ADDENDUM NO. 02

November 12, 2025

Pentwater Public Schools – Renovations & Improvements
600 E. Park Street
Pentwater, MI 49449

TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications and the Drawings dated September 22, 2025, by C2AE. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 1-1 through ADD 2-1 and C2AE Addendum No. 02, dated November 12, 2025, consisting of 15 pages.

A. SPECIFICATION SECTION 01 12 00 MULTIPLE CONTRACT SUMMARY

Paragraph 3.03 BID CATEGORIES

A. **Bid Category No. 03 – ALUMINUM WINDOWS**

Add the following Clarifications:

1. **Bid Category No. 03 Aluminum Windows** shall be responsible for all window demolition, including associated sealants as well as temporary enclosures for windows/storefront systems as needed.

B**. Bid Category No. 04 – MECHANICAL**

Add the following Clarifications:

1. **Bid Category No. 04 Mechanical** shall be responsible for the temporary removal and/or demolition of louvers for the installation of new mechanical equipment and louvers.

B. Refer to the attached Request For Information summary, Pre-Bid RFI No. 01 through 11 are included.

Pentwater Public Schools Renovations and Improvements - Pre-Bid RFI & Substitution Request Log

Date - 11/11/2025

RFI #	Company Submitting RFI	Date Received	RFI Description	RFI Response
1	Smart Building Solutions	11/5/2025	Request for Smart Building Services to be added as an approved contractor to section 230923 Direct Digital Control System Section 2.1 - B Contractors.	**C2AE:** Yes, SBS will be added to the approved contractors for the mechanical control work in Addendum #2.
2	Northwest Kent Mechanical Co.	11/11/2025	If we have to enlarge an existing Louver Opening in order to get old AHU's out or new AHU's in, who is responsible for making that opening and then patching it back in? Is it part of the $30,000.00 Allowance?	**TSC:** Bid Category #4 - Mechanical will be responsible for enlarging any openings for the demolition of old equipment or installation new mechanical equipment. This is not included in the $30,000 allowance.
3	Northwest Kent Mechanical Co.	11/11/2025	With the AHU/RTU Replacements happening in the Fall after School is back in session, will any Temporary Heat/Ventilation be required in the spaces the units feed? Are the spaces going to be unoccupied during the replacements? If Temporary Heat/Ventilation is required, who is responsible for it?	**TSC:** Bid Category #4 - Mechanical will be responsible for any temporary heating or ventilation as required. PPS will cover the cost of fuel or electric. If the units are only non-operational for less then 72 hrs. then temporary ventilation will not be required. Any units in occupied spaces are to be completed and operational by the time school is back in session. Mezzanine and roof-top-units are to be completed after school is in session, but prior to heating season.
4	Northwest Kent Mechanical Co.	11/11/2025	Will the Mechanical permits for this project go through the State of Michigan? Will we need a separate permit for the AHU/RTU replacements so the renovation project can be finaled out?	**TSC:** Yes, the Mechanical contractor shall obtain necessary permits through the state for their portion of the work. Skillman will pull the general Building Permit and provide BFS/BCC numbers to the contractors. At this time, the project is one phase and shall only require one permit.
5	Northwest Kent Mechanical Co.	11/11/2025	Is Bid Category #4 – Mechanical responsible for hiring the Commissiong Agent?	**TSC:** PPS will hire an independent commissioning agent. Bid Category #4 - Mechanical shall assist with any inspections or testing and make the necessary corrections from the final commissioning report at no additional cost.
6	Grand Valley Glass	11/11/2025	On sheet 2A-601 there is a frame, 'X', shown with fire rated glass. Am I safe to assume this is a hollow metal frame that is provided by bid category 1 general trades and that bid category number 3 aluminum windows is to provide the fire rated glazing for it?	**TSC:** Yes, this is a hollow-metal frame provided by Bid Category #1 - General Trades. Bid Category #1 - General Trades shall provide all hollow metal frames and Bid Category #3 - Aluminum Windows shall provide all glazing.
7	Control Solutions	11/11/2025	Request for Control Solutions to be added to the bidders list in specification 230923 2.1. Control Solutions is a direct dealer with Distech and meets all the requirements of the specifications.	**C2AE:** Yes, Control Solutions will be added as an approved controls contractor in Addendum #2.
8	Bolhouse LLC	11/11/2025	Request form to get Airedale approved to bid the Unit Ventilators as an equal.	**C2AE:** Yes, Airdale will be added to the specification in Addendum #2.
9	ControlNet	11/11/2025	There is existing fin tube shown on the drawings with no keynote. What Is your intent with these and other existing equipment?	**C2AE:** All existing and new equipment shown on sheet 2M-801 is to be on the new BMS.
10	ControlNet	11/11/2025	Do you know what the current control system is in the building?	**C2AE:** There is an existing Schneider Electric Havel DDC system in the building. This is being replaced in its entirety.
11	ControlNet	11/11/2025	Are we expected to integrate any existing controls or is this an entire replacement?	**C2AE:** Scope is entire replacement. All controls are pneumatic and being replaced with DDC. The four existing boilers were installed summer 2025 and are operating on their own factory installed standalone controls. The boilers, pumps, and ancillaries are to be integrated into the new BMS.

50 Louis St., NW, Suite 200
Grand Rapids, MI 49503
616.454.9414
www.c2ae.com

Addendum #2

Project No.:	24-0301	**Date:**	November 12, 2025
Project:	Pentwater Public Schools 2024 Bond Implementation – Bid Package #2	**A/E Firm:**	C2AE
		Project Manager:	Anthony Seifritz
Owner:	Pentwater Public Schools 600 East Park Street Pentwater, MI 49449		

The following changes, revisions, modifications, etc. shall be incorporated into the contract documents, specifications, and plans.

ACKNOWLEDGEMENTS

A2.1 The Bidder shall acknowledge receipt of Addenda #2 by indicating so in the spaces provided on the Bid Form.

SPECIFICATIONS

A2.2 **Refer To Section 23 0923 – Direct Digital Control (DDC) for HVAC (Not reissued):**
Refer to Article 2.1. Add paragraph 2.1B.e as follows:

"e. Smart Building Services - (Voluntary Alternate) Contact: Andrew Bosse andrewb@sbsmi.com."

A2.3 **Refer To Section 23 0923 – Direct Digital Control (DDC) for HVAC (Not reissued):**
Refer to Article 2.1. Add paragraph 2.1B.f as follows:

"f. Control Solutions - (Voluntary Alternate) Contact: Derek Strong dstrong@csibas.com."

A2.4 **Refer To Section 23 8233 – Convectors (Not reissued):**
Refer to Article 2.1. Add paragraph 2.1.A.1.e as follows:

"e. Zehnder Ritling."

A2.5 **Refer To Section 03 5300 – Gypsum Roof Deck Repair (issued):**
Add Section 03 5300 in its entirety, describing work at roof deck repair.

A2.6 **Refer To Section 05 3100 – Steel Decking (issued):**
Add Section 05 3100 in its entirety, describing work at roof deck repair.

DRAWINGS

A2.7 Refer to Sheet 2A-100A (reissued):
Add missing door from 120E.

A2.8 Refer to Sheet 2A-100B (reissued):
Add "Mezzanine Floor Plan - Zone 'B'," indicating infill work in the gypsum deck.

A2.9 Refer to Sheet 2A-311 (reissued):
Add detail number 6, Indicating Infill work at the gypsum deck.

A2.10 Refer to Sheet 2M-301 (reissued):
Add note clarifying new hydronic closed loop chemical treatment system location in boiler room.

A2.11 Refer to Sheet 2M-303 (reissued):
Revise AHU-5 enlarged plan to show reconnection of return diffuser and add note to repair damaged mezzanine flooring.

A2.12 Refer to Sheet 2M-601 (reissued):
Revise Air Handler Schedule to specify Installation of a three-way valve on AHU-5. Revise note on unit ventilator schedule.

A2.13 Refer to Sheet 2M-801 (reissued):
Add notes to drawing.

A2.14 Refer to Sheet 2M-802 (reissued):
Revise note 4 on unit ventilator schedule. Add sequence of operation for fan coil unit, energy recovery unit, and dedicated outside air unit. Remove duplicate hydronic unit heater sequence of operation.

SECTION 03 5300 – GYPSUM ROOF DECK REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes repairs for poured gypsum deck systems.

1.2 SUBMITTALS

A. See Section 01 3000-Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.

C. Manufacturer's Instructions.

1.3 QUALITY ASSURANCE

Qualifications: Work in this section shall be performed by experienced and qualified installers who have been approved or authorized by the manufacturer of the gypsum deck materials.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect all materials from excessive moisture when shipping, storing, and handling. Deliver all materials in their original unopened packages or bundles and store off the ground in a place providing protection from damage and exposure to the elements.

1.5 PROJECT CONDITIONS

A. Environmental Conditions: Provide ventilation for any plenum or joist space between roof deck and ceiling assemblies, using natural or artificial means, both during and after construction.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. The "Basis of Design" for each item is listed below. Provide either the product identified or an equivalent via substitution request.

1. *Reinforcing Mesh: KEYDECK galvanized steel woven wire mesh.*
2. *Plaster Bonder: USG Plaster Bonder.*
3. *Gypsum Concrete: USG Securock Gypsum Concrete Patch (Pyrofill), mill formulated complying with ASTM C317, Class A, 500 psi ultimate minimum compressive strength.*
4. *Water: Potable, without impurities or ice crystals.*

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine existing gypsum deck to determine areas requiring repair.

3.2 REMOVAL OF EXISING MATERIALS

A. Gypsum: Remove powdery or wet and spongy gypsum back to solid gypsum, leaving about 2-3 inches of the reinforcing mesh exposed.

3.3 INSTALLATION

A. Reinforcement Placement: Place reinforcing mesh with 16-gauge wires at right angles to sub-purlins. Lap mesh ends at least 6" but do not lap sides of mesh. Place mesh in all areas where gypsum concrete is to be poured. New mesh must be tied to the existing mesh to maintain structural continuity of the deck system.

B. Plaster Bonder: Apply plaster bonder direct from can using a brush or roller over areas of gypsum that are to be patched.

C. Gypsum Concrete: Mix gypsum concrete with 5 gallons of water per bag of gypsum using a paddle blade mixer and a 1/2" drill. Use heated water when the temperature is below 40 degrees. Add gypsum to the water, mixing until the material has a consistency of cake batter. Pour over steel deck infill to a 2" minimum thickness and screed to a smooth, even plane. Keep equipment clean to avoid flash set of the gypsum.

3.4 FIELD REVIEW

A. Notify the architect at least 24 hours in advance to schedule field personnel when the system is completed and ready for field review by the architect.

***END OF SECTION 03 5300* (ADM2)**

SECTION 05 3100 - STEEL DECKING

PART 1 GENERAL

1.1 *SECTION INCLUDES*

A. *Metal form deck.*

1.2 *REFERENCE STANDARDS*

A. *ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.*

B. *AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).*

C. *AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2018, with Errata (2022).*

D. *SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.*

E. *SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.*

1.3 *SUBMITTALS*

A. *See Section 01 3000 - Administrative Requirements, for submittals procedures.*

B. *Shop Drawings: Indicate deck plan, support locations, reinforcement, pertinent details, and accessories.*

C. *Certificates: Certify that products furnished meet or exceed specified requirements.*

D. *Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.*

1.4 *QUALITY ASSURANCE*

A. *Design deck layout, spans, fastening, and joints under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.*

B. *Manufacturer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.*

C. *Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of documented experience.*

1.5 *DELIVERY, STORAGE, AND HANDLING*

A. *Cut plastic wrap to encourage ventilation.*

B. *Separate sheets and store deck on dry wood sleepers; slope for positive drainage.*

PART 2 PRODUCTS

2.1 *MANUFACTURERS*

A. *Steel Deck:*
1. *Canam Steel Corporation: www.canam-construction.com.*
2. *Cordeck, Inc: www.cordeck.com.*
3. *James River Steel, Inc.: www.jamesriversteel.com.*
4. *New Millennium Building Systems, LLC: www.newmill.com.*
5. *Roof Deck, Inc.: www.roofdeckinc.com.*
6. *Vulcraft: www.vulcraft.com.*
7. *Substitutions: See Section 01 6000 - Product Requirements.*

2.2 *STEEL DECK*

A. *All Deck Types: Select and design metal deck in accordance with SDI Design Manual.*
1. *Calculate to structural working stress design and structural properties specified.*

B. *Metal Form Deck: Ribbed sheet steel:*
1. *Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G60/Z180 galvanized coating.*
2. *Minimum Base Metal Thickness: 18 gage, 0.0478 inch.*
3. *Nominal Height: 9/16 inch.*
4. *Formed Sheet Width: 30 inch.*
5. *Side Joints: Lock seam or lapped, welded.*
6. *End Joints: Lapped, welded.*

2.3 *ACCESSORY MATERIALS*

A. *Welding Materials: AWS D1.1/D1.1M.*

B. *Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.*

C. *Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.*

D. *Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.*

PART 3 EXECUTION

3.1 *EXAMINATION*

A. *Verify existing conditions prior to beginning work.*

3.2 *INSTALLATION*

A. *Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.*

B. *On concrete and masonry surfaces provide minimum 4 inch bearing.*

C. *On steel supports provide minimum 3 inch bearing.*

D. *Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.*
   1. *Welding: Use fusion welds through weld washers.*

E. *Clinch lock seam side laps.*

F. *At welded male/female side laps weld at 18 inches on center maximum.*

G. *Weld deck in accordance with AWS D1.3/D1.3M.*

H. *Unless otherwise indicated, at deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.*

I. *At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 05 1200.*

J. *Where deck (other than cellular deck electrical raceway) changes direction, install 6 inch minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches on center maximum.*

K. *At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete. Provide stops of sufficient strength to remain stationary without distortion.*

L. *At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.*

M. *Close openings above walls and partitions perpendicular to deck flutes with double row of foam cell closures.*

N. *Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.*

O. *Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.*

P. *Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.*

END OF SECTION 05 3100 (ADM2)

WE RECYCLE

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID: BLACK / WHITE

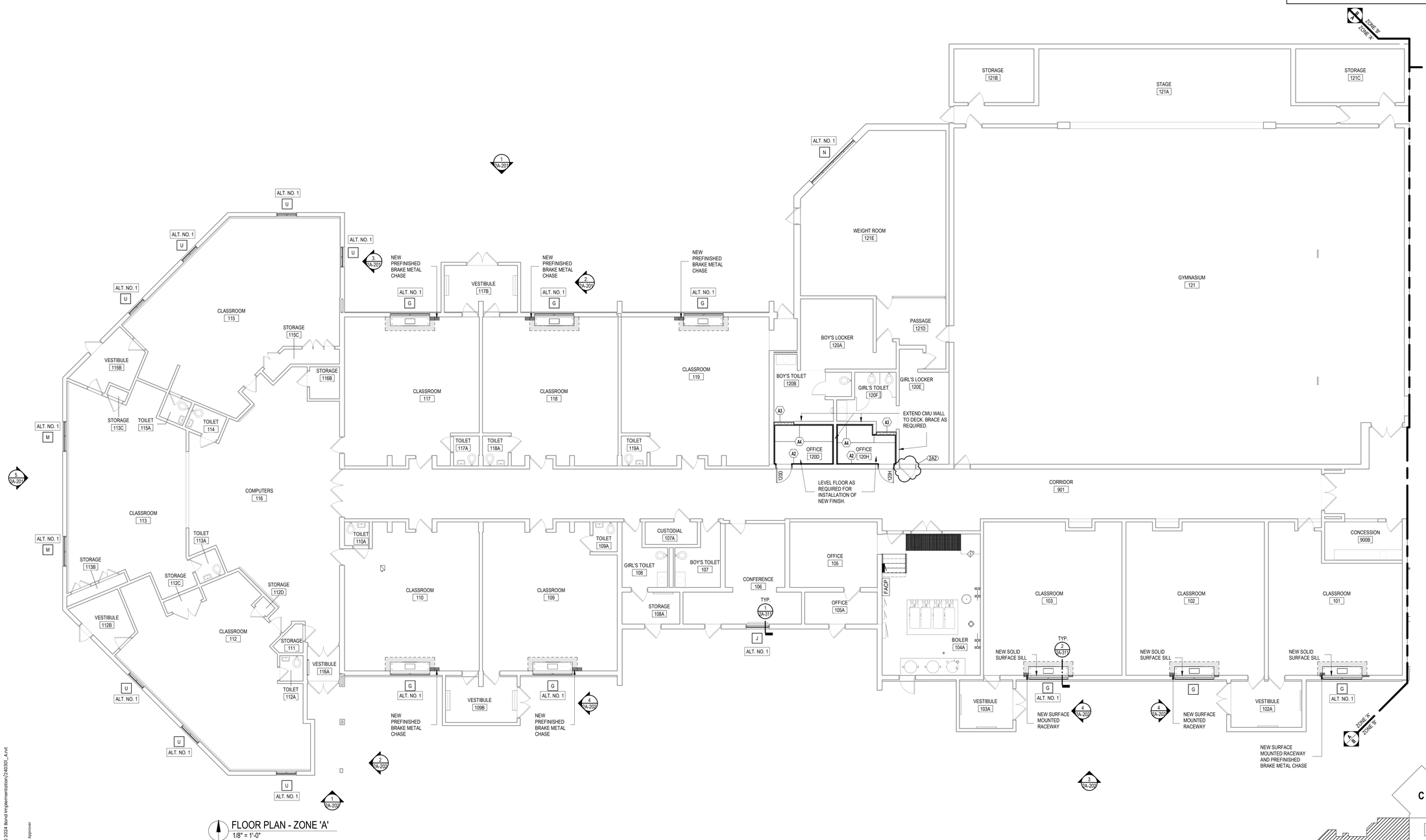
THE BAR BELOW SHOWS PRIMARY COLORS

ARCHITECTURAL KEYNOTES

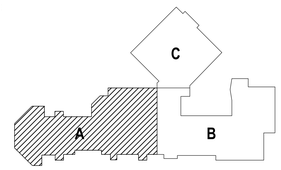
KEY VALUE	KEYNOTE TEXT
A1	1 LAYER 5/8" ABUSE RESISTANT GYPSUYM BOARD EACH SIDE OF 6" METAL STUDS @ 16" O.C. (MAX) FULL HEIGHT. SEAL ALL GAPS AND PENETRATIONS, 1 HOUR RATED UL DESIGN NO. U465.
A2	1 LAYER 5/8" ABUSE RESISTANT GYPSUM BOARD ON 1 SIDE OF 7/8" METAL HAT TRACK AT 16" O.C. (MAX) FULL HEIGHT
A3	6" CMU TO STRUCTURE ABOVE.
A4	1 LAYER 5/8" ABUSE RESISTANT GYPSUM BOARD ON 1 SIDE OF 1 1/2" METAL HAT TRACK AT 16" O.C. (MAX) FULL HEIGHT

