

Addendum 02

DOCUMENT 00 91 00

DATE: February 13, 2026

PROJECT: Antwerp Local Schools Bus Building Addition and Renovation
303 Harrmann Road
Antwerp, Ohio 45813

PROJECT #: 25057.00

OWNER: Antwerp Local School District
Contact: Marty Miller
303 Harrmann Road
Antwerp, Ohio 45813

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 Construction Documents dated January 22, 2026, 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 pages, 12 re-issued drawing sheets, and 11 specification sections.

FOR INFORMATION ONLY

1. If there is a discrepancy between the structural drawings and specifications, follow what is shown on the structural drawings.
2. Pre-bid meeting minutes as well as sign in sheet are attached for reference.

CHANGES TO THE DRAWINGS

1. Drawing sheet C1.0 Site Utilities
 - a. Labeled existing and proposed water line sizes.
 - b. Relocated both 6" and 8" water lines around building.
2. Drawing Sheet L1.1: Added welded wire mesh to the heavy-duty concrete detail



3. Drawing Sheet A1.1 First Floor Plan and Column Details
 - a. Adjusted exterior wall assembly.
 - b. Adjusted keynote references.
4. Drawing Sheet A2.1 Building Sections
 - a. Adjusted keynote references.
5. Drawing sheet A4.1 Wall Sections and Details
 - a. Adjusted exterior wall assembly.
 - b. Adjusted keynote references.
6. Drawing Sheet A5.1 Roof Plan and Roof Details
 - a. Adjusted exterior wall and roof assembly.
 - b. Removal of expansion joint detail.
 - i. Adjustment of apron detail.
 - ii. Addition of keynote for roof expansion joint.
 - iii. Addition of a line to roof plan showing location of roof expansion joint.
 - c. Adjusted keynote references.
7. Drawing sheet A6.1 Door Schedule and Details
 - a. Adjusted exterior wall assembly.
 - b. Adjusted keynote references.
 - c. Adjusted overhead door sizes.
 - d. Added 90 minute rating to doors 106d and 109d
 - e. Adjusted head and jamb details 11/A6.1 and 12/A6.1
 - f. Adjusted head of door frame type 1
8. Drawing sheet A7.1 First Floor Reflected Ceiling Plan
 - a. Removal of metal panel ceiling in wash bay.
9. Drawing sheet P1.1 General Notes, Abbreviations, Legends, Schedules and Sheet Index
 - a. Added two general notes per building department review comments.
10. Drawing Sheet S1.1 Foundation Plan
 - a. Updated foundation plan based on underground utility line locations.
11. Drawing sheet P2.1 Plumbing Plans
 - a. Addition of two general notes per building department review comments.
 - b. Addition of existing clean out (to remain) at (E)-OWS outlet added to drawing for reference only.
 - c. Addition of keynote for backflow prevention device required at hot water pressure washer cold water connection.
12. Drawing sheet P3.1 Sanitary Isometric
 - a. Addition of existing clean out (to remain) at (E)-OWS outlet added to drawing for reference only.

CHANGES TO THE SPECIFICATIONS

1. Replace the following section in its entirety: 00 41 13 Bid Form
 - a. Note: Completion Date was changed to October 30, 2026
2. Section 03 30 00 Cast-In-Place Concrete: Paragraph 2.08, remove subparagraph H.
3. Add section 05 50 00 Metal Fabrication
4. Replace the following section in its entirety: 07 21 13 Board Insulation
5. Remove the following sections from the project manual in their entirety: 07 21 16, 07 21 19, 07 22 16, 07 61 00, 07 62 00, 07 71 00, 07 71 23, and 07 72 00
6. Section 08 36 13 Sectional Doors:



- a. Paragraph 2.01 Manufacturers, subparagraph B Other Acceptable Manufacturers
 - i. Add Raynor Garage Doors, Thermal Seal Model TM200 as an acceptable manufacturer.
- b. Paragraph 2.05 Electric Operation, subparagraph B, 1 Mounting
 - i. Change to Center mounted on cross head shaft.
- 7. Section 08 71 23 Commercial Door Operator: Paragraph 2.02 Operators For Sectional Overhead Doors, subparagraph A, 1, b, Rating, Change to 3/4 hp
- 8. Replace the following section in its entirety: 13 34 19 Pre-Engineered Buildings
- 9. Plumbing Specification 22 10 06
 - a. Added trap seals.
 - b. Added approved trench drain substitution request.
- 10. Mechanical Specification 23 55 33
 - a. Added a manufacturer to the approved infrared heaters manufacturers list.
- 11. Concrete Specification 32 13 13
 - a. Added Paragraph 2.03 Reinforcing and subsequent subparagraphs A and B.
- 12. Division 33 specifications added:
 - a. 33 01 10.58-Disinfection of Water Distribution
 - b. 33 14 16-Site Water Utility Distribution Piping
 - c. 33 31 13-Site Sanitary Sewerage Gravity Piping
 - d. 33 42 11-Stormwater Gravity Piping

ATTACHMENTS

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

Drawing Sheets: C1.0, L1.1, A1.1, A2.1, A4.1, A5.1, A6.1, A7.1, P1.1, S1.1, P2.1, P3.1

Specifications: 00 41 13, 05 50 00, 07 21 13, 13 34 19, 22 10 06, 23 55 33, 32 13 13, 33 01 10.58, 33 14 16, 33 31 13, 33 42 11

END OF ADDENDUM





PreBid Meeting Minutes

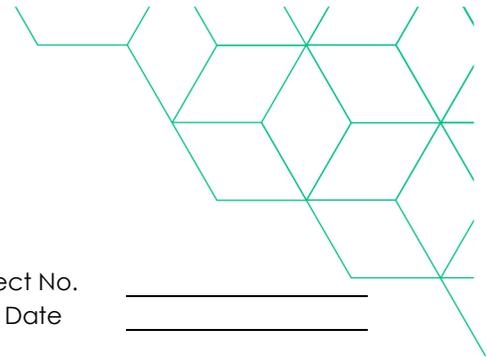
Project Name	Antwerp Local Schools – Bus Building Addition	GM Project No.	25057.00
Meeting Date	02/09/2026	Meeting Location	Antwerp Local Schools District Office

Outline

- Attendees: Sign in Sheet
- Introductions
- Project overview
 - Review of scope of work (this is not to be considered the full scope)
 - General Construction:** Demolition of the existing bus port canopy attached to the existing bus maintenance building, and the construction of a new pre-engineered metal building to be used for bus storage.
- Bidding
 - Date: February 19, 2026 at 1:30.00 pm
 - Bids will be received at the school's district office until 1:30.00 pm on February 19, 2026 at which time they will be opened and read aloud.
 - Tax exempt project
 - Builders risk is furnished by the owner
- Addendums
 - Addendum #1: Issued February 6, 2026
- Bid Categories
 - Contract A – General Construction
- Contingency amounts to be included in bid:
 - General Construction - \$50,000
- Contracts will be administered by Garmann Miller
 - All questions and correspondence to go through the A-E office
 - All RFIs through A-E office
 - Pay applications to A-E office
- Schedule.
 - Tentative award date – Soon after bids are received
 - Start of Construction – following award
 - Completion Date – September 4, 2026
- General Conditions
 - General Contractor:
 - Responsible for construction schedule and general supervision
 - Submit preliminary schedule 10 days after notice to proceed, coordinate this closely with



- owner to allow for regularly scheduled events and services.
 - iii. Responsible for administering job meetings.
 - iv. Temporary utilities
 - v. Temporary telecommunications services
 - vi. Temporary sanitary facilities
 - vii. Temporary controls: barriers, enclosures, and fencing
 - viii. Waste removal
 - ix. Job superintendent on site available via cell phone
11. Temporary Electricity
- a. Contractor may use electricity from the existing building. If more is needed than what the owner has available, then the contractor is responsible for providing that.
12. Temporary Water
- a. Contractor may use water from the existing building. If more is needed than what the owner has available, then the contractor is responsible for providing that.
13. Substitution request by 7 days prior to bid.
14. Correspondence
- a. Correspondence to run through the Architect's office
 - i. Project Manager: Ryan Heitkamp rheitkamp@creategm.com
 - ii. Construction Admin: Luke Baucher lbaucher@creategm.com
15. Drawings available at DC Reprographics, 1254 Courtland Ave, Columbus, Ohio 43201; www.DCplanroom.com; Phone 614-297-1200. Each Bidder is responsible for shipping cost.
16. Contractor questions/comments
- a. GC asked if a job trailer would need to be provided for construction meetings.
 - i. Antwerp administration conference room in school building can be used for construction meetings, no job trailer required.
 - b. GC raised concern about missing step in the foundation wall for the sanitary sewer.
 - i. Detail is show for the step in the foundation wall but is not shown on the foundation plan, to be corrected by structural engineer in addendum 02.
17. Owner questions/comments
- a. Owner requested that they have full access to the front of the existing bus maintenance garage during construction.



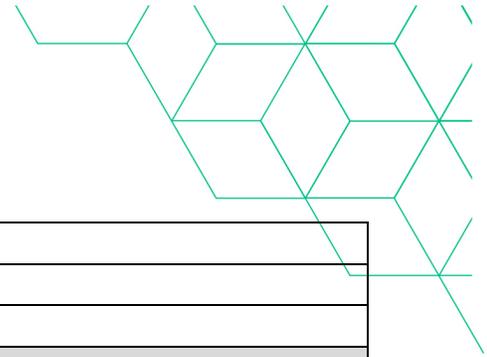
Sign-in Sheet

Project Name _____ GM Project No. _____
Meeting Location _____ Meeting Date _____

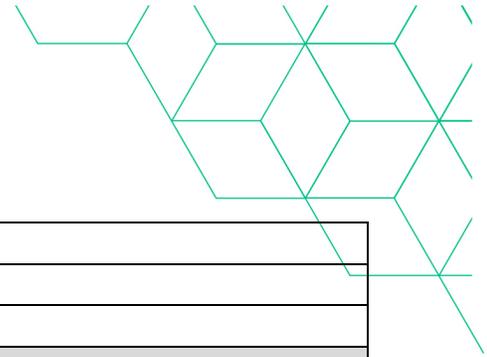
Purpose _____

Attendees

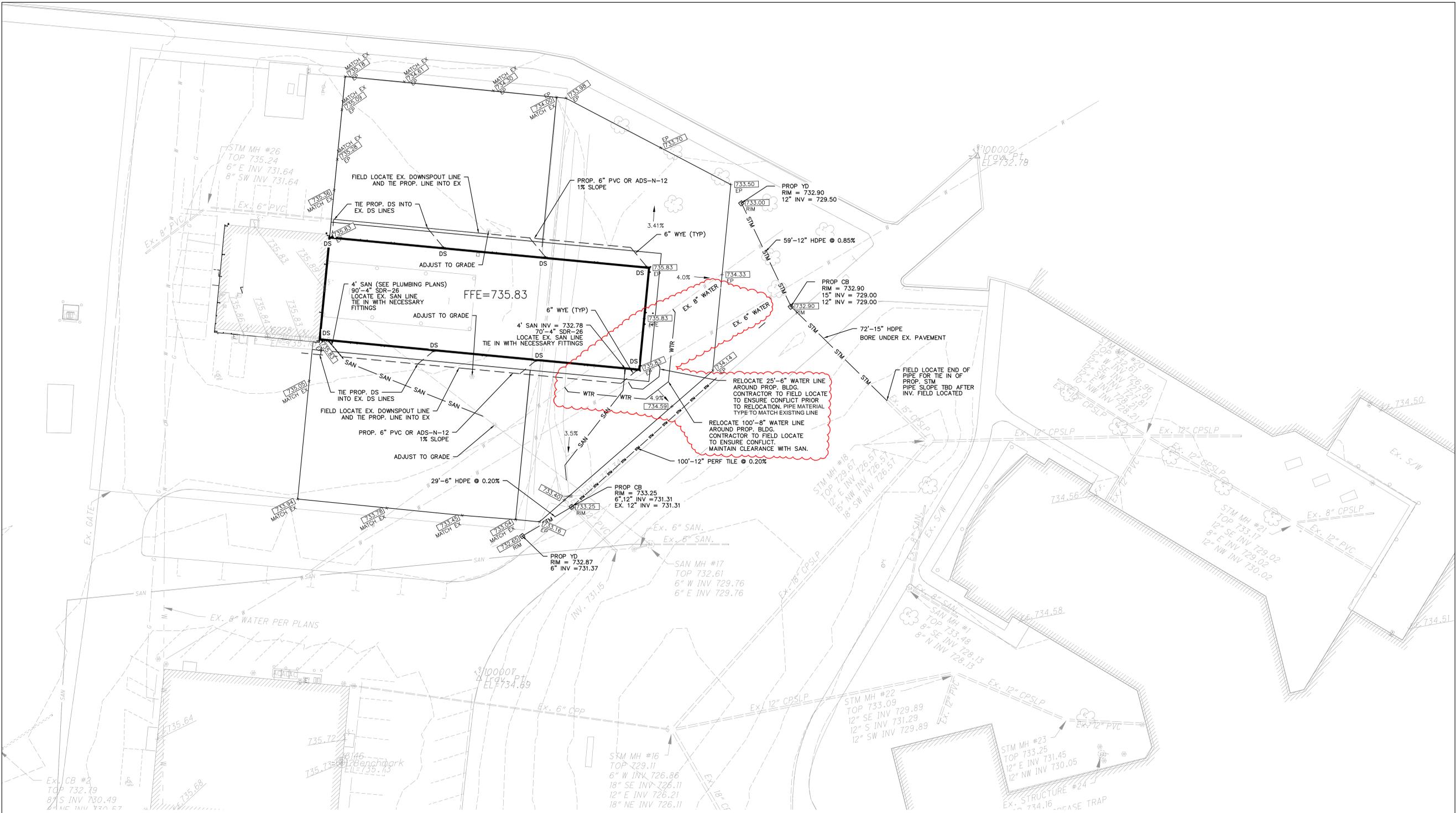
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	
Name _____	Phone _____
Business/Title _____	
Email _____	



Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		



Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		
Name	_____	Phone	_____
Business/Title	_____		
Email	_____		



ANTWERP LOCAL SCHOOLS BUS GARAGE ADDITION AND RENOVATIONS

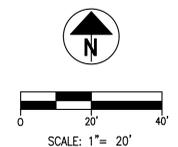
ADDITION TO

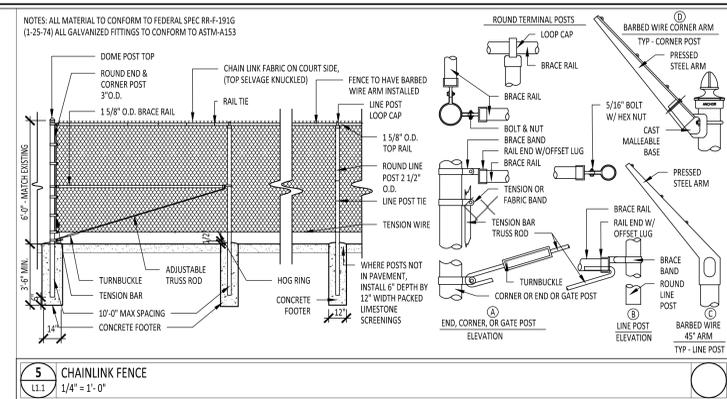
ISSUANCES/REVISIONS		
CONSTRUCTION DOCUMENTS	01/22/2025	
ADDENDUM 02	02/13/2025	

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	NKT	NKT

SHEET TITLE:
**SITE
GRADING/UTILITIES
PLAN**

SHEET NUMBER:
C1.0



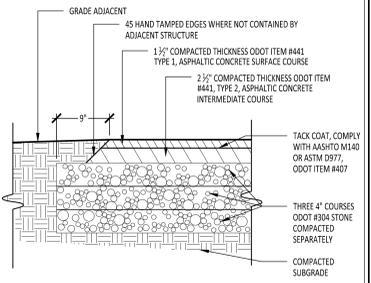
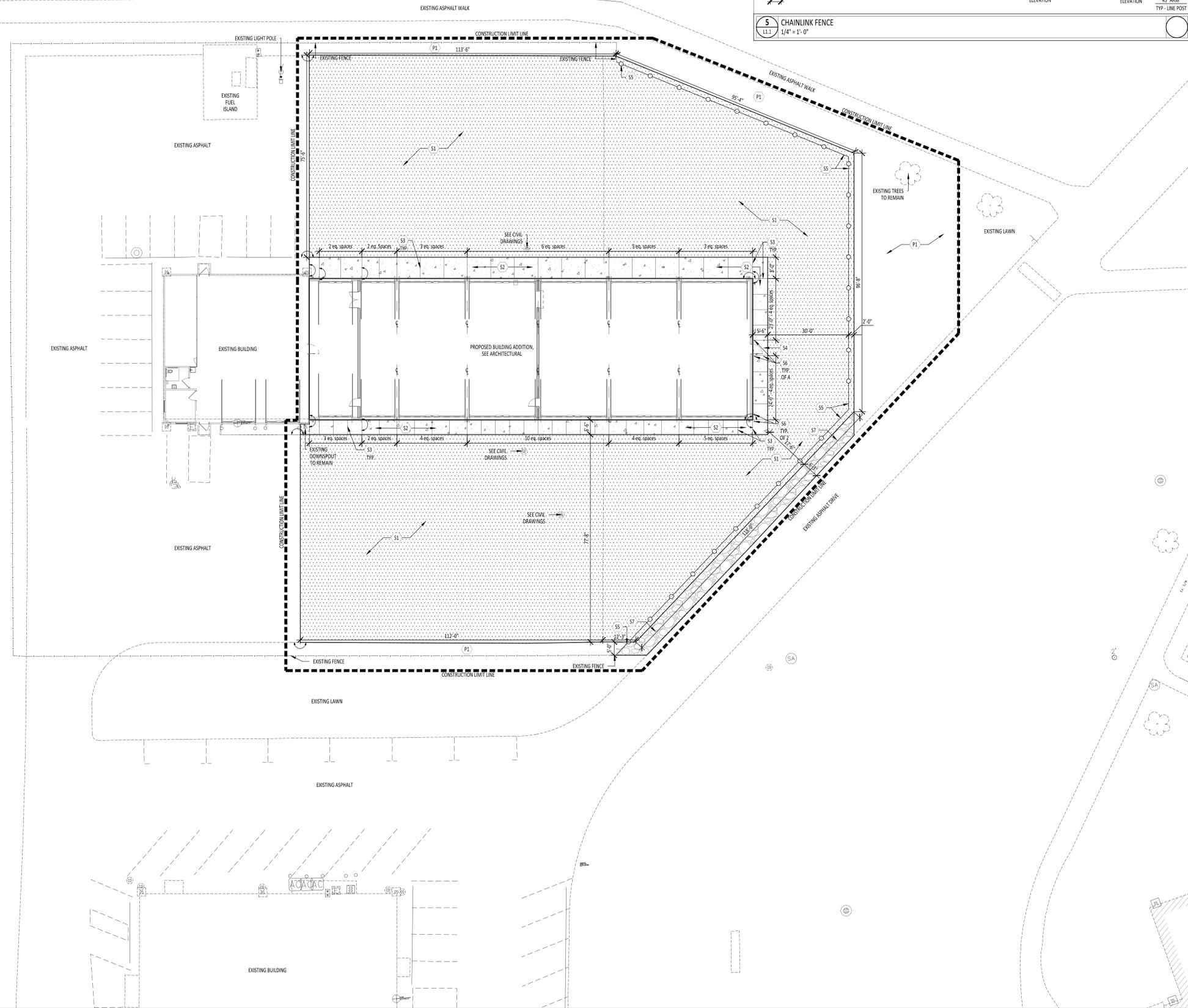


