Addendum 03

DOCUMENT 00 9100

DATE: December 30, 2025

PROJECT: Fort Loramie Local Schools Athletic Complex Building & Associated Improvements
600 East Park Street
Fort Loramie, Ohio 45845

PROJECT #: 25041.00

OWNER: Fort Loramie Local School Board of Education
575 Greenback Road
Fort Loramie, Ohio 45845

ARCHITECT: Garmann Miller
38 South Lincoln Drive
P.O. Box 71
Minster, Ohio 45865

TO: Prospective Bidders

This addendum form is a part of the Contract Documents and modifies the Bidding Documents dated December 11, 2025 with amendments and additions noted below.

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

This addendum consists of 3 page addendum, 8 pages of exhibits, 4 specification sections and 13 drawing sheets

FOR INFORMATION ONLY

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CHANGES TO THE PROJECT MANUAL

1. 07 54 19 PVC Thermoplastic Single Ply Roofing - 2.01 Manufacturers – add Holcim Elevate as an acceptable manufacturer
2. 09 62 53 Synthetic Turf Flooring – 2.01 Manufacturers – Add Field Turf as an acceptable manufacturer.
   a. Sand is an approved option in lieu of envirofill
   b. Hockey gold is an approved equal for the mezzanine turf.
3. 13 34 19 Pre Engineered Metal Building
   a. Reissued in its entirety to pick up comments from prebid RFI.
4. 23 09 13 Instruments and Control Elements – reissued in its entirety
   a. Remove reference to Alternate #8
   b. Add MSD – Mechanical Services and Design as prequalified contractor
5. 28 31 01 Fire Alarm - Detection System – 1.02 Summary – remove the verbiage 'with emergency communication system'.
6. 22 30 00 Plumbing Equipment – 2.03 Automatic Water Softener – School C. Performance and Design Data – Design based on Culligan HE 1.5 Single Tank System. 4. Design Parameters - adjusted to match single tank system.

CHANGES TO THE DRAWINGS

Locker Room Building

1. Sheet A5.1 – Roof Plan:
   a. Change details to show existing roof as asphalt shingles.

Elementary School Building

1. Sheet E3.1 – Electrical Plan – Unit A:
   a. Provide two fire alarm notification devices compatible with the existing fire alarm system.

Athletic Complex

1. Sheet A1.1 – First Floor Plan:
   a. Change exterior FRP doors to thermally broken aluminum storefront – SFE9. Storefront to be black anodized to match other storefronts.
2. Sheet A2.1 – Exterior Elevations:
   a. Change exterior FRP doors to thermally broken aluminum storefront – SFE9. Storefront to be black anodized to match other storefronts.
   b. Revised storefront tag on ribbon windows to be SFE8
3. Sheet A4.3 – Section Details:
   a. Revise Detail 9 to show metal stud infill at drywall locations.
4. Sheet A5.1 – Roof Plan
   a. Revised details 6 and 7 and added keynotes to detail 11
5. Sheet A6.1 – Door Schedule and Details:
   a. Change exterior FRP doors to thermally broken aluminum storefront – SFE9. Storefront to be black anodized to match other storefronts.
   b. Revise exterior door jamb and head details to reflect 6" aluminum frame.

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6. Sheet A6.2 – Storefront and Door Details
    a. Add SFE 9 to Storefront Elevations
    b. Revise SFE7 to have EG-1 type glazing

7. Sheet P1.2 – Site Plumbing Plan:
    a. Added Keynote #3 – "CENTERPOINT ENERGY SHALL MAKE NEW CONNECTION ON EAST SIDE OF SR 705 AND EXTEND MAIN PIPING IN THE APPROXIMATE LOCATION SHOWN. MAIN PIPING SHALL BE ROUTED IN 2" PVC CONDUIT UNDER THE ASPHALT AND CONNECTED TO THE NEW GAS METER LOCATION SHOWN. COORDINATE ALL WORK WITH CENTERPOINT AND THE GENERAL CONTRACTOR."
8. Sheet P5.1 – Plumbing Schedule:
    a. Change Incoming Water Main Detail to match sizes in Detail 2 on Sheet P4.1 – Enlarged Plumbing Plan.
9. Sheet M6.1 – Overall Temperature Control Plan:
    a. Modify Keynote #3 to remove reference to Alternate Bid #8.
10. Sheet E1.2 – Electrical Details
    a. Add detail 12 – Concrete Pole Base
11. Sheet E2.1 – Site Electrical Plan
    a. Hide mechanical controls

ATTACHMENTS

The following attachments are included and are part of this addendum:

Specification Sections: 13 34 19, 22 30 00, 23 09 13, 28 31 01

Drawing Sheets:

Locker Room Building – A5.1

Elementary School Building – E3.1

Athletic Complex – A1.1, A2.1, A4.3, A5.1, A6.1, A6.2, P1.2, P5.1, M6.1, E1.2, E2.1

END OF ADDENDUM

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Fort Loramie Pre-Bid RFIs

This document is a running list of Pre-Bid RFI questions. Yellow highlight indicates a received question that does not have a response yet. These items will be addressed in forthcoming addendums.

ADDENDUM 01

N/A

ADDENDUM 02

Reference Previous Addendum

ADDENDUM 03

1. Where does CB #11 drain to?
    a. **Response: CB #11 drains to the north and this eventually drains NW towards Osgood Bank.**

2. I was speaking with my Fire Alarm Designer this morning and noticed that in the specs it calls for emergency communication system and the drawings/code criteria call for horn strobes. Just wanted to clarify which system we should propose.
    a. **Response: Devices need to be Horn/Strobe. Specs to remove "with emergency communication system**

3. Can you please ask your structural guys if the PEMB needs to support the 10 ft masonry walls around the perimeter? Or are they self-supporting. We should put in some loading into the metal building if the wall needs support.
    a. **Response: The perimeter masonry wall is to be self standing. No additional PEMB loading required to support the masonry.**

4. Water main detail 1/P5.1 indicates a 3" meter metting, a 3" backflow preventer, and 3" main piping. The enlarged mechanical room detail 2/P4.1 indicates 2" piping. The plumbing schedule on P5.1 specifies a 1 1/2" backflow preventer. Which is correct?
    a. **Response: The water main detail has been updated to match the enlarged mechanical room detail 2/P4.1: 2" meter set, 1-1/2" backflow preventer, and 2" main piping.**

5. Is a softener system necessary since the City of Fort Loramie already has a softener system?
    a. **Response: The water softener is only for the hot water system. The water softener specifications have been updated in Addendum #3 to be a single tank model as shown on the schedule.**

6. For the defibrillator cabinets, are we able to proceed with the specs or does the school district coordinate that specifically?
    a. **Response: Defibrillator cabinet and defibrillator to provided by contractor per the specifications.**

7. Detail 2/P4.1 shows a new natural gas meter assembly in the mechanical yard. A similar design using a second meter was recently used on the South YMCA addition in Minster. CenterPoint refused to install a second meter unless it was a separate address. After much time involved the gas delivery for that project ultimately required redesign to come after the existing meter. Please confirm the proposed gas meter is not a second meter at the same address. If so, please confirm CenterPoint is aware of the proposed design to have two meters at the same address and they will install accordingly without issue.
    a. **Response: We have an email chain with Brian Volpatti confirming the addition of a new meter to the new Athletic Building without needing a new address.**

8. Regarding Alternate 08 Controls:
    - The base bid is for a stand-alone system, with an alternate to integrate the new system into the existing controls.
    - The specifications reference an existing JCI Facility Explorer BAS system; however, the current system appears to be an obsolete Trane Tracer Summit system.

      Should we assume that the existing system will be upgraded to Facility Explorer prior to project completion?
    a. **Response: Addendum #03 will remove alternate #08 in its entirety.**

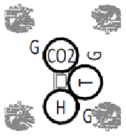
9. For the locker room renovation, detail 4/A1.1 calls for existing construction (roof) to remain. Details on A5.1 show a standing seam metal roof. It is assumed in the drawings the existing roof is metal, but the existing roof is asphalt shingle. Is the existing asphalt shingle roof to be replaced with a metal standing seam roof? If not, it is recommended the drawings be updated so roofing contractors, suppliers, and other bidders are bidding correctly.
    a. **Response: Existing Asphalt Shingle roof to remain. Drawing set to be updated to reflect asphalt shingles.**

10. Alternate 08 – Can anyone tie the controls into the existing computer system?
    a. **Response: No, Addendum #03 will remove alternate #08 in its entirety.**

11. Regarding the door schedule, the FRP doors are called out to have hollow metal frames, which is not typical according to our door supplier. Typically, FRP doors come with aluminum frames. Please advise
    a. **Response: Interior frames to be hollow metal. Exterior FRP frames to be thermally broken Black Anodized Aluminum.**

12. Are there a pole base detail for this project? I have been unable to locate on the drawings.
    a. **Response: Addendum #03 will have a pole base detail on sheet E1.2.**

13. Would you advise to the symbol below, it is located on the e2.1 site electrical plan and I am not sure what it representing.



    a. **Response: On addendum #03, mechanical control devices have been hidden on sheet E2.1.**

14. With regard to PEMB - Spec, Code, and Load;
    a. Is the Roof Live Load Tributary Area Reduction allowed? Y/N ?
        i. **Response: Yes, Live load reduction is allowed**
    b. Flat Roof Snow Load is listed in the code notes - does that apply to the PEMB or only the conventional building portion of the project? **Response: The flat roof snow load is applicable to all portions of the project**
        i. We've observed this applied to the job in general in the past, right or wrong.
    c. Snow drifting says as indicated on plans - do you have any special offset drifts with the snow rail - see also snow guard questions below. **Response: The only snow drifting is from the PEMB to the conventional low roof. We are not aware of any requirements for snow drift at guards/rails**
    d. Seismic loads- Specs on S0.1 call for Sds of 18.0%, Sd1 of 11.0% is that correct? **Response: Yes, we were granted a exception from the building department to use ASCE 7-22 for the seismic design of the project.**
        i. Specs on S0.1 call for Sms of 27.0%, Sm1 16.0%? **Response: Yes**
        ii. ASCE Hazard Tool shows Sms 30.2%, Sm1 of 7.8% for the exact jobsite address.
        iii. Long Period Transition noted as TL = 12 seconds per ASCE Hazard tool
            1. None noted on the Seismic Loads of S0.1, please clarify that 12 sec is correct or another duration? **Response: TL=12 is correct**
    e. Deflection Criteria at 2.03, 9, d. Roof Panels L/180 is pretty stiff relative to the manufacturer's standard of L/1. **Response: Please use the specified deflection of L/180**

15. With regard to PEMB - Primary and Secondary Framing
    a. Support of the masonry wall is assumed to be masonry self-supporting (No Spandrel Channel nor beam at 10'-0 elevation)? **Response: Correct**
        i. Also assuming zero positive attachment of masonry to the steel building in terms of Seismic or wind loads of any kind? **Response: Correct**
        ii. Zero seismic load from the mezzanine construction passing into the steel PEMB, correct? **Response: Correct**
        iii. Partition loading for the wall on the North side of the Mezzanine – horizontal load for interior wind noted as 5 PSF.
            1. This is per the "Special Loads" chart on S0.1. Historically, this interior partition wind load has been higher? Just checking if 5psf is correct for that? **5 PSF (ASD) is correct for lateral loads on interior partitions.**
        iv. Partition loading for the short section of wall above the masonry on the east side - see also girts question below.

16. With regard to PEMB - Girts and Purlins
    a. GIRTS.
        i. We would like to input the columns with a 9in setback relative to the 8in girt depth for multiple reasons
            1. Is it okay to do this in general and have a 1in gap between the PEMB columns and the interior of the masonry perimeter walls?
            2. Can we eliminate the 'notch' in the masonry wall as detailed on 13/A1.3? **Response: This is acceptable, however, the columns may not protrude off of the wall more than 2'-1" including the 1" gap. PEMB manufacturer to determine if 1" space is sufficient for building movement. If more than 1" is required, notches in wall are required. Finish underside of exposed girt with trim to match metal panel.**
        ii. Detail 9/A4.3 shows drywall attaching directly to girt framing - this isn't going to work.
            1. Incorporate studs and furring into that detail and all the way down to the 10ft elevation above the masonry wall. **Response: Studs to infill at all locations where drywall goes over PEMB. Detail 9/A4.3 has been revised.**
            2. Assuming for 5lbs dead load for that wall between 10ft and 17ft elevations for this studs and drywall?
                a. What is the designed interior partition wind loading for this same partition? **Response: 5 PSF (ASD) is correct for lateral loads on interior partitions**
                b. Is the masonry wall taking the lower half of the 7ft stud wall condition in terms of dead and interior wind-load? **Response: Yes**
    b. PURLINS
        i. Demand for 10in purlins size noted, please confirm that is the required size or can this be by PEMB? **Response: Size to be determined by PEMB. Select the most economical option for the proposed spacing and loads.**

17. With regard to PEMB - Bracing
    a. X-Bracing is shown in only 1 bay of the low sidewall and 1 bay of the high sidewall
        i. After preliminary review, our supplier is demanding bracing in (at least) 2 bays of the low and high sides.
        ii. Is the 2nd from each end okay location for both sidewalls? **Response: Bracing to be located between column lines 1 & 2 and 7 & 8**
        iii. Assuming NO x-bracing is allowed on the end-walls. If so, this should be noted on the plans. **Response: No X-Bracing in the end walls.**
        iv. Is double-stacking the X-bracing in the narrow 20'-0 bay acceptable?
            1. May require a pipe strut midway up to translate the braced load to each frame at lines 7 and 8. **Response: This is acceptable**

18. With regard to PEMB - Insulation
    a. Base Bid for Walls - specification discrepancy - please clarify:
        i. DIV 13 Spec 2.03, I, 2. Wall Insulation - "R24 or Greater?" or does paragraph 2.08 supersede this? **Response: 2.08 Supersedes this. Base bid to be the double layer ES systems noted in section 2.08.**

ii. DIV 13 Spec 2.08, A, 3. Wall Insulation - R25 + R10, U0.47 cavity fill Energy Saver Double Layer
iii. 3/A4.3 - wall assembly - Wall Insulation - says R 28.06?
1. This same wall assembly section calls for an INTERIOR and EXTERIOR AIR FILM - is that legitimate at all? **Response: When doing whole wall assembly R-Value calculations you include the interior and exterior air film.**

b. Base Bid for Roof - specification discrepancy - please clarify:
i. DIV 13 Spec 2.03, I, 1. Roof Insulation - "R36 or Greater?" or does DIV 13, 2.08 supersede this? **Response: 2.08 Supersedes this.**
ii. DIV 13 Spec 2.08, A,4. Roof Insulation - "R-Seal Rigid: U-.031 - charted that is approx. R-30) - Which R Value is okay? **Response: Thickness is dependent on manufacturer. Code minimums required – R30 min.**

c. Spec 07-21-16 Blanket Insulation
i. Acoustic Batts - does this relate to the pre-engineered metal building in any way? **Response: This insulation is used as acoustical batt insulation in the stacked wall assemblies in the conventional framed areas.**
1. Considering the acoustical batts behind the perforated liners - is that not energy saver fabric and cavity fill fiberglass? **Response: ES saver fabric and cavity fill fiberglass is to be used on the PEMB building.**
2. Spec is written toward both mineral wool and fiberglass both - where do these each apply on this project? **Response: As indicated in the conventional framed area.**

19. With regard to PEMB - Trims
a. DIV 13 Spec 2.10, B and C - Gutter and Flashing Trims - .022 (.56mm) reads as 24 Gage
i. 24 Gage is slightly heavier than the industry standard 26 Gage - This is okay, just asking if that was intentional? **Response: 26 Gauge is acceptable**
ii. Spec 2.10,e. 1 states Gutters of 26 Gage sheet steel - is that right or supersede above? **Response: 26 Gauge is acceptable**

b. DIV 13 Spec 2.10, D, 1. - Downspout mounting Straps spec discrepancy
i. Spec says 5ft spacing and Gage thickness to match the material and finish of the gutter, 24 Gage? **Response: This is acceptable. 26 gauge is acceptable**
ii. Drawing page section 7/A5.1 calls for a heavier 3/16 thick strap where mounting to the masonry - does this supersede? **Response: Detail to be revised**
1. Assuming the heavy downspout strap applies for the masonry—does not specify coating on the straps?
2. Assuming the matching gage downspout straps apply for the metal wall up high, is the manufacturer's standard gage okay?
iii. Gutter strainers for downspouts are not typical as listed at 2.10, C, 2.
1. Wire Ball bronze, copper, or aluminum strainer - are these desired or not? **Response: Not Required.**

iv. Expansion joints - 40 ft spacing as demand with 2.10, C, 3. - this is unusual for pre-engineered metal buildings
    1. Buildings have some built-in expansion capabilities that run for much larger distances than this spec.
    2. Is the manufacturer's spec for the gutter expansion joints acceptable? **Response: Manufacturer spec is acceptable.**

20. With regard to PEMB - Wall Panels
    a. Orientation of both the base bid, alternate, and interior liner panels is "ribs vertical", correct? **Response: Yes**
    b. For the Base Bid wall panel, do you list a maximum girt spacing for that 0.875 thickness of panel span? **Response: Manufacturer to determine girt spacing based on Allowable wind loads.**
    c. Interior Liner Panels:
        i. We see a discrepancy where the solid versus perforated panels are located for the interior, especially above and below the mezzanine.
            1. Solid style liner panel (non-perforated) noted at the East and West end of the Mezzanine - is that correct? **Response: Perforated panel at all locations where ES insulation with white fabric is located. On Interior liner panel walls, use solid panel.**
                a. Above?
                b. Below?
        ii. Perforated style noted at the North side of the Mezzanine - is that correct? **Response: Solid panel on both sides of the Full height mezzanine wall.**

21. With regard to PEMB - Roof Panels
    a. Base Bid Roof Panel - Metl-Span CFR
        i. Panel Width - Spec DIV 13, 2.06, A., 8. Lists 30in, 36in, and 42in width - which width of panel is desired?
        ii. Wider width is typically more economical, but the architectural appearance could be a factor in this decision? **Response: Manufacturer to select the most economical option for roof panels. Roof will not be visible from below.**
        iii. The wind uplift is another factor - if you want the PEMB to design the most economical balance of purlins spacing vs panel width? **Response: Yes**
    b. Alternate Roof Panel - Chief MVP
        i. Spec DIV 13 34 19- 2.05, A, Chief MVP - Panel Coverage Listed as 36in - that should be corrected to 16in width panels. **Response: Will be updated in Addendum.**
        ii. Modern coating specifications for MVP are now centered around PVDF and FEVE coatings:
            1. Are FEVE acceptable as an equal to PVDF/Kynar 500 and Hylar 5000? **Response: Yes**
            2. Is the color selected from the manufacturer's standard color line okay? No custom color upcharges? **Response: Yes**
    c. See insulation questions relative to the R-seal thickness and R-value spec.

22. With regard to PEMB - Snow Guards
    a. Roof Plan and Section Drawings 1/A4.1, 2/A4.1 show the line of guards in 1 single line along the low eave.
        i. Manufacturer recommendations are going to have multiple lines of snow guards on the roof for snow retention?
            1. We like the single line of bar with ice breakers at the low eave- would you accept that as the buyer's choice for override? **Response: Yes**
            2. Are the pre-engineered roof designs to be designed for certain snow retentions? **Response: Design intent to stop falling snow and ice from hitting the walkway below.**
        ii. As shown in section 1/A4.1 and 2/A4.1 the color band's bar faces uphill which is backwards from the usual downhill facing orientation? **Response: Manufacturer installation recommendations are acceptable.**
            1. Are you demanding that the color strip be supplied and installed in the bar, or just the mill-finished bar only? **Response: Mill finished bar is acceptable.**
            2. Are fully powder-coated snow guards acceptable? These would need to be specified as Bidders won't bid them as an alternate because they are typically a little more expensive, but have a much nicer aesthetic, as all snow guard components are colored rather than just the strip in the bar. **Response: Guards will not be visible from ground level. Utilize the most economical option**
    b. DIV 07 Spec 2.03 Snow Guards - nothing noted here? **Response: Snow guards to be supplied by Division 13 PEMB Manufacturer**
    c. DIV 13 Spec 2.10, G Snow Guard - this seems like the correct spec, superseding Div 07 stray note? **Response: Utilize div 13**

23. Are there any column constraints that must be followed.
    a. **Response: Yes, supermarket straight leg columns to extend to 14' AFF min. Columns may not protrude off of the masonry wall more than 2'-1".**

ADDENDUM 04

1. What are the weight or support requirements for the Gared Model Number 3107 basketball goals?
    a. **Response:**

2. What are the weight or support requirements for the Batting cages in the mezzanine
    a. **Response:**

3. Is there better detail for the buildout around the PEMB columns, Detail 13 on A1.3.
    a. **Response:**

4. On the drawings it shows 12 pendant speakers in the Athletic Complex but there is not specs or any other information/ equipment on these at all. Is this being provided by the school and needs cabling only or would you be able to find out the specs for these and what system they are being integrated with?
    a. **Response:**

5. Question regarding access control to tie into the existing system to get a quote for the proper readers and cards/fobs. Would you be able to find out what type and format the existing access control cards/fobs they are using and reader model? It mentions black readers for the entrances and event readers to be white.
    a. **Response:**

SECTION 13 34 19
PRE-ENGINEERED BUILDINGS

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes a rigid-frame type pre-engineered metal building of the nominal length, width, eave height, and roof pitch indicated. Mechanical equipment, Electrical equipment and piping loads and framing shall be included in the engineering load criteria.
   1. Exterior walls are covered with factory-finished wall panels attached to framing members.
   2. Interior metal liner system is required for roof and exterior walls.
   3. Roof system consists of the manufacturer's standard standing-seam painted roof, over insulation. Provide all roof penetration seals.
   4. Manufacturer's standard building structural components and accessories may be used, provided components, accessories, and complete structure conform to design indicated and specified requirements, including concrete masonry on the elevation.
   5. The intent of this specification section is to provide the manufacturer's standard metal panels that meet or exceed the specifications. In the event a manufacturer's standard panel specification does not comply, the manufacturer is to supply the closest comparable panel products in all aspects.

1.02 SECTION INCLUDES

A. Structural steel frame.

B. Complete roof covering system consisting of the exterior roof panels, panel attachments, sealants, mastics, trim and flashings as required.

C. Complete wall covering system consisting of the exterior wall panels, panel attachments, sealants, mastics, trim and flashings as required for a weathertight assembly.

D. Thermal Insulation

E. Foamed-insulation-core concealed fastener metal roof panels, with related metal trim and accessories.

F. Wall accessories, including:
   1. Louvers
   2. Wall openings trim

G. Roof Accessories, including:
   1. Gutters
   2. Pipe flashing
   3. Snow guard
   4. Downspout shoe
   5. Ventilators

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Foundations and anchor bolts.

B. Section 08 11 13 - Hollow Metal Doors and Frames

C. Section 08 36 13 - Sectional Doors

D. Section 09 90 00 - Paints and Coatings: Finish painting of structural members, doors, roof curbs, etc.

1.04 REFERENCES

1.05 DESIGN REQUIREMENTS

A. Design structural systems according to professionally recognized methods, standards, and building codes.

B. Design under supervision of professional engineer licensed in Ohio.

C. Design Loads:
   1. Refer to drawings for design loads
   2. Applicable Building Code: Ohio Basic Building Code.

D. Design wall and roof panel system to withstand specified loads with deflection of 240 of span at metal panel, maximum.

E. Anchor Bolts: Furnish design criteria for anchor bolts, to resist the loads induced by the design loads on the structure.

1.06 SUBMITTALS FOR REVIEW

A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
   1. Structural-steel-framing system. Contact Architect and Structural engineer to discuss main structural bay spacing design before issuing submittal.
   2. Metal roof panels.
   3. Metal wall panels.
   4. Metal liner panels.
   5. Insulation and vapor retarder facing
   6. Flashing and trim.
   7. Accessories.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.
   1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.
   2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
   3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory-and field-assembled work; show locations of exposed fasteners.
   4. Accessory Drawings: Include details of the following items, at a scale of not less than 11/2 inches per 12 inches:
      a. Flashing and trim.
      b. Gutters.
      c. Downspouts.
      d. Louvers.
      e. Roof Curbs.

C. Samples for Verification: For each type of exposed finish required, prepared Samples of sizes indicated below:

1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch-(150-mm-) square Samples.
4. Accessories: Nominal 12-inch-(300-mm-) long Samples for each type of accessory.

D. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer, Registered in the State of Ohio, responsible for their preparation.

1.07 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified erector, manufacturer, and professional engineer.

B. Welding certificates.

C. Metal Building System Certificates: For each type of metal building system, from manufacturer.
1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
   a. Name and location of Project.
   b. Order number.
   c. Name of manufacturer.
   d. Name of Contractor.
   e. Building dimensions including width, length, height, and roof slope.
   f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
   g. Governing building code and year of edition.
   h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
   i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
   j. Torque requirements for bolted connections.
   k. Building-Use Category: Indicate category of building use and its effect on load importance factors.
   l. AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.
   m. Design calculations.

D. Erector Certificates: For each product, from manufacturer, and signed by manufacturer certifying that the erector complies with requirements.

E. Manufacturer Certificates: For each product, from manufacturer, and signed by manufacturer certifying that products comply with requirements.

F. Material Test Reports: For each of the following products:
1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

H. Source quality-control reports.

I. Field quality-control reports.

J. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

K. Warranties: Sample of special warranties.

1.08 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

B. Metal Roofing Installation under Section 07 61 00 - Sheet Metal Roofing.
   1. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

1.09 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
   1. AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.
   2. Engineering responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this project and who is acceptable to manufacturer.
   1. Minimum of 5 years experience in this or similar trade
   2. Five similar installation references in past 3 years

C. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single manufacturer.

D. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code -Steel."
   2. AWS D1.3, "Structural Welding Code -Sheet Steel."

E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
   1. Domestic Steel Certificate: Certify compliance with Section 153.011 of the Ohio Revised Code.

F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

G. Fire-Resistance Ratings: Where indicated, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
   2. Combustion Characteristics: ASTM E136.

H. Pre-installation Conference: Conduct conference at Project Site. Contractor, Owner, and Architect of Record shall attend this conference.
   1. Review methods and procedures related to metal building systems including, but not limited to, the following:
      a. Condition of foundations and other preparatory work performed by other trades.
      b. Structural load limitations.
      c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
      d. Required tests, inspections, and certifications.
      e. Unfavorable weather and forecasted weather conditions.
   2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
      a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
      b. Structural limitations of purlins and rafters during and after roofing.
      c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
      d. Temporary protection requirements for metal roof panel assembly during and after installation.
      e. Roof observation and repair after metal roof panel installation.
   3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
      a. a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
      b. Structural limitations of girts and columns during and after wall panel installation.
      c. c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
      d. d. Temporary protection requirements for metal wall panel assembly during and after installation.
      e. Wall observation and repair after metal wall panel installation.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:
   1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
   2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.11 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Section 03 3000 - Cast-in-Place Concrete.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified elsewhere.

C. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

D. Coordinate ALL required loads and bracing for building equipment, including but not limited to: monorail hoists, bridge cranes, and mechanical equipment.

1.12 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents

C. Special Warranty on Metal Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period due to any cause.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Completion.

D. Special Weather tightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain watertight, including leaks, or otherwise fail to remain weather tight within specified warranty period, due to material or installation failure within the specified warranty period with a NO dollar limit.
   1. Warranty Period: 20 years from date of Completion.

1.13 ATTIC STOCK

A. Maintenance Stock: Pack, protect, and label all excess material and store on site as directed by the Design professional.
   1. Provide 2% excess Nuts, Bolts, Screws, Washers and other required fasteners for each metal building.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. American Steel Building Co., Inc.
   2. Butler Manufacturing Co
   3. Chief Buildings
   4. Kirby Building Systems
   5. Nucor Building Systems
   6. VarcoPruden Buildings

B. Substitutions: See Section 01 6000 Product Requirements

2.02 METAL BUILDING SYSTEMS

A. Description: Provide a complete, integrated set of metal building system manufacturer's standard mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
   1. Provide metal building system of size and with bay spacing, roof slopes, and spans as indicated in the construction document. Contact Architect and Structural engineer to coordinate main structural bay spacing design.

B. Primary-Frame Type:
   1. Rigid Frame: Solid-member, structural-framing system with or without interior columns as shown on the architectural design.

C. End-Wall Framing: Manufacturer's standard wind shear end walls. Future additions, consisting of load-bearing end-wall and corner columns and rafters not required.

D. Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior framed bypass girts.

E. Clear Height under Structure: As noted on drawings.

F. Roof Slope: As shown on Drawings.

G. Roof System: Reference specification 01 23 00 Alternates
   1. Base Bid - Manufacturer's concealed fastener 4" insulated metal roof panel equal to Metl-Span "CFR" panel, with kynar 500 painted finish.
   2. Alternate - Manufacturer's concealed fastener standing seam metal roof with 2" min rib height and pencil rib striations equal to Chief Building MVP panel on top of 4" R-seal system.

H. Exterior Wall System: Reference specification 01 23 00 Alternates
   1. Base Bid - Manufacturer's concealed fastener formed metal panel equal to Metl-Span "C-620" panel, with kynar 500 painted finish. 2 layer fiberglass batt insulation with fabric equal to Silvercote "ES R25 and R10 Double layer wall system"
   2. Alternate - Manufacturer's exposed fastener formed metal panel equal to Metl-Span "BR5-36" panel, with kynar 500 painted finish. 2 layer fiberglass batt insulation with fabric equal to Silvercote "ES R25 and R10 Double layer wall system"

2.03 METAL BUILDING SYSTEM PERFORMANCE

A. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
   1. Design Loads: As indicated on Drawings.
   2. Design Loads: As required by Ohio Building Code.
   3. Live Loads: Include vertical loads induced by the building occupancy indicated on Drawings. Include loads induced by maintenance workers, materials, and equipment for roof live loads.
      a. Building Occupancy: As indicated on Drawings.
   4. Roof Snow Loads: Include vertical loads induced by the weight of snow, as determined by Ohio Building Code. Allow for unbalanced and drift loads.
   5. Wind Loads: Include horizontal loads induced by a basic wind speed as required by Ohio Building Code
   6. Collateral Loads: Collateral loads include additional dead loads over and above the weight of the metal building system such as liner system, rigid roof insulation, lighting, sprinkler

systems and roof-mounted mechanical systems, make-up air units, canopies. Include not less than **5 LBF/SQ.FT** loading for collateral loading.

a. Structural Framing and Roof and Siding Panels: Design primary and secondary structural members and exterior covering materials for applicable loads and combinations of loads in accordance with the Metal Building Manufacturers Associations (MBMA) "Design Practices Manual" and the Ohio Building Code. Provide framing to support make-up air units, exhaust fans. Confirm loads with contractors for that work. Design connections to the pre-engineered structure for the masonry exterior walls. For smaller mechanical equipment items, respective mechanical trades Contractor to provide steel supports and connectors, but metal building supplier must provide connection details of hangers to the structure.
b. Contractors shall confirm weight and dimensions with manufacturer and coordinate final locations.

7. Auxiliary Loads: Include dynamic live loads, such as those generated by moving gymnasium equipment indicated on Drawings.
8. Load Combinations: Design metal building systems to withstand the most critical effects of load factors and load combinations as required by the Ohio Building Code
9. Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than the following:
   a. Primary framing members: L/180 for roof snow load.
   b. Purlins and Rafters: Vertical deflection of L/180 (under Live Load, Snow Load, or Wind Load) and L/120 under Dead Load plus Live Load.
   c. Girts: Horizontal deflection of L/120 at metal panel
   d. Metal Roof Panels: Vertical deflection L/180 of the span.
   e. Metal Wall Panels: Horizontal deflection of L/180 of the span at metal panel and L/480 at brick veneer.
   f. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
10. Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:
    a. Lateral Drift: Maximum of 1/300 of the building height.
11. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.

B. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to Ohio Building Code.

C. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

E. Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E 283 at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

F. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft. (137 Pa).

G. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 20 percent of inward acting, wind load design pressure of not less than 6.24lbf/sqft (330 Pa) and not more than 12lbf/sq.ft (575 Pa).

H. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

I. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518:
   1. Metal Roof Insulation:
      a. R-Value: 30 or greater.
   2. Metal Wall Insulation:
      a. R-Value: R25 + R10ci. Insulation must be a two layer system with thermal breaks and must fill entire girt cavity

2.04 FRAMING COMPONENTS

A. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns. Provide a clear span that supports the loads at bay spacings indicated.

B. Endwall Framing : Corner posts, end posts and rake beams.

C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prime painted with coil coating, to comply with the following:
   1. Purlins: C-or Z-shaped sections; fabricated from steel sheet material or structural-steel shapes; 3-inch wide flanges.
      a. Depth: To be determined
      b. Shall be 100 percent prime painted before shipping to job site.
      c. Purlin bracing tab. Provide purlin bracing tab so that flange brace does not penetrate through the vapor barrier of the metal building insulation facing. Refer to drawings for more details.
   2. Girts: C-or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch wide flanges.
      a. Depth: Minimum depth as indicated on the drawings. Greater depth as needed to comply with system performance requirements.
      b. Shall be 100 percent prime painted before shipping to job site.
   3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
   4. Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch-diameter, cold-formed structural tubing to stiffen primary-frame flanges.
   5. Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.
   6. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
   7. Girt bracing tab. Provide girt bracing tab so that flange brace does not penetrate through the vapor barrier of the metal building insulation facing. Refer to drawings for more details.

8. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; designed to withstand required loads.
10. Gymnasium Equipment Bracing: **All gymnasium equipment requiring additional supports to be provided in the pre-engineered metal building package. Coordinate locations and sizes with equipment manufacturer. Locations of gymnasium equipment as shown on the drawings. Items include but are not limited to basketball goals and batting cages.**

D. Bracing: Provide adjustable wind bracing as follows:
1. Rods: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50; or ASTM A 529/A 529M, Grade 50; minimum 1/2-inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.
2. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
3. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
4. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
5. Bracing: Provide wind bracing using any method specified above, at manufacturer's option.

E. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide hot-dip galvanized bolts for structural-framing components that are galvanized.

F. Materials:
1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A 1008/A 1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480).
7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 (230 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 (230 through 550) or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.

9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts; ASTM A 563 (ASTM A 563M) carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
10. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
11. **Primary, Secondary and all other structural steel items shall have the following painted primer. Primer: SSPC-Paint 15, Type I, Gray oxide.**

G. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer's standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design.

H. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design.

I. Base Angles: 2 inch x 3 inch x 0.059 inch steel angles, with minimum yield strength of 55,000 psi, anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 3 feet on center and not more than 6 inches from the end of any angle member.

J. Sag Angles and Bridging: Steel angles, with minimum yield strength of 36,000 psi.

K. Fabrication: Fabricate according to manufacturer's standard practice.
1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.
2. Welding operators and processes: Qualified in accordance with AWS D1.1.
3. Field Connections: Prepare members for bolted field connections by making punched, drilled, or reamed holes in the shop.

L. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

M. Shop Coating: Finish all structural steel members using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.

N. Package building components for shipping by common carrier.

2.05 METAL ROOF PANELS - ALTERNATE

A. Roof Panels: Panel Rib; 2 inch high minimum, Standing-Seam Metal Roof Panels Formed with intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
1. Material: Aluminum-zinc alloy-coated steel sheet, 0.0276-inch (24GA) nominal thickness.
    a. Exterior Finish: 2 - Coat Fluoropolymer, Kynar 500 or Hylar 5000
    b. Color: As selected by Architect from manufacturer's full range of standard colors
2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from aluminum-zinc alloy-coated steel sheet.
3. Joint Type: Mechanically seamed, folded according to manufacturer's standard.
4. Panel Coverage: 16 inches
5. Panel Height: 2 - 3 inches
    a. Uplift Rating: UL 90.