GENERAL NOTES:

1. CONTRACTORS ARE TO COORDINATE WORK WITH ALL OTHER TRADES.
2. CONFLICTS BETWEEN NOTES, DETAILS, SPECIFICATIONS, ETC. SHALL BE VERIFIED WITH HE ARCHITECT OR THE MOST STRINGENT PROVISIONS SHALL GOVERN.
3. DETAILS OF CONSTRUCTION NOT FULLY SHOWN SHALL BE OF THE SAME NATURE AS SHOWN FOR SIMILAR CONDITIONS. ANY UNCLEAR CONDITIONS SHALL BE VERIFIED WITH THE ARCHITECT PRIOR TO CONSTRUCTION OF THAT AREA.
4. DRAWINGS ARE NOT TO BE SCALED. ANY UNCLEAR DIMENSIONS, OR DIMENSIONAL DISCREPANCIES, SHALL BE VERIFIED WITH ARCHITECT.
5. ALL EXISTING CONDITIONS AND ALL RELATED DIMENSIONS INDICATED IN THE CONTRACT DOCUMENTS SHALL BE FIELD VERIFIED PRIOR TO FABRICATION, ERECTION, AND/OR CONSTRUCTION. ANY CONDITIONS THAT DIFFER FROM THAT INDICATED IN THE CONTRACT DOCUMENTS SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION, ERECTION, AND/OR CONSTRUCTION.
6. CONTRACTOR TO REVIEW ENTIRE SET OF CONSTRUCTION DOCUMENTS, INCLUDING SPECIFICATION, AND SHALL COORDINATE WORK BETWEEN ALL TRADES. IF CONFLICTS ARISE DUE TO COORDINATION OF TRADES, CONTRACTOR IS TO VERIFY CONFLICT WITH ARCHITECT PRIOR TO CONSTRUCTION/ INSTALLATION OF CONFLICTING ITEMS.
7. PATCH & REPAIR ALL EXISTING SITE, EXTERIOR, AND INTERIOR BUILDING ELEMENTS THAT WERE DISTURBED BY DEMOLITION WORK. REPAIRS ARE TO MATCH ADJACENT MATERIAL(S), COLOR(S), AND FINISH(S), UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE.
8. MAINTAIN FIRE RATING AT ALL ASSEMBLIES WHERE OPENINGS PENETRATIONS, EMBEDMENT, RECESSED EQUIPMENT, ACCESSORIES, ETC. DISRUPT THE CONTINUITY OF THE RATING.
9. INFILL EXISTING OPENINGS AND/ OR PENETRATIONS IN FLOORS, CEILINGS, WALLS, OR ROOF DECK. FIRE-RATING OF NEW CONSTRUCTION TO MATCH EXISTING.
10. PATCH & REPAIR ALL MAJOR & MINOR BLEMISHES AS REQ'D, DUE TO DEMOLITION WORK. REPAIRS ARE TO MATCH ADJACENT MATERIAL & COLOR.
11. CMU: LOAD- BEARING AND NON-LOAD BEARING UNITS TO BE ASTM C90, NORMAL WEIGHT. MANUFACTURER TO BE BEST BLOCK, CONSUMERS, ESCHELON, OR APPROVED EQUAL.
12. GROUT: ASTM C404 FROM MANUFACTURER AMERIMIX, QUIKRETE, SPEC MIX, OR APPROVED EQUAL. TOOL GROUT LINES TO MATCH EXISTING.
13. CG-1 TO BE USED AT ALL OUTSIDE GYPSUM CORNERS.



FLOOR PLAN - ZONE 'A'
1/8" = 1'-0"



KEY PLAN

c2ae
(866) 454-3923 | WWW.C2AE.COM
TMP ARCHITECTURE
SKILLMAN
The SKILLMAN Corporation
Construction Management

FLOOR PLAN - AREA A

RENOVATIONS AND IMPROVEMENTS
600 E. PARK ST., PENTWATER, MI 49449

PHASE

ISSUED FOR BIDS

ISSUANCES

#	DESCRIPTION	DATE
0	ISSUED FOR BIDS	22-SEP-2025
A1	ADDENDUM 1	23APR2025
2A2	ADDENDUM 2	12NOV2025

PROJ. #: 24-0301

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2A-100A

Addendum #2

9/11/2025 10:00:28 AM
Autodesk Docs://240320_PPS 2024 Bond Implementation/240320_A.rvt
DESIGNED BY: Designer
CHECKED BY: Checker APPROVED BY: Approver

ARCHITECTURAL KEYNOTES

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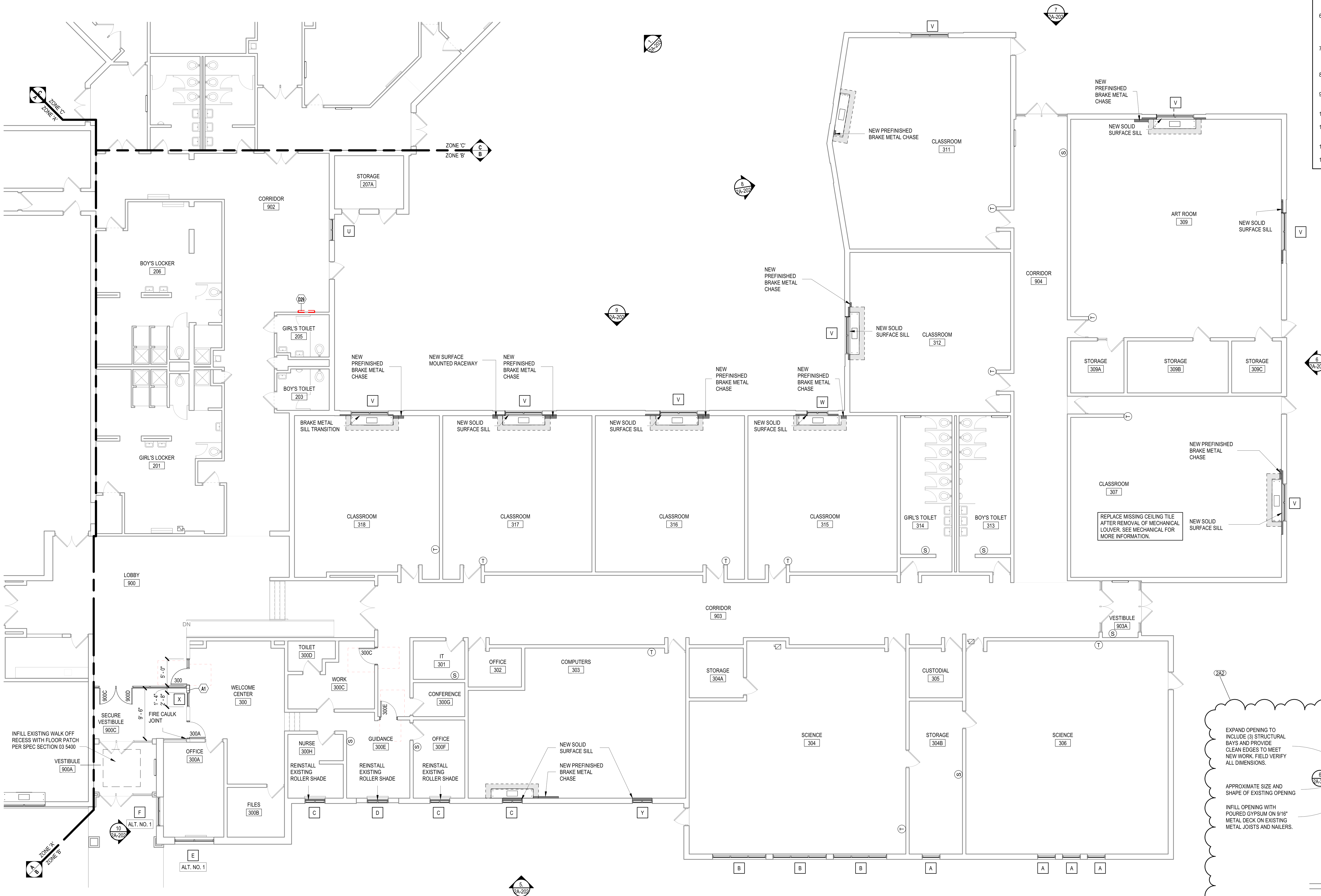
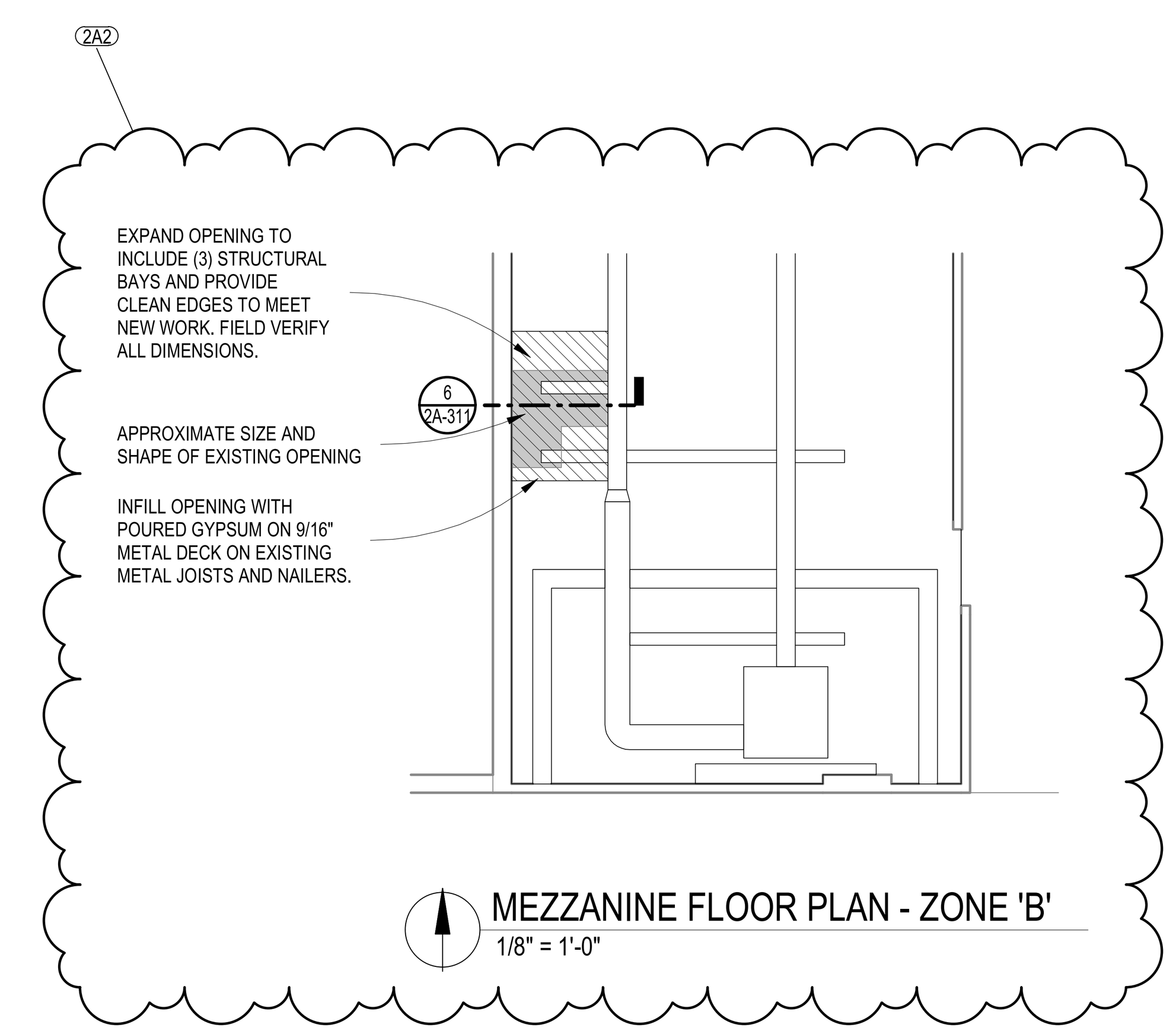
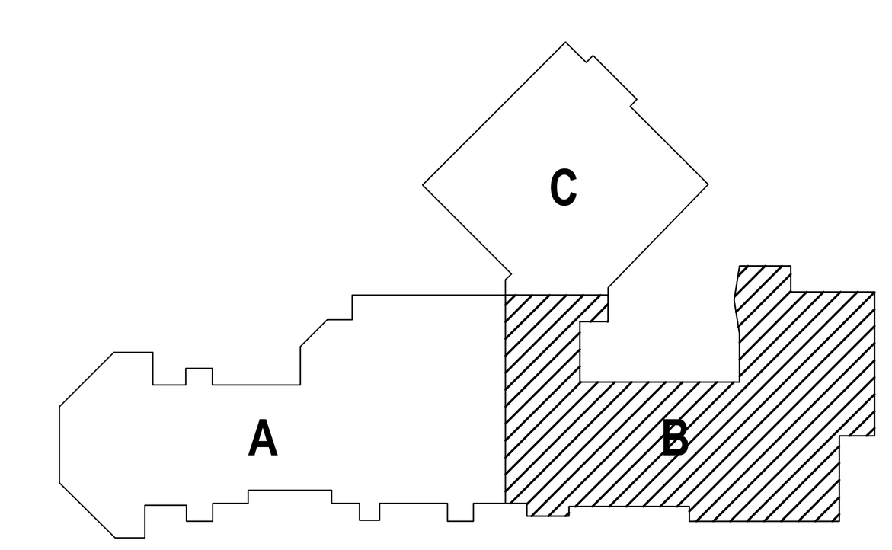


FLOOR PLAN - ZONE 'B'
1/8" = 1'-0"



MEZZANINE FLOOR PLAN - ZONE 'B'
1/8" = 1'-0"



KEY PLAN

(866) 454-3923 | WWW.C2AE.COM

ARCHITECTURE

The SKILLMAN Corporation
Construction Management

FLOOR PLAN - AREA B

RENOVATIONS AND IMPROVEMENTS
600 E. PARK ST., PENTWATER, MI 49449

PHASE

ISSUED FOR BIDS

ISSUANCES

#	DESCRIPTION	DATE
0	ISSUED FOR BIDS	22-SEP-2025
2A2	ADDENDUM 2	12NOV2025

PROJ. #: 24-0301

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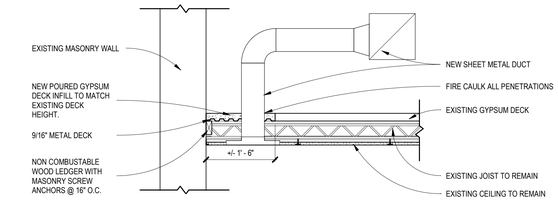
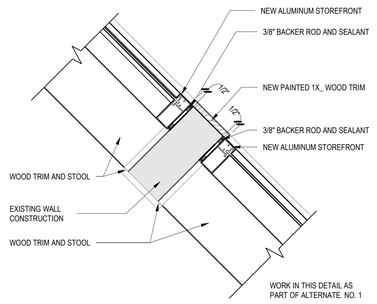
2A-100B

Addendum #2

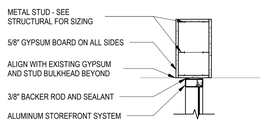
WE RECYCLE
BLACK
THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID
WHITE
THE BAR BELOW SHOWS PRIMARY COLORS



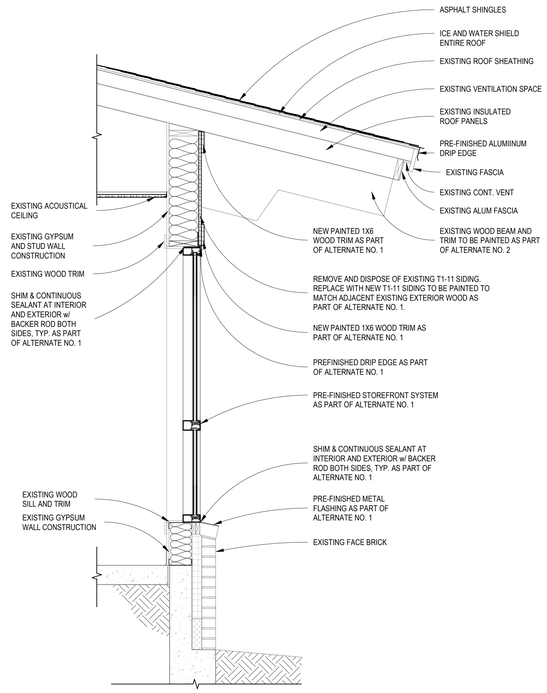
6 / 2A-100B — MEZZANINE FLOOR INFILL
SCALE: 3/4" = 1'-0"



