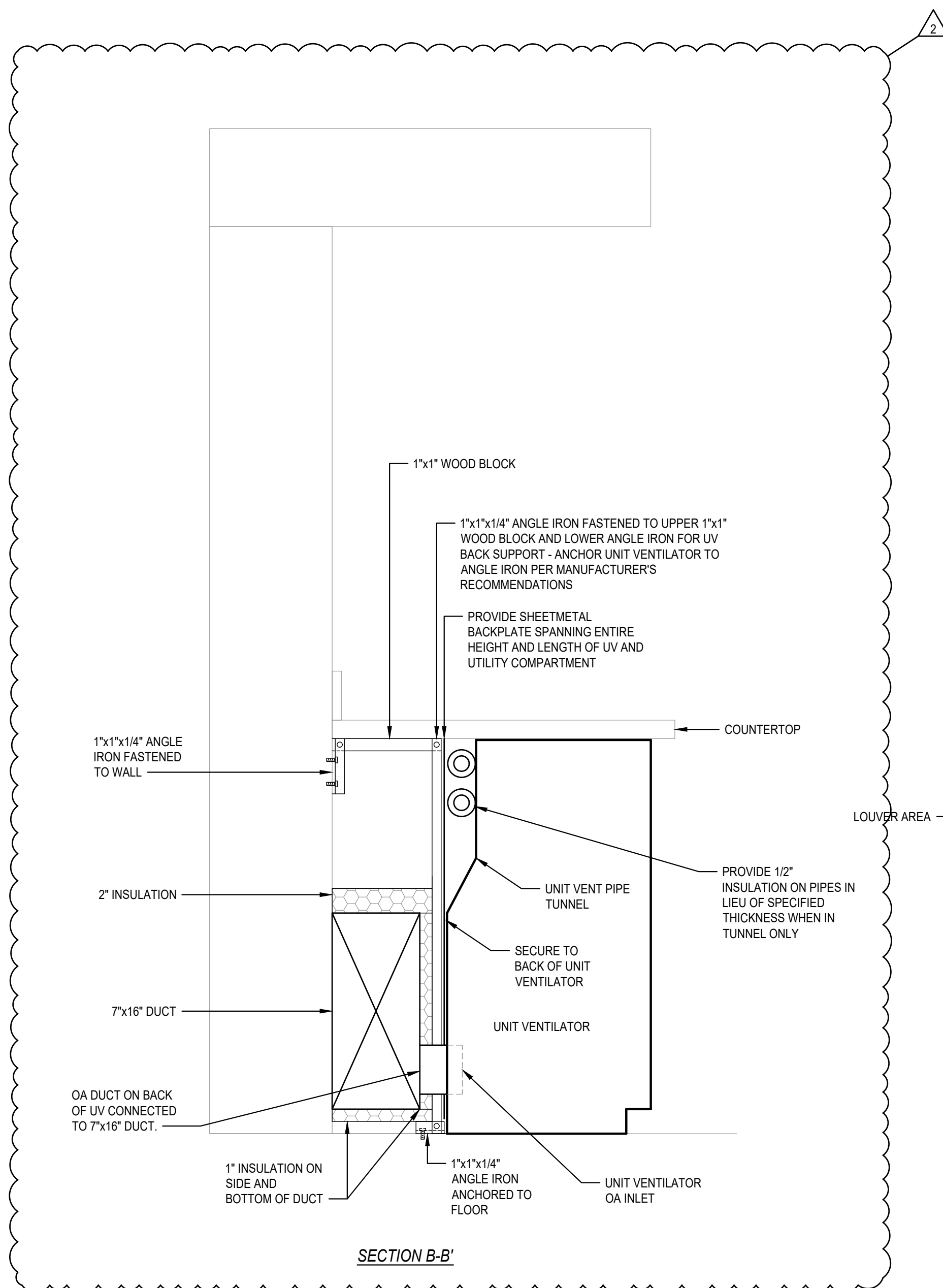
1 TYPICAL UNIT VENTILATOR REFRIGERANT PIPING AND WIRING LADDER DIAGRAM

- NOTES:
1. INSTALL TWINNING YS WITHIN 15 DEGREES OF LEVEL AND WITH 20 INCHES OF STRAIGHT PIPEON CONVEYING CONNECTION - REFERENCE INSTALLATION MANUAL FOR ADDITIONAL DETAILS INCLUDING BUT NOT LIMITED TO SPECIAL TRAPPING REQUIREMENTS WHEN TWINNING, AND PIPE SLOPE REQUIREMENTS.
 2. VERIFY SYSTEM WIRING AND NECESSARY COMPONENTS WITH EQUIPMENT MANUFACTURER'S REPRESENTATIVE PRIOR TO ORDERING.