6. Panel Configuration: Equal to: Chief Buildings, MVP panel

B. Finishes:
   1. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions, except as modified below
   2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.06 INSULATED METAL ROOF PANELS - BASE BID

A. **Concealed Fastener, Standing Seam, Foamed-Insulation-Core Metal Roof Panels**: Structural metal panels consisting of an exterior standing seam with an interior tongue and groove joint, coupled with a vapor seal in the standing seam, and provides superior resistance to air and moisture intrusion. Attached with concealed fasteners to the structure.
   1. Basis of Design: Metl-Span**, CFR Insulated Metal Panel**.
   2. **G-90 Galvanized Coated Steel:** ASTM A 653 **or Aluminum-Zinc Alloy-Coated Steel**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ50 (Grade 340, Coating Class AZM150), prepainted by the coil-coating process per ASTM A 755/A 755M.
   3. **Aluminum-Zinc Alloy-Coated Steel Sheet**: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.
   4. Exterior Face Sheet: 24 gauge coated thickness, with stucco embossed surface.
      a. Finish: Fluoropolymer two-coat system
      b. Color: As selected by Architect from manufacturer's standard colors
   5. Interior Face Sheet: 24 gauge coated thickness, with stucco embossed surface Mesa profile.
      a. Finish: Polyester two-coat system
      b. Color: As selected by Architect from manufacturer's standard colors
   6. Endlaps: Provide panels with factory endlaps, notching, swedging and backer plates; where panel lengths permit.
   7. Low Eave Treatment: Provide cutback for trim/gutter installation; where panel lengths permit.
   8. Panel Width: [30 inches (762 mm)] [36 inches (914 mm)] [42 inches (1067 mm)] [as shown on drawings].
   9. Panel Thickness: 4 inch (102 mm) or as required to meet performance requirements min R value as shown on drawings.
   10. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent
      a. Closed Cell Content: 90% or more as determined by ASTM D 6226
      b. Compressive Strength: As required to meet structural performance requirements and with a minimum of 22 psi as determined by ASTM D 1621
      c. Shear Strength: As required to meet structural performance requirements and with a minimum of 36 psi as determined by ASTM C 273
      d. Tensile Strength: As required to meet structural performance requirements and with a minimum of 41 psi ASTM D 1623

e. Minimum Density: 2.0 pcf (32 kg/m3) as determined by ASTM D 1622
f. **Thermal Resistance (R-Value)**: [insert corresponding value deg. F * hr * sq. ft./Btu (K * sq. m/W)] as determined by ASTM C 518 at 75 degrees Fahrenheit mean temperature.

2.07 METAL WALL PANELS

A. **Base Bid - Tapered-Rib-Profile, Concealed-Fastener Metal Wall Panels:** Formed double reveal profile with evenly-spaced raised plat pan between reveals; designed to be installed by lapping side edges of adjacent panels
   1. Material: Zinc-coated galvanized steel sheet, 22 GA, 50,000 psi (min.).
      a. Exterior Finish: 2 coat, Fluoropolymer, Kynar 500 / Hylar 5000.
      b. Color: As selected by the Architect from manufacturer's full range.
         1) Wall panel color to be selected by Architect from full range of colors.
   2. Major-Rib Spacing: 5.5 inches o.c.
   3. Panel Coverage: 16 inches.
   4. Panel Height: 0.875 inches.
   5. Panel configuration: Equal to Metl Span "CS-620" on exterior of building.

B. **Alternate - Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels:** Formed vertical profile with evenly-spaced raised plat pan between reveals; designed to be installed by lapping side edges of adjacent panels
   1. Material: Zinc-coated galvanized steel sheet, 24 GA, 50,000 psi (min.).
      a. Exterior Finish: 2 coat, Fluoropolymer, Kynar 500 / Hylar 5000.
      b. Color: As selected by the Architect from manufacturer's full range.
         1) Wall panel color to be selectedby Architect from full range of colors.
   2. Major-Rib Spacing: 7.2 inches o.c.
   3. Panel Coverage: 36 inches.
   4. Panel Height: 1.5 inches.
   5. Panel configuration: Equal to Metl Span "BR5-36" on exterior of building.

C. **Tapered-Rib-Profile, Metal Interior Liner Panels:** Formed with raised, trapezoidal major ribs and flat pan between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
   1. Material: Zinc-coated (galvanized) steel sheet, 24 GA, 50,000 psi (min.).
      a. Panel Finish: White Pigmented Polyester
         1) Perforated - Exterior Walls with Silvercote White Fabric backing - Open area percent to be selcted by architect from manufacturer's full range.
            (a) All perforated liner panels to have white insulation fabric between panel and fiberglass batt.
         2) Solid - Interior walls where indicated on drawings
      b. Color: As selected by Architect from manufacturer's full range.
   2. Major-Rib Spacing: 12 inches o.c.
   3. Panel Coverage: 36 inches.
   4. Panel Height: 1.25 inches.
   5. Panel Configuration: Equal to Metal Sales "PBR Panel"

D. Finishes:
   1. Exposed Coil-Coated Finish: Roof & Metal Walls
      a. Two (2) -Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply

coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Liner Panels & Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.08 THERMAL INSULATION

A. Formaldehyde-free fiberglass batt or fiberglass blanket complying with ASTM C 991, type 1 and ASTM E 84 indicated below; consisting of fibers manufactured from glass or rock wool.

1. Reflective Faced: Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
2. **Wall Vapor Barrier Facing:** Silvercote ES
   a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.
   b. Composition: Aluminum foil facing, elastomeric barrier coating, fiberglass scrim reinforcement, and kraft-paper backing.
   c. Composition: White polypropylene film facing, woven HPDE scrim reinforcement, and metallized-polyester film backing.
3. **WALL INSULATION**
   a. Facing: Composite of fiberglass and facing having flame spread index of 25 or less and smoke developed index of 50 or less, when tested in accordance with ASTM E 84.
   b. Facing: Silvercote ES Double Layer Wall System
   c. Insulation thickness: R25 + R10 or meet performance requirements of .047 U-factor
      1) Fiberglass insulation must fill entire girt cavity
   d. Insulation blankets to be installed continuous from bottom sill to top of wall.
4. **ROOF INSULATION - ALTERNATE**
   a. Polyurethane Foam-Plastic Board Insulation: Manufacturer's standard proprietary composite rigid plyurethane-core board with integral factory-applied exterior and interior fiber reinforced plypropylene scrim facings, with factory-applied tape tabe system for an integral vapor-retarding air barrier membrane; fabricated with Shiplap edges.
      1) Basis-of-Design Product; Subject to compliance requirements, provide Pacific Insulation Products; R-Seal Board Insulation or comparabe product
      2) Thickness: 4" R-Seal panel
      3) Composite product to have maxiumum flame-spread and smoke-developed indexes of 200 and 150, respectively, when tested in accordance with ASTM E84; and "Passing" in Full-Scale fire test when tested in accordance with UL 1715
      4) Composite Product to have maxium air leakage of 0.04 Cubic Ft. Per Minuter per sq. ft. under a pressure differential of 0.3 inch wg (75 Pa) when tested in accordance with ASTM E2357 (Assembly Test)
      5) Board insulation to be left exposed to interior of the building without an additional thermal barrier
      6) Interior Finish to be White Embossed texture finish

2.09 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
   1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2.10 ROOF ACCESSORIES

A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fascia, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
   1. Panel Fasteners: Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Provide corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.
   2. Joint Sealers: Provide Tape Mastic Sealants and Concealed Joint Sealants per Section 07 92 00, “Joint Sealants”.
   3. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
   4. Clips: Manufacturer's standard, formed from steel sheet, designed to withstand negative-load requirements.
   5. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel sheet.
   6. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   7. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-(25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction. Provide metal trim cover for closure strips.

B. Flashing and Trim: Formed from 26 gauge nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
   1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, internal and external corners, fasciae, and fillers.
   2. Opening Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

C. Gutters: Formed from 26 gauge nominal-thickness, aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate to 40"-0" long sections with a minimum 96-inch-(2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
   1. Gutter Supports: Fabricated from same material and finish as gutters: spaced 36 inches (900mm) o.c.
   2. Expansion Joints: To be provided per manufacturer specifications.

D. Downspouts: Formed from 0.022-inch (0.56-mm) nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot long sections, complete with formed elbows and offsets.
   1. Mounting Straps: Fabricated from same material and finish as gutters: spaced 5 feet o.c.

E. Eave Gutters: Roll-formed 26 gage steel sheet, with gutter straps, fasteners and joint sealant; manufacturer's standard color.
   1. Downspouts: 4 x 5 inches in 10 foot lengths, with downspout elbows and downspout straps; same color as wall panels.

F. Pipe flashing: Provide EPDM rubber flashings for vent penetrations.

G. Snow Guards:
   1. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating roof panel, with predrilled holes and clamps or hooks for anchoring. Snow Guards to be located as noted in the drawings. Allow for free movement of roof panels and snow guard rails as recommended by manufacturer. Snow Guard shall be approved for use with project roof type, roof panel width, project snow load and roof pitch by snow guard manufacturer.
   2. Metal Rail Type Guard: Consisting of aluminum or stainless-steel rods or bars held in place by supports clamped to vertical ribs of standing-seam roof. System compatible with metal building manufacturers standing seam profile and height. Provide all accessories necessary including intermediate snow clips for complete system as recommended by system manufacturer.
   3. S-5! ColorGard Snow Guards by Metal Roof Innovations, Ltd. Colorado Spring, CO 80908 with SnoClip: www.s-5.com
   4. Acceptable Manufacturers:
      a. Metal Roof Innovations, Ltd. Colorado Springs, CO
      b. Berger Building Products, Feasterville, Pennsylvania
      c. Colorbar; www.snobar.com
      d. Sno-Gem Inc
      e. Zaleski Snow Guards
   5. Furnish and install where indicated on plans assembly for snow retention as follows: S-5! clamps are to be spaced at every panel seam. Clamps should be on or as near as possible to the hold down clip location without interfering with the ability of the roof to float. All clamps are to be installed true-to-line. Stainless steel fasteners are to be tightened using a tool with a rating of 115 inch-pounds. This tension shall be periodically verified during installation. In no event shall the clamp spacing exceed 24 inches.
   6. The snow guard is to be furnished and installed on each S-5-U clamp with 3/8" x 3/4" stainless steel bolt and washer furnished by manufacturer. The snow guard shall be pre punched on 4" centers. Adjacent sections of snow guard are to be joined using a splice plate provided by manufacturer.
   7. SnoClip: Aluminum component with integrated rubber foot to retard the migration of snow and ice beneath the cross member. Rubber foot to prevent abrasion to the roof panel finish.

H. Downspout Shoe (Boots): Cast iron
   1. Rectangular downspout to round discharge outlet designed to empty straight into a soil pipe. Shoe is designed with an 90 degree discharge.
   2. Length: 24 inches (nominal)
   3. Size: Top bell to match downspout

4. Manufacturer:
    a. Peidmon Pipe Denver NC: B1 Series
    b. Neenah Foundry Company: www.neenahfoundry.com R4929 Series
    c. Barry Pattern and Foundry Company, Inc. Birmingham, Al: B25C Series
    d. McKinley Iron Works Inc., Fort Worth, Texas; DS2 Series
    e. Substitutions: See Section 01 6000 - Products Requirements

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: The Owner or the Architect of Record will employee/engage a qualified testing agency to evaluate/test product.

B. Testing: Test and inspect shop connections for metal buildings according to the following:
    1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
    2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
        a. Liquid Penetrant Inspection: ASTM E 165.
        b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
        c. Ultrasonic Inspection: ASTM E 164.
        d. Radiographic Inspection: ASTM E 94.

C. Product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

2.12 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.
    1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
    2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances and with AISC “Specification for Design, Fabrication, Erection of Structural Steel for Buildings”.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
    1. Make shop connections by welding or by using high-strength bolts.
    2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
    3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
    4. Weld clips to frames for attaching secondary framing.
    5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required

for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.

1. Make shop connections by welding or by using non-high-strength bolts.
2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.13 FINISHES

A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

B. Exterior Face Sheet Coil-Coated Finish System

1. Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat, [meeting solar reflectance index requirements].
   a. Basis of Design: Metl-Span, Silicone Polyester.
2. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, [meeting solar reflectance index requirements].
   a. Basis of Design: Metl-Span, Fluoropolymer.

C. Interior Face Sheet Coil-Coated Finish System:

1. Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat
2. Basis of Design: Metl-Span, Igloo White
3. Silicone-Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat
   a. Basis of Design: Metl-Span, Silicone Polyester
4. Fluoropolymer Two-Coat System: 0.2-mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat
   a. Basis of Design: Metl-Span, Fluoropolymer
5. Vinyl Plastisol Two-Coat System: 0.2 mil primer with 4 mil high solids plastisol finished with PVC technology.
   a. Basis of Design: Metl-Span, Vinyl
6. 304 and 316 Stainless Steel: 2B 304 or 2B 316 Stainless Steel.
   a. Basis of Design: Metl-Span, Stainless Steel

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position

B. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

C. Before erection proceeds, survey elevations and locations of concrete-and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage professional Surveyor Engineer to perform surveying.

D. Proceed with erection only after unsatisfactory conditions have been corrected.

3.02 GENERAL

A. Install in accordance with manufacturer's instructions.

3.03 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.04 ERECTION OF STRUCTURAL FRAMING

A. Erect framing in accordance with AISC 360 - Specification for Structural Steel Buildings.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

F. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

G. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

H. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

I. Base and Bearing Plates: Clean concrete-and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

J. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

K. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
   1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.

a. Building manufacturer to provide torque requirements for high strength bolt connections.
b. Contractor to coordinate with Owner's employed third party testing agency confirming bolted connections are installed per metal building manufacturer's recommendations.

L. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Locate canopy framing as indicated.
4. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

M. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
2. Locate interior end-bay bracing only where indicated.

N. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

O. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303-10.

3.05 ERECTION - WALL AND ROOF PANELS

A. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

B. Fasten cladding system to structural supports, aligned level and plumb.

C. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

D. Provide expansion joints where indicated.

E. Use concealed fasteners.

F. Install sealant and gaskets to prevent weather penetration.

G. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

H. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.

a. Lap metal flashing over metal panels to allow moisture to run over and off the material.

I. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.

J. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
   1. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

K. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
   1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
   2. Prepare joints and apply sealants to comply with construction document requirements."

3.06 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations. It is the intent of the Architect to to have full length panels from eave to ridge. If contractor is not able to install one continuous panel from eave to ridge, this must be brought to the attention of the Architect before bidding.
   1. Install ridge caps as metal roof panel work proceeds.
   2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
   1. Install clips to supports with self-drilling or self-tapping fasteners.
   2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
   3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
   4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
   5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
   6. Provide metal closures at peaks, rake edges, rake walls, and each side of ridge caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated on the drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.07 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Provide an exterior grade clearance to underside of exterior wall enclosure panels of a minimum of 8" above finished grade. Finished grade at exterior walls shall be an aggregate mow strip of a minimum 12". Provide a vermin wall of 16" in height above finished grade of either reinforced poured concrete stem wall or reinforced and grouted CMU (concrete masonry units). Vermin wall shall be a minimum of 8" thick.
   2. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
   3. Shim or otherwise plumb substrates receiving metal wall panels.
   4. When two rows of metal panels are required, lap panels 4 inches minimum.
   5. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
   6. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
   7. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
   8. Install screw fasteners in predrilled holes.
   9. Install flashing and trim as metal wall panel work proceeds.
   10. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.
   11. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
   12. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Installation Tolerances: Shim and align metal wall panels within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.08 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Apply bituminous paint on surfaces in contact with cementitious materials.

C. Connect downspouts to storm sewer system.

3.09 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
   1. Install pre-engineered building insulation system in accordance with manufacturer's installation instructions and the approved shop drawings.
   2. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
   3. Install in exterior spaces without gaps or voids. Do not compress insulation.
   4. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

5. Fit insulation tight in spaces and tight to exterior side of the sealed liner fabric and around mechanical and electrical services within plane of insulation.
6. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.

B. Straps: Banding shall be attached to the bottom side of the purlins and run two directional.
1. Cut straps to length and install in the pattern and spacings indicated on shop drawings.
2. Tension straps to required value.

C. Vapor Barrier Fabric:
1. Install vapor barrier fabric in large one-piece custom fabricated pieces to substantially fit defined building areas with minimum practicable job site sealing.
2. Position pre-folded fabric on the strap platform along one eave purlin.
3. Clamp the two bottom corners at the eave and also centered on the bay
4. Pull the other end of the pleat-folded fabric across the building width on the strap platform, pausing only at the ridge to fasten the straps and fabric in position where plane of the roof changes and to release temporary fasteners on the opposite ridge purlins.
5. Vapor barrier shall be stretched taught to eliminate all wrinkles and sagging in the barrier system.
6. Once positioned, install fasteners from the bottom side at each strap/purlins intersection.
7. Trim edges and seal along the rafters.
8. All seams must be completely sealed and stapled seams are not acceptable.

D. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

3.10 INSTALLATION - ACCESSORIES

A. Install door frames, doors, overhead doors, and windows and glass in accordance with manufacturer's instructions.

B. Seal wall and roof accessories watertight and weather tight with sealant in accordance with Section 07 90 05.

C. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners

where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

E. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

F. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

1. Provide elbows at base of downspouts to direct water away from building.
2. Tie downspouts to underground drainage system indicated.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.11 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner or the Architect of Record will employee/engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
   a. Liquid Penetrant Inspection: ASTM E 165.
   b. b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
   c. Ultrasonic Inspection: ASTM E 164.
   d. Radiographic Inspection: ASTM E 94.

C. Product will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.13 CLEANING AND PROTECTION

A. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
   1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
   2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

B. Touchup Painting: Cleaning and touchup painting are as specified in the Construction Document.

C. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
   1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 13 34 19

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tank Type Water Heater - Electric

B. Tankless Water Heater - Electric

C. Water Softeners

1.02 RELATED REQUIREMENTS

A. Commissioning
   1. Section 01 9113 - General Commissioning Requirements
   2. Section 01 9114 - Commissioning Authority Responsibility

B. Section 22 0519 - Meters and Gages

C. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 22 0553 - Plumbing Identification

E. Section 22 1005 - Plumbing Piping

1.03 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2009.

B. ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

C. NFPA 54 - National Fuel Gas Code; National Fire Protection Association; 1996.

D. NFPA 70 - National Electrical Code; National Fire Protection Association; 1999.

E. UL 174 - Standard for Household Electric Storage Tank Water Heaters; Current Edition, Including All Revisions.

F. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years ofdocumented experience.

B. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

D. Contractor shall explain all components of the plumbing system and demonstrate their operation and maintenance to the owner's representative.
   1. All demonstrations and training shall be video-taped by the Plumbing Contractor. Two copies shall be turned over to the owner's representative.

1.06 CERTIFICATIONS

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.08 WARRANTY

A. Provide five year manufacturer warranty for hot water storage tank.

B. Provide three year manufacturer warranty for commercial tank type water heater.

C. Provide five year manufacturer warranty for commercial water heater.

D. Provide manufacturer standard warranty for circulating pumps.

PART 2 PRODUCTS

2.01 TANKLESS WATER HEATER - ELECTRIC

A. Manufacturers:
   1. Chronomite, Inc: www.chronomite.com/#sle.
   2. Eemax.
   3. Bosch.
   4. Rheem.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Type: Automatic, electric.

C. Element shall be replaceable cartridge insert. Element shall be iron free, Nickel Chrome material. Heater shall be ftted with 1/2" compression fttings. Heater shall be installed upright with water connections on bottom. Hot water storage tanks prohibited.

D. Performance:
   1. Refer to drawings for performance information.

E. Electrical Characteristics:
   1. 120 volts, single phase.
   2. ____ amperes maximum fuse size.

F. Controls: Automatic water thermostat with externally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction box.

G. Accessories:
   1. Water Connections: Brass.
   2. Dip Tube: Brass.
   3. Drain valve.
   4. Anode: Magnesium.
   5. Temperature and Pressure Relief Valve: ASME labeled.
   6. Shock Absorbers: ASSE 1010 or PDI WH 201, Size A water hammer arrester.

2.02 TANK TYPE WATER HEATER - ELECTRIC

A. Manufacturers:
   1. Lochinvar.
   2. Rheem.
   3. A.O. Smith Corporation.
   4. Bradford White.
   5. State.
   6. Substitutions: Refer to Section 01 6000 (01600) - Product Requirements.

B. Type: Automatic, electric, vertical storage.

C. Performance:
   1. See drawings for design criteria.

D. Tank: Glass lined welded steel, thermally insulated with one inch thick glass fiber; encased in corrosion-resistant steel jacket; baked-on enamel finish.

E. Controls: Automatic water thermostat withexternally adjustable temperature range from 120 to 170 degrees F, flanged or screw-in nichrome elements, enclosed controls and electrical junction boxand operating light.Wire double element units so elements do not operate simultaneously.

F. Accessories: Provide:
   1. Water Connections: Brass.
   2. Dip Tube: Brass.
   3. Drain Valve.
   4. Anode: Magnesium
   5. Temperature and Pressure Relief Valve: ASME labelled.

2.03 AUTOMATIC WATER SOFTENER - SCHOOL

A. Manufacturers:
   1. Fleck Water Softening System
   2. Culligan, Inc: www.culligan.com
   3. Kinetico, Inc: www.kinetico.com
   4. Sterling Water Treatment System
   5. Ecowater Systems: www.ecowater.com
   6. Ecodyne
   7. Substitutions: Not Permitted.

B. Scope:
   1. Provide as indicated a vertical pressure type water softener system complete with pressure vessel, softening resin, control valve, brine maker and electronic controller. All equipment and material supplied shall be in compliance with the specifications as intended for a complete and operational system.

C. Performance and Design Data:

1. Design based on Culligan HE 1.5 Single water softening system.
2. The purpose of the water softener system is to remove mineral hardness from a known water supply to a level not to exceed 17.1 mg/L, as determined by an accepted ASTM or EDTA test method, when the system is operated at 5 gpm and in accordance with the operating instructions.
3. The system will be capable of a peak flow rate of 31.5 gpm with a pressure drop of 25.0 psi.
4. Design Parameters
    a. Maximum System Flow & Pressure Drop: 31.5 gpm @ 25.0 psi
    b. Backwash/Rinse Flow: 5.5 gpm
    c. Backwash Volume: 165 gallons nominal
    d. Daily Water Usage: 1200 gpd
    e. Daily hours of water demand: 12 hours
    f. Operating Temperature Range: 34-110 degrees F
    g. Operating Pressure Range (System): 20-125 psi
    h. Electrical Requirements: 24 volts AC, 60Hz, 1ph
    i. System Dimension: 18in L x 38in W x 53in H
    j. Effluent Water Quality: One (1) gpg hardness (ASTM soap test method).

D. Equipment:
1. Softener Tanks:
    a. System shall include one (1) tank. Each softener tank shall be 14 inch in diameter, 47 inch sideshell height to provide proper freeboard space above the resin bed for adequate expansion of the resin during backwashing.
    b. Tank construction: Seamless molded pressure vessel, high performance composite construction with fiberglass filament wound high strength polyethylene liner rated for 150 psi operating pressure. The tanks shall be capable of withstanding testing with pressure fluctuations from 10 to 150 psi for a minimum of 250,000 cycles.
    c. Tank Supports: Structural steel strap leg type welded to lower tank head.
    d. Tank Access: Each tank shall be equipped with openings for mineral filling and periodic inspection.
2. Internal Distribution:
    a. The upper distribution system shall be of the single point baffle type, constructed of Schedule 40 galvanized steel pipe and fittings.
    b. The lower distribution system shall be of the hub and radial arm type, constructed of PVC pipe and fittings with individual, fine slotted, non-clogging, polypropylene strainer arranged for even flow distribution through the resin bed. Slotted lateral arms shall not be utilized. The distribution system shall be embedded in a single layer subfill of washed inorganic material to support the resin bed.
3. Main Operating Valve:
    a. The main operating valve shall be fully automatic multiport diaphragm type. The multiport design shall incorporate all valves necessary for complete control of the softener service and regeneration steps.
    b. The diaphragm valves shall be slow opening and closing, free of water hammer. The diaphragm assembly shall be fully guided on its perimeter to assure a smooth reliable shutoff without sticking. There shall be no dissimilar metals within the valve and no special tools shall be required to service the valve.
    c. The main operating valve shall include a valve mounted automatic self adjusting brine injector to draw brine and control rinse at a constant rate regardless of water pressure in the range of 20 and 125 psi.

d. The main operating valve shall be designed and manufactured by the same manufacturer as the water softener system and tested prior to shipment
e. The valve shall have a soft water sampling cock.
f. The unit shall be supplied so that the valve will not allow automatic bypass of untreated water during regeneration. The bypass shall be integral to the main operating valve body and be capable of being easily modified to allow untreated water bypass.

4. Pipe & Fittings:
   a. The main operating valves and manifold piping shall be factory assembled and shipped attached to the resin tank for ease of installation and start-up. Piping shall be schedule 40 galvanized steel and galvanized fittings shall be standard class 150 threaded malleable iron.
   b. All system inlet, outlet and drain connections shall be less than 50 inches in distance from the softener support level to provide ease of installation and service.
5. Flow Control:
   a. The backwash flow controller shall be a pressure-compensating orifice capable of providing and maintaining proper backwash flows over the entire listed operating pressure range of the system. The backwash flow controller shall be easily serviced without special tools and design so that service to the flow controller can be performed without dissembly of the valve body or the sequencing controller and without disconnecting existing inlet and outlet piping connections.
6. Controls:
   a. A fully integrated programmable microprocessor driven electronic controller shall be provided to automatically cycle the main operating valve through the regeneration sequence.
   b. The controller shall be capable of initiating a regeneration by accepting an internal signal from the controller time keeping device; an external Hall-effect flow sensor, an external device such as a remote start push-button or any combination of these methods. The controller shall sequence all steps of an automatic regeneration and automatically return the softener to a service or stand-by mode. The initiating time and/or volume setpoints shall automatically reset upon completion of the regeneration sequence.
   c. An audible alarm beeper capable of emitting a tone of 70 dBA shall be available.
   d. The controller shall allow for a manual initiation of the automatic regeneration sequence by utilizing a regeneration button on the face of the controller.
   e. The controller shall operate on a low voltage electrical system. The system shall include a UL listed transformer.
   f. The multiported pilot control assembly shall include a dial for visual indication of the system status; the pilot control valve shall also allow manual operation in the event of a power failure.
   g. The controller shall utilize EEPROM to save pertinent programmed data and statistical functions. The controller must retain all functionality for power interruptions of less than 12 hours.
   h. An operator selected program of immediate or delayed volume initiated regeneration for parallel configurations shall be available. The controller shall be capable of being programmed in the field without additional interface devices. The controller shall indicate various data that includes flow rate, capacity remaining, total flow since installation, number of regenerations in the last 14 days, days since the last regeneration, total number of regenerations for the life of the unit, time of day, number of connected units, Progressive Flow Trip Point, and unit in regeneration.

i. Control Functions:
   1) Regeneration Sequence timers: The controller shall allow control customization of individual regeneration cycle times, each programmable from 1-99 minutes. The regeneration cycle and time of cycle remaining shall be displayed when in regeneration.
   2) Lockout Function: The controller shall include a lockout to prevent unauthorized personnel from altering program data.
   3) Regeneration override: The controller shall include a function to direct pre-programmed regeneration after a user determined period of time without an input signal from another regeneration initiation device.
   4) Alarm Status Indicator: The controller shall monitor operation of internal functions. If a fault is identified, the need for operator intervention will be signaled visually within the controller display.
   5) Two Auxiliary Outputs: Two auxiliary Outputs shall be integral to the controller circuit board. Each output shall be capable of being programmed to provide power to a "Normally Open" or "Normally Closed" contact (user choice).
   6) Flow rate indication: The controller shall indicate the flow rate of the treated water.
   7) Totalizer: The controller shall include a totalizer function and a display capacity to 99,999,999 units before resetting to zero. The totalizer value shall be displayed through the controller display during operation.

j. Flow Sensor(s):
   1) A flow sensor package shall be provided consisting of an insertion-type Hall Effect flow transducer with an appropriately sized installation fitting; the package shall include a total of two (2) flow sensors with fittings.
   2) The fitting provided shall be 3 inches, compatible with the specified piping. It will be designed to allow ease of removal of the sensor for inspection without modification of the piping system. A 25 foot length of cable shall be provided for direct connection to the system controller.
   3) The flow sensor package provided shall be functional within the flow range of 0.5 to 60 gpm and will be provided with a copper sweat fitting flow sensor installation fitting.
   4) The operating temperature/pressure range of flow sensor fittings shall be 34 - 110 degrees F at 125 max psi.
   5) The wetted surfaces of the flow sensor shall be constructed of non-corroding materials such as polypropylene, black polyvinylidene (PVDF), and titanium.
   6) The flow sensor shall have an accuracy to 5% over full range.

7. Exchange Resin:
   a. The ion exchange resin shall be virgin high capacity "standard mesh" of sulfonated polystyrene type stable over the entire pH range with good resistance to bead fracture from attrition or osmotic shock. Each cubic foot of resin will be capable of removing 30,000 grains of hardness as calcium carbonate when regenerated with 15 lbs of salt. The resin shall be solid, of the proper particle size of 20-50 mesh, U.S. standard screen and will contain no agglomerates, shells, plates or other shapes that might interfere with the normal function of the water softener. The resin shall be manufactured to comply with the food additive regulation 21 CFR 173.25 as set forth by the USFDA.
   b. The system shall include 2 cubic feet of exchange resin per vessel and a total of 2 cubic feet of resin for the system.
8. Brine System:

a. Provide a complete brine system consisting of a plastic tank, cover, salt platform, brine well, an automatic brine valve, and all necessary fittings for operation with the water softening system. The system shall consist of a combined brine measuring and salt storage tank with salt platform. Tank size 24 inch diameter x 40 inch height. The system to include one (1) tank.
b. The brine tank will be equipped with a float operated non-corrosive field serviceable brine float valve for automatic control of brine withdrawal and fresh water refill.
c. The brine valve will automatically open to admit brine to the resin tank during education and close automatically providing positive shutoff to prevent air from entering the system. The brine valve will also regulate the flow of softwater into the brine tank during refill. The brine valve works with the timed fill feature of the main operating valve controls to admit the correct volume of fresh water to the brine tank in accordance with the refill time setting in the control program. The brine valve will include a float operated safety shut-off valve as a backup to the timed refill from the main operating valve control to prevent brine tank overflow.

E. Accessories:
1. Water test kit for hardness test
2. Pressure Gauges for hard water inlet and soft water outlet
3. Sampling cocks for hard water inlet.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. All plumbing equipment should be started up by a manufacturer representative.

C. Coordinate with plumbing piping and related fuel piping and electrical work to achieve operating system.

D. Install and place in operation the water heater system as shown on the Drawings, complete with piping, supports, etc., and as recommended by the manufacturer. System shall meet or exceed state and local codes.

E. Provide shut-off valves and unions entering and leaving water heater. Provide check valve on cold water line to heater before expansion tank.

F. Expansion tank(s) shall be provided where, and as denoted on the drawings, thus providing a controlled space for the expansion of system water.

G. Water Softener:
1. Factory authorized service representative shall provide startup and owner training for water softener system.
2. Division 22 plumbing contractor to provide initial fill of salt for each brine tank at the completion of the project.

END OF SECTION 22 30 00

SECTION 23 09 13
INSTRUMENTS AND CONTROL ELEMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Control panels.

B. Transmitters:

C. Transmitters

D. Meters

E. Building Automation System

F. Building Automation Equipment

G. Temperature Control Wiring

H. Miscellaneous accessories.

1.02 RELATED REQUIREMENTS

A. Section 23 0548 - Vibration and Seismic Controls.

B. Section 23 0519 - Meters and Gages: Thermometer sockets, gage taps.

C. Section 23 05 19 - Meters and Gages: Thermometer sockets and gauge taps.

D. Section 23 0553 - HVAC Identification

E. Section 23 21 13 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, and gauge taps.

F. Section 23 33 00 - Air Duct Accessories: Installation of automatic dampers.

1.03 REFERENCE STANDARDS

A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating; 2012.

B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2015.

C. ASHRAE Standard 135-2008 BACnet Protocol.

D. ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Control Diagrams

1. Submit to the Architect/Engineer a complete system diagram, showing control connections and devices and their connection to other equipment, together with a clearly written description of the system and an outline of its function under conditions of operation.
2. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
3. Submittals shall be prepared on, or folded to, 8-1/2 inch by 11 inch size and bound in brochure form. Electronic form, pdf format, shall also be included.
4. DDC logic and control diagrams shall be included for all equipment and sequences of control. Include at a minimum all points shown on DDC control drawings. If any additional points are required to complete the sequence of operation, the control equipment needed to provide this information shall be provided.

5. Upon completion of the Work, provide the complete, accurate, and approved diagrammatic blueprinted layouts on the automatic control system specified herein and as installed. Layouts shall show all control equipment including job installation changes, and the function of each system shall be indicated. Layouts and descriptions shall be included in the project record set and in the operating and maintenance manuals.

C. Begin no work until submittals have been approved for conformity with design intent. Provide drawings as flash memory. When manufacturer's cutsheets apply to a product series rather than a specific product, clearly indicate applicable data by highlighting or by other means. Clearly reference covered specification and drawing on each submittal. General catalogs shall not be accepted as cut sheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Provide submittals within 12 weeks after contract award.

D. 100% completed points lists and sequences shall be submitted no later than the point at which system installation is 50% completed.

E. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module including, but not limited to the following equipment and components indicating arrangements, capabilities, range, voltage, horsepower, and construction.
   1. Valves
   2. Thermostats
   3. Relays
   4. Panels
   5. Gauges
   6. Sensors
   7. Dampers
   8. Switches
   9. Pressure Controllers
   10. DDC microprocessor
   11. Unitary DDC controllers
   12. Actuators
   13. Blade Server (Supervisory Controller)
   14. Laptop Workstation
   15. Wiring

F. Wiring diagrams and layouts for each control panel.

G. Floor plan schematic diagrams indicating field sensor, controller and power supply locations.

H. Provide information noting items utilizing BACnet technology are BTL certified and listed.

I. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.
   2. After drawings are finalized, provide drawings in pdf format. Include a list of all unit default safety and control settings, whether fixed or adjustable, as shipped from the factory. Where field modifications are required to meet the specification, provide all modification labor and materials, and submit a complete, detailed, step-by-step procedure for modifications.
   3. Drawings shall also be installed in workstation as web pages.

J. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
   1. As-built versions of the submittal product data.
   2. Names, addresses, and 24-hour telephone numbers of installing contractors and service representatives for equipment and control systems.
   3. Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point/object reports, trending data, overriding computer control, and changing setpoints and variables.
   4. Programming manual or set of manuals with description of the programming language and syntax of statements for algorithms and calculations used of point/object database creation and modification, of program creation and modification, and editor use.
   5. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points/objects, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
   6. Documentation of all programs created using custom programming language including setpoints, tuning parameters, and object database.
   7. Graphic files, programs and database on magnetic or optical media.
   8. List of recommended spare parts with part numbers and suppliers.
   9. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware, including computer equipment and sensors.
   10. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
   11. Licenses, guarantee, and warranty documents for equipment and systems.
   12. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
   13. Operation & Maintenance manuals shall also be installed in workstation as web pages.

K. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

L. After the control submittal has been reviewed and marked "No Exceptions Taken" by the design engineer, the controls contractor shall submit all graphics required for the temperature control system. The graphics shall be reviewed by the owner, commissioning agent, and the design engineer. The temperature control contractor shall not install any graphics until they have been reviewed and approved by the owner, commissioning agent and design engineer.