5 CHAINLINK FENCE
 L1.1
 1/4" = 1'-0"

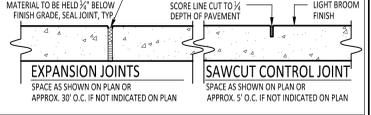
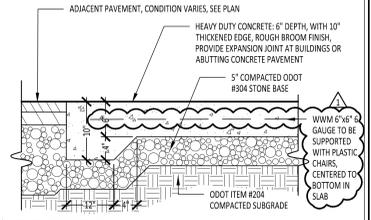
KEYNOTE SCHEDULE	
DEMOLITION	LEGEND
P1 SEEDED LAWN, SEE SPECIFICATIONS	HEAVY DUTY ASPHALT, SEE DETAIL
S1 HEAVY DUTY ASPHALT, SEE DETAIL 2/L1.1	HEAVY DUTY CONCRETE, SEE DETAIL
S2 HEAVY DUTY CONCRETE, SEE DETAIL 3/L1.1	EXPANSION JOINT
S3 SAWCUT CONTROL JOINT AND EXPANSION JOINTS, SEE DETAIL 3/L1.1	CONCRETE PAVEMENT
S4 ANTI-HEAVE SLAB, SEE STRUCTURAL AND ARCHITECTURAL	GRAVEL, SEE NOTE S7 AND SITE PLAN
S5 6' HEIGHT CHAINLINK FENCE WITH BARBED WIRE TOP, SEE SPECIFICATIONS AND DETAIL 5/L1.1	
S6 CONCRETE FILLED STEEL ROLLARD, SEE DETAIL 4/L1.1	
S7 #57 GRAVEL, 12" DEPTH, SEE SPECIFICATIONS	

GENERAL NOTES

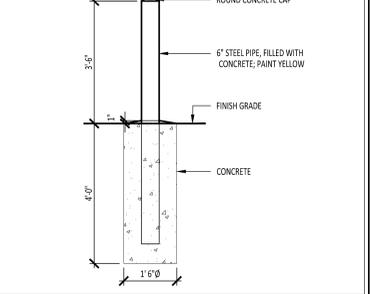
- FIELD VERIFY DIMENSIONS & CONDITIONS PRIOR TO CONSTRUCTION START. NOTIFY OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY DISCREPANCY OR SITUATION DISCOVERED THAT DOES NOT CONFORM TO CONSTRUCTION DDOS. CONTRACTOR TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO START. CALL OHIO UTILITIES PROTECTION SERVICES AT (800) 362-2764.
- CONTRACTOR TO REPAIR DAMAGES TO EXISTING UTILITIES, CURBS, PAVEMENTS, ETC., RESULTING FROM INSTALLATIONS WHICH OCCUR DURING THE CONSTRUCTION OF THE PROJECT.
- WORK PERFORMED IS SUBJECT TO APPROVAL BY THE OWNER'S REPRESENTATIVE. CONSTRUCTION MANAGER & OWNER. WORK FOUND TO BE UNSATISFACTORY SHALL BE REMOVED/PROPERLY REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
- TEMPORARILY SUPPORT WALLS, HEADERS, STRUCTURES, PIPING, DUCTWORK, CONDUIT, ETC., AS REQUIRED UNTIL FINAL SUPPORTS ARE IN PLACE.
- PATCH & REPAIR ALL AREAS, SURFACES & MATERIALS TO CONDITION OF SURROUNDING AREA.
- CLOSELY COORDINATE WORK WITH THE OWNER AND ALL CONTRACTORS HIRED BY THE OWNER. CLARIFY IN ADVANCE ANY QUESTIONS AS TO SCOPE OF WORK AND AREAS OF RESPONSIBILITY.
- PATCH AND REPAIR DISTURBED LAWN AREAS.
- DIMENSIONS ARE TO FACE OF CURB, FENCE, COLUMN OR CENTERLINE UNLESS OTHERWISE NOTED. WALKS SHALL BE CENTERED ON DOOR WAYS.
- WALKS SHALL MEET BOTH VERTICALLY AND HORIZONTALLY.
- LAYOUT AND DIMENSIONS ARE PARALLEL AND PERPENDICULAR TO ONE ANOTHER UNLESS OTHERWISE INDICATED IN PLANS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR FINISH GRADE. PROVIDE SEED/SOIL AS NOTED IN SPEC.
- SUBSTITUTIONS & PLAN CHANGES MUST BE APPROVED BY ARCHITECT PRIOR TO ACTION TAKEN.
- FINISHED TURF TO BE FLUSH WITH TOP OF ADJACENT CURB OR WALK.
- PERFORM CLEANUP DURING INSTALLATION OF SITE WORK AND UPON COMPLETION OF THE WORK. REMOVE FROM SITE EXCESS LANDSCAPE RELATED MATERIAL, SOIL DEBRIS & EQUIPMENT. SWEEP & HOSE DOWN PAVED SURFACES AFFECTED BY LANDSCAPING OPERATIONS. COORDINATE WITH CONSTRUCTION MANAGER ABOUT FINAL CLEANUP PRIOR TO CLEANING.
- CONTRACTOR SHALL REPAIR LAWN AREAS DISTURBED DURING CONSTRUCTION WITH PROJECT SPECIFIED SEED AND WARRANT A HEALTHY, WEED FREE LAWN PRIOR TO PROJECT ACCEPTANCE.
- USE DIMENSIONAL INFORMATION GIVEN. DO NOT SCALE DRAWINGS.
- CONTRACTOR SHALL REFER QUESTIONS ON MATERIALS, FINISHES, OR PERFORMANCE STANDARDS NOT SPECIFIED HEREIN TO THE CONSTRUCTION MANAGER.
- GENERAL CONTRACTOR IS TO MAINTAIN THE SITE WITHIN THE CONSTRUCTION FENCELINE THROUGHOUT CONSTRUCTION IN A CLEAN AND ORDERLY MANNER. MOW GRASS, MAINTAIN PLANT BEDS TO BE FREE OF WEEDS, PICK-UP TRASH, ETC. THE SITE IS TO BE LEFT IN THE SAME OR BETTER CONDITION THAN ORIGINALLY FOUND.



2 ASPHALT PAVEMENT HEAVY DUTY
 L1.1
 1" = 1'-0"

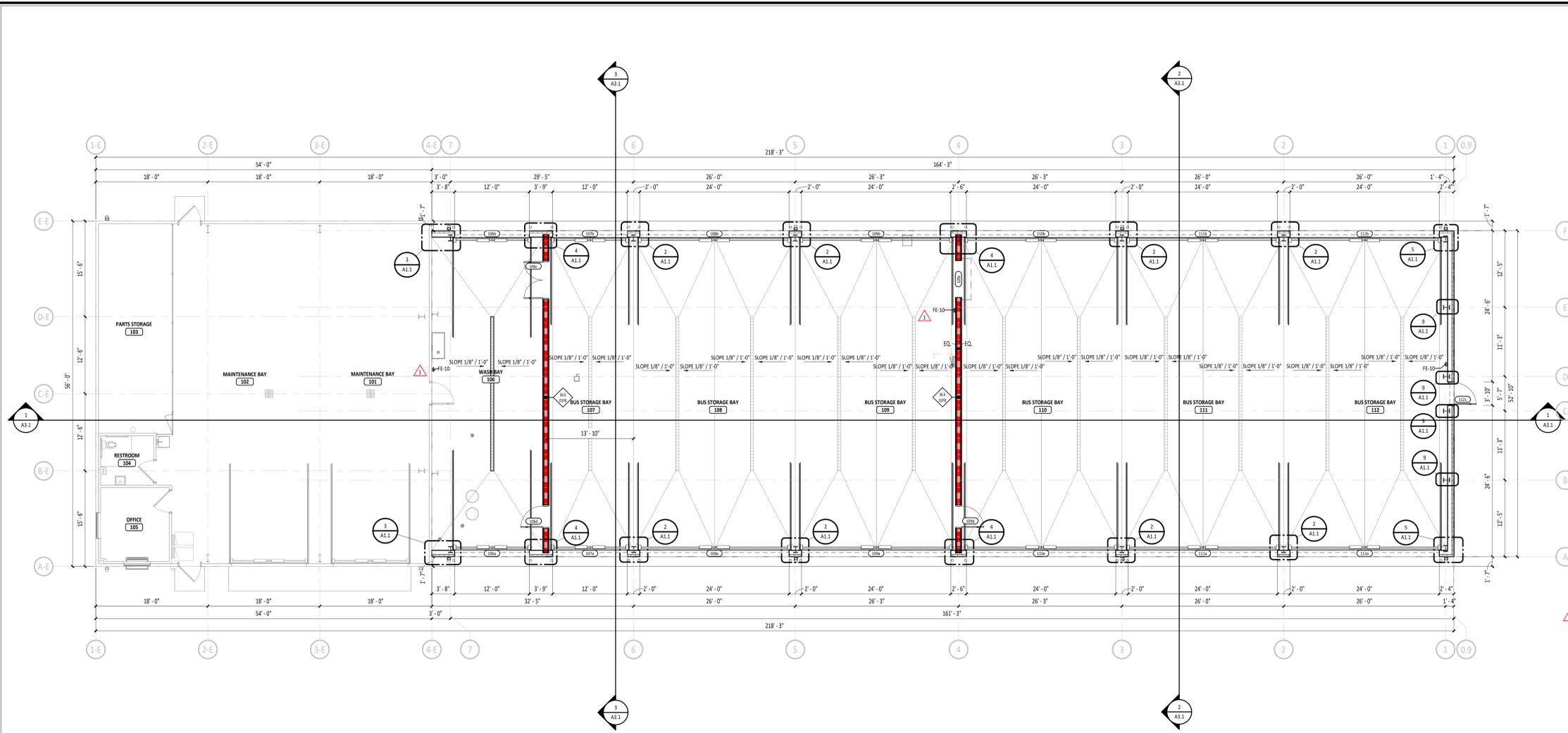


3 HEAVY DUTY CONCRETE PAVEMENT
 L1.1
 1" = 1'-0"

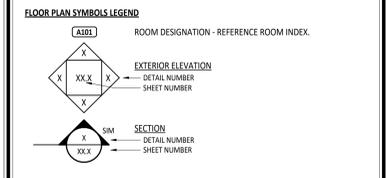


4 TYPICAL BOLLARD
 L1.1
 1/2" = 1'-0"

1 SITE LAYOUT AND MATERIALS PLAN
 L1.1
 1/16" = 1'-0"



FIRST FLOOR PLAN ROOM INDEX - OVERALL			
ROOM NUMBER	ROOM NAME	AREA	OCCUPANCY
101	MAINTENANCE BAY	968 SF	5
102	MAINTENANCE BAY	1,329 SF	7
103	PARTS STORAGE	404 SF	1
104	RESTROOM	67 SF	1
105	OFFICE	132 SF	1
106	WASH BAY	906 SF	5
107	BUS STORAGE BAY	593 SF	3
108	BUS STORAGE BAY	1,320 SF	7
109	BUS STORAGE BAY	1,206 SF	7
110	BUS STORAGE BAY	1,311 SF	7
111	BUS STORAGE BAY	1,320 SF	7
112	BUS STORAGE BAY	1,335 SF	7



FLOOR PLAN GENERAL NOTES

A ALL DIMENSIONS ARE MEASURED TO THE FACE OF MASONRY OR THE FACE OF METAL STUD UNLESS NOTED OTHERWISE.

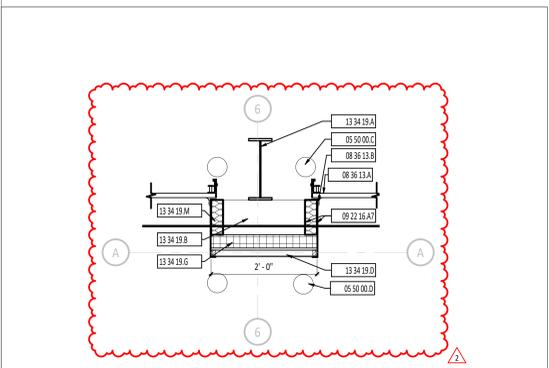
COLUMN DETAIL GENERAL NOTES

A GYPSUM WALLBOARD TO BE IMPACT RESISTANT TO 8'-0" ABOVE FINISHED FLOOR.

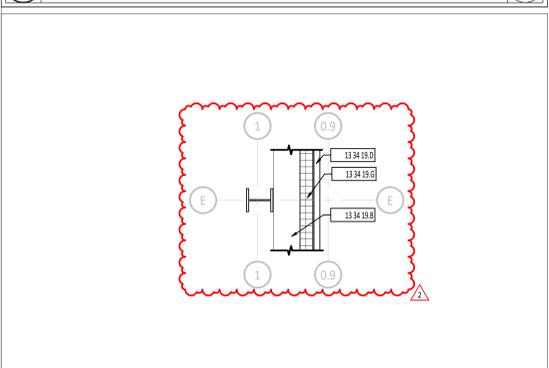
#	KEYNOTE DESCRIPTION
05 41 00.A4	6" STRUCTURAL METAL STUD FRAMING - REFERENCE STRUCTURAL DRAWINGS.
05 50 00.C	INTERIOR BOLLARD - PAINT - REFERENCE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
05 50 00.D	EXTERIOR GALVANIZED BOLLARD - PAINT - REFERENCE ARCHITECTURAL, SITE, AND STRUCTURAL DRAWINGS.
08 36 13.A	OVERHEAD SECTIONAL DOOR - REFERENCE OPENING SCHEDULE.
08 36 13.B	WEATHER STRIP
09 21 16.B2	5/8" TYPE "X" GYPSUM WALLBOARD
09 22 16.A7	8" METAL STUDS AT 16" OC
13 34 19.A	PRE-ENGINEERED METAL BUILDING SYSTEM
13 34 19.B	8" Z GIRT - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.D	FORMED METAL PANEL - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.G	3" R-SEAL CONTINUOUS RIGID INSULATION PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.M	THERMAL BATT INSULATION - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.P	CAST IRON DOWNSPOUT ROOF PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.Q	PREFINISHED METAL DOWNSPOUT - PAINT - BY P.E.M.B. MANUFACTURER

FIRE EXTINGUISHER / CABINET SCHEDULE		
MARK	DESCRIPTION	NOTES
FE-10	FIRE EXTINGUISHER - 10.0LB - CLASS A-B-C	FURNISHED AND INSTALLED BY GC

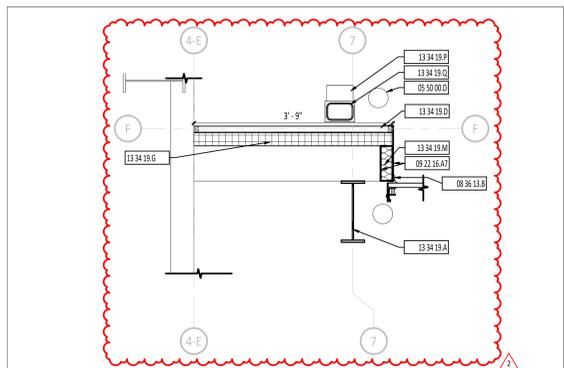
1 FIRST FLOOR PLAN
 1/8" = 1'-0"



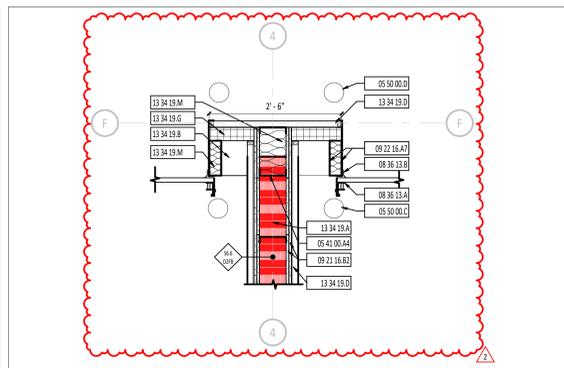
2 COLUMN DETAIL
 3/4" = 1'-0"



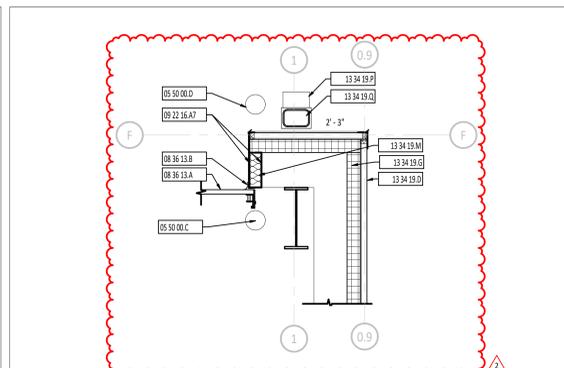
9 COLUMN DETAIL
 3/4" = 1'-0"



3 COLUMN DETAIL
 3/4" = 1'-0"



4 COLUMN DETAIL
 3/4" = 1'-0"



5 COLUMN DETAIL
 3/4" = 1'-0"

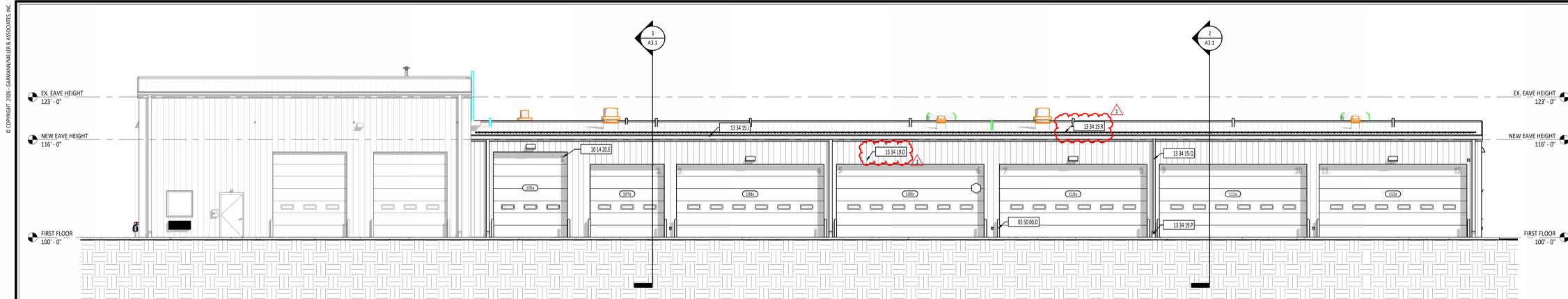
ISSUANCES/REVISIONS		
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	BER	RH

CONSTRUCTION DOCUMENTS	DATE
1	01/22/2025
2	02/06/2025
3	02/13/2025

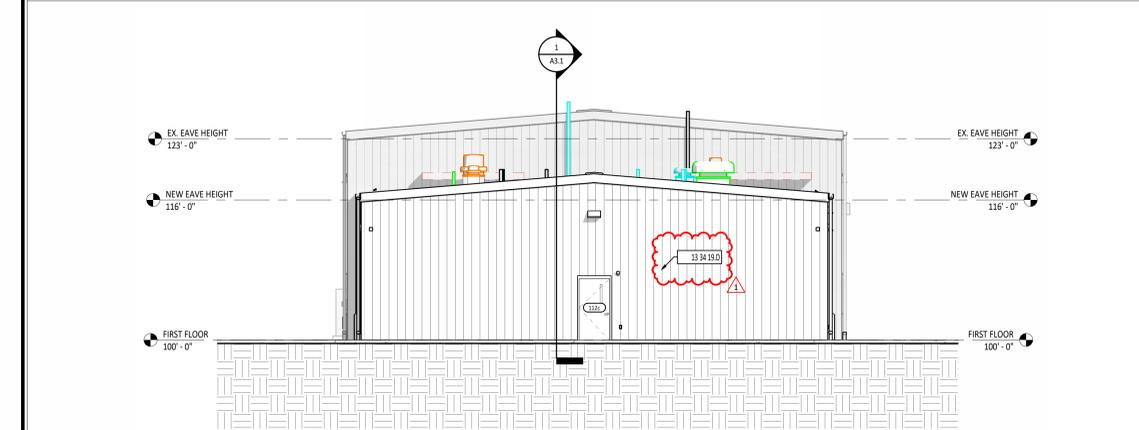
PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	BER	RH