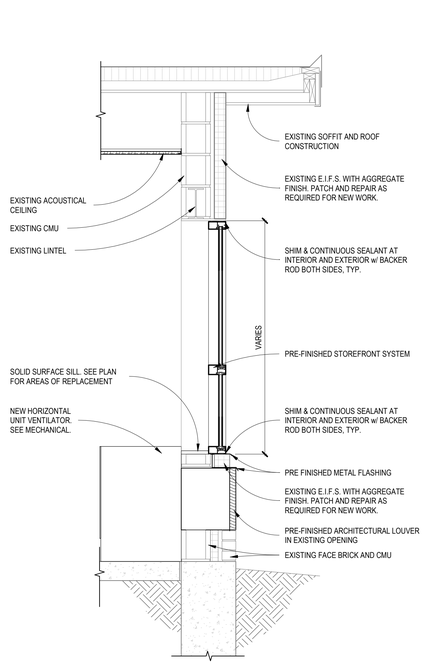
5 / 2A-100C — WINDOW DETAIL - ZONE 'C'
SCALE: 1 1/2" = 1'-0"



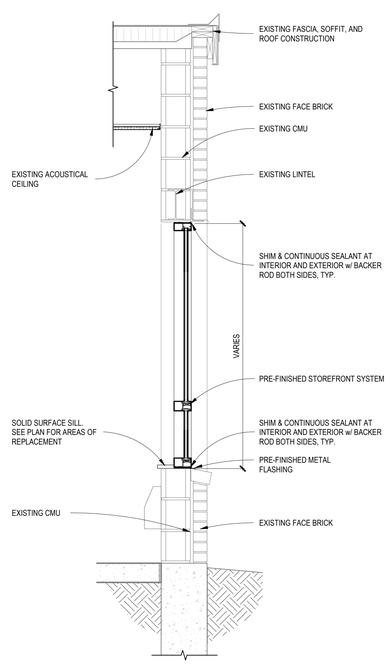
4 / 2A-110 — HEAD AT SECURITY VESTIBULE STOREFRONT
SCALE: 3/4" = 1'-0"



3 / 2A-100C — WALL SECTION AT BUSINESS OFFICE
SCALE: 3/4" = 1'-0"



2 / 2A-100A — WALL SECTION AT EIFS, TYP
SCALE: 3/4" = 1'-0"



1 / 2A-100A — WALL SECTION AT MASONRY, TYP
SCALE: 3/4" = 1'-0"

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#	DESCRIPTION	DATE
0	ISSUED FOR BIDS	22-SEP-2025
2A2	ADDENDUM 2	12NOV2025

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2A-311

Addendum #2

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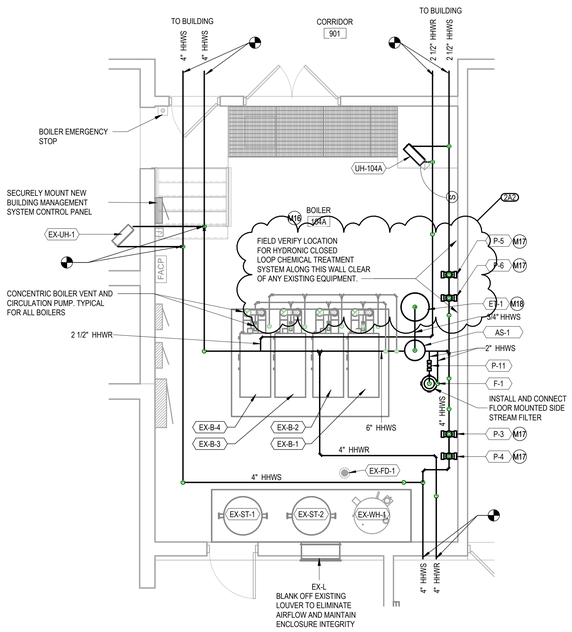
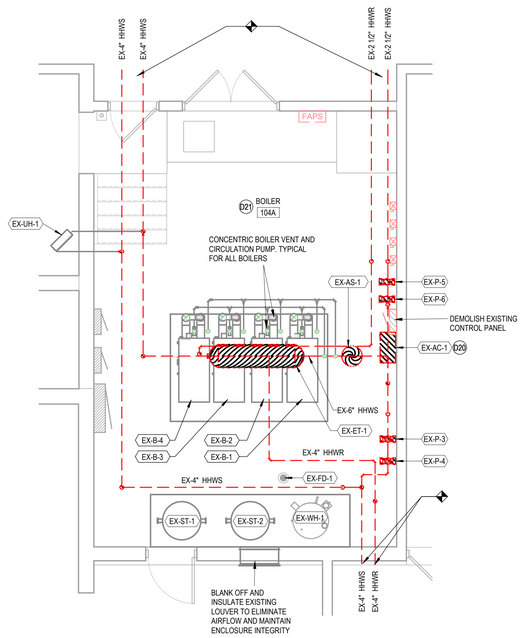
DESIGNED BY: Designer
CHECKED BY: Checker APPROVED BY: Approver

WE RECYCLE
THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK
THE BAR BELOW SHOWS PRIMARY COLORS WHITE



1 2M-101A 1/4" = 1'-0"
BOILER ROOM ENLARGED PLAN



3 2MD-101A 1/4" = 1'-0"
BOILER ROOM MECHANICAL DEMOLITION PLAN

MECHANICAL GENERAL NOTES:

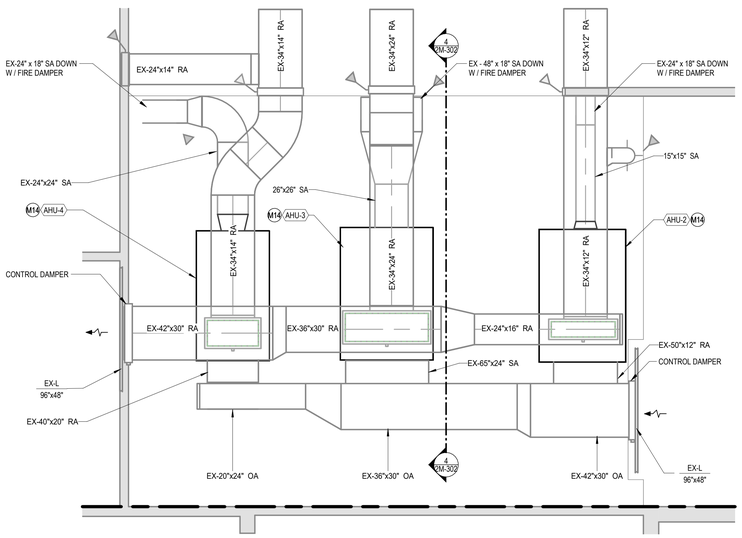
1. IF COMPLIANCE WITH TWO OR MORE DIFFERING STANDARDS, REQUIREMENTS, DRAWINGS OR SPECIFICATIONS, OR ANY COMBINATION THEREOF, IS SPECIFIED AND THESE ESTABLISH DIFFERENT OR CONFLICTING REQUIREMENTS FOR MINIMUM QUANTITIES OR QUALITY LEVELS, COMPLY WITH THE MOST STRINGENT REQUIREMENT. THE MOST STRINGENT REQUIREMENT WILL BE THE BETTER QUALITY OR GREATER QUANTITY OF WORK, AND WILL TYPICALLY BE THE MORE EXPENSIVE OPTION. REFER UNCERTAINTIES AND REQUIREMENTS THAT ARE DIFFERENT, BUT APPARENTLY EQUAL, TO ENGINEER FOR A DECISION BEFORE PROCEEDING.
2. THE QUANTITY OR QUALITY LEVEL SHOWN OR SPECIFIED SHALL BE THE MINIMUM PROVIDED OR PERFORMED. THE ACTUAL INSTALLATION MAY COMPLY EXACTLY WITH THE MINIMUM QUANTITY OR QUALITY SPECIFIED, OR IT MAY EXCEED THE MINIMUM WITHIN REASONABLE LIMITS. TO COMPLY WITH THESE REQUIREMENTS, INDICATED NUMERIC VALUES ARE MINIMUM OR MAXIMUM, AS APPROPRIATE, FOR THE CONTEXT OF REQUIREMENTS. REFER UNCERTAINTIES TO ENGINEER FOR A DECISION BEFORE PROCEEDING.
3. DESIGN DOCUMENTS MUST BE REPRODUCED IN THEIR ENTIRETY, INCLUDING ALL PLANS, SPECIFICATIONS, AND FRONT END DOCUMENTS.
4. ONLY COMPLETE DOCUMENT SETS ARE TO BE DISTRIBUTED TO SUBCONTRACTORS AND SUPPLIERS OF THE CONTRACTOR DURING BIDDING OR CONSTRUCTION.
5. FAILURE TO REVIEW AND COMPLY WITH A FULL SET OF CONTRACT DOCUMENTS WILL NOT BE ACCEPTED AS A VALID REASON FOR FAILURE TO MEET THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS.
6. ALL MECHANICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH LOCAL ORDINANCES, CODES, AND LAWS. FOR PURPOSES OF THIS DESIGN, THE CODES FOR THE STATE OF **MICHIGAN** WERE USED AS THE BASIS.
7. CONTRACTOR SHALL FURNISH AND INSTALL ISOLATION AND BALANCING VALVES AT ALL HYDRONIC COILS, AND BALANCING VALVES AT EACH DISTRIBUTION LOOP ON THE RETURN PIPE. CONTRACTOR SHALL LOCATE VALVES TO ALLOW FOR ACCESS WITHIN 3' AFTER CONSTRUCTION IS COMPLETE.
8. MECHANICAL CONTRACTOR SHALL COORDINATE EQUIPMENT INSTALLATION WITH ROOFING CONTRACTOR OR ROOFING MANUFACTURER TO AVOID DAMAGE TO ROOFING SYSTEM AND MAINTAIN ROOFING WARRANTY WHERE POSSIBLE.
9. COORDINATE LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL, STRUCTURAL, CIVIL, INTERIORS, AND ELECTRICAL PRIOR TO ROUGH-IN. ALL CONFLICTS WITH FINISHES, ADJACENT CONSTRUCTION AND CONSTRUCTION DOCUMENTS ARE TO GENERATE AN RFI FROM THE MECHANICAL CONTRACTOR TO THE ENGINEER PRIOR TO PROCEEDING AND COMPLETION OF WORK
10. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIRESTOPPING ALL NEW MECHANICAL PENETRATIONS THROUGH RATED ASSEMBLIES, INSTALLING A FIRE DAMPER AT EACH FIRE-RATED WALL, AND A SMOKE DAMPER WHERE APPLICABLE.
11. A TEST AND BALANCE (TAB) IS REQUIRED FOR THE WORK.
12. ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED WITH MOTOR STARTERS COMPATIBLE WITH CONTROLS SYSTEM. COORDINATE WITH CONTROLS AND ELECTRICAL CONTRACTORS.
13. AIR HANDLER INSTALLATION IS THE RESPONSIBILITY OF THE BIDDING CONTRACTOR. RECOMMENDED METHOD INCLUDES REMOVING THE EXTERIOR LOUVER TO MOVE EQUIPMENT INTO THE MEZZANINE. IF SIZE PERMITS. IF EQUIPMENT IS TOO LARGE, ON-SITE ASSEMBLY MAY BE REQUIRED. AFTER INSTALLATION, REPLACE AND RESEAL THE EXISTING LOUVER. PATCH AND REPAIR AS NEEDED.

NOTES - MECHANICAL KEYNOTES

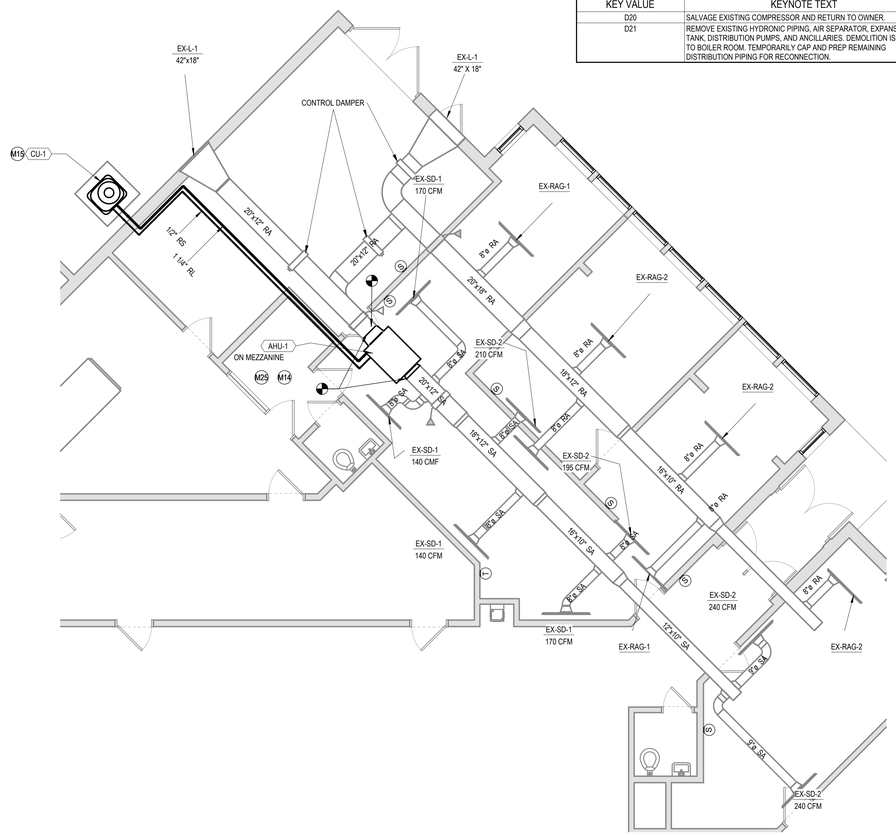
KEY VALUE	KEYNOTE TEXT
M14	INSTALL NEW AIR HANDLING UNIT. CONNECT TO EXISTING DUCTWORK AND HYDRONIC PIPING. RECONFIGURE AS NEEDED AND PROVIDE ALL NECESSARY TRANSITIONS TO CONNECT TO EXISTING DUCTWORK. CLEAN ALL EXISTING DUCT FROM UNIT TO BE REUSED. REFER TO SPECIFICATION.
M15	INSTALL NEW ON GRADE CONDENSING UNIT AND ROUTE NEW REFRIGERATION LINES TO UNIT.
M16	INSTALL NEW HYDRONIC PIPING WITHIN THE BOILER ROOM AS SHOWN. FIELD VERIFY EXISTING PIPE SIZES PRIOR TO DEMOLITION. MATCH NEW PIPE TO EXISTING IN SIZE AND CONFIGURATION. RECONNECT INTO EXISTING HYDRONIC MAINS ROUTED TO EACH RESPECTIVE HEATING ZONE.
M17	INSTALL NEW SECONDARY PUMP. CONFIGURATION TO MATCH THE DEMOLISHED SECONDARY PUMPS. WALL MOUNT 3 FEET ABOVE FINISHED FLOOR.
M18	INSTALL NEW AIR SEPARATOR AND EXPANSION TANK. ENSURE ELECTRICAL DISCONNECTS HAVE APPROPRIATE CLEARANCE BEFORE FINALIZING INSTALLATION. EXPANSION TANK TO BE SUPPORTED FROM CEILING.
M25	INSULATE ALL NEW AND EXISTING RETURN AND SUPPLY DUCTWORK ASSOCIATED WITH AHU-1. INSULATE AHU-1. REFER TO SPECIFICATION SECTIONS 23-0713 AND 23-0716

MECHANICAL DEMOLITION KEYNOTES

KEY VALUE	KEYNOTE TEXT
D20	SALVAGE EXISTING COMPRESSOR AND RETURN TO OWNER.
D21	REMOVE EXISTING HYDRONIC PIPING, AIR SEPARATOR, EXPANSION TANK, DISTRIBUTION PUMPS, AND ANCILLARIES. DEMOLITION IS LIMITED TO BOILER ROOM. TEMPORARILY CAP AND PREP REMAINING DISTRIBUTION PIPING FOR RECONNECTION.