1.05 SUMMARY

A. General: The control system shall be as indicated on the drawings and described in the specifications.

B. **Base Bid:** The control system for the new athletic complex can be stand alone system, independent of the districts other buildings. The installed system must comply with all other portions of this specification.

C. ~~**Alternate Bid #8: The control system for the new athletic complex can shall be integrated into the district's existing BAS system for the other buildings, for a unified front end. The current BAS system is Facilities Explorer, maintained by ChillTex.**~~

D. **The intent of this specification and related sections is to provide a fully integrated, open, interoperable, peer-to-peer networked, distributed Direct Digital Control System. The following communication protocols are acceptable:**

1. ANSI/ASHRAE Standard 135 BACnet - A Data Communication Protocol for Building Automation and Control Networks
2. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard

E. The Direct Digital Control System (DDC) shall be based on a Tridium Niagra N4 framework. Provide an open automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be easily managed in real time over the internet using a standard web browser.

F. It is the Owner's express goal to implement an open system that will allow products from various suppliers to be integrated into to a unified system in order to provide flexibility for expansion, maintenance, and service of the system. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s). In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use with the JACE, N4 Supervisor, and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the Owner. The Owner shall determine which organizations to be named in the SI organization ID ("orgid") of all software licenses. Owner shall be free to direct the modification of the "orgid" in any software license, regardless of supplier, by Tridium Inc.

G. The Network Controller (NWC) shall connect to the Owner's local or wide area network, depending on configuration. Access to the system, either locally in each building, or remotely shall be accomplished through standard Web browsers and/or the N4 Supervisor, via the Internet and/or local area network.

H. Each NWC shall communicate to BACnet (B-AAC, B-ASC), devices and/or other open protocol systems/devices as described on the contract drawings and/or in the specifications.

I. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems for Owner.

J. The control system shall accommodate a minimum 8 simultaneous multiple user operation utilizing standard web-browser clients. Access to the control system data should be limited only by user ID and operator password. Multiple users shall have access to all valid system data. An operator shall be able to log onto any work-station on the school's network and have access to all appropriate data. All users shall have an unique ID and password. Owner shall provide user information and permission levels ninty days prior to scheduled completion.

K. The control system shall be designed such that each mechanical system will be able to operate under stand-alone control. As such, in the event of a network communication failure, the loss of any other controller, or the school district network, the control system shall continue to independently operate under control.

L. Communication between the control panels and all work-stations shall be over a high speed 100 Mpbs (at minimum) Ethernet network. All nodes on this network shall be peers. The operator shall not have to know the panel identifier or location to view or control an object. Application Specific Controllers shall be constantly scanned by the network controllers to update point information and alarm information.
   1. The communication network wiring between control panels, and equipment controls with BACnet communication cards (chiller control panel, boiler control panels, domestic water heaters, and VFD's) shall be provided and installed by the temperature control contractor. The use of the owner's network for communication between devices shall be prohibited.

Provide a single point of communication between the owner's network and the DDC control system network.

M. Temperature control contractor shall be responsible for the following:
   1. The DDC System shall communicate to the owner's communication network thru a single point of data connection. All wiring and communication downstream of that single point of data connection shall be provided with the DDC control system.
   2. Providing of a complete DDC electronic automatic temperature control system.
   3. Control of rooftop air handling units along with other miscellaneous equipment as denoted on drawings in accordance with requirements herein specified.
   4. Providing of control devices, valves, instruments, and the like, as herein specified and as required to comply with required sequences of automatic control.
   5. Providing of wiring for secondary control devices, relay switches, safety low limit controls, etc., and such interlock wiring required.
   6. Provide all control wiring between all primary network controllers and equipment furnished with Bacnet control panels. Provide a single point connection to owner's LAN.
   7. Coordinate communication requirements for the air handling units controls that are provided by the air handling unit manufacturer.
   8. Tag all automatic controls, instruments, safeties, panels, actuators and relays. Key to control schematic. Refer to specification 23 0553 - HVAC Identification
   9. Furnish adequate supervision on Work performed for him by others to insure proper operation and the neatest and best possible arrangement.
   10. Testing and maintenance of system as herein specified.

N. The documentation is schematic in nature. The Contractor shall provide hardware and software necessary to implement the functions and sequences shown.

1.06 QUALITY ASSURANCE

A. The temperature control contractor shall furnish and install a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control, and subsystems as herein specified. The installation of the control system shall be performed by an authorized dealer of the controls manufacturer with the shop drawings, flow diagrams, bill of materials, component designation or identification number, and sequence of operation all bearing the name of the manufacturer.

B. All materials and equipment used shall be standard components, regularly manufactured for the specified system. All systems and components shall have been thoroughly tested and proven in actual use of at least 2 years.

C. The temperature control contractor shall read all other Drawings and Specifications, become familiar with requirements and scope of the Project, and include such coordination work as may be required.

D. Designer Qualifications: Design system under direct supervision of a Control Engineer experienced in design of this work and is certified by control system manufacturer.

E. Installer Qualifications
   1. Installing contractor shall have an established working relationship with control system manufacturer of not less than 5 years.
   2. Installing contractor and his sub-contractors shall have successfully completed manufacturer's control system training. Provide certification of completed training, including hours of instruction and course outlines, with bid.
   3. Installing contractor shall have an office within 75 miles of the project site and provide 24 hours response in the event of a customer call, 7 days per week, 365 days per year.

F. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., UL-916 Energy Managment Systems, UL-864UUKL Smoke Systems as suitable for the purpose specified and indicated and shall comply with NFPA 70.

G. Systems utilizing BACnet technology shall be BTL certified and comply with ASNI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for building Automation and control networks.

H. Systems utilizing Lonworks shall not be permitted.

I. Damper components shall meet the requirements of AMCA 500.

J. Control systems shall meet the requirements of ASHRAE Standard 90.1.

K. Performance Standards. System shall conform to the following minimum standards over network connections:
   1. Graphic Display. A graphic with 20 dynamic points/objects shall display with current data within 10 seconds.
   2. Graphic Refresh. A graphic with 20 dynamic points/objects shall update with current data within 8 seconds.
   3. Object Command. Devices shall react to command of a binary object within 2 seconds. Devices shall begin reacting to command of an analog object within 2 seconds.
   4. Object Scan. Data used or displayed at a controller or workstation shall have been current within the previous 6 seconds.
   5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 seconds
   6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 second. Select execution times consistent with the mechanical process under control.
   7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per second. Select execution times consistent with the mechanical process under control.
   8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 seconds of other workstations.

1.07 CONTRACTOR RESPONSIBILITIES

A. The temperature control contractor shall be responsible for final design drawings, installation of all control wiring and control devices in accordance with National Electric Code. The temperature control contractor shall also be responsible for startup and complete checkout, and commissioning of the systems.

B. This Contractor shall furnish complete drawings, component lists, specification sheets and sequences of operation to the Architect/Engineer for approval before start of installation.

C. All DDC logic diagrams shall be updated as built and included in the Operation and Maintenance Manuals for the Owner.

D. The temperature control contractor is responsible to use all room numbers developed and approved by the owner in the development of the temperature control system for this building.

E. The temperature Control Contractor shall provide labeling for all control system sensors, panels, actuators, etc. The label names shall match the point names given on the computer and as shown on the temperature control drawings.

F. The temperature control contractor shall contact the rooftop unit manufacturer to integrate the cotnrol and monitoring points specified in the sequence of operations. The connection to the controller shall be thru BACnet/IP, BACnet MS/TP.

G. The temperature control contractor shall be responsible to provide low voltage Power Supplies for opeation of system as required. Temperature Control contractor shall be responsible to provide low voltage wiring from power supplies to controllers. Submit wiring diagram as part of temperature control submittal.

1.08 SOFTWARE LICENSE AGREEMENT

A. The owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to the owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software. The owner shall receive a copy or multiple copies licensed to them of any local programming tool required to replace or program local controller.

B. It is the owner's goal to implement an open system that will allow products from various suppliers to be integrated into an unified system in order to provide flexibility for expansion, maintenance, and service of the system.

C. OPEN NIC STATEMENT: All Niagra 4 software licenses shall have the following NiCS: "accept.station.in=*"; "accept.station.out=*"; "accept.wb.in=*"; "accept.wb.out=*". All open NIC statments shall follow Niagra Open NIC specifications.

D. The owner shall be named license holder of all software associated with any and all incremental work on the project(s). The owner shall receive a copy or multiple copies licensed to them of any local programming tool required to replace or program local controller.

E. In addition, the owner shall receive ownership of all job-specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job-specific software code and documentation for all configuration and programming that is generated for a given project.

F. The owner shall be provided with all usernames and passwords required from complete and unlimited access to the system.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a one year period following owner acceptance of entire building.

C. Warranty shall also include any software upgrades available during the one (1) year period.

D. Temperature control contractor shall provide support for operation of the system and improvements to energy usage to the owner throughout the first two years of operation after the date of substantial completion.

1.10 MAINTENANCE SERVICE

A. Provide service and maintenance of control system for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. The design intent is to provide a peer-to-peer networked, stand-alone, distributed control system with the capability to integrate both the ANSI/ASHRAE Standard 135-2008 BACnet protocol in one open, interoperable system. System shall be capable for future extension by other manufacturer's and shall not be write-protected.

B. Control Manufacturers (Certified by BACnet testing laboratory):
   1. Tridium Niagara 4 Vykon - JACE 8000

2. Schneider Electric - TAC I/A Series Micronet / MNB Bacnet Controllers
3. Alerton Controls - VAV and VLC Series Bacnet Controllers
4. Honeywell - Spyder PUB / PVB Series Bacnet Controllers, WEB-8000 Supervisory.
5. Johnson Controls - METASYS FEC / IOM / Series Bacnet Controllers. FX-90 Supervisory
6. Distech - ECY / ECB controllers; by prequalified contractor.
7. Trane Controls - UC210 / UC400 / UC600 Bacnet Controllers.

C. The following Installing Contractors are prequalified:
1. ChillTex
2. Waibel Energy Systems, Building Logix
3. Smith Boughan, Inc
4. Wadsworth Solutions, Inc
5. Point to Point Systems
6. **MSD - Mechanical Services and Design**

D. Substitutions: See Section 01 60 00 - Product Requirements.

E. All temperature control systems shall be installed by the factory authorized installer or representative serving the Ohio, OH Area.

2.02 EQUIPMENT - GENERAL

A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.03 CONTROL PANELS

A. Control cabinet/enclosure shall be extruded aluminum, galvanized steel or factory-hardened plastic with key locks and hinged doors. Electric panels shall be of code gauge steel construction with UL label. Panels shall be labeled with nameplates and legends as required.
1. The control cabinet/enclosure shall be required to house devices not enclosed as a part of the DDC building automation system panels. Prewire with internal wiring terminated at labeled terminal strips. Thermometers and switches shall be mounted on the cover of the panel. Relays, transformers, and components shall be mounted inside the panel. Devices, whether interior or exterior, shall be provided with legend plates of engraved formica or equal. Cabinets shall be located as approved by the Architect/Engineer or as indicated on the Drawings.
2. Local type panels need not contain graphic representations or symbols, unless specified below, but must contain approved nameplates, legends, etc., for each device.
3. Where panels contain any wiring, panels shall be UL approved cubicles.

B. Provide common keying for all panels.

2.04 TRANSMITTERS

A. Electronic Temperature Sensors
1. Provide temperature sensors and other temperature indicating sensors of commercial grade quality located at the point of measurement and installed according to the manufacturer's recommendations. Sensors to be vibration and corrosion resistant.
2. Thermistor temperature accuracy shall be +/-0.36 F between the range of 32.0 - 158.0 F.
3. Provide temperature sensors such that the BAS shall be able to convert the resistive input signal available from the element into a digital signal for use by the BAS.
4. Provide outside air temperature sensors with a watertight fitting and adequate protection from the effects of solar radiation.
5. Provide water temperature sensors of the bulb type, mounted within stainless steel wells filled with a heat conductive compound and in direct contact with the water within the pipe.

6. All field mounted sensors shall be labeled as to their function and name used in the control program.

B. Electronic Room Temperature Sensors
   1. Room Temperature Sensors shall be used in classrooms, office spaces, kitchen spaces, student dining, and gymnasiums.
   2. Temperature sensors shall be equal to PreCon type-IV thermistors utilizing a 20K ohm thermistor or platinum RTD's of 2000 ohm resistance.
   3. Housing: Sensors shall be manufactured in a durable epoxy housing and shall be enclosed for protection from elements when installed in the sensors operating environment. The sensor cover shall be provided with tamperproof screws. Sensors shall not include a display or keypad.
   4. Temperature sensors shall be provided with an override button that will switch the mechanical system into occupied mode of control. Other than the override button the thermostat face shall be blank, with no temperature adjustment, readout panels, etc.
   5. Sensor cover shall be color "Pure White".

C. Humidity Sensors
   1. Shall be a "Current Type" humidity transducer. Sensor shall produce a linear 4-20mA current representing the span of the sensor. This signal shall be produced by the sensor itself through a current converter supplied with the sensor.
   2. Space humidity sensor shall be enclosed in a durable enclosure for mounting in interior zones. Sensor shall have a range of 0 to 100 percent relative humidity and shall be accurate with + 2 percent of span.
   3. Duct humidity sensor shall be a probe type with all wiring enclosed in an electrical box. Sensor shall have a range of 0 to 100 percent with an accuracy of + 3 percent of span.
   4. Outdoor humidity sensor shall be enclosed in a weather proof enclosure for mounting outdoors. Sensor shall have a range of 0 to 100 percent with an accuracy of +/- 3 percent of span.

D. Carbon Dioxide Sensors
   1. Sensor type shall be Non-dispersive infrared (NDIR), diffusion sampling with a measurement range from 0-2000 PPM.
   2. Minimum Accuracy: +/- 75 PPM of calibrated span.
   3. Input Voltage: 20 to 30 VAC/DC; 100 mA max.
   4. Analog Output: 0-5 VDC, 0-10 VAC or 4-20 mA user selectable.
   5. Sensor shall have self-calibrating capabilities.
   6. Sensor shall have capability of sensing an alarm to the BAS in the event of a calibration problem or malfunction.
   7. At the time of Project Completion, the TCC shall verify the calibration of all CO2 sensors.
   8. TCC to verify with sensor manufacturer the best signal wiring to be used to prevent signal irregulatities and errors.

E. Current Status Switch
   1. Shall be capable of detecting changes in flow of current to motors in determining accurate and reliable equipment status.
   2. Ampere rating for 2.5 - 135 amps continuous.
   3. Sensor supply voltage shall be included from monitor conductor.
   4. Minimum current required is 1 amp.
   5. Trip setpoint shall be adjustable to +/- 1 percent of range.

2.05 BUILDING AUTOMATION SYSTEM

A. Furnish a complete Direct Digital Control system.
   1. The entire system shall be totally DDC with electric/electronic actuation. No pneumatics shall be utilized except where noted on the associated drawings.
   2. The DDC System shall support the ASHRAE Standard 135-1995 BACnet protocol.
   3. The DDC System shall communicate to the owner's communication network thru a single point of data connection. All wiring and communication downstream of that single point of data connection shall be provided with the DDC control system.
   4. The Local Area Network shall be a 100 Mpbs Ethernet network.
   5. The system shall be backward compatible. Whenever a system upgrade is provided, the system shall be capable of communicating to existing device level controllers without the requirement to provide any new equipment and controllers.
   6. The system shall be capable of operating on the latest version of IE explorer, Firefox, or Google Chrome. System shall be capable of operating without JAVA.

B. The following HVAC equipment shall be controlled by the Building Automation System including sequences. A graphic shall be provided for each piece of equipment listed below:
   1. Rooftop Air Handling Units
   2. Energy Recovery Unit

C. Operator Workstation
   1. Data Network Equipment Contractor to furnish a dedicated virtualized server to host web services and storage for temperature control use at minimum (1 TB) partition. Temperature Control Contractor shall be responsible to coordinate with Data Network Equipment Contractor and the owner's representative on requirements for server. Temperature Control Contractor to coordinate with Data Network Equipment Contractor for server resource requirements. Data Network Equipment Contractor to provide Microsoft Operating System only. Temperature Control Contractor to provide all necessary programming, additional licensing, and software required for a fully functional system.
   2. A laptop computer shall be provided as part of this project. This contractor shall install network server software on the laptop as part of this project to allow interface with this project. Provide any additional cables necessary to connect to any of the controllers on the system. The laptop shall be made available to the commissioning agent for their use as well.
      a. Critical alarms shall be reported to the laptop, cell phones, and email accounts of the maintenance department employees. All critical alarms shall be wired so that unit fans, pumps, etc. cannot be turned on in hand mode when safety device is tripped.
      b. The laptop computer shall include the ability to access the temperature control system via the owners network. User interface shall be seamless and the user shall be capable of performing all functions that can be performed locally.
   3. The computer designated shall be used for command entry, information management, network alarm management, and data base management functions. All real-time control functions shall be resident in the standalone DDC panels to facilitate greater fault tolerance and reliability.
      a. The laptop computer shall have a minimum Intel Core i5 processor with a 500.0 GB hard drive, 8 GB Ram, parallel port, serial port, USB port, wireless 802.11 A/G/N network card, an RJ45 10/100/1000 internal network card, and high capacity Lithium Ion battery. The laptop shall include a minimum 15.4" WXGA LCD panel. Furnish Nylon laptop carrying case. Acceptable manufacturers shall be IBM/Lennovo, HP,

Dell, and Toshiba. Computer platform shall be certified by DDC system manufacturer. Furnish Microsoft Windows 7 operating system as a minimum.

D. Laptop computer Hardware - Communications
   1. The new personal computers shall provide a minimum of two communication ports, one EIA-232C for local direct connect communications and one for remote dial-up communications. All communication ports shall be bidirectional data communicators.
   2. Storage of software programs and communication logic shall be maintained without battery backed assistance.

E. Server Software
   1. Server software shall take advantage of daily energy management report generation capability of the Global Control Panel (GCP) and all remote DDC controllers. The host computer shall automatically poll direct or remotely connected sites, gather the data, archive it and generate daily, weekly, monthly and yearly summaries as needed.
   2. The host software shall permit acquisition and long term storage of unlimited independent trend logs. Trends shall be operated by the host directly or automatically uploaded from the GCP or remote DDC controllers at user specified intervals. Trend data shall be graphically represented using a dynamic process graphics report generator in a bar chart or line format including HTML, XML, PlainText, or HTTP formats.
   3. Host software will contain alarm and exception processing systems. Events including point alarm, point faults, device diagnostics, maintenance time reminders, actual control programs and log on/off shall be recorded in the system status log. The System Status log shall define automatically generated exception reports based on user selectable criteria such as point type, operator, time and date of occurrence, etc. The program shall prioritize alarms for display with the most critical alarm first. An operator shall also be able to user define individual alarms to interrupt a user and display the system status log.
   4. Provide icon selection of users programs such as database programming and monitoring. Provide menus with highlighted active commands, context commands descriptions and help files. A standard mouse interface and normal keyboard operation shall access all programs. Provide continuous display of system status, and text monitoring screens with highlighted alarm conditions and report generation.
   5. Any action taken by an operator shall be logged to the systems status log to render an audit trail of operator actions. User access definitions shall be completely definable and modifiable by the system's manager.
   6. The Graphical User Interface (GUI) shall run on Microsoft Windows 7 or most recent.
   7. The GUI shall employ standard browsers including Windows Explorer and Firefox. It shall include a tree view (similar to Windows Explorer) for quick viewing of, and access to, the hierarchical structure of the database. In addition, menu-pull downs, and toolbars shall employ buttons, commands and navigation to permit the operator to perform tasks with a minimum knowledge of the HVAC Control System and basic computing skills. These shall include, but are not limited to, forward/backward buttons, home button, and a context sensitive locator line (similar to a URL line), that displays the location and the selected object identification.
   8. Real-Time Displays. The GUI, shall at a minimum, support the following graphical features and functions:
      a. Minimum Required Graphics:
         1) All setpoints shall be shown on the respected graphic page for each piece of equipment. All setpoints shall be adjustable and acceptable range of adjustment shall be noted in as-built sequence of operation.

2) Home Screen with background image of school building or school logo and include following:
   (a) Information on current weather conditions
   (b) Link to building floor plan
   (c) Link to each individual air handling unit screen.
   (d) Link to alarms page
   (e) Link to schedules page
   (f) Snow Day Schedule Button.
3) Floor Plan: Overall floor plan shall be provided with units broke out in different colors. Link to each individual enlarged unit plan. Enlarged Unit plans shall contain:Unit shall Color graphic floor plan and zone floorplans showing all space temperatures, space CO2 levels and humidity levels where indicated on tempeature control drawings.
   (a) Floor plan showing all spaces with room numbers matching owner's final room number designations.
   (b) Temperature of each space. Either space or text shall change color based on deviation away from setpoint. Space or text shall change to blue if room below setpoint by 2 F (adj) and change to red if above 2 F (adj) setpoint. Text to be green for space setpoint met.
   (c) Show space humidity at locations of space humidity sensors.
   (d) Link back to overall floor plan.
   (e) Link to equipment page serving the room by clicking on the individual space.
   (f) Link to alarm page.
4) Space Equipment Screen: Screen showing the individual equipment serving the space. Information on screen shall include:
   (a) Graphic of equipment including heating / cooling coils, valves, fans, and dampers. Graphics shall be dynamic.
   (b) Fan operation including fan speed if variable speed.
   (c) Damper Positions.
   (d) Primary airflow value. Also minimum and maximum airflow settings.
   (e) Discharge air temperature.
   (f) Current space temperature, space setpoint, and setback temperature setpoints
   (g) Override button with override temperature
   (h) Current CO2 level (if specified), high and low level CO2 setpoints
   (i) Link to associated air handling unit.
   (j) Link back to overall floor plan screen.
   (k) Link to alarm screen.
5) Air Handling Unit Screen:
   (a) Graphic of equipment including heating / cooling coils, valves, dampers, fans, filters, airflow stations and other sensors. Graphic shall be dynamic
   (b) Fan operation including fan speed if variable speed.
   (c) Provide a link to VFD screen. On VFD screen provide in a table format all information from VFD.
   (d) Damper Positions.
   (e) Energy Recovery wheel status
   (f) Airflow values and temperature values as shown on temperature control drawing schematics.

(g) If air handling unit is set up as a VAV air handling unit, include the following information:
(1) Supply air temperature
(2) Supply air temperature setpoint
(3) Supply air static pressure
(4) Supply air fan static pressure setpoint.
(h) If air handling unit serves a single zone, include the following information on the equipment screen:
(1) Space Temperature
(2) Space Temperature setpoint.
(3) Unoccupied space temperature and humdity setpoints.
(4) Space Humidity level.
(5) Space Humidity setpoint.
(6) Space CO2 level.
(7) Space CO2 setpoint.
(i) Filter differential pressure. Include alarm if DP hits high limit.
(j) Link to associated chilled water plant.
(k) Link to associated heating water plant.
(l) Link to sequence of operation page.
(m) Link to alarm page.
(n) Link back to overall floor plan.

6) Miscellaneous Equipment
(a) Include status, on/off button where noted in the sequence of operation, space temperature, space temperature setpoint for:
(1) Electric Duct Heater
(2) Technology space cooling equipment.

7) Alarms Page
(a) The system will be provided with a dedicated alarm screen. This screen will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm.
(b) All critical alarms shall be wired so that unit fans, pumps, etc. cannot be turned on in hand mode when safety device is tripped.
(c) All critical alarms as determined by the owner shall be sent ot email accounts, cell phones, and pagers via text messaging capabilities.

8) Schedules Page
(a) Provide calendars for all air handling equipment.

b. The sequence of operations shall be located as a pull down feature at each piece of equipment or provide a link to a pdf document of the sequence of operations.
c. Provide As-Built wiring diagrams complete with material part numbers.
d. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands. Dynamic temperature values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention.
e. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, or JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures.

f. Graphic screens shall contain objects for text, real-time values, animation, color spectrum objects or “thermo-graphics”, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.
g. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.
h. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.
    1) Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
    2) Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.
    3) Snow Day Operation shall be set by clicking on a "Snow Day" button located on screen of graphics.
i. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.
j. Adjustments to analog objects, such as set points, shall be done by right-clicking the selected object and using a graphical slider to adjust the value. No entry of text shall be required.

9. System Configuration: At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:
    a. Create, delete or modify control strategies.
    b. Add/delete objects to the system.
    c. Tune control loops through the adjustment of control loop parameters.
    d. Enable or disable control strategies.
    e. Generate hard copy records or control strategies on a printer.
    f. Select points to be alarmable and define the alarm state.
    g. Select points to be trended over a period of time and initiate the recording of values automatically.
10. On-Line Help: Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in HTML format.
11. Security: Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.
12. System Diagnostics. The system shall automatically monitor the operation of all workstations, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

2.06 BUILDING AUTOMATION EQUIPMENT

A. System Network Controller (SNC)
    1. These controllers are designed to manage communications between the programmable equipment controllers (PEC), application specific controllers (ASC) and advanced unitary

controllers (AUC) which are connected to its communications trunks, manage communications between itself and other system network controllers (SNC) and with any operator workstations (OWS) that are part of the BAS, and perform control and operating strategies for the system based on information from any controller connected to the BAS.

2. The controllers shall be fully programmable to meet the unique requirements of the facility it shall control.
3. All devices shall meet the requirements of clause 22.1.5 of ASHRAE 135-2012. Use Analog inputs and outputs. If Analog Output objects are used, these must be writeable.
4. The controllers shall be capable of peer-to-peer communications with other SNC's and with any OWS connected to the BAS, whether the OWS is directly connected, connected via cellular modem or connected via the Internet.
5. The communication protocols utilized for peer-to-peer communications between SNC's will be Niagara 4 Fox, BACnet TCP/IP and SNMP. Use of a proprietary communication protocol for peer-to-peer communications between SNC's is not allowed.
6. The SNC shall employ a device count capacity license model that supports expansion capabilities.
7. The SNC shall be enabled to support and shall be licensed with the following Open protocol drivers (client and server) by default:
    a. BACnet
    b. SNMP
8. The SNC shall be capable of executing application control programs to provide:
    a. Calendar functions.
    b. Scheduling.
    c. Trending.
    d. Alarm monitoring and routing.
    e. Time synchronization.
    f. Integration of BACnet controller data.
    g. Network management functions for all SNC, PEC and ASC based devices.
9. The SNC shall provide the following hardware features as a minimum:
    a. Two 10/100 Mbps Ethernet ports.
    b. Two Isolated RS-485 ports with biasing switches.
    c. 1 GB RAM
    d. 4 GB Flash Total Storage / 2 GB User Storage
    e. Wi-Fi (Client or WAP)
    f. USB Flash Drive
    g. High Speed Field Bus Expansion
    h. -20-60°C Ambient Operating Temperature
    i. Integrated 24 VAC/DC Global Power Supply
    j. MicroSD Memory Card Employing Encrypted Safe Boot Technology
10. The SNC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.
11. The SNC shall provide alarm recognition, storage, routing, management and analysis to supplement distributed capabilities of equipment or application specific controllers
12. The SNC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via cellular modem, or wide-area network.
    a. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but not limited to:
        1) Alarm.
        2) Return to normal.

3) To default.
b. Alarms shall be annunciated in any of the following manners as defined by the user:
1) Screen message text.
2) Email of complete alarm message to multiple recipients.
c. The following shall be recorded by the SNC for each alarm (at a minimum):
1) Time and date.
2) Equipment (air handler #, access way, etc.).
3) Acknowledge time, date, and user who issued acknowledgement

13. Programming software and all controller "Setup Wizards" shall be embedded into the SNC.
14. The SNC shall support the following security functions.
a. Module code signing to verify the author of programming tool and confirm that the code has not been altered or corrupted.
b. Role-Based Access Control (RBAC) for managing user roles and permissions.
c. Require users to use strong credentials.
d. Data in Motion and Sensitive Data at Rest be encrypted.
e. LDAP and Kerberos integration of access management
15. The SNC shall support the following data modeling structures to utilize Search; Hierarchy; Template; and Permission functionality:
a. Metadata: Descriptive tags to define the structure of properties.
b. Tagging: Process to apply metadata to components
c. Tag Dictionary
16. The SNC shall employ template functionality. Templates are a containerized set of configured data tags, graphics, histories, alarms... that are set to be deployed as a unit based upon manufacturer's controller and relationships. All lower level communicating controllers (PEC, AUC, AVAV, VFD…) shall have an associated template file for reuse on future project additions.
17. The SNC shall be provided with a 5 Year Software Maintenance license. Labor to implement not included.

B. Primary Controllers (Air Handling Units, Chilled Water Plant, and Heating Water Plant)
1. Each primary controller shall be a dedicated, stand-alone, microprocessor-based DDC controller that is BACnet certified (B-BC / B-AAC) with sufficient capacity to handle all points and programming associated with the control sequences as specified. In addition, each controller shall have a minimum 15% spare point capacity. Primary controllers shall be capable of being mounted within the equipment housing and shall have the capability to be programmed on-line and/or off-line (simulation capability) as required to meet unique HVAC application needs as well as the various ASHRAE control cycles. Primary controllers shall be capable of communicating global and critical variables to other primary controllers residing on the same network without the intervention of a higher level controller (Peer to Peer communication).
2. All devices shall meet the requirements of clause 22.1.5 of ASHRAE 135-2012. Use Analog inputs and outputs. If Analog Output objects are used, these must be writeable.
3. All primary controllers shall be application programmable and shall at all times maintain their certification. All control sequences within or programmed into the primary controller shall be stored in non-volatile memory, which is not dependent upon the presence of a battery to be retained.
4. Software incorporated into the controller shall include the following:
a. Real time operating system software
b. Real time clock/calendar and network time synchronization

c. Primary control unit diagnostic software
d. LAN/WAN communication software
e. Alarm processing and buffer software
f. Energy management software
g. Data trending, reporting, and buffering software
h. Input/output database (physical and virtual points)

5. Primary controller shall have expansion capability to support additional I/O requirements thru remote expansion input/output modules.
6. The controller shall have a mix of digital inputs (DI), digital Triac outputs (DO), analog outputs (AO), and universal inputs (UI).
   a. Analog outputs (AO) shall be capable of being configured as digital outputs (DO).
   b. Input and Output wiring terminal strips shall be removable from the controller without disconnecting wiring.
   c. Input and Output wiring terminals shall be designated with color coded labels.
   d. Universal inputs shall be capable of being configured as binary inputs, resistive inputs, voltage inputs (0-10 VDC), or current inputs (4-20 mA).
7. The controller shall provide "continuous" automated loop tuning with an Adaptive Integral Algorithm Control Loop.
8. An RJ-11 type connection serial port shall allow a local portable operator terminal to access all program blocks and attributes for complete programmability. The port shall also support complete up/downloading capability.
9. All input/output and control parameters may be utilized or shared throughout the network. All primary controllers shall be accessible throughout the network.

C. Secondary Controllers (VAV units, cabinet heaters, and miscellaneous equipment)
1. Each secondary controller shall be a stand-alone, microprocessor-based DDC controller that is BACnet certified (B-AAC / B-ASC) with sufficient capacity to handle all points associated with the control sequences as specified. Secondary controllers shall be capable of being programmed on-line and/or off-line (simulation capability) as required to meet the specific HVAC application needs as well as the various ASHRAE control cycles. Secondary controllers shall be capable of communicating with other secondary controllers through an interface or higher level controller.
2. All devices shall meet the requirements of clause 22.1.5 of ASHRAE 135-2012. Use Analog inputs and outputs. If Analog Output objects are used, these must be writeable.
3. Secondary controllers shall be microprocessor-based, programmable DDC controllers with all operating parameters, setpoints and schedules stored in memory which resides on the controller.
4. Software incorporated into the controller shall include the following:
   a. Real time operating system software
   b. Secondary control unit diagnostic software
   c. LAN/WAN communication software
   d. Control software applicable to the unit it serves that will support one mode of operation
   e. Input/output database (physical and virtual points) to support one mode of operation
5. The controller shall have digital inputs (DI), digital Triac outputs (DO), three analog outputs (AO), and universal inputs (UI).
   a. Analog outputs (AO) shall be capable of being configured as digital outputs (DO).
   b. Input and Output wiring terminal strips shall be removable from the controller without disconnecting wiring.
   c. Input and Output wiring terminals shall be designated with color coded labels.

6. The controller shall provide "continuous" automated loop tuning with an Adaptive Integral Algorithm Control Loop.
7. The controller platform shall have a standard HVAC application program(s) that are modifiable to support both the traditional and specialized "sequence of operations" as outlined in the specification. The controller shall have the capability to communication thru read/write the following:
    a. Reset room setpoint
    b. Read/log/trend room temperature
    c. Override day or night operation
    d. Change maximum heating and cooling CFM flow rates (VAV terminal units)
    e. Change minimum heating and cooling CFM flow rates (VAV terminal units)
    f. Read CFM flow rate at each terminal (VAV terminal units)
    g. Read the discharge air temperature at each terminal unit
    h. Room CO2 control.
    i. Assign daily occupied/unoccupied times
    j. Read terminal type i.e. fan powered, reheat, etc.
8. Should communications to the secondary controller fail in any manner, the controller will have its configuration in non volatile memory and shall maintain room setpoint.

2.07 TEMPERATURE CONTROL WIRING

A. The DDC System shall communicate to the owner's communication network thru a single point of data connection. All wiring and communication downstream of that single point of data connection shall be provided with the DDC control system.

B. Control wiring shall meet the requirements of Article 725, Class 1, Class 2, Class 3 Remote-Control, signaling, and power-limited circuits of the NEC.

C. Control wiring shall be UL listed plenum rated cable or installed in conduit. Wiring shall be routed in conduit where exposed to occupied spaces and in mechanical rooms. Conduit shall be 1/2 inch minimum size and shall be furnished and installed under this section. Exposed wiring in occupied spaces and mechanical rooms will not be accepted.

D. Concealed wiring and wiring in non-plenum ceiling cavities, which is operating under 100 volts, may be open wired if in compliance with Article 725, NFPA-70 (NEC). Open wiring shall be secured with plastic tie wraps to the permanent building structure as approved by the Architect/Engineer.

E. Terminations shall be performed by the Temperature Control Contractor.

F. Wire and conduit not indicated on the Drawings or in the Specifications, but required by the controls supplier, shall be paid for by the Temperature Control Contractor. This includes power supply wiring which is not indicated in the Division 26 drawings but which is necessary for system operation.

G. Temperature control cable is to be properly supported per industry standards and practices. Cable tray shall not be used for installation of temperature control wiring.
    1. Bridle rings shall be used to support wiring in all return air plenums.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that systems are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

C. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.

D. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

E. Ensure installation of components is complementary to installation of similar components.

F. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Airflow measurement sensing elements location and sizing of airflow measurement elements shall be confirmed in the field by local factory representative. Velocity calculation and corresponding differential pressure calculations will be calculated accordingly.

C. Installing contractor shall remote mount the transducer in an acceptable location and provide all pneumatic tubing & wiring required between the transducer and airflow sensors.

D. Check and verify location of thermostats with plans and room details before installation. Locate bottom at 44 inches above floor. Align with lighting switches.

E. Mount freeze protection thermostats using flanges and element holders.

F. Mount outdoor reset thermostats and outdoor sensors indoors, with sensing elements outdoors with sun shield.

G. Provide separable sockets for liquids and flanges for air bulb elements.

H. Provide guards on thermostats where indicated.

I. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.

J. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.

3.03 SEQUENCE OF OPERATION

A. Refer to Specification Section 23 0993 for all equipment sequences of operation.

3.04 OCCUPIED / UNOCCUPIED ZONES

A. Manual Overrides:
   1. Provide manual, push button overrides as a part of each room temperature sensor. Pressing of override button will place zone on which sensor is located into a programmed override that is adjustable through the software.
   2. All zones shall include computer controlled overrides.