SHEET TITLE:
FIRST FLOOR PLAN AND COLUMN DETAILS

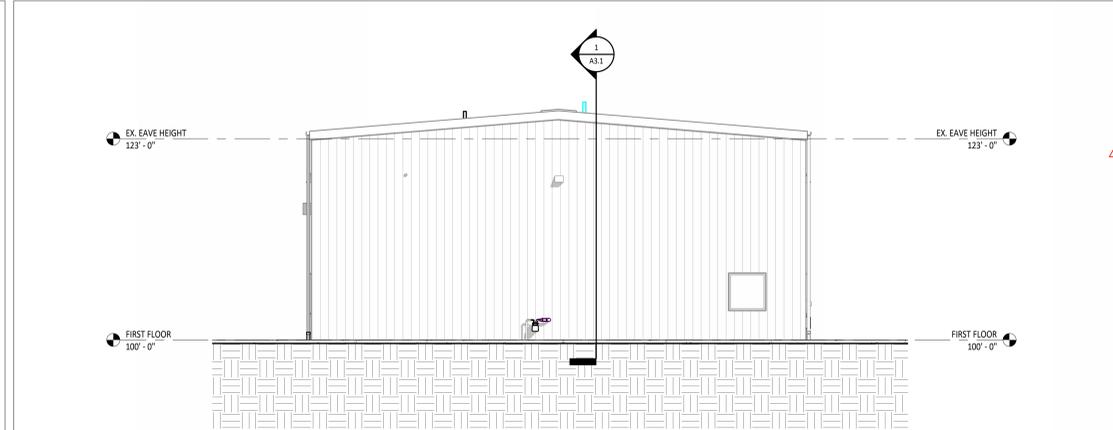
SHEET NUMBER:
A1.1



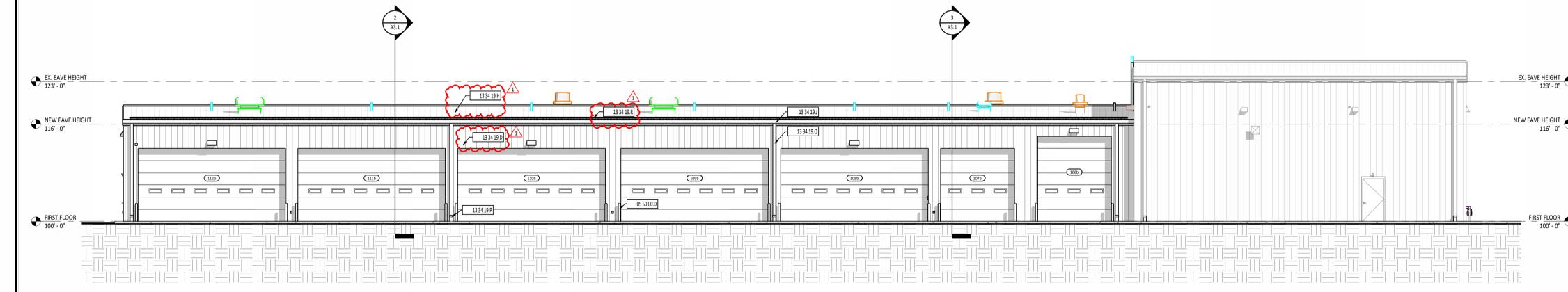
1 BUILDING ELEVATION
1/8" = 1'-0"



2 BUILDING ELEVATION
1/8" = 1'-0"



3 BUILDING ELEVATION
1/8" = 1'-0"



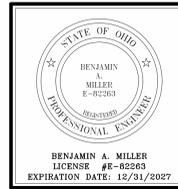
4 BUILDING ELEVATION
1/8" = 1'-0"

EXTERIOR ELEVATION GENERAL NOTES

EXTERIOR ELEVATION SYMBOLS LEGEND

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

#	KEYNOTE DESCRIPTION
05 50 00.D	EXTERIOR GALVANIZED BOLLARD - PAINT - REFERENCE ARCHITECTURAL, SITE, AND STRUCTURAL DRAWINGS.
10 14 20.E	EXTERIOR VINYL DOOR SIGNAGE
13 34 19.D	FORMED METAL PANEL - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.H	4" R-SEAL CONTINUOUS RIGID INSULATION PROVIDED BY P.E.M.B. MANUFACTURER WITH STANDING SEAM METAL ROOF
13 34 19.J	PREFINISHED GUTTER PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.P	CAST IRON DOWNSPOUT BOOT PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.Q	PREFINISHED METAL DOWNSPOUT - PAINT - BY P.E.M.B. MANUFACTURER
13 34 19.R	SNOW GUARD - CONTINUOUS ACROSS TOP OF VERTICAL LEGS - REFERENCE ROOF PLAN FOR LOCATIONS - BY P.E.M.B. MANUFACTURER



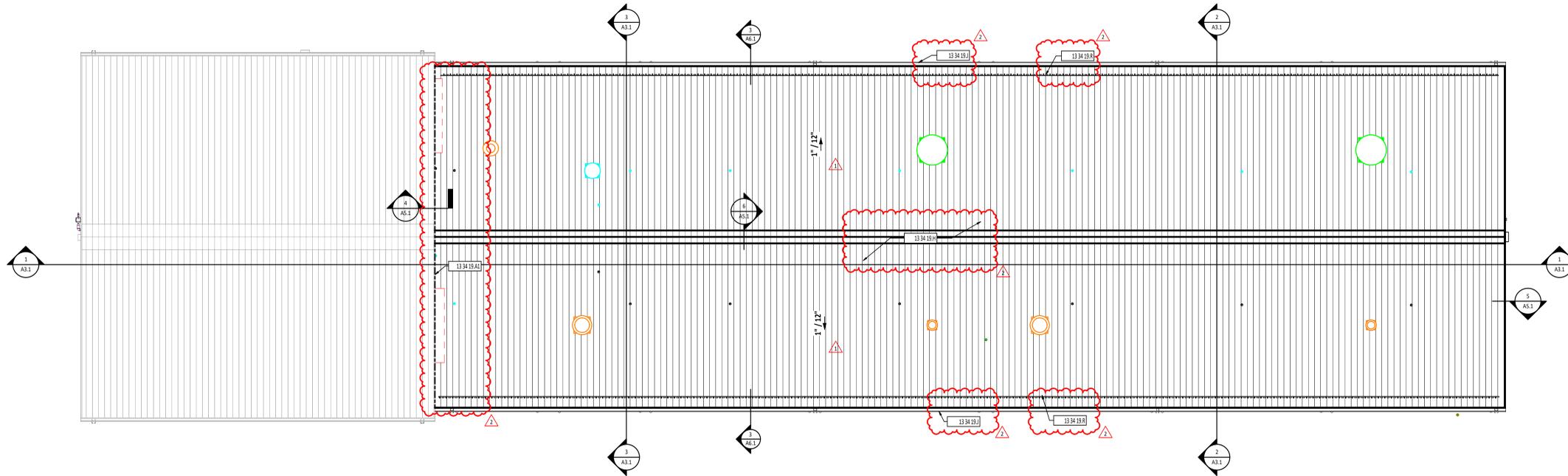
ANTWERP LOCAL SCHOOLS BUS BUILDING
 ADDITION/RENOVATION TO
 303 HARRISBURG RD., ANTWERP, OH 46013

ISSUANCES/REVISIONS	
CONSTRUCTION DOCUMENTS	01/22/2025
1 ADDENDUM #02	02/13/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	BER	RH

SHEET TITLE:
EXTERIOR ELEVATIONS

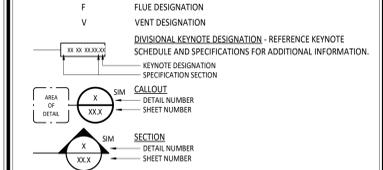
SHEET NUMBER:
A2.1



ROOF 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.
- D PROVIDE WELDED CURB FLASHING FOR PENETRATIONS IN METAL ROOF - REFERENCE ROOF DETAILS.

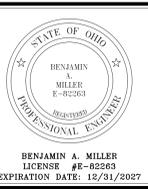
ROOF PLAN SYMBOLS LEGEND



ROOF PLAN MATERIAL PATTERNS LEGEND

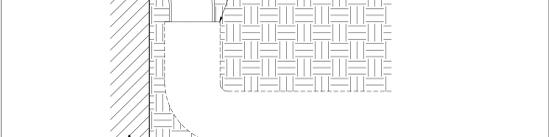
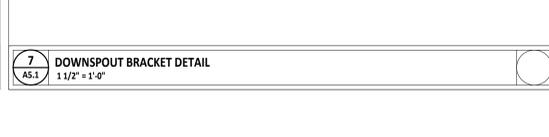
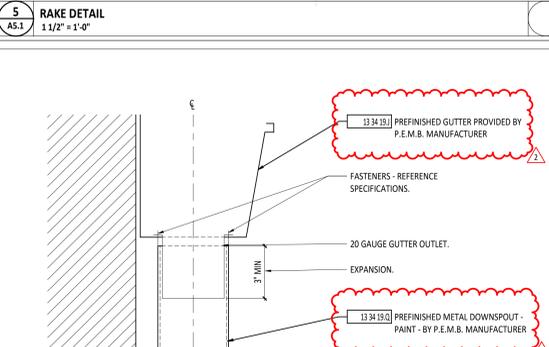
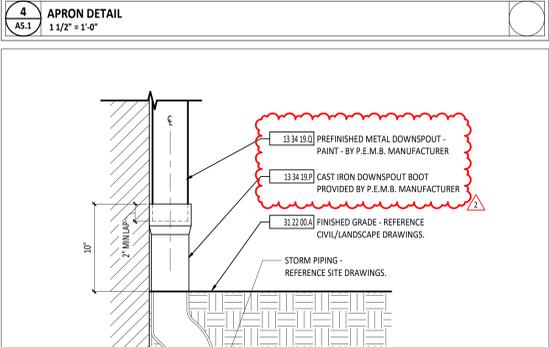
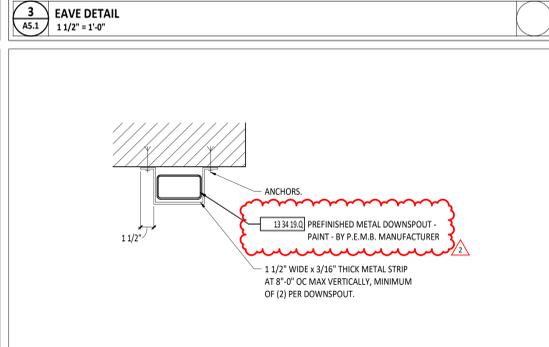
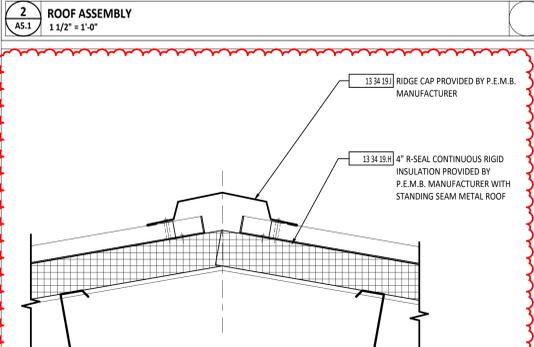
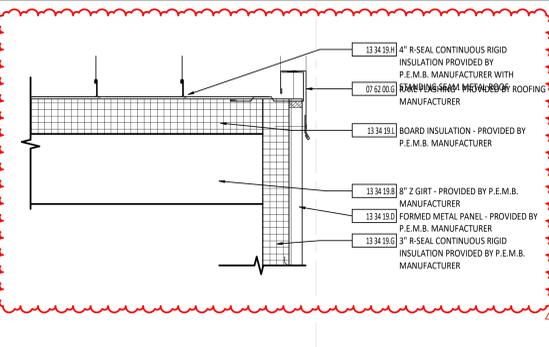
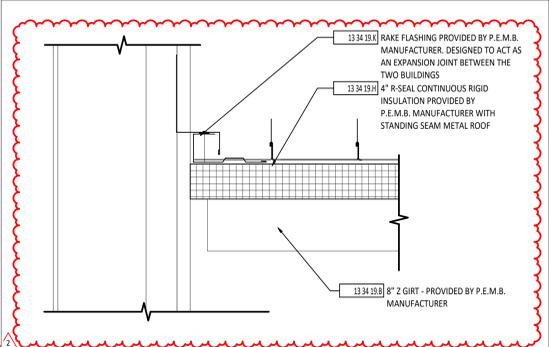
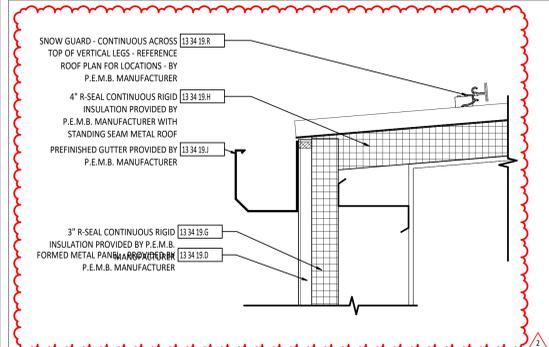
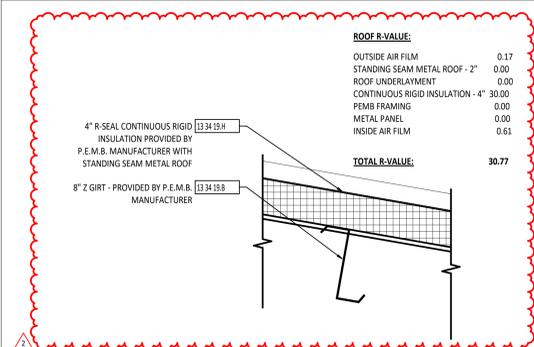


#	KEYNOTE DESCRIPTION
07 62 00.G	RAKE FLASHING - PROVIDED BY ROOFING MANUFACTURER
13 34 19.A1	ROOF EXPANSION JOINT - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.B	8" Z GIRT - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.D	FORMED METAL PANEL - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.G	3" R-SEAL CONTINUOUS RIGID INSULATION PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.H	4" R-SEAL CONTINUOUS RIGID INSULATION PROVIDED BY P.E.M.B. MANUFACTURER WITH STANDING SEAM METAL ROOF
13 34 19.I	RIDGE CAP PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.J	PREFINISHED GUTTER PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.K	RAKE FLASHING PROVIDED BY P.E.M.B. MANUFACTURER, DESIGNED TO ACT AS AN EXPANSION JOINT BETWEEN THE TWO BUILDINGS
13 34 19.L	BOARD INSULATION - PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.P	CAST IRON DOWNSPOUT BOOT PROVIDED BY P.E.M.B. MANUFACTURER
13 34 19.Q	PREFINISHED METAL DOWNSPOUT - PAINT - BY P.E.M.B. MANUFACTURER
13 34 19.R	SNOW GUARD - CONTINUOUS ACROSS TOP OF VERTICAL LEGS - REFERENCE ROOF PLAN FOR LOCATIONS - BY P.E.M.B. MANUFACTURER
31 22 00.A	FINISHED GRADE - REFERENCE CIVIL/LANDSCAPE DRAWINGS.



ANTWERP LOCAL SCHOOLS BUS BUILDING

1 ROOF PLAN
1/8" = 1'-0"



ISSUANCES/REVISIONS

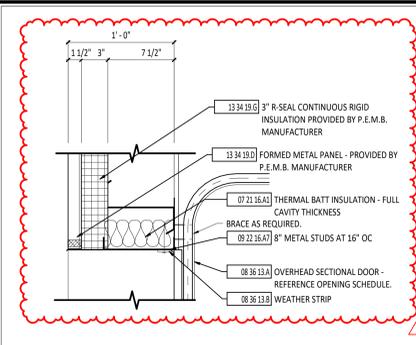
CONSTRUCTION DOCUMENTS	DATE
1 ADDENDUM #01	01/22/2020
2 ADDENDUM #02	02/06/2020
2 ADDENDUM #02	02/13/2020

PROJECT NUMBER: 25057.00

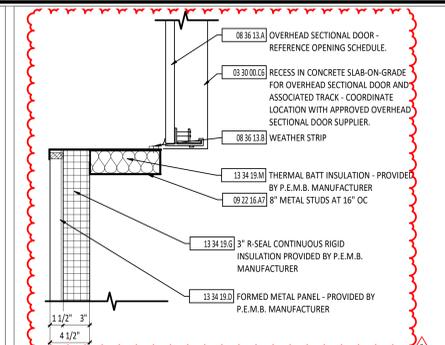
PROJECT NUMBER	DRAWN BY	CHECKED BY
25057.00	BER	RH

ROOF PLAN AND ROOF DETAILS

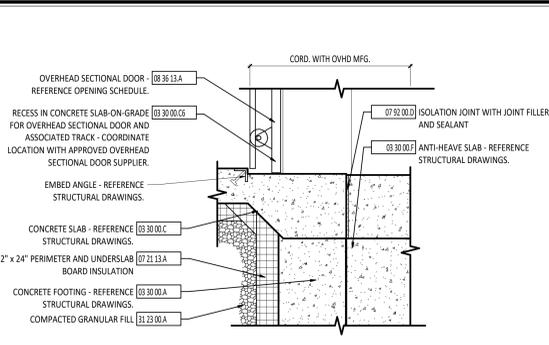
SHEET NUMBER: A5.1



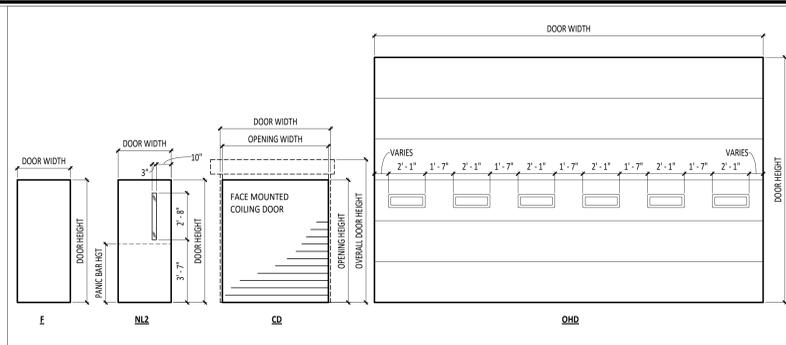
1 HEAD DETAIL - EXTERIOR
1 1/2" = 1'-0"



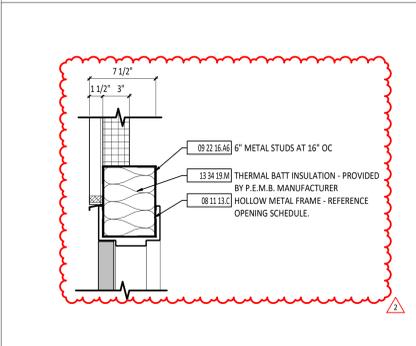
2 JAMB DETAIL - EXTERIOR
1 1/2" = 1'-0"



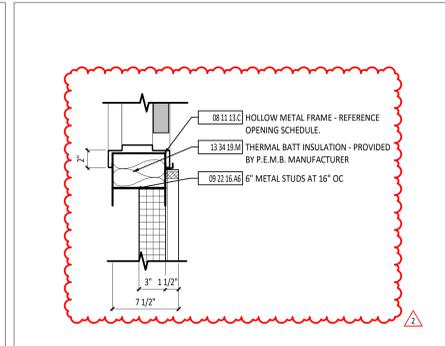
3 SILL DETAIL - EXTERIOR
1 1/2" = 1'-0"