2 2M-101C 1/4" = 1'-0"
AHU-2, 3, & 4 ENLARGED PLAN



5 2M-101C 3/16" = 1'-0"
AHU-1 ENLARGED PLAN

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#	DESCRIPTION	DATE
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2A2	ADDENDUM 2	12NOV2025

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2M-301

Addendum #2

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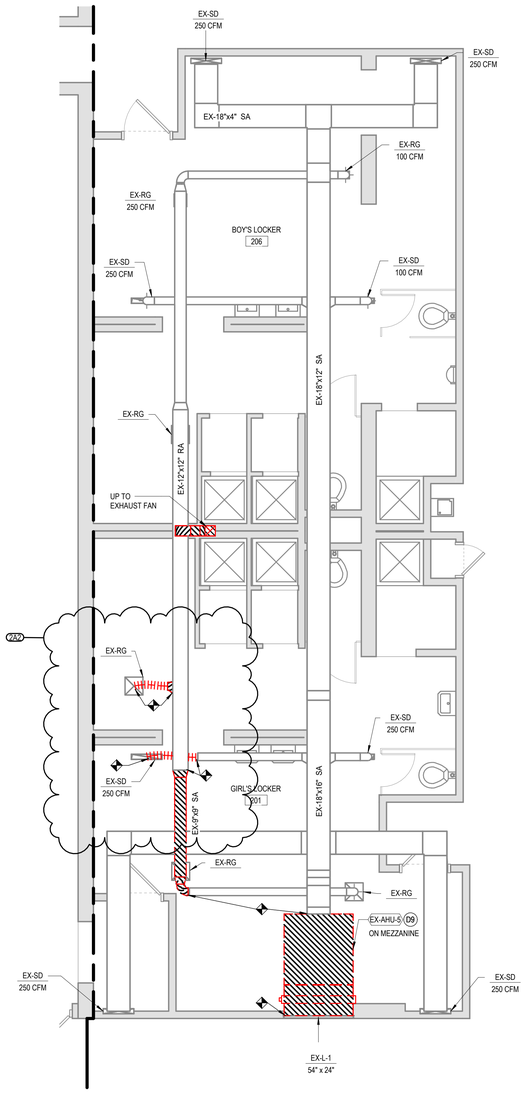
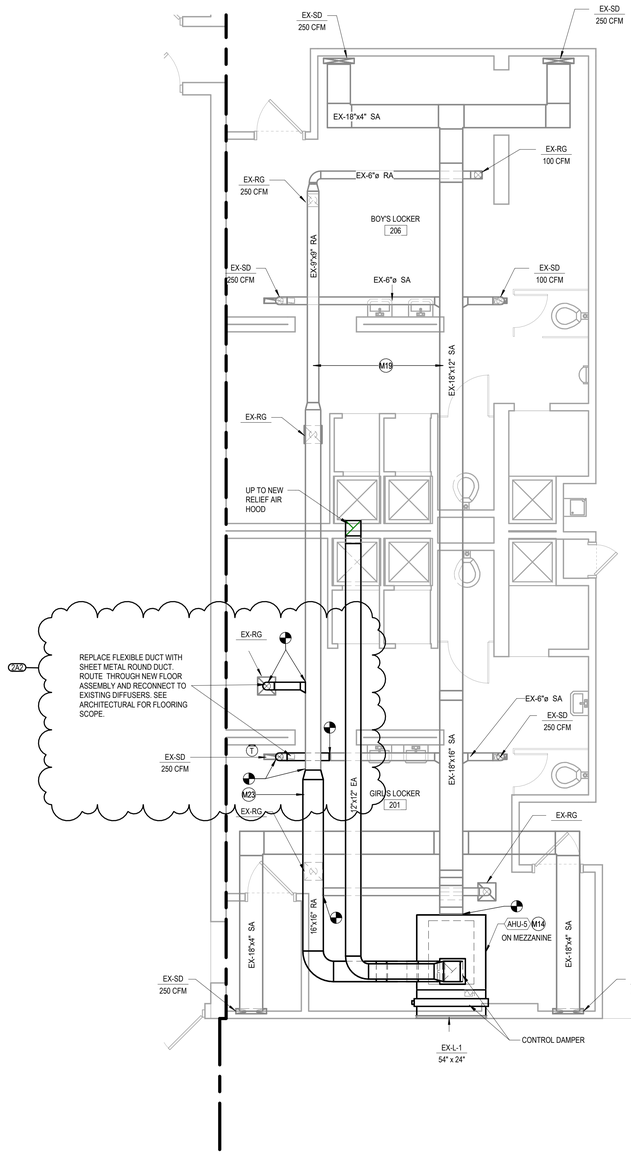
DESIGNED BY: NBI
CHECKED BY: DTD APPROVED BY: Approver



1 AHU-5 ENLARGED DEMOLITION PLAN
2MD-101B 1/4" = 1'-0"



2 AHU-5 ENLARGED MECHANICAL PLAN
2M-101B 1/4" = 1'-0"

MECHANICAL DEMOLITION NOTES:

1. THE CONTRACTOR SHALL REVIEW THE ENTIRETY OF THE DRAWINGS AND SPECIFICATIONS BEFORE ANY WORK IS STARTED.
2. ALL WORK TO BE DEMOLISHED IS NOTED WITH DASHED LINES. OR A DEMOLITION KEYNOTE, OR BOTH. REVIEW THE DEMOLITION KEYNOTES PRIOR TO BEGINNING THE WORK.
3. EXCEPT FOR WHEN NOTED ON DRAWINGS, MECHANICAL EQUIPMENT AND SYSTEMS NOTED TO BE REMOVED SHALL BE ENTIRELY DEMOLISHED, AND SHALL BECOME PROPERTY OF THE CONTRACTOR TO REMOVE FROM THE SITE, WHILE FOLLOWING ALL CODES AND REQUIREMENTS.
4. ITEMS NOTED FOR SALVAGE SHALL BE REMOVED WITH DUE CARE TAKEN, AND RETURNED TO THE OWNER IN A LIKE CONDITION TO IT'S PREVIOUS STATE.
5. DEMOLITION SHALL BE COORDINATED WITH OTHER TRADES. THE CONTRACTOR IS RESPONSIBLE FOR ANY EXISTING MATERIALS TO REMAIN THAT ARE DAMAGED IN THE DEMOLITION PROCESS.
6. THESE DRAWINGS ARE COMPILED BY THE ARCHITECT AND ENGINEER FROM THE OWNER'S RECORD DRAWINGS AND LIMITED FIELD VERIFICATION OF EXISTING CONDITIONS. THE CONTRACTOR SHALL VERIFY EXISTING FIELD CONDITIONS. AREAS OF WORK THAT DIFFER GREATLY FROM THE DEMOLITION PLAN SHALL GENERATE AN RFI TO THE ENGINEER.
7. MECHANICAL SYSTEMS AND EQUIPMENT LOCATED IN THE AREA OF DEMOLITION BUT USED TO SERVE AREAS THAT ARE NOT TO BE DEMOLISHED SHALL BE LEFT TO REMAIN, OR RELOCATED IN SUCH A WAY AS TO MAINTAIN THE ORIGINAL DESIGN INTENT OF THE SYSTEM.
8. REMOVE ALL EXPOSED INACTIVE PNEUMATIC PIPING AND DEVICES THROUGHOUT THE BUILDING FOLLOWING DEMOLITION OF THE AIR COMPRESSOR.

MECHANICAL GENERAL NOTES:

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9. COORDINATE LOCATIONS OF ALL DEVICES WITH ARCHITECTURAL, STRUCTURAL, CIVIL, INTERIORS, AND ELECTRICAL PRIOR TO ROUGH-IN. ALL CONFLICTS WITH FINISHES, ADJACENT CONSTRUCTION AND CONSTRUCTION DOCUMENTS ARE TO GENERATE AN RFI FROM THE MECHANICAL CONTRACTOR TO THE ENGINEER PRIOR TO PROCEEDING AND COMPLETION OF WORK
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MECHANICAL DEMOLITION KEYNOTES

KEY VALUE	KEYNOTE TEXT
D9	DEMOLISH EXISTING AIR HANDLING UNIT AS INDICATED, INCLUDING SUPPORTS AND ANCILLARIES. DISCONNECT HYDRONIC PIPING AND DUCTWORK AND PREPARE FOR REUSE WITH NEW EQUIPMENT.

NOTES - MECHANICAL KEYNOTES

KEY VALUE	KEYNOTE TEXT
M14	INSTALL NEW AIR HANDLING UNIT. CONNECT TO EXISTING DUCTWORK AND HYDRONIC PIPING. RECONFIGURE AS NEEDED AND PROVIDE ALL NECESSARY TRANSITIONS TO CONNECT TO EXISTING DUCTWORK. CLEAN ALL EXISTING DUCT FROM UNIT TO BE REUSED. REFER TO SPECIFICATION.
M19	CLEAN INSIDE OF ALL EXISTING DUCT TO BE REUSED. REFER TO SPECIFICATION.
M23	INSTALL NEW RETURN AIR DUCT AND ROUTE TO NEW UNIT. MATCH SIZE OF REMAINING SECTION. FIELD VERIFY DIMENSIONS. RECONNECT BRANCH DUCTS.

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2A2	ADDENDUM 2	12NOV2025

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2M-303

Addendum #2

WE RECYCLE

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

THE BAR BELOW SHOWS PRIMARY COLORS WHITE

11/12/2025 12:03:33 PM
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DESIGNED BY: RBR
CHECKED BY: DTD APPROVED BY: Approver

WE RECYCLE

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

THE BAR BELOW SHOWS PRIMARY COLORS WHITE

AIR HANDLING UNIT SCHEDULE

GENERAL				SUPPLY FAN					HEATING COIL									ELECTRICAL			NOTES
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	OUTDOOR AIRFLOW (CFM)	ESP (IN-WG)	TSP (IN-WG)	HP	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	VOLTAGE	PHASE	FREQUENCY	
AHU-1	TRANE	CLIMATE CHANGER	OFFICE 212	1500	160	0.80	2.14 in-wg	1	63	59	98	2.8	0.76	180	135	THREE-WAY	WATER	230	3	60	1,2,3,4,5,6,7
AHU-1N	TRANE	CLIMATE CHANGER	GYMNASIUM 121	4000	1800	0.20	1.70 in-wg	3	217	47	97	22.0	2.60	180	160	THREE-WAY	WATER	230	3	60	2,3,4,5,6
AHU-2	TRANE	CLIMATE CHANGER	MEDIA CENTER 210	2750	1200	1.17	2.42 in-wg	3	149	38	88	15.0	6.74	180	160	TWO-WAY	WATER	230	3	60	2,3,4,5,6
AHU-2N	TRANE	CLIMATE CHANGER	GYMNASIUM 121	4000	1800	0.20	1.70 in-wg	3	217	47	97	22.0	2.60	180	160	THREE-WAY	WATER	230	3	60	2,3,4,5,6
AHU-3	TRANE	CLIMATE CHANGER	MULTI-PURPOSE 217	8400	2700	1.26	2.31 in-wg	7.5	408	40	80	41.0	3.89	180	160	TWO-WAY	WATER	230	3	60	2,3,4,5,6
AHU-4	TRANE	CLIMATE CHANGER	MUSIC 215	3200	1600	1.13	2.66 in-wg	5	191	35	90	19.1	2.73	180	160	THREE-WAY	WATER	230	3	60	2,3,4,5,6
AHU-5	TRANE	CLIMATE CHANGER	LOCKER ROOM 201/206	2000	600	0.80	2.11 in-wg	2	150	26	95	15.0	1.09	180	160	THREE-WAY	WATER	230	3	60	2,3,4,5,6

1. PROVIDE AND INSTALL DX COOLING COIL WITH LEAK DETECTION AND ON GRADE CONDENSING UNIT.
2. DAMPERS FOR OUTSIDE AND RETURN AIR.
3. VARIABLE FREQUENCY DRIVES FOR ALL UNIT FANS.
4. CO_2 SENSOR FOR DEMAND CONTROL VENTILATION.
5. DISCONNECT SWITCH ON UNIT.
6. PROGRAMMABLE ZONE THERMOSTAT WITH TEMPERATURE ADJUSTMENT AND DISPLAY.
7. PROVIDE DOUBLE WALLED PANELS WITH A MINIMUM OF 1.5" INSULATION.

(2)(2)

GENERAL TAB SCOPE

1. A RECENT TEST AND BALANCE OF THE FOUR NEW BOILER CIRCULATION PUMPS ONLY WILL BE PROVIDED.
2. PERFORM PREWORK WATERSIDE TAB FOR ALL EXISTING EQUIPMENT AND PROVIDE REPORT TO ENGINEER. THIS WILL ESTABLISH BASELINE FOR EXISTING SYSTEM PERFORMANCE AND FINAL TAB VERIFICATION.
3. A COMPLETE AIR AND WATERSIDE TEST AND BALANCE IS REQUIRED FOR ALL EQUIPMENT AND ASSOCIATED SYSTEMS CONTROLLED BY THE BMS AT PROJECT COMPLETION.
4. REFER TO SPECIFICATION SECTION 230593 TESTING, ADJUSTING, AND BALANCING FOR HVAC.

GENERAL COMMISSIONING SCOPE

1. OWNER WILL OBTAIN THIRD PARTY COMMISSIONING OF ALL NEW EQUIPMENT AND SYSTEMS DEFINED IN THIS PROJECT SCOPE OF WORK. THIS INCLUDES HYDRONINC HEATING SYSTEM AS WELL AS BOILERS.
2. REFER TO COMMISSIONING SPECIFICATION FOR REQUIRED CONTRACTOR COORDINATION WITH COMMISSIONING AGENT.

HYDRONIC SYSTEM PIPING CLEANING

1. FLUSH AND CLEAN ALL EXISTING HYDRONIC PIPING PRIOR TO NEW EQUIPMENT INSTALLATION. UTILIZE EXISTING LOW POINT DRAINS AS NEEDED. THERE IS LIMITED DRAWINGS OF HYDRONIC PIPING SYSTEM WHICH WILL BE PROVIDED TO THE CONTRACTOR.
2. FLUSH AND CLEAN ALL EXISTING EQUIPMENT HYDRONIC COILS (FIN TUBE ETC) SHOWN TO REMAIN INDIVIDUALLY. PROVIDE TEMPORARY PIPING AROUND EXISTING EQUIPMENT TO REMAIN AS REQUIRED WHEN CLEANING HYDRONIC MAINS SO THAT EQUIPMENT/COILS WILL NOT ACCUMULATE DEBRIS/SEDIMENT DURING CLEANING/FLUSHING OF MAINS.

ROOFTOP UNIT SCHEDULE

GENERAL				SUPPLY FAN				DX COOLING							GAS HEATING				ELECTRICAL							
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	AIR FLOW - VENTILATION (OA CFM)	ESP (IN-WG)	HP	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	REFRIGERANT	INPUT CAPACITY (MBH)	OUTPUT CAPACITY (MBH)	EAT (°F)	LAT (°F)	FUEL TYPE	VOLTAGE	PHASE	FREQUENCY	MCA	MOCP	WEIGHT (LBS)	NOTES
RTU-1	CARRIER	48FEFM12D3A5-8L2A0	COMPUTERS 116	4000	1200 CFM	1.00	3	123.9	92.5	80	67	58.6	57.3	R-454B	250	205	70	117.5	NG	208	3	60	63	80	985	1-12

1. HORIZONTAL DUCT CONFIGURATION.
2. FIELD INSTALLED ENTHALPY SENSING ECONOMIZER WITH RELIEF.
3. CONDENSATE OVERFLOW PROTECTION.
4. NON-FUSED DISCONNECT SWITCH.
5. 4" MERV-13 FILTERS
6. HINGED ACCESS PANELS
7. RTU-OPEN COMMUNICATING CONTROLS INTEGRATED INTO BUILDING MANAGEMENT SYSTEM.
8. THROUGH BASE UTILITY CONNECTIONS.
9. SUPPLY AIR SMOKE DETECTOR.
10. PROGRAMMABLE ZONE THERMOSTAT WITH TEMPERATURE ADJUSTMENT AND DISPLAY.
11. START-UP BY AUTHORIZED MANUFACTURER'S REPRESENTATIVE.
12. INCLUDE CO_2 SENSOR FOR DEMAND CONTROLLED VENTILATION.

DEDICATED OUTSIDE AIR UNIT SCHEDULE

GENERAL				SUPPLY FAN						EXHAUST FAN						DESIGN CONDITIONS								HEATING PERFORMANCE						ENERGY RECOVERY PERFORMANCE			ELECTRICAL						WEIGHT (LBS)	NOTES
																SUMMER				WINTER																			
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	ESP (IN-WG)	TSP (IN-WG)	RPM	BHP	MOTOR (HP)	AIRFLOW (CFM)	ESP (IN-WG)	TSP (IN-WG)	RPM	BHP	MOTOR (HP)	OA DB (°F)	OA WB (°F)	RA DB (°F)	RH (%)	OA DB (°F)	OA WB (°F)	RA DB (°F)	RH (%)	TYPE	FUEL TYPE	INPUT (MBH)	OUTPUT (MBH)	EDB (°F)	LDB (°F)	TURNDOWN RATIO	ERV TYPE	SUMMER ENTHALPY RECOVERY RATIO (%)	WINTER ENTHALPY RECOVERY RATIO (%)	VOLTAGE	PHASE	MCA	MOCP	NO. OF MOTORS		
DOAS-1	GREENHECK	RVE-40-36D	SCIENCE 304	2400	0.50	2.09	1534	1.22	1 1/2	2400	0.50	1.43	1404	1.01	1 1/2	84	72	75	50	2	0	72	35	INDIRECT GAS	NG	100	81	48.3	79.5	16:1	POLYMER WHEEL	67.1	64.8	230	3	14.5	15	2	2410	1,2,3,4,5,6
DOAS-2	GREENHECK	RVE-40-36D	SCIENCE 306	2400	0.50	2.09	1534	1.22	1 1/2	2400	0.50	1.43	1404	1.01	1 1/2	84	72	75	50	2	0	72	35	INDIRECT GAS	NG	100	81	48.3	79.5	16:1	POLYMER WHEEL	67.1	64.8	230	3	14.5	15	2	2410	1,2,3,4,5,6

1. 2 IN. MERV 8 ENERGY WHEEL FILTERS FOR BOTH AIR STREAMS.
2. 2 IN. MESH WEATHERHOOD FILTERS.
3. AMCA CLASS 1A DAMPERS WITH LEAKAGE RATING LESS THAN 3 CFM/FT^2 @ 1 IN. WG.
4. STAINLESS STEEL DRAIN PAN SHALL BE WELDED AND SLOPED IN TWO DIRECTIONS TO MEET ASHARE 62.1 REQUIREMENTS.
5. LOW SOUND CONDENSER FANS.

UNIT VENTILATOR SCHEDULE

GENERAL					SUPPLY FAN			HYDRONIC HEATING								ELECTRICAL				NOTES
MARK	MANUFACTURER	MODEL	TYPE	SERVING	NOMINAL AIRFLOW (CFM)	OUTDOOR AIRFLOW (CFM)	HP	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	VOLTAGE	PHASE	MCA	WEIGHT (LBS)	
UV-101	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 101	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-102	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 102	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-103	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 103	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-109	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 109	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7
UV-110	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 110	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7
UV-117	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 117	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-118	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 118	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7
UV-119	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 119	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7
UV-303	TRANE	VUV 150	FLOOR MOUNTED CONSOLE CABINET	COMPUTERS 303	1500	370	1/4	90	46	117	3.2	180	125	TWO-WAY	WATER	115	1	8.75	470	1,2,3,4,5,7,8
UV-307	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 307	1250	370	1/4	75	46	122	3.2	180	133	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7,8
UV-309	TRANE	VUV 150	FLOOR MOUNTED CONSOLE CABINET	ART ROOM 309	1500	430	1/4	100	46	125	4.0	180	130	THREE-WAY	WATER	115	1	8.75	470	1,2,3,4,5,7,8
UV-311	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 311	1250	370	1/4	75	46	122	3.2	180	133	THREE-WAY	WATER	115	1	8.75	450	1,2,3,4,5,7,8
UV-312	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 312	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-315	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 315	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-316	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 316	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-317	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 317	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6
UV-318	TRANE	VUV 125	FLOOR MOUNTED CONSOLE CABINET	CLASSROOM 318	1250	315	1/4	70	45	116	2.6	180	125	TWO-WAY	WATER	115	1	8.75	450	1,2,3,4,5,6,8

1. PROVIDE WITH FAN VFD.
2. PROVIDE WITH PROGRAMMABLE ZONE THERMOSTAT WITH TEMPERATURE ADJUSTMENT AND DISPLAY.
3. DAMPERS FOR OUTSIDE AND RETURN AIR.
4. CO_2 SENSOR FOR DEMAND CONTROL VENTILATION, SET TO 800 PPM (ADJUSTABLE).
5. DISCONNECT SWITCH ON UNIT.
6. RIGHT HAND PIPE CONNECTION (FIELD VERIFY).
7. LEFT HAND PIPE CONNECTION. (FIELD VERIFY).
8. PROVIDE WITH FALSEBACK COVER AND END COVERS.