B. Refer to specification section 23 0993 for specified zones.

3.05 GUARANTEE

A. It is intended that the Temperature Control Contractor include as part of his bid two (2) year full service warranty. All labor and material shall be guaranteed against defects in workmanship for two (2) year period from the date of Substantial Completion and acceptance by the Owner. Any material proving defective shall be repaired or replaced during that period. This shall not, however, apply to material that has been damaged due to willful negligence.

B. The Contractor will provide hardware and software support during the two year guarantee after the date of acceptance. Hardware support includes replacing of any major or minor components, relays, sensors, etc., that fail to operate properly. Software support includes upgrading of software during warranty period such that system is loaded with latest available revision at end of warranty period.

C. Software support during the two year warranty shall include any programming changes to correct control operation resulting in alarms. All changes shall be cooresponded with the design engineer and owner.

D. Support is also defined to include Owner personnel training needed to operate the system effectively as outlined in this Specification. Explicitly included is the training needed to analyze a building's operation with a view to minimizing energy costs.

3.06 TRAINING

A. The Temperature Control Contractor shall, during the one-year guarantee period, provide no less than (8) 4-hour training sessions to be held at the building site after system is in full operation. A total of two 4 hour training sessions shall be given quarterly during the first 12 months of operation to familiarize maintenance personnel on the operation of the mechanical and control systems through the host computer.

B. Training shall include a hands on process to get owner involved with making changes, setting schedules, monitoring and acknowleding alarms, setting up trends, and monitoring trends.

C. All training shall be video-taped by the control Contractor. Two copies shall be turned over to the owner's maintenance staff.

3.07 SERVICE CHECKS

A. Prior to final inspection, this Contractor shall perform the following service work, including, but not limited to, the following items:
   1. Check and oil electric motors furnished under control system.
   2. Lubricate damper bearings as required.
   3. Check damper travel, adjust and tighten set screws.
   4. Lubricate valve stems, as required, check packing; repair as required.
   5. Calibration of instruments.
   6. Check and verify circuitry.
   7. Calibrate and checkout controllers, fusing, etc.
   8. Test and debug microprocessor and software.
   9. Startup and test operation of variable frequency drive with factory authorized personnel.

3.08 FINAL COMPLETION

A. When the work is completed, and at a time directed by the Owner or the Architect/Engineer, the Contractor shall carefully adjust all parts of the equipment and systems. This includes adjustment of automatic controls and safety devices, proper setting of adjustable devices, dampers and valves, and other necessary operations so the systems are fully operable and automatic in operation. Upon completion of the Work, notify the Owner, and/or Architect/Engineer that system is ready for final tests and inspection.

B. At the time of final inspection, this Contractor shall be represented by a person with the proper authority, who shall demonstrate, as directed by the Architect/Engineer, that his Work fully complies with the purpose and intent of the Specifications and Drawings. Labor, services, instruments, and tools necessary for demonstrations and tests shall be provided by the Contractor.

C. The Contractor shall test and adjust each instrument specialty and equipment furnished by him, prior to final acceptance. The Contractor shall demonstrate, for approval by the Architect/Engineer, that subsystems operate as a coordinated and properly functioning, integrated system.

D. The Contractor shall furnish labor, provide adjustments and incidentals necessary to obtain the desired and intended results.

E. The Contractor shall turn over a printed copy and electronic copy of the completed and debugged operating software to the Owner at the conclusion of the first year warranty.

F. The contractor shall provide a list of all devices and their addresses to the owner. This shall be included in the O&M manual.

G. The Contractor shall corrdinate with the Commissioning Agent to run requested trends for demonstration of the functions.

END OF SECTION 23 09 13

SECTION 28 31 01
FIRE ALARM - DETECTION SYSTEM

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements are included as a part of this Section as though bound herein.

1.02 SUMMARY

A. Provide labor, material, equipment, and accessories necessary for a complete operable, electronically operated fire alarm system as indicated on the Athletic Building Drawings and specified herein.

1.03 SUBMITTALS

A. Shop Drawings
   1. The system manufacturer's representative shall be responsible for furnishing 5 sets of engineering drawings matching the layout, scale, and sheet size of the contract documents. These drawings shall be assembled in a manor to satisfy the most recently adopted edition of the Ohio Building Code (OBC) concerning Fire Alarm Detection System Shop Drawings. These drawings shall indicate the interlocking of equipment external to the various control panels. These Drawings shall be included in the submittal to the Architect/Engineer for approval and shall be stamped/signed by a manufacturer's representative who is NICET Level III or IV certified and certified by the State of Ohio Board of Building Standards (OBBS) as a fire alarm system designer, or stamped by a Professional Engineer in the State of Ohio. The Owner will pay the drawing approval fees associated with the state plan approval of the fire alarm system. The Architect will be responsible for submitting the final fire alarm system shop drawings to the state for approval. The Contractor must submit this shop drawing information in a timely manner so as not to impede the project progress.
      a. The engineered drawings shall be stamped by the NICET certified designer or the PE of record for the fire alarm system.
      b. The Contractor shall provide additional documentation, certification, etc. as required to submit for fire alarm system plan approval.
      c. Fire alarm Drawings released with this set of specifications are for bidding purposes only. Devices are shown in the desired locations as coordinated with the building design, equipment, furniture, etc. The fire alarm system designer shall review the Drawings and notify the electrical engineer immediately if it is noticed that additional devices will be needed for code compliance.
   2. Complete and comprehensive shop drawings shall be submitted to the Architect/Engineer for review.

B. Post Construction
   1. Provide signed (by attendees & trainer) & dated training syllabus for each completed training session to the Architect/Engineer Technology Designer.
   2. Operation & Maintenance Manuals
      a. Provide complete O & Ms. PDF format.
      b. PDF shall be fully indexed by Section Name/System/Device.
   3. The Architect/Engineer Technology Designer may require operational demonstration of any products and systems to verify Execution/Installation/Configuration requirements are met.

1.04 QUALITY ASSURANCE

A. Units on the fire alarm system shall be listed by Underwriters Laboratories, Inc. for fire alarm use, and the control panel shall bear the UL label. The system shall be installed in accordance with requirements set by National Electric Code with particular attention to Article 760 and in compliance with applicable provisions of Standards No. 72 published by the National Fire Protection Association (NFPA), section 907 of the Ohio Building Code (OBC) and also with Local Code requirements.

B. All equipment must have transient protection to comply with UL864 requirements. Where fire alarm circuits leave the building, additional transient protection must be provided for each circuit.

1.05 CERTIFICATION

A. The Contractor shall provide the services and equipment of an alarm service company certified by NICET as being capable of furnishing the signaling systems specified herein. All components of the fire alarm system shall be U.L. listed.

B. The Contractor shall be certified by the system manufacturer for installation and programing with a minimum of five years experience with this system or similar fire alarm systems. All components of the fire alarm system shall be U.L. listed.

1.06 WARRANTY

A. Components, parts, and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship in a period of 12 months, commencing upon system start up and beneficial use, at which time the system is protecting property of occupants, provided such defects are not caused by a misuse, abuse, neglect, unauthorized tampering, equipment modifications, or acts of God. Warranty services shall be provided by a qualified factory trained representative of the equipment manufacturer during normal working hours. The representative shall be based in a fully staffed branch office and located within a reasonable distance from the job site. An adequate supply of repair parts shall be maintained by the branch office. The manufacturer shall not be liable for consequential damages. The manufacturer's statement of warranty shall be included in the submittals.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Simplex

B. Secutron

C. EST

D. Siemens

E. Notifier

F. Mircom

G. Potter

H. Substitutions: See Section 01 6000 - Product Requirements.

2.02 FIRE ALARM CONTROL PANEL

A. Provide a new analog/addressable Fire Alarm Control Panel (FACP), model number FX-353-LDR manufactured by Mircom, equals by Notifier NFS2-640, Simplex 4100ES and Secutron MR-2200, EST iO500, Siemens FC924. The FACP shall be capable of supporting up to 378 addressable points of any combination of addressable sensors or modules, equipped with a backlit LCD display, numerical keypad, and integrated UDACT/Digital Communicator. The

digital communicator shall be able to be set for DACT or UDACT mode of operation. The FACP shall be configurable via the front panel, PC, or remotely through a built-in modem. The control panel shall have an interface for connection of up to seven remote annunciators.

1. Sensors shall be configurable as alarm, verified alarm, latching or non-latching supervisory, monitor, and trouble.
2. Modules shall be capable to be configured as alarm, latching supervisory, non-latching supervisory, water flow, monitor, trouble, fire drill switch, signal silence switch, and aux disconnect.
3. Indicating circuits shall be configurable as silenceable or non-silenceable for both horns and strobes.
4. The control unit shall be capable of fire detection, equipment supervision and control, alarm management, and historical data collection and archiving.

B. Cellular Fire Alarm Communicator

1. Provide a new cellular fire alarm communicator equal to Telguard TG-7FS model.
2. The communicator may be used in Commercial Fire Alarm Systems as the sole (Cellular Transmission only), primary (Cellular Primary & Telco Backup), or secondary (Telco Primary & Cellular Backup) communication paths, via cellular network.
3. Communicator is to be capable of working on Verizon's LTE Band or AT&T's Dual Band CDMA 1xRTT.
4. Compliant with the 2016 Edition of NFPA 71.
5. Meets UL 864 requirements for sole, primary, or backup path communications.
6. Power
    a. Transmit Power: 200mW in all bands
    b. 60mA Standby
    c. 250mA Transmission
    d. Transformer - 12 VAC, 800mA, UL Listed - Plug In
    e. Minimum 7AH Battery
7. Multiple Alarm Format Support
    a. Pulse Formats
        1) 3+1 pulse, 10pps, Double Round, 1400Hz ack
        2) 3+1 pulse, 20pps, Double Round, 2300Hz ack
        3) 3+1 pulse, 40pps, Double Round, 1400Hz ack
        4) 4+2 pulse, 20pps, Double Round, 1400Hz ack
        5) 4+2 pulse, 20pps, Double Round, 2300Hz ack
        6) 4+2 pulse, 40pps, Double Round, 2300Hz ack
    b. ContactId
    c. Modem IIe/IIIa2/4
    d. SIA2 (SIA-DC-03 level 2 release at 300 baud)
    e. Sonitrol
    f. DMP
8. Complete Supervision of Communication Path(s)
    a. Line Fault Condition (LFC)
    b. No Service Condition (NSC)
    c. Radio Communications Failure Condition (RFC)
    d. Panel Presence Failure (PPF)
    e. Control Failure to Communicate (CFC)
9. Complete Power Supervision
    a. Low/Missing Battery Condition (LBC)

b. AC Failure Condition (ACFC)
c. Dial Tone Failure (DTF)
d. Catastrophic Failure (CF)

10. Programmable Supervisory Trip Output Relays (STC), (2)
    a. STC1 - Normally Open
    b. STC2 - Normally Closed
    c. 1 or both STC relays shall be interfaced to main fire alarm panel to initiate abnormal trouble condition(s)
    d. The following supervisory features or combination of features are programmable to trip STC relays to meet a variety of installation requirements:
        1) Trips on AC fail condition (ACFC or Low Power Failure (LPF) if applicable)
        2) Trips on low or missing battery condition (LBC)
        3) Trips on no service condition (NSC)
    e. Trips on line fault condition (LFC)
        1) Trips on radio failure condition (RFC)
        2) Trips on dial tone failure (DTF)
    f. The following system trouble features or embedded in the communicator for tripping the STC relays and cannot be changed:
        1) Tripped when unit is not activated at the Telguard Communications Center (TCC)
        2) Trips on catastrophic failure (CF)
        3) Trips on deactivation command from the TCC
11. Radio Transceiver
    a. LTE Bands: 4 & 13 (Verizon)
    b. Dual Band CDMA 1xRTT (AT&T)
12. Physical Details
    a. 7.5" H x 11.5" W x 3.5" D Red Cabinet to house transceiver and battery
    b. Operating Environment: 32 to 122 degrees Fahrenheit, up to 95% Humidity
13. Accessories
    a. ACD12/ACD35/ACD50/ACD100: 12/35/50/100 Feet of Low Loss High Performance Cable
    b. HGDL-0/HGD-0 High Gain Directional Antenna or equal.
    c. EXDL-0/EXD-0 External Antenna or equal (if 2.5 RSSI is not obtained by unit mounted antenna).
    d. Provide and install necessary cable and antenna to ensure minimum 2.5 RSSI.

C. Provide dedicated 20 amp, 120 volt circuit for control panel power feed. This circuit shall be fed from the emergency generator power system when emergency generator power is available on site.
    1. Provide circuit breaker markings, locks, etc. to satisfy applicable codes and the local AHJ.

D. Provide panel with NAC extender modules as required to accommodate the number of NAC power supply units for a complete operating system.

E. The following components shall be supervised in the event of an open circuit and be identified by a yellow LED as to its faulty circuit, whether the trouble is in the alarm bell relay, device alarm, or alarm LED's.
    1. Provide necessary auxiliary contacts (alarm and trouble), for sending signals to the dialer system.
    2. Provide necessary auxiliary contacts to shut down the AH units and close the smoke doors as required. See Drawings for location on initiation devices.

3. Control panel shall provide a telephone dialer actuation and supervisory circuit. A switch shall be provided to disconnect the fire alarm system from the telephone dialer. Actuation of the disconnect switch or disconnecting the dialer phone line shall cause the system trouble signal to operate and a specific telephone dialer disconnect LED to annunciate.
4. Control panel shall have provisions for graphic remote zone annunciation.

2.03 NOTIFICATION APPLIANCE CIRCUIT (NAC) POWER SUPPLY UNITS

A. Provide NAC units as necessary per manufacturer for a complete operating system. Coordinate rough-in and power requirements for unit with Division 26 contractor. Division 26 contractor shall provide rough-ins and power per manufacturer's requirements.
   1. Provide 20 amp, 120 volt circuit for power supply unit power feed. This circuit shall be fed from the emergency generator power system when emergency generator power is available on site. Provide circuit breaker markings, locks, etc. to satisfy applicable codes and the local AHJ.

2.04 SYSTEM DEVICES

A. Addressable Manual Fire Alarm Pull Station.
   1. The pull station shall be dual action pull lever type, key resettable, have a permanently attached intelligent addressable module, and have a plastic breakrod. The pull station shall have a red, metal die-cast housing.
   2. The pull station shall contain electronics that communicate the station's status to the FACP.

B. Addressable Thermal Fire Detector and base.
   1. Combination rate-of rise and 135 degrees F fixed temperature
   2. White polycarbonate housing.
   3. Low profile, flanged, addressable mounting base with electronics to communicate the detector's status to the FACP.
      a. Thermal fire detectors used for direct control of other systems or devices (i.e. smoke dampers, door holds, elevators, shunt trip circuit breakers, etc.) shall have a mounting base equipped with an integral set of dry contacts, or an external intelligent addressable relay module may be used for control. Power through the relay to be coordinated with Division 26. Refer to E3 and E5 sheets for additional information.

C. Addressable Area Photo Electric Smoke Detector and base.
   1. Intelligent photoelectric smoke sensor with LED which flashes when detector is polled and turns steady on when detector goes into alarm.
      a. Provide a remote LED indicator for smoke detectors mounted above ceilings in smoke dampers and the like. LED indicator shall be flush mounted in ceiling directly below smoke detectors. Provide a label for the remote LED to indicate its purpose.
   2. White polycarbonate housing.
   3. Low profile, flanged, addressable mounting base with electronics to communicate the detector's status to the FACP.
      a. Smoke detectors used for direct control of other systems or devices (i.e. smoke dampers, door holds, elevators, shunt trip circuit breakers, etc.) shall have a mounting base equipped with an integral set of dry contacts, or an external intelligent addressable relay module may be used for control. Power through the relay to be coordinated with Division 26. Refer to E3 and E5 sheets for additional information.

D. Addressable Duct Type Smoke Detector.
   1. Air duct mounted photoelectric type smoke detector assemblies listed by UL and approved by Factory Mutual Research under the current standards for photoelectric type duct

detectors. The duct detector assembly shall be addressable with electronics to communicate detector's status to the FACP.

2. Assembly shall operate at air velocities from 100 feet to 4000 feet per minute.
3. Provide sampling tubes based on size of ductwork. Coordinate exact size with ductwork in field.
4. Assembly shall have visual indication of alarm and power. Provide a remote LED indicator light, wall mounted and labeled, to indicate its purpose by each air handler unit VFD.
5. The duct type smoke detector shall be equipped with integral set of dry contacts, or an external intelligent addressable relay module may be used for control. Power through the relay to be coordinated with Division 26.

E. Addressable Carbon Monoxide Gas Detector
   1. Intelligent CO sensor with LED which flashes when detector is polled and turns steady on when detector goes into alarm.
   2. White polycarbonate housing.
   3. Low profile, flanged, addressable mounting base with electronics to communicate the detector's status to the FACP.

F. Addressable Monitor Module.
   1. Intelligent addressable module with electronics to communicate the module's status to the FACP.
   2. LED to indicate module status.

G. Addressable Relay Module.
   1. Intelligent addressable module with electronics to communicate the module's status to the FACP.
   2. LED to indicate module status.
   3. Two isolated sets of contacts to control desired functions.

H. Remote LED Alarm Indicator.
   1. LED indicator light to connect to smoke detectors, duct detectors, etc. to show status of hidden or remote device.

I. Notfication Devices:
   1. Wall Strobe
      a. Recessed synchronized strobe light with back box and trim, 24VDC, with light intensity of 110 candela, 225mA, flush mounted at 80 inches above finished floor or 6 inches below ceiling, whichever is lower.
      b. Color: Red
      c. Provide a sync module for notification devices.

J. Signal Devices:
   1. Recessed combination synchronized strobe light with 4 inch electronic horn (or single synchronized strobe), with back box and trim, 24VDC, with light intensity of 110 candela, 225mA, flush mounted at 80 inches above finished floor or 6 inches below ceiling, whichever is lower.
      a. Wire circuits to a maximum of 80% capacity.
      b. Provide a sync module for signal devices.

K. Remote Annunciator.
   1. Backlit LCD display to show system status.
   2. Indicators for A.C. on, alarm, supervisory, trouble, and CPU fail.
   3. Control switches for system reset, signal silence, fire drill, and acknowledge.
   4. Numeric keypad to access menu functions.

5. Flush mounted.

2.05 SYSTEM WIRING

A. Provide in accordance with manufacturer's instructions, wiring (in conduit), and outlet boxes for the erection of a complete system as described herein and as shown on the Engineer's Drawings. Minimum wire size shall be No. 14, provide wiring per manufacturer's requirements.

B. Wiring shall be in accordance with requirements of the National Electrical Code and NFPA Regulation No. 72. The fire alarm, including components and wiring, shall be completely installed and wiring shall be properly tagged and color coded. The Contractor shall make final connections as shown and required by the equipment manufacturer's wiring instructions.

C. The manufacturer's authorized representative shall perform a quality inspection of the final installation, which shall be done in the presence of the Contractor and local Authority Having Jurisdiction (AHJ). The representative shall submit a certificate of completion to the contractor when work is satisfactorily completed.

2.06 SYSTEM PERFORMANCE REQUIREMENTS

A. The activation of any fire alarm station or automatic detector circuit shall automatically perform the following functions:
   1. All automatic programs assigned to the alarm point shall be executed and the associated indicating devices and relays activated.
   2. The System Alarm on appropriate panel will indicate an alert condition.
   3. Activate all control by event functions related to the alarm.
   4. The approved certified Central Monitoring Agency to be signaled automatically.
   5. Shut down individual HVAC units upon activation of local detectors.
   6. Sound a continuous alarm over all signals and activate the associated flashing light.
   7. Activation of the building fire alarm system shall automatically unlock access controlled egress doors and the doors shall remain unlocked until the fire alarm system has been reset.

B. Test - Fire Drill Mode
   1. Include with the system a "Fire Drill Mode". Upon activation of Fire Drill Mode, the annunciators and horns and strobes will activate. HVAC units will NOT be shut down, and the communicator will NOT dial out to the central monitoring agency. This will be a button activation at the main control panel, and there will be button deactivation at the main control panel.

C. Emergency Lock Down Monitoring.
   1. The system shall monitor the access control system and release all doors with hold opens upon activition of the emergency lock down function without activating notification devices.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install new manual stations, signals, wiring system, and power and automatic stations (ceiling smoke detectors, duct mounted smoke detectors, thermo detectors, and the like). Connect to new fire alarm system as required by system manufacturer.

B. Installations shall be in strict conformance with the manufacturer's recommendations.

C. For each smoke damper shown on the Drawings provide a smoke detector rated for the air velocity of the opening. Mount the smoke detector in the damper opening per the manufacturer's recommendations.

1. Coordinate 120 volt power connections to smoke dampers with Division 26. Smoke detectors used for control of smoke dampers shall have an integral relay, or an external intelligent addressable relay module may be used for damper power control. Refer to E3 and E5 sheets for smoke damper locations.

D. Outlets shall be equipped with the appropriate fire alarm device.

E. Wiring shall be installed in conduit.

3.02 PROGRAMMING

A. Program the system using the Owner's final room number designations, not the Architect's room numbers as shown on the Drawings.

3.03 PARTIAL OR CONTINUED OCCUPANCY

A. Should the Owner elect to partially occupy or continuously occupy the building prior to Substantial Completion of all work, the fire alarm system for that portion of the building so occupied, including the assigned means of egress from same, shall be made fully operational. System status shall be certified in writing by the manufacturer and the Division 26 Contractor.

3.04 DEMONSTRATION/INSPECTION

A. The manufacturer's authorized representative shall perform a quality inspection of the final installation and in the presence of electrical contractor and Owner's representatives, shall perform a complete functional testing of this system. A system certification verifying the proper system operation shall be required prior to acceptance by the Owner.

B. Demonstrate entire system and proper function of each device.

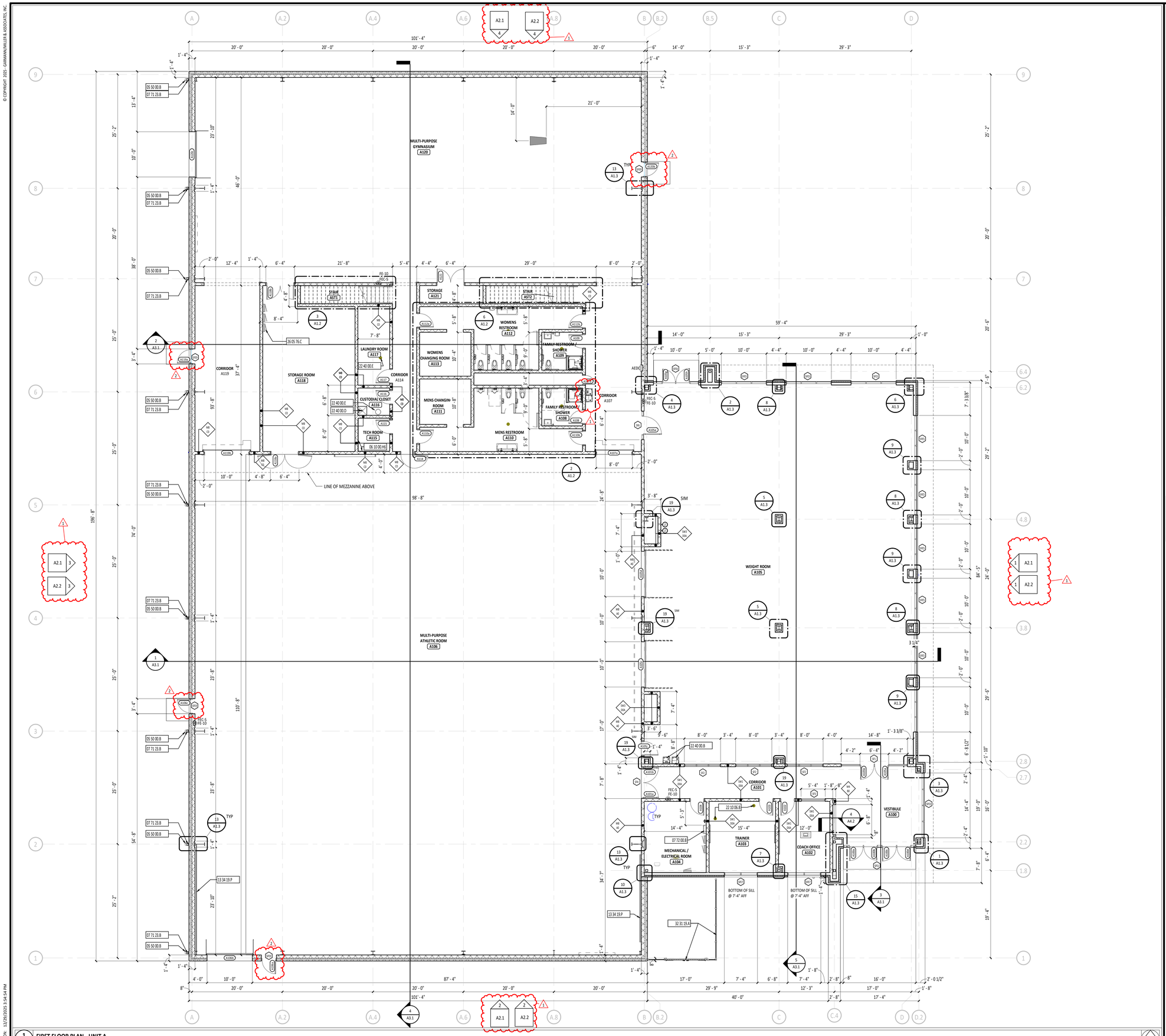
C. Coordinate and assist the Owner with the requirements and set-up of system monitoring with the monitoring company of the Owner's preference.

3.05 TRAINING

A. Provide four (4) hours training for District's personnel on the operation, programming and maintenance of the system.

B. Provide two (2) video copies of all training.

END OF SECTION 28 31 01



1 A1.1 **FIRST FLOOR PLAN - UNIT A**
1/8" = 1'-0"

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FIRST FLOOR PLAN ROOM INDEX - OVERALL

ROOM NUMBER	ROOM NAME	AREA	OCCUPANCY
A100	VESTIBULE	323 SF	
A101	CORRIDOR	291 SF	
A102	COACH OFFICE	178 SF	1
A103	TRAINER	231 SF	2
A104	MECHANICAL / ELECTRICAL ROOM	215 SF	1
A105	WEIGHT ROOM	4,895 SF	98
A106	MULTI-PURPOSE ATHLETIC ROOM	10,934 SF	219
A107	CORRIDOR	456 SF	
A108	FAMILY RESTROOM / SHOWER	74 SF	
A109	FAMILY RESTROOM / SHOWER	73 SF	
A110	MENS RESTROOM	317 SF	
A111	MENS CHANGING ROOM	114 SF	2
A112	WOMENS RESTROOM	307 SF	
A113	WOMENS CHANGING ROOM	111 SF	2
A114	CORRIDOR	199 SF	
A115	TECH ROOM	52 SF	0
A116	CUSTODIAL CLOSET	42 SF	0
A117	LAUNDRY ROOM	122 SF	0
A118	STORAGE ROOM	689 SF	2
A119	CORRIDOR	529 SF	
A120	MULTI-PURPOSE GYMNASIUM	4,483 SF	90
A121	STORAGE	51 SF	0
AST1	STAIR	82 SF	
AST2	STAIR	89 SF	

FLOOR PLAN SYMBOLS LEGEND

- AED — AUTOMATED EXTERNAL DEFIBRILLATOR DESIGNATION
- XXXX — DOOR DESIGNATION - REFERENCE DOOR/OPENING SCHEDULE.
- FE-_ — FIRE EXTINGUISHER DESIGNATION - REFERENCE SPECIFICATIONS
- FEC-_ — FIRE EXTINGUISHER CABINET DESIGNATION - REFERENCE SPECIFICATIONS
- A101 — ROOM DESIGNATION - REFERENCE ROOM INDEX.
- XX — CURTAIN WALL/STOREFRONT/WINDOW TYPE DESIGNATION
- XX XXX — WALL TYPE DESIGNATION - REFERENCE WALL TYPES.
- X — STRUCTURAL GRID - REFERENCE STRUCTURAL DRAWINGS.
- XX XX XX.XX — DIVISIONAL KEYNOTE DESIGNATION - REFERENCE KEYNOTE SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
  - KEYNOTE DESIGNATION
  - SPECIFICATION SECTION
- AREA OF DETAIL — X / XX.X — SIM — CALLOUT
  - DETAIL NUMBER
  - SHEET NUMBER
- X / XX.X / X — EXTERIOR ELEVATION
  - DETAIL NUMBER
  - SHEET NUMBER
- X / XX.X / X — INTERIOR ELEVATION
  - DETAIL NUMBER
  - SHEET NUMBER
- X / XX.X — SIM — SECTION
  - DETAIL NUMBER
  - SHEET NUMBER

FIRE EXTINGUISHER / CABINET SCHEDULE

MARK	DESCRIPTION	NOTES
FE-10	FIRE EXTINGUISHER - 10.0LB - CLASS A:B:C	1
FEC-R	FULLY RECESSED FIRE EXTINGUISHER CABINET	1
FEC-S	SEMI-RECESSED FIRE EXTINGUISHER CABINET	1

FIRE EXTINGUISHER / CABINET NOTES:
1. FURNISHED AND INSTALLED BY GC

#	KEYNOTE DESCRIPTION
05 50 00.B	PRIME PAINTED CAST IRON DOWNSPOUT BOOT - PAINT TO MATCH DOWNSPOUT.
06 10 00.H6	3/4" FIRE-RETARDANT PLYWOOD - 4'-0" x 8'-0" MOUNTED 8" AFF - PAINT.
07 71 23.B	PREFINISHED METAL DOWNSPOUT
07 72 00.B	ROOF HATCH
13 34 19.P	CROSS BRACING BY P.E.M.B. MANUFACTURER
22 10 06.B	FLOOR DRAIN - REFERENCE PLUMBING DRAWINGS.
22 40 00.B	DRINKING WATER COOLER - REFERENCE PLUMBING DRAWINGS - REFERENCE A0.2 FOR MOUNTING HEIGHTS.
22 40 00.D	FLOOR SERVICE SINK - REFERENCE PLUMBING DRAWINGS.
22 40 00.E	FLOOR DRAIN - REFERENCE PLUMBING DRAWINGS.
26 05 76.C	ELECTRICAL EQUIPMENT - REFERENCE ELECTRICAL DRAWINGS.
32 31 19.A	DECORATIVE METAL FENCE AND GATE - REFERENCE SITE DRAWINGS.

STATE OF OHIO
MATTHEW R. HIBNER
#1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
ARCHITECTS, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
mmhgrp.com

NEW BUILDING FOR
FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

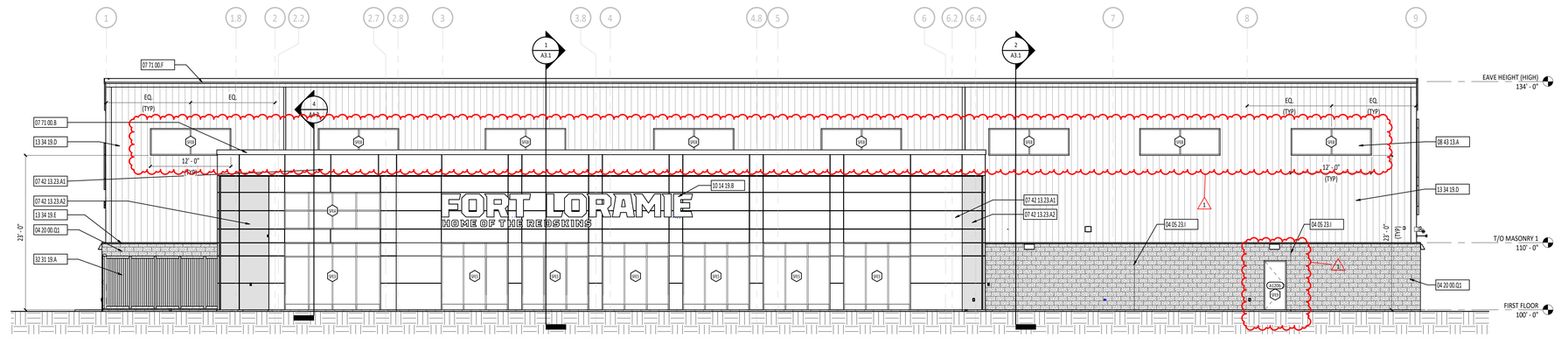
ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 02	12/15/2025
2	ADDENDUM 03	12/30/2025

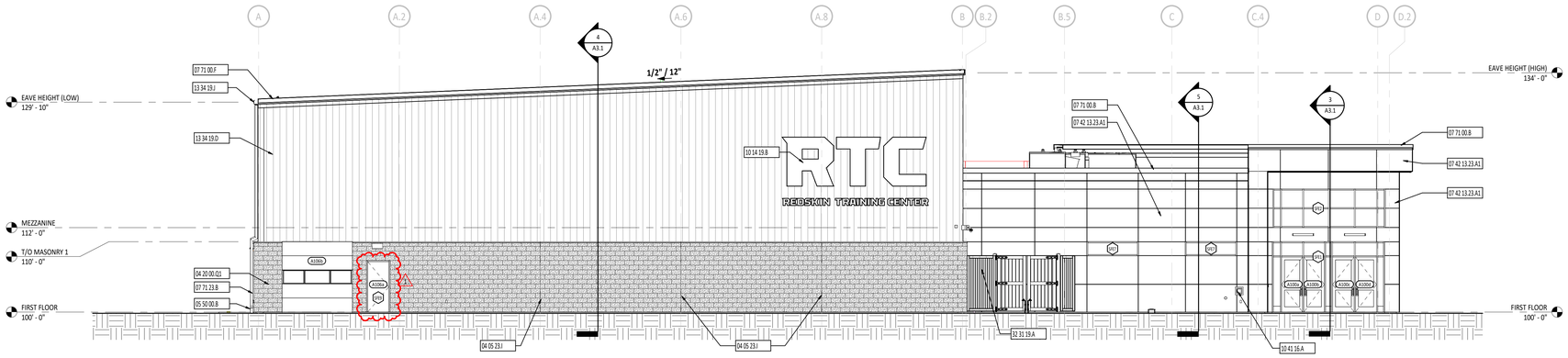
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:
FIRST FLOOR PLAN

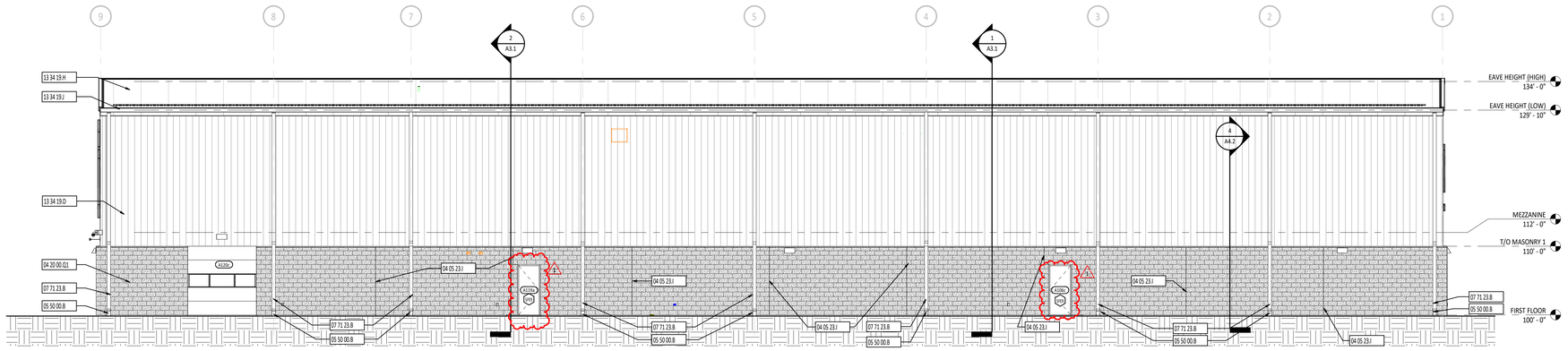
SHEET NUMBER:
A1.1



1 / A2.1 EAST BUILDING ELEVATION
1/8" = 1'-0"



2 / A2.1 SOUTH BUILDING ELEVATION
1/8" = 1'-0"



3 / A2.1 WEST BUILDING ELEVATION
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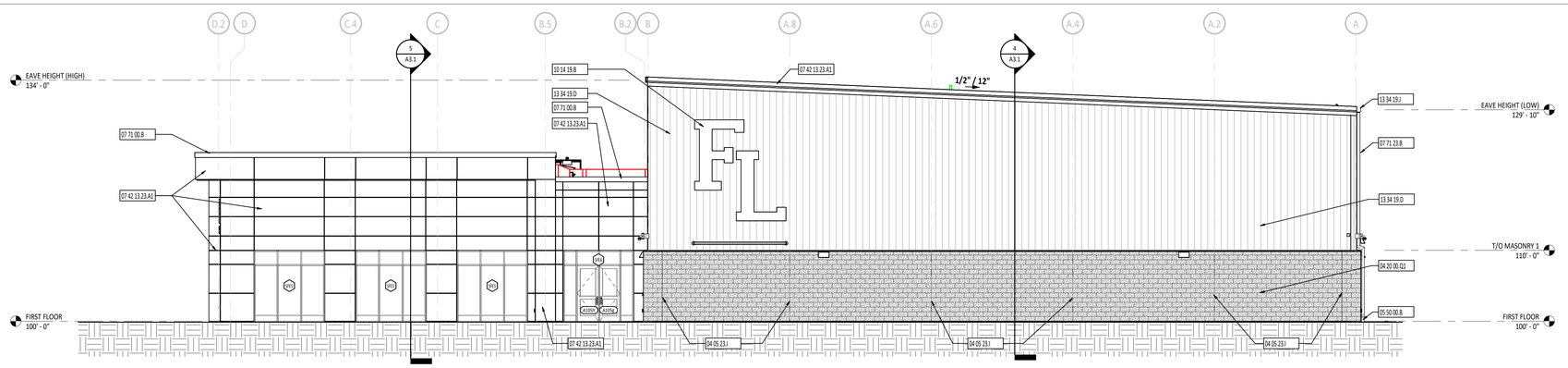

4 / A2.1 NORTH BUILDING ELEVATION
1/8" = 1'-0"

EXTERIOR ELEVATION GENERAL NOTES

A PROVIDE CONTROL JOINTS AND EXPANSION JOINTS AT BUILDING INSIDE CORNERS AND AT CONCRETE MASONRY UNIT VENEER AND BRICK VENEER MATERIAL CHANGES.