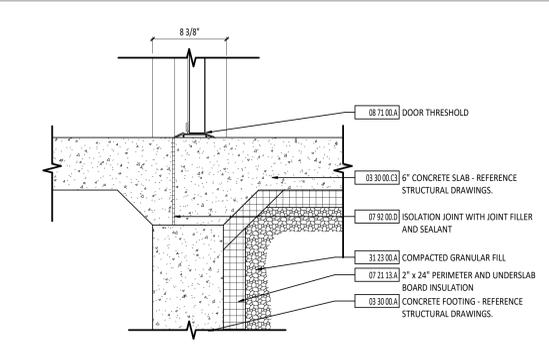
4 DOOR TYPES
1/4" = 1'-0"



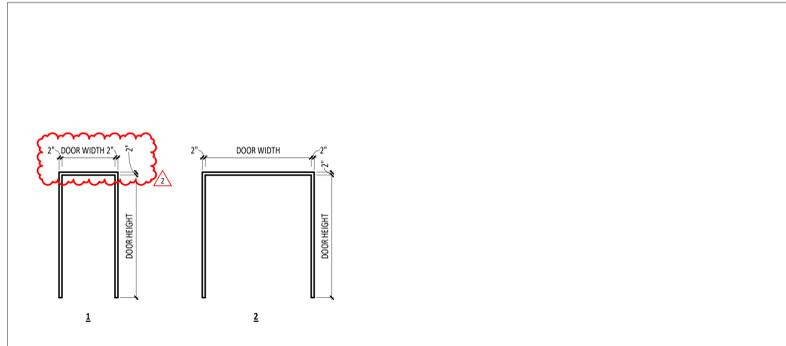
5 HEAD DETAIL - EXTERIOR
1 1/2" = 1'-0"



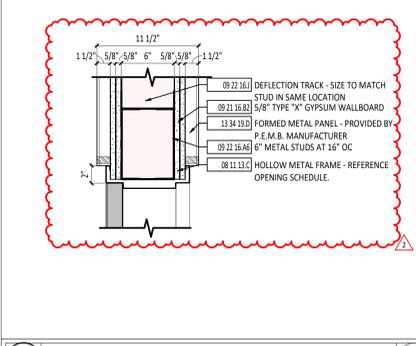
6 JAMB DETAIL - EXTERIOR
1 1/2" = 1'-0"



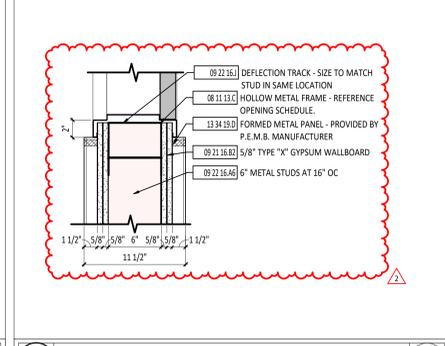
7 SILL DETAIL - EXTERIOR
1 1/2" = 1'-0"



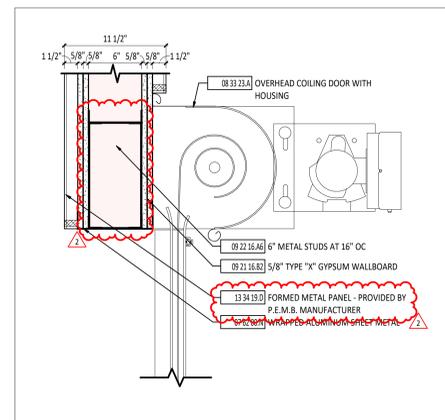
8 HOLLOW METAL DOOR FRAME TYPES
1/4" = 1'-0"



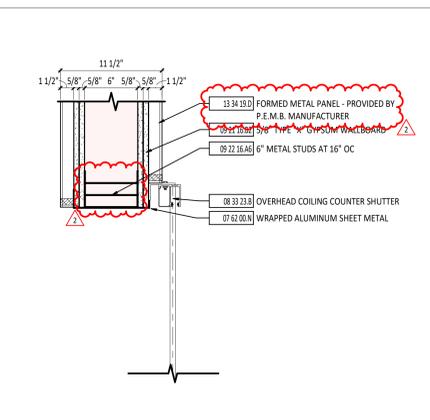
9 HEAD DETAIL - INTERIOR
1 1/2" = 1'-0"



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



11 HEAD DETAIL - INTERIOR
1 1/2" = 1'-0"



12 JAMB DETAIL - INTERIOR
1 1/2" = 1'-0"

DOOR GENERAL NOTES

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
SG	SAFETY GLASS
TG	TEMPERED GLASS
W	WOOD

DOOR/OPENING SCHEDULE NOTES

1. SECTIONAL DOOR NUMBERING - ADHERE 12" NUMERIC STICKER TO OUTSIDE FACE OF SECTIONAL DOOR. REFERENCE 1/A2.1. ACTUAL DOOR NUMBER TO BE THE FOLLOWING:
 - NUMERIC STICKER "1" AT DOOR 106a
 - NUMERIC STICKER "2" AT DOOR 107a
 - NUMERIC STICKER "3" AT DOOR 108a
 - NUMERIC STICKER "4" AT DOOR 109a
 - NUMERIC STICKER "5" AT DOOR 109a
 - NUMERIC STICKER "6" AT DOOR 109a
 - NUMERIC STICKER "7" AT DOOR 110a
 - NUMERIC STICKER "8" AT DOOR 110a
 - NUMERIC STICKER "9" AT DOOR 111a
 - NUMERIC STICKER "10" AT DOOR 111a
 - NUMERIC STICKER "11" AT DOOR 112a
 - NUMERIC STICKER "12" AT DOOR 112a

NUMBER	DOOR/OPENING SCHEDULE										HARDWARE SET	ROOM KEY SIDE	FUNCTION	LABEL (MIN)	NOTES	
	DOOR					FRAME										
	SIZE	THK	MATL	TYPE	GLASS	DEPTH	MATL	TYPE	GLASS	DETAIL NUMBER						
106a	12'-0" X 14'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Interior	-	1
106b	12'-0" X 14'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Interior	-	-
106c	(2) 3'-0" X 7'-0"	1 3/4"	HM	NL2	1/4" - TG - SG	12 1/4"	HM	2	-	9/A6.1	10/A6.1	-	2	Interior	-	-
106d	3'-6" X 7'-0"	1 3/4"	HM	NL2	1/4" - TG - SG	12 1/4"	HM	1	-	9/A6.1	10/A6.1	-	3	Exterior	90 MIN	-
107a	12'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	90 MIN	1
107b	12'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
108a	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	1
108b	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
109a	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	1
109b	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
109c	6'-0" X 7'-0"	2"	AL	CD	-	6 1/4"	AL	-	-	11/A6.1	12/A6.1	-	5	Interior	90 MIN	-
109d	3'-6" X 7'-0"	1 3/4"	HM	NL2	1/4" - TG - SG	12 1/4"	HM	1	-	9/A6.1	10/A6.1	-	4	Exterior	90 MIN	-
110a	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	1
110b	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
111a	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	1
111b	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
112a	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	1
112b	24'-0" X 12'-0"	2"	STL	OHD	1/4" - TG - SG	12"	AL	-	-	1/A6.1	2/A6.1	3/A6.1	5	Exterior	-	-
112c	3'-6" X 7'-0"	1 3/4"	HM	NL2	1/4" - TG - SG	12 1/4"	HM	1	-	5/A6.1	6/A6.1	7/A6.1	1	Exterior	-	-



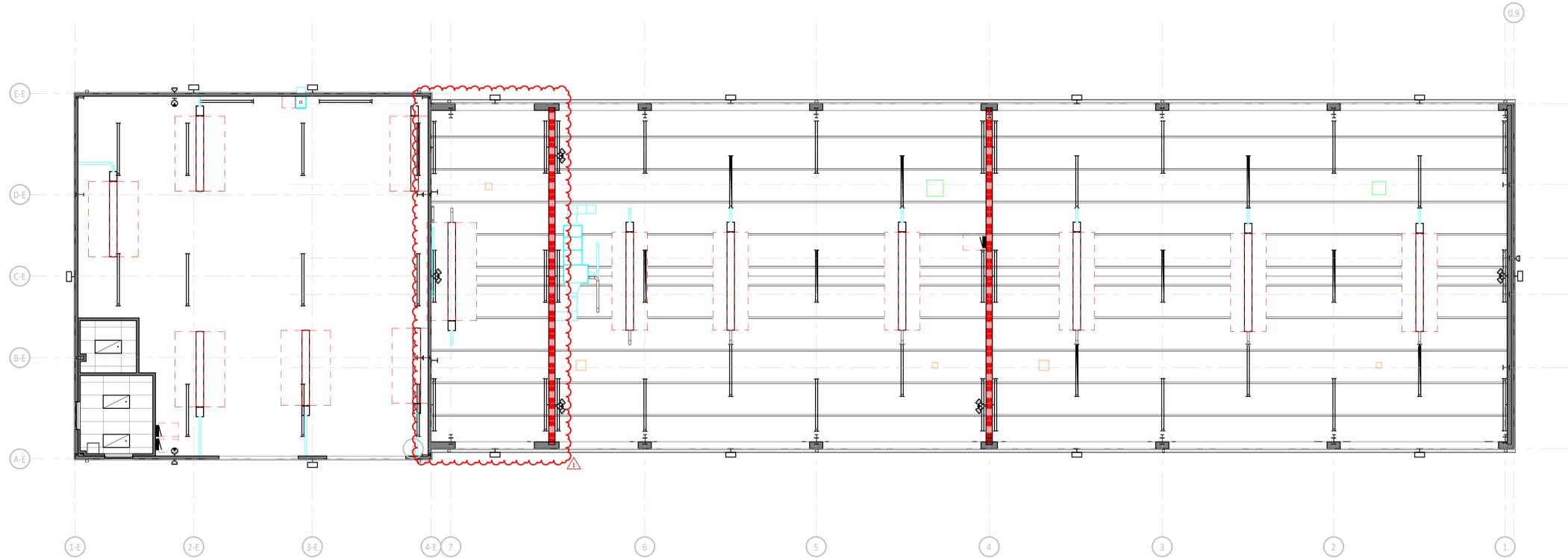
ANTWERP LOCAL SCHOOLS BUS BUILDING

ISSUANCES/REVISIONS	
1	CONSTRUCTION DOCUMENTS 02/22/2025
2	ADDENDUM #01 02/06/2025
3	ADDENDUM #02 02/13/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	BER	RH

DOOR SCHEDULE AND DETAILS

SHEET NUMBER:
A6.1



FIRST FLOOR PLAN ROOM INDEX - OVERALL			
ROOM NUMBER	ROOM NAME	AREA	OCCUPANCY
101	MAINTENANCE BAY	968 SF	5
102	MAINTENANCE BAY	1,329 SF	7
103	PARTS STORAGE	404 SF	1
104	RESTROOM	67 SF	1
105	OFFICE	132 SF	1
106	WASH BAY	906 SF	5
107	BUS STORAGE BAY	593 SF	3
108	BUS STORAGE BAY	1,320 SF	7
109	BUS STORAGE BAY	1,306 SF	7
110	BUS STORAGE BAY	1,311 SF	7
111	BUS STORAGE BAY	1,320 SF	7
112	BUS STORAGE BAY	1,335 SF	7

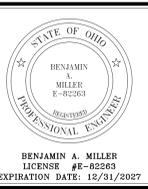
REFLECTED CEILING PLAN GENERAL NOTES

- REFLECTED CEILING PLAN SYMBOLS LEGEND**
- ROOM DESIGNATION - REFERENCE ROOM INDEX.
 - LEVEL LINE
 - LEVEL ELEVATION
 - STRUCTURAL GRID - REFERENCE STRUCTURAL DRAWINGS.
 - DIVISIONAL KEYNOTE DESIGNATION - REFERENCE KEYNOTE SCHEDULE AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
 - KEYNOTE DESIGNATION - SPECIFICATION SECTION.
 - CEILING TYPE AND HEIGHT DESIGNATION
 - CALLOUT
 - AREA OR DETAIL
 - SECTION

- REFLECTED CEILING PLAN MATERIAL PATTERNS LEGEND**
- CAP CEILING

- REFERENCE ELECTRICAL/MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION**
- SOUND SYSTEM CEILING SPEAKER
 - FIRE ALARM SMOKE OR HEAT DETECTOR
 - LIGHT FIXTURE
 - LIGHT FIXTURE
 - LIGHT FIXTURE
 - LIGHT FIXTURE
 - CEILING MOUNTED EXIT SIGN
 - OCCUPANCY SENSOR
 - AIR TERMINAL

#	KEYNOTE DESCRIPTION



ANTWERP LOCAL SCHOOLS BUS BUILDING

ISSUANCES/REVISIONS	
CONSTRUCTION DOCUMENTS	01/22/2025
1 ADDED/REVISED	02/13/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	BER	RH

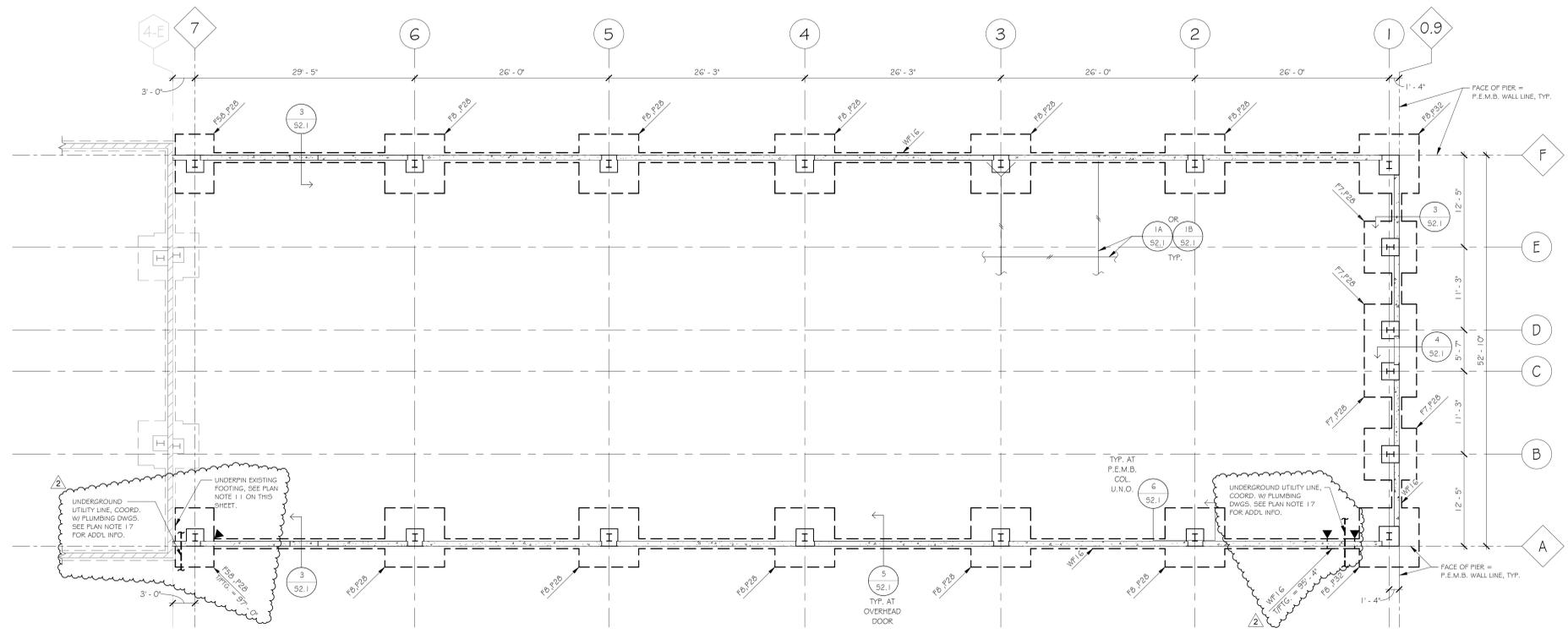
SHEET TITLE:
FIRST FLOOR REFLECTED CEILING PLAN

SHEET NUMBER:
A7.1





ANTWERP LOCAL SCHOOLS BUS BUILDING
 ADDENDUM/REVISION TO
 25057.00 ANTWERP LOCAL SCHOOLS BUS BUILDING

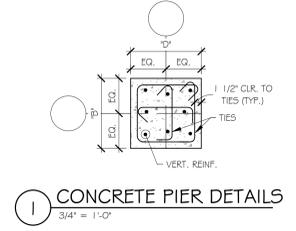


A FOUNDATION PLAN
1/8" = 1'-0"

FOOTING SCHEDULE		
MARK	SIZE	REINFORCING
WF 16	1'-0" WIDE x 1'-0" DEEP	(2) #3 CONT. U.N.O.
F7	7'-0" SQ. x 1'-0" DEEP	(7) #6 EA. WAY TOP AND BOT.
F8	8'-0" SQ. x 2'-0" DEEP	(8) #6 EA. WAY TOP AND BOT.
F5B	8'-0" x 5'-0" x 2'-0" DEEP	(8) #6 LONGITUDINAL AND (5) #6 TRANSVERSE TOP AND BOT.

CONCRETE PIER SCHEDULE		
Type Mark	SIZE (B x D)	REINFORCING
P26	26" SQ.	(8) #6 VERT. W/ #3 TIES AT 1'-0" O.C.
P32	32" SQ.	(8) #6 VERT. W/ #3 TIES AT 1'-0" O.C.