(2)(2)

HYDRONIC UNIT HEATER SCHEDULE

GENERAL				HYDRONIC HEATING								ELECTRICAL					
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	VOLTAGE	PHASE	MCA	FACE SIZE	AIRFLOW TYPE/MOUNTING STYLE	NOTES
CUH-112B	TRANE	FORCEFLO-1	VESTIBULE 112A	150	10	55	95	1.2	180	160	THREE-WAY	WATER	115	1	2.75	40"X30"	HORIZONTAL CEILING CONCEALED	1
CUH-115B	TRANE	FORCEFLO-1	VESTIBULE 115A	150	10	55	95	1.2	180	160	THREE-WAY	WATER	115	1	2.75	40"X30"	HORIZONTAL CEILING CONCEALED	1
CUH-116A	TRANE	FORCEFLO-1	VESTIBULE 116A	150	10	55	95	1.2	180	160	THREE-WAY	WATER	115	1	2.75	40"X28"	HORIZONTAL WALL CONCEALED	1
CUH-213A	TRANE	FORCEFLO-1	RECIEVING 213	350	30	55	95	3.0	180	160	THREE-WAY	WATER	115	1	2.75	60"X28"	VERTICAL WALL MOUNTED	1
CUH-214A	TRANE	FORCEFLO-1	KITCHEN 214	200	15	55	95	1.5	180	160	TWO-WAY	WATER	115	1	2.75	40"X25"	VERTICAL WALL MOUNTED	1
CUH-214B	TRANE	FORCEFLO-1	KITCHEN 214	200	15	55	95	1.5	180	160	TWO-WAY	WATER	115	1	2.75	40"X25"	VERTICAL WALL MOUNTED	1
CUH-900A	TRANE	FORCEFLO-1	VESTIBULE 900A	250	20	55	95	1.2	180	160	TWO-WAY	WATER	115	1	2.75	60"X25"	HORIZONTAL WALL CONCEALED	1
CUH-902	TRANE	FORCEFLO-1	PASSAGE 902	300	25	55	95	2.5	180	160	TWO-WAY	WATER	115	1	2.75	45"X25"	VERTICAL WALL MOUNTED	1
CUH-903A	TRANE	FORCEFLO-1	VESTIBULE 903A	150	10	55	95	1.2	180	160	TWO-WAY	WATER	115	1	2.75	60"X36"	HORIZONTAL FLOOR MOUNTED	1
CUH-904	TRANE	FORCEFLO-1	PASSAGE 904	200	15	55	95	1.5	180	160	THREE-WAY	WATER	115	1	2.75	60"X36"	HORIZONTAL FLOOR MOUNTED	1
CUH-905	TRANE	FORCEFLO-1	VESTIBULE 905	200	15	55	95	1.5	180	160	TWO-WAY	WATER	115	1	2.75	45"X25"	VERTICAL WALL MOUNTED	1
CUH-906	TRANE	FORCEFLO-1	VESTIBULE 906	250	20	55	95	2.0	180	160	TWO-WAY	WATER	115	1	2.75	45"X25"	VERTICAL WALL MOUNTED	1
CUH-907	TRANE	FORCEFLO-1	VESTIBULE 907	125	10	55	95	1.2	180	160	THREE-WAY	WATER	115	1	2.75	45"X25"	VERTICAL WALL MOUNTED	1
UH-104A	REZNOR	UWS	BOILER 104A	600	30	55	95	3.0	180	160	TWO-WAY	WATER	115	1	2.75	N/A	CEILING SUSPENDED	
UH-121B	REZNOR	UWS	STORAGE 121B	200	30	55	95	3.0	180	160	THREE-WAY	WATER	115	1	2.75	N/A	CEILING SUSPENDED	1,2
UH-121C	REZNOR	UWS	STORAGE 121C	200	30	55	95	3.0	180	160	THREE-WAY	WATER	115	1	2.75	N/A	CEILING SUSPENDED	1,2

1. PROVIDE REMOTE WALL MOUNTED THERMOSTAT.
2. SUPPORT A MINIMUM OF 6'-0" AFF

HYDRONIC CONVECTOR SCHEDULE

GENERAL				HYDRONIC HEATING									
MARK	MANUFACTURER	MODEL	SERVING	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	FACE SIZE	NOTES
CV-1	MODINE	PL	GIRLS TOILET 314	7.5	65	85	0.8	0.00	180	160	TWO-WAY	WATER	48"X30"	1,2
CV-2	MODINE	PL	BOY'S TOILET 313	7.5	65	85	0.8	0.00	180	160	TWO-WAY	WATER	48"X30"	1,2

1. WALL MOUNTED.
2. PROVIDE WITH PENCIL PROOF BAR GRILLE OPTION..

SECONDARY PUMP SCHEDULE

GENERAL				PERFORMANCE		ELECTRICAL				NOTES
MARK	MANUFACTURER	SERIES	SERVING	FLOW (GPM)	WPD (FT-HD)	RPM	HP	VOLTAGE	PHASE	
P-3	BELL & GOSSETT	E-80	BUILDING CIRCULATION	183	49	1800	5	208	3	1,2,3
P-4	BELL & GOSSETT	E-80	BUILDING CIRCULATION	183	49	1800	5	208	3	1,2,3
P-5	BELL & GOSSETT	E-80	NORTH ADDITION	91	58	1730	3	208	3	1,2,3
P-6	BELL & GOSSETT	E-80	NORTH ADDITION	91	58	1730	3	208	3	1,2,3
P-11	BELL & GOSSETT	PL-75	HYDRONIC FILTER	30	15	3400	1/6	115	1	

1. PROVIDE WITH VFD.
2. PUMP INLET AND OUTLET PRESSURE GAUGES.
3. INCLUDE ELASTOMER TYPE FLEXIBLE CONNECTORS.

ENERGY RECOVERY VENTILATOR SCHEDULE

GENERAL				SUPPLY FAN			EXHAUST FAN			ELECTRICAL						WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	ESP (IN-WG)	HP	AIRFLOW (CFM)	ESP (IN-WG)	HP	VOLTAGE	PHASE	FLA	MCA	MOCP	NO. OF MOTORS		
ERV-1	RENEWAIRE	HE4XRTV	WEIGHT ROOM 121E	2800	0.75	3	3000	0.50	3	230	3	8.4	20.3	25	2	1279	1,2,3,4,5,6

1. INTERLOCK CONTROLS WITH EXISTING DUCT MOUNTED HYDRONIC HEATING COIL UTILIZING CAREL PREMIUM CARD FROM MANUFACTURER. SEE ERV SEQUENCE OF OPERATIONS.
2. PROVIDE STANDARD 20"x20"x2" MERV 8 FILTERS (QTY: 8)
3. PROVIDE STANDARD NON-FUSED DISCONNECT.
4. PROVIDE WITH ROOF CURB: STANDARD 14".
5. PROVIDE WITH WALL MOUNTED CO_2 SENSOR.
6. PROVIDE WITH IE3 EFFICIENCY MOTOR WITH VFD'S

DIFFUSER, REGISTER, AND GRILLE SCHEDULE

GENERAL			DESCRIPTION	FINISH	MATERIAL	FACE SIZE	NOTES
MARK	MANUFACTURER	TYPE					
RD-1	TITUS	PAR	RETURN DIFFUSER	PREFORATED CEILING DIFFUSER	STANDARD WHITE	STEEL	24"X24"	
SD-1	TITUS	TJD	SUPPLY DIFFUSER	PLAQUE FACE DIFFUSER	STANDARD WHITE	STEEL	24"X24"	

CONDENSING UNIT SCHEDULE

GENERAL				MODEL NUMBER	DX COOLING		ELECTRICAL			WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	SERVING		NOMINAL CAPACITY (TON)	REFRIGERANT	VOLTAGE	PHASE	FAN HP		
CU-1	TRANE	ODESSEY	AHU-1	TTA072K*A*	6	R-454B	230	3	1/2	288	

LOUVER SCHEDULE

GENERAL			DESCRIPTION	FINISH	MATERIAL	NECK SIZE	NOTES
MARK	MANUFACTURER	MODEL					
L-1	TRANE	WALL BOX	INTAKE LOUVER	DARK BRONZE	ALUMINUM	SEE DWG	1,2,3
L-2	GREENHECK	ESD-403	INTAKE LOUVER	DARK BRONZE	ALUMINUM	SEE DWG	1,2,3
L-3	GREENHECK	ESD-403	INTAKE LOUVER	DARK BRONZE	ALUMINUM	SEE DWG	1,2,3
L-4	GREENHECK	ESD-635	INTAKE LOUVER	DARK BRONZE	ALUMINUM	SEE DWG	1,2,3

1. PROVIDE BIRD SCREEN INSIDE OF LOUVER.
2. FLANGED FRAME.
3. INSTALL INTO EXISTING OPENING. FIELD VERIFY REQUIRED SIZES PRIOR TO SUBMITTALS.

EXPANSION TANK SCHEDULE

GENERAL			PERFORMANCE	
MARK	MANUFACTURER	MODEL	VOLUME (GAL)	ACCEPTANCE (GAL)
ET-1	BELL & GOSSETT	B-400	55.7	22.6

AIR SEPERATOR SCHEDULE

MARK	MANUFACTURER	MODEL	FLOW (GPM)	Notes
AS-1	BELL AND GOSSETT	RL	360 GPM	1

1. SUPPORT FROM CEILING

HOOD SCHEDULE

GENERAL					AIRFLOW (CFM)	ESP (IN-WG)	MODEL SIZE	WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	SERVING	TYPE					
RAH-1	GREENHECK	GRSR	CLASSROOM 117	RELIEF AIR HOOD	315	0.00	24	29	1,2,3
RAH-2	GREENHECK	GRSR	CLASSROOM 118	RELIEF AIR HOOD	315	0.00	24	29	1,2,3
RAH-3	GREENHECK	GRSR	CLASSROOM 119	RELIEF AIR HOOD	315	0.00	24	29	1,2,3
RAH-4	GREENHECK	GRSR	CLASSROOM 110	RELIEF AIR HOOD	315	0.00	24	29	1,2,3
RAH-5	GREENHECK	GRSR	CLASSROOM 109	RELIEF AIR HOOD	315	0.00	24	29	1,2,3
RAH-6	GREENHECK	GRSR	PASSAGE 901	RELIEF AIR HOOD	2675	0.09	24	29	1,2,3
RAH-7	GREENHECK	GRSR	LOCKER ROOM 201/206	RELIEF AIR HOOD	600	0.00	24	29	1,2,3

1. PROVIDE WITH BIRD SCREEN.
2. PROVIDE WITH MOTORIZED DAMPER AND BACKDRAFT DAMPER.
3. INSTALL ON EXISTING CURB.

FAN COIL UNIT SCHEDULE

GENERAL				SUPPLY FAN	HYDRONIC HEATING						ELECTRICAL				NOTES
MARK	MANUFACTURER	MODEL	SERVING	AIRFLOW (CFM)	CAPACITY (MBH)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	VOLTAGE	PHASE	MCA	FACE SIZE	
FCU-1	TRANE	UNITRANE	STAFF 209	100	8.5	0.8	2.00	180	140	TWO-WAY	WATER	115	1	2.75	45"X25"	1

1. HEATING ONLY.

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TMP ARCHITECTURE

MECHANICAL SCHEDULES

RENOVATIONS AND IMPROVEMENTS
600 E. PARK ST, PENTWATER, MI 49449

PHASE
ISSUED FOR BIDS

ISSUANCES

#	DESCRIPTION	DATE
0	ISSUED FOR BIDS	22SEP2025
2A1	ADDENDUM 1	31OCT2025
2A2	ADDENDUM 2	12NOV2025

PROJ. #: 24-0301

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2M-601

Addendum #2

11/12/2025 12:02:25 PM
Autodesk Docs://24030_IPS 20/24 Bond Implementation/24030_MEP.rvt
DESIGNED BY: MR
CHECKED BY: DTD APPROVED BY: Approver

WE RECYCLE

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

THE BAR BELOW SHOWS PRIMARY COLORS WHITE

EXISTING FINNED TUBE RADIATOR...

GENERAL	HYDRONIC HEATING		NOTE
MARK	FLOW (GPM)	FLUID	
EX-RAD-102A	2.5	WATER	1
EX-RAD-103A	2.1	WATER	1
EX-RAD-106	1.5	WATER	1
EX-RAD-108A	0.5	WATER	1
EX-RAD-109B	2.5	WATER	1
EX-RAD-112	1.7	WATER	1
EX-RAD-113	1.6	WATER	1
EX-RAD-115	2.0	WATER	1
EX-RAD-116	0.4	WATER	1
EX-RAD-116B	0.4	WATER	1
EX-RAD-117B	2.8	WATER	1
EX-RAD-201	1.2	WATER	1
EX-RAD-203	0.2	WATER	1
EX-RAD-205	0.2	WATER	1
EX-RAD-206	1.2	WATER	1
EX-RAD-209	0.2	WATER	1
EX-RAD-210A	0.4	WATER	1
EX-RAD-210B	0.5	WATER	1
EX-RAD-211	0.5	WATER	1
EX-RAD-212	0.3	WATER	1
EX-RAD-212A	0.6	WATER	1
EX-RAD-212B	0.5	WATER	1
EX-RAD-214A	0.2	WATER	1
EX-RAD-215C	0.4	WATER	1
EX-RAD-215C1	0.4	WATER	1
EX-RAD-215C2	0.4	WATER	1
EX-RAD-300A	0.5	WATER	1
EX-RAD-300E	0.7	WATER	1
EX-RAD-300F	0.5	WATER	1
EX-RAD-300H	0.5	WATER	1
EX-RAD-304	5.0	WATER	1
EX-RAD-309	2.3	WATER	1
EX-RAD-902	1.2	WATER	1

1. EXISTING UNIT TO REMAIN. REMOVE AND REPLACE EXISTING PNEUMATIC CONTROLS WITH DDC HYDRONIC CONTROL VALVE AND THERMOSTAT. REWORK HYDRONIC PIPING IF NECESSARY.

NORTH ADDITION EQUIPMENT

GENERAL		HYDRONIC HEATING
MARK	ASSOCIATED PUMP(S)	FLOW (GPM)
AHU-1	P-3 & P-4	2.8
AHU-2	P-3 & P-4	15.0
AHU-3	P-3 & P-4	41.0
AHU-4	P-3 & P-4	19.1
CUH-214A	P-3 & P-4	1.5
CUH-214B	P-3 & P-4	1.5
CUH-905	P-3 & P-4	1.5
CUH-906	P-3 & P-4	2.0
CUH-907	P-3 & P-4	1.2
EX-RAD-209	P-3 & P-4	0.2
EX-RAD-210A	P-3 & P-4	0.4
EX-RAD-210B	P-3 & P-4	0.5
EX-RAD-211	P-3 & P-4	0.5
EX-RAD-212	P-3 & P-4	0.3
EX-RAD-212A	P-3 & P-4	0.6
EX-RAD-212B	P-3 & P-4	0.5
EX-RAD-214A	P-3 & P-4	0.2
EX-RAD-215C	P-3 & P-4	0.4
EX-RAD-215C1	P-3 & P-4	0.4
EX-RAD-215C2	P-3 & P-4	0.4
FCU-1	P-3 & P-4	0.8