EXTERIOR ELEVATION SYMBOLS LEGEND

- XXXX — DOOR DESIGNATION - REFERENCE DOOR/OPENING SCHEDULE.
- SIGNAGE DESIGNATION - REFERENCE SIGNAGE DETAILS.
- CURTAIN WALL/STOREFRONT/WINDOW TYPE DESIGNATION
- LEVEL ELEVATION — LEVEL LINE
- X — STRUCTURAL GRID - REFERENCE STRUCTURAL DRAWINGS.
- XX XX XX.XX — DIVISIONAL KEYNOTE DESIGNATION - REFERENCE KEYNOTE SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
  - KEYNOTE DESIGNATION
  - SPECIFICATION SECTION
- AREA OF DETAIL — X / XX.X SIM — CALLOUT
  - DETAIL NUMBER
  - SHEET NUMBER
- X / XX.X SIM — SECTION
  - DETAIL NUMBER
  - SHEET NUMBER

#	KEYNOTE DESCRIPTION
04 05 23.I	CONTROL JOINT
04 20 00.Q1	NOMINAL 4" x 8" x 16" SPLIT-FACED CONCRETE MASONRY UNIT
05 50 00.B	PRIME PAINTED CAST IRON DOWNSPOUT BOOT - PAINT TO MATCH DOWNSPOUT.
07 42 13.23.A1	METAL COMPOSITE MATERIAL WALL PANEL - COLOR 1
07 42 13.23.A2	METAL COMPOSITE MATERIAL WALL PANEL - COLOR 2
07 71 00.B	PREFINISHED COPING WITH ANCHORAGES
07 71 00.F	PREFINISHED ALUMINUM ARCHITECTURAL FASCIA
07 71 23.B	PREFINISHED METAL DOWNSPOUT
08 43 13.A	ALUMINUM STOREFRONT WINDOW SYSTEM
10 14 19.B	EXTERIOR BUILDING SIGNAGE - REFERENCE A12 SHEETS
10 41 16.A	KNOX BOX - TOP TO BE MOUNTED AT 52" AFF
13 34 19.D	FORMED METAL PANEL PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.E	PREFINISHED TWO-PIECE METAL WALL CAP - MAINTAIN POSITIVE SLOPE
13 34 19.H	4" INSULATED METAL ROOF PANEL PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.J	6" PREFINISHED GUTTER PROVIDED BY P.E.M.B. MANUFACTURER
32 31 19.A	DECORATIVE METAL FENCE AND GATE - REFERENCE SITE DRAWINGS.

STATE OF OHIO
MATTHEW R. HIBNER
1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
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NEW BUILDINGS FOR:
FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

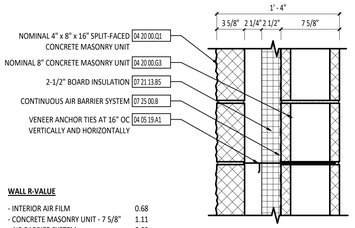
	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:
EXTERIOR ELEVATIONS

SHEET NUMBER:
A2.1

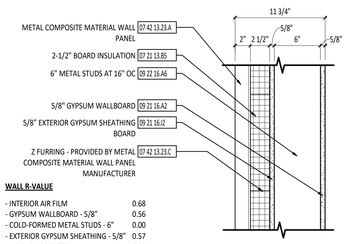
PRINTED ON: 12/29/2025 3:04:05 PM



WALL R-VALUE

- INTERIOR AIR FILM	0.68
- CONCRETE MASONRY UNIT - 7 5/8"	1.11
- AIR BARRIER SYSTEM	0.00
- CAVITY INSULATION - 2 1/2"	15.00
- AIR CAVITY - 2 1/4"	1.00
- BRICK MASONRY - 3 5/8"	0.44
- EXTERIOR AIR FILM	0.17
TOTAL R-VALUE	**18.40**

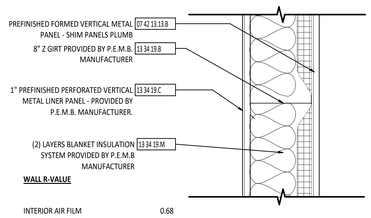
1 A4.3 **EXTERIOR WALL ASSEMBLY**
1 1/2" = 1'-0"



WALL R-VALUE

- INTERIOR AIR FILM	0.68
- GYPSUM WALLBOARD - 5/8"	0.56
- COLD-FORMED METAL STUDS - 6"	0.00
- EXTERIOR GYPSUM SHEATHING - 5/8"	0.57
- AIR BARRIER SYSTEM	0.00
- BOARD INSULATION - 2 1/2"	17.80
- AIR CAVITY	1.00
- METAL COMPOSITE WALL PANEL - 2"	0.61
- EXTERIOR AIR FILM	0.17
TOTAL R-VALUE	**21.39**

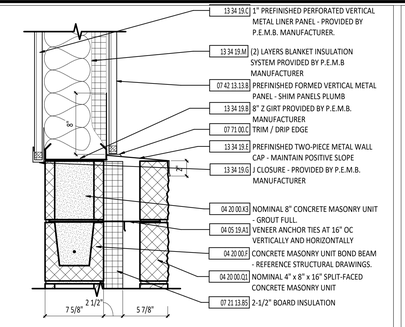
2 A4.3 **EXTERIOR WALL ASSEMBLY**
1 1/2" = 1'-0"



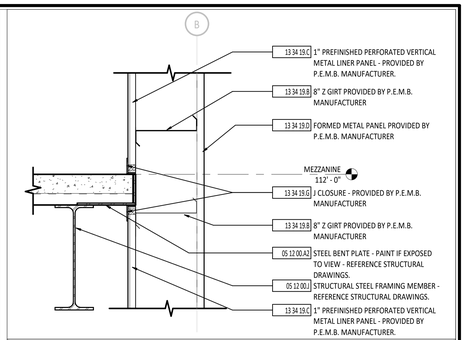
WALL R-VALUE

INTERIOR AIR FILM	0.68
INTERIOR LINER PANEL	0.00
BLANKET INSULATION SYSTEM	25.60
AIR CAVITY AND GIRT SPACE - 8"	1.00
INSULATED METAL SIDING	0.61
EXTERIOR AIR FILM	0.17
TOTAL R-VALUE	**28.06**

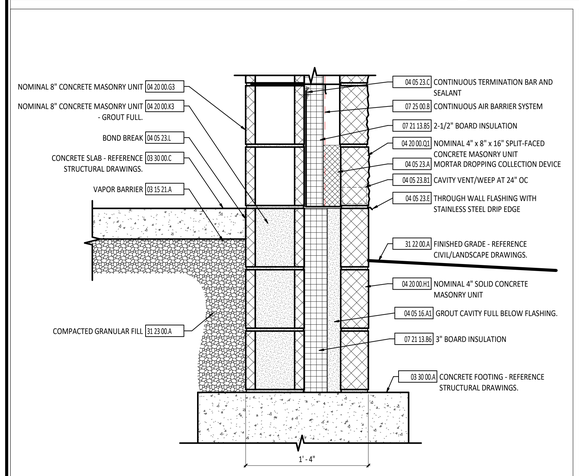
3 A4.3 **EXTERIOR WALL ASSEMBLY**
1 1/2" = 1'-0"



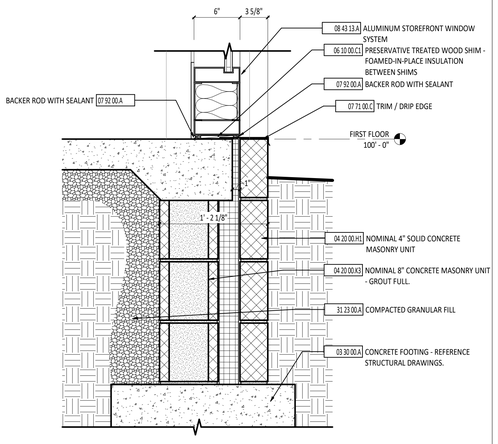
4 A4.3 **P.E.M.B. MIDWALL DETAIL**
1 1/2" = 1'-0"



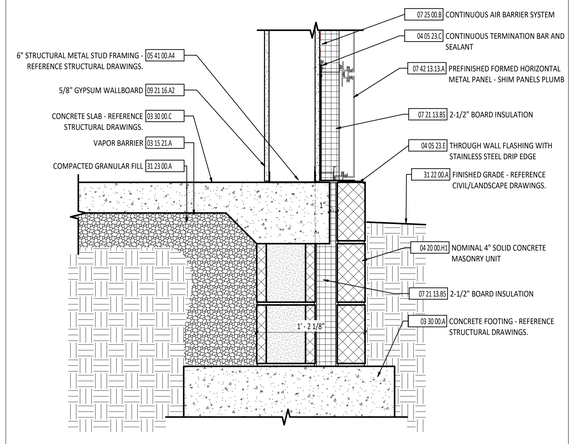
5 A4.3 **WALL SECTION DETAIL**
1 1/2" = 1'-0"



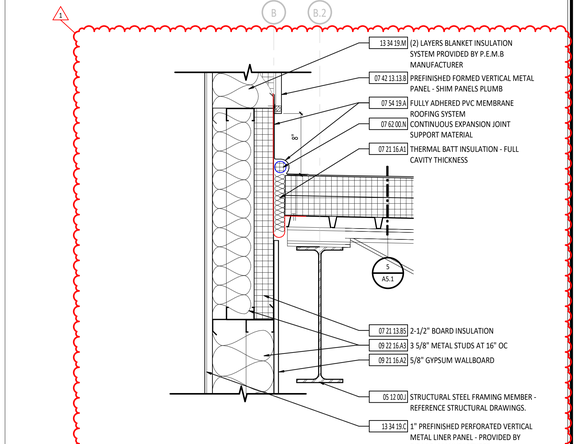
6 A4.3 **TYPICAL FOUNDATION DETAIL**
1 1/2" = 1'-0"



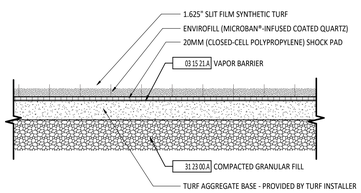
7 A4.3 **TYPICAL FOUNDATION DETAIL**
1 1/2" = 1'-0"



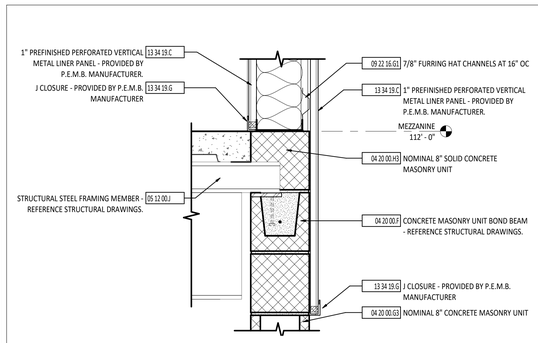
8 A4.3 **TYPICAL FOUNDATION DETAIL**
1 1/2" = 1'-0"



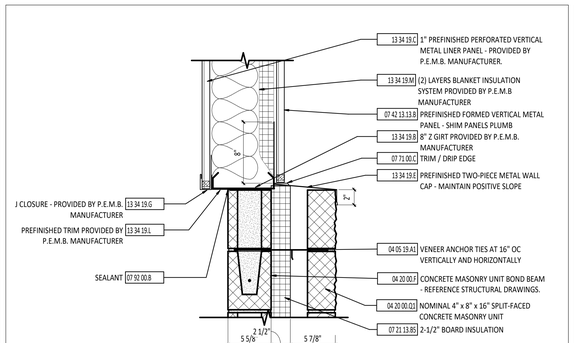
9 A4.3 **APRON WALL DETAIL**
1 1/2" = 1'-0"



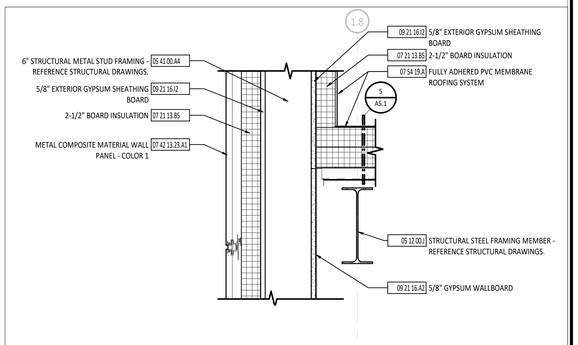
10 A4.3 **CONCRETE SLAB ASSEMBLY**
1 1/2" = 1'-0"



11 A4.3 **MEZZANINE MIDWALL DETAIL**
1 1/2" = 1'-0"



12 A4.3 **P.E.M.B. MIDWALL DETAIL (6" CMU)**
1 1/2" = 1'-0"



13 A4.3 **APRON WALL DETAIL**
1 1/2" = 1'-0"

14 A4.3 **TURF ASSEMBLY**
1 1/2" = 1'-0"

PRINTED ON: 12/30/2025 3:16:50 PM

STATE OF OHIO
MATTHEW R. HIBNER
#1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
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NEW BUILDING FOR

FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING

600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 03	12/30/2025

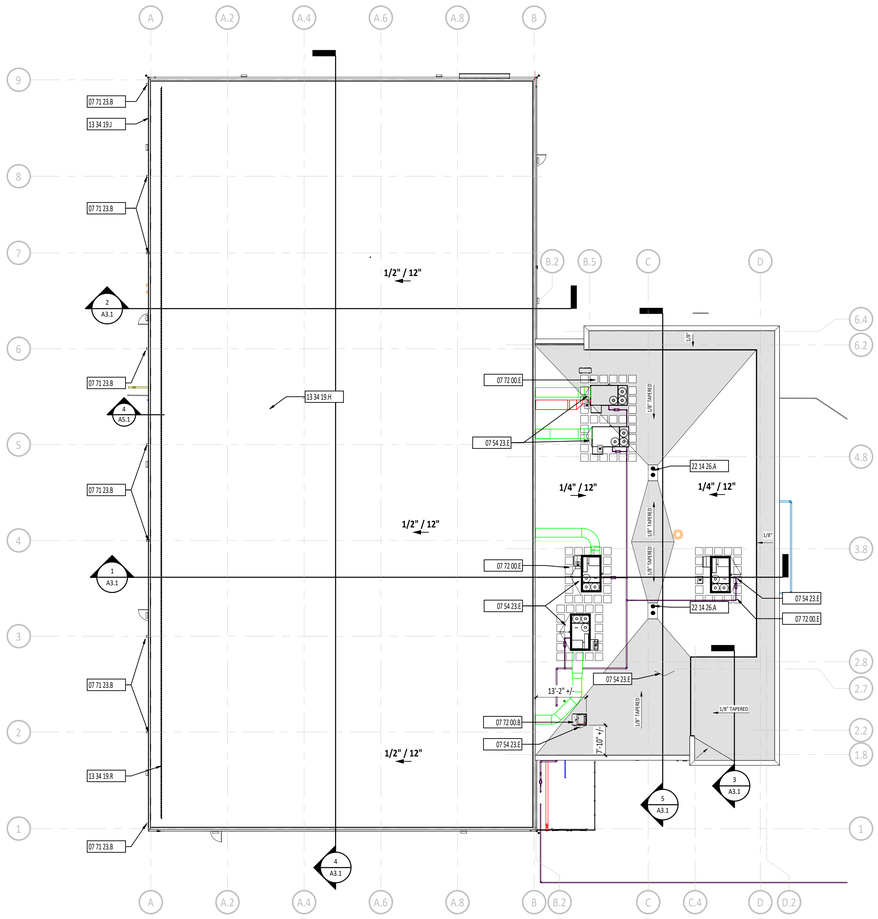
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:

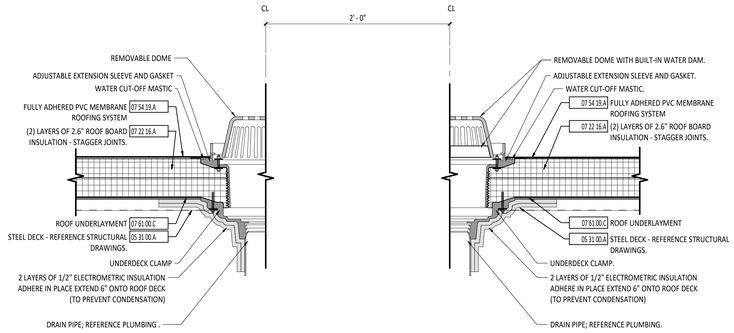
SECTION DETAILS

SHEET NUMBER:

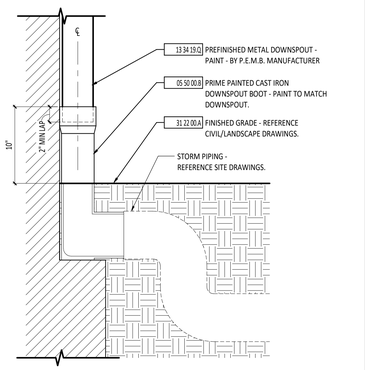
A4.3



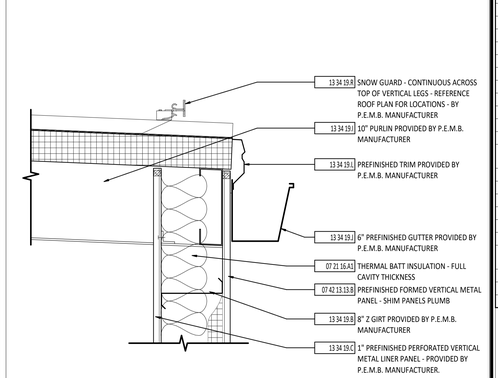
1 ROOF PLAN A5.1 — 1/16" = 1'-0"



2 ROOF DRAIN DETAIL A5.1 — 1 1/2" = 1'-0"



3 DOWNSPOUT BOOT DETAIL A5.1 — 1 1/2" = 1'-0"



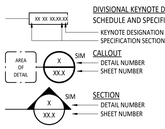
4 EAVE DETAIL A5.1 — 1 1/2" = 1'-0"

ROOF PLAN PLAN GENERAL NOTES

A PROVIDE FLASHING IN ACCORDANCE WITH THE SMACNA ARCHITECTURAL SHEET METAL MANUAL LATEST EDITION.
B REFER TO MANUFACTURER FOR ROOF INSTALLATION DETAILS.
C ALL WOOD BLOCKING AT ROOF PENETRATIONS SHALL BE PRESERVATIVE TREATED.
D PROVIDE WELDED CURB FLASHING FOR PENETRATIONS IN METAL ROOF - REFERENCE ROOF DETAILS.
E PROVIDE CRICKETS WITH TAPERED FLASHING AT MECHANICAL OPENINGS.

ROOF PLAN SYMBOLS LEGEND

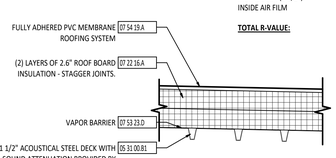
F FLUE DESIGNATION
V VENT DESIGNATION



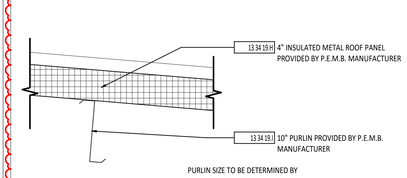
ROOF PLAN MATERIAL PATTERNS LEGEND

TAPERED INSULATION

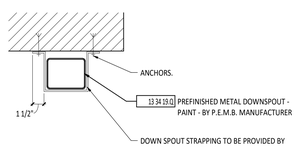
#	KEYNOTE DESCRIPTION
05 12 00.E	SUPPORT STEEL ANGLE - PAINT IF EXPOSED TO VIEW - REFERENCE STRUCTURAL DRAWINGS.
05 31 00.A	STEEL DECK - REFERENCE STRUCTURAL DRAWINGS.
05 31 00.B1	1 1/2" ACOUSTICAL STEEL DECK WITH SOUND ATTENUATION PROVIDED BY STEEL DECK MANUFACTURER- REFERENCE STRUCTURAL DRAWINGS.
05 50 00.B	PRIME PAINTED CAST IRON DOWNSPOUT BOOT - PAINT TO MATCH DOWNSPOUT.
06 10 00.D	WOOD BLOCKING/NAILER
06 10 00.F	PRESERVATIVE TREATED WOOD BLOCKING/NAILER
07 21 13.B5	2-1/2" BOARD INSULATION
07 21 16.A1	THERMAL BATT INSULATION - FULL CAVITY THICKNESS
07 21 29.A	SPRAY APPLIED FOAM INSULATION
07 22 16.A	(2) LAYERS OF 2.6" ROOF BOARD INSULATION - STAGGER JOINTS.
07 42 13.13.B	PREFINISHED FORMED VERTICAL METAL PANEL - SHIM PANELS PLUMB
07 42 13.23.A1	METAL COMPOSITE MATERIAL WALL PANEL - COLOR 1
07 53 23.D	VAPOR BARRIER
07 54 19.A	FULLY ADHERED PVC MEMBRANE ROOFING SYSTEM
07 54 23.E	ROOF CRICKET
07 61 00.C	ROOF UNDERLAYMENT
07 71 00.B	PREFINISHED COPING WITH ANCHORAGES
07 71 23.B	PREFINISHED METAL DOWNSPOUT
07 72 00.A	ROOF CURB - REFERENCE MECHANICAL DRAWINGS.
07 72 00.B	ROOF HATCH
07 72 00.E	ROOF WALKWAY PAD
07 92 00.B	SEALANT
09 21 16.J2	5/8" EXTERIOR GYPSUM SHEATHING BOARD
13 34 19.B	8" Z GIRT PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.C	1" PREFINISHED PERFORATED VERTICAL METAL LINER PANEL - PROVIDED BY P.E.M.B. MANUFACTURER.
13 34 19.H	4" INSULATED METAL ROOF PANEL PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.J	10" PURLIN PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.L	PREFINISHED TRIM PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.R	8" Z GIRT PROVIDED BY P.E.M.B. MANUFACTURER
22 10 05.A	PLUMBING VENT - REFERENCE PLUMBING DRAWINGS.
22 14 26.A	ROOF DRAIN AND EMERGENCY OVERFLOW - REFERENCE PLUMBING DRAWINGS.
31 22 00.A	FINISHED GRADE - REFERENCE CIVIL/LANDSCAPE DRAWINGS.



5 ROOF ASSEMBLY A5.1 — 1 1/2" = 1'-0"

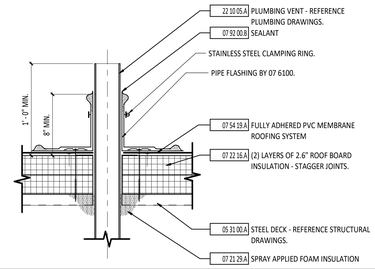


6 ROOF ASSEMBLY A5.1 — 1 1/2" = 1'-0"

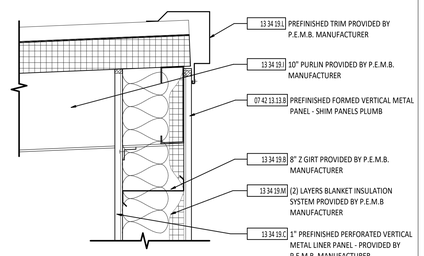


7 DOWNSPOUT BRACKET DETAIL A5.1 — 1 1/2" = 1'-0"

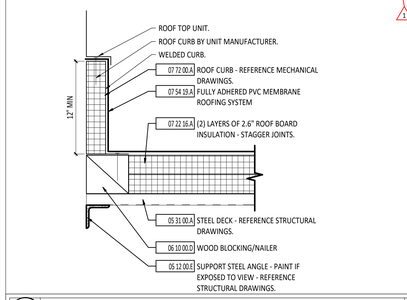
NOTES:
MEMBRANE ROOF MANUFACTURER AND DIVISION 22 TO COORDINATE LOCATION OF ROOF OPENING AND SIZE.



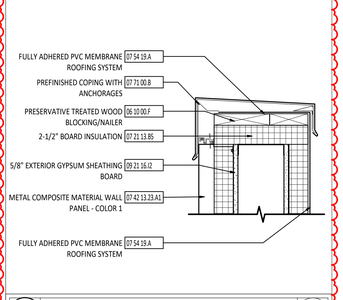
8 VENT STACK PENETRATION DETAIL A5.1 — 1 1/2" = 1'-0"



9 EAVE DETAIL A5.1 — 1 1/2" = 1'-0"



10 CURB SECTION DETAIL A5.1 — 1 1/2" = 1'-0"



11 PARAPET DETAIL A5.1 — 1 1/2" = 1'-0"

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

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600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

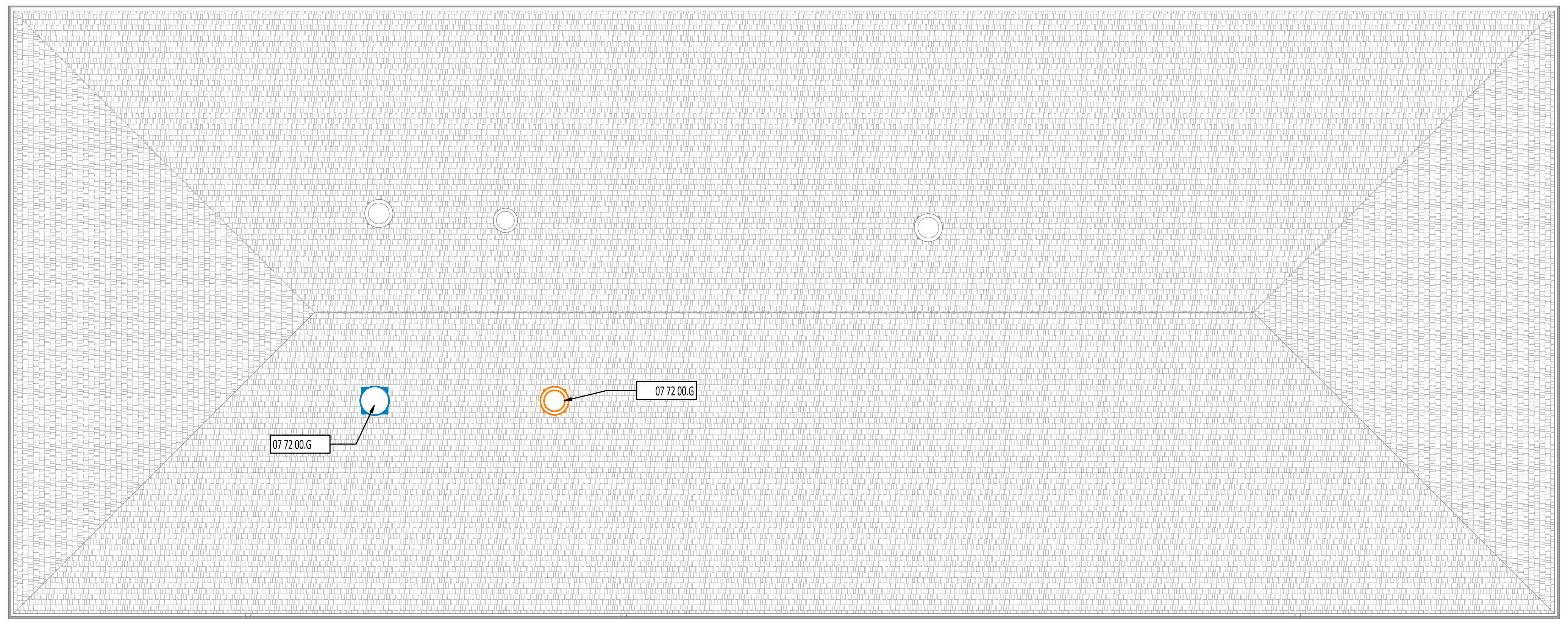
ISSUANCES/REVISIONS		
	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

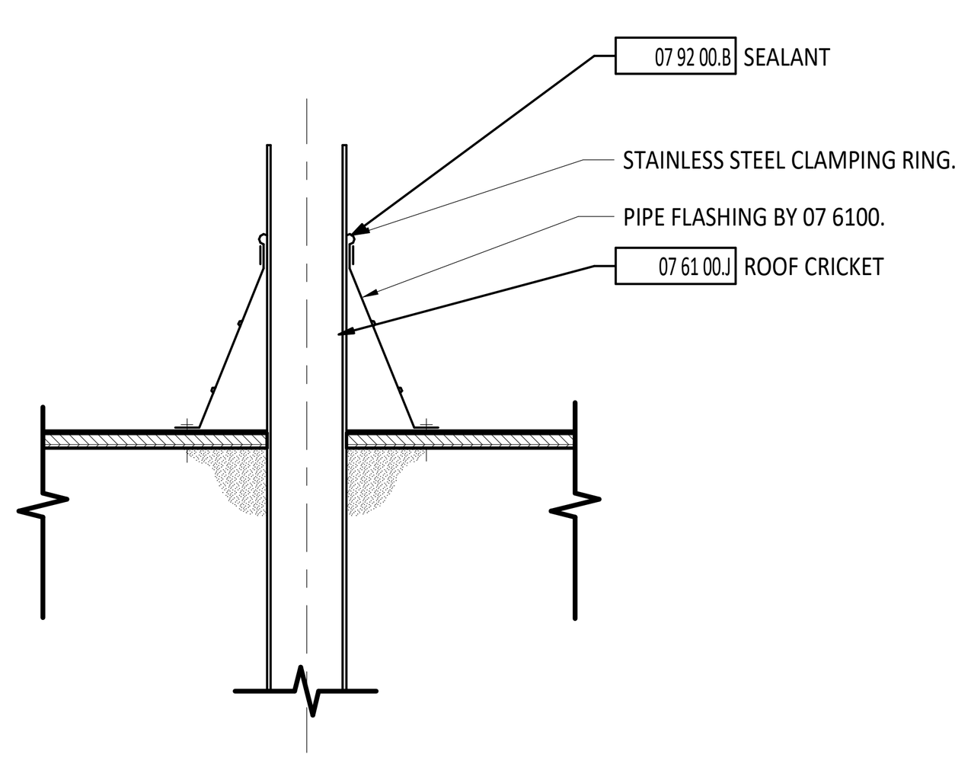
SHEET TITLE:
ROOF PLAN

SHEET NUMBER:
A5.1

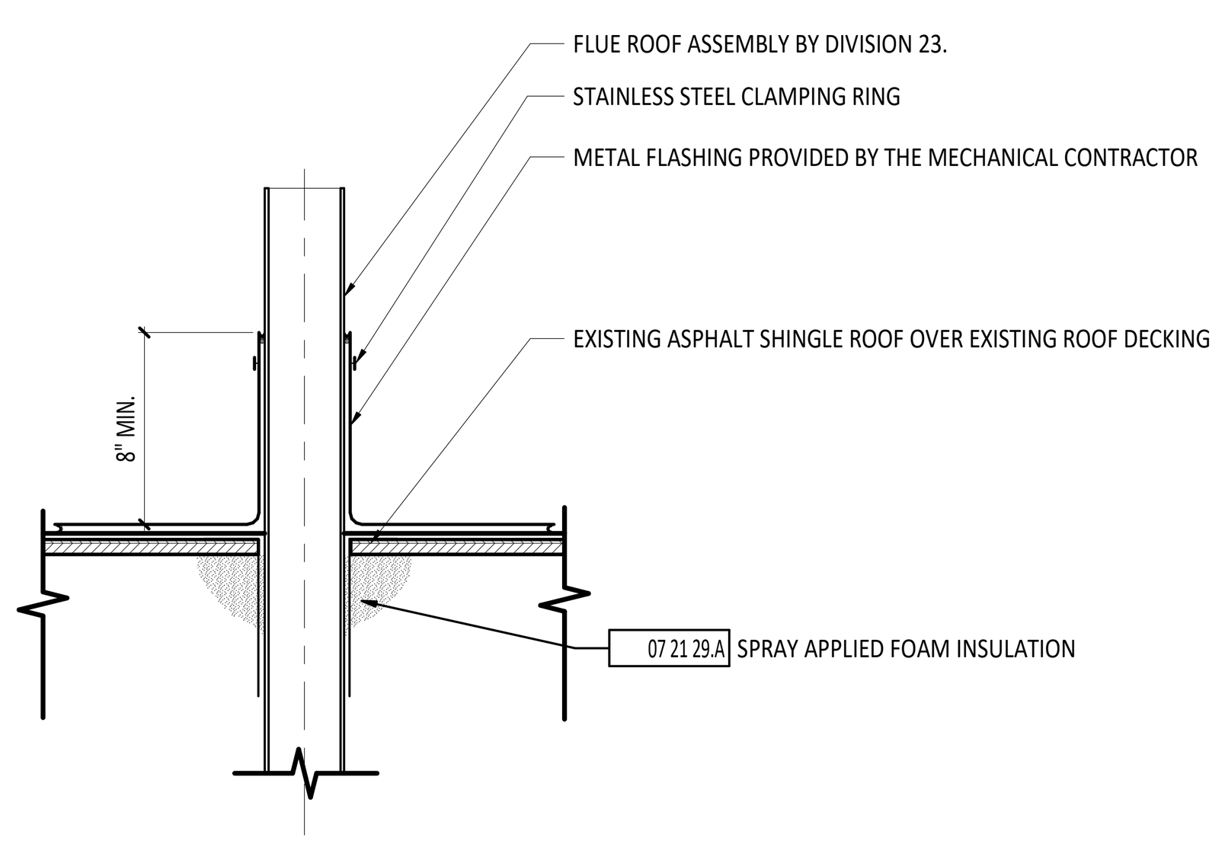
PRINTED ON: 12/31/2025 8:10:03 AM



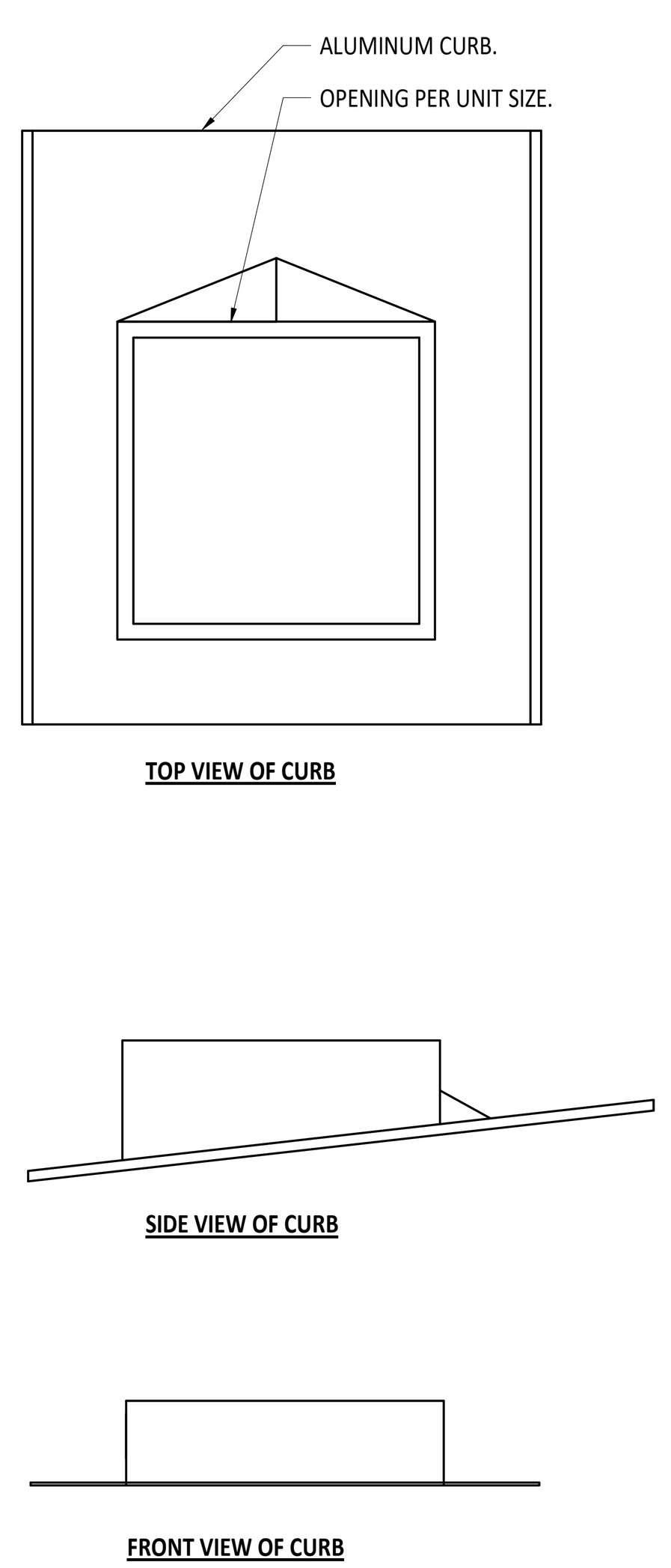
1 — A5.1 — ROOF PLAN
1/8" = 1'-0"



2 — A5.1 — VENT STACK PENETRATION DETAIL
1 1/2" = 1'-0"



3 — A5.1 — FLUE PENETRATION DETAIL
1 1/2" = 1'-0"



NOTES:
1. FLASHING TO BE PROVIDED BY MECHANICAL CONTRACTOR

4 — A5.1 — CURB DETAIL
3" = 1'-0"

ROOF PLAN PLAN GENERAL NOTES

A PROVIDE FLASHING IN ACCORDANCE WITH THE SMACNA ARCHITECTURAL SHEET METAL MANUAL LATEST EDITION.
B REFER TO MANUFACTURER FOR ROOF INSTALLATION DETAILS.
C ALL WOOD BLOCKING AT ROOF PENETRATIONS SHALL BE PRESERVATIVE TREATED.
D PROVIDE WELDED CURB FLASHING FOR PENETRATIONS IN METAL ROOF - REFERENCE ROOF DETAILS.
E PROVIDE CRICKETS WITH TAPERED FLASHING AT MECHANICAL OPENINGS.