2 UNIT VENTILATOR WITH ADAPTOR/FALSE BACK INSTALLATION DIAGRAM

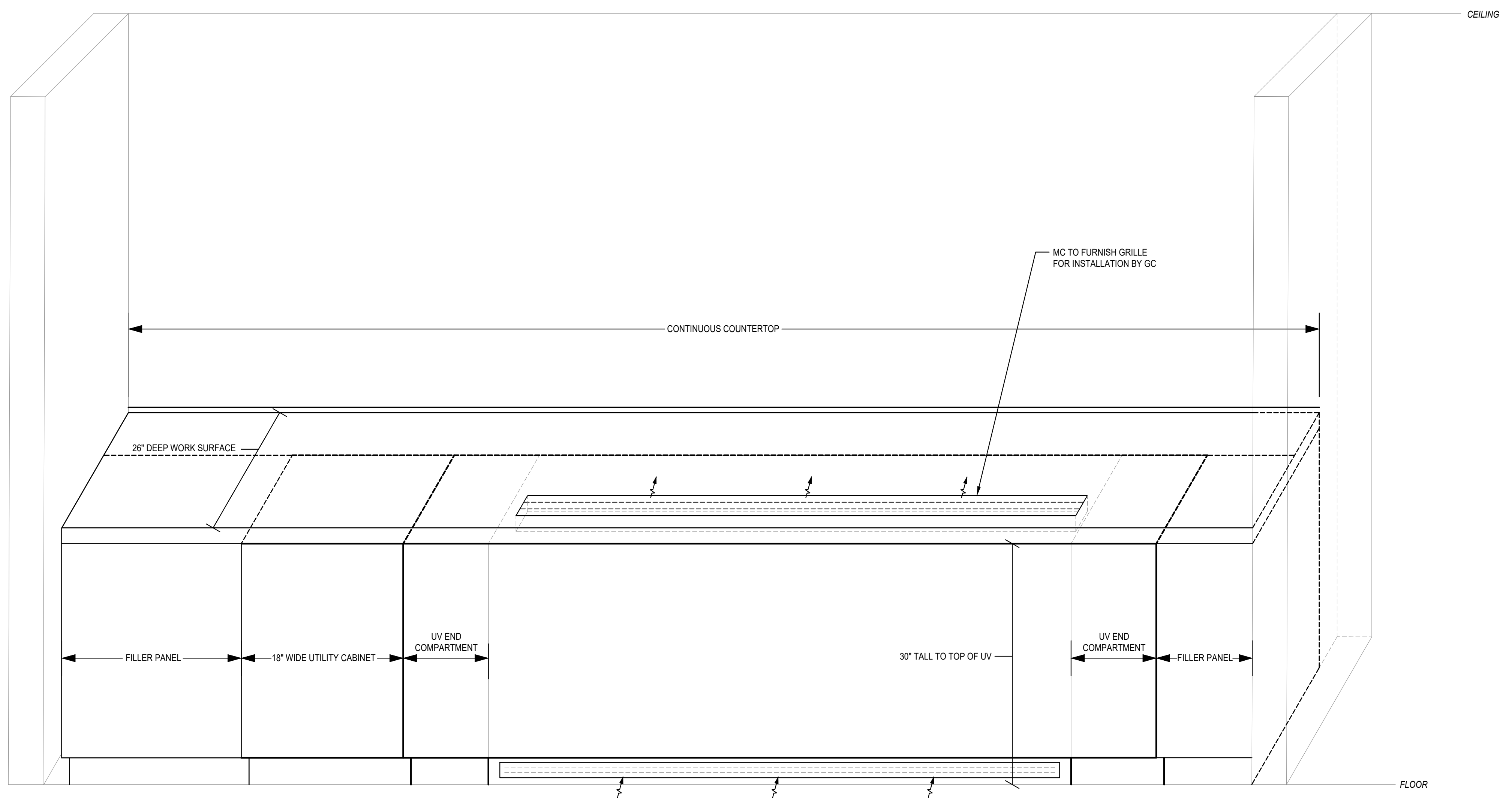
- NOTES:
1. IT IS THE RESPONSIBILITY OF THIS CONTRACTOR TO INSURE THAT ALL AREAS OF THE UNIT VENTILATOR ARE COMPLETELY SEALED AND INSULATED TO THE OUTSIDE AIR INTAKE WITH THE EXCEPTION OF THE INSULATED PORTION OF THE ADAPTER BACK.
 2. AS WALL CONDITIONS VARY AT EACH INDIVIDUAL UNIT THIS CONTRACTOR MUST PROVIDE SAFING, INSULATION, SHEET METAL, AND ACCESSORIES REQUIRED TO SEAT UNIT VENTILATOR FIRMLY AGAINST THE WALL.
 3. REFER TO DETAIL FOR PIPING.
 4. THE END COMPARTMENTS OF EACH UNIT VENTILATOR MUST BE COMPLETELY SEALED-OFF AND RE-INSULATED TO PREVENT ANY OUTSIDE AIR FROM ENTERING THE UNIT OR THE ROOM.



- GENERAL DIAGRAM NOTES**
- INSULATE HOT WATER SUPPLY AND RETURN WITH 1/2" INSULATION WHEN IN SAFOED OFF UNIT VENTILATOR TUNNEL. PROVIDE SPECIFIED INSULATION THICKNESS IN ALL OVER LOCATIONS.
 - ELASTOMERIC INSULATION TO BE SELF ADHERING TYPE, WITH ANTI-MICROBIAL PRODUCT PROTECTION, RESISTANCE TO WATER VAPOR OF 0.08 PER INCH AND FLAME SPREAD INDEX OF LESS THAN 25 AND SMOKE DEVELOPED INDEX OF LESS THAN 50. INSULATION SHALL HAVE A MINIMUM R-VALUE OF 4.2 AT A THICKNESS OF 1" AND 8 AT A THICKNESS OF 2. INSULATION SHALL BE ARMACELL APIARMFLEX SELF-ADHESIVE, OR EQUAL.
 - CONTRACTOR TO INSTALL A MOCK UP OF INSTALLATION, MINUS COUNTER TOP INSTALLATION FOR REVIEW BY OWNER'S REPRESENTATIVE, ENGINEER, AND EQUIPMENT MANUFACTURER. RECOMMEND OMITTING COUNTER TOP TO ALLOW FOR FULL ACCESS AND REVIEW OF INSTALLATION.
 - CONTRACTOR TO BRUSH SCREEN / BACK OF EXISTING LOUVER AND PLENUM AREA BEHIND EXISTING UNIT VENTILATOR AND VACUUM UP ALL LOOSE DEBRIS.
 - INSTALLATION MAY BE MIRRORRED OR ROTATED - COORDINATE INSTALLATION WITH LOUVER LOCATION AND PROPOSED REFRIGERANT PIPE ROUTING.
 - REFER TO PIPING DIAGRAM(S) FOR ADDITIONAL INFORMATION ON WATER SYSTEM SPECIAL TIES REQUIRED FOR EQUIPMENT CONNECTIONS.
 - DETAILS INCLUDED BELOW HAVE VARYING INSTALLATION TYPES WITH LOUVER ON OPPOSITE SIDES. CUT BACK, OR NO UTILITY CABINET. DETAILS TO BE USED AS SUPPLEMENTAL INFORMATION AND REFER TO M300 DRAWINGS FOR EACH INSTALLATION TYPE.



EXISTING CONDITIONS PHOTOS



1 UNIT VENTILATOR WITH SIDE LOUVER INTAKE INSTALLATION DIAGRAM
SCALE: NTS

CERTIFICATE OF AUTHORIZATION ENGINEERING - 0021631 SURVEY - 0020652 58 Exchange Street Binghamton, New York 13901 Phone: 607.722.1100 Fax: 607.722.2315 Email: info@keystone.com www.keystone.com KEYSTONE ASSOCIATES ARCHITECTS, ENGINEERS AND SURVEYORS, LLC	
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engineered solutions 646 Plank Road #104 Clifton Park, NY 12065 Phone: (518) 280-2410 Fax: (518) 280-2461 www.esnyc.com ES# 2501	
SED PROJECT NUMBERS: SED SCHOOL HIGH SCHOOL 00-04-02-04-0-007-023	
DATE: 02/09/2025 PROJECT NO. 1823.24221.1.3 DATE: 12/12/2025 PROJECT NO. 1823.24221.1.3	2 BILL Addendum #1 02/09/2025
NEWARK VALLEY CENTRAL SCHOOL DISTRICT 2023 CAPITAL PROJECT - PHASE III HIGH SCHOOL AIR CONDITIONING 68 WILSON CREEK ROAD TIOGA COUNTY, NY MECHANICAL DETAILS	
SHEET NO. M607-AD1	