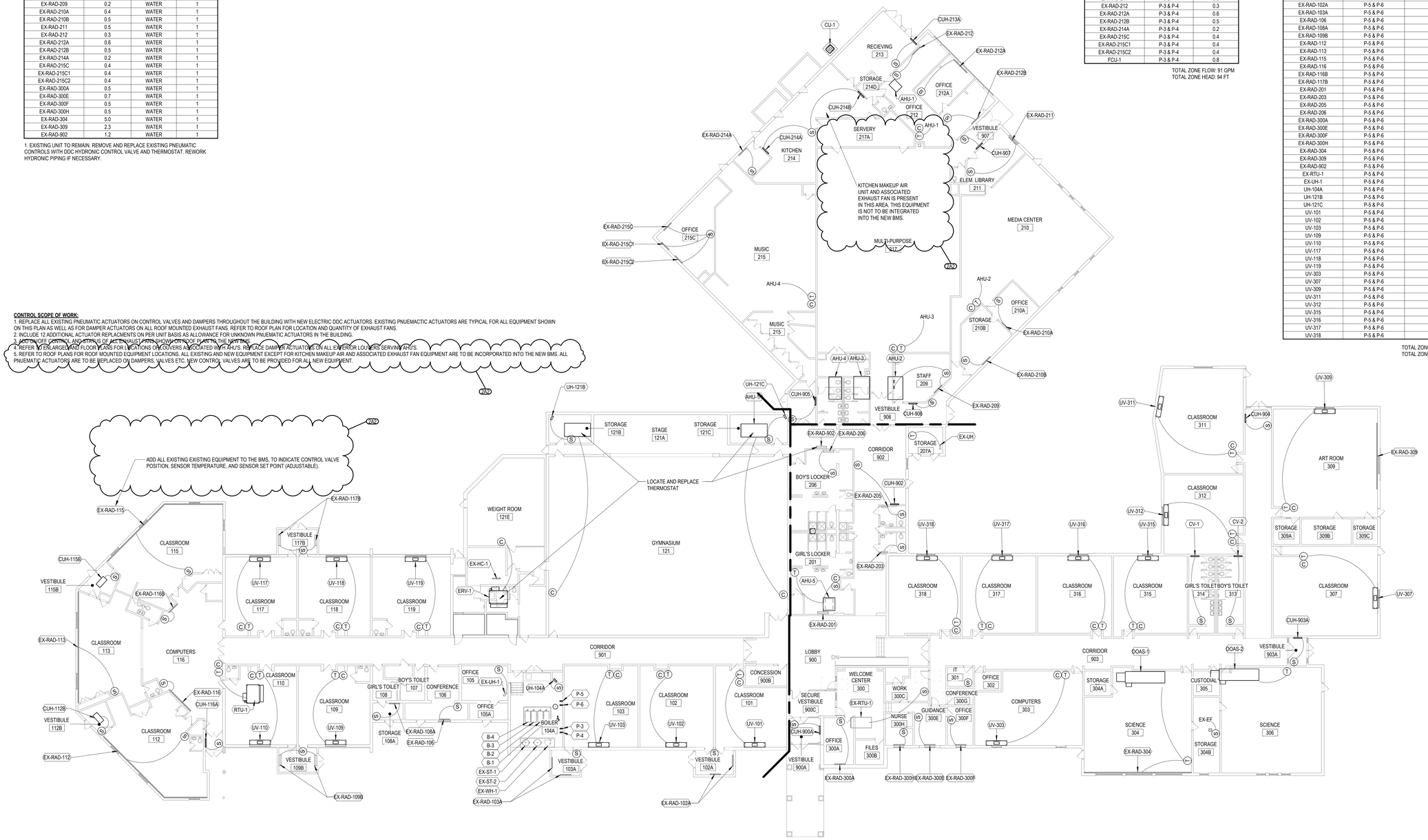
TOTAL ZONE FLOW: 91 GPM
TOTAL ZONE HEAD: 94 FT

BUILDING CIRCULATION EQUIPMENT

GENERAL		HYDRONIC HEATING
MARK	ASSOCIATED PUMP(S)	FLOW (GPM)
AHU-1N	P-5 & P-6	22.0
AHU-2N	P-5 & P-6	22.0
AHU-5	P-5 & P-6	15.0
CUH-112B	P-5 & P-6	1.2
CUH-115B	P-5 & P-6	1.2
CUH-116A	P-5 & P-6	1.2
CUH-213A	P-5 & P-6	3.0
CUH-900A	P-5 & P-6	1.2
CUH-902	P-5 & P-6	2.5
CUH-903A	P-5 & P-6	1.2
CUH-904	P-5 & P-6	1.5
CV-1	P-5 & P-6	0.8
CV-2	P-5 & P-6	0.8
EX-HC-1	P-5 & P-6	15.0
EX-RAD-102A	P-5 & P-6	2.5
EX-RAD-103A	P-5 & P-6	2.1
EX-RAD-106	P-5 & P-6	1.5
EX-RAD-108A	P-5 & P-6	0.5
EX-RAD-109B	P-5 & P-6	2.5
EX-RAD-112	P-5 & P-6	1.7
EX-RAD-113	P-5 & P-6	1.6
EX-RAD-115	P-5 & P-6	2.0
EX-RAD-116	P-5 & P-6	0.4
EX-RAD-116B	P-5 & P-6	0.4
EX-RAD-117B	P-5 & P-6	2.8
EX-RAD-201	P-5 & P-6	1.2
EX-RAD-203	P-5 & P-6	0.2
EX-RAD-205	P-5 & P-6	0.2
EX-RAD-206	P-5 & P-6	1.2
EX-RAD-300A	P-5 & P-6	0.5
EX-RAD-300E	P-5 & P-6	0.7
EX-RAD-300F	P-5 & P-6	0.5
EX-RAD-300H	P-5 & P-6	0.5
EX-RAD-304	P-5 & P-6	5.0
EX-RAD-309	P-5 & P-6	2.3
EX-RAD-902	P-5 & P-6	1.2
EX-RTU-1	P-5 & P-6	5.2
EX-UH-1	P-5 & P-6	1.7
UH-104A	P-5 & P-6	3.0
UH-121B	P-5 & P-6	3.0
UH-121C	P-5 & P-6	3.0
UV-101	P-5 & P-6	2.6
UV-102	P-5 & P-6	2.6
UV-103	P-5 & P-6	2.6
UV-109	P-5 & P-6	2.6
UV-110	P-5 & P-6	2.6
UV-117	P-5 & P-6	2.6
UV-118	P-5 & P-6	2.6
UV-119	P-5 & P-6	2.6
UV-303	P-5 & P-6	3.2
UV-307	P-5 & P-6	3.2
UV-309	P-5 & P-6	4.0
UV-311	P-5 & P-6	3.2
UV-312	P-5 & P-6	2.6
UV-315	P-5 & P-6	2.6
UV-316	P-5 & P-6	2.6
UV-317	P-5 & P-6	2.6
UV-318	P-5 & P-6	2.6

TOTAL ZONE FLOW: 183.4 GPM
TOTAL ZONE HEAD: 58 FT

CONTROL SCOPE OF WORK:
1. REPLACE ALL EXISTING PNEUMATIC ACTUATORS ON CONTROL VALVES AND DAMPERS THROUGHOUT THE BUILDING WITH NEW ELECTRIC DDC ACTUATORS. EXISTING PNUEMACTIC ACTUATORS ARE TYPICAL FOR ALL EQUIPMENT SHOWN ON THIS PLAN AS WELL AS FOR DAMPER ACTUATORS ON ALL ROOF MOUNTED EXHAUST FANS. REFER TO ROOF PLAN FOR LOCATION AND QUANTITY OF EXHAUST FANS.
2. INCLUDE 12 ADDITIONAL ACTUATOR REPLACMENTS ON PER UNIT BASIS AS ALLOWANCE FOR UNKNOWN PNUEMATIC ACTUATORS IN THE BUILDING.
3. ADD ON/OFF CONTROL AND STATUS OF ALL EXHAUST FANS SHOWN ON ROOF PLAN TO THE SYSTEMS.
4. REFER TO ENLARGED AND FLOOR PLANS FOR LOCATIONS ON LOUVERS ASSOCIATED WITH AHU'S. REPLACE DAMPER ACTUATORS ON ALL EXTERIOR LOUVERS SERVING AHU'S.
5. REFER TO ROOF PLANS FOR ROOF MOUNTED EQUIPMENT LOCATIONS. ALL EXISTING AND NEW EQUIPMENT EXCEPT FOR KITCHEN MAKEUP AIR AND ASSOCIATED EXHAUST FAN EQUIPMENT ARE TO BE INCORPORATED INTO THE NEW BMS. ALL PNUEMATIC ACTUATORS ARE TO BE REPLACED ON DAMPERS, VALVES ETC. NEW CONTROL VALVES ARE TO BE PROVIDED FOR ALL NEW EQUIPMENT.



BUILDING MECHANICAL CONTROLS PLAN
1/16" = 1'-0"

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ARCHITECTURE

MECHANICAL CONTROLS

RENOVATIONS AND IMPROVEMENTS
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PHASE

ISSUED FOR BIDS

ISSUANCES

#	DESCRIPTION	DATE
0	ISSUED FOR BIDS	22SEP2025
2A1	ADDENDUM 1	31OCT2025
2A2	ADDENDUM 2	12NOV2025

PROJ. #: 24-0301

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2M-801

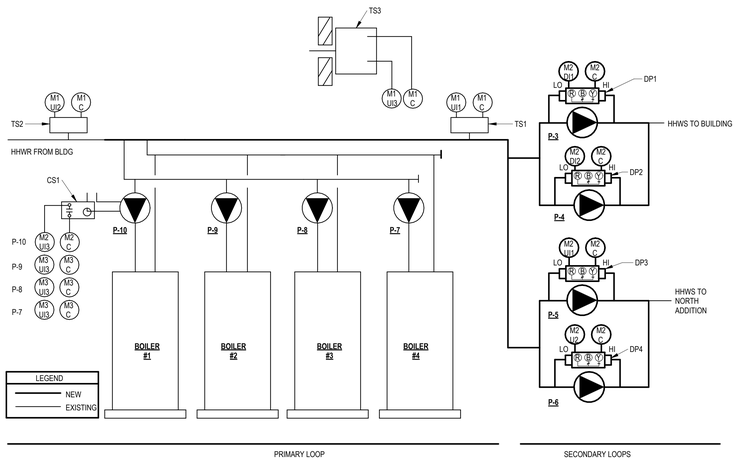
Addendum #2

11/12/2025 12:02:24 PM
Autodesk Docs://24030_PPS 2024 Bond Implementation/24030_MP.rvt
DESIGNED BY: MH
CHECKED BY: DTD APPROVED BY: Approver

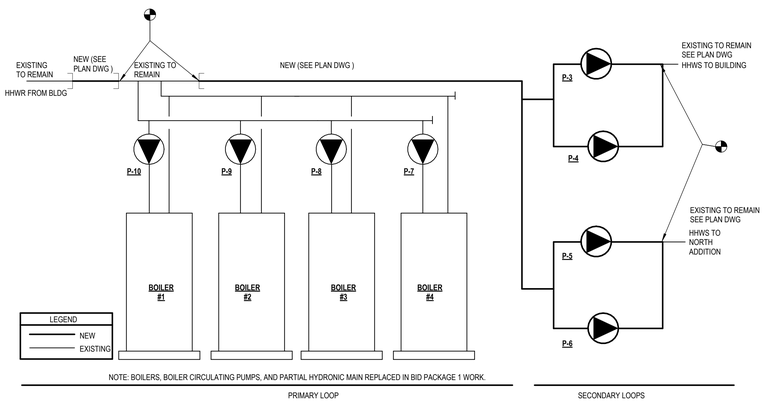
WE RECYCLE
THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK
WHITE
THE BAR BELOW SHOWS PRIMARY COLORS

GENERAL CONTROL SYSTEM SCOPE

1. EXISTING SCHNEIDER ELECTRIC-HAVEL BROTHERS DDC SYSTEM IS PRESENT IN THE BUILDING. THE EXISTING CONTROL SYSTEM IS TO BE REPLACED WITH NEW TRIDIUM OPEN PROTOCOL SYSTEM.
2. NEW BOILERS HAVE BEEN INSTALLED IN PHASE 1 WORK SCOPE AND SHALL BE INTEGRATED INTO THE NEW CONTROL SYSTEM INCLUDING GRAPHICS. BOILER OPERATE VIA FACTORY CONTROLS TO MAINTAIN SUPPLY WATER TEMPERATURE SETPOINT (ADJ).
3. INTEGRATE PACKAGED NG FIRED/DX COOLING RTU SERVING THE MAIN OFFICE AREA INTO THE NEW BMS. THIS RTU WAS REPLACED BY THE DISTRICT IN SPRING 2025.
4. ALL NEW HVAC EQUIPMENT SHALL BE CONTROLLED BY THE NEW SYSTEM AS WELL AS THE EXISTING BOILERS, BOILER CIRCULATING PUMPS, AND ANY EXISTING EQUIPMENT THAT IS NOT BEING DEMOLISHED. ALL EXISTING EQUIPMENT CONTAINS PNEUMATIC ACTUATORS. ALL PNEUMATIC ACTUATORS THROUGHOUT THE BUILDING WILL BE REPLACED WITH NEW ELECTRIC ACTUATORS. REFER TO PLAN DRAWING 2M-801 FOR LOCATIONS.



1 **CONTROLS SCHEMATIC BOILER**
NOT TO SCALE



NOTE: BOILERS, BOILER CIRCULATING PUMPS, AND PARTIAL HYDRONIC MAIN REPLACED IN BID PACKAGE 1 WORK.

2 **SYSTEM SCHEMATIC BOILER**
NOT TO SCALE

PACKAGED ROOFTOP UNIT (SINGLE-ZONE VAV) – GAS HEAT & DX COOLING

A. **GENERAL REQUIREMENTS**:
1. PACKAGED UNIT WITH SELF-CONTAINED COMPRESSOR/CONDENSER AND DX COOLING COIL, MODULATING NATURAL GAS HEAT EXCHANGER, VARIABLE SPEED SUPPLY FAN AND POWER RELIEF FAN.
2. PACKAGED UNIT INCLUDES FACTORY INSTALLED CONTROLS AND PROGRAMMED MICROPROCESSOR WITH BACNET COMMUNICATIONS INTERFACE FOR BAS MONITORING AND CONTROL. ALL UNIT CONTROL POINTS, SET POINTS, STATUS AND ALARMS SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
3. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS. ALL SETPOINTS SHALL BE ADJUSTABLE (BY BAS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - OCCUPIED COOLING: 75° F
   - UNOCCUPIED HEATING 65° F
   - UNOCCUPIED COOLING: 78° F

4. A 5°F DEADBAND BETWEEN ACTIVE HEATING AND COOLING SPACE TEMPERATURE SETPOINTS SHALL BE MAINTAINED TO PREVENT SHORT CYCLING SITUATIONS.
5. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL INCLUDE A TEMPORARY UNCCUPIED-TO-OCCUPIED OVERRIDE BUTTON. DURATION OF TEMPORARY OVERRIDE SHALL BE LIMITED TO ONE-HOUR (ADJUSTABLE BY BAS OPERATOR ONLY).
6. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL ALLOW FOR TEMPERATURE SETPOINT ADJUSTMENT OVERRIDE. SETPOINT OVERRIDE SHALL BE LIMITED TO +/- 2° F. BAS GRAPHICS SHALL DISPLAY ACTIVE SETPOINT ADJUSTMENT.

B. **UNOCCUPIED MODE**:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE RTU SHALL DISABLE THE HEAT EXCHANGER, STOP THE RELIEF AND SUPPLY FANS, AND CLOSE THE OUTSIDE AIR DAMPER.
2. THE RTU SHALL OPERATE AS NEEDED, WITH THE OUTSIDE AIR DAMPER IN THE CLOSED POSITION, TO MAINTAIN THE UNOCCUPIED HEATING/COOLING SETPOINTS.
   - PERIMETER HEATING VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE 1° F ABOVE HEATING SETPOINT DURING UNOCCUPIED MODE.
3. IF THE TEMPORARY UNOCCUPIED-TO-OCCUPIED OVERRIDE BUTTON ON THE SPACE TEMPERATURE SENSOR (OR THERMOSTAT) IS PRESSED, RTU SHALL OPERATE IN OCCUPIED MODE FOR A LIMITED DURATION AS DEFINED ABOVE.

C. **OCCUPIED MODE**:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, THE OCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. THE RTU CONTROLLER SHALL MODULATE THE SUPPLY FAN TO 50% DESIGN AIRFLOW AND OPEN THE OUTSIDE AIR DAMPER TO THE MINIMUM POSITION.
   - MINIMUM OUTSIDE AIR DAMPER POSITION (%) AND MAXIMUM SUPPLY FAN SPEED ARE ESTABLISHED DURING THE FINAL AIR BALANCING. MAXIMUM SUPPLY FAN SPEED IS ASSOCIATED WITH THE BALANCED MAXIMUM DESIGN AIRFLOW. COORDINATE WITH TAB CONTRACTOR.
2. IF THE SPACE TEMPERATURE RISES ABOVE OCCUPIED COOLING SETPOINT, THE RTU CONTROLLER SHALL MODULATE THE DX COOLING AND SUPPLY FAN SPEED. ONCE THE SPACE TEMPERATURE DROPS BELOW SETPOINT, SUPPLY FAN SHALL MODULATE BACK TO 50% DESIGN AIRFLOW AND THE DX COOLING SHALL MODULATE TO MAINTAIN OCCUPIED COOLING SETPOINT.
3. IF THE SPACE TEMPERATURE DROPS BELOW THE OCCUPIED HEATING SETPOINT, THE RTU CONTROLLER SHALL MODULATE THE GAS HEAT EXCHANGER AND SUPPLY FAN SPEED TO MAINTAIN THE HEATING SETPOINT. ONCE THE SPACE TEMPERATURE RISES ABOVE SETPOINT, THE SUPPLY FAN SHALL MODULATE TO 50% DESIGN AIRFLOW THE GAS HEAT EXCHANGER SHALL MODULATE TO MAINTAIN SPACE HEATING SETPOINT.
   - PERIMETER HEATING VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE 1° F ABOVE HEATING SETPOINT DURING OCCUPIED MODE.

D. **ECONOMIZER MODE (FREE COOLING)** :
1. WHEN IN COOLING MODE AND THE RETURN AIR ENTHALPY IS HIGHER THAN THE OUTDOOR AIR ENTHALPY, AND THE OUTDOOR AIR TEMPERATURE IS BELOW 70°F, THE MIXED AIR DAMPERS AND SUPPLY FAN SHALL MODULATE TO MAINTAIN THE OCCUPIED COOLING SETPOINT AS THE FIRST MODE OF COOLING.
2. ONCE THE OUTSIDE AIR DAMPER REACHES THE FULLY OPEN POSITION, THE DX COOLING SHALL MODULATE TO MAINTAIN THE OCCUPIED COOLING SETPOINT. THE DX COOLING SHALL REMAIN DISABLED UNTIL THE OUTSIDE AIR DAMPER REACHES THE 100% OPEN POSITION AND THE DISCHARGE AIR TEMPERATURE IS STILL ABOVE SETPOINT.
3. WHENEVER THE OUTSIDE AIR DAMPER EXCEEDS THE 50% (ADJUSTABLE) OPEN POSITION, THE RTU CONTROLLER WILL ENERGIZE THE RELIEF FAN. WHEN THE OUTSIDE AIR DAMPER MODULATES BELOW 50% OPEN, THE RELIEF FAN SHALL BE DEENERGIZED.
4. THE RTU CONTROLLER SHALL MODULATE RELIEF FAN SPEED BY A FACTOR OF OUTSIDE AIR DAMPER POSITION MULTIPLIED BY THE SPEED RATIO OF THE SUPPLY FAN (I.E. 50% DAMPER POSITION X 0.70 FAN SPEED RATIO = 35% RELIEF FAN SPEED).
   - THE SUPPLY FAN SPEED RATIO IS EQUAL TO THE ACTIVE FAN SPEED (%) DIVIDED BY THE MAXIMUM SUPPLY FAN SPEED (%) THAT IS ESTABLISHED DURING THE FINAL SYSTEM AIR BALANCING, WITH A MAX RATIO OF 1.0.
5. WHEN AHU IS IN ECONOMIZER MODE, A GRAPHICAL ICON SHALL BE ACTIVATED AT THE BAS.