ROOF PLAN SYMBOLS LEGEND

F FLUE DESIGNATION
V VENT DESIGNATION

XX XX XX.XX.XX — DIVISIONAL KEYNOTE DESIGNATION - REFERENCE KEYNOTE SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
KEYNOTE DESIGNATION
SPECIFICATION SECTION

AREA OF DETAIL — X / XX.X — SIM — CALLOUT
DETAIL NUMBER
SHEET NUMBER

X / XX.X — SIM — SECTION
DETAIL NUMBER
SHEET NUMBER

ROOF PLAN MATERIAL PATTERNS LEGEND

ASPHALT SHINGLES

#	KEYNOTE DESCRIPTION
07 21 29.A	SPRAY APPLIED FOAM INSULATION
07 61 00.J	ROOF CRICKET
07 72 00.G	NEW ROOF PENETRATION - OPENING LOCATION TO COORDINATED WITH OWNER. FLASHING TO BE INSTALLED AROUND PENETRATIONS PER MANUFACTURER RECOMMENDATIONS.
07 92 00.B	SEALANT

1

STATE OF OHIO
MATTHEW R. HIBNER 1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
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BUILDING ADDITION FOR
FORT LORAMIE LOCAL SCHOOLS LOCKER ROOM BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO

ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 03	12/30/2025

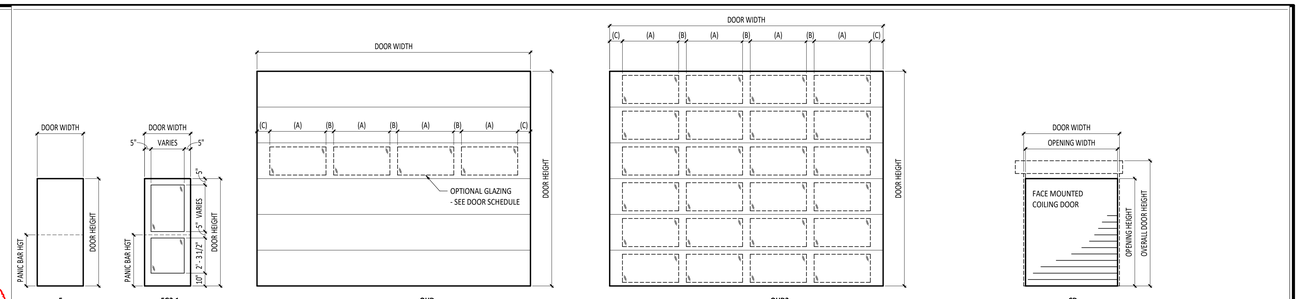
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:
ROOF PLAN

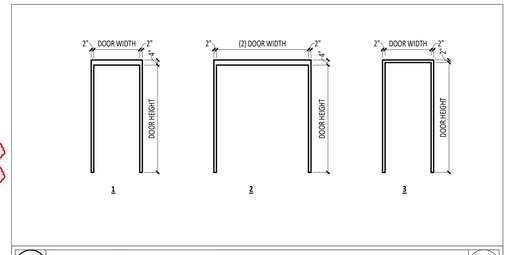
SHEET NUMBER:
A5.1

DOOR/OPENING SCHEDULE

NUMBER	DOOR SIZE	DOOR THK	DOOR MATL	DOOR TYPE	DOOR GLASS	FRAME DEPTH	FRAME MATL	FRAME TYPE	FRAME GLASS	DETAIL NUMBER HEAD	DETAIL NUMBER JAMB	DETAIL NUMBER SILL	HARDWARE SET	ROOM KEY SIDE	FUNCTION	LABEL (MIN)	NOTES
A100a	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE1	EG1	5/A6.2	7/A6.2	11/A6.1	1.0	EXT	Exterior	-	3
A100b	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE1	EG1	5/A6.2	7/A6.2	11/A6.1	3.0	EXT	Exterior	-	3
A100c	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE1	EG1	5/A6.2	7/A6.2	11/A6.1	4.0	EXT	Exterior	-	3
A100d	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE1	EG1	5/A6.2	7/A6.2	11/A6.1	5.0	EXT	Exterior	-	3
A101a	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	G2	4 1/2"	AL	SF4	-	9/A6.2	11/A6.2	-	10.0	A101	Interior	-	
A101b	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	G2	4 1/2"	AL	SF4	-	9/A6.2	11/A6.2	-	11.0	A101	Interior	-	
A102	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1		22.0	A101	Interior	-	
A103	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1		16.0	A101	Interior	-	
A104	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1		19.0	A101	Interior	-	
A105a	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	G1	4 1/2"	AL	SF1	G1	9/A6.2	11/A6.2	-	12.0	A101	Interior	-	
A105b	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	G1	4 1/2"	AL	SF1	G1	9/A6.2	11/A6.2	-	13.0	A101	Interior	-	
A105c	10'-0" x 8'-0"	2 1/8"	AL	OHD2	G2	2"	STL	-	-	17/A6.2	18/A6.2		26.0	-	Interior	-	
A105d	10'-0" x 8'-0"	2 1/8"	AL	OHD2	G2	2"	STL	-	-	17/A6.2	18/A6.2		26.0	-	Interior	-	
A105e	4'-0" x 7'-10"	1 3/4"	AL	FG2.1	G2	4 1/2"	AL	SF6	G2	9/A6.2	11/A6.2	-	14.0	A107	Interior	-	
A105g	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE6	EG1	5/A6.2	7/A6.2	11/A6.1	7.0	EXT	Exterior	-	
A105h	3'-0" x 7'-10"	1 3/4"	AL	FG2.1	EG1	6"	AL	SFE6	EG1	5/A6.2	7/A6.2	11/A6.1	6.0	EXT	Exterior	-	
A105j	3'-0" x 7'-10"	1 3/4"	FRP	F	-	8 3/4"	HM	2	-	9/A6.1	10/A6.1	-	20.0	A106	Interior	-	
A106a	3'-0" x 7'-2"	1 3/4"	FRP	F	-	6"	AL	SFE5	-	3/A6.1	4/A6.1	5/A6.1	8.0	-	Exterior	-	
A106b	10'-0" x 10'-0"	2 1/8"	AL	OHD	G2	2"	STL	-	-	6/A6.1	7/A6.1	8/A6.1	26.0	-	Exterior	-	
A106c	3'-0" x 7'-2"	1 3/4"	FRP	F	-	6"	AL	SFE5	-	3/A6.1	4/A6.1	5/A6.1	9.0	-	Exterior	-	
A107a	8'-0" x 8'-0"	3/4"	AL	CD	-	8 3/4"	STL	-	-	17/A6.1	13/A6.1		26.0	-	Interior	-	
A107b	2'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	20.0	A107	Interior	-	
A108	3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	23.0	A107	Interior	-	
A109	3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	23.0	A107	Interior	-	
A110a	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	25.0	-	Interior	-	
A110b	3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	25.0	-	Interior	-	
A112a	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	25.0	-	Interior	-	
A112b	3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	25.0	-	Interior	-	
A114	3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	24.0	-	Interior	-	
A115	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	19.0	A114	Interior	-	
A116	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	21.0	A114	Interior	-	
A117	3'-0" x 7'-0"	1 3/4"	HM	F	-	8 3/4"	HM	1	-	9/A6.1	10/A6.1	-	21.0	A114	Interior	-	
A118a	(2) 3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	2	-	9/A6.1	10/A6.1	-	17.0	A106	Interior	-	
A118b	(2) 3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	2	-	9/A6.1	10/A6.1	-	18.0	A120	Interior	-	
A119a	3'-0" x 7'-2"	1 3/4"	FRP	F	-	6"	AL	SFE5	-	3/A6.1	4/A6.1	5/A6.1	9.0	-	Exterior	-	
A119b	10'-0" x 8'-0"	3/4"	AL	CD	-	8 3/4"	STL	-	-	17/A6.1	13/A6.1		26.0	-	Interior	-	
A120b	3'-0" x 7'-2"	1 3/4"	FRP	F	-	6"	AL	SFE5	-	3/A6.1	4/A6.1	5/A6.1	9.0	-	Exterior	-	
A120c	10'-0" x 10'-0"	2 1/8"	AL	OHD	G2	2"	STL	-	-	6/A6.1	7/A6.1	8/A6.1	26.0	-	Exterior	-	
A121	(2) 3'-0" x 7'-0"	1 3/4"	FRP	F	-	8 3/4"	HM	2	-	9/A6.1	10/A6.1	-	17.0	A120	Interior	-	
A202a	3'-0" x 7'-0"	1 3/4"	FRP	F	-	7 5/8"	HM	1	-	14/A6.1	15/A6.1		15.0	A201	Interior	-	
A202b	10'-0" x 8'-0"	2 1/8"	AL	OHD2	G2	3 3/4"	STL	-	-	15/A6.2	16/A6.2		26.0	-	Interior	-	
A203	(2) 3'-0" x 7'-0"	1 3/4"	FRP	F	-	7 5/8"	HM	2	-	14/A6.1	15/A6.1		17.0	A201	Interior	-	



1 A6.1 **DOOR TYPES** 1/4" = 1'-0"



2 A6.1 **HOLLOW METAL DOOR FRAME TYPES** 1/4" = 1'-0"

DOOR GENERAL NOTES

A REFERENCE A6 SHEETS FOR DOOR AND STOREFRONT DETAILS.
B REFERENCE SPECIFICATION SECTION 08 71 00 FOR HARDWARE SETS.
C USE TYPE "X" GYSPUM WALLBOARD WHERE FIRE-RATED WALL ASSEMBLIES ARE CALLED OUT ON THE A1 UNIT PLANS.

DOOR/OPENING SCHEDULE NOTES

1. DOOR AND FRAME/LOCK BY SECTION 08 80 00.
2. REFERENCE ELECTRONIC SCHEMATIC WIRING DIAGRAM DETAIL ELECTRICAL AND TECHNOLOGY SHEETS
3. REMOVABLE MULLION.

DOOR/OPENING SCHEDULE ABBREVIATIONS

SYMBOL DESCRIPTION

AL	ALUMINUM
CD	COILING DOOR
DG	DIFFUSING GLASS
F	FLUSH
FG	FULL GLASS
FRG	FIRE RATED GLASS
HG	HALF GLASS
HM	HOLLOW METAL
IG	INSULATED GLASS
LG	LAMINATED GLASS
N	NARROW LITE
OHD	OVERHEAD SECTIONAL DOOR
SG	SAFETY GLASS
TG	TEMPERED GLASS
W	WOOD

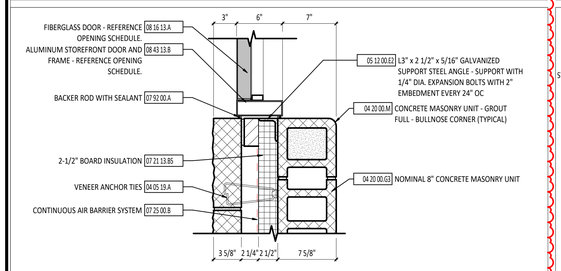
3 A6.1 **HEAD DETAIL - EXTERIOR** 1 1/2" = 1'-0"

6 A6.1 **HEAD DETAIL - EXTERIOR** 1 1/2" = 1'-0"

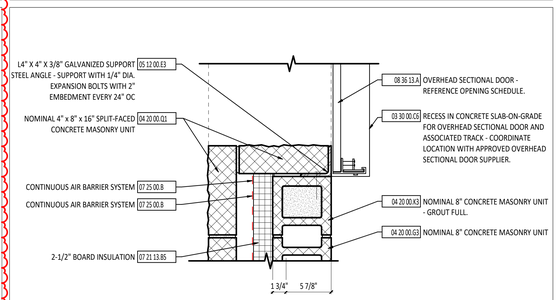
9 A6.1 **HEAD DETAIL - INTERIOR** 1 1/2" = 1'-0"

12 A6.1 **HEAD DETAIL - INTERIOR** 1 1/2" = 1'-0"

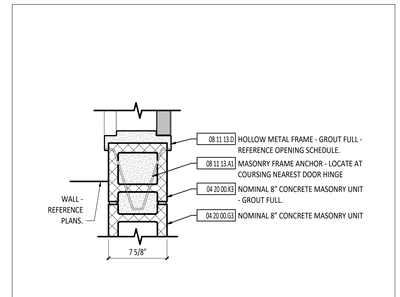
13 A6.1 **JAMB DETAIL - INTERIOR** 1 1/2" = 1'-0"



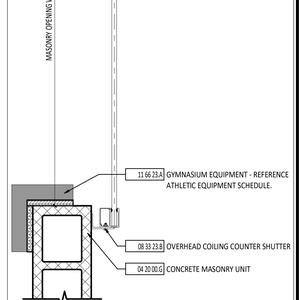
4 A6.1 **JAMB DETAIL - EXTERIOR** 1 1/2" = 1'-0"



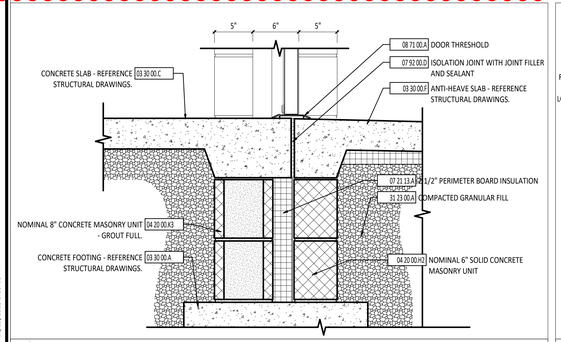
7 A6.1 **JAMB DETAIL - EXTERIOR** 1 1/2" = 1'-0"



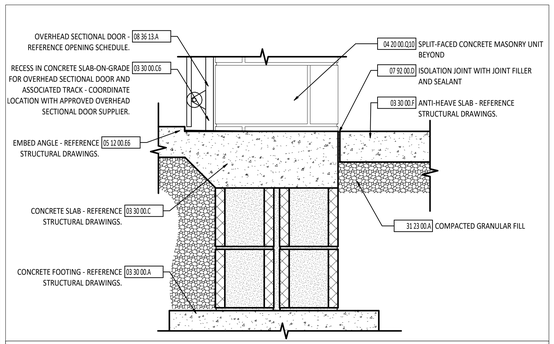
10 A6.1 **JAMB DETAIL - INTERIOR** 1 1/2" = 1'-0"



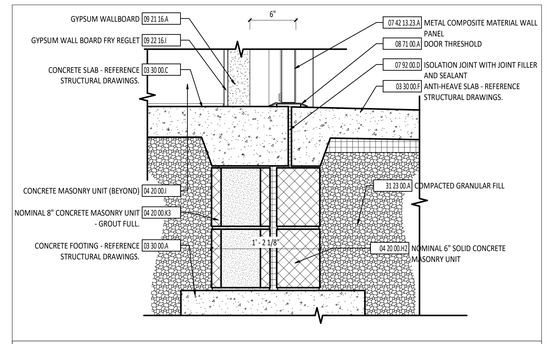
13 A6.1 **JAMB DETAIL - INTERIOR** 1 1/2" = 1'-0"



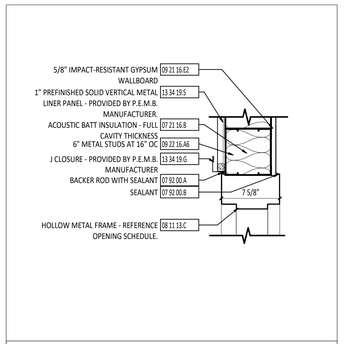
5 A6.1 **SILL DETAIL - EXTERIOR** 1 1/2" = 1'-0"



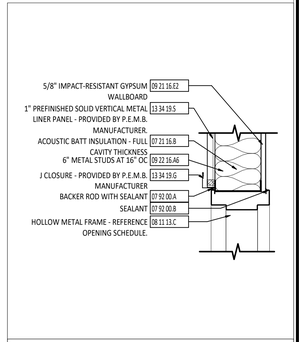
8 A6.1 **SILL DETAIL - EXTERIOR** 1 1/2" = 1'-0"



11 A6.1 **SILL DETAIL - EXTERIOR** 1 1/2" = 1'-0"



14 A6.1 **HEAD DETAIL - INTERIOR** 1 1/2" = 1'-0"



15 A6.1 **JAMB DETAIL - INTERIOR** 1 1/2" = 1'-0"

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STATE OF OHIO
MATTHEW R. HIBNER
#1416052
REGISTERED ARCHITECT
MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
MARION, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
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NEW BUILDING FOR
FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING
609 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 03	12/30/2025

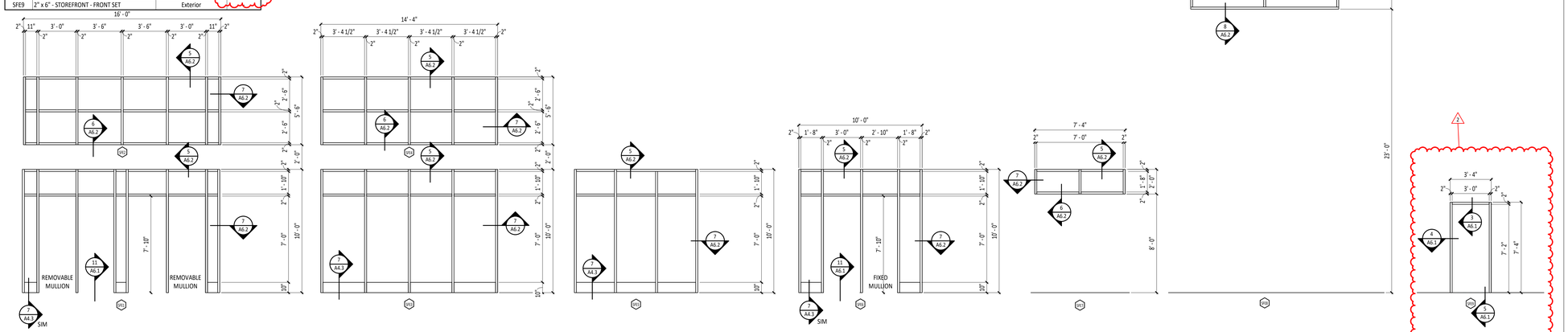
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:
DOOR SCHEDULE AND DETAILS

SHEET NUMBER:
A6.1

EXTERIOR STOREFRONT SCHEDULE

MARK	DESCRIPTION	FUNCTION	NOTES
SFE1	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE2	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE3	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE4	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE5	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE6	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE7	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE8	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1
SFE9	2" x 6" - STOREFRONT - FRONT SET	Exterior	EG-1



1 A6.2 STOREFRONT ELEVATIONS - EXTERIOR
1/4" = 1'-0"

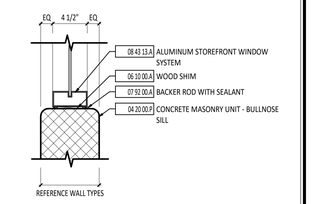
INTERIOR STOREFRONT SCHEDULE

MARK	DESCRIPTION	FUNCTION	NOTES
SF1	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-1
SF2	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-1
SF3	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-1
SF4	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-2
SF5	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-2
SF6	2" x 4 1/2" - STOREFRONT - CENTER SET	Interior	G-2

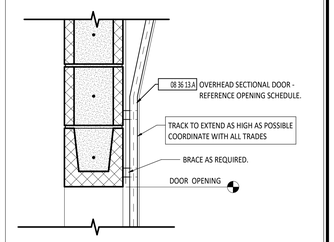
2 A6.2 STOREFRONT ELEVATIONS - INTERIOR
1/4" = 1'-0"

CURTAIN WALL/STOREFRONT AND WINDOW TYPE SYMBOLS LEGEND

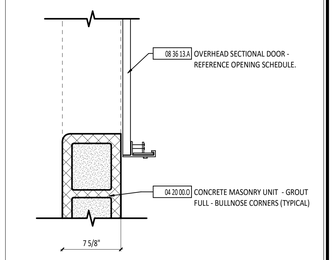
- XX — CURTAIN WALL/STOREFRONT/WINDOW TYPE DESIGNATION
- LEVEL ELEVATION — LEVEL LINE
- X / XX.X — SECTION: SIM, DETAIL NUMBER, SHEET NUMBER



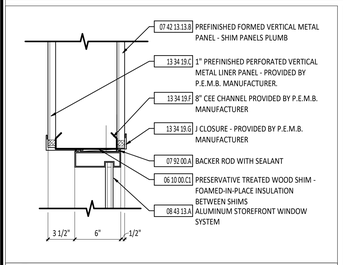
20 A6.2 SILL DETAIL - INTERIOR
1 1/2" = 1'-0"



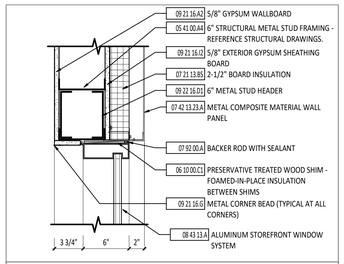
17 A6.2 HEAD DETAIL - EXTERIOR
1 1/2" = 1'-0"



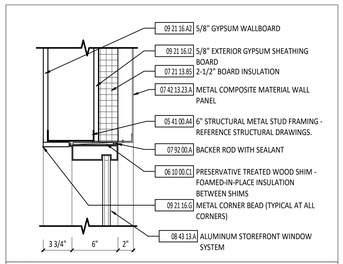
18 A6.2 JAMB DETAIL - EXTERIOR
1 1/2" = 1'-0"



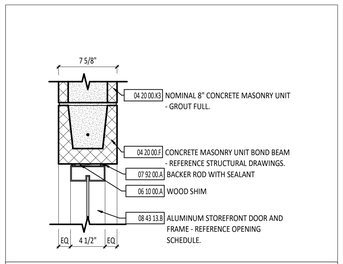
3 A6.2 HEAD DETAIL - EXTERIOR
1 1/2" = 1'-0"



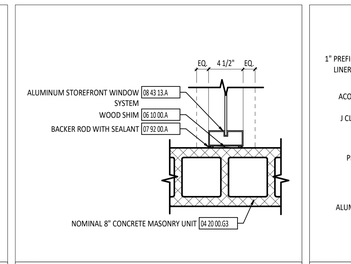
5 A6.2 HEAD DETAIL - EXTERIOR
1 1/2" = 1'-0"



7 A6.2 JAMB DETAIL - EXTERIOR
1 1/2" = 1'-0"



9 A6.2 HEAD DETAIL - INTERIOR
1 1/2" = 1'-0"



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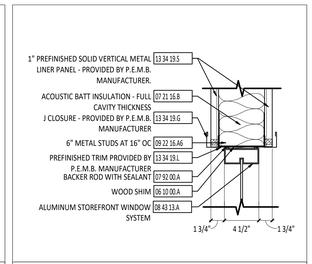
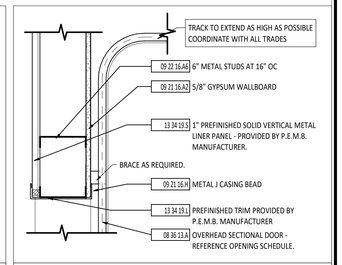
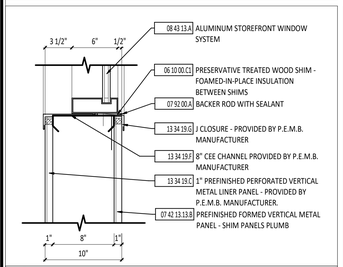


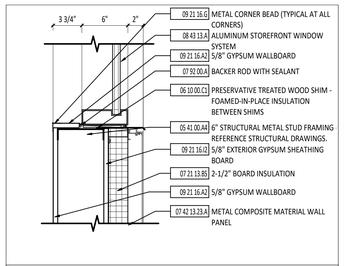
13 A6.2 JAMB DETAIL - INTERIOR
1 1/2" = 1'-0"



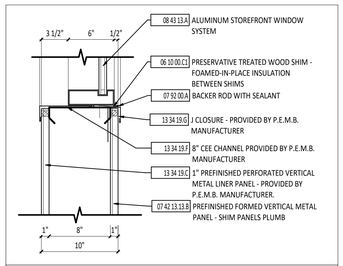
15 A6.2 HEAD DETAIL - INTERIOR
1 1/2" = 1'-0"



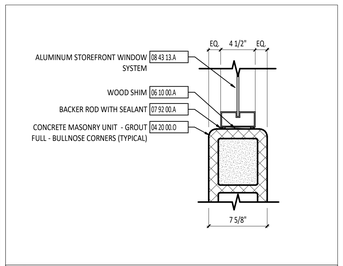
4 A6.2 JAMB DETAIL - EXTERIOR
1 1/2" = 1'-0"



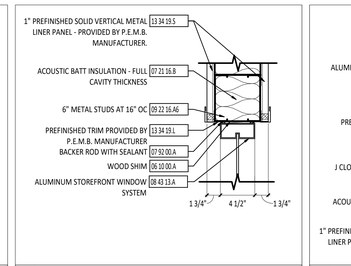
6 A6.2 SILL DETAIL - EXTERIOR
1 1/2" = 1'-0"



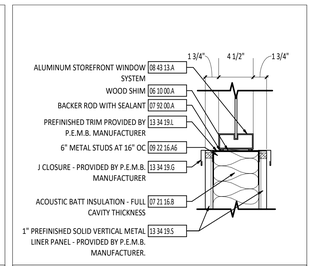
8 A6.2 SILL DETAIL - EXTERIOR
1 1/2" = 1'-0"



10 A6.2 JAMB DETAIL - INTERIOR
1 1/2" = 1'-0"



12 A6.2 HEAD DETAIL - INTERIOR
1 1/2" = 1'-0"



14 A6.2 SILL DETAIL - INTERIOR
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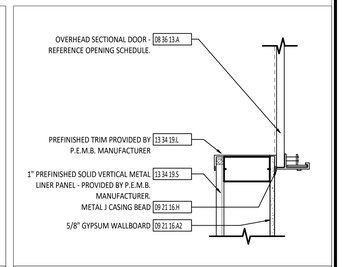


16 A6.2 JAMB DETAIL - INTERIOR
1 1/2" = 1'-0"

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
MARION, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
mmhgroup.com

NEW BUILDING FOR:
FORT LORAMIE LOCAL SCHOOLS
ATHLETIC COMPLEX BUILDING
600 EAST PARK STREETS, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

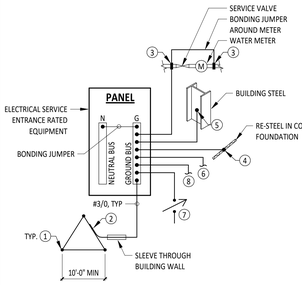
	CONSTRUCTION DOCUMENTS	12/11/2025
1	ADDENDUM 02	12/19/2025
2	ADDENDUM 03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MDB	JCR

SHEET TITLE:
STOREFRONT & DOOR ELEVATIONS / DETAILS

SHEET NUMBER:
A6.2

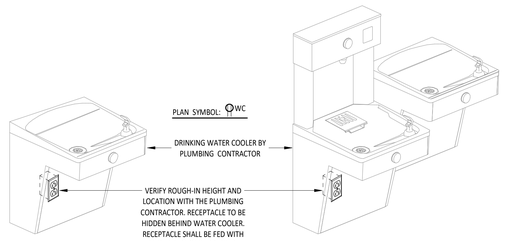
PRINTED ON: 12/29/2025 3:44:26 PM



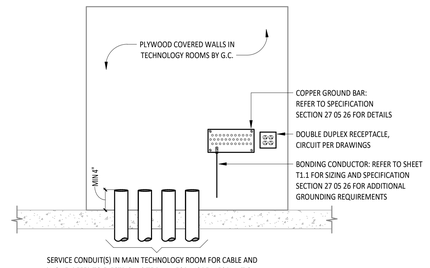
DETAIL NOTES:

1. GROUND ROD, 3/4"x10'-0" LONG. BURY TOP OF GROUND ROD AT 6" BELOW FINISH GRADE. ROD TO CABLE EXOTHERMIC WELDED CONNECTION.
2. CABLE-TO-CABLE EXOTHERMIC WELDED CONNECTION.
3. WATER PIPE GROUND CLAMP.
4. EXOTHERMIC WELDED CONNECTION TO RE-STEEL.
5. EXOTHERMIC WELDED CONNECTION TO BUILDING STEEL.
6. TO ADDITIONAL CONNECTIONS AS REQUIRED BY N.E.C. ARTICLE 250.
7. LIGHTNING ARRESTOR (IF APPLICABLE).
8. PROVIDE GROUNDING CONDUCTOR TO TECHNOLOGY MAIN GROUND BAR (TMGB). REFER TO BONDING AND GROUNDING DETAIL ON TECHNOLOGY DRAWINGS FOR CONDUCTOR SIZE.