Branch Panel: L-5A													
Location: Mech/Elec H240.3				Voltage: 120/208 Wye				Options:					
Supply From: T-5A				Phases: 3				SE Rated:		☐			
Mounting: Surface				Wires: 4				Hinged Trim:		☒			
Notes:				Mains Type: 100A MCB				Feed-Through:		☐			
				Bus Rating (Amps): 100 A				Sub Feed Lugs:		☐			
				A.I.C. Rating: 10 KAIC				200% Neutral:		☐			
				NEMA Rating: Type 1				Sub Feed Breaker:		☐			
				Design Make: Square D NQ				Isolated Ground:		☐			
								Computer Grade:		☐			
CKT	Circuit Description	Trip	Pol...	A	B	C	A	B	C	Pol...	Trip	Circuit Description	CKT
1	ACCU-10	25 A	3	1767			1767			3	25 A	ACCU-1	2
3	--	--	--		1767			1767		--	--	--	4
5	--	--	--			1767		1767		--	--	--	6
7	ACCU-9	25 A	3	1767			980			1	15 A	UV-15	8
9	--	--	--		1767			984		1	15 A	UV-16	10
11	--	--	--			1767			0	1	20 A	Spare	12
13	Spare	20 A	1	0			0			1	20 A	Spare	14
15	Spare	20 A	1		0		0			1	20 A	Spare	16
17	Spare	20 A	1			0		0		1	20 A	Spare	18
19	Spare	20 A	1	0			0			1	20 A	Spare	20
21	Spare	20 A	1		0			0		1	20 A	Spare	22
23	Spare	20 A	1			0		0		1	20 A	Spare	24
25	Spare	20 A	1	0			0			1	20 A	Spare	26
27	Spare	20 A	1		0			0		1	20 A	Spare	28
29	Spare	20 A	1			0		0		1	20 A	Spare	30
31	Spare	20 A	1	0			0			1	20 A	Spare	32
33	Spare	20 A	1		0			0		1	20 A	Spare	34
35	Spare	20 A	1			0		0		1	20 A	Spare	36
37	Spare	20 A	1	0			0			1	20 A	Spare	38
39	Spare	20 A	1		0			0		1	20 A	Spare	40
41	Spare	20 A	1			0		0		1	20 A	Spare	42
Total Load:				6280 VA			6284 VA				5300 VA		
Total Amps:				54 A			54 A				44 A		
Load Classification				Connected Load		Demand Factor		Estimated Demand		Panel Totals			
Motors				17864 VA		100.00%		17864 VA					
										Total Conn. Load: 17864 VA			
										Total Est. Demand: 17864 VA			
										Total Conn.: 50 A			
										Total Est. Demand: 50 A			

1. PROVIDE 480V, 800A BRANCH CIRCUIT FROM MDP TO NEW PANEL SDP2
CIRCUIT BREAKER 800A/3P CIRCUIT BREAKER IN EXISTING SWITCHGEAR.
2. PROVIDE 120V/20A GFI RECEPTACLE FOR FILL TANK.
3. PROVIDE 120V, 20A BRANCH CIRCUIT FROM PANEL D. PROVIDE 20A/1P
CIRCUIT BREAKER IN EXISTING PANEL.
4. PROVIDE 480V, 15A BRANCH CIRCUIT FROM PANEL F. PROVIDE 15A/3P
CIRCUIT BREAKER IN EXISTING PANEL.



1 BASEMENT POWER PLAN - AREA 1
E401-AD1 1/8" = 1'-0"

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QUESTIONS:
HIGH SCHOOL
60-04-0

60-04-02-04-0-007-023

HIGH SCHOOL

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**2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING**
WILSON CREEK ROAD
TOGA COUNTY, NY

68 W

SHEET NO.

401-AD1

PROJECT NO.
1823.24221.1.3

E: 12/12/2025

FILE NO.: High School_RVT24.rvt

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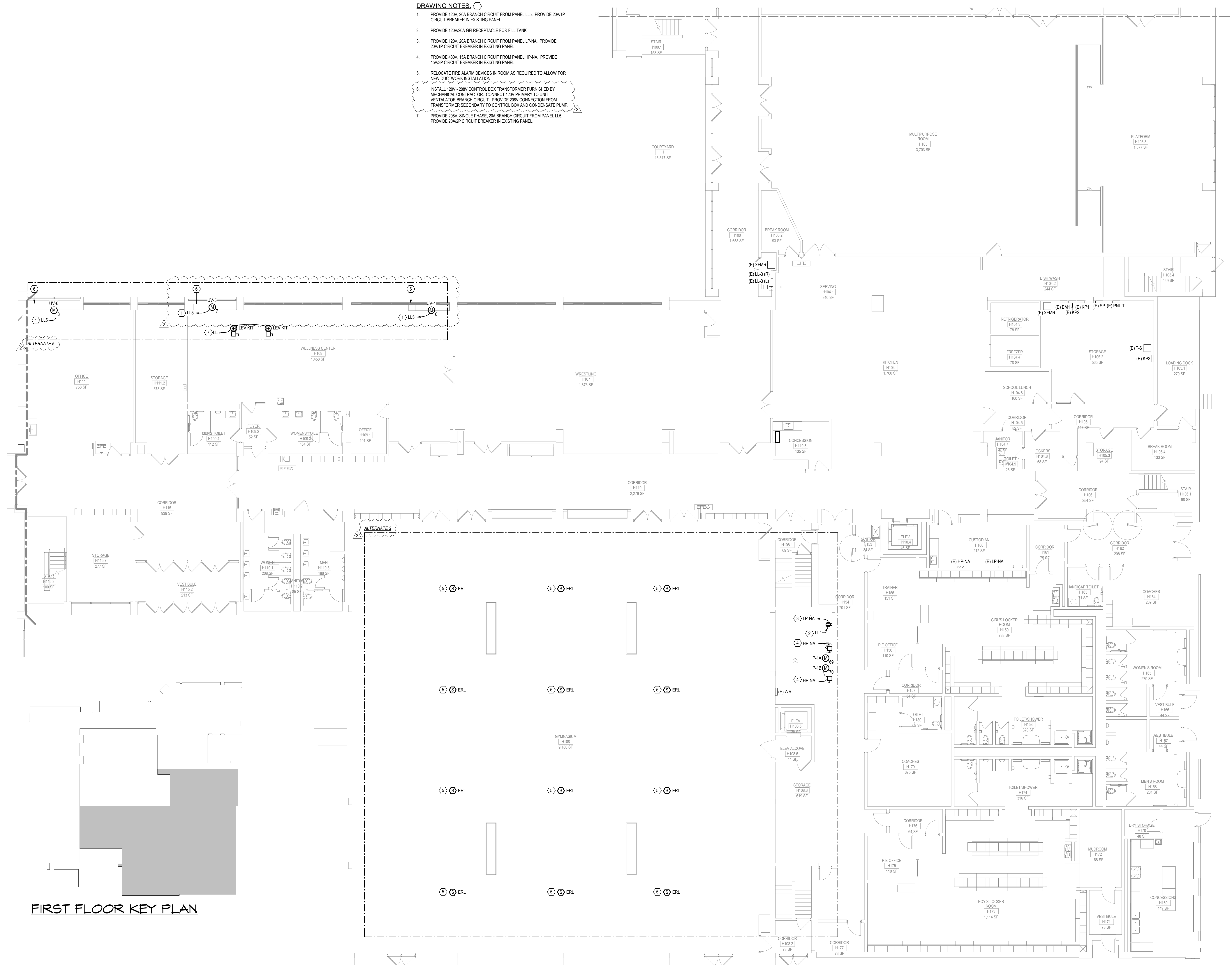
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
WILSON CREK ROAD
TIOGA COUNTY, NY
FIRST FLOOR POWER & SYSTEMS PLAN - AREA 1