- FOUNDATION PLAN NOTES**
- COORDINATE ALL DIMENSIONS AND ELEVATIONS WITH ARCHITECTURAL DRAWINGS AND PRE-ENGINEERED METAL BUILDING (P.E.M.B.) DRAWINGS. SEE ARCHITECTURAL DRAWINGS FOR DIMENSIONS AND ELEVATIONS NOT SHOWN. THE FOUNDATION ENGINEER HAS NOT VERIFIED AND IS NOT RESPONSIBLE FOR THE VERIFICATION OF METAL BUILDING INFORMATION PROVIDED BY THE P.E.M.B. MANUFACTURER. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL METAL BUILDING REQUIREMENTS AND THE INFORMATION SHOWN ON THE CONSTRUCTION DOCUMENTS. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE FOUNDATION ENGINEER OF RECORD IF ANY METAL BUILDING REQUIREMENTS CONFLICT WITH THE INFORMATION ON THE CONSTRUCTION DOCUMENTS.
 - THE FOUNDATION DIMENSIONS, COLUMN FOOTING SIZES AND PIER SIZES SHOWN ON THIS PLAN ARE PRELIMINARY AND ARE TO BE USED FOR PRELIMINARY PRICING PURPOSES ONLY AND ARE NOT TO BE USED FOR MATERIAL FABRICATION OR CONSTRUCTION. AFTER THE SELECTED PRE-ENGINEERED METAL BUILDING (P.E.M.B.) MANUFACTURER SUBMITS A FINAL DIMENSIONED PLAN WITH FINAL COLUMN BASE REACTIONS AND FINAL COLUMN BASE PLATE DETAILS, THESE DRAWINGS WILL BE REVISED TO REFLECT THE FINAL FOUNDATION REQUIREMENTS OF THE P.E.M.B. AND THESE DRAWINGS WILL BE ISSUED FOR FINAL BIDDING AND CONSTRUCTION.
 - SLAB CONSTRUCTION: 6" THICK CONCRETE SLAB-ON-GROUND REINFORCED WITH 6x6 W2.9 W2.9 W.W.R. AT MID-DEPTH OVER COMPACTED AGGREGATE SUB-BASE. SEE ARCHITECTURAL DRAWINGS FOR MINOR DEPRESSIONS AND SLOPES TO DRAINS. MAINTAIN A MINIMUM 6" SLAB THICKNESS THROUGHOUT.
 - PROVIDE CONTRACTION JOINTS AND/OR CONSTRUCTION JOINTS IN INTERIOR CONCRETE SLABS-ON-GROUND PER DETAILS 1A92.1 OR 1B92.1 AT EVEN INTERVALS NOT EXCEEDING 15'-0" ON CENTER, EACH WAY.
 - TOP OF SLAB ELEVATION (TSLAB) = 100'-0" +/-, MATCH EXISTING SLAB ELEVATION, TYPICAL UNLESS NOTED OTHERWISE.
 - TOP OF EXTERIOR FOOTING ELEVATION (TFE) = 97'-4" TYPICAL, UNLESS NOTED OTHERWISE.
 - UNLESS DIMENSIONED OTHERWISE, CENTER ALL WALL FOOTINGS UNDER CONCRETE FOUNDATION WALLS AND CENTER ALL COLUMN FOOTINGS UNDER PIERS.
 - PATCH ALL ABUTTING SURFACES BETWEEN THE NEW WORK AND THE EXISTING CONSTRUCTION TO MATCH EXISTING FINISHES. SEE THE ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
 - AT THE INTERFACE BETWEEN NEW AND EXISTING FOUNDATIONS, STEP NEW FOUNDATIONS PER 252.1 SO THAT THE BOTTOMS OF NEW AND EXISTING FOUNDATIONS ALIGN.
 - WHERE NEW CONSTRUCTION IS TO BE BUILT DIRECTLY ON EXISTING FOUNDATIONS OR IS DIRECTLY ADJACENT TO EXISTING CONSTRUCTION, PROVIDE DOWELS TO MATCH HORIZONTAL AND VERTICAL REINFORCING OF NEW CONSTRUCTION. EMBED DOWELS 6 INCHES MINIMUM INTO EXISTING CONSTRUCTION WITH CHEMICAL ADHESIVE.
 - UNDERPIN ALL EXISTING FOUNDATIONS WHICH ARE UNDERMINED BY NEW UNDERGROUND UTILITIES OR NEW FOUNDATIONS OR TO MAINTAIN AT LEAST 36" OF BEARING DEPTH BELOW EXISTING GRADES FOR FROST PROTECTION. WHERE NEW UNDERGROUND UTILITIES OR FOUNDATIONS ARE LOCATED OUTSIDE THE AREA OF INFLUENCE BELOW THE BOTTOM OF EXISTING FOUNDATIONS (DEFINED BY A 2:1 HORIZONTAL TO VERTICAL RELATIONSHIP FROM THE BOTTOM EDGE OF THE EXISTING FOUNDATION), NO UNDERPINNING IS REQUIRED.
 - WHERE EXISTING UNDERGROUND UTILITIES ARE SHOWN OR ENCOUNTERED WITHIN THE VICINITY OF NEW BUILDING FOUNDATIONS, THE CONTRACTOR SHALL VERIFY WITH THE SOILS ENGINEER THAT THE EXISTING SUBSURFACE CONDITIONS ARE SUFFICIENT FOR THE SUPPORT OF NEW BUILDING FOUNDATIONS. IF THE EXISTING SUBSURFACE CONDITIONS ARE DETERMINED TO BE INSUFFICIENT FOR FOUNDATION SUPPORT, THE CONTRACTOR SHALL CONSULT WITH THE ARCHITECT AND THE SOILS ENGINEER FOR REMEDIAL MEASURES REQUIRED TO PROVIDE ADEQUATE FOUNDATION SUPPORT.
 - PLAN DIMENSIONS AT EXTERIOR WALLS ARE TO OUTSIDE FACE OF CONCRETE FOUNDATION WALLS.
 - SEE THIS SHEET FOR FOOTING AND PIER SCHEDULES.
 - SEE SHEET 50.1 FOR STRUCTURAL NOTES AND TABLES.
 - PROVIDE STEP-IN FOUNDATION ELEVATION PER 202.1 NOTED CIRCLED ON PLAN. PROVIDE UNDERGROUND UTILITY LINE PASS THROUGH FOUNDATION WALLS. PROVIDE CAST-IRON SLEEVE THROUGH WALL. SLEEVE TO BE 1" LARGER THAN OUTSIDE DIAMETER OF UTILITY LINE. FILL VOID BETWEEN UTILITY LINE AND SLEEVE WITH COMPRESSIBLE MATERIAL. REPLACE WALL REINFORCING AROUND SLEEVE. DO NOT INTERRUPT WALL REINFORCING.



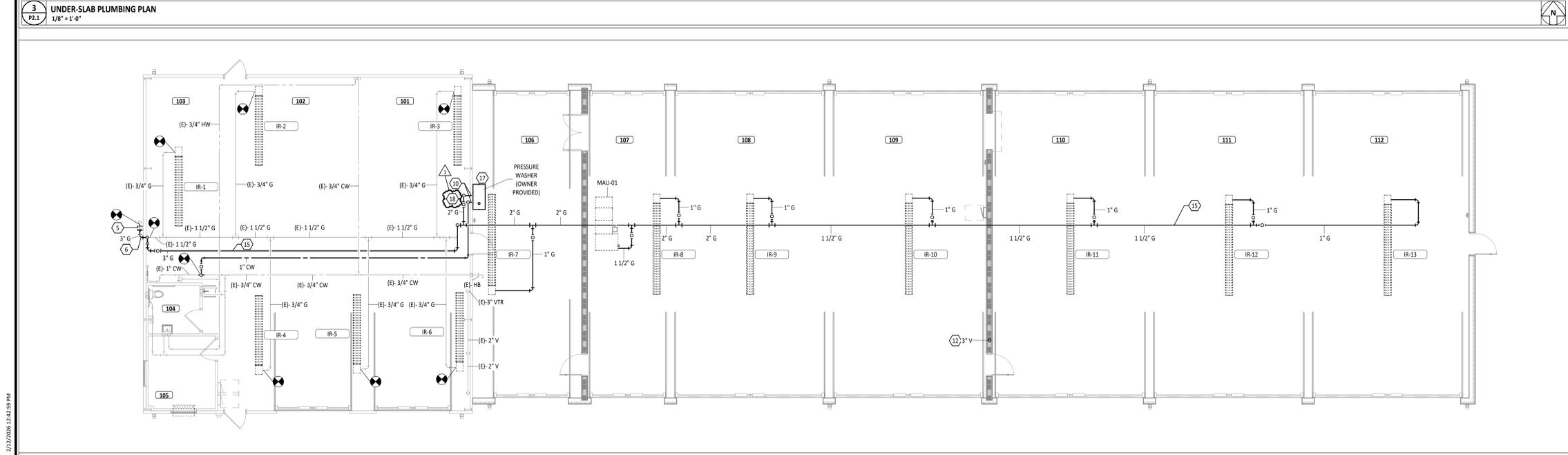
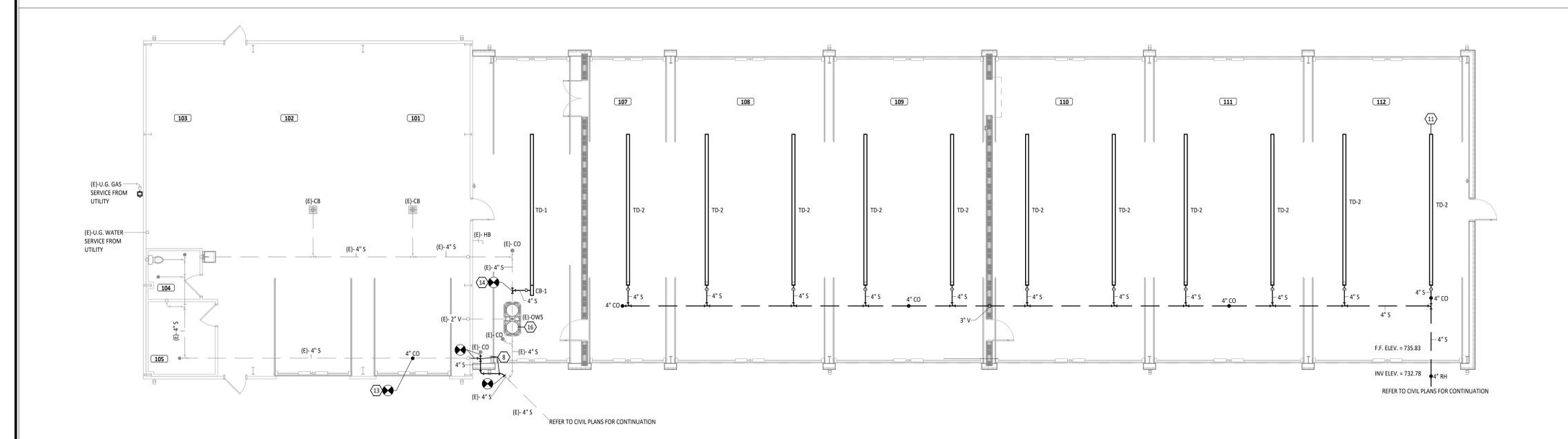
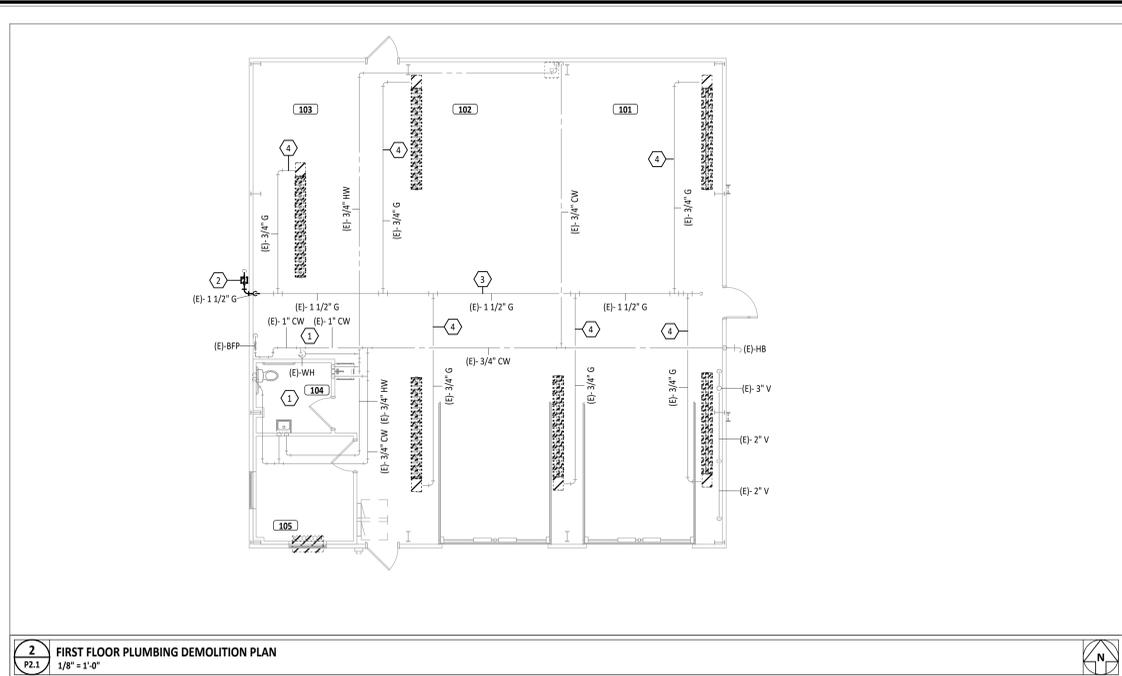
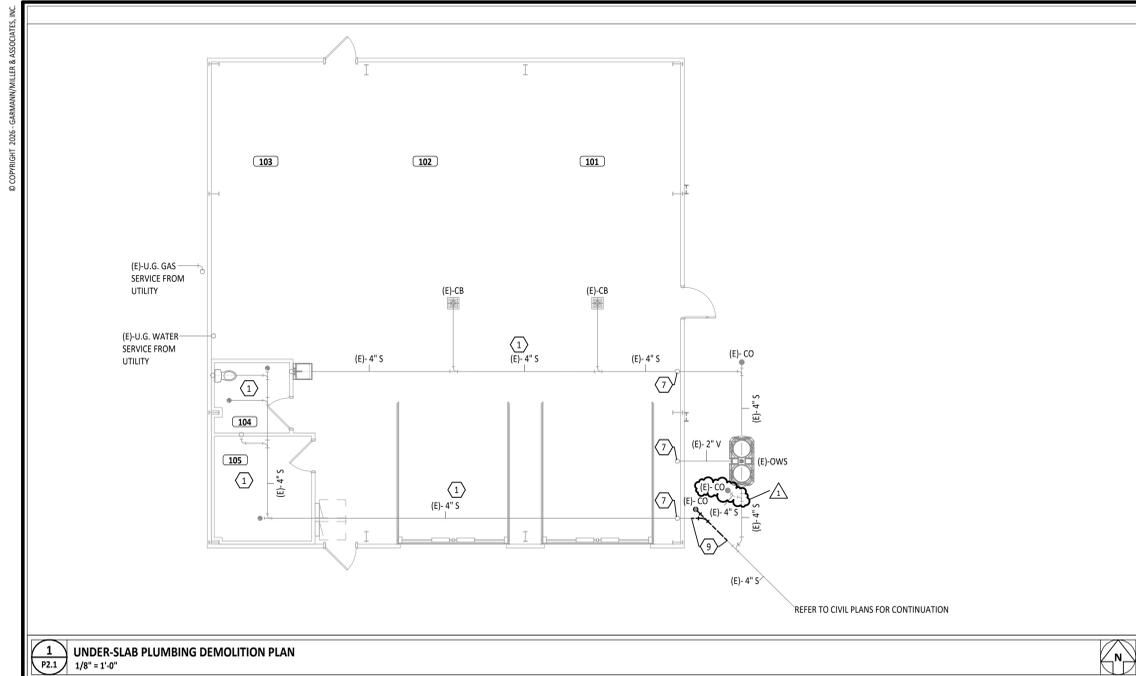
1 CONCRETE PIER DETAILS
3/4" = 1'-0"

ISSUANCES/REVISIONS		
CONSTRUCTION DOCUMENTS	DATE	BY
1. ADDENDUM #01	02/22/2025	JMB
2. ADDENDUM #02	02/13/2025	JMB

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	JMC	JMB

SHEET TITLE:
FOUNDATION PLAN

SHEET NUMBER:
S1.1

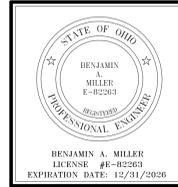


FIRST FLOOR PLAN ROOM INDEX

ROOM NUMBER	ROOM NAME	AREA
101	MAINTENANCE BAY	968 SF
102	MAINTENANCE BAY	1,329 SF
103	PARTS STORAGE	404 SF
104	RESTROOM	67 SF
105	OFFICE	132 SF
106	WASH BAY	908 SF
107	BUS STORAGE BAY	594 SF
108	BUS STORAGE BAY	1,322 SF
109	BUS STORAGE BAY	1,308 SF
110	BUS STORAGE BAY	1,313 SF
111	BUS STORAGE BAY	1,322 SF
112	BUS STORAGE BAY	1,339 SF

- PLUMBING GENERAL NOTES**
- PROVIDE TRAP SEALS FOR ALL TRENCH DRAINS, AND AS REQUIRED BY CODE. REFER TO 2024 OHIO PLUMBING CODE 1002.4.1 AND PROJECT SPECIFICATIONS.
 - VERIFY INVERT ELEVATIONS ON UNDERGROUND SANITARY, STORM AND OTHER UTILITIES. COORDINATE DEPTHS WITH THE BUILDING CONSTRUCTION AND ALL OTHER UTILITIES INSIDE AND OUTSIDE OF THE BUILDING.
 - ALL FINAL GAS CONNECTIONS SHALL BE MADE WITH FLEXIBLE STAINLESS STEEL PIPE OR RIDGED PIPE WITH UNION, SHUT-OFF VALVE AND DIRT LEG. REFERENCE DETAILS AND EQUIPMENT INSTALLATION INSTRUCTIONS FOR ADDITIONAL INFORMATION.
 - PITCH UNDERFLOOR SANITARY WASTE PIPING 3" AND GREATER AT 1/8" PER FOOT, UNLESS NOTED OTHERWISE. PITCH ALL OTHER WASTE PIPING AT 1/4" PER FOOT UNLESS OTHERWISE NOTED.
 - WASTE AND VENT PIPING BELOW FLOOR AND THROUGH FLOOR SHALL BE 2" MINIMUM.
 - ROUTE DOMESTIC WATER AND SANITARY SEWER SERVICES TO SITE UTILITIES 5'-0" FROM BUILDING UNLESS NOTED OTHERWISE. REFERENCE CIVIL PLANS.
 - PROVIDE CLEANOUT IN ACCESSIBLE LOCATION AT THE BASE OF ALL PLUMBING SANITARY RISERS.
 - DIVISION 22 PLUMBING CONTRACTOR SHALL REFERENCE OTHER TRADES PLANS FOR ANY ADDITIONAL PLUMBING WORK REQUIRED.
 - WHERE FLOOR DRAINS OCCUR WITHIN THE LIMITS OF CONSTRUCTION, PREVENT CONSTRUCTION DEBRIS FROM ENTERING DRAIN BODY BY SEALING DRAIN OPENING PRIOR TO START OF WORK.
 - FIRE SEAL AROUND PIPING PENETRATIONS OF FIRE RATED WALLS.
 - PROVIDE SLEEVES AND/OR OPENINGS TO RUN PIPES THROUGH FOUNDATIONS, FLOORS, WALLS, AND ROOF.
 - FIELD VERIFY ALL NEW WATER, WASTE, AND VENT PIPING CONNECTIONS, LOCATIONS, SIZES, ELEVATIONS AND INVERTS AND PROVIDE NEW CONNECTIONS AS REQUIRED FOR PROPERLY OPERATING SYSTEMS.
 - ALL PLUMBING WORK TO COMPLY WITH 2024 OHIO PLUMBING CODES.