E. **VENTILATION:**
THE AHU SHALL VENTILATE TO PROVIDE FRESH AIR AS FOLLOWS:
- DEMAND CONTROLLED VENTILATION: CO_2 SENSORS SHALL MODULATE THE MIXED AIR TO MAINTAIN A SPACE CO_2 LEVEL OF LESS THAN 1100 PPM.
- MIXED AIR SHALL NOT MODULATE TO A CONCENTRATION OF OUTDOOR AIR THAT IS GREATER THAN NOTED ON THE AHU SCHEDULE ON M-601.
- MIXED AIR SHALL MODULATE CLOSED IN THE UNOCCUPIED MODE AND THE STANDBY MODE.

F. ALARMS & SAFETIES:
1. IF THE DISCHARGE AIR TEMPERTURE DROPS BELOW 45°F FOR LONGER THAN 30 MINUTES (ADJ), A LOW TEMPERATURE NOTIFICATION SHALL BE GENERATED AT THE BAS.
2. IF THE DISCHARGE AIR TEMPERTURE DROPS BELOW 38°F, A FREEZE PROTECTION ALARM WILL BE GENERATED AT THE BAS, AND THE FOLLOWING ACTIONS SHALL OCCUR:
3. OUTSIDE AIR DAMPER SHALL CLOSE
4. SUPPLY FAN SHALL STOP (AND RELIEF FAN SHALL STOP IF APPLICABLE)

3. IF THE DISCHARGE AIR TEMPERTURE EXCEEDS 125°F FOR LONGER THAN 5 MINUTES (ADJ), A HIGH TEMPERATURE ALARM SHALL BE GENERATED AT THE BAS AND THE RTU SHALL DISABLE THE GAS HEAT EXCHANGER.
4. IF THE CONDENSATE OVERFLOW SWITCH DETECTS AN OVERFLOW CONDITION, A CONDENSATE ALARM SHALL BE GENERATED AT THE BAS AND THE RTU SHALL DISABLE THE DX COOLING.
5. WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR THE SUPPLY FAN SHALL SHUT DOWN AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. WHEN THE FIRE ALARM CIRCUIT IS RESET, RTU SHALL BE ALLOWED TO RESTART.

[END OF SEQUENCE]

FAN COIL UNIT (FCU) – HW HEATING COIL

A. **GENERAL REQUIREMENTS FOR ALL ATUS** :
1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. CONSTANT SUPPLY AIRFLOW (FCU FAN) SHALL BE AS INDICATED ON THE FCU SCHEDULES. AIRFLOWS ESTABLISHED WITH ACTUATED DAMPERS DURING FINAL SYSTEM AIR BALANCING.
3. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BMS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS (UNLESS NOTED OTHERWISE). ALL SETPOINTS SHALL BE ADJUSTABLE (BY BMS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - UNOCCUPIED HEATING 65° F

4. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL INCLUDE A TEMPORARY UNCCUPIED-TO-OCCUPIED OVERRIDE BUTTON. DURATION OF TEMPORARY OVERRIDE SHALL BE LIMITED TO ONE-HOUR (ADJUSTABLE BY BMS OPERATOR ONLY).
5. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL ALLOW FOR TEMPERATURE SETPOINT ADJUSTMENT OVERRIDE. SETPOINT OVERRIDE SHALL BE LIMITED TO +/- 2° F. BMS GRAPHICS SHALL DISPLAY ACTIVE SETPOINT ADJUSTMENT.

B. **UNOCCUPIED MODE**:
1. WHEN THE BMS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE UNOCCUPIED HEATING SETPOINTS SHALL BE ACTIVE. FCU CONTROLLER SHALL STOP SUPPLY FAN AND CLOSE THE HEATING COIL VALVE.
2. IF SPACE TEMPERATURE DROPS BELOW UNOCCUPIED HEATING SETPOINT, FCU CONTROLLER SHALL START SUPPLY FAN AND OPEN HEATING COIL VALVE. ONCE SPACE TEMPERATURE RISES SUFFICIENTLY ABOVE UNOCCUPIED HEATING SETPOINT, FCU SHALL CLOSE HEATING COIL VALVE AND STOP SUPPLY FAN.
3. IF THE TEMPORARY UNOCCUPIED-TO-OCCUPIED OVERRIDE BUTTON ON THE SPACE TEMPERATURE SENSOR (OR THERMOSTAT) IS PRESSED, FCU SHALL OPERATE IN OCCUPIED MODE FOR A LIMITED DURATION AS DEFINED ABOVE.

C. **OCCUPIED MODE**:
1. WHEN THE BMS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, FCU CONTROLLER SHALL START SUPPLY FAN, MODULATE HEATING COIL VALVE TO MAINTAIN OCCUPIED HEATING SETPOINT.
   - MORNING WARM-UP: IF THE SPACE TEMPERATURE IS BELOW THE OCCUPIED HEATING SETPOINTS 60 MINUTES (ADJUSTABLE) PRIOR TO SCHEDULED OCCUPANCY, FCU CONTROLLER SHALL START SUPPLY FAN AND MODULATE HEATING TO ACHIEVE OCCUPIED SETPOINTS. UTILIZE OPTIMUM START ALGORYTHM TO MINIMUMIZE WARM-UP DURATION.

[END OF SEQUENCE]

ENERGY RECOVERY VENTILATOR (ERV) – DUCT MOUNTED HW HEATING COIL

A. **GENERAL REQUIREMENTS**:
1. ALL SETPOINTS AND INTERVALS DESCRIBED IN SEQUENCE SHALL BE OPERATOR ADJUSTABLE.
2. PROVIDE AND INSTALL ALL NECESSARY COMPONENTS AND ACCESSORIES FOR A COMPLETE AND OPERATIONAL SYSTEM INCLUDING, BUT NOT LIMITED TO, SENSORS, RELAYS, COMMUNICATION WIRING AND CONDUIT, AND ALL NECESSARY ELECTRICAL DEVICES, WIRING, AND CONDUIT.

B. SCHEDULING:
1. THE ERV SHALL HAVE SCHEDULING FUNCTIONALITY THROUGH THE DDC SYSTEM FOR OCCUPIED/UNOCCUPIED AND SPECIAL SCHEDULE TIMES.

C. HEATING MODE:
1. IF THE SPACE TEMPERATURE DROPS BELOW THE OCCUPIED HEATING SETPOINT, MODULATE THE DUCT MOUNTED HYDRONIC COIL CONTROL VALVE AND SUPPLY FAN SPEED TO MAINTAIN SPACE HEATING SETPOINT. ONCE THE SPACE TEMPERATURE RISES ABOVE SETPOINT, THE SUPPLY FAN SHALL MODULATE TO 50% DESIGN AIRFLOW AND DUCT MOUNTED HEATING COIL HYDRONIC CONTROL VALVE SHALL MODULATE TO MAINTAIN SPACE HEATING SETPOINT.
2. SPACE TEMPERATURE SET POINT SHALL BE: 68F.

[END OF SEQUENCE]

DEDICATED OUTSIDE AIR UNIT (DOAS) - NG HEAT AND ENERGY RECOVERY WHEEL

A. **GENERAL REQUIREMENTS**:
1. ALL SETPOINTS AND INTERVALS DESCRIBED IN SEQUENCE SHALL BE OPERATOR ADJUSTABLE.
2. PROVIDE AND INSTALL ALL NECESSARY COMPONENTS AND ACCESSORIES FOR A COMPLETE AND OPERATIONAL SYSTEM INCLUDING, BUT NOT LIMITED TO, SENSORS, RELAYS, COMMUNICATION WIRING AND CONDUIT, AND ALL NECESSARY ELECTRICAL DEVICES, WIRING, AND CONDUIT.

B. SCHEDULING:
1. THE DOAS SHALL HAVE SCHEDULING FUNCTIONALITY THROUGH THE DDC SYSTEM FOR OCCUPIED/UNOCCUPIED AND SPECIAL SCHEDULE TIMES.

C. ENERGIZE/DE-ENERGIZE:
1. UNIT OPERATES VIA FACTORY CONTROLS SUPPLY/EXHAUST FANS, NG HEAT, DEHUMIDIFACTION, ENERGY RECOVERY WHEEL, AND ALL ANCILLARIES TO MAINTAIN SPACE SETPOINT TEMPERATURE OF 68F IN OCCUPIED MODE AND 60F IN UNOCCUPIED.
2. REPORT ALL AVAILABLE ALARM, CONTROL, AND MONITOR POINTS TO THE BMS.

[END OF SEQUENCE]

2A2

SINGLE ZONE VAV AIR HANDLING UNIT SEQUENCE OF OPERATION

AIR HANDLING UNIT - RUN CONDITIONS:
OCCUPIED MODE:
- THE AHU SHALL RUN CONTINUOUSLY WHEN THE SPACE IS IN THE OCCUPIED MODE.

UNOCCUPIED MODE
- THE AHU SHALL RUN INTERMITTENTLY AS NECESSARY TO PROVIDE SETBACK CONDITION WHEN THE SPACE IS UNOCCUPIED.

STANDBY MODE:
- IN THE STANDBY MODE, THE AHU SHALL HEAT OF COOL TO OCCUPIED CONDITIONS. OUTDOOR AIR DAMPERS SHALL BE CLOSED.

HEATING MODE: (REFER TO DWGS FOR HEATING COIL LOCATION EITHER IN UNIT OR IN DUCTWORK, PROVIDE ALL NECESSARY ANCILLARIES FOR CONTROL IN EITHER LOCATION):
ON A CALL FOR HEATING, THE AHU OPERATES AS FOLLOWS:
- THE CONTROL VALVE MODULATES TO MAINTAIN A DISCHARGE AIR TEMPERATURE OF 55°F (ADJ.).
- THE SUPPLY FAN VFD MODULATES TO MAINTAIN A PRESSURE DIFFERENTIAL OF 1.5 IN-WG AT THE DIFFERENTIAL PRESSURE SENSOR LOCATED 2/3 DOWN THE MAIN SUPPLY DUCTWORK RUN.

COOLING MODE: (IF PRESENT) 2A2
ON A CALL FOR COOLING, THE AHU OPERATES AS FOLLOWS:
- THE CONTROL VALVE MODULATES TO MAINTAIN A DISCHARGE AIR TEMPERATURE OF 55°F (ADJ.).
- THE SUPPLY FAN VFD MODULATES TO MAINTAIN A PRESSURE DIFFERENTIAL OF 1.5 IN-WG AT THE DIFFERENTIAL PRESSURE SENSOR LOCATED 2/3 DOWN THE MAIN SUPPLY DUCTWORK RUN.

STATIC PRESSURE RESET:
IF ALL SPACE SETPOINTS ARE SATISFIED, THE SUPPLY FAN OPERATES AS FOLLOWS:
- THE DPS RESETS THE SUPPLY FAN VFD TO MAINTAIN A DIFFERENTIAL PRESSURE OF 0.25 IN-WG.
- THE DPS RESETS BACK TO 1.5 IN-WG UPON A CALL FOR CONDITIONING FROM ANY SPACE.

ECONOMIZER MODE:
THE AHU OPERATES IN ECONOMIZER MODE WHEN THE FOLLOWING CONDITIONS ARE MET:
- THE AHU IS IN THE OCCUPIED COOLING MODE.
- THE RETURN AIR ENTHALPY IS HIGHER THAN THE OUTDOOR AIR ENTHALPY.

ONCE THE CONDITIONS ARE MET, THE MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN A 55°F MIXED AIR TEMPERATURE.

VENTILATION:
THE AHU SHALL VENTILATE TO PROVIDE FRESH AIR AS FOLLOWS:
- DEMAND CONTROLLED VENTILATION: CO_2 SENSORS SHALL MODULATE THE MIXED AIR TO MAINTAIN A SPACE CO_2 LEVEL OF LESS THAN 1100 PPM.
- MIXED AIR SHALL NOT MODULATE TO A CONCENTRATION OF OUTDOOR AIR THAT IS GREATER THAN NOTED ON THE AHU SCHEDULE ON M-601.
- MIXED AIR SHALL MODULATE CLOSED IN THE UNOCCUPIED MODE AND THE STANDBY MODE.

ALARMS & SAFETIES:
THE FOLLOWING ALARMS & SAFETIES SHALL BE PROVIDED:
- FREEZE PROTECTION - IF THE AIR TEMPERATURE ON THE SUPPLY SIDE OF THE HEATING COIL FALLS BELOW 45°F AN ALARM SHALL SIGNAL AFTER A 30 SECOND DELAY. IF THE TEMPERATURE CONTINUES TO FALL BELOW 38°F, THE AHU FANS SHALL SHUT DOWN, THE OUTDOOR AIR DAMPERS SHALL CLOSE, THE CIRCULATING PUMP SHALL BE ENERGIZED AND THE CONTROL VALVE ON THE HEATING COIL SHALL OPEN TO 100%. THE AHU WILL NEED TO BE RESET MANUALLY.
- AUTOMATIC SHUTDOWN / RESTART - WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTOR THE AHU FANS SHALL SHUT DOWN AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. EXHAUST FANS SERVING AREAS OF THE ALARMED AHU SYSTEM SHALL CONTINUE TO RUN. THE AHU WILL NEED TO BE RESET MANUALLY.
- STATIC PRESSURE CONTROL - THE SUPPLY FAN VFD SHALL NOT MODULATE TO CREATE A STATIC PRESSURE ABOVE 4 IN-WG; IF THE STATIC PRESSURE RISES ABOVE 4 IN-WG, THE VFD SHALL MODULATE DOWN AND AN ALARM SHALL TRIP.

HYDRONIC FIN TUBE/CONVECTOR SEQUENCE OF OPERATION
- HEATING HOT WATER VALVE SHALL OPEN TO MAINTAIN SPACE SET POINT TEMPERATURE OF 70F (ADJ) FROM REMOTE OR UNIT MOUNTED THERMOSTAT. IF MODULATING VALVE THE VALVE SHALL MODULATE FROM CLOSED TO FULLY OPEN TO MAINTAIN SPACE SET POINT TEMPERATURE.

HYDRONIC UNIT HEATER & CABINET UNIT HEATER SEQUENCE OF OPERATION
- UNIT HEATER FAN SHALL BE ENERGIZED ON A CALL FOR HEAT VIA REMOTE OR UNIT MOUNTED THERMOSTAT. THE FAN SPEED SHALL MODULATE TO MAINTAIN SPACE AIR TEMPERATURE OF 65F (ADJ). HEATING HOT WATER CONTROL VALVE SHALL MODULATE UPON ENERGIZING AND OPERATE TO MAINTAIN SPACE SET POINT TEMPERATURE AND CLOSE WHEN DE-ENERGIZED.

CONVECTOR SEQUENCE OF OPERATION
CORRIDOR CONVECTOR WINTER/SUMMER MODE SELECTION WILL BE THROUGH AN OUTDOOR AIR TEMPERATURE SCHEDULE IN THE BMS.

WINTER MODE
- A TWO-POSITION CONTROL VALVE LOCATED IN THE HHWR LINE WILL BE OPEN WHENEVER THE OUTDOOR AIR TEMPERATURE IS BELOW 50°F (ADJ)..
- A SELF CONTAINED CONTROL VALVE LOCATED IN THE STAIRWELL CONVECTOR CABINET WILL MODULATE IN RESPONSE TO A CALL FOR HEAT TO MAINTAIN 60°F (ADJ).
- A SELF CONTAINED CONTROL VALVE LOCATED IN THE CORRIDOR CONVECTOR CABINET WILL MODULATE IN RESPONSE TO A CALL FOR HEAT TO MAINTAIN 68°F (ADJ.).

SUMMER MODE
- A TWO-POSITION CONTROL VALVE LOCATED IN THE HHWR LINE WILL BE CLOSED WHENEVER THE OUTDOOR AIR TEMPERATURE IS ABOVE 55°F (ADJ)..

BMS INTERFACE
THE FOLLOWING PARAMETERS SHALL BE MONITORED AND CONTROLLED:
- CONTROL VALVE POSITION
- ON/OFF CONTROL

PACKAGED ROOFTOP UNIT (MULTIZONE VAV) – GAS HEAT & DX COOLING

A. **GENERAL REQUIREMENTS**:
1. PACKAGED UNIT WITH SELF-CONTAINED COMPRESSOR/CONDENSER AND DX COOLING COIL, 2-STAGE NATURAL GAS HEAT EXCHANGER, VARIABLE SPEED SUPPLY FAN AND POWER RELIEF FAN.
2. PACKAGED UNIT INCLUDES FACTORY INSTALLED CONTROLS AND PROGRAMMED MICROPROCESSOR WITH BACNET COMMUNICATIONS INTERFACE FOR BAS MONITORING AND CONTROL. ALL UNIT CONTROL POINTS, SET POINTS, STATUS AND ALARMS SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
3. PACKAGED RTU OPERATES IN A MULTIZONE VAV CONFIGURATION SERVING MULTIPLE VAV AIR TERMINAL UNITS. POWERED RELIEF FAN SHALL ENERGIZE WHENEVER THE RTU OUTSIDE AIR DAMPER OPENS ABOVE MINIMUM POSITION AND EXHAUST FAN (EF-1) IS OPERATING AT MAXIMUM SPEED. EF-1 IS A VARIABLE SPEED FAN THAT MODULATES TO MAINTAIN THE SPACE DIFFERENTIAL PRESSURE.