SHEET NO.
E402-AD1

PROJECT NO.
1823.24221.1.3

FILE NO.: High School_RVT24.rvt

1. PROVIDE 120V/20A BRANCH CIRCUIT FROM PANEL LLS. PROVIDE 20A/1P CIRCUIT BREAKER IN EXISTING PANEL.
2. PROVIDE 120V/20A GFI RECEPTACLE FOR FILL TANK.
3. PROVIDE 120V/20A BRANCH CIRCUIT FROM PANEL LP-NA. PROVIDE 20A/1P CIRCUIT BREAKER IN EXISTING PANEL.
4. PROVIDE 480V, 15A BRANCH CIRCUIT FROM PANEL HP-NA. PROVIDE 15A/3P CIRCUIT BREAKER IN EXISTING PANEL.
5. RELOCATE FIRE ALARM DEVICES IN ROOM AS REQUIRED TO ALLOW FOR NEW DUCTWORK INSTALLATION.
6. INSTALL 120V - 208V CONTROL BOX TRANSFORMER FURNISHED BY MECHANICAL CONTRACTOR. CONNECT 150V PRIMARY TO UNIT. PROVIDE 20A BRANCH CIRCUIT FROM TRANSFORMER CONNECTION TO TRANSFORMER SECONDARY TO CONTROL BOX AND CONDENSATE PUMP.
7. PROVIDE 208V SINGLE PHASE BRANCH CIRCUIT FROM PANEL LLS. PROVIDE 20A/2P CIRCUIT BREAKER IN EXISTING PANEL.

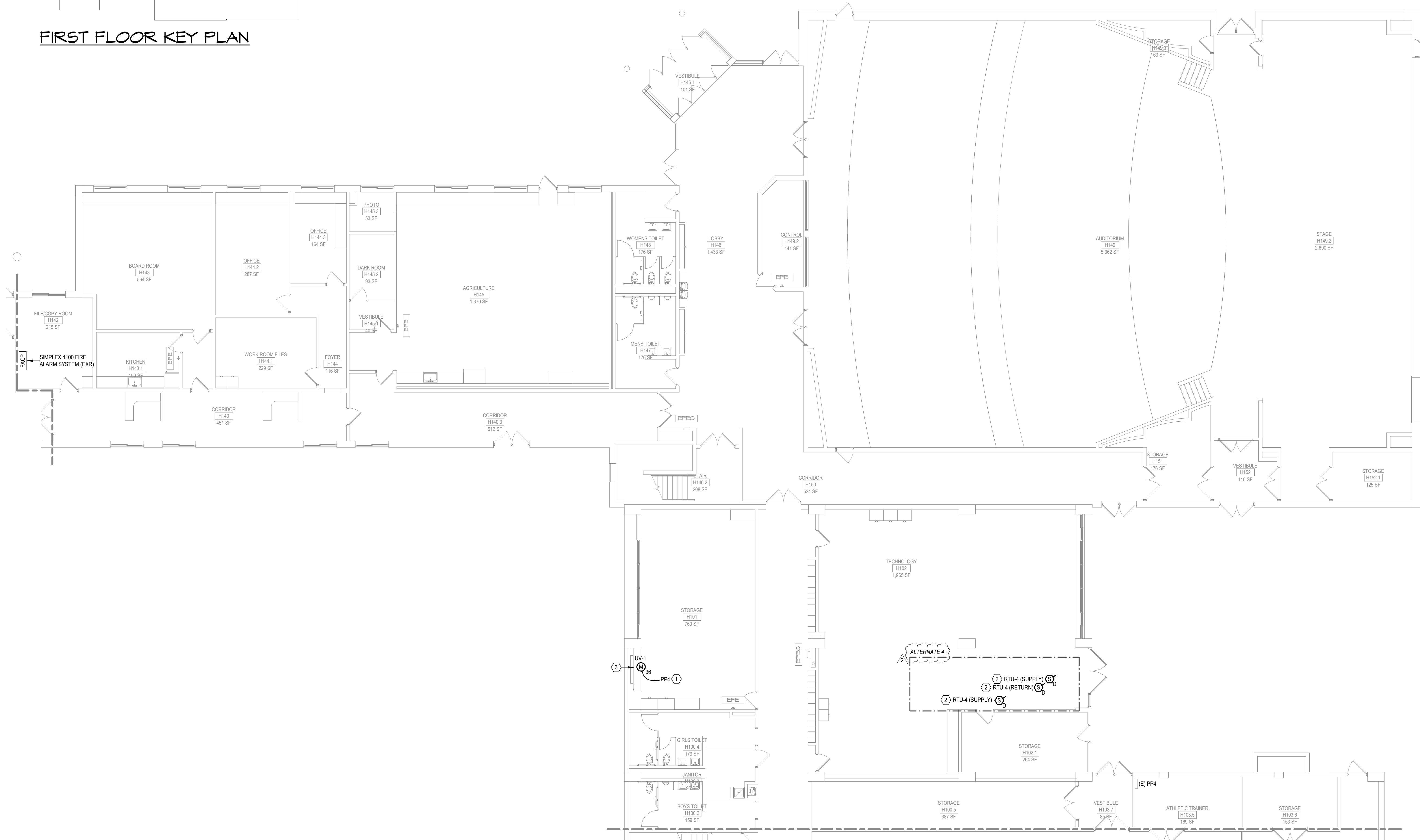


FIRST FLOOR KEY PLAN

1 FIRST FLOOR POWER PLAN - AREA 1
E402-AD1 1/8" = 1'-0"

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1
E403-AD



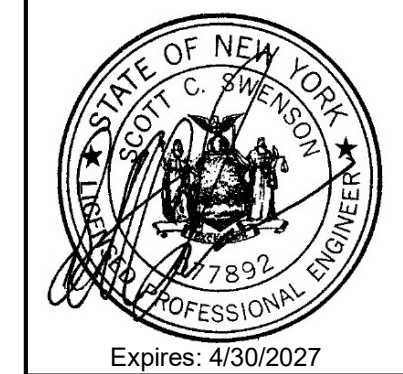
DRAWING NOTES: 

1. PROVIDE 120V, 20A BRANCH CIRCUIT FROM PANEL PP4. PROVIDE 20A/1P CIRCUIT BREAKER IN EXISTING PANEL.
2. PROVIDE FIRE ALARM DEVICE TO MATCH EXISTING SYSTEM AND DEVICES. CONNECT TO EXISTING FIRE ALARM SYSTEM.
3. INSTALL 120V - 208V CONTROL BOX TRANSFORMER FURNISHED BY MECHANICAL CONTRACTOR. CONNECT 120V PRIMARY TO UNIT VENTILATOR BRANCH CIRCUIT. PROVIDE 208V CONNECTION FROM TRANSFORMER SECONDARY TO CONTROL BOX AND CONDENSATE PUMP.