- KEYNOTE DESCRIPTION**
- EXISTING PLUMBING IN THIS AREA TO REMAIN UNLESS NOTED OTHERWISE. SHOWN FOR REFERENCE ONLY.
 - COORDINATE WITH THE UTILITY COMPANY FOR THE REMOVAL OF EXISTING GAS METER. PREPARE FOR NEW, LARGER, GAS METER. REMOVE GAS PIPING STUBBED INTO BUILDING FROM EXISTING GAS METER. PREPARE FOR NEW, LARGER, PIPING FROM NEW METER. REFER TO NATURAL GAS PIPING DETAIL ON SHEET P2.1 FOR ADDITIONAL INFORMATION. COORDINATE BUILDING WORK WITH GENERAL CONTRACTOR.
 - EXISTING 1-1/2" GAS MAIN LINE TO REMAIN. PREPARE TO BACKFEED LINE WITH NEW GAS LINE FROM NEW METER. REFER TO NEW WORK PLAN.
 - EXISTING 3/4" BRANCH GAS LINE TO EXISTING RADIANT HEATER TO REMAIN. DISCONNECT BRANCH LINE FROM EXISTING HEATER AND RECONNECT TO NEW HEATER. REFER TO NEW WORK PLANS FOR ADDITIONAL INFORMATION. COORDINATE WORK WITH MECHANICAL CONTRACTOR.
 - COORDINATE WITH LOCAL NATURAL GAS PROVIDER FOR INSTALLATION OF NEW GAS METER WITH REGULATOR, SIZED ADEQUATELY. GAS PRESSURE POST-METER TO BE 7"-14" W.C.. NOTIFY ENGINEER IF AFOREMENTIONED GAS PRESSURE CANNOT BE ACCOMMODATED POST-GAS METER. VERIFY METER SET IS OF APPROPRIATE SIZE BEFORE CONNECTION. CONFIRM ALL REQUIREMENTS WITH LOCAL NATURAL GAS PROVIDER PRIOR TO WORK.
 - PROVIDE NEW GAS LINE, SIZED AS INDICATED ON PLAN, FROM NEW GAS METER ROUTED INTO EXISTING BUILDING. MODIFY EXISTING BUILDING PENETRATION AS REQUIRED AND SEAL OPENING WATER-TIGHT. COORDINATE ROUTING WITH GENERAL CONTRACTOR. NEW GAS MAIN TO BACKFEED EXISTING GAS-FIRED EQUIPMENT AND SERVE NEW GAS-FIRED EQUIPMENT. REFER TO DETAIL 7/PS.1 FOR ADDITIONAL INFORMATION.
 - EXISTING VENT UP THROUGH SLAB FROM UNDERGROUND BELOW.
 - PROVIDE NEW SANITARY PIPING UNDERGROUND. COORDINATE ROUTING WITH STRUCTURAL DRAWINGS TO AVOID NEW COLUMN AND FOOTER. VERIFY EXACT ROUTING IN FIELD AND COORDINATE WORK WITH THE GENERAL CONTRACTOR.
 - DEMOLISH EXISTING SANITARY PIPING AS INDICATED. PREPARE FOR NEW PIPING CONNECTIONS.
 - PROVIDE COLD WATER AND NATURAL GAS PIPING THROUGH WALL WITH FINAL CONNECTIONS AS REQUIRED FOR NATURAL GAS-FIRED PRESSURE WASHER. CONFIRM EXACT INSTALLATION LOCATION WITH GENERAL CONTRACTOR. CONFIRM EXACT REQUIREMENTS WITH PRESSURE WASHER INSTALLATION INSTRUCTIONS.
 - TRENCH DRAIN TO BE CENTERED IN BUS LANE. TYPICAL ALL.
 - PROVIDE 3" VENT PIPING IN WALL CAVITY FROM SANITARY LINE BELOW UP THROUGH ROOF. VENT OUTLET TO BE MINIMUM 10'-0" FROM ALL FRESH AIR INTAKES. SEAL WATER-TIGHT. COORDINATE ALL ROOF PENETRATION REQUIREMENTS WITH GENERAL CONTRACTOR.
 - PROVIDE NEW SECTION OF SANITARY MAIN AS REQUIRED TO ALLOW FOR INSTALLATION OF CLEAN OUT IN THIS APPROXIMATE LOCATION. VERIFY EXISTING PIPE SIZE, TYPE AND LOCATION ON SITE. COORDINATE WORK WITH THE GENERAL CONTRACTOR.
 - CONNECT TO EXISTING SANITARY IN THE APPROXIMATE LOCATION. VERIFY EXISTING SIZE, TYPE, INVERT AND LOCATION ON SITE. COORDINATE WORK WITH THE GENERAL CONTRACTOR.
 - PAINT EXPOSED GAS PIPING YELLOW. TYPICAL ALL NEW EXPOSED GAS PIPING.
 - EXISTING OIL WASTE SEPARATOR TO REMAIN. ADJUST LID HEIGHT TO BE FLUSH WITH NEW CONCRETE SLAB. COORDINATE WITH GENERAL CONTRACTOR AND PROVIDE WORK AS REQUIRED.
 - COORDINATE WITH GENERAL CONTRACTOR TO PROVIDE A CONCRETE EQUIPMENT HOUSEKEEPING PAD FOR OWNER PROVIDED PRESSURE WASHER. PAD TO BE LEVEL. CONFIRM PAD DIMENSIONS WITH OWNER PROVIDED EQUIPMENT. CONFIRM FINAL INSTALLATION LOCATION WITH GENERAL CONTRACTOR AND OWNER.
 - PROVIDE A REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY PER 2024 OHIO PLUMBING CODE 608.17.6 AT WATER CONNECTION TO HOT WATER PRESSURE WASHER.



ANTWERP LOCAL SCHOOLS BUS BUILDING

ADDITION/REVISIONS TO SHEET: GARMANN MILLER, INC. ANTWERP, OHIO SHEETS

ISSUANCES/REVISIONS

CONSTRUCTION DOCUMENTS	01/22/2025
1 CONSTRUCTION DOCUMENTS - ADDENDUM 02	02/19/2025

PROJECT NUMBER:	DRAWN BY:	CHECKED BY:
25057.00	JAS	AIB

SHEET TITLE:
PLUMBING PLANS

SHEET NUMBER:
P2.1

SECTION 00 41 13 - BID FORM
THE PROJECT AND THE PARTIES

TO:

Antwerp Local Schools
303 South Harrmann Road
Antwerp, Ohio45813

FOR:

Project: Antwerp Local Schools Bus Building Addition and Renovation
Project Number: 25057.00
303 South Harrmann Rd, Antwerp, OH 45813
Antwerp, Ohio45813

DATE: _____ (Bidder to enter date)

SUBMITTED BY:

Bidder's Full Name: _____

Address: _____

City, State, Zip: _____

Telephone: _____

Fax No.: _____

E-mail: _____

OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Garmann/Miller & Associates Inc. for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Sum of:

Item 1 - Contract A, General Construction - Base Bid:

_____ dollars

All Cash and Contingency Allowances described in Section 01 21 00 are included in the Bid Sum.

We have included the Bid Bond or security deposit as required by the Advertisement, Notice to Bidders, Instructions to Bidders.

This is a Tax Exempt Project.

Builders Risk Insurance is to be furnished by the Owner.

ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.

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

Execute the Agreement within ten (10) days of receipt of Notice of Award.

Commence work within ten (10) days after written Notice to Proceed of this bid.

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

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

CONTRACT TIME

Owners desired start date: March 2, 2026

Owners desired completion date: October 30, 2026

If this Bid is accepted, we will:

Complete the Work by Date or at an earlier date of _____ (Bidder to enter completion date or time frame prior to completion date listed.)

ADDENDA

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

- Addendum # _____ Dated _____.

BID FORM SUPPLEMENTS

- Bid Bond
- Noncollusion Affidavit
- Contractor's Affidavit

BID FORM SIGNATURE(S)

(Bidder - print the full name of your firm)
was hereunto affixed in the presence of:

(Authorized signing officer)

(Authorized signing officer, Title)

SEALED SUBMISSION:

Bid is to be submitted in Duplicate.

Bid is to be submitted in a sealed envelope containing bid and bid form supplements and addressed as follows:

Prime Contract Bid for:
Antwerp Local Schools
303 South Harrmann Rd, Antwerp, OH 45813
Antwerp, Ohio 45813

END OF BID FORM

**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items including:
 - 1. Pipe bollard

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 04 20 00 - Unit Masonry: Placement of lintels in masonry.
- D. Section 09 91 13 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.
- C. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).
- E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- G. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Samples
 - 1. Submit samples as requested by the Architect during the course of construction.

1.05 QUALITY ASSURANCE

- A. The work of this section shall be coordinated with the work of other Sections.
 - 1. Verify the dimensions and work of other trades adjoining items of this Section before fabrication and installation.
- B. Furnish to the pertinent trades items included in this Section that are built into the work of other Sections.
- C. Welding shall be performed by qualified welders and shall conform to the applicable AWS welding code.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver items to be incorporated into the work of other trades in sufficient time to be checked prior to installation

- B. Repair items which have become damaged to the satisfaction of the Architect prior to incorporating them into the work. Replace damaged items if repair cannot be done to the satisfaction of the Architect.

1.07 PROJECT SITE REQUIREMENTS

- A. Field measurements shall be taken at the job site, prior to fabrication of items, to verify or supplement indicated dimensions and to ensure proper fitting of all items.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Angles, Channels, and S Shapes: ASTM A 36/A 36M - ASTM 992 (FY = 50ksi)
- B. Steel W Shapes: ASTM A 992/A 992M (FY = 50ksi).
- C. Rolled Steel Structural Shapes: ASTM A 992/A 992M (FY = 50ksi).
- D. Plates and Bar: ASTM A 36, unless otherwise noted.
- E. Pipe: ASTM A 53/A 53M Grade B Schedule 40, black and hot-dip galvanized finish as indicated.
- F. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
 - 1. Properly mark and match mark materials for field assembly
 - 2. Use connections that maintain structural values of joined pieces
- B. Fabricate items with joints tightly fitted and secured.
 - 1. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise shown.
 - 2. Form bent-metal corners to smallest radius possible without causing grain separation of otherwise impairing work.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware, screws, and similar items.

2.03 FABRICATED ITEMS

- A. Bollards: ASTM 36 steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.
 - 1. Contractor's option:
 - a. Hand form concrete top
 - or

- b. Provide pipe bollard cap finish with a class A formed finish having a symmetrical domed utilizing a minimum of 5000 psi fiber reinforced cementitious material. Product TopGard by Top Gard Inc; www.topgard.com

2.04 FINISHES - STEEL

- A. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for galvanized finish.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
 - 3. Exception: Galvanized items to be embedded in exterior walls or surfaces
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

END OF SECTION

**SECTION 07 21 13
BOARD INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at foundation perimeter and under floor slabs.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete
- B. Section 04 20 00 - Unit Masonry
- C. Section 05 41 00 - Structural Metal Stud Framing: Board insulation as wall sheathing.
- D. Section 07 21 19 - Foamed-In-Place Insulation: Plastic foam insulation other than boards.

1.03 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.
- C. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2024.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2024a.
- F. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).
- H. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies; 2018.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.05 QUALITY ASSURANCE

1.06 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Application: Perimeter foundation insulation below slab.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Board Size: 24 x 96 inch.
 - 6. Board Thickness: 2 inches.
 - 7. Board Edges: Square.
 - 8. Thermal Resistance: R-value of 5.0 per 1 inch at 75 degrees F mean temperature.
 - 9. Compressive Resistance: 25 psi.
 - 10. Water Absorption, Maximum: 0.3 percent, by volume.
 - 11. Manufacturers:
 - a. DuPont: Styrofoam Brand Square Edge XPS; www.dupont.com.
 - b. Kingspan Insulation LLC: GreenGuard XPS Type IV, 25 psi; www.kingspan.com.
 - c. Owens Corning Corporation: FOAMULAR 250 Extruded Polystyrene (XPS) Insulation; www.ocbuildingspec.com.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.

2.03 ACCESSORIES

- A. Provide all accessories that are approved per manufacturers installation instructions.
- B. Adhesive: Provide insulation manufacturer's recommended adhesive.
 - 1. Product: The Dow Chemical Company GREAT STUFF PRO™ Gaps & Cracks single component insulating foam sealant where necessary
- C. Joint Sealants
 - 1. LiquidArmor LT(low temp application)
 - a. Fluid Applied with Trowel
 - b. Installed during low temperature applications
 - c. Used to create seamless barriers at rough openings of windows and doors as well as insulation joints.
 - d. Can be used in temps as low as -20 degrees F
 - e. Will withstand rain within 15 minutes of installation, however do not apply over wet surfaces.
 - f. Complies with ASTM E331 and ASTM E2357.
 - g. Shall be applied per manufacturers' recommendations and instructions
- D. Penetration Filler: Provide insulated sheathing manufacturer's recommended polyurethane foam for sealing penetrations of insulated sheathing.
 - 1. Products:
 - a. The Dow Chemical Company "GREAT STUFF PRO™ Gaps & Cracks" single component polyurethane insulating foam sealant.
 - b. The Dow Chemical Company "GREAT STUFF PRO™ Window & Door" single component polyurethane low-pressure foam sealant.
- E. Gap Air Infiltration Filler: Two Component, Quick Cure Polyurethane Foam
 - 1. NFPA 286 Approval for Exposed use to the interior of the building without the need for a 15-min thermal barrier.
 - 2. ASTM E-84 Class A
 - 3. Product: The Dow Chemical Company FROTH-PAK™ Foam Insulation two component, quick-cure polyurethane foam

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Apply adhesive to back of boards:
 - 1. Three continuous beads per board length.
- B. Install boards vertically on foundation perimeter.
 - 1. Place boards to maximize adhesive contact.
 - 2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Extend boards over expansion joints, unbonded to foundation on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

**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. Roof system consists of the manufacturer's standard standing-seam painted roof, over insulation. Provide all roof penetration seals.
 - 3. 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.
 - 4. 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. R-Seal Thermal Insulation
- E. Foamed-insulation-core concealed fastener metal wall 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. Downspouts
 - 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

- A. Section 01 21 00 - Allowances: Payment procedures relating to allowances.

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. 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: overhead sectional doors 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 Buildings Company
 - 2. A & S Building Systems, Inc; Division of NCI Building Systems, L.P.
 - 3. American Steel Building Co., Inc.
 - 4. Butler Manufacturing Co
 - 5. Chief Buildings
 - 6. Ceco Building Systems
 - 7. Corle Building Systems
 - 8. Kirby Building Systems
 - 9. Nucor Building Systems
 - 10. Star Building Systems
 - 11. VarcoPruden Buildings

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 expandable end walls for possible future additions, consisting of load-bearing end-wall and corner columns and rafters.
- 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: Manufacturer's standing-seam metal roof panel equal to Chief Buildings "MVP" panel, with kynar 500 painted finish.
- H. Exterior Wall System: Manufacturer's standard tapered-rib, exposed-fastener metal wall panels with field-installed insulation.

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 **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 cranes and materials-handling 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.
 - 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.
 - b. U-Factor: .035 or less.
 2. Metal Wall Insulation:
 - a. R-Value: 22 or greater.
 - b. U-Factor: 060 or less.

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 : Full frames with endposts, for future expansion.
- 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: 8 inch depth as indicated on the drawings.
 - 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.
- 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

- 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 to match Owners existing metal roof system.
 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: 36 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.
- C. Ridge Assembly for High End of Slopes: SSR Ridge; draw-formed aluminum seam caps factory-attached to SSR ridge panels that are seamed together along the center of the ridge, utilizing only one weathersealed joint and providing a true expansion joint for panel movement.

2.06 METAL WALL PANELS

- A. **Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels:** Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced 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, 26 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: 12 inches o.c.
 3. Panel Coverage: 36 inches.
 4. Panel Height: 1.25 inches.
 5. Panel configuration: Equal to Chief Buildings "AP Panel" on exterior of building.
- B. **Tapered-Rib-Profile, Metal 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, 26 GA, 50,000 psi (min.).
 - a. Panel Finish: White Pigmented Polyester
 - 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 Chief Buildings "CS Panel"
- C. 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.

2.07 THERMAL INSULATION

A. WALL INSULATION

1. Polyurethane Foam-Plastic Board Insulation: Manufacturer's standard proprietary composite rigid polyurethane-core board with integral factory-applied exterior and interior fiber reinforced polypropylene scrim facings, with factory-applied tape tabe system for an integral vapor-retarding air barrier membrane; fabricated with tongue & grove edges.
 - a. Basis-of-Design Product; Subject to compliance requirements, provide Pacific Insulation Products; R-Seal Board Insulation or comparabe product
 - b. Thickness: 3" R-Seal panel
 - c. 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
 - d. 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)
 - e. Board insulation to be left exposed to interior of the building without an additional thermal barrier
 - f. Interior Finish to be White Embossed texture finish

B. ROOF INSULATION

1. Polyurethane Foam-Plastic Board Insulation: Manufacturer's standard proprietary composite rigid polyurethane-core board with integral factory-applied exterior and interior fiber reinforced polypropylene scrim facings, with factory-applied tape tabe system for an integral vapor-retarding air barrier membrane; fabricated with Shiplap edges.
 - a. Basis-of-Design Product; Subject to compliance requirements, provide Pacific Insulation Products; R-Seal Board Insulation or comparabe product
 - b. Thickness: 4" R-Seal panel
 - c. 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
 - d. 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)
 - e. Board insulation to be left exposed to interior of the building without an additional thermal barrier
 - f. Interior Finish to be White Embossed texture finish

2.08 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.

- B. Louvers: 18 gage galvanized steel, self-framing, self-flashing with integral head gutter, with paint finish.
 1. Screen: Exterior mounted, removable insect screen.
 2. Minimum Free Area: 65 percent.
 3. Color: Manufacturer's standard bronze.
- C. Wall Openings: Cold-formed sheet metal framing concealed with trim; same color as wall panels.

2.09 ROOF ACCESSORIES

- A. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, 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 0.022-inch (0.56-mm) 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 0.022-inch (0.56-mm) 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. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
 3. Expansion Joints: Provide gutter expansion joint a maximum spacing of 40'-0". Fabricate joints with a neoprene (0.15 thick) membrane bonded to 0.048 aluminum flanges

anchored to gutter sections with pop rivets set in heavy bead of sealant. Joint to be concealed with a cover plate matching the profile of gutter.

- 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.sno-bar.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.
 - 8. The color strip, which is 2" wide x 8' long, that is inserted into the snow guard system shall be furnished with the system. Color shall match the roof panels.
- 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

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: The Owner or the Architect of Record will employ/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.

2.11 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.

2.12 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. This includes, but is not limited to all non factory finished metal surfaces.
- 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 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. Pre-drill 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. Pre-drill 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.

3.10 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. 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 employ/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. 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

**SECTION 22 10 06
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Water hammer arrestors / Shock Absorbers.
- D. **Trap Seal Protection Devices**

1.02 RELATED REQUIREMENTS

- A. Section 22 10 05 - Plumbing Piping.
- B. Section 22 40 00 - Plumbing Fixtures.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains; 2019.
- B. ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers; 2017.
- C. DIN EN 1433 - Drainage Channels for Vehicular and Pedestrian Areas - Classification, Design and Testing Requirements; Marking and Evaluation of Conformity; 2005.
- D. NSF 61 - Drinking Water System Components - Health Effects; 2022, with Errata.
- E. NSF 372 - Drinking Water System Components - Lead Content; 2022.
- F. PDI-WH 201 - Water Hammer Arresters; 2017.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

1.07 EXTRA MATERIALS

- A. Supply for Owner's use in maintenance of project:
 - 1. Two loose keys for each outside wall hydrants and indoor hose bibbs.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Manufacturers:
 - 1. Zurn Industries, Inc.

2. Wade.
3. Josam Company.
4. Jay R. Smith Manufacturing Company.
5. Watts Regulator Company.
6. MIFAB
7. Sioux Chief
8. ABT, Inc
9. Hubell, Inc.
10. Froet Industries
11. Eric'sons Dura Trech
12. ACO, Inc
13. Substitutions: See Section 01 60 00 - Product Requirements.

B. Trench Drain (TD)

1. High density polyethylene structural composite drain channel with bottom slope. All sections shall include integral top frame, interlocking ends and radiused bottom. Combination tie-down/leveling devices as required.
2. Grate: Galvanized Ductile Iron Bar Grate - Heavy Duty Class C
 - a. Reference Standard: DIN EN 1433
3. Refer to schedule on drawings for length of drains required.
4. Provide with quantity two fiberglass trench shovels designed specifically for use with the trench drain system without damaging the interior walls of the trench. Shovel blade shall be laminated using same glass-filled polyester fiberglass material found in the trench drain system. Equal to Zurn model Z-812.
5. **Acceptable trench drain substitution: Pre-sloped, extra heavy-duty polymer concrete trench drain system with integrally cast ductile iron edge rails (hard-nose type), rated for Heavy Duty Class C, complete with modular channels, heavy-duty grates, frame, and all necessary accessories for a complete installation.**

2.03 CLEANOUTS

A. Manufacturers:

1. Wade
2. Jay R. Smith Manufacturing Company
3. Josam Company
4. Zurn Industries, Inc
5. Watts Regulator Company.
6. MIFAB
7. Sioux Chief
8. Neenah
9. Substitutions: See Section 01 60 00 - Product Requirements.