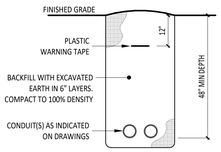
1 E1.2 SERVICE GROUNDING ELECTRODE SYSTEM
NTS



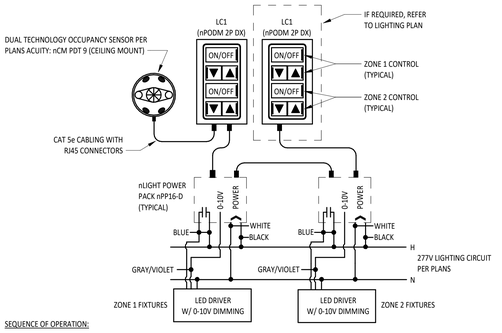
2 E1.2 WATER COOLER RECEPTACLE DETAIL
NTS



3 E1.2 TECHNOLOGY SERVICE ENTRANCE CONDUIT(S)
NTS



4 E1.2 CONDUIT TRENCH DETAIL
NTS



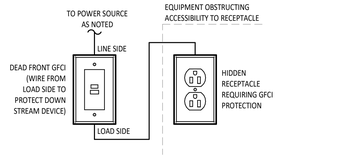
SEQUENCE OF OPERATION:

- WHEN OCCUPANT SELECTS THE "ON" MODE FROM THE ROOM CONTROLLER 'LC1', THE CONTROLLER SHALL TURN ON CORRESPONDING LIGHTS AT 100% LIGHT LEVEL.
- WHEN OCCUPANT SELECTS THE "OFF" MODE FROM THE ROOM CONTROLLER 'LC1', THE CONTROLLER SHALL TURN OFF CORRESPONDING LIGHTS IN THE ROOM.
- WHEN OCCUPANT SELECTS THE UP OR DOWN ARROW FROM THE ROOM CONTROLLER 'LC1', THE CORRESPONDING LIGHTS IN THE ROOM SHALL DIM OR BRIGHTEN ACCORDINGLY.
- OCCUPANCY SENSORS ARE TO HAVE CONTROL OF ALL LIGHTING. LIGHTS SHALL TURN OFF ONLY WHEN OCCUPANCY SENSOR(S) DETECT NO OCCUPANCY. (VACANCY MODE)

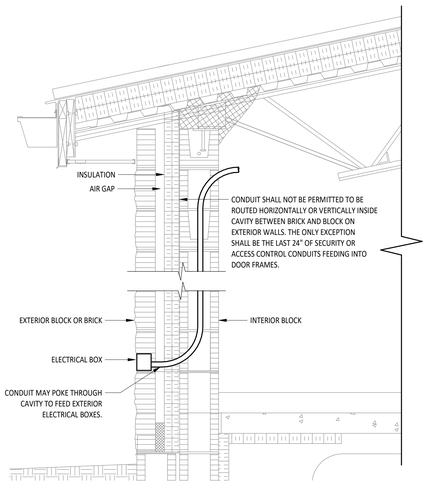
NOTES:

- ACCEPTABLE MANUFACTURERS - ACUITY (BASIS OF DESIGN), WATTSTOPPER, HUBBELL
- ALL WIRING SHALL BE DONE ACCORDING TO MANUFACTUER'S WRITTEN INSTRUCTIONS

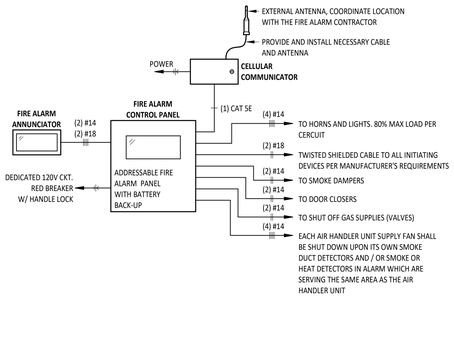
8 E1.2 WIRING DIAGRAM - nLIGHT 2-ZONE CLASSROOM
NTS



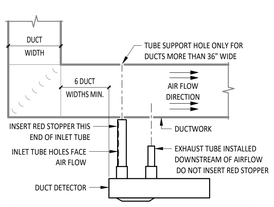
9 E1.2 DEAD FRONT GFCI DETAIL
NTS



13 E1.2 TYPICAL EXTERIOR WALL CAVITY
NTS



5 E1.2 FIRE ALARM RISER DIAGRAM - CELLULAR COMMUNICATOR
NTS



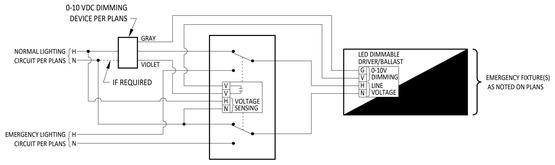
GENERAL NOTES:

A. MOUNTINGS SHOWN ARE TYPICAL. DETECTORS CAN BE INSTALLED SIDE, BOTTOM OR TOP OF DUCT AS LONG AS PROPER TUBE OPERATION AND FLOW/PRESSURE PERFORMANCE IS MAINTAINED.
B. DUCT DETECTOR SHALL, WHEN POSSIBLE, BE LOCATED A MINIMUM OF SIX DUCT WIDTHS DOWNSTREAM FROM A SOURCE OF TURBULENCE (BENDS, INLETS, OR DEFLECTION PLATES).

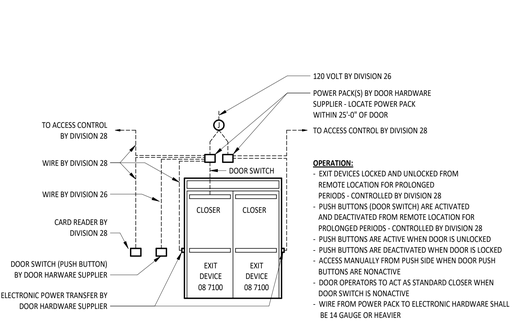
6 E1.2 DUCT DETECTOR DETAIL
NTS

OPERATION:

- ALL SWITCHING SHALL BE ON THE NORMAL CIRCUIT PRIOR TO THE GENERATOR TRANSFER DEVICE. ALL EMERGENCY LIGHTS SHALL RETURN TO FULL BRIGHTNESS WHEN LOSS OF NORMAL POWER IS DETECTED.
- WIRE PER MANUFACTUER'S WRITTEN INSTRUCTIONS.



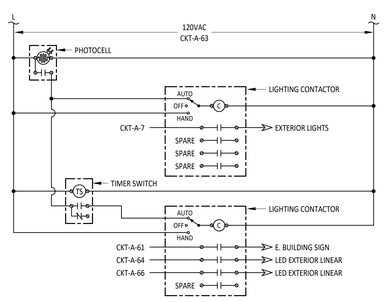
7 E1.2 LIGHTING CONTROL SCHEMATIC - GENERATOR TRANSFER DEVICE
NTS



OPERATION:

- EXIT DEVICES LOCKED AND UNLOCKED FROM REMOTE LOCATION FOR PROLONGED PERIODS - CONTROLLED BY DIVISION 28
- PUSH BUTTONS (DOOR SWITCH) ARE ACTIVATED AND DEACTIVATED FROM REMOTE LOCATION FOR PROLONGED PERIODS - CONTROLLED BY DIVISION 28
- PUSH BUTTONS ARE ACTIVE WHEN DOOR IS UNLOCKED
- PUSH BUTTONS ARE DEACTIVATED WHEN DOOR IS LOCKED
- ACCESS MANUALLY FROM PUSH SIDE WHEN DOOR PUSH BUTTONS ARE NONACTIVE
- DOOR OPERATORS TO ACT AS STANDARD CLOSER WHEN DOOR SWITCH IS NONACTIVE
- WIRE FROM POWER PACK TO ELECTRONIC HARDWARE SHALL BE 14 GAUGE OR HEAVIER

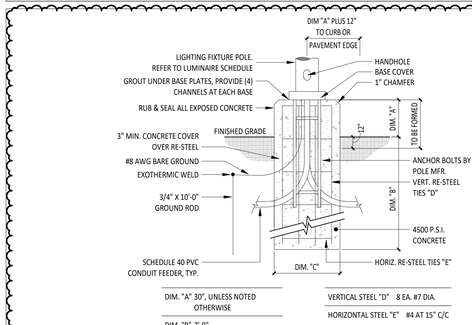
10 E1.2 ACCESS CONTROL SYSTEM SCHEMATIC WIRE DIAGRAM - DUAL DOOR WITH ADO
NTS



GENERAL NOTES:

1. PHOTOCELL SHALL BE INTERMATIC K4236C, OREQ.
2. TIMER SWITCH SHALL BE A 24 HOUR DIAL TIME SWITCH, INTERMATIC T105, OREQ.
3. PROVIDE AN ELECTRICALLY HELD LIGHTING CONTACTOR WITH 120VAC COIL AND NUMBER OF POLES AS SHOWN, NEMA 1 ENCLOSURE.
4. CONTACTOR SHALL HAVE INTEGRAL H-O-A SELECTOR SWITCH.

11 E1.2 EXTERIOR LIGHTING CONTROL DIAGRAM
NTS



DIM. "A" 30", UNLESS NOTED OTHERWISE	VERTICAL STEEL "D" 8 EA. #7 DIA.
DIM. "B" 7'-0"	HORIZONTAL STEEL "E" #4 AT 15" C/C
DIM. "C" 30" ROUND	

NOTE:

1. TACK WELD ALL ANCHOR BOLT NUTS IN PLACE WHEN POLES ARE SET AND PLUMB. REPAIR FINISH WITH COLD GALVANIZING COMPOUND.
2. SET POLES USING DOUBLE NUT CONSTRUCTION METHOD.

12 E1.2 CONCRETE POLE BASE DETAIL - 25'-0" POLE
NTS

STATE OF OHIO
MATTHEW R. HIBNER
1416052
REGISTERED ARCHITECT
MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

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NEW BUILDING FOR
FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

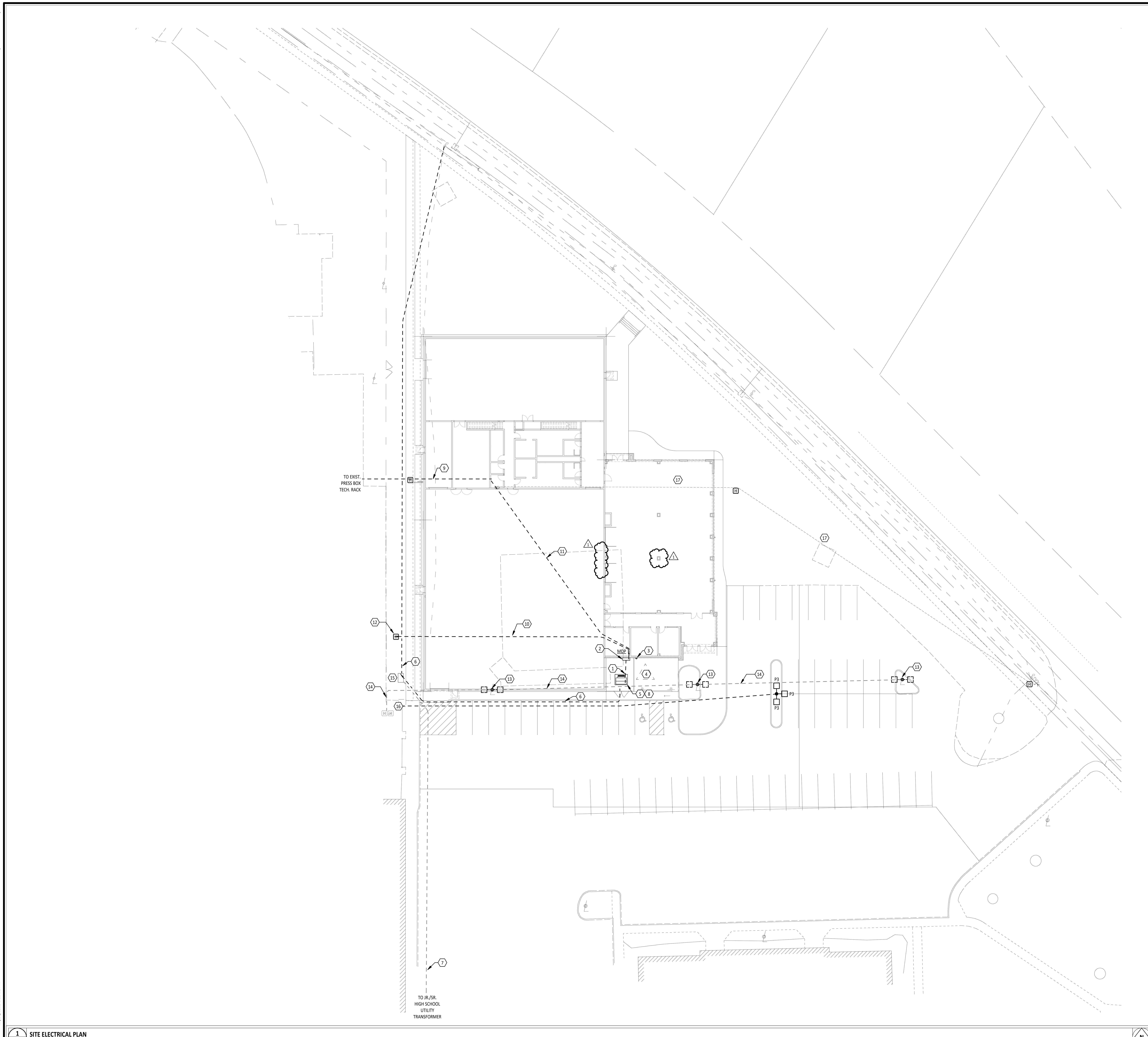
	CONSTRUCTION DOCUMENTS	12/11/2025
1	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	SJH	HJP

SHEET TITLE:
ELECTRICAL DETAILS

SHEET NUMBER:
E1.2

PRINTED ON: 12/30/2025 1:08:42 PM



1 E2.1 SITE ELECTRICAL PLAN
1" = 20'-0"

UTILITY COMPANY CONTACT

AES
LUIS PEREZ DESIGN TECHNICIAN
ijus.lperez@aes.com

ELECTRICAL SITE GENERAL NOTES

A SEE CIVIL SITE PLAN, AND LANDSCAPE SITE PLANS FOR EXACT LOCATION OF OTHER UTILITIES. INSTALLATION OF ELECTRICAL WORK SHALL BE COORDINATED WITH THE OTHER TRADES.
B ELECTRICAL UTILITY SERVICE CONDUITS TO BE MINIMUM OF 48" BELOW GRADE TO TOP OF CONDUITS.
C PROVIDE PULL WIRES IN ALL EMPTY CONDUITS.
D ALL UNDERGROUND CONDUIT SHALL BE 1" SCHEDULE 40 PVC, UNLESS NOTED OTHERWISE.
E COORDINATE CONSTRUCTION WITH THE ELECTRIC UTILITY COMPANY.
F PROVIDE IDENTIFICATION LABEL FOR EACH POLE LIGHT.

KEYNOTE LEGEND

#	KEYNOTE DESCRIPTION
1	UNDERGROUND FEEDER FROM SECONDARY OF UTILITY COMPANY TRANSFORMER TO MAIN SWITCHBOARD VIA CT CABINET. REFERENCE ONE-LINE DIAGRAM FOR FEEDER INFORMATION.
2	PROVIDE CT CABINET. COORDINATE REQUIREMENTS WITH UTILITY COMPANY.
3	PROVIDE METER SOCKET. COORDINATE REQUIREMENTS AND LOCATION WITH UTILITY COMPANY.
4	GROUNDING GRID. REFERENCE GROUNDING DETAIL FOR ADDITIONAL INFORMATION. COORDINATE LOCATION WITH OTHER EQUIPMENT IN AREA.
5	NEW UTILITY COMPANY PAD MOUNTED TRANSFORMER. TRANSFORMER FURNISHED AND INSTALLED BY UTILITY COMPANY. CONCRETE PAD PROVIDED BY ELECTRICAL CONTRACTOR. COORDINATE ALL WORK WITH UTILITY COMPANY.
6	UNDERGROUND PRIMARY SERVICE CONDUITS. PROVIDE TWO (2) 5" PVC SCHEDULE 40 CONDUITS WITH PULL ROPE APPROX. 48" BELOW FINISHED GRADE. CONDUCTORS PROVIDED BY UTILITY COMPANY. COORDINATE WORK WITH UTILITY COMPANY PRIOR TO START OF WORK.
7	EXISTING UNDERGROUND SERVICE CONDUCTORS (SERVING THE JR./SR. HIGH SCHOOL) RE-ROUTED TO THE NEW 'LBC' CABINET BY UTILITY COMPANY.
8	PROVIDE 8" THICK CONCRETE PAD FOR UTILITY TRANSFORMER. PROVIDE #4 REBAR (12" ON CENTER HATCH PATTERN). COORDINATE PAD REQUIREMENTS WITH UTILITY COMPANY.
9	PROVIDE TWO (2) 3" UNDERGROUND CONDUITS WITH PULL WIRE FOR TECHNOLOGY CABLING, GROUNDING, AND FUTURE TECHNOLOGY PATHWAYS. CONDUITS TO EXTEND TO TECHNOLOGY CLOSET AND STUB UP 1'-0" AFF IN TECHNOLOGY ROOM. COORDINATE EXACT STUB UP LOCATIONS WITH TECHNOLOGY CONTRACTOR PRIOR TO INSTALLATION. REFER TO DETAIL 3/E1.2 FOR ADDITIONAL INFORMATION.
10	PROVIDE ONE (1) 2-1/2" UNDERGROUND CONDUIT WITH PULL STRING FROM MDP TO HAND HOLE FOR FUTURE POWER TO PRESS BOX.
11	PROVIDE (1)1-1/2" UNDERGROUND CONDUIT WITH #300 KCMIL AWG COPPER GROUND WIRE FROM SERVICE GROUND TO TECHNOLOGY ROOM GROUND BAR.
12	PROVIDE 24" X 24" X 24" FLUSH IN GRADE PULL BOX WITH TIER 15 LID. QUAZITE 'PG' STYLE OR EQUAL.
13	EXISTING LIGHTS, POLE AND CONCRETE BASE TO BE REMOVED. TURN LIGHTS OVER TO OWNER.
14	REMOVE EXISTING UNDERGROUND SITE LIGHTING CONDUCTORS BACK TO EXISTING PULL BOX.
15	PROPOSED LOCATION FOR 'LBC' CABINET PROVIDED BY UTILITY COMPANY.
16	PROVIDE 2-#8 AWG CU, 1-#10 AWG CU GND. IN UNDERGROUND CONDUIT. CONNECT TO EXISTING POLE LIGHT CIRCUIT MADE AVAILABLE DURING DEMOLITION IN FLUSH IN GRADE POLE BOX.
17	PROVIDE TWO (2) 3" UNDERGROUND CONDUITS WITH PULL WIRE FOR TECHNOLOGY CABLING. CONDUITS TO EXTEND TO TECHNOLOGY CLOSET AND STUB UP 1'-0" AFF IN TECHNOLOGY ROOM. COORDINATE EXACT STUB UP LOCATIONS WITH TECHNOLOGY CONTRACTOR PRIOR TO INSTALLATION. REFER TO DETAIL 3/E1.2 FOR ADDITIONAL INFORMATION.

Know what's **below.**
Call before you dig.

STATE OF OHIO
MATTHEW R. HIBNER 1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER

NEW BUILDING FOR
FORT LORAMIE LOCAL SCHOOLS
ATHLETIC COMPLEX BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

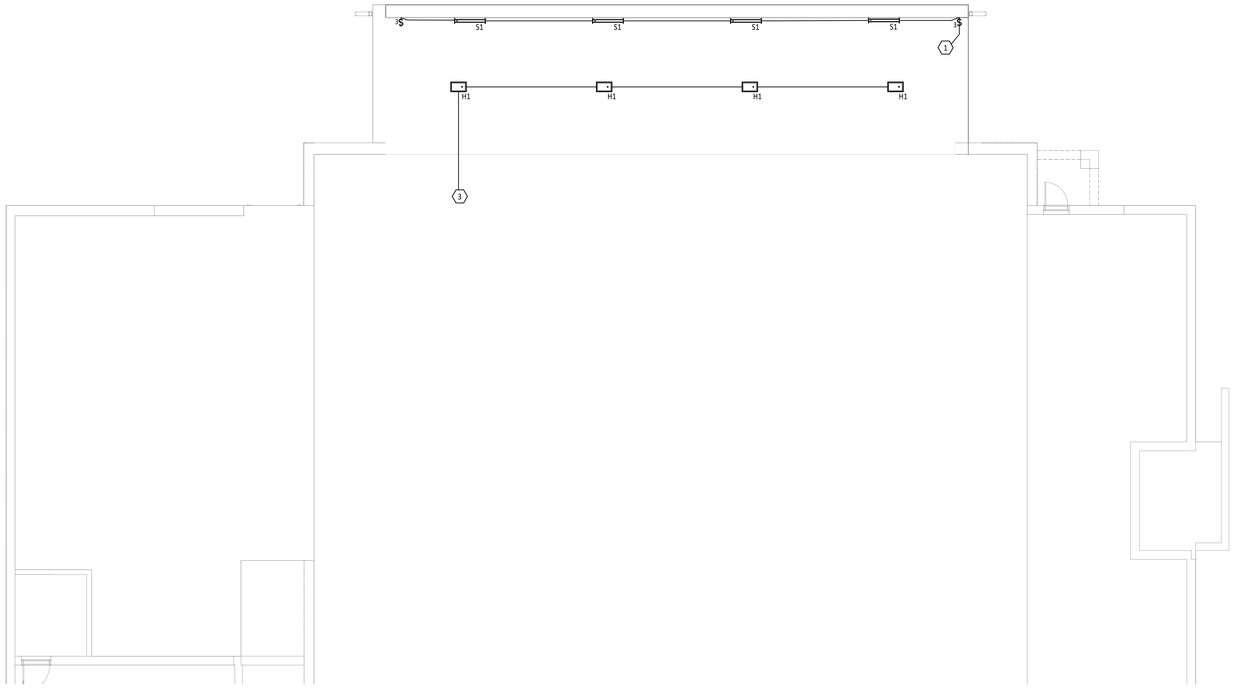
	CONSTRUCTION DOCUMENTS	12/11/2025
1	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	SJH	HJP

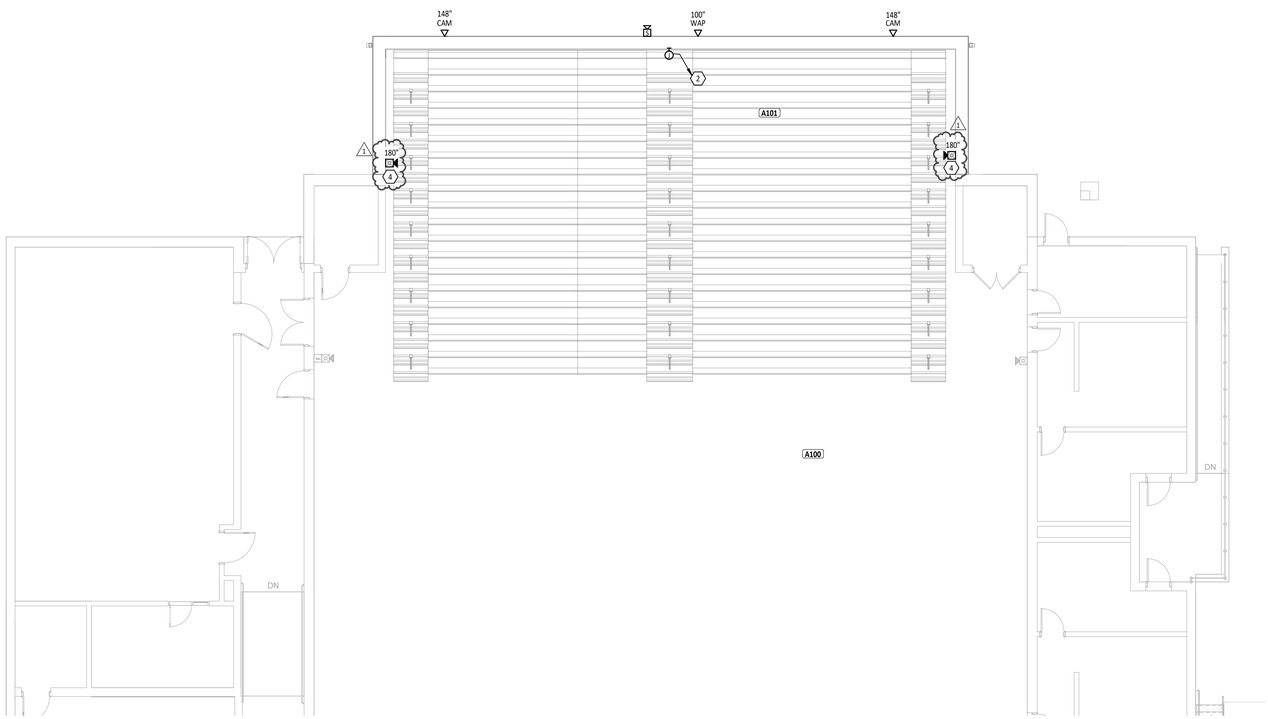
SHEET TITLE:
SITE ELECTRICAL PLAN

SHEET NUMBER:
E2.1

PRINTED ON: 12/30/2025 1:09:26 PM



1 / E3.1 **LIGHTING PLAN - UNIT A**
1/8" = 1'-0"



2 / E3.1 **POWER AND SYSTEMS PLAN - UNIT A**
1/8" = 1'-0"

FIRST FLOOR PLAN ROOM INDEX - UNIT A

ROOM NUMBER	ROOM NAME	AREA
A100	GYMNASIUM	6,691 SF
A101	GYMNASIUM ADDITION	1,336 SF
A130	DINING	4,995 SF

SYSTEMS GENERAL NOTES

A WHERE DEVICES ARE SHOWN UNDER CABINETS, CASEWORK, FURNITURE AND THE LIKE; REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT PLACEMENT SO THAT DEVICES SHALL BE LOCATED WITHIN KNEE SPACE OR OPEN AREA.

B ALL LOW VOLTAGE CABLING FOR THE SCOPE OF WORK BY DIVISION 26, 27, AND 28 IN EXPOSED CEILING SPACES SHALL BE ROUTED INSIDE CONDUIT. COORDINATE WITH INSTALLER OF EACH SYSTEM PRIOR TO ROUGH-IN. PAINT CONDUIT TO MATCH SURROUNDING AREA.

C CONDUIT IN EXPOSED CEILING SPACES SHALL BE CONCEALED INSIDE WALLS. EXPOSED CONDUIT SHALL ONLY BE ALLOWED IN JOIST SPACE NEAR ROOF.

D ALL CONDUIT ENDS FOR CABLING NOT CONNECTED TO A BOX OR FITTING SHALL BE PROVIDED WITH NYLON BUSHINGS TO PROTECT CABLING FROM DAMAGE.

E ALL MOUNTING HEIGHTS REFER TO BOTTOM OF BOX, UNO.

#	KEYNOTE DESCRIPTION
1	MODIFY AND EXTEND EXISTING LIGHTING CIRCUIT MADE AVAILABLE DURING DEMOLITION. REFER TO DEMOLITION WORK FOR MORE INFORMATION.
2	MODIFY AND EXTEND EXISTING BLEACHER POWER CIRCUIT (20A, 208V, 3-PHASE) MADE AVAILABLE DURING DEMOLITION. MAKE ALL NECESSARY CONNECTIONS. REFER TO DEMOLITION WORK FOR MORE INFORMATION.
3	CONNECT TO EXISTING GYM LIGHT CIRCUIT FROM PANEL L1B, ABOVE EXISTING BLEACHERS APPROXIMATELY 25' SOUTH OF NEW HI-FIXTURES.
4	PROVIDE A FIRE ALARM NOTIFICATION DEVICE COMPATIBLE WITH THE EXISTING SYSTEM. EXISTING SYSTEM IS SECUTRON - MR-2200.

STATE OF OHIO
MATTHEW R. HIBNER
1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
MARION, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
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FT LORAMIE ELEMENTARY SCHOOL RENOVATION

BUILDING ADDITION

55 ELM STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	SJH	HJP

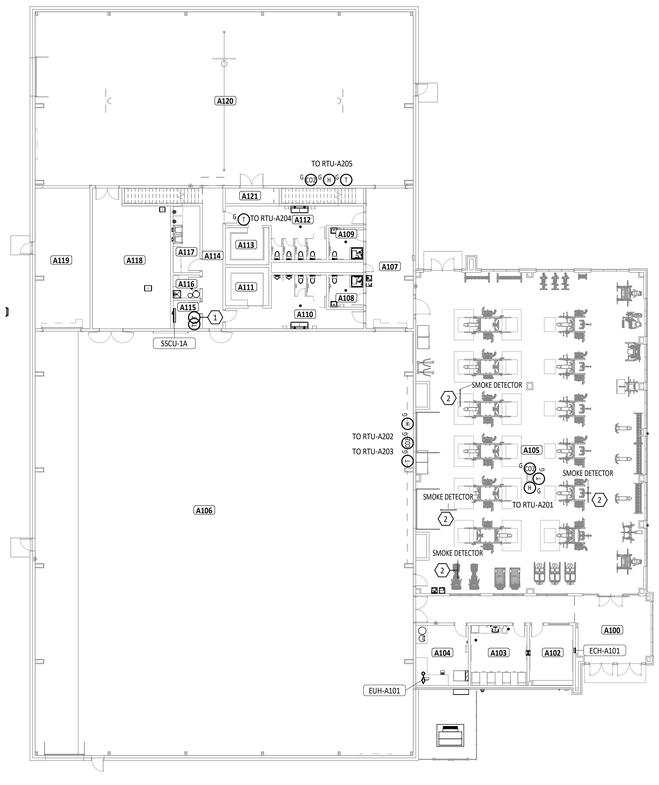
SHEET TITLE:

ELECTRICAL PLAN - UNIT A

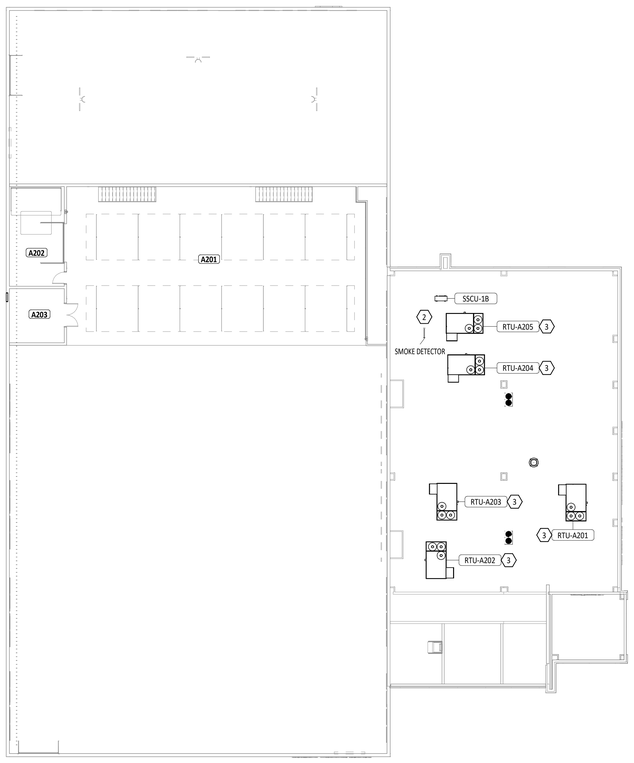
SHEET NUMBER:

E3.1

PRINTED ON: 12/22/2025 2:30:09 PM



1 M6.1 **OVERALL TEMPERATURE CONTROL FIRST FLOOR PLAN**
1/16" = 1'-0"



2 M6.1 **OVERALL TEMPERATURE CONTROL MEZZANINE AND ROOF PLAN**
1/16" = 1'-0"

FIRST FLOOR PLAN ROOM INDEX

ROOM NUMBER	ROOM NAME	AREA
A100	VESTIBULE	323 SF
A101	CORRIDOR	291 SF
A102	COACH OFFICE	178 SF
A103	TRAINER	231 SF
A104	MECHANICAL / ELECTRICAL ROOM	215 SF
A105	WEIGHT ROOM	4,895 SF
A106	MULTI-PURPOSE ATHLETIC ROOM	10,934 SF
A107	CORRIDOR	456 SF
A108	FAMILY RESTROOM / SHOWER	74 SF
A109	FAMILY RESTROOM / SHOWER	73 SF
A110	MENS RESTROOM	317 SF
A111	MENS CHANGING ROOM	114 SF
A112	WOMENS RESTROOM	307 SF
A113	WOMENS CHANGING ROOM	111 SF
A114	CORRIDOR	199 SF
A115	TECH ROOM	52 SF
A116	CUSTODIAL CLOSET	42 SF
A117	LAUNDRY ROOM	122 SF
A118	STORAGE ROOM	689 SF
A119	CORRIDOR	529 SF
A120	MULTI-PURPOSE GYMNASIUM	4,483 SF
A121	STORAGE	51 SF
A201	MEZZANINE	3,103 SF
A202	GOLF SIMULATOR	372 SF
A203	STORAGE	202 SF
AST1	STAIR	82 SF
AST2	STAIR	89 SF

KEYNOTE LEGEND

#	KEYNOTE DESCRIPTION
1	THERMOSTAT FOR SPLIT SYSTEM COOLING UNIT PROVIDED BY UNIT MANUFACTURER AND INSTALLED BY DIVISION 23 MECHANICAL CONTRACTOR. TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE A SEPARATE THERMOSTAT IN ROOM TO MONITOR TECHNOLOGY CLOSET SPACE TEMPERATURE THROUGH THE BAS.
2	APPROXIMATE LOCATION OF DUCT MOUNTED SMOKE DETECTOR. SMOKE DETECTOR SHALL BE INSTALLED AND WIRED BY DIVISION 26 ELECTRICAL CONTRACTOR.
3	ROOFTOP UNIT SHALL COME WITH BACNET CARD. CONTROLS CONTRACTOR SHALL INTEGRATE ROOFTOP INTO BUILDING AUTOMATION SYSTEM. UNDER BASE BID, BUILDING AUTOMATION SYSTEM SHALL BE STAND ALONE (TO THIS BUILDING ONLY).

1

TECHNOLOGY ROOM POINT LIST

POINT TAG	POINT DESCRIPTION	HARDWARE POINTS DI	AI	DO	AO	SOFTWARE POINTS		ALARM	TREND	GRAPHIC
ZN-T	TECH CLOSET XXXX SPACE TEMPERATURE		X					X		X

TECHNOLOGY ROOM UNIT

SPACE TEMPERATURE (TECH CLOSET XXXX)
ZN-T | AI

3 M6.1 **TECHNOLOGY ROOM AIR CONDITIONING CONTROL SCHEMATIC**

SPACE CARBON DIOXIDE
*ZN-CO2 | AI
SPACE HUMIDITY
*ZN-H | AI
SPACE TEMPERATURE
ZN-T | AI
BACNET MS/TP OR IP
REFER TO SEQUENCE OF OPERATION FOR LIST OF REQUIRED INTEGRATION POINTS
PACKAGED OUTDOOR AHU

POINT LIST

POINT TAG	POINT DESCRIPTION	HARDWARE POINTS DI	AI	DO	AO	SOFTWARE POINTS DV	AV	ALARM	TREND	GRAPHIC
ZN-T	SPACE TEMPERATURE		X						X	X
*ZN-H	SPACE HUMIDITY		X						X	X
*ZN-CO2	CARBON DIOXIDE SENSOR		X						X	X
	OCCUPIED HEATING SETPOINT						X			X
	OCCUPIED COOLING SETPOINT						X			X
	UNOCCUPIED HEATING SETPOINT						X			X
	UNOCCUPIED COOLING SETPOINT						X			X
	DUCT STATIC PRESSURE SETPOINT						X			X
	SUPPLY AIRFLOW SETPOINT (CFM)						X			X
	MINIMUM SUPPLY AIRFLOW SETPOINT (CFM)						X			X

*WHERE INDICATED ON PLANS.

PACKAGED OUTDOOR AHU SCHEMATIC

4 M6.1 **PACKAGED MAKEUP AIR CONTROL SCHEMATIC**

TEMPERATURE CONTROL GENERAL NOTES

A REFER TO SECTION 23 0913 AND 23 0993 FOR TEMPERATURE CONTROL SPECIFICATIONS.
B MOUNT THE THERMOSTATS AND SENSORS WITH BOTTOM AT 44" AFF UNLESS OTHERWISE NOTED, A MINIMUM OF 8" FROM LIGHT SWITCH. COORDINATE HEIGHT WITH LIGHT SWITCHES. SEE DETAIL FOR ADDITIONAL INFORMATION.