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SED PROJECT NUMBERS:
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HIGH SCHOOL

[illegible]

NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
88 WILSON CREEK ROAD TIOGA COUNTY, NY
FIRST FLOOR POWER & SYSTEMS PLAN - AREA 2

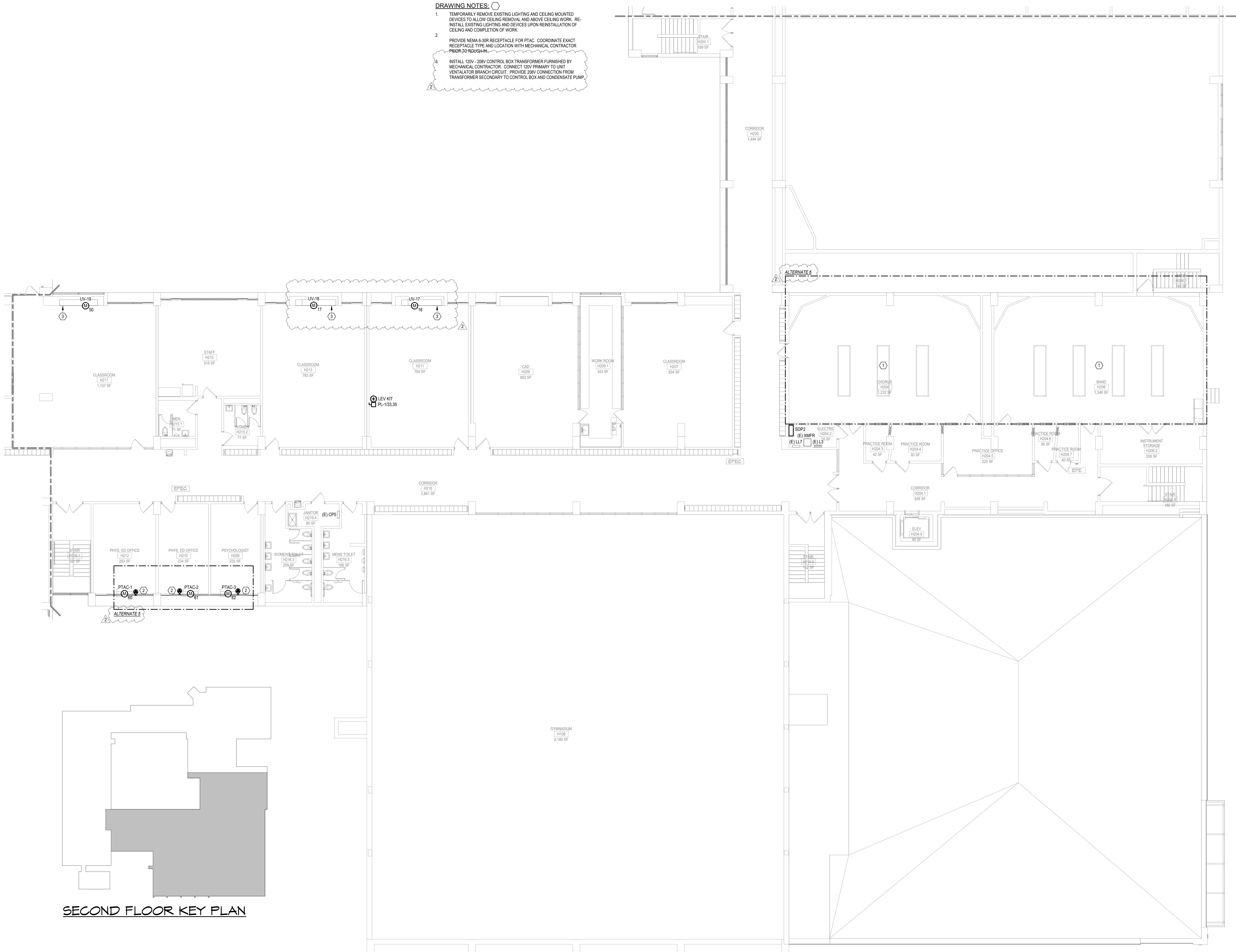
SHEET NO. E403-AD1	
PROJECT NO. 1823.24221.1.3	
DATE:	12/12/2025
CAD FILE NO.: High_School_RVT24.rvt	

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- CAD FILE NO.: High_School_RVT24.rvt

2/9/2026 9:49:38 AM



1 SECOND FLOOR POWER PLAN - AREA 1
E405-AD1 1/8" = 1'-0"

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SED PROJECT NUMBERS:
HIGH SCHOOL
60-04-02-04-0-007-023

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**NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREK ROAD
TIOGA COUNTY, NY**

SECOND FLOOR POWER & SYSTEMS PLAN - AREA 1

SHEET NO.
E405-AD1

PROJECT NO.
1823.24221.1.3

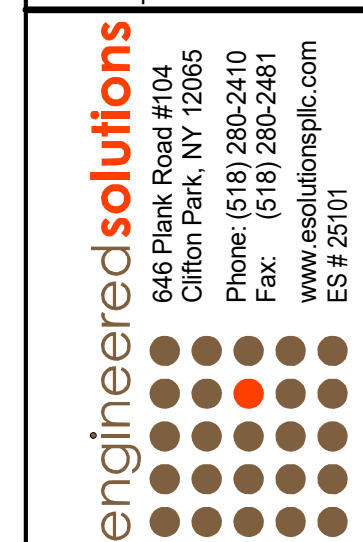
DATE:
12/12/2025

CAD FILE NO.: High_School_RVT24.mxd

1. PROVIDE 480V, 50A BRANCH CIRCUIT FROM PANEL L5 TO T-5A. PROVIDE 50A/3P CIRCUIT BREAKER IN EXISTING PANEL
2. INSTALL 120V - 208V CONTROL BOX TRANSFORMER FURNISHED BY MECHANICAL CONTRACTOR. CONNECT 120V PRIMARY TO UNIT VENTILATOR BRANCH CIRCUIT. PROVIDE 208V CONNECTION FROM TRANSFORMER SECONDARY TO CONTROL BOX AND CONDENSATE PUMP