B. Cleanouts at Exterior Surfaced Areas (RH):

1. Round cast nickel bronze access frame and non-skid cover.

C. Cleanouts at Interior Finished Floor Areas (CO):

1. Cast iron, inside caulking, with adjustable nickel-bronze round tops.

2.04 WATER HAMMER ARRESTORS / SHOCK ABSORBER

A. Manufacturers:

1. Jay R. Smith Manufacturing Company.
2. Zurn Industries, Inc.
3. Watts Regulator Company.

4. Wade.
 5. Josam.
 6. MIFAB
 7. Oatey
 8. Precision Plumbing Products
 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Water Hammer Arrestors:
1. Stainless Steel or Copper construction, ASSE Listed, Piston or Bellow type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 150 psi working pressure.

2.05 TRAP SEAL PROTECTION DEVICES

- A. **As an alternate to the trap primers for trench drains, a trap seal protection device can be used as allowed per the OBC, section 106.7.1**
- B. **Manufacturers:**
1. **Sureseal**
 2. **Mifab**
 3. **Oatey**
 4. **Green Drain, Inc.**
 5. **Zurn**
 6. **Mainline**
 7. **Substitutions: See section 01 6000 - Product Requirements**
- C. **Construction: Mechanical device shall be an inline drain trap sealer, ASSE 1072 or IPC 09.1 listed. Body shall be constructed of ABS plastic. Diaphragm and sealing gasket to be constructed of neoprene rubber. Compression fitting sealing gasket 80 durometer. Coordinate with exact drain provided.**

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install all drains at 99'-11-1/2" elevation (Finish Floor = 100'-0") unless noted otherwise on drawings. Install floor drains in shower areas to accommodate a floor slope of 1:48. The minimum height of the floor drain shall be 99'-11-1/2".

END OF SECTION

**SECTION 23 55 33
FUEL FIRED HEATERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Single Burner Infrared Radiant Heaters

1.02 RELATED REQUIREMENTS

- A. Section 23 51 00 - Breechings, Chimneys, and Stacks.

1.03 REFERENCE STANDARDS

- A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
- C. NFPA 211 - Guide for Smoke and Heat Venting; 2013, Including All Amendments.
- D. Gas Fired Infrared Heater Standard Z83.20/CSA 2.34, Latest Edition.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.
- D. Manufacturer's Instructions: Indicate rigging, assembly, and installation instructions.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.
- F. Warranty: Submit manufacturers warranty and ensure forms have been filled out 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 of documented experience.

1.06 REGULATORY REQUIREMENTS

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

1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Gas Fired Infra-Red Heaters: Provide a three (3) year warranty from date of final acceptance of all other components including electrical.

PART 2 PRODUCTS

2.01 MANUFACTURERS:

- A. Roberts Gordon
- B. Superior Radiant Products as provided by local manufacturer's representative.
- C. Detroit Radiant Products Company: www.detroitradiant.com.

- D. Ambirad, Inc.
- E. Advanced Radiant Systems
- F. **Combustion Research / Omega II**
- G. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 SINGLE BURNER INFRARED RADIANT HEATERS

- A. Burner Box:
 - 1. Natural Gas model approved to operate at a minimum inlet gas pressure of 5 inches W.C., and having a full load electrical draw requirement of 1 amp max at 120 VAC (60 Hz).
 - 2. Burner cup shall be chrome plated to resist temperature and moisture degradation over the life of the unit.
 - 3. Air blower motor shall be totally enclosed, requiring no oiling and shall be provided with an integral thermal overload switch.
 - 4. Gas and electric controls shall be separated from the combustion air stream. Additionally, all operating controls shall be enclosed in a sealed burner housing.
 - 5. The burner shall be serviceable from either side once installed, and in operation.
 - 6. Gas valve shall be of the slow opening type.
 - 7. Burner housing shall be constructed of minimum 18 Ga. Corrosion resistant steel, and factory coated with powder epoxy paint.
 - 8. Burner shall be equipped with a flame sight port safely usable while the unit is running during service or maintenance.
- B. Burner Controls:
 - 1. Factory Wired: All burners shall be factory wired for 120 volts AC, DSI operation and supplied with a grounded three wire pigtail located at rear of burner. Burner will accept 24 volt AC control wiring directly to provide post purge operation.
 - 2. Ignition shall be of the direct spark type (DSI), and provide a minimum 3 trials for ignition, a minimum 15 second trial for ignition period, a 1 hour recycle period, and ignition shall take place within the burner cup for added reliability. Ignition and flame proving electrodes located in front of the burner cup shall not be allowed. DSI controls shall have a lighted diagnostic capability to be used during troubleshooting of the burner, and provide a minimum 30 second post purge of the unit.
 - 3. Air proving safety switch shall be provided as standard equipment.
 - 4. The burner shall be equipped with power on, and run lights clearly visible once unit is installed.
- C. Thermostat
 - 1. Standard Installation: Provide a modulating low voltage thermostats as shown on construction documents. Include a transformer for low voltage thermostat where required.
- D. Reflectors:
 - 1. Provide aluminum highly radiant reflective material reflectors, installed over all heat exchangers.
 - 2. Provide reflector joint pieces over heat exchanger fittings such as elbows so reflector covers heat exchanger continuously. In order to maximize radiant output and minimize convection losses, reflectors shall protrude past the bottom of the heat exchanger pipe. Reflectors shall have a minimum 10 reflective surfaces to prevent bounce back of energy to the tubing. Reflectors with fewer bends will not be allowed.
 - 3. Over all fittings: All reflectors at termination of the heat exchanger pipe and any elbows shall have end caps to prevent convective heat from escaping.
- E. Radiant Piping - Heat Exchanger

1. Radiant Tube shall be new 4 in. O.D. Hot-Rolled steel tube or heat treated aluminized tube with 16 gauge wall with an emissivity factor of 0.80 or greater.
 2. Fittings for tubes shall be per manufacturer's recommendations.
 3. Hanging Materials: All system's tube must be supported in accordance with acceptable practices, local codes, and applicable standards and as shown on plans. Pipe shall pitch down at least a half inch in 20 feet away from the burner box.
- F. Outside Air: Provide fresh outside air to supply each burner for the support of combustion air as called for on plans.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that space is ready for installation of units and openings are as indicated on shop drawings.
- B. Coordinate routing and elevation with all other utilities.
- C. Verify that proper power supply is available.
- D. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install gas fired infrared heaters as indicated, in accordance with manufacturer's installation operation and service manual and in compliance with applicable codes and approvals. Allow adequate space for servicing or removal of the unit without disturbing other piping or equipment.
- B. Install in accordance with NFPA 90A.
- C. Provide vent connections in accordance with NFPA 211. Refer to Section 23 51 00.
- D. Install per manufacturer's instructions.
- E. Suspend heat exchanger, burner, gas piping, conduit, and reflectors from building substrate as indicated, or if not indicated, in manner to provide durable and safe installation; and in accordance with manufacturer's installation instructions.
- F. Install vent piping as indicated. Terminate where indicated on the drawings with a vent terminal assembly as supplied by the manufacturer. The venting must be installed in accordance with the requirements within the installation operation and service manual and the following codes:
United States: Refer to National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.
Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.
- G. Do not exceed clearance to combustibles outlined and printed on burner nameplate, and in manufacturer's product data. Measure clearance distance from surface of heat exchanger or as indicated by approval agency's listing.

3.03 QUALITY CONTROL

- A. Start-up, test, and adjust gas fired infrared heaters in accordance with manufacturer's start-up instructions in the installation operation and service manual, and Utility Company's requirements. Check and calibrate controls, adjust burners if applicable according to manufacturer's installation operation and service manual instructions for maximum efficiency.

END OF SECTION

**SECTION 32 13 13
CONCRETE PAVING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete paving, parking areas.

1.02 RELATED REQUIREMENTS

- A. Section 31 22 00 - Grading.
- B. Section 31 23 23 - Fill.
- C. Section 32 11 23 - Aggregate Base Courses.

1.03 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Concrete Construction; 2020.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- D. ACI 305R - Hot Weather Concreting; 2010.
- E. ACI 306R - Cold Weather Concreting; 2010.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- G. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2021.
- H. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2021b.
- I. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.
- K. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- L. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, and curing compound.
- C. Product Data: Manufacturer's data sheets on striping paint product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.
- C. Follow recommendations of ACI 305R when concreting during hot weather.
- D. Follow recommendations of ACI 306R when concreting during cold weather.

- E. Installer Qualifications: Installer with minimum three years experience in similar projects.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

- A. Comply with applicable requirements of ACI 301.
- B. Parking Area Pavement: 4,500psi 28 day concrete, thickness shown on the drawings, heavy broom finish.

2.02 FORM MATERIALS

- A. Form Materials: As specified in Section 03 10 00, comply with ACI 301.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
 - 1. Thickness: 1/2 inch.

2.03 REINFORCEMENT

- A. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- B. Bar Supports: Bolsters, chairs, spacers, supporting, and fastening reinforcement bars, welded with fabric and dowels in place. Manufacture supports according to CRSI's Manual of Standard Practice.

2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C 150, Type I - Normal portland type. grey color.
 - 1. Acquire all cement for entire project from same source.
- C. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C618, Type C or F may be used up to a maximum of 25% of the total cementitious materials content in all concrete mixes, unless otherwise noted.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120 maybe used up to a maximum of 35% of the total cementitious material content in all concrete mixes, unless otherwise noted.
 - 3. The exact percentages shall be used on a successful test placement on the project site
- D. Fine and Coarse Aggregates:
 - 1. ASTM C33, Class 3S, normal weight aggregates, uniformly graded, non-exceeding 1-1/2 inch nominal size.
 - 2. ASTM C330, light weight aggregates.
 - 3. Combined aggregate gradation for slabs shall be 8%-18% for large top size aggregate (1 1/2") or 8 - 22% for smaller top size aggregates (1" or 3/4") retained on each sieve below the top size and above the No. 100.
 - 4. Aggregate Supply: Provide aggregate from one source of supply to maintain uniformity of color size and shape.
- E. Water: Clean and not detrimental to concrete.
 - 1. ASTM C94
- F. Air-Entraining Admixtures: ASTM C260/C260M.
 - 1. Acceptable Manufacturers:

- a. Air-Mix or Perma-Air, Euclid Chemical
 - b. Sealtight AEA WR Meadows, Inc.
 - c. Darex AEA or Daravair, WR Grace Company
 - d. Axim Italcementi Group
 - e. Promix
 - f. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing.
- 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

2.05 ACCESSORIES

- A. Curing Compound: ASTM C 309, Type 1, Class A.
 - 1. Clear waterborne membrane-forming curing compound.
 - a. Day Chem Rez Cure: Dayton Superior Corporation
 - b. Diamond Clear Vox: Euclid Chemical Co.
 - c. Safe-Cure Clear; Chem Masters
- B. Bonding Compound: Polyvinyl acetate or acrylic base complying with ASTM C 1059, type II.
- C. Epoxy Adhesive: ASTM C881

2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures:
 - 1. Use of admixtures: Admixtures, except air entraining mixture, are not allowed except with permission of Architect.
 - 2. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus 1 - 1/2 percent with the following limits:
 - a. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure(all above grade):
 - 1) 6.0 percent(severe exposure) 3/4 inch max. aggregate
 - 2) Other concrete (not exposed to freezing, thawing, or hydraulic pressure or to receive a surface hardener: 2 percent to 4 percent air
 - 3. NO calcium chloride will be permitted.
- D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- E. Normal Weight Concrete:
 - 1. Compressive Strength, per ASTM C 39 at 28 days: As scheduled.
 - 2. Water-Cement Ratio: Provide concrete for following conditions with maximum water-cement (W/C) ratios as follows:
 - a. Subjected to deicer/watertight and freezing and thawing: W/C 0.45.
 - b. Subjected to brackish water, salt spray, or deicer: W/C 0.40
 - 3. Slump Limits: Proportion and mixes to result in concrete slump a point of placement as follows:

- a. Slump limit for concrete containing high-range water reducing admixture (superplasticizers): Not more than 8 inches after adding admixture to site-verified 2 to 3 inch slump concrete.
- b. Ramps, slabs and sloping surfaces: Not more than 4 inches.
- c. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
- d. Other concrete: Note less than 1 inch, not more than 4 inches.

2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
 - 1. When air temperature is between 85 degrees F and 90 degrees F, reduce mixing and delivery time from 1 1/2 hour to 75 minutes, and when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.
 - 2. Use set retarding admixtures during hot weather only when approved by Architect/Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

- A. See Section 32 11 23 for construction of base course for work of this Section.

3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 PLACING CONCRETE

- A. Before placing concrete, inspect, and complete formwork installation, reinforcing steel, and install items to be embedded or cast in. Notify other trades to permit installation of their work.
 - 1. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.
- B. Moisten subbase to provide a uniform dampened condition at the time concrete is placed.
- C. Place concrete in accordance with ACI 304R.
- D. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.
- E. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- F. Consolidate concrete by mechanical vibrating equipment supplemented by rodding or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R.

3.06 JOINTS

- A. General: Construct contraction, construction and isolation joints true to line with faces perpendicular to surface plan of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.
 - 1. Align curb, gutter, and sidewalk joints.
 - 2. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise
- B. Construction Joint: Set construction joints at side and end termination of paving at locations where paving operations are stopped unless paving terminates at isolation joints.
 - 1. Continue reinforcement across construction joints unless otherwise indicated.
- C. Expansion Joints:
 - 1. Place 1/2 inch wide expansion joints at 100 foot intervals unless otherwise indicated on drawings and to separate paving from vertical surfaces and other components and in pattern indicated.
 - 2. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
 - 3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required lace or clip joint filler sections together.
 - 4. Secure to resist movement by wet concrete.
- D. Contraction Joints: Provide weakened-plane contraction joints, section concrete into areas as shown on Drawings. Construct contraction joints for a depth of 1/4 of the concrete thickness.
 - 1. Inserts: Form contraction joints by inserting premolded plastic, hardboard, or fiber strips into fresh concrete until top surface of strip is flush with concrete. Radius each joint edge with a jointer tool. Carefully remove strips after concrete has hardened. Clean groove of loose debris.
 - 2. Provide joints at five (5) feet intervals if not indicated.

3.07 FINISHING

- A. Nonslip Broom Finish (Ns-Brm-FN): Apply nonslip broom finish to exterior concrete platforms, steps, walks, curbs, gutters and ramps.
 - 1. Immediately after float finishing, slightly roughen concrete by brooming with fiber bristle broom, perpendicular to main traffic route unless otherwise indicated on drawing.
- B. Area Paving: Light broom, texture perpendicular to pavement direction unless otherwise indicated on drawings.
- C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.08 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- B. Maximum Variation From True Position: 1/4 inch.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 43 00 - Quality Assurance.
- B. The owner will employ services of an independent testing agency to perform specified testing and inspections
- C. Provide free access to concrete operations at project site and cooperate with appointed firm.

- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- F. Compressive Strength Tests: ASTM C 39. For each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cu yd or less of each class of concrete placed in a day or for each 3000 square feet of surface area placed..
 - 1. Cure specimens on job site under same conditions at concrete it represents
 - 2. Test one specimen at 7 days
 - 3. Test one specimen at 28 days
 - 4. Retain one specimen in reserve for later testing if required.
- G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- H. Slump: ASTM C 143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

- A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit pedestrian or vehicular traffic over pavement until 75 percent design strength of concrete has been achieved.

END OF SECTION

**SECTION 33 01 10.58
DISINFECTION OF WATER DISTRIBUTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 33 14 16.
- B. Testing and reporting results.

1.02 RELATED REQUIREMENTS

- A. Section 33 14 16 - Site Water Utility Distribution Piping.

1.03 REFERENCE STANDARDS

- A. AWWA B300 - Hypochlorites; 2024.
- B. AWWA B301 - Liquid Chlorine; 2024.
- C. AWWA B302 - Ammonium Sulfate; 2023.
- D. AWWA B303 - Sodium Chlorite; 2024.
- E. AWWA C651 - Disinfecting Water Mains; 2014.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Test Reports: Indicate results comparative to specified requirements.
- C. Certificate: Certify that cleanliness of water distribution system meets or exceeds specified requirements.
- D. Disinfection report:
 - 1. Type and form of disinfectant used.
 - 2. Date and time of disinfectant injection start and time of completion.
 - 3. Test locations.
 - 4. Initial and 24 hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - 5. Date and time of flushing start and completion.
 - 6. Disinfectant residual after flushing in ppm for each outlet tested.
- E. Bacteriological report:
 - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
 - 2. Time and date of water sample collection.
 - 3. Name of person collecting samples.
 - 4. Test locations.
 - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
 - 6. Coliform bacteria test results for each outlet tested.
 - 7. Certification that water complies, or fails to comply, with bacterial standards

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651.
- B. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this Section with minimum three years documented experience.
- C. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of Ohio.

1.06 REGULATORY REQUIREMENTS

- A. Provide certificate of compliance from authority having jurisdiction indicating approval of water system.

PART 2 PRODUCTS

2.01 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B300 Hypochlorite, AWWA B300 Hypochlorite, and AWWA B300 Hypochlorite.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that piping system has been cleaned, inspected, and pressure tested.
- B. Schedule disinfecting activity to coordinate with start-up, testing, adjusting and balancing, demonstration procedures, including related systems.

3.02 DISINFECTION

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Flush piping system with clean potable water until dirty water does not appear at point of outlet.
- D. Introduce treatment into piping system.
- E. Maintain disinfectant in system for 24 hours.
- F. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- G. Replace permanent system devices removed for disinfection.

3.03 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 43 00.
- B. Test samples in accordance with AWWA C651.

END OF SECTION

SECTION 33 14 16
SITE WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe and fittings for site water lines including domestic water lines.

1.02 RELATED REQUIREMENTS

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 09 91 13 - Exterior Painting.
- C. Section 31 23 16 - Excavation: Excavating of trenches.
- D. Section 31 23 23 - Fill: Bedding and backfilling.
- E. Section 33 01 10.58 - DISINFECTION OF WATER DISTRIBUTION: Disinfection of site service utility water piping.

1.03 REFERENCE STANDARDS

- A. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2020.
- B. AWWA C502 - Dry-Barrel Fire Hydrants; 2024.
- C. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 48-In. (50-mm Through 1,200-mm) NPS; 2025.
- D. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service; 2015.
- E. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2016.
- F. UL 246 - Hydrants for Fire-Protection Service; Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with municipality requirements.
- B. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping
 - 1. Underground Piping: 150 psig

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers with labeling in place.
 - 1. Ensure valves are dry and internally protected against rust and corrosion
 - 2. Protect valves against damage to threaded ends, flange faces, and weld ends.
- B. Deliver pipes and tubes with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

- C. Protect stored pipes and tubes from moisture and dirt. Elevate above grade.
- D. Protect flanges, fittings, and piping specialties from moisture and dirt.

1.07 SEQUENCE AND SCHEDULING

- A. Coordinate connection to water main with utility company.
- B. Coordinate with pipe materials, sizes, entry location and pressure requirements of building fire protection systems piping.
- C. Coordinate with pipe materials, sizes, entry location and pressure requirements of building water distribution systems piping
- D. Coordinate with other utility work.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. See civil drawings for pipe material, size and other additional information.
- B. Products to conform to applicable codes
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Water Service" in large letters.