B. **UNOCCUPIED MODE**:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE RTU SHALL DISABLE THE HEAT EXCHANGER, STOP WITH RELIEF AND SUPPLY FANS, AND CLOSE THE OUTSIDE AIR DAMPER.
2. IF ANY ONE OF THE VAV AIR TERMINAL UNITS ARE UNABLE TO MAINTAIN THEIR UNOCCUPIED SPACE SETPOINT TEMPERATURES, THE RTU SHALL OPERATE AS NEEDED WITH THE OUTSIDE AIR DAMPER IN THE CLOSED POSITION.
3. IF ANY ONE OF THE VAV AIR TERMINAL UNITS ENTER INTO A TEMPORARY UNOCCUPIED-TO-OCCUPIED MODE, THE RTU SHALL OPERATE AS NEEDED FOR A LIMITED DURATION.

C. **OCCUPIED MODE**:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, THE RTU SHALL MODULATE THE SUPPLY AIR FAN TO MAINTAIN THE DISCHARGE STATIC PRESSURE SETPOINT OF 1.0 " W.C. (ADJ), OPEN THE OUTSIDE AIR DAMPER TO MINIMUM POSITION (TO ACHIEVE THE MINIMUM OUTDOOR VENTILATION AIRFLOW).
   - DISCHARGE STATIC PRESSURE SETPOINT IS ESTABLISHED DURING FINAL SYSTEM AIR BALANCING.

D. **COOLING MODE: (IF PRESENT)** 2A2
1. THE RTU OPERATES IN COOLING MODE WHENEVER THE OUTSIDE AIR TEMPERATURE IS ABOVE 5 0°F (ADJ). THE DX COIL, COMPRESSORS AND CONDENSERS MODULATE TO MAINTAIN A DISCHARGE AIR TEMPERATURE OF 55°F.
2. CRITICAL ZONE DAT RESET : IF THE RETURN AIR RELATIVE HUMIDITY IS BELOW 60%RH AND ALL OF THE VAV AIR TERMINAL UNITS ARE OPERATING BELOW THEIR MAXIMUM DESIGN AIRFLOW, THE RTU SHALL INCREASE THE DISCHARGE AIR TEMPERATURE SETPOINT UP TO 60°F, IN 1°F INCREMENTS. IF ANY VAV AIR TERMINAL UNIT CANNOT MAINTAIN ITS SPACE TEMPERATURE SETPOINT, THE DAT SHALL RESET BACK TO 55°F

E. **ECONOMIZER MODE (FREE COOLING)** :
1. WHEN THE OUTSIDE AIR TEMPERATURE IS LESS THAN 65°F (ADJ) AND THE OUTSIDE AIR ENTHALPY IS LESS THAN THE SPACE ENTHALPY, THE OUTSIDE AIR DAMPER AND RETURN AIR DAMPER SHALL MODULATE IN SEQUENCE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT.
   - DURING ECONOMIZER MODE, THE RTU RELIEF FAN SHALL NOT BE ENERGIZED UNTIL EXHAUST FAN (EF-1) IS OPERATING AND MAXIMUM SPEED.
2. THE DX COOLING SHALL REMAIN DISABLED UNTIL THE OUTSIDE AIR DAMPER REACHES THE 100% OPEN POSITION AND THE DISCHARGE AIR TEMPERATURE IS STILL ABOVE SETPOINT.

F. **VENTILATION:**
THE AHU SHALL VENTILATE TO PROVIDE FRESH AIR AS FOLLOWS:
- DEMAND CONTROLLED VENTILATION: CO_2 SENSORS SHALL MODULATE THE MIXED AIR TO MAINTAIN A SPACE CO_2 LEVEL OF LESS THAN 1100 PPM.
- MIXED AIR SHALL NOT MODULATE TO A CONCENTRATION OF OUTDOOR AIR THAT IS GREATER THAN NOTED ON THE AHU SCHEDULE ON M-601.
- MIXED AIR SHALL MODULATE CLOSED IN THE UNOCCUPIED MODE AND THE STANDBY MODE.

G. HEATING MODE:
1. THE RTU OPERATES IN HEATING MODE WHENEVER THE FOLLOWING CONDITIONS EXIST:
   - OUTSIDE AIR TEMPERATURE IS BELOW 5 0°F (ADJ).
   - DISCHARGE AIR TEMPERATURE IS BELOW SETPOINT.
   - ANY ONE OF THE VAV AIR TERMINAL UNITS ARE UNABLE TO MAINTAIN THEIR SPACE HEATING SETPOINT TEMPERATURE.
2. ONCE THE ABOVE CONDITIONS EXIST, THE RTU SHALL ENABLE THE 1 ST STAGE OF THE GAS HEAT EXCHANGER. THE 2 ND STAGE GAS HEAT SHALL BE ENABLE AFTER 30 MINUTES IF NEEDED. ONCE ALL VAV AIR TERMINAL UNITS HAVE ACHIEVE THEIR SPACE HEATING SETPOINT, THE RTU SHALL DISABLE THE GAS HEAT EXCHANGER.

H. **ALARMS & SAFETIES**:
1. IF THE DISCHARGE AIR TEMPERTURE DROPS BELOW 45°F FOR LONGER THAN 5 MINUTES (ADJ), A LOW TEMPERATURE NOTIFICATION SHALL BE GENERATED AT THE BAS.
2. IF THE DISCHARGE AIR TEMPERTURE DROPS BELOW 38°F, A FREEZE PROTECTION ALARM WILL BE GENERATED AT THE BAS, AND THE FOLLOWING ACTIONS SHALL OCCUR:
3. OUTSIDE AIR DAMPER SHALL CLOSE
4. SUPPLY FAN SHALL STOP (AND RELIEF FAN SHALL STOP IF APPLICABLE)

3. IF THE DISCHARGE AIR TEMPERTURE EXCEEDS 125°F FOR LONGER THAN 2 MINUTES (ADJ), A HIGH TEMPERATURE ALARM SHALL BE GENERATED AT THE BAS AND HE RTU SHALL DISABLE THE GAS HEAT EXCHANGER.
4. IF THE CONDENSATE OVERFLOW SWITCH DETECTS AN OVERFLOW CONDITION, A CONDENSATE ALARM SHALL BE GENERATED AT THE BAS AND THE RTU SHALL DISABLE THE DX COOLING.
5. IF THE DUCT STATIC PRESSURE EXCEEDS 3.0 " W.C., A HIGH PRESSURE ALARM SHALL BE GENERATED AT THE BAS, THE SUPPLY FAN SHALL BE DISABLED, AND THE OUTSODE AIR DAMPER SHALL CLOSE.

[END OF SEQUENCE]

HOT WATER SYSTEM SEQUENCE OF OPERATION - PRIMARY/SECONDARY LOOP

BOILER SYSTEM - RUN CONDITIONS:
THE BOILER SYSTEM SHALL BE ENABLED TO RUN WHENEVER OUTSIDE AIR TEMPERATURE IS LESS THAN 65° F (ADJ.). TO PREVENT SHORT CYCLING, EACH BOILER SHALL RUN FOR AND BE OFF FOR MINIMUM ADJUSTABLE TIMES (BOTH USER DEFINABLE), UNLESS SHUTDOWN ON SAFETIES OR OUTSIDE AIR CONDITIONS. EACH BOILER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS. THE BOILER SYSTEM SHALL ALSO RUN FOR FREEZE PROTECTION WHENEVER THE OUTSIDE AIR TEMPERATURE IS LESS THAN 38°F (ADJ.).

BOILER SAFETIES:
THE FOLLOWING SAFETIES SHALL BE MONITORED:
- BOILER ALARM.
- LOW WATER LEVEL.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- BOILER ALARM.
- LOW WATER LEVEL ALARM.

HOT WATER PUMP LEAD/LAG OPERATION :
THE ZONE HOT WATER PUMPS SHALL OPERATE IN A LEAD/LAG FASHION. THERE ARE TWO ZONES WITH TWO PUMPS IN THE BUILDING.
- THE LEAD PUMP SHALL RUN FIRST.
- ON FAILURE OF THE LEAD PUMP, THE LAG PUMP SHALL RUN AND THE LEAD PUMP SHALL TURN OFF.
- ON DECREASING HOT WATER DIFFERENTIAL PRESSURE, THE LAG PUMP SHALL STAGE ON AND RUN IN UNISON WITH THE LEAD PUMP TO MAINTAIN HOT WATER DIFFERENTIAL PRESSURE SETPOINT.

THE DESIGNATED LEAD PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):
- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
- VFD FAULT.

HOT WATER DIFFERENTIAL PRESSURE CONTROL:
THE CONTROLLER SHALL MEASURE HOT WATER DIFFERENTIAL PRESSURE AND MODULATE THE HOT WATER PUMP VFDS IN SEQUENCE TO MAINTAIN ITS HOT WATER DIFFERENTIAL PRESSURE SETPOINT.
THE FOLLOWING SETPOINTS ARE RECOMMENDED VALUES. ALL SETPOINTS SHALL BE FIELD ADJUSTED DURING THE COMMISSIONING PERIOD TO MEET THE REQUIREMENTS OF ACTUAL FIELD CONDITIONS.
THE CONTROLLER SHALL MODULATE HOT WATER PUMP SPEEDS TO MAINTAIN A HOT WATER DIFFERENTIAL PRESSURE OF 12 LBF/IN2 (ADJ.). THE VFDS MINIMUM SPEED SHALL NOT DROP BELOW 20% (ADJ.).
ON DROPPING HOT WATER DIFFERENTIAL PRESSURE, THE VFDS SHALL STAGE ON AND RUN TO MAINTAIN SETPOINT AS FOLLOWS:
- THE CONTROLLER SHALL MODULATE THE LEAD VFD TO MAINTAIN SETPOINT.
- IF THE LEAD VFD SPEED IS GREATER THAN A SETPOINT OF 90% (ADJ.), THE LAG VFD SHALL STAGE ON.
- THE LAG VFD SHALL RAMP UP TO MATCH THE LEAD VFD SPEED AND THEN RUN IN UNISON WITH THE LEAD VFD TO MAINTAIN SETPOINT.

ON RISING HOT WATER DIFFERENTIAL PRESSURE, THE VFDS SHALL STAGE OFF AS FOLLOWS:
- IF THE VFDS SPEEDS DROPS BACK TO 60% (ADJ.) BELOW SETPOINT, THE LAG VFD SHALL STAGE OFF.
- THE LEAD VFD SHALL CONTINUE TO RUN TO MAINTAIN SETPOINT.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH HOT WATER DIFFERENTIAL PRESSURE: IF 25% (ADJ.) GREATER THAN SETPOINT.
- LOW HOT WATER DIFFERENTIAL PRESSURE: IF 25% (ADJ.) LESS THAN SETPOINT.

BOILER PUMPS:
THE BOILER PUMP(S) SHALL RUN ANYTIME THE BOILER(S) ARE CALLED TO RUN AND SHALL HAVE A USER DEFINABLE DELAY (ADJ.) ON STOP.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
- BOILER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- BOILER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- BOILER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER-DEFINABLE LIMIT.

BOILER LEAD/STANDBY OPERATION:
THE BOILERS SHALL CYCLE ON IN A LEAD/LAG FASHION WHEN CALLED TO RUN AND FLOW IS PROVEN.
- THE LEAD BOILER SHALL RUN FIRST.
- ON FAILURE OF THE LEAD BOILER, THE LAG BOILER(S) SHALL RUN AND THE LEAD BOILER SHALL TURN OFF.
- AS HOT WATER TEMPERATURE DROPS BELOW A SETPOINT OF 150°F (ADJ.), THE LAG BOILER(S) SHALL STAGE ON AND RUN IN UNISON WITH THE LEAD BOILER TO MAINTAIN HOT WATER TEMPERATURE SETPOINT.
- AS HOT WATER TEMPERATURE RISES BACK TO 20°F ABOVE SETPOINT, THE LAG BOILER(S) SHALL STAGE OFF.

THE DESIGNATED LEAD BOILER SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS: (USER SELECTABLE):
- MANUALLY THROUGH A SOFTWARE SWITCH
- IF BOILER RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- FAILURE: COMMANDED ON BUT THE STATUS IS OFF.
- RUNNING IN HAND: COMMANDED OFF BUT THE STATUS IS ON.
- RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
- LEAD BOILER FAILURE: THE LEAD BOILER IS IN FAILURE AND THE STANDBY BOILER IS ON.

HOT WATER SUPPLY TEMPERATURE SETPOINT RESET:
THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET BASED ON OUTSIDE AIR TEMPERATURE. AS OUTSIDE AIR TEMPERATURE RISES FROM 0°F (ADJ.) TO 70°F (ADJ. THE HOT WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET DOWNWARDS BY SUBTRACTING FROM 0°F (ADJ.) TO 20°F (ADJ.) FROM THE CURRENT BOILER SETPOINT.

PRIMARY HOT WATER TEMPERATURE MONITORING:
THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- PRIMARY HOT WATER SUPPLY.
- PRIMARY HOT WATER RETURN.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH PRIMARY HOT WATER SUPPLY TEMP: IF GREATER THAN 200°F (ADJ.).
- LOW PRIMARY HOT WATER SUPPLY TEMP: IF LESS THAN 100°F (ADJ.).

BOILER HOT WATER TEMPERATURE MONITORING:
THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- BOILER HOT WATER SUPPLY.
- BOILER HOT WATER RETURN.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH HOT WATER SUPPLY TEMP: IF GREATER THAN 200°F (ADJ.).

LOW HOT WATER SUPPLY TEMP: IF LESS THAN 100°F (ADJ.).

2A2

UNIT VENTILATOR WITH OA & HW SEQUENCE OF OPERATION

UNIT VENTILATOR OCCUPIED/UNOCCUPIED MODE SELECTION WILL BE THROUGH A TIME SCHEDULE IN THE BMS.

OCCUPIED MODE
- THE SUPPLY FAN WILL RUN CONTINUOUSLY AND THE OUTDOOR AIR DAMPER WILL BE OPEN TO MINIMUM POSITION.
- EXHAUST FAN (WHERE PRESENT) SHALL BE INTERLOCKED WITH ITS ASSOCIATED UNIT VENTILATOR AND WILL BE ENERGIZED WHENEVER THE UNIT VENTILATOR OUTDOOR AIR DAMPER POSITION EXCEEDS 50% OPEN.
- UPON A CALL FOR HEATING THE CONTROL VALVE WILL MODULATE AS REQUIRED TO MAINTAIN THE SPACE HEATING SETPOINT OF 68°F (ADJ.). THE ASSOCIATED FIN TUBE VALVE (WHERE PRESENT) SHALL MODULATE WITH THE HEATING COIL CONTROL VALVE UPON A CALL FOR HEATING. 2A2

UNOCCUPIED MODE
- THE SUPPLY FAN WILL BE OFF AND CYCLE ON IN RESPONSE TO A CALL FOR HEATING. THE OUTDOOR AIR DAMPER WILL REMAIN CLOSED AND THE ASSOCIATED EXHAUST FAN WILL BE OFF. THE SUPPLY FAN SHALL CYCLE OFF ONCE THE UNOCCUPIED SETPOINT OF 60°F (ADJ.) FOR HEATING.
- THE CONTROL VALVE SHALL BE 100% OPEN TO THE COIL DURING A CALL FOR HEATING.
- WHEN THERE IS NO CALL FOR HEATING THE CONTROL VALVE SHALL REMAIN CLOSED.
- WHENEVER THE OA TEMPERATURE IS BELOW 45°F (ADJ), THE HEATING COIL CONTROL VALVE SHALL MODULATE TO MAINTAIN 65°F COIL DISCHARGE AIR INDEPENDENT OF A CALL FOR HEATING TO PROVIDE COIL FREEZE PROTECTION.

VENTILATION:
THE UV SHALL VENTILATE TO PROVIDE FRESH AIR AS FOLLOWS:
- DEMAND CONTROLLED VENTILATION: CO_2 SENSORS SHALL MODULATE THE MIXED AIR TO MAINTAIN A SPACE CO_2 LEVEL OF LESS THAN 1100 PPM.
- MIXED AIR SHALL NOT MODULATE TO A CONCENTRATION OF OUTDOOR AIR THAT IS GREATER THAN NOTED ON THE SCHEDULE ON M-601.
- MIXED AIR SHALL MODULATE CLOSED IN THE UNOCCUPIED MODE AND THE STANDBY MODE.

LOCAL OVERRIDES
- AN OCCUPANT-ACCESSIBLE CONTROL FEATURE WILL ALLOW SETPOINT ADJUSTMENT BY A FACTOR OF +/- 3°F (ADJ.).

BMS INTERFACE
THE FOLLOWING PARAMETERS SHALL BE MONITORED AND CONTROLLED:
- UNIT VENT FAN ON/OFF
- UNIT VENT OA DAMPER POSITION
- CO2 SENSOR LEVEL
- UNIT VENT HEATING COIL CONTROL VALVE POSITION
- UNIT VENT DISCHARGE AIR TEMPERATURE
- SPACE TEMPERATURE

THE FOLLOWING PARAMETERS SHALL BE ALARMED:
- UNIT VENT FAN OFF WHEN COMMANDED ON
- UNIT VENT DISCHARGE AIR TEMPERATURE BELOW 40F (ADJ)

SAFETIES
- A HARDWIRED LOW TEMPERATURE SENSOR WILL DE-ENERGIZE THE FAN, OPEN THE HOT WATER VALVE, CLOSE THE OUTDOOR AIR DAMPER, AND DISPLAY AN ALARM AT THE CENTRAL BMS WHENEVER UNIT VENTILATOR DISCHARGE AIR TEMPERATURE FALLS BELOW 36°F (ADJ).

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2A2	ADDENDUM 2	12NOV2025

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