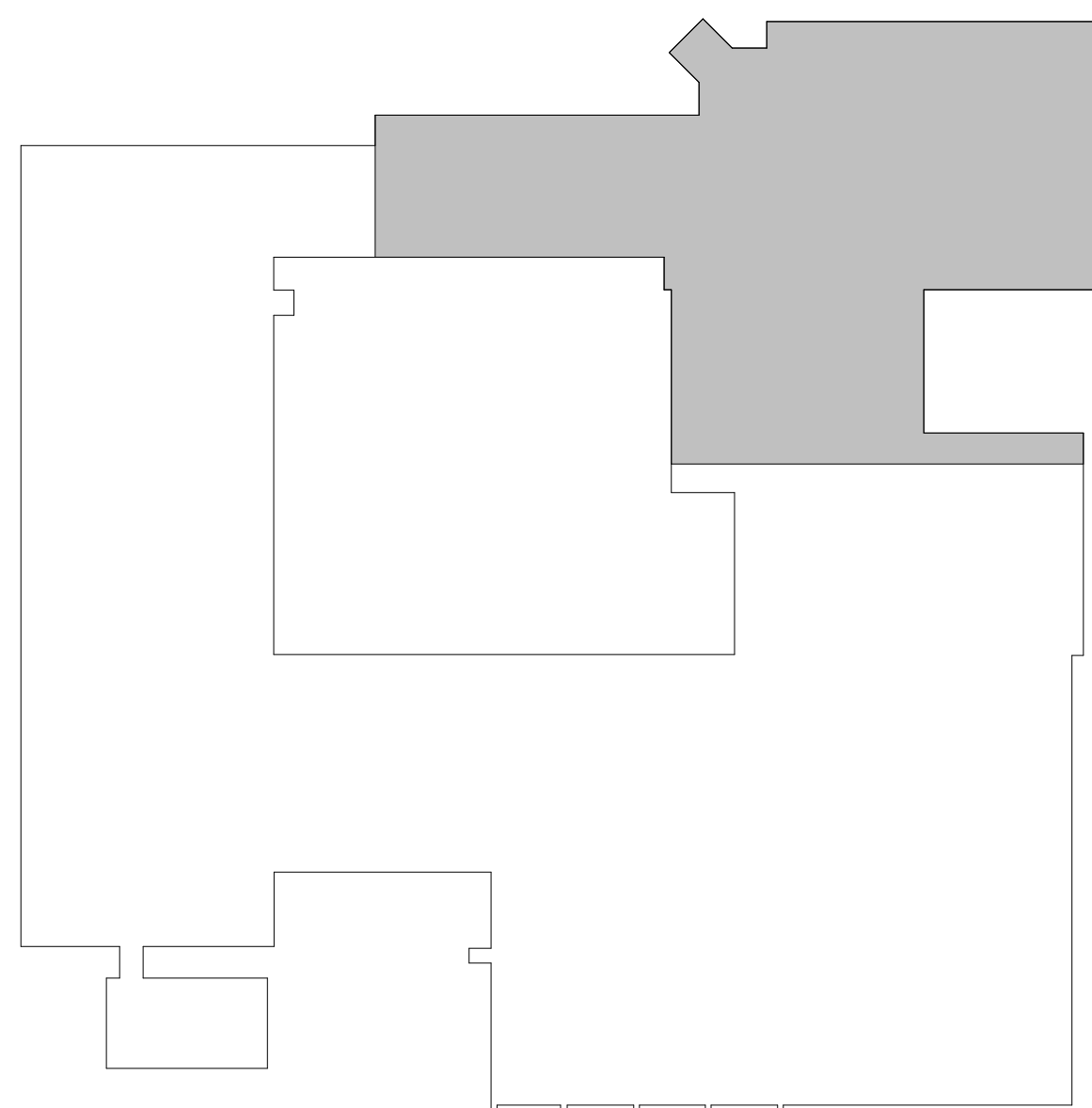
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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
SECOND FLOOR POWER & SYSTEMS PLAN AREA 2