2.02 VALVES (IF SHOWN ON CIVIL DRAWINGS)

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Gate Valves Up To 3 Inches:
 - 1. See civil drawings for more information
 - 2. Manufacturers:
 - a. American Darling Valve Division, American Cast Iron Pipe Co.
 - b. Clow Valve Company, Division McWane Inc.
 - c. East Jordan Iron Works Inc.
 - d. Hammond Valve Corporation
 - e. Kenney Valve Corporation
 - f. Milwaukee Valve Company Inc.
 - g. Mueller Company, Grinnell Corporation
 - h. Nibco Inc.
 - i. Stockham Valves & Fittings Inc.
 - j. Waterous Company
 - k. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Gate Valves 3 Inches and Over:
 - 1. See civil drawings for more information
 - 2. Manufacturers:
 - a. American Darling Valve Division, American Cast Iron Pipe Co.
 - b. Clow Valve Company, Division McWane Inc.
 - c. East Jordan Iron Works Inc.
 - d. Hammond Valve Corporation
 - e. Kenney Valve Corporation
 - f. Milwaukee Valve Company Inc.
 - g. Mueller Company, Grinnell Corporation
 - h. Nibco Inc.
 - i. Stockham Valves & Fittings Inc.
 - j. Waterous Company
 - k. Substitutions: See Section 01 60 00 - Product Requirements.

- D. Valve Boxes:
 - 1. Three-piece cast iron diameter nominal, adjustable screw type, cover marked "WATER".

2.03 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 23 23.
 - 1. See civil drawings for more information
- B. Cover: As specified in Section 31 23 23.
 - 1. See civil drawings for more information

2.04 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 03 30 00.
- B. Identification: Polyethylene plastic tape, 6 inches wide by 4 mils thick, solid blue in color with continuously printed caption in black letters "CAUTION - WATER LINE BURIED BELOW"
- C. Valve Manhole Frames and Covers as shown on the drawings

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.
- B. Extend water system piping into building and terminate 1'-0" above finish floor. Terminate piping with caps, plugs or flanges as required for piping material. Make connection to building water systems when those systems are available.
- C. Water Main Connection: Arrange for tap in water main, of size and in location indicated, from water utility. Connect water piping according to the requirements of the water utility.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.03 TRENCHING

- A. See the sections on excavation and fill and civil drawings for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.
 - 1. Bedding around pipe, ODOT 703.11 Type 3 (#57 or #67 aggregate) or other approved equivalent. See civil drawings for more information.

3.04 INSTALLATION - PIPE

- A. Maintain separation of water main from sewer piping as indicated on the civil drawings. The water main shall be installed above the sewer whenever possible.
 - 1. See Civil Drawings for more information and location of proposed water lines
 - a. Provide one full length of water centered over the sewer so that both joints will be as far from the sewer as possible. Water mains shall be laid with a cover of not less than what's indicated on the civil drawings from top of pipe to finish grade.
- B. Establish elevations of buried piping to ensure not less than cover indicated on drawings .
- C. Route pipe in straight line.

- D. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- E. Install fittings for changes in direction and branch connections
- F. Slope water pipe and position drains at low points.
- G. Install trace wire 8 inches above top of pipe; coordinate with Section 31 23 23.
- H. Extend water system piping and connect to water supply source and building distribution and fire protection systems where indicated on the drawings.

3.05 INSTALLATION - VALVES AND HYDRANTS

- A. Set valves on solid bearing.
- B. Center and plumb valve box over valve. Set box cover flush with finished grade.
- C. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- D. Set hydrants to grade, with nozzles at least 20 inches above ground, unless noted otherwise by AHJ.
- E. Locate valves/fittings per the civil drawings
- F. Provide a drainage pit 36 inches square by 24 inches deep filled with 2 inches washed gravel. Encase elbow of hydrant in gravel to 6 inches above drain opening. Do not connect drain opening to sewer.
- G. Paint hydrants in accordance with Section 09 91 13.

3.06 FIELD QUALITY CONTROL

- A. See Section 01 43 00 - Quality Assurance, for additional requirements.
- B. Perform field inspection and testing in accordance with Section 01 43 00.
- C. Contact the architect and civil engineer for visual inspection before backfilling commences.
 - 1. Inspect interior of piping after approximately 24 inches and at completion of backfill for displacement or other damages.
 - 2. Inspect piping for alignment, deflection, crushed or damaged piping and infiltration and exfiltration.
 - a. Replace defective piping using new material.
- D. Piping Test: Conduct piping test before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use potable water.
 - 1. Hydrostatic Tests Fire Line and Combination (fire and domestic) Lines: AWWA C 600, test at no less than 200psi working pressure for 2 hours minimum duration.
 - a. Test water piping in accordance with NFPA 13
 - b. Test by certified fire protection contractor and utility representative.
 - 2. Hydrostatic Tests: AWWA C 600, test at no less than 150psi working pressure for 2 hours minimum duration.
 - a. Test in the presence of the utility representative.
- E. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 33 31 13
SITE SANITARY SEWERAGE GRAVITY PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to existing school system, see civil drawings for location.

1.02 RELATED REQUIREMENTS

- 1. Section 01 74 19 - Construction Waste Management & Disposal
- B. Section 31 23 16 - Excavation: Excavating of trenches.
- C. Section 31 23 23 - Fill: Bedding and backfilling.
- D. Division 22 - Connection to building sanitary sewer system.

1.03 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

- A. ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe; 2020.
- B. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2020.
- C. ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets; 2020.
- D. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015, with Editorial Revision (2018).
- E. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2017.
- F. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2016.
- G. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material; 2012.

1.05 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories ,and manholes and accessories.
- C. Project Record Documents:
 - 1. Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.
 - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.
- B. Environmental Agency Compliance: Comply with regulations pertaining to sanitary sewerage systems.

- C. Utility Compliance: Comply with regulation pertaining to sanitary sewerage systems where appropriate, ie connections into utility system

1.07 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic, manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seal from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.08 PROJECT CONDITIONS

- A. Coordinate the Work with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.
- B. Existing Sewers.
 - 1. Reroute existing sewer encountered as required to maintain proper functioning. Before completion of the construction work, the existing sewers shall be restored and/or provided with adequate outlet as directed by the Architect. Under no conditions shall the underground lines be abandoned or plugged until sufficient test have been made to indicate that it is not functioning line.
- C. Public Right-Of-Way
 - 1. Sewer to be installed in public right of ways, including right-of-way that are to be dedicated to public use, shall be constructed in strict accordance with standards, methods and requirements of the authority having jurisdiction. Other Work occurring on the Owner's property or adjacent property within contract limits shall be installed in accordance with the requirements of this Section.

PART 2 PRODUCTS

2.01 MANUFACTURERS AND PRODUCTS SHOWN ON THE DRAWINGS:

2.02 SEWER PIPE MATERIALS

- A. As indicated on civil drawings. See civil drawings for more information.
- B. Provide products that comply with applicable code(s).
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- D. Join piping of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and fit both systems' materials and dimensions.

2.03 PIPE ACCESSORIES

- A. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Sewer Service" in large letters.
- B. Cleanouts: Outside cleanouts shall be standard type furnished with cast iron cover and frame set in concrete with finish grade.
- C. Acceptable Manufacturers:
 - 1. See Civil Drawings for more information
 - 2. East Jordan Iron Works
 - 3. Neenah Foundry Company
 - 4. Barry Pattern & Foundry Company
 - 5. Substitutions: See Section 01 6000 - Products Requirements

2.04 MANHOLES

- A. As indicated on civil drawings. See civil drawings for more information.

- B. Manhole Frame and Covers: As indicated on the civil drawings. See civil drawings for more information.
 - 1. Manufacturer:
 - a. See civil drawings
 - b. Acceptable Manufacturers
 - 1) Neenah
 - 2) East Jordon Iron Works:
 - 3) Barry Pattern & Foundry Company
 - 4) R.J. Smith
 - 5) Substitutions: See Section 01 6000 - Products Requirements

2.05 CLEANOUT MANHOLE

- A. As indicated on civil drawings. See civil drawings for more information.

2.06 BEDDING AND COVER MATERIALS

- A. Pipe Bedding Material: As specified in Section 31 23 23 and on drawings.
 - 1. As indicated on civil drawings. See civil drawings for more information.
- B. Pipe Cover Material: As specified in Section 31 23 23 and on drawings.
 - 1. As indicated on civil drawings. See civil drawings for more information.

PART 3 EXECUTION

3.01 LAYOUT

- A. The work under this section shall include the making of a complete layout on the site of the sanitary sewer system verifying the layout and grade correspond with the design drawings. Any deviation in location or grade shall be called to the architect/engineer's attention for written direction before proceeding with the work. Perform layout with other trades in establishing the exact routing, and points of connection with the work of other contractors.
- B. Verify location of existing utilities before commencing work. Care must be taken to ensure contact or injury to electrical, fiber, underground and underground utilities.
- C. Sizes referred to on drawings refer to nominal inside diameter dimension unless otherwise noted.
- D. See civil drawings for more information.

3.02 TRENCHING

- A. See Section 31 2316 - Excavation
- B. See Section 31 2323 - Fill
- C. Hand trim excavation for accurate placement of pipe to elevations indicated.
- D. A dry trench must be maintained to avoid sediment into the system.
- E. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.
- F. Also, see civil drawings for more information

3.03 INSTALLATION - PIPE

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with ASTM D 2321 and manufacturer's instructions. Seal joints watertight.

- C. Make joints using system manufacturer's couplings unless otherwise indicated. Join piping of different materials or dimensions with couplings compatible with different materials.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- E. Use manholes for changes in direction, except where fittings are indicated.
- F. Connect to building sanitary sewer outlet and municipal sewer system .
- G. Install trace wire 6 inches above top of pipe; coordinate with Section 31 23 23.
- H. Also, see civil drawings for more information.

3.04 INSTALLATION - MANHOLES

- A. General: Install manholes, complete with accessories, as indicated
- B. Form continuous concrete channels and benches between inlets and outlets.
- C. Place precast concrete manhole sections as indicated, and install according to ASTM C891.
- D. Also, see civil drawings for more information.

3.05 INSTALLATION - CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.
- E. As indicated on civil drawings. See civil drawings for more information.

3.06 TAP CONNECTIONS

- A. Make connections to existing piping and underground structures so finished work conforms as nearly as practical to requirements specified for new work. All work shall be done per local authorities having jurisdiction.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6 inch overlap, with not less than 6 inches of 3000-psi, 28-day compressive-strength concrete.
- C. Make branch connections from side into existing piping, sizes 4 to 20 inches by removing a section of existing pipe and installing a wye fitting into existing piping. Encase entire wye with not less than 6 inches of 3000-psi, 28-day compressive-strength concrete.
- D. Make branch connections from side into existing piping, sizes 24 inches or larger or to underground structures by cutting an opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall, unless otherwise indicated. On outside of pipe or structure wall, encase entering connection in 6 inches of concrete for a minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - 1. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.
 - 2. Use epoxy bonding compound as an interface between new and existing concrete and piping materials.
- E. Protect existing piping and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

F. Also, see civil drawings for more information.

3.07 CLOSING ABANDONED SEWERAGE AND DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping that is indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either of the following procedures:
 - 1. Close open ends of piping with at least 8-inch thick brick masonry bulkheads.
 - 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Structures: Excavate around structure as required, remove structure and close open ends of remaining piping.
- C. Also, see civil drawings for more information.

3.08 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 01 43 00.
- B. Clear interior of piping and structures of dirt and superfluous material as the work progresses.
 - 1. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- C. Contact the architect or civil engineer for visual field inspection before backfilling commences.
 - 1. Inspect interior of piping after approximately 24 inches of backfill is in place and at completion of backfill is completed for displacement or other damage.
 - 2. Inspect piping for alignment, deflection, crushed or damaged piping and infiltration and exfiltration.
 - a. Alignment: Less than a full diameter of inside of pipe is visible between structures.
 - b. Deflection: Prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter
 - c. Infiltration: Water leaking into piping
 - d. Exfiltration: Water leaking from or around piping.
 - e. Replace defective piping using new material.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- E. Test new piping systems and parts of existing systems that have been altered, extended or repaired for leaks and defects per Ohio EPA requirements.
 - 1. Do not enclose, cover, or put into service before inspection and approval.
 - 2. Test completed piping systems according to authorities having jurisdiction.
 - 3. Schedule test, and their inspections by authorities having jurisdiction, with at least 24 hours advance notice.
 - 4. Submit separate reports for each test.
 - 5. Where authorities having jurisdiction do not have published procedures perform tests as follows:
 - a. Sanitary Sewerage: Perform hydrostatic test.
 - b. Allowable leakage is a maximum of 50 gallons per inch nominal pipe size, for every mile of pipe, during a 24-hour period.
 - c. Close openings in system and fill with water.
 - d. Purge air and refill with water.
 - e. Disconnect water supply.
 - f. Test and inspect joints for leaks.
 - 6. Sanitary Sewerage: Perform air test according to UNI-B-6.

F. Also, see civil drawings for more information.

3.09 PROTECTION

A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

**SECTION 33 42 11
STORMWATER GRAVITY PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to on-site school storm system/network.
- C. Catch basins, Paved area drainage, and Site surface drainage.

1.02 RELATED REQUIREMENTS

- A. Section 31 23 16 - Excavation: Excavating of trenches.
- B. Section 31 23 23 - Fill: Bedding and backfilling.
- C. Division 22: Plumbing - Connection to building storm sewer system.

1.03 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.04 REFERENCE STANDARDS

- A. AASHTO M 252 - Standard Specification for Corrugated Polyethylene Pipe, 75- to 250-mm (3- to 10-in.) Diameter; 2025.
- B. AASHTO M 294 - Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter; 2025.
- C. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe; 2020.
- D. ASTM C76M - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe (Metric); 2020.
- E. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015, with Editorial Revision (2018).
- F. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2017.
- G. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Material; 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting as required by AHJ but no less than two weeks prior to the start of the work of this section; require attendance by all affected installers, AHJ and architect/civil engineer.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.06 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents:
 - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for materials and installation of the Work of this section.
- B. Environmental Agency Compliance: Comply with regulations pertaining to storm sewerage systems.
- C. Utility Compliance: Comply with regulation pertaining to storm sewerage systems where appropriate, ie connections into utility system

1.08 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic, manholes, pipe, and fittings in direct sunlight.
- B. Protect pipe, pipe fittings, and seal from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

1.09 PROJECT CONDITIONS

- A. Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system and municipal sewer utility service.
- B. Existing Sewers or Drain Lines.
 1. When existing sewers are encountered, whether indicated on the drawings or not, adequate provisions shall be made for diverting the flow of such existing sewers so that the excavation will be kept dry during the progress of construction.
 2. Reroute existing sewer encountered as required to maintain proper functioning. Before completion of the construction work, the existing sewers shall be restored and/or provided with adequate outlet as directed by the Architect. Under no conditions shall the underground lines be abandoned or plugged until sufficient test have been made to indicate that it is not functioning line.
 3. Reconnect existing drain lines which are to remain in service and which would otherwise be cut off and blocked by new work.
- C. Public Right-Of-Way
 1. Sewer to be installed in public right of ways, including right-of-way that are to be dedicated to public use, shall be constructed in strict accordance with standards, methods and requirements of the authority having jurisdiction. Other Work occurring on the Owner's property or adjacent property within contract limits shall be installed in accordance with the requirements of this Section.

PART 2 PRODUCTS

- A. As indicated on the civil drawings. See civil drawings for more information.
- B. Provide products that comply with applicable code(s).

2.02 PIPE ACCESSORIES

- A. Pipe Joints: Mechanical clamp ring type, stainless steel expanding and contracting sleeve, neoprene ribbed gasket for positive seal.
- B. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- C. Trace Wire: Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service " in large letters.
- D. Also, see civil drawings for more information

2.03 MANHOLES (IF SHOWN ON THE CIVIL DRAWINGS)

- A. As indicated on civil drawings. See civil drawings for more information.
- B. Manhole and Frame covers as indicated on civil drawings. See civil drawings for more information.
- C. Acceptable Manufacturers:
 - 1. As indicated on the drawings.
 - 2. Neenah
 - 3. East Jordon Iron Works
 - 4. Barry Pattern and Foundry Company
 - 5. Substitutions: See Section 01 6000 - Products Requirements

2.04 INLETS (IF SHOWN ON THE CIVIL DRAWINGS)

- A. Catch Basin Frame and Covers as indicated on civil drawings, see civil drawings for more information.
- B. Catch Basin Inlet Frame and Covers:
 - 1. Manufacturer:
 - a. Acceptable Manufacturers:
 - 1) As indicated on the drawings
 - 2) Neena
 - 3) Barry Pattern & Foundry Company
 - 4) East Jordon Iron Works:
 - 5) Substitutions: See Section 01600 - Products Requirements

2.05 CATCH BASINS (IF SHOWN ON THE CIVIL DRAWINGS)

- A. Catch Basin Frame and Covers as indicated on civil drawings, see civil drawings for more information.
- B. Acceptable Manufacturers:
 - 1. As indicated on the drawings
 - 2. Neenah
 - 3. East Jordon Iron Works
 - 4. Barry Pattern and Foundry Company
 - 5. Substitutions: See Section 01 6000 - Products Requirements

2.06 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 23 23.
 - 1. Also, see civil drawings for more information
- B. Cover: As specified in Section 31 23 23.
 - 1. Also, see civil drawings for more information

PART 3 EXECUTION

3.01 LAYOUT

- A. The work under this section shall include the making of a complete layout on the site of the storm sewer system verifying the layout and grade correspond with the design drawings. Any deviation in location or grade shall be called to the architects/engineer's attention for written direction before proceeding with the work. Perform layout with other trades in establishing the exact routing, and points of connection with the work of other contractors.
- B. Verify location of existing utilities before commencing work. Care must be taken to avoid contact or injury to electrical, fiber, underground and underground utilities.

- C. Sizes referred to on drawings refer to nominal inside diameter dimension unless otherwise noted.

3.02 TRENCHING

- A. See Section 31 23 16 - Excavation and Section 31 23 23 - Fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. A dry trench must be maintained to avoid sediment into the system.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.
- E. Also, see civil drawings for more information

3.03 INSTALLATION - PIPE

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Make joints using system manufacturer's couplings unless otherwise indicated. Join piping of different materials or dimensions with couplings compatible with different materials.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch in 10 feet.
- E. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- F. Use manholes for changes in direction, except where fittings are indicated.
- G. Connect to municipal storm sewer system .
- H. Install continuous trace wire 6 inches above top of pipe; coordinate with Section 31 2323 .
- I. Also, see civil drawings for more information

3.04 INSTALLATION - MANHOLES

- A. General: Install manholes, complete with accessories, as indicated
- B. Form continuous concrete channels and benches between inlets and outlets.
- C. Place precast concrete manhole sections as indicated, and install according to ASTM C891.
- D. Construct cast in place manholes as indicated.
- E. Also, see civil drawings for more information

3.05 INSTALLATION - CATCH BASINS

- A. General: Install catch basins, complete with accessories, as indicated
- B. Form continuous concrete channels and benches between inlets and outlets unless noted otherwise.
- C. Place precast concrete manhole sections as indicated, and install according to ASTM C891.
- D. Construct cast in place manholes as indicated.
- E. Also, see civil drawings for more information

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection in accordance with Section 01 43 00 - Quality Assurance.
- B. Clear interior of piping and structures of dirt and superfluous material as the work progresses

1. Flush piping between manholes and other structures, if required by authorities having jurisdiction, to remove collected debris.
- C. Contact the architect for visual field inspection before backfilling commences.
 1. Inspect interior of piping for displacement or other damage after approximately 24 inches of backfill is in place.
 2. Inspect piping for alignment, deflection, crushed or damaged piping and infiltration and exfiltration.
 - a. Alignment: Less than a full diameter of inside of pipe is visible between structures.
 - b. Deflection: Prevents passage of a ball or cylinder of a size not less than 92.5 percent of piping diameter
 - c. Infiltration: Water leaking into piping
 - d. Exfiltration: Water leaking from or around piping.
 - e. Replace defective piping using new material.
 - f. Replace defective piping using new material.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.

3.07 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

END OF SECTION