ABBREVIATIONS

ABBREV	DESCRIPTION	ABBREV	DESCRIPTION
AF	AIRFLOW SENSOR (BY VAV MFG)	LTA	LOW TEMPERATURE FREEZESTAT
AFMS	AIRFLOW MONITORING STATION	M	MOTOR
AI	ANALOG INPUT	MA	MIXED AIR
AO	ANALOG OUTPUT	NC	NORMALLY CLOSED
CCP	COIL CIRCULATING PUMP	NO	NORMALLY OPEN
CD	CONTROL DAMPER	NO	NITROGEN DIOXIDE
CLG	CHILLED WATER	OA	OUTSIDE AIR
CO	CARBON DIOXIDE	OAFILT	OUTSIDE AIR PREFILTER
CMO	CARBON MONOXIDE	OCC	OCCUPANCY SENSOR (BY OTHERS)
CT	ELECTRICAL CURRENT TRANSDUCER	PCLG	PRIMARY CHILLED WATER LOOP
CV	CONTROL VALVE	PFILT	PREFILTER
DA	DISCHARGE AIR	RA	RETURN AIR
DI	DIGITAL INPUT	RAFILT	RETURN AIR FILTER
DO	DIGITAL OUTPUT	RM	ROOM (SPACE)
DP	DIFFERENTIAL PRESSURE	RWT	RETURN WATER TEMPERATURE
DPHI	DIFFERENTIAL PRESSURE HIGH LEVEL	SD	SMOKE DETECTOR (BY OTHERS)
EA	EXHAUST AIR	SA	SUPPLY AIR
EAB	BUILDING EXHAUST AIR	SCLG	SECONDARY CHILLED WATER LOOP
EAFILT	EXHAUST AIR FILTER	SF	SUPPLY FAN
EF	EXHAUST FAN	SP	SETPOINT
ERW	ENERGY RECOVERY WHEEL	STARTER	MOTOR STARTER (BY OTHERS)
FDP	FILTER DIFFERENTIAL PRESSURE SENSOR	STATUS	FAN STATUS
FFILT	FINAL FILTER	S/S	START / STOP
FM	FLOW METER (GPM)	SWT	SUPPLY WATER TEMPERATURE
H	HUMIDITY	T	TEMPERATURE SENSOR
HTG	HEATING	VFD	VARIABLE FREQUENCY DRIVE
		ZN	ZONE

SYMBOLS

SYMBOL	DESCRIPTION
XX-AFMS | AI	AIRFLOW MONITORING STATION
XX-CD | AO	CONTROL DAMPER
SD XX-SD | DI	SMOKE DETECTOR (BY OTHERS)
	AIR FILTER
H L RA-FDP | AI	FILTER WITH DIFFERENTIAL PRESSURE SWITCH
T XX-T | AI	AIR TEMPERATURE SENSOR
H XX-H | AI	AIR HUMIDITY SENSOR
T XX-T | AI	AVERAGING TEMPERATURE SENSOR
FM WM-F | AI	FLOW METER
LTA | DI	FREEZESTAT
C	COOLING COIL
H C	HEATING COIL
AO XXX-CV	HYDRONIC CONTROL VALVE
AI CLG-LWT T	HYDRONIC TEMPERATURE SENSOR
	PUMP
R	CONTROL RELAY
	FAN
DI EF-STATUS | CT	ELECTRICAL CURRENT TRANSDUCER
STARTER M	MOTOR WITH MOTOR STARTER
VFD M	MOTOR WITH VARIABLE FREQUENCY DRIVE

CONTROL CONTRACTOR SHALL PROVIDE ANY ADDITIONAL POINTS AS REQUIRED TO CARRY OUT THE SEQUENCE OF OPERATION IN SECTION 23 0993 OF THE SPECIFICATIONS.

THERMOSTAT / SENSOR LEGEND

CO2 CARBON DIOXIDE SENSOR
CO CARBON MONOXIDE SENSOR
NO2 NITROGEN DIOXIDE SENSOR
HS HUMIDITY SENSOR
H HUMIDISTAT
TH TEMPERATURE & HUMIDITY SENSOR
TS TEMPERATURE SENSOR
T THERMOSTAT
SW MANUAL SWITCH
S SENSOR
G GUARD
E ELECTRIC LINE VOLTAGE THERMOSTAT
R REVERSE ACTING THERMOSTAT

STATE OF OHIO
MATTHEW R. HIBNER
1416052
REGISTERED ARCHITECT

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

GARMANN MILLER
MARION, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
mmhgroup.com

NEW BUILDING FOR
FORT LORAMIE LOCAL SCHOOLS
ATHLETIC COMPLEX BUILDING
600 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS

	CONSTRUCTION DOCUMENTS	12/11/2025
1	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	MAK	DJL

SHEET TITLE:
OVERALL TEMPERATURE CONTROL PLAN

SHEET NUMBER:
M6.1

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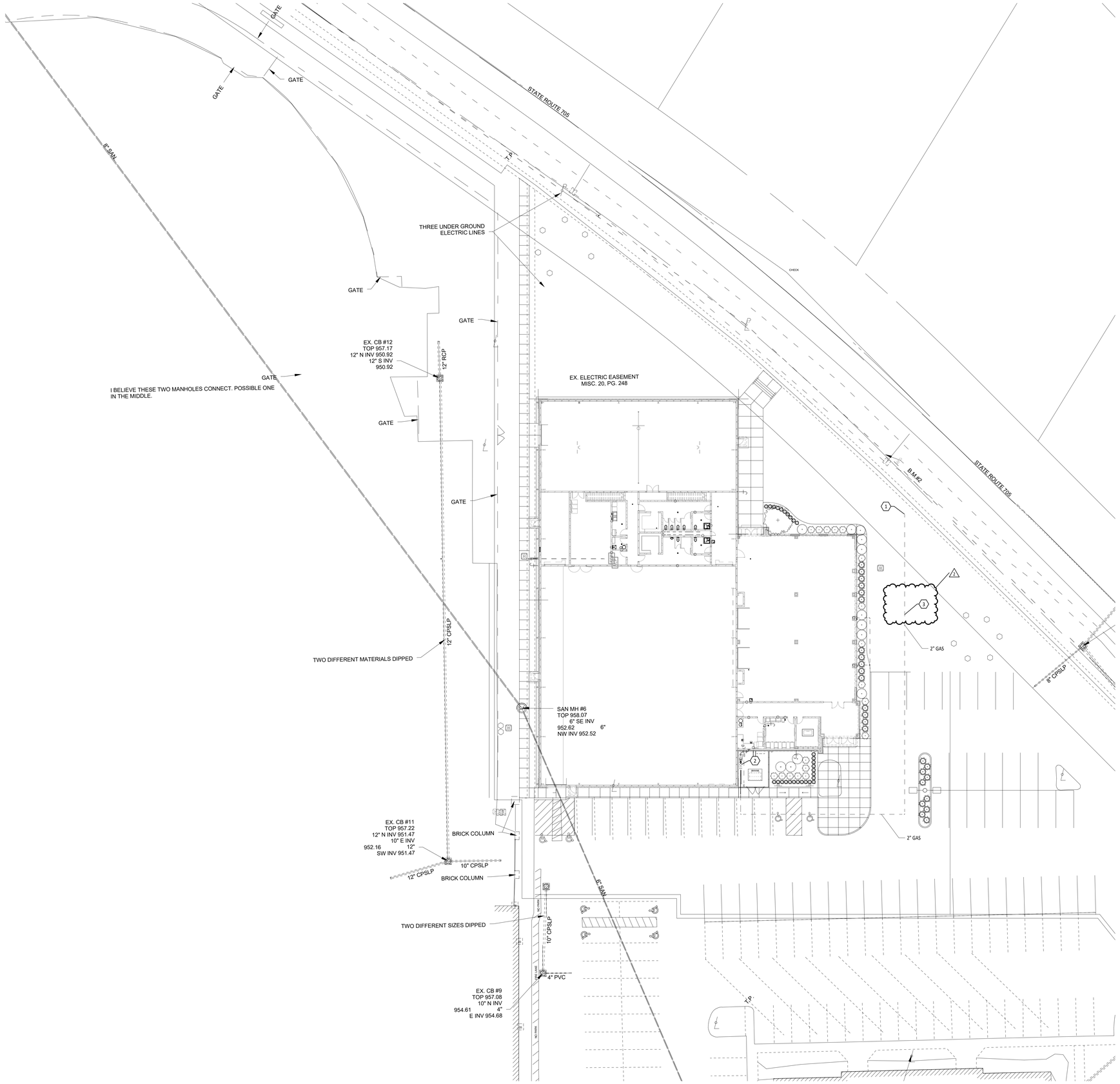

1 P1.2 **SITE PLUMBING PLAN**
1" = 20'-0"

KEYNOTE LEGEND	
#	KEYNOTE DESCRIPTION
1	REFER TO CIVIL DRAWING FOR CONTINUATION.
2	APPROXIMATE LOCATION OF GAS METER / REGULATOR SET BY CENTERPOINT ENERGY GAS COMPANY. COORDINATE EXACT LOCATION WITH CENTERPOINT AND OTHER UTILITIES.
3	CENTERPOINT ENERGY SHALL MAKE NEW CONNECTION ON EAST SIDE OF SR 705 AND EXTEND MAIN PIPING IN THE APPROXIMATE LOCATION SHOWN. MAIN PIPING SHALL BE ROUTED IN 2" PVC CONDUIT UNDER THE ASPHALT AND CONNECTED TO THE NEW GAS METER LOCATION SHOWN. COORDINATE ALL WORK WITH CENTERPOINT AND THE GENERAL CONTRACTOR.

STATE OF OHIO
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EXPIRATION DATE: 12/31/2025

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MANSFIELD, OHIO | COLUMBUS, OHIO | INDIANAPOLIS, INDIANA | FORT WAYNE, INDIANA
mmmgm.com

FORT LORAMIE LOCAL SCHOOLS ATHLETIC COMPLEX BUILDING

NEW BUILDING FOR
609 EAST PARK STREET, FORT LORAMIE, OHIO 45845

ISSUANCES/REVISIONS		
1	CONSTRUCTION DOCUMENTS - ADDENDUM #02	12/19/2025
2	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25041.00	RAG	LGW

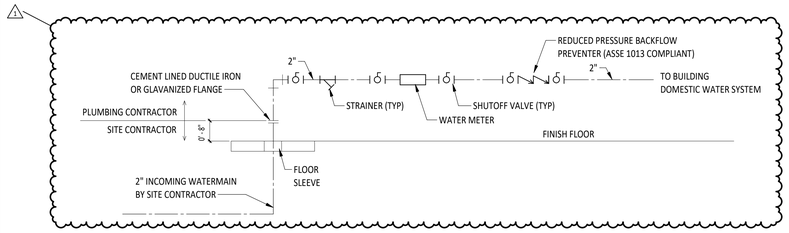
SHEET TITLE:
SITE PLUMBING PLAN

SHEET NUMBER:
P1.2

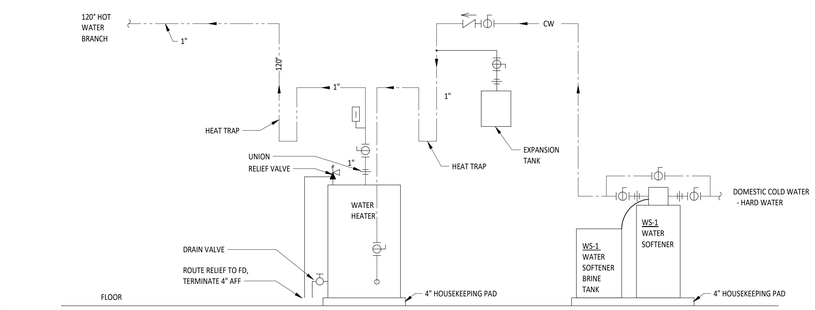
PRINTED ON: 12/30/2025 8:46:45 AM

DOMESTIC FIXTURE SCHEDULE

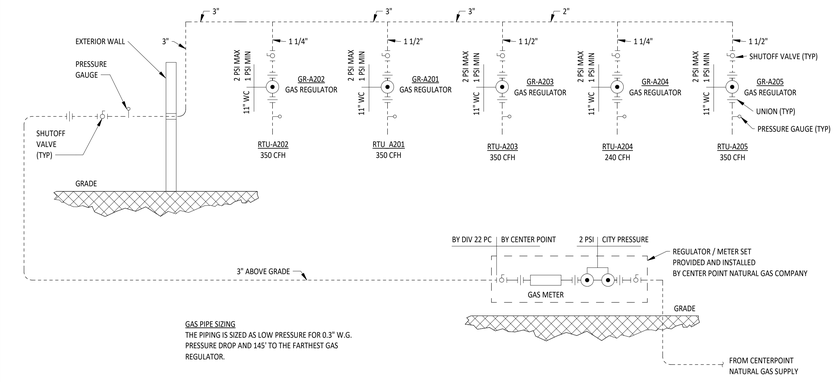
ID	DESCRIPTION	MANUFACTURER	MODEL	QTY	MATERIAL DESCRIPTION	FINISH	MOUNTING HEIGHT	DEPTH	ADA	TRIM MANUFACTURER	TRIM MODEL	TRIM TYPE	TRIM MOTION SENSOR CONTROL	FLOW FIXTURE WATER FLOW	FLOW FIXTURE COLD WATER TEMP.	FLOW FIXTURE HOT WATER TEMP.	FLOW FIXTURE MAX. MIXED WATER TEMP.	FLUSH FIXTURE VOL. PER FLUSH	FLUSH FIXTURE MIN. VOL. PER FLUSH	WASTE ROUGH-IN PIPE SIZE	INDIRECT WASTE PIPE SIZE	VENT PIPE SIZE	COLD WATER ROUGH-IN PIPE SIZE	HOT WATER ROUGH-IN PIPE SIZE	SPECIFICATION	REMARKS
EWC-1	WATER COOLER	ELKAY	LVRCGRN8F	1	STAINLESS STEEL	STAINLESS STEEL CABINET	40" TO SPOUT		No				No	0.13 GPM	40 °F		40 °F			2"	---	1-1/2"	1/2"		SINGLE LEVEL WALL HUNG WATER COOLER. THE UNIT SHALL BE COMPLETE WITH CABINET, MOUNTING FRAME, SELF CLOSING EASY TOUCH SIDE AND FRONT PUSHBAR CONTROLS, VANDAL RESISTANT BUBBLER, FILTER, REFRIGERATING SYSTEM, AIR COOLED, 120 VOLT, 60 CYCLE, SINGLE PHASE POWER CONNECTION, FULLY AUTOMATIC, COMPLETE AND READY TO OPERATE.	
EWC-2A	WATER COOLER W/ BOTTLE FILLER - ADA	ELKAY	LVRCGRN8WSK	1	STAINLESS STEEL	STAINLESS STEEL CABINET	36" TO SPOUT		Yes				No	0.13 GPM	40 °F		40 °F			2"	---	1-1/2"	1/2"		SINGLE LEVEL WALL HUNG WATER COOLER WITH WATER COOLER. THE UNIT SHALL BE COMPLETE WITH CABINET, MOUNTING FRAME, FRONT PUSH-BUTTON CONTROL, VANDAL-RESISTANT BUBBLER, FILTER, REFRIGERATING SYSTEM, AIR COOLED, 120 VOLT, 60 CYCLE, SINGLE PHASE POW	
EWC-3	WATER COOLER - DUAL HEIGHT	ELKAY	EZSTL8WSSK	1	GALVANIZED STEEL	STAINLESS STEEL CABINET	33" & 38" TO SPOUT		Yes				No	0.13 GPM	40 °F		40 °F			2"	---	1-1/2"	1/2"		TWO LEVEL WALL HUNG WATER COOLER WITH BOTTLE FILLING STATION. THE UNIT SHALL BE COMPLETE WITH CABINET, MOUNTING FRAME, FRONT PUSH BUTTOM CONTROL, VANDAL-RESISTANT BUBBLER, REFRIGERATING SYSTEM, AIR COOLED, 120 VOLT, 60 CYCLE, SINGLE PHASE POWER CONNECTION, FULLY AUTOMATIC, COMPLETE AND READY TO OPERATE.	
FSSK	FLOOR SERVICE SINK	ZURN	Z-1996-24	1	MOLDED HIGH DENSITY COMPOSITE	WHITE	36" TO SPOUT	0' - 10"	No	ZURN	Z843M1-XL-CS	MANUAL	No	2.50 GPM	40 °F	120 °F	105 °F			---	3"	---	3/4"	3/4"	FLOOR SERVICE SINK: 24"x24"x10" BASIN, MOLDED HIGH DENSITY COMPOSITE BASIN, 3" DRAIN BODY WITH STAINLESS STEEL, 3" DRAIN TRAP, VINYL BUMPER GUARD, HOSE, HOSE BRACKET, MOP HANGER, AND STAINLESS STEEL WALL GUARDS. FAUCET: WALL MOUNTED, VANDAL RESISTANT COLOR CODED LEVER HANDELS, 6" SPOUT, WALL BRACE, PAIL HOOK, INTEGRAL SERVICE STOPS, CHECK STOPS AND ATMOSPHERIC VACUUM BREAKER SPOUT.	
HB	HOSE BIBB			1	BRONZE	POLISHED BRONZE	4'-0" AFF			ZURN	Z1341-XL	MANUAL	No	2.50 GPM	40 °F		40 °F						1/2"		INTERIOR HOSE BIBB WITH VACUUM BREAKER, 3/4" HOSE THREAD OUTLET, LOCK SHIELD CAP, AND REMOVABLE "TEE" HANDLE. PROVIDE SHUTOFF VALVE IN COLD WATER SUPPLY AHEAD OF HOSE BIBB.	
HYD-1	EXTERIOR WALL HYDRANT			3	BRONZE	POLISHED NICKEL BRONZE	1'-6" AFF			ZURN	Z1320-XL	MANUAL	No	2.50 GPM	40 °F		40 °F						3/4"		NON-FREEZE TYPE WALL HYDRANT, VALVE AND SHOCK ABSORBER ON THE INSIDE OF THE WALL ABOVE CEILING, SPOUT WITH BACKFLOW PREVENTER, AND LOOSE KEY SOCKET ON THE OUTSIDE OF THE WALL. MAKE ARRANGEMENTS WITH THE GENERAL CONTRACTOR TO PROVIDE THE NECESSARY RECESS IN THE WALL. PROVIDE SHUTOFF VALVE IN ACCESSIBLE LOCATION.	
L-1	LAVATORY - WALL HUNG - ADA	ZURN	Z5340	2	WHITE VITREOUS CHINA	WHITE	34" TO RIM	0' - 6 1/2"	Yes	ZURN	Z81101-XL	MANUAL	No	0.35 GPM	40 °F	120 °F	105 °F			---	2"	---	1/2"	1/2"	LAVATORY: WALL HUNG LAVATORY, CONCEALED ARM SUPPORTS, REAR OVERFLOW, FAUCET LEDGE, 4" CENTERS. FAUCET: DECK-MOUNTED FAUCET WITH 4" SPOUT, ADA DUAL LEVER HANDLES, VANDAL RESISTANT HANDLES AND SPRAY, QUARTER TURN CERAMIC DISC CARTRIDGE, EXTERNAL ASSE 1070 COMPLIANT THERMOSTATIC MIXING VALVE, GRID DRAIN, ANGLE STOPS AND SUPPLIES. COVER WATER AND WASTE WITH ADA INSULATION KIT. MOUNT AT ADA COMPLIANT HEIGHT.	
LD-1	2-STATION LAVATORY DECK - WALL HUNG - ADA	BRADLEY	ELX-2	2	TERREON CONSTRUCTION	SELECTED BY ARCHITECT	34" TO RIM	0' - 6 1/2"	Yes	AMERICAN STANDARD	Z81101-XL	MANUAL	No	0.35 GPM	40 °F	120 °F	105 °F			---	2"	---	1/2"	1/2"	WALL HUNG 2-STATION LAVATORY DECK, FAUCET HOLES ON 4" CENTERS. FAUCET: DECK-MOUNTED FAUCET WITH 4" SPOUT, ADA DUAL LEVER HANDLES, VANDAL RESISTANT HANDLES AND SPRAY, QUARTER TURN CERAMIC DISC CARTRIDGE, EXTERNAL ASSE 1070 COMPLIANT THERMOSTATIC MIXING VALVE, GRID DRAIN, LOOSE KEY ANGLE STOPS AND SUPPLIES. INSULATE WATER AND WASTE WITH ADA INSULATION KIT. MOUNT AT ADA COMPLIANT HEIGHT.	
OB-1	WALL DRAINAGE BOX	IPS CORPORATION	FRMIB12ABDS	1	COLD ROLLED STEEL	WHITE	4'-0" AFF						No	2.50 GPM			105 °F			2"	---	2"			WALL RECESSED WASHING MACHINE BOX TO BE USED AS CONDENSATE DRAIN BOX. RATED TO BE IN A FIRE WALL. 1/2" METAL CAP WATER KNOCK-OUTS SHALL REMAIN IN. SCREW ON 18 GAUGE STEEL FACE PLATE. THE PLUMBING CONTRACTOR SHALL PROVIDE A HOLE IN THE TOP OF THE METAL BOX AND 1-1/2" PVC PIPE IN THE BLOCK WALL FROM THE TOP OF THE DRAIN BOX UP TO THE LEVEL OF THE WALL MOUNTED COOLING UNIT. THE HVAC CONTRACTOR SHALL USE THIS PIPE AS A PATHWAY FOR THE CONDENSATE DRAIN TUBE. HVAC CONTRACTOR SHALL SECURE PIPE TO PROVIDE AIR GAP AND DRAIN TO THE RECEPTOR. COORDINATE WORK WITH THE HVAC CONTRACTOR.	
OB-2	WASHING MACHINE OUTLET BOX	IPS CORPORATION	FRM12DS	2	COLD ROLLED STEEL	WHITE	4'-0" AFF	0' - 6 1/2"	Yes				No	0.50 GPM	40 °F	120 °F	105 °F			2"	---	2"	1/2"	1/2"	FULLY RECESSED WASHING MACHINE OUTLET BOX WITH COVER . RATED TO BE INSTALLED IN A FIRE WALL. PROVIDE 1/4 TURN BALL VALVES AND WATER HAMMER ARRESTORS IN BOX. PROVIDE A 2" TRAPPED STANDPIPE IN CONCEALED WALL SPACE.	
OB-3	ICE MAKER OUTLET BOX	IPS CORPORATION	FRM12DS	1	COLD ROLLED STEEL	WHITE	1'-6" AFF						No	0.10 GPM	40 °F		40 °F						1/2"		FULLY RECESSED ICE MAKER SUPPLY BOX WITH COVER. RATED TO BE INSTALLED IN FIRE WALL. PROVIDE 1/4 TURN BALL VALVE AND WATER HAMMER ARRESTOR IN BOX. PROVIDE AN ASSE 1012 BACKFLOW PREVENTER INSTALLED BEHIND ICE MAKER WITH AIR GAP TO NEAREST DRAIN.	
S-1	SINGLE BOWL SINK	JUST	A33338-T-J	1	STAINLESS STEEL	STAINLESS STEEL	34" TO RIM	0' - 5 1/2"	Yes	ZURN	Z812B1-XL-22F	MANUAL	No	1.00 GPM	40 °F	120 °F	105 °F			---	2"	---	1/2"	1/2"	SINK: SINGLE BOWL, WALL MOUNT, CENTER REAR DRAIN CONNECTION, 4" REAR FAUCET CENTERS. FAUCET: DECK-MOUNTED FAUCET WITH 5 3/8" SPOUT, ADA DUAL LEVER HANDLES, VANDAL RESISTANT HANDLES AND SPRAY, QUARTER TURN CERAMIC DISC CARTRIDGE, EXTERNAL ASSE 1070 COMPLIANT THERMOSTATIC MIXING VALVE, GRID DRAIN, ANGLE STOPS AND SUPPLIES. COVER WATER AND WASTE WITH ADA INSULATION KIT. MOUNT AT ADA COMPLIANT HEIGHT.	
SH-1A	SHOWER - ADA			2				0' - 6 1/2"	Yes	BRADLEY	HN250	MANUAL	No	1.50 GPM	40 °F	120 °F	105 °F			---	2"	---	1/2"	1/2"	SURFACE MOUNTED INDIVIDUAL COVERALL SHOWER WITH STAINLESS STEEL WALL PANEL. ASSE 1013 COMPLIANT THERMOSTIC MIXING VALVE WITH SINGLE LEVER HANDLE CONTROL, LIMIT STOPS. 1.5 GPM FLOW CONTROL, DIVERTER VALVE, 60" STAINLESS STEEL FLEXIBLE HOSE WITH ADA SHOWERHEAD, RECESSED SOAP DISH. PROVIDE ACCESSORY ITEMS INCLUDING ADA GRAB BARS, ADA FOLD DOWN SEAT, SHOWER CURTAIN, AND HANGER ROD. REFER TO DRAWING FOR VALVE HAND POSITION.	
UR	URINAL	ZURN	Z5755-U	1	WHITE VITREOUS CHINA	WHITE	21" TO BOTTOM		Yes	ZURN	Z6003AV-ULF	MANUAL	No		40 °F		40 °F	0.125 gal	0.125 gal	2"	---	1-1/2"	3/4"		URINAL: WALL MOUNTED, CARRIER, ULTRA LOW FLOW CONSUMPTION, WASHOUT FLUSH ACTION, ELONGATED RIM, TOP SPUD CONNECTION. FLUSH VALVE: EXPOSED, QUIET CLOG RESISTANT DIAPHRAGM-TYPE, ULTRA LOW CONSUMPTION, MANUAL FLUSH.	
UR-1	URINAL - ADA	ZURN	Z5755-U	1	WHITE VITREOUS CHINA	WHITE	17" TO RIM		Yes	ZURN	Z6003AV-ULF	MANUAL	No		40 °F		40 °F	0.125 gal	0.125 gal	2"	---	1-1/2"	3/4"		URINAL: WALL MOUNTED, CARRIER, ULTRA LOW FLOW CONSUMPTION, WASHOUT FLUSH ACTION, ELONGATED RIM, TOP SPUD CONNECTION. FLUSH VALVE: EXPOSED, QUIET CLOG RESISTANT DIAPHRAGM-TYPE, ULTRA LOW CONSUMPTION, MANUAL FLUSH.	
WC	WATER CLOSET - WALL HUNG	ZURN	Z5615-BWL	4	WHITE VITREOUS CHINA	WHITE	15" TO RIM		Yes	ZURN	Z6000AV-HET	MANUAL	No		40 °F		40 °F	1.28 gal	1.28 gal	4"	---	2"	1"		WATER CLOSET: ELONGATED WALL HUNG WATER CLOSET, 1-1/2" TOP SPUD, CARRIER, ULTRA LOW CONSUMPTION, ELONGATED SIPHON ACTION JETTED BOWL. FLUSH VALVE: EXPOSED, QUIET CLOG RESISTANT DIAPHRAGM-TYPE, ULTRA LOW CONSUMPTION, MANUAL FLUSH.	
WC-1	WATER CLOSET - WALL HUNG - ADA - 17"	ZURN	Z5615-BWL	4	WHITE VITREOUS CHINA	WHITE	17" TO RIM		Yes	ZURN	Z6000AV-HET	MANUAL	No		40 °F		40 °F	1.28 gal	1.28 gal	4"	---	2"	1"		WATER CLOSET: ELONGATED WALL HUNG WATER CLOSET, 1-1/2" TOP SPUD, CARRIER, ULTRA LOW CONSUMPTION, ELONGATED SIPHON ACTION JETTED BOWL. FLUSH VALVE: EXPOSED, QUIET CLOG RESISTANT DIAPHRAGM-TYPE, ULTRA LOW CONSUMPTION, MANUAL FLUSH.	



1 / P5.1 INCOMING WATER MAIN DETAIL
NTS



2 / P5.1 WATER HEATER PIPING DETAIL
1/8" = 1'-0"



3 / P5.1 NATURAL GAS PIPING DETAIL
NTS

REDUCED PRESSURE BACKFLOW PREVENTER SCHEDULE

ID	NOMINAL DIAMETER	DESCRIPTION	MANUFACTURER	MODEL	COUNT	MATERIAL	VALVE PROPERTIES RATED FLOW	PRESSURE DROP AT RATED FLOW	MAXIMUM ALLOWABLE WORKING PRESSURE	MAXIMUM ALLOWABLE WORKING TEMPERATURE	HYDROSTATIC TEST PRESSURE	REMARKS
RPBP-1	1 1/2"	DOUBLE CHECK VALVE ASSEMBLY	ZURN WILKINS	975XL	1	BRONZE	100.0 GPM	15.0 lb/in²	175.0 lb/in²	140 °F	350.0 lb/in²	ASSE 1013 CERTIFIED 1-1/2" REDUCED PRESSURE BACKFLOW PREVENTER WITH FULL PORT QUARTER TURN SHUTOFF VALVES. PROVIDE AN AIR GAP WITH REIEF PIPED TO NEAREST FLOOR DRAIN.

ELECTRIC WATER HEATER SCHEDULE

ID	LOCATION NAME	LOCATION NO.	MANUFACTURER	MODEL NO.	TYPE	ELECTRIC HEAT EXCHANGER HEATING CAP	WATERSIDE FLOW DESIGN	WATERSIDE FLOW MIN	WATERSIDE STORAGE RECOVERY	WATERSIDE STORAGE VOL	WATERSIDE MAX TEMP RISE	ELECTRIC HEAT EXCHANGER HEATING ELEMENT QTY	ELECTRIC HEAT EXCHANGER HEATING ELEMENT POWER	UNIT WEIGHT	FLA	MCA	MOCP	VOLT	PH	REMARKS
WH-1	CUSTODIAL	A116	AO SMITH	DEN-52	STORAGE	5.0 kW	0.0 GPM	0.0 GPM	13.0 gal/h	50.0 gal	80 °F	2	2.5 kW	145 lb	24 A	30 A	35 A	208 V	1	
WH-2	TRAINER	A103	EEMAX	AM005240T	INSTANTANEOUS	3.6 kW	0.4 GPM	0.3 GPM	24.0 gal/h	0.0 gal	70 °F	1	3.6 kW	6 lb	17 A	17 A	20 A	208 V	1	

WATER SOFTENER SCHEDULE

ID	MANUFACTURER	MODEL NO.	TYPE	Water Flow	PEAK FLOW (GPM)	WATER FLUSH VOLUME	CAPACITY (LBS)	GRAINS PER GALLON	RESIN TANKS	VOLTAGE	FLA	PHASE	UNIT DIMENSIONS HEIGHT	UNIT DIMENSIONS DIAMETER	UNIT WEIGHT	REMARKS
WS-1	CULLIGAN	HE1.5 060-DF	SINGLE	25.0 GPM	31.5	165.0 gal	350 lb	5	1	24 V	1	1	3' - 11"	1' - 2"	257 lb	

FLOOR DRAIN SCHEDULE

ID	DESCRIPTION	MANUFACTURER	MODEL	QTY	MATERIAL DESCRIPTION DRAIN BODY	MATERIAL DESCRIPTION STRAINER	WASTE PIPE SIZE	VENT PIPE SIZE	PRIMER PIPE SIZE	SPECIFICATION	REMARKS
FD	FLOOR DRAIN	ZURN	ZN415-BZ1	10	EPOXY COATED CAST IRON	NICKEL BRONZE	3"	2"	---	EPOXY COATED CAST IRON FLOOR DRAIN WITH ANCHOR FLANGE, REVERSIBLE CLAMPING COLLAR WITH PRIMARY & SECONDARY WEEPHOLES, ADJUSTABLE ROUND HEEL PROOF NICKEL BRONZE STRAINER, AND NO HUB OUTLET.	
FS-1	FLOOR SINK	ZURN	Z566-AR-GT	2	EPOXY COATED CAST IRON	CAST IRON	4"	2"	---	12" SQUARE X 8" DEEP SANITARY FLOOR SINK WITH EPOXY COATED INTERIOR, LOOSE SET EPOXY COATED CAST IRON GRATE, CAST IRON DOME BOTTOM STRAINER, AND NO HUB OUTLET.	

CLEAN OUT SCHEDULE

ID	DESCRIPTION	MANUFACTURER	MODEL	QTY	MATERIAL	FINISH DESCRIPTION	PIPE ACCESSORY DIAMETER	SPECIFICATION	REMARKS
CO	FLOOR CLEANOUT	ZURN	ZN1400-BZ1	2	DURA-COATED CAST IRON	POLISHED NICKEL BRONZE	3"	ROUND FLOOR CLEAN OUT WITH ADJUSTABLE COVER, THREADED CONNECTION, GAS AND WATER TIGHT SEAL. COVER TO BE FLUSH WITH FINISHED FLOOR.	
CO	FLOOR CLEANOUT	ZURN	ZN1400-BZ1	3	DURA-COATED CAST IRON	POLISHED NICKEL BRONZE	4"	ROUND FLOOR CLEAN OUT WITH ADJUSTABLE COVER, THREADED CONNECTION, GAS AND WATER TIGHT SEAL. COVER TO BE FLUSH WITH FINISHED FLOOR.	
RH	RODDING HOLE	ZURN	Z1474	2	DURA-COATED CAST IRON	CAST IRON	4"	ROUND FRAME WITH SOLID TOP COVER. SET COVER FLUSH WITH GRADE. REFER TO DETAIL FOR ADDITIONAL INFORMATION.	
WCO	WALL CLEANOUT	ZURN	Z1446	2	DURA-COATED CAST IRON	STAINLESS STEEL	4"	9" ROUND WALL CLEAN OUT WITH SMOOTH STAINLESS STEEL WALL COVER, THREADED CONNECTION, GAS AND WATER TIGHT SEAL	

GAS REGULATOR SCHEDULE

ID	MANUFACTURER	MODEL	CAPACITY	CONNECTION SIZE	OUTLET PRESSURE	MAXIMUM INLET PRESSURE	REMARKS
GR-A201	SENSUS	243-12-2	350000 Btu/h	1 1/2"	11 in-wg	2.0 psi	NATURAL GAS REGULATOR, GREEN SPRING, 1/4" ORIFIC.
GR-A202	SENSUS	243-12-2	350000 Btu/h	1 1/2"	11 in-wg	2.0 psi	NATURAL GAS REGULATOR, GREEN SPRING, 1/4" ORIFIC.
GR-A203	SENSUS	243-12-2	350000 Btu/h	1 1/2"	11 in-wg	2.0 psi	NATURAL GAS REGULATOR, GREEN SPRING, 1/4" ORIFIC.
GR-A204	SENSUS	243-12-2	240000 Btu/h	1 1/2"	11 in-wg	2.0 psi	NATURAL GAS REGULATOR, GREEN SPRING, 1/4" ORIFIC.
GR-A205	SENSUS	243-12-2	350000 Btu/h	1 1/2"	11 in-wg	2.0 psi	NATURAL GAS REGULATOR, GREEN SPRING, 1/4" ORIFIC.

EXPANSION TANK SCHEDULE

ID	MANUFACTURER	MODEL NO.	VOLUME TANK	VOLUME ACCEPTANCE	PRESS RELIEF	UNIT DIMENSIONS HEIGHT	UNIT DIMENSIONS DIAMETER	UNIT WEIGHT	REMARKS
EXP-1	B&G	PT-5	3.5 gal	2.5 gal	125.0 psi	1' - 2"	10' - 0"	22 lb	DOMESTIC HOT WATER EXPANSION TANK, FIXED BLADDER TYPE, 3/4" NPT STAINLESS STEEL CONNECTION.

STORM DRAIN SCHEDULE

ID	DESCRIPTION	MANUFACTURER	MODEL	QTY	MATERIAL DESCRIPTION DRAIN BODY	MATERIAL DESCRIPTION STRAINER	WASTE PIPE SIZE	SPECIFICATION	REMARKS
SD-1	COMBINATION DRAINS	ZURN	ZA163-W3	2	LACQUERED CAST IRON	ALUMINUM	4"	COMBINED LARGE SUMP ROOF DRAIN AND SECONDARY OVERFLOW SYSTEM; CONSISTING OF 24" X 42" GALVANIZED SUMP RECEIVER, TWO ROOF DRAIN BODIES WITH 15" DIAMETER ANCHOR FLANGE, CAST IRON WATERPROOFING MEMBRANE CLAMP RINGS WITH INTEGRAL GRAVEL STOP, ONE 3" ABS OVERFLOW STANDPIPE AND TWO SELF-LOCKING DOME STRAINERS WITH A COMBINED FREE AREA OF 250 SQUARE INCHES.	
DN-1	STORM DRAIN - NOZZLE	ZURN	Z199-SS	2	POLISHED NICKLE BRONZE	STAINLESS STEEL	4"	DOWNSPOUT NOZZLE FOR SECONDARY ROOF DRAIN, NO-HUB CONNECTION, REMOVABLE STAINLESS STEEL SCREEN.	

MATTHEW R. HIBNER
LICENSE #1416052
EXPIRATION DATE: 12/31/2025

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ISSUANCES/REVISIONS		
	CONSTRUCTION DOCUMENTS	12/11/2025
1	CONSTRUCTION DOCUMENTS - ADDENDUM #03	12/30/2025

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