SHEET NO.	
E406-AD	
PROJECT NO.	
1823.24221.1.3	
DATE:	12/12/2025
CA0 FILE NO.: High School_RV124	

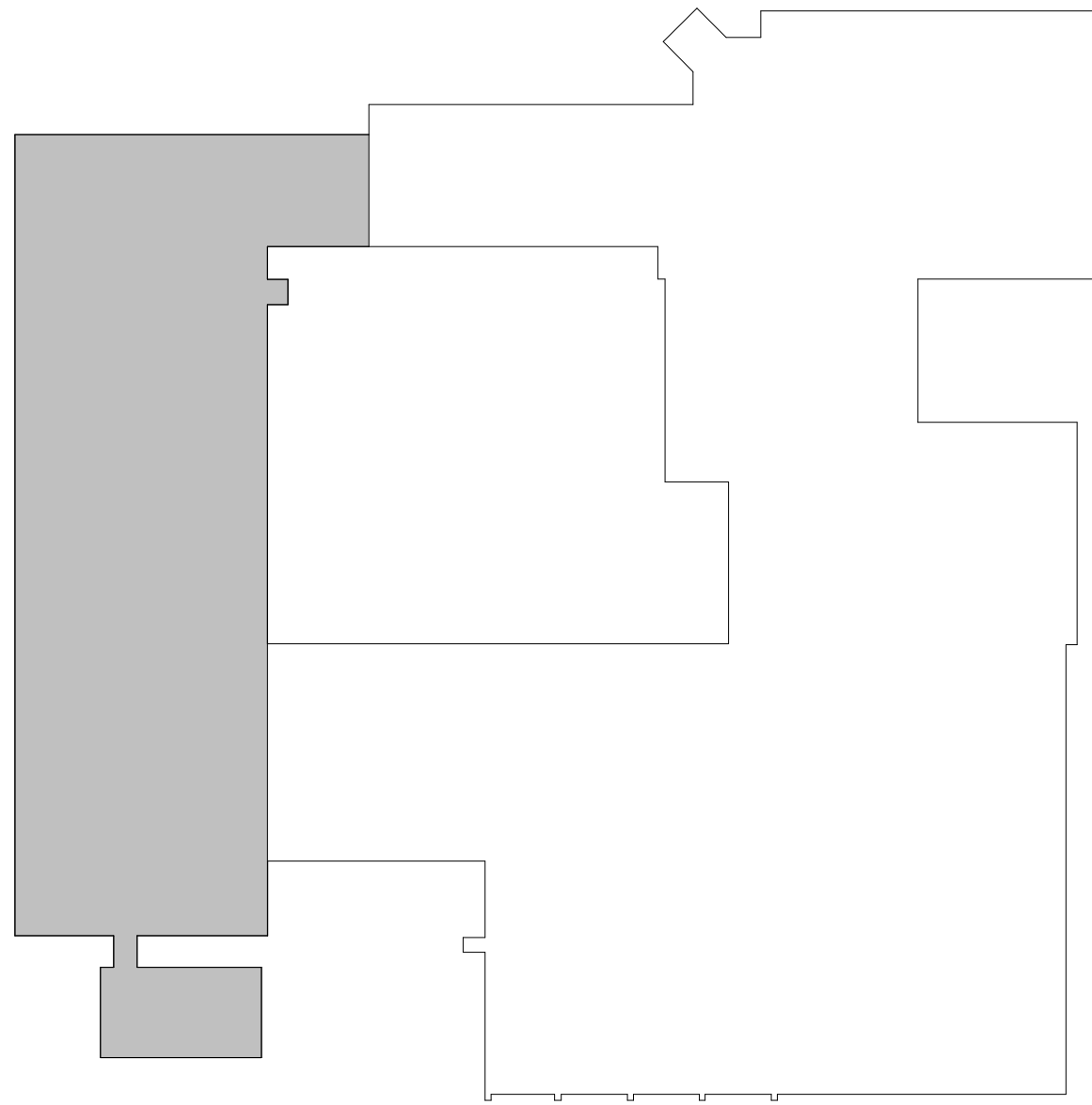


SECOND FLOOR KEY PLAN

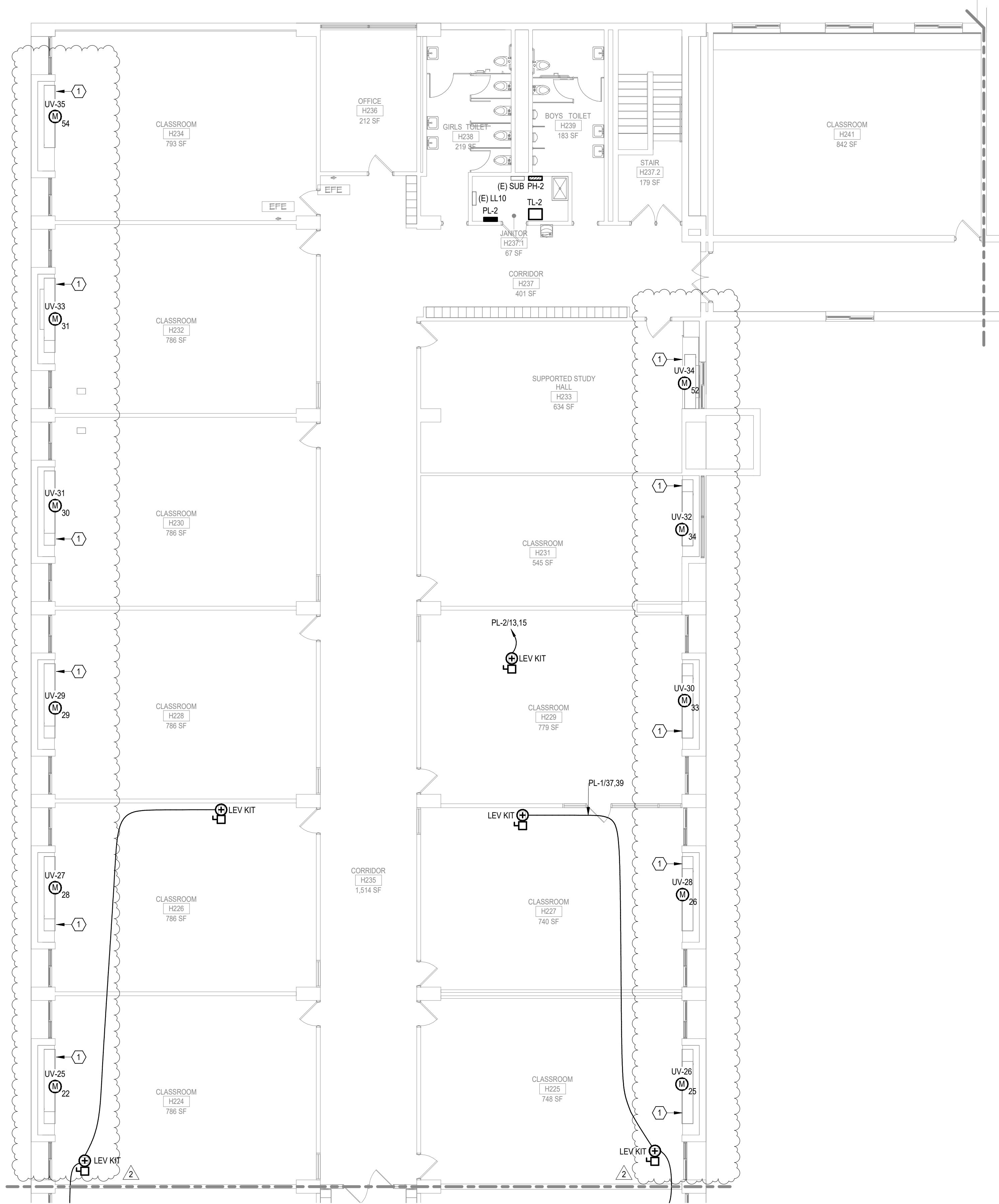


1 SECOND FLOOR POWER PLAN - AREA 2
E406-AD1 1/8" = 1'-0"

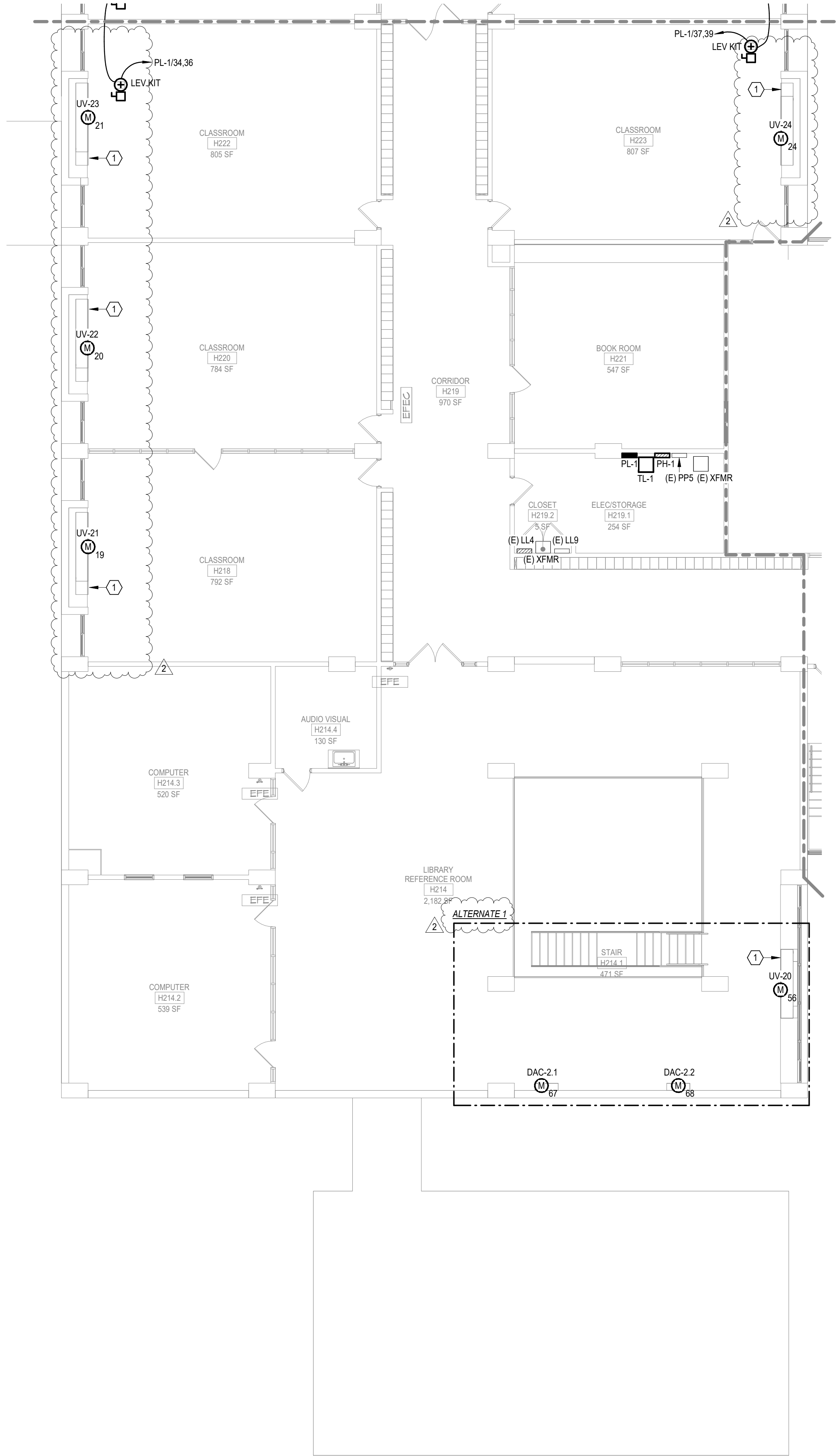
2/9/2026 9:49:39 AM



SECOND FLOOR KEY PLAN



1 SECOND FLOOR POWER PLAN - AREA 3 UPPER
E407-AD1 1/8" = 1'-0"



2 SECOND FLOOR POWER PLAN - AREA 3 LOWER
E407-AD1 1/8" = 1'-0"

DRAWING NOTES:
1. INSTALL 120V - 208V CONTROL BOX TRANSFORMER FURNISHED BY MECHANICAL CONTRACTOR. CONNECT 120V PRIMARY TO UNIT VENTILATOR BRANCH CIRCUIT. PROVIDE 208V CONNECTION FROM TRANSFORMER SECONDARY TO CONTROL BOX AND CONDENSATE PUMP.
2.

CERTIFICATE OF AUTHORIZATION
ENGINEERING - 0021631
SURVEY - 0020652

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STATE OF NEW YORK
JULY 8, 2017
Professional Engineer
Expires: 4/30/2027

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ES # 2501

SED PROJECT NUMBERS:
HIGH SCHOOL
60-04-02-04-0-007-023

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NEWARK VALLEY CENTRAL SCHOOL DISTRICT
2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING
68 WILSON CREEK ROAD
TIOGA COUNTY, NY
SECOND FLOOR POWER & SYSTEMS PLAN - AREA 3

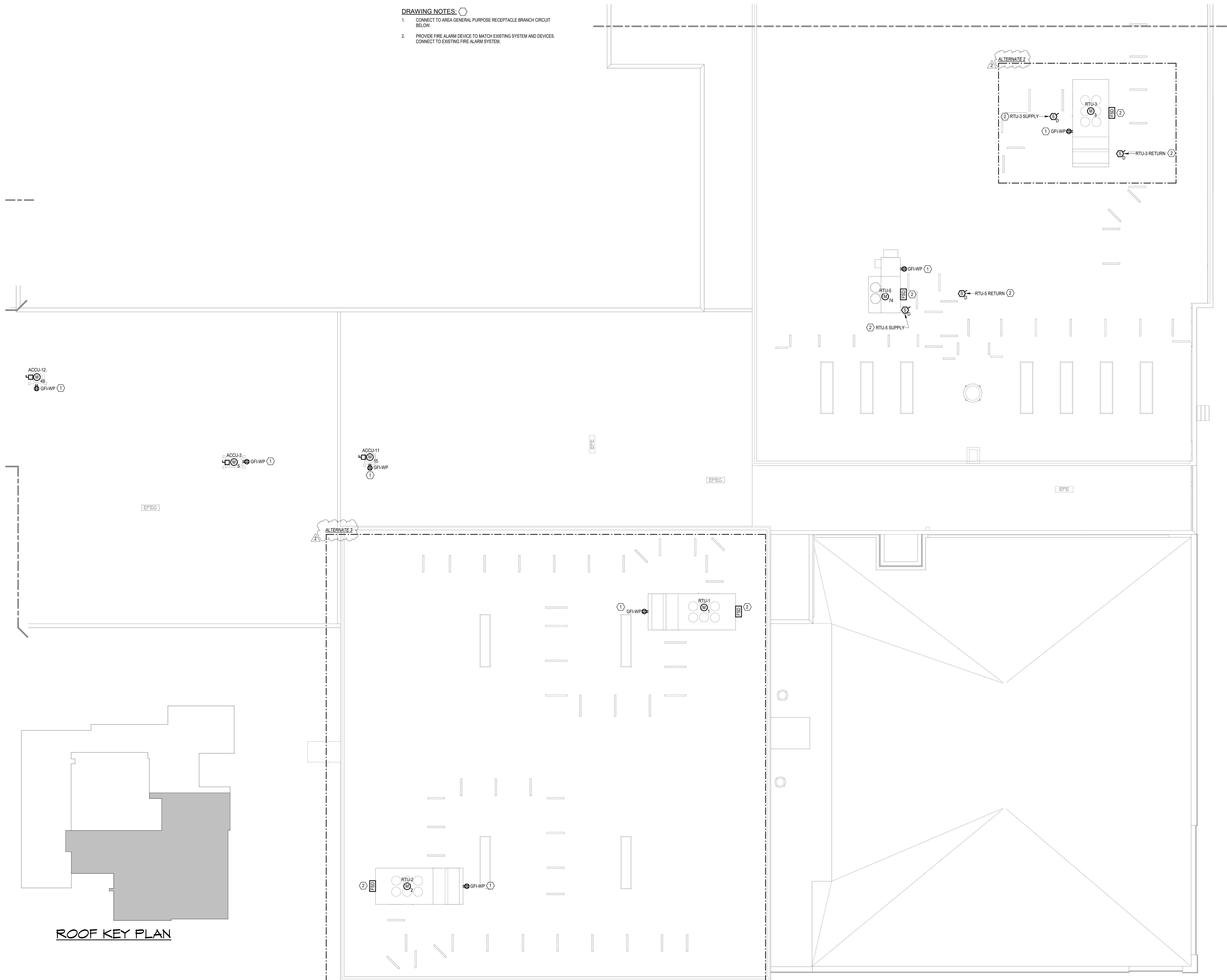
SHEET NO.
E407-AD1

PROJECT NO.
1823.24221.1.3

DATE:
12/12/2025

CAD FILE NO.: High_School_RVT24-rvt

1. CONNECT TO AREA GENERAL PURPOSE RECEPTACLE BRANCH CIRCUIT BELOW.
2. PROVIDE FIRE ALARM DEVICE TO MATCH EXISTING SYSTEM AND DEVICES. CONNECT TO EXISTING FIRE ALARM SYSTEM.



ROOF KEY PLAN

1 ROOF ELECTRICAL PLAN - AREA 1
E408-AD1 1/8" = 1'-0"

CERTIFICATE OF
AUTHORIZATION
ENGINEERING - 0021631
SURVEY - 0020652

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ES # 25101

OLD TOWNSHIP NUMBERS:
HIGH SCHOOL 60-04-0

60-04-02-04-0-007-023

HIGH SCHOOL

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2023 CAPITAL PROJECT - PHASE III
HIGH SCHOOL AIR CONDITIONING

68 WILSON CREEK ROAD
TIOGA COUNTY, NY

ROOF POWER & SYSTEMS PLAN - AREA 1

SHEET NO.
408-AD1

PROJECT NO.	
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1823.24221.1.3

E: 12/12/2025

D FILE NO.: High School_RV124.rvt



- DRAWING NOTES:** 
1. CONNECT TO AREA GENERAL PURPOSE RECEPTACLE BRANCH CIRCUIT BELOW.
 2. PROVIDE FIRE ALARM DEVICE TO MATCH EXISTING SYSTEM AND DEVICES. CONNECT TO EXISTING FIRE ALARM SYSTEM.
 3. PROVIDE 480V, 60A BRANCH CIRCUIT FROM PANEL LL5. PROVIDE 60A/3P CIRCUIT BREAKER IN BRANCH PANEL.



1. CONNECT TO AREA GENERAL PURPOSE RECEPTACLE BRANCH CIRCUIT BELOW.

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SHEET NO.
E410-AD1
PROJECT NO.
1823.24221.1.3
DATE: 12/12/2025
FILE NO.: High_School_RVT24.rvt